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RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT ADDENDUM VOLUME 5 OF 5 SECTIONS C TO D ZONE H CNC CHARLESTON SC

5/5/2000

ENSAFE INC.

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY
CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA
CTO-029

ZONE H
RCRA FACILITY INVESTIGATION REPORT
RFI ADDENDUM
VOLUME V OF V
SECTIONS C (continued) TO D

SOUTHDIV CONTRACT
NUMBER: N62467-89-D-0318

Prepared for:

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA

Prepared by:

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May 5, 2000
Revision: 0

Release of this document requires prior notification of the Commander of the Southern Division, Naval Facilities Engineering Command, North Charleston, South Carolina.

VALIDATA
Chemical Services, Inc.
P. O. Box 930422 Norcross, Ga 30093

DATA VALIDATION SUMMARY REPORT (DRAFT)

COMPANY:	EnSafe/Allen & Hoshall
SITE NAME:	Charleston Naval Base
PROJECT NUMBER:	8500.014
CONTRACTED LAB:	PACE Inc.
EPA SOW/METHOD:	EPA 8290
VALIDATION GUIDELINES:	EPA 8290, Professional Judgement, Laboratory Statements
SAMPLE MATRIX:	Soil, Water
TYPES OF ANALYSES:	2,3,7,8-substituted PCDD's and PCDF's

SDG NO: APX01

SAMPLES:

Client Sample #:	Lab Sample #:	Matrix	PCDD/ PCDF
656CB00201	IK1049-1	Soil	X
013CB00601	IK1049-2	Soil	X
013CB01202	IK1049-3	Soil	X
656CB00901	IK1049-4	Soil	X
013CB01602	IK1049-5	Soil	X
013CB02101	IK1049-6	Soil	X
662CB00201	IK1049-7	Soil	X
017CB00402	IK1049-8	Soil	X
013CB02201	IK1049-9	Soil	X
	LCS-SO-IK1049	Soil	X
	LCSD-SO-IK1049	Soil	X
017EB00402	IK1049-10	Water	X
	LCS-AQ-IK1049	Water	X
	LCSD-AQ-IK1049	Water	X
017DB00501	IK1054-01	Water	X
	LCS-AQ-IK1054	Water	X
	LCSD-AQ-IK1054	Water	X

E = EQUIPMENT BLANK, D = D.I. WATER SYSTEM BLANK

DATA REVIEWER(S): Linda H. Liu, Shawn S. Lin, Ph.D., Kevin C. Harmon

RELEASE SIGNATURE: Kevin C. Harmon

Data Qualifier Definitions:

J	-	The associated numerical value is an estimated quantity.
R	-	The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
U	-	The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	-	The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA QUALIFICATION SUMMARY

PACE Inc. - APX01 2,3,7,8-substituted PCDD's and PCDF's

SAMPLES: 656CB00201, 013CB00601, 013CB01202, 656CB00901, 013CB01602, 013CB02101, 662CB00201, 017CB00402, 013CB02201, 017EB00402, 017DB00501, MB-SO-IK1049, LCS-SO-IK1049, LCSD-SO-IK1049, MB-AQ-IK1049, LCS-AQ-IK1049, LCSD-AQ-IK1049, MB-AQ-IK1054, LCS-AQ-IK1054, LCSD-AQ-IK1054

2,3,7,8-SUBSTITUTED PCDD'S AND PCDF'S

I.) Holding Times:

All criteria were met, so no action was taken.

II.) HRGC/HRMS System Performance:

GC Column Performance Check:

According to EPA method 8290, a column performance check must be run before the beginning routine calibration run.

The laboratory ran a column performance check after the beginning routine calibration run, which invalidated the beginning routine calibration results. Since the effects of this sequence deviation cannot be verified, all associated positive sample results are recommended to be flagged as estimated (J).

Mass Resolution Check:

According to EPA method 8290, a Mass Resolution Check must be performed immediately at the end of each analytical sequence and within a 12-hour time limit. Section 8.3.2.4 of the method also states that deviation from the method criteria specified for Mass Resolution Checks invalidates all positive sample results in the analytical sequence and all effected samples must be reanalyzed.

The following end of sequence Mass Resolution Checks were run outside the 12-hour QC limit:

I.D.	Date and Time	Total Time
End Mass Res. Check	9/14/94 07:07	19:47
End Mass Res. Check	9/16/94 06:44	13:53

Since the laboratory did not reanalyze the effected samples, all associated positive sample results are recommended to be flagged as estimated (J).

There were time "gaps" (more than two hours) between the End of the Calibration and the End of the Mass Resolution Check runs. The laboratory certified that there were no instrument adjustments or Resolution Check runs in the time "gaps", so no action was taken (see Section X).

Mass Verification Check:

Mass Verification was checked at the beginning of each analytical sequence. All criteria were met, so no action was taken.

Data Acquisition:

The were no Signal-to-Noise Ratios calculated. See Section VIII for data validation action.

III.) Calibration:

Calibration Range:

All criteria were met, so no action was taken.

Initial Calibration:

All criteria were met, so no action was required.

Calibration Verifications:

According to EPA method 8290, a new initial calibration is required immediately (within 2 hours) if the end-of-shift (End CS3) calibration exceeds the QC limits. Failure to perform a new initial calibration will automatically require reanalysis of all positive sample extracts.

The laboratory did not perform a new initial calibration and did not reanalyze all positive sample extracts after the end-of-shift calibration failed.

The Percent Differences (%D's) for End CS3 calibration standard run on 9/13/94 at 08:14 on instrument VG Autospec #2 exceeded the QC limits for the following compounds:

Compound	%D	QC limit
123478-HxCDD	-29	25
123789-HxCDF	-38	25
1234789-HpCDF	-38	25

All positive results for these compounds in the associated samples (IK1049-1, IK1049-2, IK1049-3, IK1049-4, IK1049-5, IK1049-6 and IK1049-7) are recommended to be flagged as estimated (J).

The Percent Differences (%D's) for End CS3 calibration standard run on 9/13/94 at 23:36 on instrument VG Autospec #2 exceeded the QC limits for the following compounds:

Compound	%D	QC limit
13C-1234678-HpCDD	103	35
13C-OCDD	97	35
13C-123478-HxCDF	111	35
13C-1234678-HpCDF	98	35
123478-HxCDD	98	25

Compound	%D	QC limit
123678-HxCDD	95	25
123789-HxCDD	126	25
2378-TCDF	-54	25
12378-PeCDF	-50	25
23478-PeCDF	-48	25
1234678-HpCDF	-28	25

All positive results for these compounds in the associated samples (IK1054-1, IK1049-8, IK1049-9 and IK1049-10) are recommended to be flagged as estimated (J).

IV.) Blanks:

According to EPA method 8290, a method blank must be analyzed immediately after a beginning calibration run to demonstrate freedom from contamination and freedom from carryover from the calibration run. Also according to EPA method 8000, the performance of the entire analytical system must be checked daily, using data gathered from analyses of blanks, standards, and replicated samples.

The laboratory ran a method blank after the beginning calibration run, a column performance check and a nonane blank. The addition of the nonane blank invalidated use of the method blanks in determining instrument carryover levels.

The laboratory did not submit nonane blank quantitation results, therefore, no blank results could be used to assess instrument carryover levels.

All associated low level (see Section IX) positive sample results are recommended to be flagged as undetected (U), with the detection limit being raised to the level of contamination in each sample. Blank contaminants below the PQL should be raised to the PQL.

The raw data for method blank MB-AQ-IK1054 run on 9/13/94 was dated 9/15/94. The laboratory certified the reasons for the replacement of the 9/13/95 data by the 9/15/95 data (see Section X). The effects of the replacement were not clear, so no action was taken.

The following blank results were used to validate the high level (see Section IX) positive sample results:

Method Blanks:

A 2,3,7,8-substituted PCDD was detected in method blanks at the following concentrations:

Method Blank	Compound	Concentration pg/L	Action Level pg/L
MB-AQ-IK1049	OCDD	55.1	550
MB-AQ-IK1054	OCDD	55.0	550

Because nonane blanks were run immediately before method blanks in the analytical sequence, it is believed that the method blank detections are biased low. For this reason, a 10X blank rule was used to qualify the data.

Detections of the above compound in all associated samples below 10X the blank amounts are recommended to be flagged as undetected (U), with the detection limit being raised to the level of contamination in each sample. Blank contaminants below the PQL should be raised to the PQL.

Equipment Blanks:

No equipment blank was analyzed.

Field Blanks:

No field blank was analyzed.

V.) Internal Standards Performance:

The Percent Recovery (%R) of 13C-OCDD for sample IK1054-1 was 34.3%, which was below the 40-135% QC limits. All results associated with this IS (OCDD and OCDF) for sample IK1054-1 were recommended to be flagged as estimated (J) and (UJ).

The Percent Recovery (%R) of 13C-OCDD for sample LCD-AQ-IK1054 was 36.2%, which was below the 40-135% QC limits. Since this was a QC sample, no data qualification action was taken.

VI.) Spike/Spike Duplicates:

No matrix spike/spike duplicates were analyzed for this batch.

Three sets of method blank spike/spike duplicates were analyzed. The Percent Recoveries (%R's) and Relative Percent Differences (RPD's) exceeded the QC limits for the following compounds:

	Compound	MS %R	MSD %R	QC Limits %R	RPD	QC Limit RPD
LCS-SO-IK1049 / LCSD-SO-IK1049	2378-TCDF	*50	112	60-140	*112	20
	12378-PeCDF	*35	78	60-140		20
	23478-PeCDF	*55	117	60-140		20

* = outside the QC limits.

All results for these compounds in the associated samples (IK1049-1, IK1049-2, IK1049-3, IK1049-4, IK1049-5, IK1049-6, IK1049-7, IK1049-8 and IK1049-9) are recommended to be flagged as estimated (J) and (UJ).

VII.) Duplicates:

No field duplicates were analyzed.

VIII.) PCDD/PCDF Identification:

Retention Times:

All criteria were met, so no action was taken.

Ion Abundance:

All criteria were met, so no action was taken.

Signal-to-Noise (S/N) Ratio:

There was no evidence in the raw data that the S/N was checked by the laboratory for all reported positive sample results. The S/N ratios were not printed on the quantitation reports. However, the laboratory certified that all reported positive sample results met method S/N criteria (greater than or equal to 2.5), so no action was taken (see Section X).

Polychlorinated Diphenyl Ether (PCDPE) Interferences:

There was no evidence in the raw data that PCDPE interferences were checked by the lab. The S/N ratios were not printed on the quantitation report. However, the laboratory certified that there were no signals detected having a S/N ratio greater than or equal to 2.5 at same retention time (+/- 2 seconds), in the corresponding PCDPE channel for all reported positive sample results, so no action was taken (see Section X).

Second Column Confirmation:

Second column confirmation was not run for all reported positive 2378-TCDF results. Since the laboratory cannot resolve the 2378-TCDF isomer from the 2347-TCDF isomer, all reported positive 2378-TCDF sample results are recommended to be rejected (R).

IX.) Overall Assessment of Data/General:

The laboratory did not follow the 12-hour analysis sequence and quality control (QC) procedures specified in EPA Method 8290 (Reversion 0, November 1990).

All reported positive 2378-TCDF sample results are recommended to be rejected (R).

Some reported positive and non-detected sample results are recommended to be flagged according to their QC problems.

For purposes of blank assessment, all other unflagged positive sample results are divided into low and high levels based on professional judgement as follows:

Level	Matrix	TCDD	PeCDD/PeCDF HxCDD/HxCDF HpCDD/HpCDF	OCDD/OCDF
Low	Soil	< 10 pg/g	< 25 pg/g	< 50 pg/g
Low	Water	< 100 pg/L	< 250 pg/L	< 500 pg/L
High	Soil	> 10 pg/g	> 25 pg/g	> 50 pg/g
High	Water	> 100 pg/L	> 250 pg/L	> 500 pg/L

All unflagged low-level sample results are recommended to be flagged as undetected (U), with the detection limit being raised to the level of contamination in each sample. Blank contaminants below the PQL should be raised to the PQL.

All unflagged high-level sample results are recommended to be flagged as estimated (J).

X.) Laboratory Certifications Concerning Data Validation Deliverables:

In the validation of the PCDD/PCDF data, several important informational items were not verifyable from the data packages. Pace, Inc. provided the following certifications concerning the procedures used in the laboratory and in data reporting which address these issues.

The following certifications were made by Pace, Inc.:

1.) Nonane blanks were run before method blanks in the analytical sequence to document instrument condition and integrity.

2.) Nonane blank quantitation reports were not generated because of software limitations.

3.) In the event data for an analysis are unacceptable due to instrumental problems or other unpredictable factors, the analyst will reanalyze the particular extract and include only information from the reanalysis in the data package. The original analysis data isremoved and the reanalysis data is inserted in the position in the raw data that wouldnormally be occupied by the original analysis. This causes the data to appear to be outof order chronologically. This procedure was used by Pace, Inc. to report SDG APX01 method blank raw data and LCSD-AQ-IK1409/IK1054 data in the analytical sequence beginning 09/13/94. This procedure is common laboratory practice within Pace's dioxin laboratory.

4.) All positive reported results met all S/N method criteria.

5.) For all positive reported results, there were no S/N ratios greater than 2.5 in thecorresponding ether channel.

6.) Pace, Inc. did not perform any analyses, checks or instrument adjustments between theend of sequence Calibration Checks and Mass Resolution Checks in the cases wheremore than one hour separated the Calibration and Mass Resolution Checks.

Validata Chemical Services, Inc. has incorporated these certification into its data review as fact, and they have formed the basis for data validation of the unverifyable items. Validata Chemical Services, Inc. takes no responsibility for the validity of these certifications.

VALIDATA

Chemical Services, Inc.

P. O. Box 930422 Norcross, Ga. 30093

DATA VALIDATION SUMMARY REPORT

COMPANY:	EnSafe/Allen & Hoshall
SITE NAME:	Charleston Naval Base
PROJECT NUMBER:	8500.014
CONTRACTED LAB:	PACE, Inc.
QA/QC LEVEL:	CLP Level IV
EPA SOW/METHOD:	EPA 1990 SOW, 8240, 8270, 8080, 8140, 8150, 6010, 7471, 9012, 7196, 418.1
VALIDATION GUIDELINES:	*USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review,* 1994; *Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Data Analyses,* 1994
SAMPLE MATRIX:	Soil, Water
TYPES OF ANALYSES:	Volatile (VOC), Semivolatile Organics (SVOC), Organochlorine Pesticides/PCB's (P/PCB), Organophosphate Pesticides (OP), Herbicides (Herb), Total Metals and Cyanide (Me/CN), Total Petroleum Hydrocarbon (TPH), Hexavalent Chromium (HEXCR)

SDG NUMBER: APX01

SAMPLES:

Client Sample #:	Lab Sample #:	Matrix	VOC	SVOC	P/PCB	OP	HERB
013TB00101	TDP-005	Water	X				X
013TB00401	TDP-003	Water	X				
013CB00601	TDP-001	Soil	X	X	X	X	X
103CB00601	TDP-001DL	Soil			X		
013CB01202	TDP-002	Soil	X	X	X	X	X
013CB01602	TEH-001	Soil	X	X	X	X	X
013TB01602	TEH-004	Water	X				
013CB02101	TEH-002	Soil	X	X	X	X	X
013CB02201	TET-002	Soil	X	X	X	X	X
017TB00101	TET-005	Water	X				
017CB00402	TET-001	Soil	X	X	X	X	X
017TB00402	TET-003	Water	X				
017EB00402	TET-004	Water	X	X	X	X	X
017TB00501	TFO-002	Water	X				
017DB00501	TFO-001	Water	X	X	X	X	X
656CB00201	TCB-001	Soil	X	X	X	X	X
656CB00901	TDP-004	Soil	X	X	X	X	X

Client Sample #:	Lab Sample #:	Matrix	VOC	SVOC	P/PCB	OP	HERB
662CB00201	TEH-003	Soil	X	X	X	X	X
013CB00601MS	TDP-001MS	Soil			X		
013CB00601MSD	TDP-001MSD	Soil			X		
013CB01202MS	TDP-002MS	Soil				X	
013CB01201MSD	TDP-222MSD	Soil				X	
013CB02101MS	TEH-002MS	Soil					X
013CB02101MSD	TEH-002MSD	Soil					X
BLANK SPIKE-1MS	DW154MS	Water	X				
BLANK SPIKE-1MS	BW9442MS	Water		X			
BLANK SPIKE-1MSD	DW154MSD	Water	X				
BLANK SPIKE-1MSD	BW9442MSD	Water		X			
BLANK SPIKE-2MS	DW156MS	Water	X				
BLANK SPIKE-2MSD	DW156MSD	Water	X				
BLANK SPIKE-2MS	BSL9424MS	Soil		X			
BLANK SPIKE-2MSD	BSL9424MSD	Soil		X			
BLANK SPIKE-3MS	FL060MS	Soil	X				
BLANK SPIKE-3MSD	FL060MSD	Soil	X				
BLANK SPIKE-4MS	FW199MS	Water	X				
BLANK SPIKE-4MSD	FW199MSD	Water	X				

MS = MATRIX SPIKE, MATRIX SPIKE DUPLICATE, TB = TRIP BLANKS, EB = EQUIPPMENT BLANK, DW = RINSATE WATER BLANK, DL = SAMPLE DILUTION

Client Sample #:	Lab Sample #:	Matrix	Me/CN	TPH	HEXCR
013CB01602	41210-001	Soil	X	X	X
013CB02101	41210-002	Soil	X	X	X
013CB00601	41189-001	Soil	X	X	X
013CB01202	41189-002	Soil	X	X	X
013CB02201	41214-001	Soil	X	X	X
017CB00402	41214-001	Soil	X	X	X
017EB00402	41214-004	Water	X	X	X
017DB00501	41213-001	Water	X	X	X
556CB00201	41123-001	Soil	X	X	X
656CB00901	41192-001	Soil	X	X	X
662CB00201	41210-003	Soil	X	X	X
013CB00601D*	41189-001D*	Soil	X		
103CB00601S*	41189-001S*	Soil	X		
656CB00201D*	41123-001D*	Soil	X		
656CB00201S*	41123-001S*	Soil	X		
017DB00501D*	41213-001D*	Water			X
017DB00501S*	41213-001S*	Water			X
LCS1	B-C1130A	Water		X	
LCS2	B-C1132A	Water		X	
LCS3	B-C1134A	Water		X	

EB = EQUIPMENT BLANK, DB = RINSATE WATER BLANK, D* = MATRIX DUPLICATE, S* = MATRIX SPIKE, LCS = LABORATORY CONTROL SAMPLE

DATA REVIEWER(S): Marvin L. Smith, Kevin C. Harmon

RELEASE SIGNATURE: Kevin C. Harmon

Data Qualifier Definitions:

J	-	The associated numerical value is an estimated quantity.
R	-	The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
U	-	The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	-	The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA QUALIFICATION SUMMARY

EnSafe/Allen & Hoshall - APX01 CLP Organics and Inorganics

SAMPLES: 13TB00101, 13TB00401, 013CB00601, 013CB00601DL, 013CB00601MS, 013CB00601MSD, 013CB00601D*, 013CB00601S*, 013CB01202, 013CB01202MS, 013CB01202MSD,013CB01602, 013TB01602, 013CB02101, 013CB02101MS, 013CB02101MSD, 013CB02201, 017TB00101, 013CB00402, 017TB00402, 013EB00402, 017TB00501, 013DB00501, 017DB00501D*, 017DB00501S*, 656CB00201, 656CB00201D*, 656CB00201S*, 656CB00901, 662CB00201, BLANK SPIKE-1MS, BLANK SPIKE-1MSD, BLANK SPIKE-2MS, BLANK SPIKE-2MSD, BLANK SPIKE-3MS, BLANK SPIKE-3MSD, BLANK SPIKE-4MS, BLANK SPIKE-4MSD, LCS1, LCS2, LCS3

VOLATILE ORGANICS

I.) Holding Times:

All samples were analyzed within the required holding times, so no action was taken.

II.) GC/MS Tuning:

All GC/MS Tuning criteria for the method were met, so no action was required.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviations (%RSD's) exceeded the 30% QC limit for the standards run on 8/17/94 for the following compounds:

methylene chloride	46.8%
acetone	83.4%
acrolein	65.3%
acetonitrile	35.9%
methacrylonitrile	76.1%

Associated positive and non-detect results for methacryonitrile were flagged as estimated (J) and (UJ). All positive results for the remaining compounds in the associated water samples were flagged as estimated (J). The average Relative Response Factor (RRF) for isobutyl alcohol was 0.008 for the standards run on 8/17/94, which was below the 0.05 QC limit. All results for this compound in the associated water samples, which consisted entirely of non-detects, were rejected (R).

The Percent Relative Standard Deviations (%RSD's) exceeded the 30% QC limit for the standards run on 8/23/94 for the following compounds:

methylene chloride	74.0%
acetone	68.3%
ethylbenzene	63.8%
acetonitrile	40.1%
ethyl cyanide	41.2%

Positive and non-detyect results for methlene chloride were flagged as estimated (J) and (UJ). All positive results for the remaining compounds in the associated samples were flagged as estimated (J).
The average Relative Response Factor (RRF) for isobutyl alcohol was 0.004 for the standards run on 8/23/94, which was below the 0.05 QC limit. All results for this compound in the associated soil samples, which consisted entirely of non-detects, were rejected (R).

Continuing Calibration:

The Percent Differences (%D's) exceeded the 25% QC Limit for the standard run on 8/24/94 at 12:43 for the following compounds:

methylene chloride	28.2%
acetone	96.9%
1,2,3-trichloropropane	27.8%

All positive and non-detect results for these compounds in the associated water samples were flagged as estimated (J) and (UJ).

The Percent Differences (%D's) exceeded the 25% QC Limit for the standard run on 8/29/94 at 12:07 for the following compounds:

methylene chloride	41.1%
acetone	97.1%
acrolein	98.9%

All positive and non-detect results for these compounds in the associated water samples were flagged as estimated (J) and (UJ).

The Percent Differences (%D's) exceeded the 25% QC Limit for the standard run on 8/30/94 at 11:29 for the following compounds:

methylene chloride	40.5%
acetone	98.4%
acrolein	94.1%
acrylonitrile	25.6%
2-butanone	45.9%
2-hexanone	31.0%
ethyl cyanide	26.7%
isobutyl alcohol	38.8%

All positive and non-detect results for these compounds in the associated water samples were flagged as estimated (J) and (UJ). All results for isobutyl alcohol were previously rejected due to a low RRF in the Initial Calibration.

The Percent Differences (%D's) exceeded the 25% QC Limit for the standard run on 9/15/94 at 14:27 on instrument E, for the following compounds:

methylene chloride	26.4%
chloromethane	33.0%
isobutyl alcohol	31.4%

All positive and non-detect results for these compounds in the associated soil samples were flagged as estimated (J) and (UJ). All results for isobutyl alcohol were previously rejected due to a low RRF in the Initial Calibration.

The Relative Response Factors (RRF's) for isobutyl alcohol were below the 0.05 QC limit in all five Continuing Calibrations. All non-detect results for this compound were previously rejected due to low RRF's in the Initial Calibrations, so no further action was necessary.

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks, so no action was taken.

Equipment Blanks:

Xylenes (total) was detected at 0.9 ug/L in equipment blank 017EB00402. Detections of this compound group in the associated samples below 5X the blank amount were flagged as undetected (U) with the detection limit being raised to the amount of contamination in each sample. Methylene chloride and acetone were also detected in this blank. Since these compounds were qualified using the trip blanks, no further action was required.

Rinsate Water Blanks:

Toluene was detected at 2.1 ug/L in rinsate water blank 017DB00501. Detections of this compound in the associated samples below 5X this amount were flagged as undetected (U) with the detection limit being raised to the amount of contamination in each sample. Methylene chloride and acetone were also detected in this blank. Since these compounds were qualified using the trip blanks, no further action was required.

Trip Blanks:

Methylene chloride and 4-methyl-2-pentanone were detected at 15.4 ug/L and 3.2 ug/L, respectively, in trip blank 013TB00401. Detections of these compounds in the associated samples below 10X and 5X, these amounts respectively, were flagged as undetected (U) with the detection limits being raised to the amount of contamination in each sample. Acetone was also detected in this blank. Since acetone was qualified using another trip blank, no further action was required.

Carbon disulfide was detected at 2.0 ug/L in trip blank 013TB00101. Detections of this compound in the associated samples below 5X this amount were flagged as undetected (U) with the detection limit being raised to the amount of contamination in each sample. Methylene chloride and acetone were also detected in this blank. Since these compounds were qualified using other trip blanks, no further action was required.

Acetone was detected at 44.8 ug/L in trip blank 017TB00402. Detections of this compound in the associated samples below 10X this amount were flagged as undetected (U) with the detection limit being raised to the amount of contamination in each sample. Methylene chloride was also detected in this blank. Since methylene chloride was qualified using another trip blank, no further action was required.

V.) Surrogate Recoveries:

All Surrogate Percent Recovery criteria for the method were met, so no aciton was necessary.

VI.) Matrix Spike/Matrix Spike Duplicate (MS/MSD):

All MS/MSD criteria for the method were met, so no action was required.

VII.) Field Duplicates:

There were no field duplicates associated with this SDG.

VIII.) Internal Standards Performance:

All Internal Standard criteria for the method were met, so no action was taken.

IX.) TCL Compound Identification:

All criteria for the method were met, so no action was necessary.

X.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All criteria for the method were met, so no action was required.

XI.) Tentatively Identified Compounds (TIC's):

All TIC criteria for the method were met, so no action was taken.

XII.) System Performance:

All criteria were met, so no action was necessary.

XIII.) Overall Assessment of Data/General:

All sample results for isobutyl alcohol were rejected due to low RRF's in the Initial and Continuing Calibrations. The remaining laboratory data were acceptable with qualification.

SEMIVOLATLE ORGANICS

I.) Holding Times:

All Holding Time criteria for the method were met, so no action was necessary.

II.) GC/MS Tuning:

All GC/MS Tuning criteria for the method were met, so no action was necessary.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviations (%RSD's) exceeded the 30% QC Limit for the standards run on 6/24/94 for the following compounds:

aniline	37.0%
n-nitrosodimethylamine	61.8%
4-nitroaniline	45.3%

There were no positive detections of these compounds in the associated samples, so no action was required.

The Percent Relative Standard Deviations (%RSD's) exceeded the 30% QC Limit for the standards run on 9/7/94 for the following compounds:

methyl methacrylate	34.2%
4-nitroquinoline-1-oxide	39.6%
methyl methanesulfonate	35.3%
2-naphthyamine	39.3%
4-aminobiphenyl	32.4%
3,3'-dimethylbenzidine	52.4%
p-phenylenediamime	50.1%

There were no positive detections of these compounds in the associated samples, so no action was required.

Continuing Calibration:

The Percent Differences (%D's) exceeded the 25% QC Limit for the standard run on 9/8/94 at 09:46 for the following compounds:

aniline	34.2%
4-nitroaniline	44.5%
n-nitrosodimethylamine	36.0%
4-chloroaniline	34.8%
3-nitroaniline	28.8%

All positive and non-detect results for these compounds in the associated samples were flagged as

estimated (J) and (UJ).

The Percent Differences (%D's) exceeded the 25% QC Limit for the standard run on 9/8/94 at 13:23 for the following compounds:

methyl methacrylate	29.7%
ethyl methacrylate	30.2%
2-picoline	27.9%
4-aminobiphenyl	38.8%

All positive and non-detect results for these compounds in the associated samples were flagged as estimated (J) and (UJ).

IV.) Blanks:

Method Blanks:

There were no positive detection in the method blanks, so no data qualification was necessary.

Equipment Blanks:

There were no positive detections in the equipment blank, so data qualification was not required.

Rinsate Water Blanks:

There were no positive detections in the rinsate water blank, so no action was taken.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria for the method were met, so no action was necessary.

VI.) Matrix Spike/Matrix Spike Duplicate (MS/MSD):

All MS/MSD criteria for the method were met, so no action was required.

VII.) Field Duplicates:

There were no field duplicates associated with this SDG.

VIII.) Internal Standards Performance:

All Internal Standard criteria were met, so no action was taken.

IX) TCL Compound Identification:

All criteria for the method were met, so no action was necessary.

X.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All criteria for the method were met, so no action was required.

XI.) Tentatively Identified Compounds (TIC's):

All TIC criteria for the method were met, so no action was taken.

XII.) System Performance:

All criteria were met, so no action was necessary.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

ORGANOCHLORINE PESTICIDES AND PCB's

I.) Holding Times:

All samples were extracted and analyzed within required holding times, so no action was taken.

II). Instrument Performance:

All Pesticide Instrument Performance criteria for the method were met, so no action was required.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviations (%RSD's) for kepone (primary column) and chlorobenzilate (secondary column) were 29.5% and 51.5%, respectively, for the standards run on 8/25/94, which exceeded the 20% QC Limit. There were no positive detections of these compounds in the associated samples. The %RSD for chlorobenzilate exceeded the 30% QC limit and the non-detect results for this compound in the associated samples were flagged as estimated (UJ).

Continuing Calibration:

The Percent Difference (%D) was 26.2% for kepone (secondary column) which exceeded the 25% QC Limit for the standard run on 9/9/94 at 12:04. All results for this compound, which consisted entirely of non-detects, were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

There were no positive detections of any compound in method blanks, so no data qualification was

necessary.

Equipment Blanks:

There were no positive detections in the equipment blanks, so no action was required.

Rinsate Water Blanks:

There were no positive detections in the rinsate water blank, so no action was taken.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met, so no action was necessary

VI.) Laboratory Control Samples (LCS):

All LCS criteria for the method were met, so no action was required.

VII.) Matrix Spike/Matrix Spike Duplicate:

The Relative Percent Difference (RPD) for 4,4'-DDT in spiked samples 013CB00601MS and 013CB00601MSD was 74%, which exceeded the 50% QC Limit. The positive result for this compound in associated sample 013CB00601DL was flagged as estimated (J).

The Percent Recovery of 4,4'-DDT was 168% in matrix spike sample 013CB00601MS, which exceeded the 25-160% QC Limits. This compound was previously qualified based on the high RPD.

VIII.) TCL Compound Identification:

Pesticide/PCB Identification Summary (PIS):

All criteria for the method were met, so no action was taken.

IX.) Field Duplicates:

There were no field duplicates associated with this SDG.

X.) Pesticide Cleanup Check:

Florisil Cartridge Check:

All criteria for this method were met, so no action was taken.

Gel Permeation Chromatography (GPC):

All GPC criteria for the method were met, so no action was taken.

XI.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

ORGANOPHOSPHORUS PESTICIDES

I.) Holding Times:

All samples were extracted and analyzed within required holding times, so no action was taken.

II). Instrument Performance:

All Pesticide Instrument Performance criteria for the method were met, so no action was required.

III.) Calibration:

Initial Calibration:

All Initial Calibration criteria for the method were met, so no action was necessary.

Continuing Calibration:

The Percent Difference (%D) was 18.5% for dimethoate (secondary column) which exceeded the 15% QC Limit for the standard run on 8/25/94 at 13:37. All results for this compound, which consisted entirely of non-detects, were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

There were no positive detections of any compound in method blank, so no data qualification was necessary.

Equipment Blanks:

There were no positive detections in the equipment blanks, so no action was required.

Rinsate Water Blanks:

There were no positive detections in the rinsate water blanks, so no action was taken.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met, so no action was necessary.

VI.) Laboratory Control Samples (LCS):

All LCS criteria for the method were met, so no action was required.

VII.) Matrix Spike/Matrix Spike Duplicate (MS/MSD):

All MS/MSD criteria were met, so no action was necessary.

VIII.) TCL Compound Identification:

All criteria for the method were met, so no action was taken.

IX.) Field Duplicates:

There were no field duplicates associated with this SDG.

X.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

HERBICIDES

I.) Holding Times

All Holding Time criteria for the method were met, so no action was taken.

II.) Instrument Performance

All Instrument Performance criteria for the method were met, so no action was taken.

III.) Calibration

Initial Calibration:

All Initial Calibration criteria for the method were met, so no action was required.

Continuing Calibration:

All Continuing Calibration criteria for the method were met, so no action was required.

IV.) Blanks

Method Blank:

There were no positive detections in the method blanks, so no action was taken.

Equipment Blanks:

There were no positive detections in the equipment blanks, so no action was necessary.

Rinsate Water Blanks:

There were no positive detections in the rinsate blanks, so no action was required.

V.) Surrogate Recoveries

All Surrogate Recoveries criteria for the method were met, so no action was necessary.

VI.) Laboratory Control Spikes (LCS):

All LCS criteria for the method were met, so no action was taken.

VII.) Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS/MSD criteria for the method were met, so no action was required.

VIII.) TCL Compound Identification

All criteria for the method were met, no action was required.

IX.) Field Duplicate

There were no field duplicate associated with this SDG.

X.) Overall Assessment of Data/General

All laboratory data were acceptable without qualification.

TOTAL METALS AND CYANIDE

I.) Holding Times:

All Holding Time criteria for the method were met, so no action was taken.

II.) Calibration:

All Calibration criteria for the method were met, so no action was required.

III.) Blanks:

The following blank results represent the highest detections associated with these samples and were used for data qualification:

Blank Type/ID#	Element	Max. Conc.	Action Level mg/kg
DB	barium	0.56 mg/L	0.56
PBS	chrominum	0.30 mg/kg	2.50
PBS	lead	6.90 mg/kg	34.5
PBS	tin	2.60 mg/kg	13.0
PBS	vanadium	0.40 mg/kg	2.00
PBS	zinc	1.40 mg/kg	7.00

PBS = Soil Preparation Blank, DB = Rinsate Water Blank

All results greater than the IDL but less than 5X the blank amount for which the contaminated blank is an associated laboratory preparation blank or field blank were flagged as undetected (U).

IV.) ICP Interference Check Sample Results:

All ICP Interference criteria for the method were met, so no action was required.

V.) ICP Serial Dilution Analysis:

All criteria for ICP Dilution was met, so no action was taken.

VI.) Laboratory Control Samples (LCS):

The Percent Recoveries (%R's) of selenium were 78% and 79% in soil LCS-21677 and soil LCS-21672, respectively, which were below the 80-120% QC limits. All positive and non-detect results for selenium in associated soil samples were flagged as estimated (J) and (UJ).

VII.) Duplicate Sample Analysis:

All Duplicate Sample criteria were met, so no action was taken.

VIII.) Matrix Spike Recoveries:

All Percent Recovery criteria for the method were met, so no action was required.

IX.) Field Duplicates:

No field duplicates were associated with this SDG.

X.) Furnace Atomic Absorption QC:

Method of Standard Additions (MSA):

All MSA criteria for the method were met, so no action was required.

Post Digestion Spike Recoveries:

All Spike Recoveries were met, so no data qualification were taken.

XI.) Sample Result, Calculation/Transcription Verification:

All criteria for the method were met, so no action was taken.

XII.) Quarterly Verification of Instrumental Parameters:

All criteria for the method were met, so no action was taken.

XIII.) Overall Assessment of Data/General:

Sample 013CB01602 (41210-001) was mislabeled as 013TB00401. The number was corrected on the spreadsheet during the validation process. Units for field blanks 017EB00402 and 017DB00501 were mislabeled as mg/L, instead of ug/L. Proper corrections were made on the spreadsheet during the validation process.

All laboratory data were acceptable with qualification.

TOTAL PETROLEUM HYDROCARBON

I.) Holding Times

All Holding Times criteria for the method were met, so no action was taken.

II.) Calibration

Initial Calibration:

All Initial Calibration criteria for the method were met, so no action was required.

Continuing Calibration:

All Continuing Calibration criteria for the method were met, so no action was taken.

III.) Blanks

Method Blanks:

There were no positive detections in the method blanks, so no data qualification was necesssary.

Equipment Blanks:

There were no positive detections in the equipment blanks, so no data qualification was required..

Rinsate Water Blanks:

TPH was detected in rinsate water blank 017DB00501 at 1.1 mg/L. Detections of TPH below 5X this amount were flagged as undetected (U) in the associated samples, with the detection limit being raised to the amount of contamination in each sample.

IV.) Laboratory Control Sample (LCS)

All LCS criteria were met for the method, so no action was necessary.

V.) Matrix Spike/Matrix Spike Duplicate (MS/MSD)

No MS/MSD analyses were performed for this SDG. Instead three Laboratory Control Samples were analyzed with an average Percent Recovery (%R) of 108% and a %RSD of 5.3%. Data qualification was not required.

VI.) Field Duplicates

There were no field duplicates analyzed with this SDG, so no action was taken.

VII.) Compound Quantitation and Reported Practical Quantitation Limits (PQL's)

All PQL criteria for the method were met, so no action was taken.

VIII.) Overall Assessment of Data/General

All data were acceptable without qualification.

Sample 013CB01602 (41210-001) was mislabeled as 013TB00401. The number was corrected on the spreadsheet duing the validation process.

HEXAVALENT CHROMIUM

I.) Holding Times

All Holding Time criteria for the method were met, so no action was taken.

II.) Calibration

Initial Calibration:

All Initial Calibration criteria for the method were met, so no action was required.

Continuing Calibration:

All Continuing Calibration criteria for the method were met, so no action was taken.

III.) Blanks

Method Blanks:

All Method Blank criteria were met, so no action was taken.

IV.) Laboratory Control Sample (LCS)

All LCS criteria were met for the method, so no action was taken.

V.) Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS and MSD criteria for the method were met, so no action was necessary.

VI.) Field Duplicates

There were no field duplicates analyzed with this SDG, so no action was necessary.

VII.) Compound Quantitation and Reported Practical Quantitation Limits (PQL's)

All PQL criteria for the method were met, so no action was taken.

VIII.) Overall Assessment of Data/General

Sample 013CB01602 (41210-001) was mislabeled as 013TB00401. Proper corrections were made on the spreadsheet duing the validation process. All laboratory data were acceptable without qualification.

VALIDATA

Chemical Services, Inc.

P. O. Box 930422 Norcross, Ga. 30093

DATA VALIDATION SUMMARY REPORT

COMPANY:	EnSafe/Allen & Hoshall
SITE NAME:	Charleston Naval Base
PROJECT NUMBER:	8500.014
CONTRACTED LAB:	PACE Inc.
EPA SOW/METHOD:	EPA 8290
VALIDATION GUIDELINES:	EPA 8290, Professional Judgement, Laboratory Statements
SAMPLE MATRIX:	Water
TYPES OF ANALYSES:	2,3,7,8-substituted PCDD's and PCDF's

SDG NO: APX17

SAMPLES:

Client Sample #:	Lab Sample #:	Matrix	PCDD/ PCDF
017HW00501	IL0711-1	Water	X
009HW01601	IL0725-1	Water	X
	LCS-APX17	Water	X
	LCSD-APX17	Water	X

DATA REVIEWER(S): Linda H. Liu, Shawn S. Lin, Ph.D., Kevin C. Harmon

RELEASE SIGNATURE: Kevin C. Harmon

DATA QUALIFICATION SUMMARY

PACE Inc. - APX17 2,3,7,8-substituted PCDD's and PCDF's

SAMPLES: 017HW00501, 009HW01601, LCS-APX17, LCSD-APX17

2,3,7,8-SUBSTITUTED PCDD'S AND PCDF'S

I.) Holding Times:

All criteria were met, so no action was taken.

II.) HRGC/HRMS System Performance:

GC Column Performance Check:

According to EPA method 8290, a column performance check must be run before the beginning routine calibration run.

The laboratory ran a column performance check after the beginning routine calibration run, which invalidated the beginning routine calibration results. Since the effects of this sequence deviation cannot be verified, all associated positive sample results are recommended to be flagged as estimated (J).

Mass Resolution Check:

The data and time for the end of sequence Mass Resolution Check run on 5/2/95 was printed as "2-MAY-1995:17:48" on page 145 and was in a different format from the beginning of sequence Mass Resolution Check on page 144. No Resolving power was calculated by the lab for the End of sequence resolution check.

The data and time for the end of sequence Mass Resolution Check run on 5/3/95 was printed as "3-MAY-1995:17:59" on page 236 and was in a different format from the beginning of sequence Mass resolution check on page 144. No Resolving power was calculated by the lab for the end of sequence resolution check.

The resolving powers for the above two end of sequence Mass Resolution Checks were estimated as greater than 10,000 by the validator, so no action was taken.

Mass Verification Check:

Mass Verification was checked at the beginning of each analytical sequence. All criteria were met, so no action was taken.

Data Acquisition:

The were no Signal-to-Noise Ratios calculated. See Section VIII for data validation action.

III.) Calibration:

Calibration Range:

All criteria were met, so no action was required.

Initial Calibration:

All criteria were met, so no action was required.

Calibration Verifications:

All criteria were met, so no action was taken.

IV.) Blanks:

According to EPA method 8290, a method blank must be analyzed immediately after a beginning calibration run to demonstrate freedom from contamination and freedom from carryover from the calibration run. Also according to EPA method 8000, the performance of the entire analytical system must be checked daily, using data gathered from analyses of blanks, standards, and replicated samples.

The laboratory ran a method blank after the beginning calibration run, a column performance check and a nonane blank. The addition of the nonane blank (pure solvent, no internal standards added) invalidated use of the method blanks in determining instrument carryover levels.

The laboratory did not submit nonane blank quantitation results, therefore, no blank results could be used to assess instrument carryover levels.

Two positive results reported for this batch are recommended to be designated as EMPC (Estimated Maximum Possible Concentration) due to their QC problems and there were no other positive results for this batch, so no further action was taken.

Method Blanks:

Method blank MB-APX17 was analyzed. There were no PCDD's/PCDF's detected, so no action was taken.

Field Blanks:

No field blank was analyzed for this batch.

V.) Internal Standards Performance:

All criteria were met, so no action was taken.

VI.) Spike/Spike Duplicates:

No matrix spike/spike duplicates were analyzed for this batch.

One set of LCS/LCSD was analyzed. All criteria were met, so no action was taken.

The recovery of OCDF for LCS-APX17 was 79%, which was below the lab QC limits (80-120%) but was within the validation QC limits (60-140%), so no action was taken.

VII.) Duplicates:

No field duplicates were analyzed.

VIII.) PCDD/PCDF Identification:

Retention Times:

All criteria were met, so no action was taken.

Ion Abundance:

All criteria were met, so no action was taken.

Signal-to-Noise (S/N) Ratio:

There was no evidence in the raw data that the S/N was checked by the laboratory for all reported positive sample results. The S/N ratios were not printed on the quantitation reports. However, the laboratory certified that all reported positive sample results met method S/N criteria (greater than or equal to 2.5), so no action was taken (see Section X).

Polychlorinated Diphenyl Ether (PCDPE) Interferences:

There was no evidence in the raw data that PCDPE interferences were checked by the lab. The S/N ratios were not printed on the quantitation report. However, the laboratory certified that there were no signals detected having a S/N ratio greater than or equal to 2.5 at same retention time (+/- 2 seconds), in the corresponding PCDPE channel for all reported positive sample results, so no action was taken (see Section X).

There was a peak at same retention time in the corresponding DCDPE channel (page 86) for the positive OCDD sample result (page 87) for sample IL0725-1. This results is recommended to be designated as EMPC (Estimated Maximum Possible Concentration).

Second Column Confirmation:

Second column confirmation was not run for all reported positive 2378-TCDF results. Since the laboratory cannot resolve the 2378-TCDF isomer from the 2347-TCDF isomer, the reported positive 2378-TCDF sample result for sample IL0725-1 is recommended to be designated as EMPC (Estimated Maximum Possible Concentration).

IX.) Overall Assessment of Data/General:

The laboratory did not follow the 12-hour analysis sequence and quality control (QC) procedures specified in EPA Method 8290 (Revision 0, November 1990).

Two reported positive sample results are recommended to be flagged according to individual QC problems.

All total positive PCDD/PCDF sample results are recommended to be flagged as estimated (J).

X.) Laboratory Certifications Concerning Data Validation Deliverables:

In the validation of the PCDD/PCDF data, several important informational items were not verifiable from the data packages. Pace, Inc. provided certifications concerning the procedures used in the laboratory and in data reporting which address these issues.

The following certifications were made by Pace, Inc.:

1.) Nonane blanks were run before method blanks in the analytical sequence to document instrument condition and integrity.

2.) Nonane blank quantitation reports were not generated because of software limitations.

3.) In the event data for an analysis are unacceptable due to instrumental problems or other unpredictable factors, the analyst will reanalyze the particular extract and include only information from the reanalysis in the data package. The original analysis data is removed and the reanalysis data is inserted in the position in the raw data that would normally be occupied by the original analysis. This causes the data to appear to be out of order chronologically. This procedure was used by Pace, Inc. to report SDG APX01 method blank raw data and LCSD-AQ-IK1409/IK1054 data in the analytical sequence beginning 09/13/94. This procedure is common laboratory practice within Pace's dioxin laboratory.

4.) All positive reported results met all S/N method criteria.

5.) For all positive reported results, there were no S/N ratios greater than 2.5 in the corresponding ether channel.

6.) Pace, Inc. did not perform any analyses, checks or instrument adjustments between the end of sequence Calibration Checks and Mass Resolution Checks in the cases where more than one hour separated the Calibration and Mass Resolution Checks.

Validata Chemical Services, Inc. has incorporated these certifications into its data review as fact, and they have formed the basis for data validation of the unverifiable items. Validata Chemical Services, Inc. takes no responsibility for the validity of these certifications.

VALIDATA

Chemical Services, Inc.

P. O. Box 930422 Norcross, Ga. 30093

DATA VALIDATION SUMMARY REPORT

COMPANY:	Ensafe/Allen & Hoshall
SITE NAME:	Charleston Naval Base
PROJECT NUMBER:	8500.014
CONTRACTED LAB:	PACE, Inc.
QA/QC LEVEL:	Level III
EPA SOW/METHOD:	EPA 1990 SOW
VALIDATION GUIDELINES:	*USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review,* 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review,* 1994
SAMPLE MATRIX:	Soil
TYPES OF ANALYSES:	Volatile Organics (VOA), Semivolatile Organics (SVOC),Pesticides/PCB's (P/PCB), Total Metals and Cyanide (Me/CN), Total Petroleum Hydrocarbons (TPH)
SDG NUMBER:	CHS04

SAMPLES:

Client Sample #:	Lab Sample #:	Matrix	VOA	SVOC	P/PCB	Me/CN	TPH
013SB02201	081714	Soil	X	X	X	X	X
013SB02202	081715	Soil	X	X	X	X	X
013SB02301	081716	Soil	X	X	X	X	X
013SB02302	081717	Soil	X	X	X	X	X
017SB00101	081705	Soil	X	X	X	X	X
017SB00101MS	081706MS	Soil	X	X	X	X	X
017SB00101MSD	081706MSD	Soil	X	X	X		X
017SB00101MD	081706MD	Soil				X	
017SB00201	081707	Soil	X	X	X	X	X
017SB00301	081708	Soil	X	X	X	X	X
017SB00302	081709	Soil	X	X	X	X	X
017SB00401	081710	Soil	X	X	X	X	X
017SB00402	081711	Soil	X	X	X	X	X
017SB00501	081801	Soil	X	X	X	X	X
017SB00501MS	081801MS	Soil				X	
017SB00501MD	081801MD	Soil				X	
017SB00502	081802	Soil	X	X	X	X	X
017SB00601	081712	Soil	X	X	X	X	X

Client Sample #:	Lab Sample #:	Matrix	VOA	SVOC	P/PCB	Me/CN	TPH
017SB00602	081713	Soil	X	X	X	X	X
017SB00701	081803	Soil	X	X	X	X	X
017SB00702	081804	Soil	X	X	X	X	X
017SB00801	081805	Soil	X	X	X	X	X
017SB00802	081806	Soil	X	X	X	X	X
017SB00901	081807	Soil	X	X	X	X	X
017SB00902	081808	Soil	X	X	X	X	X

MS = MATRIX SPIKE, MSD = MATRIX SPIKE DUPLICATE, MD = MATRIX DUPLICATE

DATA REVIEWER(S): Amy L. Hogan, Marvin L. Smith

RELEASE SIGNATURE: Kevin C. Adamson

Data Qualifier Definitions:

J	-	The associated numerical value is an estimated quantity.
R	-	The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
U	-	The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	-	The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA QUALIFICATION SUMMARY

PACE, Inc. - CHS03 Organics and Inorganics

SAMPLES: 013SB01602, 013SB01701, 013SB01702, 013SB01801, 013SB01801MS, 013SB01801MSD, 013SB01801MD, 013SB01802, 013SB01901, 013SB02001, 013SB02001RE, 013SB01902, 013SB02002, 013SB02101, 013SB02102, 013TB01401, 662SB00101, 662SB00102, 662SB00102RE, 662SB00201, 662SB00202, 662SB00301, 662SB00302, 662SB00401, 662SB00402

VOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) GC/MS Tuning:

All Tuning criteria were met. No action was necessary.

III.) Calibration:

Initial Calibration:

All Initial Calibration criteria for the method were met. No action was required.

Continuing Calibration:

All Continuing Calibration criteria for the method were met. No action was taken.

IV.) Blanks:

Method Blanks:

Methylene chloride was detected at 4.7 ug/kg in soil method blank BC082594A. Detections of this compound in the associated samples below 10X the blank amount were flagged as undetected (U) with the detection limit being raised to the level of contamination in each sample.

Methylene chloride was detected at 7.4 ug/kg in soil method blank BC082694A. Detections of this compound in the associated samples below 10X the blank amount were flagged as undetected (U) with the detection limit being raised to the level of contamination in each sample.

Trip Blanks:

Methylene chloride was detected at 6.0 ug/L in trip blank 013TB01401. Detections of this compound in the associated samples below 10X the blank amount were flagged as undetected (U) with the detection limit being raised to the level of contamination in each sample.

Blank contaminations below the CRQL were raised to the CRQL and flagged as undetected (U).

TIC's:

There were no TIC's reported in the method blanks for this SDG.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria for the method were met, so no action was taken.

VI.) Matrix Spike/Matrix Spike Duplicate (MS/MSD):

All MS / MSD criteria for the method were met. No action was required.

VII.) Field Duplicates:

There were no field duplicates associated with this SDG.

VIII.) Internal Standards Performance:

All Internal Standard criteria were met. No action was taken.

IX.) TCL Compound Identification:

All criteria for the method were met, so no action was necessary.

X.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All criteria for the method were met, so no action was required.

XI.) Tentatively Identified Compounds (TIC's):

All TIC criteria for the method were met, so no action was taken.

XII.) System Performance:

All criteria were met, so no action was necessary.

XIII.) Overall Assessment of Data/General:

All data were acceptable with qualification.

SEMIVOLATILE ORGANICS

I.) Holding Times:

There were 27 days between sample date and extraction date for samples 013SB02001RE and 662SB00102RE. This period of time exceeded the QC limit of 14 days for semivolatile extractions. All positive and non-detect results for these samples were flagged as estimated (J) and (UJ).

II.) GC/MS Tuning:

All GC/MS Tuning criteria for the method were met, so no action was necessary.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviation (%RSD) for benzo(k)fluoranthene (40.9%) exceeded the QC limit of 30% for the initial calibration run on 8/30/94. Since all results for this compound consisted entirely of non-detects, no action was necessary.

Continuing Calibration:

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 9/10/94 at 08:25 for the following compounds:

benzyl alcohol	26.5%
hexachloroethane	25.8%
hexachlorocyclopentadiene	43.8%
2,4-dinitrophenol	34.0%
4-nitrophenol	86.5%
4-nitroaniline	34.8%

All positive and non-detect results for these compounds in the associated samples were flagged as estimated (J) and (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 9/12/94 at 13:10 for the following compounds:

benzyl alcohol	37.7%
n-nitroso-di-n-propylamine	32.1%
nitrobenzene	26.1%
2-nitroaniline	32.1%
2,4-dinitrophenol	32.5%
4-nitrophenol	78.4%
4-nitroaniline	40.2%
4,6-dinitro-2-methylphenol	25.5%
pentachlorophenol	33.4%

All positive and non-detect results for these compounds in the associated samples were flagged as estimated (J) and (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 9/09/94 at 10:52 for the following compounds:

benzidine	34.3%
benzo(k)fluoranthene	35.2%

All results for these compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 9/10/94 at 15:35 for the following compounds:

benzoic acid	30.0%
benzidine	33.0%

All results for these compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 9/11/94 at 14:26 for the following compounds:

benzyl alcohol	26.5%
benzoic acid	43.5%
2,4-dinitrophenol	30.6%
benzidine	33.9%
benzo(k)fluoranthene	25.9%

All results for these compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

All method blank criteria for the method were met. No action was necessary.

V.) Surrogate Recoveries:

The Percent Recoveries (%R's) of the surrogates listed below were below their respective QC limits for sample 013SB02001:

Compound:	(%R)	QC limits
nitrobenzene-d5	19%	(23-120%)
2-fluorobiphenyl	22%	(30-115%)
2-fluorophenol	23%	(25-121%)

As a results of these QC exceedances, all base / neutral compound results for this sample were flagged as estimated (J) and (UJ). The sample was re-extracted and re-analyzed.

The Percent Recoveries (%R's) of the surrogates listed below were below their respective QC limits for sample 662SB00102:

Compound:	(%R)	QC limits
nitrobenzene-d5	19%	(23-120%)
2-fluorobiphenyl	23%	(30-115%)
2-fluorophenol	18%	(25-121%)
phenol-d5	20%	(24-113%)

As a results of these exceedances, all acid and base / neutral compound results for this sample were flagged as estimated (J) and (UJ). The sample was re-extracted and re-analyzed.

VI.) Matrix Spike/Matrix Spike Duplicate:

The Relative Percent Difference (RPD) of acenapthene (20%) exceeded the QC limit of 19% for spiked samples 013SB01801MS and 013SB01801MSD. All positive and non-detect results for this compound in associated sample 013SB001801 were flagged as estimated (J) and (UJ).

VII.) Field Duplicates:

There were no field duplicates associated with this SDG.

VIII.) Internal Standards Performance:

The Percent Recoveries (%R's) of the internal standards listed below exceeded the QC limits of 50-200% for sample 013SB01801:

napthalene-d8	206%
acenapthene-d8	234%
phenanthrene-d10	236%
chrysene-d12	209%

All positive results for compounds associated with these internal standards were flagged as estimated (J). In addition, all internal standards for this sample were outside their established retention time windows. No further action was necessary.

The Percent Recoveries (%R's) of the internal standards listed below were below the QC limits of 50-200% for sample 013SB01701:

1,4-dichlorobenzene	40%
napthalene-d8	35%
acenapthene-d8	29%
phenanthrene-d10	25%
chrysene-d12	22%
perylene-d12	18%

All positive and non-detect results for compounds associated with these internal standards were flagged as estimated (J) and (UJ). In addition, all internal standards for this sample were outside their established retention time windows. No further action was necessary.

IX) TCL Compound Identification:

All criteria for the method were met, so no action was required.

X.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All criteria for the method were met, so no action was required.

XI.) Tentatively Identified Compounds (TIC's):

All TIC criteria for the method were met, so no action was taken.

XII.) System Performance:

All criteria were met, so no action was necessary.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification. The original analyses are considered of preferable data quality to the reanalyses because the reanalyses exceeded holding times for samples 013SB02001 and 662SB00102.

PESTICIDES/PCB's

I.) Holding Times:

All samples were extracted and analyzed within required holding times. No action was required.

II.) Instrument Performance:

All Instrument Performance criteria for the method were met. No action was necessary.

III.) Calibration:

The Percent Relative Standard Deviation (%RSD) of 4,4'-DDT (32.5%) exceeded the QC limit of 20% for the continuing calibration run on 9/09/94 at 02:54. All results for this compound, which consisted entirely of non-detects, in the associated samples were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks, so no data qualification was necessary.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria for the method was met. No action was required.

VI.) Matrix Spike/Matrix Spike Duplicate:

All MS / MSD criteria for the method were met. No action was taken.

VII.) TCL Compound Identification:

Pesticide/PCB Identification Summary (PIS):

All PIS criteria for the method were met. No action was required.

VIII.) Field Duplicates:

There were no field duplicates associated with this SDG.

IX.) Pesticide Cleanup Check:

Florisil Cartridge Check:

All criteria for this method were met, so no action was taken.

Gel Permeation Chromatography (GPC):

All GPC criteria for the method were met, so no action was necessary.

X.) Overall Assessment of Data/General:

All data were acceptable with qualification.

TOTAL METALS AND CYANIDE

I.) Holding Times:

All Holding Time criteria for the method were met, so no action was taken.

II.) Calibration:

All Calibration criteria for the method were met, so no action was required.

II.) Blanks:

The following blank results represent the highest detections associated with the samples and were used for data qualification:

Blank Type/ID#	Element	Max. Conc.	Action Level mg/kg
CCB9	aluminum	55 ug/L	55.0
PB21670	lead	0.58 mg/kg	2.40
CCB9	magnesium	72 ug/L	72.0

CCB = Continuing Calibration Blank, PB = Soil Preperation Blank

All results greater than the IDL but less than 5X the blank amount (Action Level, ug/L for water samples, mg/kg for soil samples) for which the contaminated blank is an associated calibration blank or preparation blank were flagged as undetected (U).

The following analytes had negative results with absolute values greater than the IDL's:

Blank Type/ID#	Analyte	Neg. Conc.	5X Conc. (mg/kg)
CCB5	copper	-4.7 ug/L	4.7
CCB4	thallium	-6.9 ug/L	6.9

CCB = Continuing Calibration Blank

All associated positive sample results less than 5X the absolute value of the negative blank result were flagged as estimated (J) and all non-detects were flagged as estimated (UJ).

IV.) ICP Interference Check Sample Results:

All Interference Check sample criteria for the method were met. No action was required.

V.) ICP Serial Dilution Analysis:

All Serial Dilution criteria for the method were met, so no action was necessary.

VI.) Laboratory Control Samples (LCS):

The solid LCS Percent Recoveries (%R's) were outside the 80-120% QC limits for beryllium in LCSA (78%) and LCSB (78%). All results for this analyte less than the IDL in the associated samples were flagged as estimated (UJ).

VII.) Duplicate Sample Analysis:

Duplicate sample analysis was performed on sample 013SB01801MD. The Relative Percent Differences (RPD's) for the compounds listed below exceeded the 35% QC limit:

copper	103%
aluminum	40.3%

All results for these analytes in associated sample 0135SB01301were flagged as estimated (J) and (UJ).

VIII.) Matrix Spike Recoveries:

The Percent Recoveries (%R's) for antimony (56.8%), cobalt (247%) and magnesium (140%) were outside the QC limits of 75-125%. All positive and non-detect results for antimony were flagged as estimated (J) and (UJ) in associated sample 013SB01801. All positive results for cobalt and magnesium were flagged as estimated (J) in the associated samples.

IX.) Field Duplicates:

No designated field duplicates were provided for this SDG.

X.) Furnace Atomic Absorption QC:

Graphite Furnace Analysis was not performed for samples in this SDG.

XI.) Sample Result, Calculation/Transcription Verification:

All criteria for the method were met, so no action was taken.

XII) Quarterly Verification of Instrumental Parameters:

All criteria for the method were met, so no action was taken.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

TOTAL PETROLEUM HYDROCARBONS

I.) Holding Times:

All samples were extracted and analyzed within required holding times. No action was required.

II.) Instrument Performance:

All Instrument Performance criteria for the method were met. No action was necessary.

III.) Calibration:

All Calibration criteria for the method were met. No action was necessary.

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks, so no data qualification was necessary.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria for the method was met. No action was required.

VI.) Matrix Spike/Matrix Spike Duplicate (MS / MSD):

The Relative Percent Difference (RPD) for the MS / MSD was 83%, which exceeded the 30% QC limit. All positive and non-detect results in associated sample 013SB01801 were flagged as estimated (J) and (UJ).

The Percent Recovery (%R) was 34% for spiked sample 013SB01801MSD, which was below the 57-141% QC limits. Data qualification was previously performed based on the RPD. No further action was required.

VII.) TCL Compound Identification:

All Compound Identification criteria for the method were met. No action was required.

VIII.) Field Duplicates:

There were no field duplicates associated with this SDG.

IX.) Overall Assessment of Data/General:

All data were acceptable with qualification.

VALIDATA

Chemical Services, Inc.

P. O. Box 930422 Norcross, Ga. 30093

DATA VALIDATION SUMMARY REPORT

COMPANY:	EnSafe/Allen & Hoshall
SITE NAME:	Charleston Naval Base
PROJECT NUMBER:	8500.014
CONTRACTED LAB:	PACE, Inc.
QA/QC LEVEL:	Level III
EPA SOW/METHOD:	EPA 1990 SOW
VALIDATION GUIDELINES:	*National Functional Guidelines for Organic Data Review,* 1994; *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses,* 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review,* 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review,* 1994
SAMPLE MATRIX:	Soil/Water
TYPES OF ANALYSES:	Volatile Organics (VOA), Semivolatile Organics (SVOC), Pesticides/PCB's (P/PCB), Total Metals and Cyanide (Me/CN)
SDG NUMBER:	CHS05

SAMPLES:

Client Sample ID:	Lab Sample ID:	Matrix	VOA	SVOC	P/PCB	Me/CN	TPH
017SB01001	BDB620/41233-010/014	Soil	X	X	X	X	X
017SB01002	BDB621/41233-011/015	Soil	X	X	X	X	X
017SB01002DL	BDB621/41233-011DL	Soil		X			
017SB01101	BDB622/41233-012/016	Soil	X	X	X	X	X
017SB01102	BDB623/41233-013/017	Soil	X	X	X	X	X
017TB00701	BDB624 -	Water	X	X			
650SB00101	BDB625/41273-019	Soil	X	X	X	X	
650SB00201	BDB626/41273-020	Soil	X	X	X	X	
650SB00301	BDB627/41273-021	Soil	X	X	X	X	
649SB00101	BDB628/41273-022	Soil	X	X	X	X	
649SB00201	BDB629/41273-023	Soil	X	X	X	X	
649SB00301	BDB630/41273-024	Soil	X	X	X	X	
649SB00401	BDB631/412273-025	Soil	X	X	X	X	
649SB00401MD	BDB631/412273-025MD	Soil				X	

Client Sample ID:	Lab Sample ID:	Matrix	VOA	SVOC	P/PCB	Me/CN	TPH
649SB00401MS	BDB631/412273-025MS	Soil	X	X	X	X	
649SB00401MSD	BDB631/412273-025MSD	Soil	X	X	X	X	
649SB00501	BDB632/41273-026	Soil	X	X	X	X	
650SB00401	BDB633/41273-027	Soil	X	X	X	X	
650SB00401RE	BDB633/41273-027RE	Soil	X	X	X	X	
666SB00101	BDB634/41291-028/019	Soil	X	X	X	X	X
666SB00101RE	BDB634RE	Soil		X			
666SB00102	BDB635/41291-029/020	Soil	X	X	X	X	X
666SB00102RE	BDB635RE	Soil		X			
666SB00201	BDB636/41291-030/021	Soil	X	X	X	X	X
666SB00201RE	BDB636RE	Soil	X	X			
666SB00202	BDB637/41291-031/022	Soil	X	X	X	X	X
666SB00202RE	BDB637RE	Soil		X			
666SB00301	BDB638/41291-032/023	Soil	X	X	X	X	X
666SB00302	BDB639/41291-033/024	Soil	X	X	X	X	X
666SB00302RE	BDB639RE	Soil		X			
666SB00401	BDB640/41291-034/025	Soil	X	X	X	X	X
666SB00402	BDB641/41291-035/026	Soil	X	X	X	X	X
666SB00402MS	BDB641/41291-035/026MS	Soil	X		X	X	
666SB00402MSD	BDB641/41291-035/026MSD	Soil	X		X	X	
666SB00402RE	BDB641/41291-035/026RE	Soil		X			
666SB00501	BDB642/41291-036/027	Soil	X	X	X	X	X
666SB00501RE	BDB642RE	Soil		X			

MS = MATRIX SPIKE, MSD = MATRIX SPIKE DUPLICATE, RE=REANALYSIS, TB = TRIP BLANK, D = DUPLICATE

DATA REVIEWER(S): Kent F. Pan, Ph.D., Marvin L. Smith

RELEASE SIGNATURE: Kevin C. Harmon

Data Qualifier Definitions:

J	-	The associated numerical value is an estimated quantity.
R	-	The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
U	-	The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	-	The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA QUALIFICATION SUMMARY

PACE, Inc. - CHS04 Organics and Inorganics

SAMPLES: 013SB02201, 013SB02202, 013SB02301, 013SB02302, 017SB00101, 017SB00101MS, 017SB00101MSD, 017SB00101MD, 017SB00201, 017SB00301, 017SB00302, 017SB00401, 017SB00402, 017SB00501, 017SB00501MS, 017SB00501MD, 017SB00502, 017SB00601, 017SB00602, 017SB00701, 017SB00702, 017SB00801, 017SB00802, 017SB00901, 017SB00902

VOLATILE ORGANICS

I.) Holding Times:

The 15 days between sample collection and analysis date for sample 017SB00501 exceeded the 14 day QC limit. All positive and non-detect results for this sample were estimated (J) and (UJ).

II.) GC/MS Tuning:

All Tuning criteria were met. No action was necessary.

III.) Calibration:

Initial Calibration:

All Initial Calibration criteria for the method were met. No action was required.

Continuing Calibration:

All Continuing Calibration criteria for the method were met, so no action was taken.

IV.) Blanks:

Method Blanks:

No compounds were detected in the method blanks.

TIC's:

There were no TIC's reported in the method blanks for this SDG.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria for the method were met, so no action was taken.

VI.) Matrix Spike/Matrix Spike Duplicate (MS/MSD):

All MS / MSD criteria for the method were met. No action was required.

VII.) Field Duplicates:

There were no field duplicates associated with this SDG.

VIII.) Internal Standards Performance:

All Internal Standard criteria were met. No action was taken.

IX.) TCL Compound Identification:

All criteria for the method were met, so no action was necessary.

X.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All criteria for the method were met, so no action was required.

XI.) Tentatively Identified Compounds (TIC's):

All TIC criteria for the method were met, so no action was taken.

XII.) System Performance:

All criteria were met, so no action was necessary.

XIII.) Overall Assessment of Data/General:

The data were acceptable with qualification.

SEMIVOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria for the method were met. No action was required.

II.) GC/MS Tuning:

All GC/MS Tuning criteria for the method were met, so no action was necessary.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviation (%RSD) for 2,4-dinitrophenol (37.9%) exceeded the QC limit of 30% for the initial calibration run on 8/26/94. Since there were no positive results for this compound in the associated samples, no action was taken.

Continuing Calibration:

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 8/29/94 at 11:50 for the following compounds:

hexachlorocyclopentadiene	33.7%
benzidine	68.2%

All results for these compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 8/30/94 at 09:49 for the following compounds:

hexachlorocyclopentadiene	34.5%
2,4-dinitrophenol	30.1%
4-nitroaniline	29.7%
benzidine	67.8%
3,3'-dichlorobenzidine	59.1%

All results for these compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

All Method Blank criteria for the method were met. No action was necessary.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria for the methos were met. No action was required.

VI.) Matrix Spike/Matrix Spike Duplicate:

All MS / MSD criteria for the method were met. No action was taken.

VII.) Field Duplicates:

There were no field duplicates associated with this SDG.

VIII.) Internal Standards Performance:

All Internal Standards Performance criteria for the method were met. No action was necessary.

IX) TCL Compound Identification:

All criteria for the method were met, so no action was required.

X.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All criteria for the method were met, so no action was required.

XI.) Tentatively Identified Compounds (TIC's):

All TIC criteria for the method were met, so no action was taken.

XII.) System Performance:

All criteria were met, so no action was necessary.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

PESTICIDES/PCB's

I.) Holding Times:

All samples were extracted and analyzed within required holding times. No action was required.

II). Instrument Performance:

All Instrument Performance criteria for the method were met. No action was necessary.

III.) Calibration:

The Percent Relative Standard Deviations (%RSD's) of alpha-BHC (26.9%), gamma-BHC (21.3%) and delta-BHC (26.1%) exceeded the QC limit of 20% for the initial calibration run on 8/31/94. All positive and non-detect results for these compounds in the associated samples were flagged as estimated (J) and (UJ).

The Percent Relative Standard Deviations (%RSD's) of alpha-BHC (25.0%), delta-BHC (23.9%) and endrin ketone (28.9%) exceeded the QC limit of 20% for the initial calibration run on 9/02/94. All positive and non-detect results for these compounds in the associated samples were flagged as estimated (J) and (UJ).

The Percent Differences (%D's) for the compounds listed below exceeded the 20% QC limit for the continuing calibration run on 8/31/94 at 20:18:

gamma-BHC	26.4%
aldrin	31.4%
heptachlor epoxide	27.6%
gamma-chlordane	27.9%
endosulfan I	30.4%
dieldrin	29.9%
endosulfan II	25.9%
4,4'-DDT	35.2%
endrin aldehyde	32.0%
endrin ketone	26.1%

All positive and non-detect results for these compounds in the associated samples were flagged as estimated (J) and (UJ).

The Percent Differences (%D's) for the compounds listed below exceeded the 20% QC limit for the continuing calibration run on 9/01/94 at 18:21:

alpha-BHC	33.3%
methoxychlor	39.5%

All positive and non-detect results for these compounds in the associated samples were flagged as estimated (J) and (UJ), since their percent recoveries exceeded 30%.

The Percent Differences (%D's) for the compounds listed below exceeded the 20% QC limit for the continuing calibration run on 9/02/94 at 02:07:

alpha-BHC	34.5%
methoxychlor	35.3%

All positive and non-detect results for these compounds in the associated samples were flagged as estimated (J) and (UJ), since their percent recoveries exceeded 30%.

The Percent Difference (%D) for 4,4'-DDT (30.9%) exceeded the 20% QC limit for the continuing calibration run on 9/7/94 at 16:48. All positive and non-detect results for this compound in the associated samples were flagged as estimated (J) and (UJ), since the percent recovery exceeded 30%.

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks, so no data qualification was necessary.

V.) Surrogate Recoveries:

The samples for this SDG were spiked with the surrogates dibutylchlorendate and tetrachloro-m-xylene. The Percent Recoveries (%R's) of the surrogates for the samples listed below were outside the QC limits (30-150%):

Client Sample#:	DBC (%R)	TCX (%R)
017SB00101	155	
017SB00201	0	
017SB00301	10	
017SB00401	0	
017SB00402	0	
017SB00601	0	
017SB00602	0	0
013SB02201	13	
013SB02202	14	
013SB02301	15	
017SB00501	21	
017SB00502		0
017SB00702	21	
017SB00802	10	
017SB00901	0	

The surrogates for sample 017SB00602 were diluted out. All positive and non-detect results were flagged as estimated (J) and (UJ). The positive results were flagged as estimated (J) and the non-detect results were rejected (R) for undiluted samples with surrogate recoveries less than 10%. All positive and non-detect results for the samples with surrogate recoveries between 10% and 30% were flagged as estimated (J) and (UJ). All positive results for sample 017SB00101 were flagged as estimated (J).

VI.) Matrix Spike/Matrix Spike Duplicate:

All MS / MSD compounds were diluted out for samples 017SB00101MS and 017SB00101MSD. No action was taken.

VII.) TCL Compound Identification:

Pesticide/PCB Identification Summary (PIS):

All PIS criteria for the method were met. No action was required.

VIII.) Field Duplicates:

There were no field duplicates associated with this SDG.

IX.) Pesticide Cleanup Check:

Florisil Cartridge Check:

All criteria for this method were met, so no action was taken.

Gel Permeation Chromatography (GPC):

All GPC criteria for the method were met, so no action was necessary.

X.) Overall Assessment of Data/General:

The laboratory did not re-analyze samples with Surrogate Recoveries outside QC limits. All non-detect results for samples 017SB00201, 017SB00401, 017SB00402, 017SB00601, 017SB00901 were rejected due to low surrogate recoveries. All other data were acceptable with qualification.

TOTAL METALS AND CYANIDE

I.) Holding Times:

All Holding Time criteria for the method were met, so no action was taken.

II.) Calibration:

All Calibration criteria for the method were met, so no action was required.

II.) Blanks:

The following blank results represent the highest detections associated with the samples and were used for data qualification:

Blank Type/ID#	Element	Max. Conc.	Action Level mg/kg
CCB3	aluminum	421 ug/L	42
CCB11	potassium	821 ug/L	821
CCB11	copper	25.6 ug/L	25.6

CCB = Continuing Calibration Blank

All results greater than the IDL but less than 5X the blank amount (Action Level, ug/L for water samples, mg/kg for soil samples) for which the contaminated blank is an associated calibration blank were flagged as undetected (U).

The following analytes had negative results with absolute values greater than the IDL's

Blank Type/ID#	Analyte	Neg. Conc.	5X Conc. (mg/kg)
CCB2	thallium	-13.8 ug/L	13.8
CCB4	selenium	-29.7 ug/L	29.7

CCB = Continuing Calibration Blank

All associated positive sample results less than 5X the absolute value of the negative blank result were flagged as estimated (J) and all non-detects were flagged as estimated (UJ).

IV.) ICP Interference Check Sample Results:

All Interference Check Sample criteria for the method were met. No action was required.

V.) ICP Serial Dilution Analysis:

All Serial Dilution criteria for the method were met, so no action was necessary.

VI.) Laboratory Control Samples (LCS):

The Percent Recovery (%R) of cyanide (78.5%) for LCS #1 for batch 449 was below the QC limits of 80-120%. All positive and non-detect results in the associated samples were flagged as estimated (J) and (UJ).

VII.) Duplicate Sample Analysis:

Duplicate Sample Analysis was performed on sample 017SB00101MD for batch 21673. The Relative Percent Differences (RPD's) for the compounds listed below exceeded the 35% QC limit:

aluminum	38.3%
barium	109%
lead	68.9%
manganese	48.7%
nickel	49.1%
sodium	49.4%

All results for these analytes in associated sample 017SB00101 were flagged as estimated (J) and (UJ).

Duplicate Sample Analysis was performed on sample 017SB00501 for batch 21674. The Relative Percent Differences (RPD's) for the compound listed below exceeded the 20% QC limit:

magnesium	50.3%

All results for these analytes in associated sample 017SB00501 were flagged as estimated (J) and (UJ).

VIII.) Matrix Spike Recoveries:

The Percent Recoveries (%R's) of antimony (65.2%), copper (63.5%), nickel (74.3%) and zinc (282%) were outside the QC limits of 75-125% for spiked sample 017SB00101MS. All positive and non-detect results for antimony, copper and nickel were flagged as estimated (J) and (UJ) in the associated samples. All positive results for zinc were flagged as estimated (J) in associated sample 017SB00101.

The Percent Recoveries (%R's) of antimony (44.4%) and magnesium (73.1%) were below the QC limits of 75-125% for spiked sample 017SB00501MS. All positive and non-detect results for these analytes in associated sample 017SB00501 were flagged as estimated (J) and (UJ).

IX.) Field Duplicates:

No designated field duplicates were provided for this SDG.

X.) Furnace Atomic Absorption QC:

Graphite Furnace Analysis were not used for the samples in this SDG.

XI.) Sample Result, Calculation/Transcription Verification:

All criteria for the method were met, so no action was taken.

XII) Quarterly Verification of Instrumental Parameters:

All criteria for the method were met, so no action was taken.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

TOTAL PETROLEUM HYDROCARBONS

I.) Holding Times:

All samples were extracted and analyzed within required holding times. No action was required.

II). Instrument Performance:

All Intsrument Performance criteria for the method were met. No action was necessary.

III.) Calibration:

All Calibration criteria for the method were met. No action was necessary.

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks, so no data qualification was necessary.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria for the method was met. No action was required.

VI.) Matrix Spike/Matrix Spike Duplicate:

The Percent Recoveries (%R's) of 170% for sample 017SB00101MS and 180% for sample 017SB00101MSD exceeded the 57-141% QC limits. All positive results in associated sample 017SB00101 were flagged as estimated (J).

VII.) TCL Compound Identification:

All Compound Identification criteria for the method were met. No action was required.

VIII.) Field Duplicates:

There were no field duplicates associated with this SDG.

IX.) Overall Assessment of Data/General:

All data were acceptable with qualification.

VALIDATA

Chemical Services, Inc.

P. O. Box 930422 Norcross, Ga. 30093

DATA VALIDATION SUMMARY REPORT

COMPANY:	Ensafe/Allen & Hoshall
SITE NAME:	Charleston Naval Base
PROJECT NUMBER:	8500.014
CONTRACTED LAB:	PACE, Inc.
QA/QC LEVEL:	Level III
EPA SOW/METHOD:	EPA 1990 SOW
VALIDATION GUIDELINES:	*National Functional Guidelines for Organic Data Review,* 1994; *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses,* 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review,* 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review,* 1994
SAMPLE MATRIX:	Soil, Water
TYPES OF ANALYSES:	Volatile Organics (VOA), Semivolatile Organics (SVOC), Pesticides/PCB's (P/PCB), Total Metals and Cyanide (Me/CN),Total Petroleum Hydrocarbons (TPH)
SDG NUMBER:	CHS22

SAMPLES:

Client Sample #:	Lab Sample #:	Matrix	VOA	SVOC	P/PCB	Me/CN	TPH
GDHSW04D07	102001	Soil	X	X	X	X	
017GW00301	102002	Water	X	X	X	X	X
017GW00201	102003	Water	X	X	X	X	X
017GW00101	102004	Water	X	X	X	X	X
017TW00301	102005	Water	X				
017TW00301RE	102005RE	Water	X				
017TW00302	102006	Water	X				
178GW00201	102101	Water	X	X	X	X	X
178TW00102	102102	Water	X				
178GW00101	102103	Water	X	X	X	X	X
017GW00401	102104	Water	X	X	X	X	X
178TW00101	102105	Water	X				
663GW00201	102501	Water	X	X	X	X	X
662GW00201RE	102501RE	Water	X				
136GW00101	102502	Water	X	X	X	X	X
662GW00201	102505	Water	X	X	X	X	X

Client Sample #:	Lab Sample #:	Matrix	VOA	SVOC	P/PCB	Me/CN	TPH
662TW00201	102506	Water	X				
662GW00101	102504	Water	X	X	X	X	X
662GW00101MS	102504MS	Water	X	X	X	X	X
662GW00101MSD	102504MSD	Water	X	X	X		X
662GW00101MD	102504MD	Water				X	
662TW00102	102507	Water	X				
662GW00101	102605	Water	X	X	X	X	X
660GW00201	102606	Water	X	X	X	X	X
660GW00101	102607	Water	X	X	X	X	X
667GW00201	102608	Water	X	X	X	X	X
667GW00101	102609	Water	X	X	X	X	X
666GW00101	102701	Water	X	X	X	X	X
666GW00201	102702	Water	X	X	X	X	X
656GW00201	102703	Water	X	X	X	X	X
656GW00301	102704	Water	X	X	X	X	X
666TW00101	102705	Water	X				
654SB00601	090822	Soil	X	X	X	X	
654SB00601RE	090822RE	Soil	X				
654SB00602	090823	Soil	X	X	X	X	
654SB00602RE	090823RE	Soil	X				

MS = MATRIX SPIKE, MSD = MATRIX SPIKE DUPLICATE, MD = MATRIX DUPLICATE
RE = RE-ANALYSIS, TW = TRIP BLANK

DATA REVIEWER(S): Amy L. Hogan, Marvin L. Smith

RELEASE SIGNATURE: Kevin C. Harmon

Data Qualifier Definitions:

J	-	The associated numerical value is an estimated quantity.
R	-	The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
U	-	The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	-	The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA QUALIFICATION SUMMARY

PACE, Inc. - CHS22 Organics and Inorganics

SAMPLES: GDHSW04D07, 017GW00301, 017GW00201, 017GW00101, 017TW00301, 017TW00301RE, 017TW00302, 178GW00201, 178TW00102, 178GW00101, 017GW00401, 178TW00101, 663GW00201, 663GW00201RE, 136GW00101, 136TW00101, 662GW00201, 662TW00201, 662GW00101, 662GW00101MS, 662GW00101MSD, 662GW00101MD, 662TW00102, 663GW00101, 660GW00201, 660GW00101, 667GW00201, 667GW00101, 666GW00101, 666GW00201, 656GW00201, 656GW00301, 666TW00101

VOLATILE ORGANICS

I.) Holding Times:

The samples listed below exceed the 7 day holding time QC limit for unpreserved water samples:

Client Sample #:	Days to Analysis
017GW00101	14
017GW00201	14
017GW00301	14
178GW00101	14
017GW00401	14
178GW00201	14
663GW00201	14
662GW00201	14
136GW00101	14
663GW00101	14
667GW00201	14
663GW00201RE	15

All positive and non-detect results for 663GW00201RE were flagged as estimated (J) and (UJ). Since only the 7 day QC limit was exceeded for the remaining samples, all positive and non-detect results for only aromatic volatile compounds in the remaining samples were flagged as estimated (J) and (UJ).

II.) GC/MS Tuning:

All Tuning criteria were met. No action was necessary.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviations (%RSD's) of chloromethane (34.7%), acetone (30.3%), and carbon disulfide (45.2%) exceeded the 30% QC limit for the initial calibration run on 10/25/94. Since all of the results for these compounds consisted of non-detects in the associated samples, no action was required.

Continuing Calibration:

The Percent Differences (%D's) of carbon disulfide (31.7%) and 1,1-dichloroethene (25.5%) exceeded the 25% QC limit for the continuing calibration run on 11/01/94 at 12:59. All results for these compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Difference (%D) of carbon disulfide (37.2%) exceeded the 25% QC limit for the continuing calibration run on 11/03/94 at 11:12. All results for this compound in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Differences (%D's) of chloromethane (27.4%), carbon disulfide (94.6%), 2-butanone (25.8%), 4-methyl-2-pentanone (28.0%) and 2-hexanone (31.3%) exceeded the 25% QC limit for the continuing calibration on 11/07/94 at 13:32. All the results for these compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Differences (%D's) of chloromethane (41.8%), acetone (41.0%) and 2-hexanone (26.1%) exceeded the 25% QC limit for the continuing calibration run on 11/08/94 at 10:34. All results for these compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

Methylene chloride was detected at 760 ug/kg in soil method blank BV1044A. Detections of this compound in the associated soil samples below 10X the blank amount were flagged as undetected (U) with the detection limit being raised to the level of contamination in each sample.

Methylene chloride and acetone were detected at 8.0 ug/L and 25 ug/L, respectively, in water method blank BC110894B. Detections of these compounds in the associated samples below 10X the blank amount were flagged as undetected (U) with the detection limit being raised to the level of contamination in each sample.

Methylene chloride was detected at 3.3 ug/L and 3.2 ug/L, respectively, in water method blanks BC110394B and BC110794B. Since the trip blanks were used for blank qualifications in the associated samples, no further action was required.

Trip Blanks:

Methylene chloride was detected in the trip blanks at the concentrations listed below:

Trip Blank Sample #:	Methylene Chloride Concentration
136TW00101	6.0 ug/L
178TW00101	4.1 ug/L
178TW00102	4.3 ug/L
662TW00102	6.0 ug/L
662TW00201	5.0 ug/L
666TW00101	7.0 ug/L

Blank contaminations below the CRQL were raised to the CRQL and flagged as undetected (U). Trip blank 666TW00101 (7.0 ug/L) was used for methylene chloride blank qualifications. All positive detections of this compound in the associated samples less than 10X the blank contamination were flagged as undetected with the detection limit being raised to the level of contamination in each sample.

TIC's:

There were no TICs reported in the method blanks for this SDG.

V.) Surrogate Recoveries:

The Percent Recovery (%R) of toluene-d8 was below the 88-110% QC limits for sample 017GW00301 (87%). All positive and non-detect results in sample were flagged as estimated (J) and (UJ).

The Percent Recovery (%R) of 1,2-dichloroethene-d4 in samples 017TW00301 (338%) and 017TW00301RE (125%) exceeded the 76-114% QC limits. Since this was a trip blank with no positive detections, no action was required.

VI.) Matrix Spike/Matrix Spike Duplicate (MS/MSD):

The Relative Percent Difference (RPD) of 1,1-dichloroethene (36%) exceeded the 14% QC limit for 662GW00101MS and 662GW00101MSD. The non-detect result for this compound in associated sample 662GW00101 was flagged as estimated (UJ).

The Percent Recovery (%R) of 1,1-dichloroethene (60%) was below the 61-145% QC limits for 662GW00101MSD. The non-detect result for this compound in the associated sample was flagged as estimated (UJ).

VII.) Field Duplicates:

There were no field duplicates associated with this SDG.

VIII.) Internal Standards Performance:

The Percent Recovery (%R) of bromochloromethane (24%) was below the 50-200% QC limits for sample

017TW00301. The positive and non-detect results for the compounds quantified using this internal standard were flagged as estimated (J) and (UJ).

IX.) TCL Compound Identification:

All criteria for the method were met, so no action was necessary.

X.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All criteria for the method were met, so no action was required.

XI.) Tentatively Identified Compounds (TIC's):

All TIC criteria for the method were met, so no action was taken.

XII.) System Performance:

All criteria were met, so no action was necessary.

XIII.) Overall Assessment of Data/General:

All data were acceptable with qualification. The original analyses of samples 017TW00301 and 662GW00201 are considered to be of preferable data quality to the reanalyses since the reanalyses exceeded holding times. The original analyses of samples 654SB00601 and 654SB00602 were also of preferable data quality due to holding times.

SEMIVOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria for the method were met. No action was required.

II.) GC/MS Tuning:

All GC/MS Tuning criteria for the method were met, so no action was necessary.

III.) Calibration:

Initial Calibration:

All Initial Calibration criteria for the method were met. No action was necessary.

Continuing Calibration:

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 10/27/94 at 09:10 for the following compounds:

2-methylphenol	26.4%
hexachlorocyclopentadiene	34.4%

All results for these compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 10/28/94 at 11:11 for the following compounds:

hexachlorobenzene	28.6%
benzidine	32.2%

All results for these compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

There were no compounds detected in the method blanks. No action was necessary.

V.) Surrogate Recoveries:

The Percent Recoveries (%R's) of all of the surrogates for sample GDHSW04D07 (0%) were below the QC limits. Since the poor recoveries were due to sample dilution, all positive and non-detect sample results were flagged as estimated (J) and (UJ).

VI.) Matrix Spike/Matrix Spike Duplicate:

All MS / MSD criteria for the method were met. No action was necessary.

VII.) Field Duplicates:

There were no field duplicates associated with this SDG.

VIII.) Internal Standards Performance:

All Internal Standard Performance criteria for the method were met. No action was required.

IX) TCL Compound Identification:

All criteria for the method were met, so no action was required.

X.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All criteria for the method were met, so no action was required.

XI.) Tentatively Identified Compounds (TIC's):

All TIC criteria for the method were met, so no action was taken.

XII.) System Performance:

All System Performance criteria for the method were met. No action was necessary.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

PESTICIDES/PCB's

I.) Holding Times:

All samples were extracted and analyzed within required holding times. No action was required.

II.) Instrument Performance:

All Instrument Performance criteria for the method were met. No action was necessary.

III.) Calibration:

All Calibration criteria for the method were met, so no action was taken.

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks, so no data qualification was necessary.

V.) Surrogate Recoveries:

The Percent Recoveries (%R's) of both the surrogates for sample GDHSW04D07 (0%) were below the 30-150% QC limits. Since the poor recoveries were due to sample dilution, all positive and non-detect results were flagged as estimated (J) and (UJ).

VI.) Matrix Spike/Matrix Spike Duplicate:

All MS / MSD criteria for the method were met. No action was taken.

VII.) TCL Compound Identification:

Pesticide/PCB Identification Summary (PIS):

All PIS criteria for the method were met. No action was required.

VIII.) Field Duplicates:

There were no field duplicates associated with this SDG.

IX.) Pesticide Cleanup Check:

Florisil Cartridge Check:

All criteria for this method were met, so no action was taken.

Gel Permeation Chromatography (GPC):

All GPC criteria for the method were met, so no action was necessary.

X.) Overall Assessment of Data/General:

All data were acceptable with qualification.

TOTAL METALS AND CYANIDE

I.) Holding Times:

All Holding Time criteria for the method were met, so no action was taken.

II.) Calibration:

All Calibration criteria for the method were met, so no action was required.

III.) Blanks:

The following blank results represent the highest detections associated with the samples and were used for data qualification:

Blank Type/ID#	Element	Max. Conc.	Action Level (ug/L / mg/kg)
PB12221	arsenic	22.6 ug/L	113 / 22.6
CCB6	zinc	48.1 ug/L	241 / 48.1
CCB9	iron	55.9 ug/L	280 / 55.9
CCB1	selenium	29.9 ug/L	150 / 29.9
CCB9	thallium	7.79 ug/L	39.0 / 7.79

CCB = Continuing Calibration Blank, PB = Preparation Blank

All results greater than the IDL but less than 5X the blank amount (Action Level, ug/L for water samples, mg/kg for soil samples) for which the contaminated blank is an associated calibration blank or preparation blank were flagged as undetected (U).

The following analytes had negative results with absolute values greater than the IDL's:

Blank Type/ID#	Analyte	Neg. Conc.	5X Conc. (ug/L / mg/kg)
CCB2	potassium	-3060 ug/L	15300 / 3060
CCB2	lead	-10.8 ug/L	54.0 / 10.8

CCB = Continuing Calibration Blank

All associated positive sample results less than 5X the absolute value of the negative blank result were flagged as estimated (J) and all non-detects were flagged as estimated (UJ).

IV.) ICP Interference Check Sample Results:

All Interference Check Sample criteria for the method were met. No action was required.

V.) ICP Serial Dilution Analysis:

All Serial Dilution criteria for the method were met, so no action was necessary.

VI.) Laboratory Control Samples (LCS):

The Percent Recovery (%R) of cadmium (122%) exceeded the 80-120% QC limits for laboratory control sample LCS12221. Since there were no positive results for this compound in the associated samples, no action was required.

VII.) Duplicate Sample Analysis:

All Duplicate Sample Analysis criteria for the method were met. No action was necessary.

VIII.) Matrix Spike Recoveries:

The Percent Recoveries (%R's) of chromium (58%), iron (151%) and mercury (58.8%) were outside the QC limits of 75-125% for spiked sample 662GW00101MS. The positive and non-detect results for chromium and mercury were flagged as estimated (J) and (UJ) in associated sample 662GW00101. The positive result for iron in the associated sample was flagged as estimated (J).

IX.) Field Duplicates:

No field duplicates were provided for this SDG.

X.) Furnace Atomic Absorption QC:

Method of Standard Additions (MSA):

Graphite Furnace Analysis was not performed for the samples in this SDG.

XI.) Sample Result, Calculation/Transcription Verification:

All criteria for the method were met, so no action was taken.

XII) Quarterly Verification of Instrumental Parameters:

All criteria for the method were met, so no action was taken.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

TOTAL PETROLEUM HYDROCARBONS

I.) Holding Times:

All samples were extracted and analyzed within required holding times. No action was required.

II.) Instrument Performance:

All Instrument Performance criteria for the method were met. No action was necessary.

III.) Calibration:

All Calibration criteria for the method were met. No action was necessary.

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks, so no data qualification was necessary.

V.) Laboratory Control Sample (LCS):

All LCS Recovery criteria for the method was met. No action was required.

VI.) Matrix Spike/Matrix Spike Duplicate:

All MS / MSD criteria for the method were met. No action was necessary.

VII.) TCL Compound Identification:

All Compound Identification criteria for the method were met. No action was required.

VIII.) Field Duplicates:

There were no field duplicates associated with this SDG.

IX.) Overall Assessment of Data/General:

All data were acceptable without qualification.

VALIDATA

Chemical Services, Inc.

P. O. Box 930422 Norcross, Ga. 30093

DATA VALIDATION SUMMARY REPORT

COMPANY:	Ensafe/Allen & Hoshall
SITE NAME:	Charleston Naval Base
PROJECT NUMBER:	8500.014
CONTRACTED LAB:	PACE, Inc.
QA/QC LEVEL:	Level III
EPA SOW/METHOD:	EPA 1990 SOW; SW-846: 8270, 8080, 6000, 7470, 8115 (Modified), 8100 (Modified)
VALIDATION GUIDELINES:	*National Functional Guidelines for Organic Data Review,* 1994; *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses,* 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review,* 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review,* 1994
SAMPLE MATRIX:	Soil
TYPES OF ANALYSES: Metals and	Semivolatile Organics (SVOC), Pesticides/PCB's (P/PCB), Total Metals, Total Gasoline (GAS), Hydrocarbons (HYD)
SDG NUMBER:	CHS29

SAMPLES:

Client Sample #:	Lab Sample #:	Matrix	SVOC	P/PCB
017SB01201	42800-005/003	Soil	X	X*
017SB01202	42800-006/004	Soil	X	X*
017SB01901	42783-019	Soil	X	X*
017SB01901RE	42783-019RE	Soil	X	
017SB01902	42783-020	Soil	X	X*
017SB02001	42783-017	Soil	X	X*
017SB02001RE	42783-017RE	Soil	X	
017SB02002	42783-018	Soil	X	X*
017SB02101	42783-013	Soil	X	X*
017SB02102	42783-014	Soil	X	X*
017SB02201	42783-011	Soil	X	X*
017SB02202	42783-012	Soil	X	X*
017SB02301	42783-015	Soil	X	X*
017SB02302	42783-016	Soil	X	X*

Client Sample #:	Lab Sample #:	Matrix	SVOC	P/PCB
656SB01001	42766-001/005	Soil	X	
656SB01002	42766-002	Soil	X	
656SB01101	42766-003	Soil	X	
656SB01102	42766-004	Soil	X	
655SB00901	42766-006	Soil		X
655SB01001	42766-005	Soil		X
655SB01101	42766-010	Soil		X
655SB01102	42766-012	Soil		X
655SB01201	42766-008	Soil		X
655SB01202	42766-009	Soil		X
655SB01301	42766-007	Soil		X
655SB01302	42766-011	Soil		X
017SB02202MS	42783-012MS	Soil	X	X
017SB02202MSD	42783-012MSD	Soil	X	X

* Note: PCB analyses only, pesticides not required.

MS = MATRIX SPIKE, MSD = MATRIX SPIKE DUPLICATE, RE = RE-ANALYSES

Client Sample #:	Lab Sample #:	Matrix	Metals	GAS	HYD*
017SB01201	42800-005/001/003	Soil	X	X	X
017SB01202	42800-006/002/004	Soil	X	X	X
017SB01901	42783-029/009/019	Soil	X	X	X
017SB01902	42783-030/010/020	Soil	X	X	X
017SB02001	42783-027/007/017	Soil	X	X	X
017SB02002	42783-028/008/018	Soil	X	X	X
017SB02101	42783-023/003/013	Soil	X	X	X
017SB02102	42783-024/004/014	Soil	X	X	X
017SB02201	42783-021/001/011	Soil	X	X	X
017SB02202	42783-022/002/012	Soil	X	X	X
017SB02301	42783-025/005/015	Soil	X	X	X
017SB02302	42783-026/006/016	Soil	X	X	X
017SB02202D	42783-022D/012D	Soil	X		X
017SB02202S	42783-022S/012S	Soil	X		X
655SB00901	42766-014/006	Soil		X	X
655SB01001	42766-013/005	Soil		X	X
655SB01101	42766-018/010	Soil		X	X
655SB01102	42766-020/012	Soil		X	X
655SB01201	42766-016/008	Soil		X	X
655SB01202	42766-017/009	Soil		X	X
655SB01301	42766-015/007	Soil		X	X
655SB01302	42766-019011	Soil		X	X

* Note: Analyses include intermediate lubricating oil, miscellaneous light products and heavy products

MS = MATRIX SPIKE, MSD = MATRIX SPIKE DUPLICATE, D = MATRIX DUPLICATE, S = MATRIX SPIKE

DATA REVIEWER(S): Marvin L. Smith, Kevin C. Harmon

RELEASE SIGNATURE: Kevin C. Harmon

Data Qualifier Definitions:

J	-	The associated numerical value is an estimated quantity.
R	-	The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
U	-	The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	-	The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA QUALIFICATION SUMMARY

PACE, Incorporated - CHS29 SW-846 Organics and Inorganics

SAMPLES: 017SB01201, 017SB01202, 017SB01901, 017SB01901RE, 017SB01902, 017SB02001, 017SB02001RE, 017SB02002, 017SB02101, 017SB02102, 017SB02201, 017SB02202, 017SB02301, 017SB02302, 656SB01001, 656SB01001, 656SB01002, 656SB01101, 656SB01102, 655SB00901, 655SB01001, 655SB01101, 655SB01102, 655SB01201, 655SB01202, 655SB01301, 655SB01302, 017SB02202MS, 017SB02202MSD, 017SB02202D, 017SB02202S

SEMIVOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria for the method were met. No action was required.

II.) GC/MS Tuning:

All GC/MS Tuning criteria for the method were met, so no action was necessary.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviation (%RSD) was 41.7% for benzo(k)fluoranthene for the standards run on 1/4/95 on instrument FMS, which exceeded the 30% QC limit. The positive result for this compound in associated sample 656CB01101 was flagged as estimated (J). No further action was required.

The Percent Relative Standard Deviation (%RSD) was 40.0% for benzo(k)fluoranthene for the standards run on 11/18/94 on instrument HMS, which exceeded the 30% QC limits. Since there were no positive detections of this compound in the associated samples, no action was taken.

Continuing Calibration:

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 1/17/95 at 10:49 on instrument FMS for the following compounds:

benzidine	33.5 %
benzo(k)fluoranthene	32.5 %

All positive and non-detect results for these compounds in the associated samples were flagged as

estimated (J) and (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 1/20/95 at 12:35 on instrument FMS for the following compounds:

benzidine	53.5 %
benzo(k)fluoranthene	40.3 %

All results for these compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 1/19/95 at 15:52 on instrument HMS for the following compounds:

2,4-dinitrophenol	27.6 %
pentachlorophenol	25.6 %
benzidine	45.2 %
benzo(b)fluoranthene	33.9 %
dibenz(a,h)anthracene	26.0 %

All results for these compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks, so no action was taken.

Equipment Blanks:

There were no field blanks associated with this SDG.

TIC's:

There were no TIC detections in the blanks, so no action was required.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria for the method were met, so no action was necessary.

VI.) Matrix Spike/Matrix Spike Duplicate:

All MS / MSD criteria for the method were met. In addition, all Laboratory Control Sample (LCS) criteria were met. No action was taken.

VII.) Field Duplicates:

There were no field duplicates associated with this SDG. No action was necessary.

VIII.) Internal Standards Performance:

The area count Percent Recoveries (%R's) of perylene-d12 were 45% and 41%, respectivel, for samples 017CB01901RE and 017CB02001RE, which were below the 50-200% QC limits. All positive and non-detect results associated with this internal standard in the two samples were flagged as estimated (J) and (UJ).

IX.) TCL Compound Identification:

All criteria for the method were met, so no action was required.

X.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All criteria for the method were met, so no action was required.

XI.) Tentatively Identified Compounds (TIC's):

All TIC criteria for the method were met, so no action was taken.

XII.) System Performance:

All System Performance criteria for the method were met. No action was necessary.

XIII.) Overall Assessment of Data/General:

Samples 017CB01901 and 017CB02001were re-analyzed for no apparent reason, except suspected TIC contamination. Internal standard deficiencies were observed in the re-analyses (071CB01901RE and 017CB02001RE). For this reason the initial analyses were considered to be of preferable data quality. All laboratory data were acceptable with qualification.

PESTICIDES/PCB's

I.) Holding Times:

All samples were extracted and analyzed within required holding times. No action was required.

II.) Instrument Performance:

All Instrument Performance criteria for the method were met. No action was necessary.

III.) Calibration:

Initial Calibration:

All Initial Calibration criteria for the method was met. No action was required.

Contiuning Calibration;

The Percent Difference (%D) was 29.0% for endrin for the continuing calibration standard run on 1/23/95 at 09:28, which exceeded the 25% QC limit. The non-detect results for endrin in associated samples 017SB01201 and 017SB01202 were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks, so no data qualification was necessary.

V.) Surrogate Recoveries:

The Percent Recoveries (%R's) of both surrogates were 0% for samples 017SB02001, 017SB02002 and 017SB01901, which were below the 30-150% QC limits. Since the poor recoveries were due to sample dilution, all positive and non-detect results for these samples were flagged as estimated (J) and (UJ).

VI.) Matrix Spike/Matrix Spike Duplicate:

All MS / MSD criteria for the method were met. No action was taken.

VII.) TCL Compound Identification:

Pesticide/PCB Identification Summary (PIS):

All PIS criteria for the method were met. No action was required.

VIII.) Field Duplicates:

There were no field duplicates associated with this SDG. No action was required.

IX.) Pesticide Cleanup Check:

Florisil Cartridge Check:

Data was not provided for the florisil cartridge check. No action was taken.

Gel Permeation Chromatography (GPC):

GPC data was not provided. No action was taken.

X.) Overall Assessment of Data/General:

All data were acceptable with qualification.

TOTAL METALS

I.) Holding Times:

All Holding Time criteria for the method were met, so no action was taken.

II.) Calibration:

All Calibration criteria for the method were met, so no action was required.

II.) Blanks:

The following blank results represent the highest detections associated with the samples and were used for data qualification:

Blank Type/ID#	Element	Max. Conc.	Action Level mg/kg
CCB	aluminum	41.2	41.2
CCB	antimony	32.7	32.7
CCB	arsenic	1.01	1.01
CCB	barium	26.6	26.6
CCB	beryllium	1.10	1.10
CCB	cadmium	2.99	2.99
CCB	calcium	209.	209.
CCB	chromium	2.68	2.68
CCB	cobalt	5.17	5.17
CCB	copper	23.8	23.8
CCB	iron	33.0	33.0
CCB	lead	1.14	1.14
CCB	magnesium	33.0	33.0
CCB	manganese	10.5	10.5
CCB	nickel	10.7	10.7
CCB	potassium	425.	425.
CCB	selenium	2.30	2.30
CCB	silver	1.71	1.71
CCB	sodium	65.6	65.6
CCB	thallium	2.44	2.44
CCB	vanadium	9.39	9.39
CCB	zinc	43.7	43.7

CCB = Continuing Calibration Blank

All results greater than the IDL but less than 5X the blank amount (Action Level, mg/kg for soil samples)

for which the contaminated blank is an associated calibration blank were flagged as undetected (U).

Negative results were observed for the following metals in the initial (ICB) and continuing (CCB) calibration blanks:

Blank Type/ID#	Element	Max. Conc.(ug/L)	Action Level mg/kg
CCB	arsenic	-0.23	0.23
ICB	barium	-0.62	0.62
ICB	cadmium	-0.35	0.35
ICB	cobalt	-0.75	0.75
ICB	lead	-0.79	0.79
ICB	magnesium	-9.19	9.19
CCB	mercury	-0.04	0.04
CCB	silver	-2.72	2.72
CCB	selenium	-1.55	1.55
ICB	sodium	-9.37	9.37
CCB	thallium	-0.49	0.49

ICB = Initial Calibration Blank, CCB = Continuing Calibration Blank

All associated positive sample results less than 5X the absolute value of the negative blank result were flagged as estimated (J) and all non-detects were flagged as estimated (UJ).

IV.) ICP Interference Check Sample Results:

All Percent Recovery criteria for the method were met, so no action was taken.

The following metals were present in ICS Solution A at concentrations greater than 2X IDL:

antimony	16 ug/L
copper	24 ug/L
lead	16 ug/L
manganese	4 ug/L
nickel	6 ug/L
sodium	43 ug/L
thallium	17 ug/L
vanadium	3 ug/L
zinc	26 ug/L

These analytes should not be present. Since aluminum, calcium, iron nor magnesium were present at greater than 50% these amounts in Solution A, no action was required.

The following metals were present in ICS Solution A at negative concentrations greater than the IDL:

arsenic	-305 ug/L
barium	-15 ug/L
cadmium	-3 ug/L

chromium	-5 ug/L
cobalt	-3 ug/L
lead	-5 ug/L
potassium	-413 ug/L
selenium	-49 ug/L
silver	-5 ug/L
thallium	-26 ug/L

Since neither aluminum, calcium, iron nor magnesium were present at greater than 50% the amounts in Solution A, no action was required.

V.) ICP Serial Dilution Analysis:

No Serial Dilution analyses were performed for samples associated with this SDG.

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria for the method were met, so no action was taken.

VII.) Duplicate Sample Analysis:

All Duplicate Sample Analysis criteria for the method were met. No action was necessary.

VIII.) Matrix Spike Recoveries:

The Percent Recoveries of the following metals were outside the 75-125% QC limits for spiked sample 017SB2202S:

antimony	40 %
chromium	150 %
potassium	148 %
silver	72 %

The non-detect results for antimony and silver in sample 017SB02202S were flagged as estimated (UJ), and positive results for chromium and potassium in samples 017SB02202 and 017SB02202D were flagged as estimated (J).

IX.) Field Duplicates:

No designated field duplicates were provided for this SDG.

X.) Furnace Atomic Absorption QC:

All Graphite Furnace criteria for the method were met. No action was necessary.

XI.) Sample Result, Calculation/Transcription Verification:

All criteria for the method were met, so no action was taken.

XII.) Quarterly Verification of Instrumental Parameters:

All criteria for the method were met, so no action was taken.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

TOTAL GASOLINE

I.) Holding Times

All Holding Time criteria for the method were met, so no action was taken.

II.) Calibration

Initial Calibration:

All Initial Calibration criteria for the method were met, so no action was required.

Continuing Calibration:

All Continuing Calibration criteria for the method were met, so no action was taken.

III.) Blanks

Method Blanks:

There were no positive detections in the method blanks, so no data qualification was necesssary.

Equipment Blanks:

There were no equipment blanks associated with this SDG.

IV.) Laboratory Control Sample (LCS)

There were no LCS analyses performed for this fraction. No action was required.

V.) Matrix Spike/Matrix Spike Duplicate (MS/MSD)

No MS/MSD analyses were performed for this fraction. No action was necessary.

VI.) Field Duplicates

There were no field duplicates analyzed with this SDG, so no action was taken.

VII.) Compound Quantitation and Reported Practical Quantitation Limits (PQL's)

All PQL criteria for the method were met, so no action was taken.

VIII.) Overall Assessment of Data/General

All data were acceptable without qualification.

HYDROCARBONS

I.) Holding Times

All Holding Time criteria for the method were met, so no action was taken.

II.) Calibration

Initial Calibration:

All Initial Calibration criteria for the method were met, so no action was required.

Continuing Calibration:

All Continuing Calibration criteria for the method were met, so no action was taken.

III.) Blanks

Method Blanks:

There were no positive detections in the method blanks, so no data qualification was necesssary.

Equipment Blanks:

There were no equipment blanks associated with this SDG.

IV.) Laboratory Control Sample (LCS)

All LCS criteria were met for the method, so no action was necessary.

V.) Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS/MSD criteria for the method were met, so no action was required.

VI.) Field Duplicates

There were no field duplicates analyzed with this SDG, so no action was taken.

VII.) Compound Quantitation and Reported Practical Quantitation Limits (PQL's)

All PQL criteria for the method were met, so no action was taken.

VIII.) Overall Assessment of Data/General

The TPH notation includes analyses for intermediate lubricating oil, miscellaneous light products and heavy products.

VALIDATA

Chemical Services, Inc.

P. O. Box 830422 Norcross, Ga. 30093

DATA VALIDATION SUMMARY REPORT

COMPANY:	Ensafe/Allen & Hoshall
SITE NAME:	Charleston Naval Base
PROJECT NUMBER:	8500.014
CONTRACTED LAB:	PACE, Inc.
QA/QC LEVEL:	Level III
EPA SOW/METHOD:	EPA 1990 SOW; SW-846: 8270, 8080, 6000, 7470, 8015 (Modified), 8100 (Modified)
VALIDATION GUIDELINES:	*National Functional Guidelines for Organic Data Review,* 1994; *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses,* 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review,* 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review,* 1994
SAMPLE MATRIX:	Soil
TYPES OF ANALYSES:	Semivolatile Organics (SVOC), Polychlorinated Biphenyls (PCB), Total Metals, Total Gasoline (GAS), Hydrocarbons (HYD)
SDG NUMBER:	CHS30

SAMPLES:

Client Sample #:	Lab Sample #:	Matrix	SVOC	PCB*
017SB01301	42808-017	Soil	X	X
017SB01302	42808-018	Soil	X	X
017SB01401	42799-027	Soil	X	X
017SB01501	42799-023	Soil	X	X
017SB01502	42799-024	Soil	X	X
017SB01601	42799-025	Soil	X	X
017SB01602	42799-026	Soil	X	X
107SB01701	42799-021	Soil	X	X
017SB01702	42799-022	Soil	X	X
017SB01801	42799-019	Soil	X	X
017SB01802	42799-020	Soil	X	X
017SB02401	42808-013	Soil	X	X
017SB02402	42808-014	Soil	X	X
017SB02501	42808-015	Soil	X	X

Client Sample #:	Lab Sample #:	Matrix	SVOC	PCB*
017SB02502	42808-016	Soil	X	X
019SB01001	42848-002	Soil	X	X
019SB01101	42808-003	Soil	X	X
019SB01101RE	42808-003RE	Soil	X	
019SB01201	42808-001	Soil	X	X
121SB00701	42808-019	Soil	X	X
121SB00702	42808-020	Soil	X	X
017SB01802MS	42799-020MS	Soil	X	X
017SB01802MSD	42799-020MSD	Soil	X	X

* Note; PCB analysis only, no pesticides.

MS = MATRIX SPIKE, MSD = MATRIX SPIKE DUPLICATE, RE = RE-ANALYSIS

Client Sample #:	Lab Sample #:	Matrix	Metals	GAS	HYD*
017CB01301	42808-017/005/011	Soil	X	X	X
017SB01302	42808-018/006/012	Soil	X	X	X
017SB01401	42799-027/009/018	Soil	X	X	X
017SB01501	42799-023/005/014	Soil	X	X	X
017SB01502	42799-024/006/015	Soil	X	X	X
017SB01601	42799-025/007/016	Soil	X	X	X
017SB01602	42799-026/008/017	Soil	X	X	X
017SB01701	42799-021/003/012	Soil	X	X	X
017SB01702	42799-022/004/013	Soil	X	X	X
017SB01801	42799-019/001/010	Soil	X	X	X
017SB01802	42799-020/002/011	Soil	X	X	X
017SB02401	42808-001/007	Soil		X	X
017SB02402	42808-002/008	Soil		X	X
017SB02501	42808-003/009	Soil		X	X
017SB02502	42808-004/010	Soil		X	X
019SB01001	42848-002	Soil	X		
019SB01101	42848-003	Soil	X		
019SB01201	42848-001	Soil	X		
121SB00701	42808-019	Soil	X		
121SB00702	42808-020	Soil	X		
017SB01802D	42799-020D	Soil	X		
017SB01802S	42799-020S	Soil	X		
017SB01802MS	42799-002/011MS	Soil		X	X
017SB01802MSD	42799-002/011MSD	Soil		X	X

* Note: Analyses include intermediate lubricating oil, miscellaneous light products and heavy products

MS = MATRIX SPIKE, MSD = MATRIX SPIKE DUPLICATE, D = MATRIX DUPLICATE
S = MATRIX SPIKE

DATA REVIEWER(S): Marvin L. Smith, Kevin C. Harmon

RELEASE SIGNATURE: Kevin C. Harmon

Data Qualifier Definitions:

J	-	The associated numerical value is an estimated quantity.
R	-	The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
U	-	The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	-	The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA QUALIFICATION SUMMARY

PACE, Incorporated - CHS30 SW-846 Organics and Inorganics

SAMPLES: 017SB01301, 017SB01302, 017SB01401, 017SB01501, 017SB01502, 017SB01601, 017SB01602, 017SB01701, 017SB01702, 017SB01801, 017SB01802, 017SB02401, 017SB02402, 017SB02501, 017SB02502, 019SB01001, 019SB01101, 019SB01101RE, 019SB01201, 121SB00701, 121SB00702, 017SB01802MS, 017SB01802MSD, 017SB01802D, 017SB01802S

SEMIVOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria for the method were met. No action was required.

II.) GC/MS Tuning:

All GC/MS Tuning criteria for the method were met, so no action was necessary.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviation (%RSD) was 40.0 % for benzo(k)fluoranthene for the standards run on 11/1894 on instrument HMS, which exceeded the 30% QC limits. The positive results for this compound in the associated samples were flagged as estimated (J).

Continuing Calibration:

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 1/19/95 on instrument HMS at 15:52 for the following compounds:

2,4-dinitrophenol	27.6 %
pentachlorophenol	25.6 %
benzidine	45.2 %
benzo(b)fluoranthene	33.9 %
dibenz(a,h)anthracene	26.0 %

All positive and non-detect resuls for these compounds in the associated samples were flagged as estimated (J) and (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 1/24/95 at 10:25 on

instrument HMS for the following compounds:

2,4-dinitrophenol	25.8 %
pentachlorophenol	28.5 %
benzidine	56.0 %
benzo(b)fluoranthene	28.7 %
indeno(1,2,3-cd)pyrene	27.5 %
dibenz(a,h)anthracene	28.0%

All positive and non-detect resuls for these compounds in the associated samples were flagged as estimated (J) and (UJ).

The Percent Difference (%D) was 28.1% for 4,6-dinitro-2-methylphenol for the standard run on 2/1/95 on instrument FMS, which exceeded the 25% QC limit. All results for this compound in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

All Method Blank criteria for the method were met. No action was necessary.

Equipment Blanks:

There were no equipment blanks associated with the SVOC fraction of this SDG.

TIC's:

No TIC's were detected in the blanks, so no action was necessary.

V.) Surrogate Recoveries:

All Surrogate Percent Recovery criteria for the method were met, so no action was required.

VI.) Matrix Spike/Matrix Spike Duplicate:

All MS / MSD criteria for the method were met. Additionally, all criteria were met for the three Laboratory Control Samples (LCS's) analyzed with this SDG. No action was necessary.

VII.) Field Duplicates:

There were no field duplicates associated with this SDG. No action was necessary.

VIII.) Internal Standards Performance:

The Retention Times (RT's) were 1.60 minutes to 5.76 minutes above the upper limits for the six internal standards associated with sample 019SB01101. The RT's were acceptable for the re-analysis (017SB01101RE), however, the area count Percent Recovery (%R) was 35% for perylene-d12, which was

below the 50-200% QC limits. All positive and non-detect results in sample 017SB01101RE associated with this internal standard was flagged as estimated (J) and (UJ).

IX.) TCL Compound Identification:

All criteria for the method were met, so no action was required.

X.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All criteria for the method were met, so no action was required.

XI.) Tentatively Identified Compounds (TIC's):

All TIC criteria for the method were met, so no action was taken.

XII.) System Performance:

All System Performance criteria for the method were met. No action was necessary.

XIII.) Overall Assessment of Data/General:

The re-analysis (019SB01101RE) of sample 019SB01101 is considered to be of perferable data quality to the original analysis since there were fewer deficiencies involved. The initial sample results were not reported by the laboratory. All laboratory data were acceptable with qualification.

POLYCHLORINATED BIPHENYLS:

I.) Holding Times:

All samples were extracted and analyzed within required holding times. No action was required.

II.) Instrument Performance:

All Instrument Performance criteria for the method were met. No action was necessary.

III.) Calibration:

All Calibration criteria for the method was met. No action was required.

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks, so no data qualification was necessary.

Equipment Blanks:

There were no equipment blanks associated with the PCB fraction of this SDG.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria for the method were met, so no action was required.

VI.) Matrix Spike/Matrix Spike Duplicate:

All MS / MSD criteria for the method were met. No action was taken.

VII.) TCL Compound Identification:

Pesticide/PCB Identification Summary (PIS):

All PIS criteria for the method were met. No action was required.

VIII.) Field Duplicates:

There were no field duplicates associated with this SDG. No action was required.

IX.) Pesticide Cleanup Check:

Florisil Cartridge Check:

Florisil Check data was not provided with this SDG. No action was taken.

Gel Permeation Chromatography (GPC):

GPC data was not provided for this SDG. No action was taken.

X.) Overall Assessment of Data/General:

All data were acceptable without qualification.

TOTAL METALS

I.) Holding Times:

All Holding Time criteria for the method were met, so no action was taken.

II.) Calibration:

All Calibration criteria for the method were met, so no action was required.

II.) Blanks:

The following blank results represent the highest detections associated with the samples and were used for data qualification:

Blank Type/ID#	Element	Max. Conc.	Action Level mg/kg
CCB	aluminum	41.2	41.2
CCB	antimony	32.7	32.7
CCB	arsenic	2.03	2.03
CCB	barium	39.0	39.0
CCB	beryllium	0.55	0.55
CCB	cadmium	2.99	2.99
CCB	calcium	210.	210.
CCB	chromium	5.01	5.01
CCB	cobalt	5.17	5.17
CCB	copper	39.8	39.8
CCB	iron	33.0	33.0
CCB	lead	1.01	1.01
CCB	magnesium	37.9	37.9
CCB	manganese	10.5	10.5
CCB	nickel	10.7	10.7
CCB	potassium	583	583.
CCB	selenium	4.22	4.22
CCB	silver	7.97	7.97
CCB	sodium	222	222
CCB	thallium	2.37	2.37
CCB	vanadium	3.39	3.39
CCB	zinc	31.7	31.7

CCB = Continuing Calibration Blank

All results greater than the IDL but less than 5X the blank amount (Action Level, ug/L for water samples, mg/kg for soil samples) for which the contaminated blank is an associated calibration blank were flagged as undetected (U).

Negative results were observed for the following metals in the initial (ICB) and continuing (CCB) calibration blanks:

Blank Type/ID#	Element	Max. Conc.(ug/L)	Action Level mg/kg
CCB	arsenic	-0.63	0.63
ICB	barium	-0.62	0.62
ICB	cadmium	-0.66	0.66
ICB	cobalt	-0.75	0.75
ICB	copper	-1.97	1.97
CCB	lead	-0.31	0.31
ICB	magnesium	-9.19	9.19

Blank Type/ID#	Element	Max. Conc.(ug/L)	Action Level mg/kg
CCB	mercury	-0.04	0.04
CCB	nickel	-5.83	5.83
CCB	silver	-4.26	4.26
CCB	selenium	-2.41	2.41
ICB	sodium	-9.37	9.37
CCB	thallium	-1.93	1.93
ICB	vanadium	-0.88	0.88

ICB = Initial Calibration Blank, CCB = Continuing Calibration Blank

All associated positive sample results less than 5X the absolute value of the negative blank result were flagged as estimated (J) and all non-detects were flagged as estimated (UJ).

IV.) ICP Interference Check Sample Results:

All Percent Recovery criteria for the method were met, so no action was taken.

The following metals were present in ICS Solution A at concentrations greater than 2X IDL:

antimony	16 ug/L
copper	24 ug/L
lead	72 ug/L
manganese	4 ug/L
nickel	4 ug/L
sodium	42 ug/L
thallium	16 ug/L
vanadium	3 ug/L
zinc	26 ug/L

These analytes should not be present. Since aluminum, calcium, iron nor magnesium were present at the amounts in Solution A, no action was required.

The following metals were present in ICS Solution A at negative concentrations greater than the IDL:

antimony	-11 ug/L
arsenic	-305 ug/L
barium	-17 ug/L
cadmium	-3 ug/L
chromium	-5 ug/L
cobalt	-3 ug/L
lead	-5 ug/L
potassium	-754 ug/L
selenium	-232 ug/L
silver	-5 ug/L
sodium	-7 ug/L

thallium	-26 ug/L
zinx	-2 ug/L

Since neither aluminum, calcium, iron nor magnesium were present at the amounts in Solution A, no action was required.

V.) ICP Serial Dilution Analysis:

No Serial Dilution analysis was performed for this SDG.

VI.) Laboratory Control Samples (LCS):

The LCS Percent Recoveries (%R's) for selenium were 78.0% and 78.5%, respectively, in LCS 21734 and LCS 21738, which were below the 80-120% QC limits. All positive and non-detect results for selenium were flagged as estimated (J) and (UJ).

VII.) Duplicate Sample Analysis:

The Relative Percent Differences (RPD's) for beryllium (53.4%), copper (49.0%), manganese (52.5%), nickel (37.1%) and zinc (46.5%) for duplicate sample 017SB01802D exceeded the 35% QC limit. The positive and non-detect results for these analytes in associated sample 017SB01802 were flagged as estimated (J) and (UJ).

VIII.) Matrix Spike Recoveries:

The Percent Recoveries (%R's) of antimony and zinc were 32.2% and 72.0%, respectively, for spiked sample 017SB01802S,.which were below the 75-125% QC limits. All positive and non-detect results for these metals in associated sample 017SB01802 were flagged as estimated (J) and (UJ).

IX.) Field Duplicates:

No designated field duplicates were provided for this SDG.

X.) Furnace Atomic Absorption QC:

All Graphite Furnace criteria for the method were met. No action was necessary.

XI.) Sample Result, Calculation/Transcription Verification:

All criteria for the method were met, so no action was taken.

XII.) Quarterly Verification of Instrumental Parameters:

All criteria for the method were met, so no action was taken.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

TOTAL GASOLINE

I.) Holding Times

All Holding Times criteria for the method were met, so no action was taken.

II.) Calibration

Initial Calibration:

All Initial Calibration criteria for the method were met, so no action was required.

Continuing Calibration:

All Continuing Calibration criteria for the method were met, so no action was taken.

III.) Blanks

Method Blanks:

There were no positive detections in the method blanks, so no data qualification was necesssary.

Equipment Blanks:

There were no equipment blanks associated with this SDG.

IV.) Laboratory Control Sample (LCS)

All LCS Recovery criteria for the method were met, so no action was necessary.

V.) Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS/MSD criteria for the method were met, so no action was required.

VI.) Field Duplicates

There were no field duplicates analyzed with this SDG, so no action was taken.

VII.) Compound Quantitation and Reported Practical Quantitation Limits (PQL's)

All PQL criteria for the method were met, so no action was taken.

VIII.) Overall Assessment of Data/General

All data were acceptable without qualification.

HYDROCARBONS

I.) Holding Times

All Holding Times criteria for the method were met, so no action was taken.

II.) Calibration

Initial Calibration:

All Initial Calibration criteria for the method were met, so no action was required.

Continuing Calibration:

All Continuing Calibration criteria for the method were met, so no action was taken.

III.) Blanks

Method Blanks:

There were no positive detections in the method blanks, so no data qualification was necesssary.

Equipment Blanks:

There were no equipment blanks associated with this SDG.

IV.) Laboratory Control Sample (LCS)

All LCS Recovery criteria for the method were met, so no action was necessary.

V.) Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS/MSD criteria for the method were met, so no action was required.

VI.) Field Duplicates

There were no field duplicates analyzed with this SDG, so no action was taken.

VII.) Compound Quantitation and Reported Practical Quantitation Limits (PQL's)

All PQL criteria for the method were met, so no action was taken.

VIII.) Overall Assessment of Data/General

The TPH notation includes analyses for intermediate lubricating oil, miscellaneous light products and heavy products. All laboratory data were acceptable without qualification.

VALIDATA
Chemical Services, Inc.
P. O. Box 930422, Norcross, Ga. 30093

DATA VALIDATION SUMMARY REPORT

COMPANY: Ensafe Environmental Services, Inc.
SITE NAME: Charleston Naval Base
PROJECT NUMBER: 8500.014
CONTRACTED LAB: Southwest Laboratories of Oklahoma
EPA SOW/METHOD: EPA 8290
VALIDATION GUIDELINES: EPA 8290, Professional Judgement
SAMPLE MATRIX: Soil
TYPES OF ANALYSES: 2,3,7,8-substituted PCDD's and PCDF's

SDG NO: NAVY CLEAN / ENSAFE CHS33

SAMPLES:

Client Sample #:	Lab Sample #:	Matrix	PCDD/ PCDF
013SB02401	21330.01	Soil	X
013SB02402	21330.02	Soil	X
017SB02601	21330.03	Soil	X
017SB02602	21330.04	Soil	X
653SB00501	21330.05	Soil	X
653SB00502	21330.06	Soil	X
019SB01401	21330.07	Soil	X
121SB01201	21330.08	Soil	X
121SB01201 RE	21330.08RE	Soil	X
013CB02401	21330.09	Soil	X
013CB02401 MS	21330.10	Soil	X
013CB02401 MSD	21330.11	Soil	X

D = DUPLICATE, MS = MATRIX SPIKE, MD = MATRIX SPIKE DUPLICATE, RE = REANALYZED

DATA REVIEWER(S): Linda H. Liu, Shawn S. Lin, Ph.D., Kevin C. Harmon

RELEASE SIGNATURE: Kevin C. Harmon

Data Qualifier Definitions:

J	-	The associated numerical value is an estimated quantity.
R	-	The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
U	-	The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	-	The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA QUALIFICATION SUMMARY

Southwest Laboratories of Oklahoma - 2,3,7,8-substituted PCDD's and PCDF's

SAMPLES: 013SB02401, 013SB02402, 017SB02601, 017SB02602, 653SB00501, 653SB00502, 019SB01401, 121SB01201, 121SB01201 RE, 013CB02401, 013CB02401 MS, 013CB02401 MSD

2,3,7,8-SUBSTITUTED PCDD'S AND PCDF'S

I.) Holding Times:

All criteria were met, so no action was taken.

II.) HRGC/HRMS System Performance:

GC Column Performance:

All criteria were met, so no action was taken.

HRMS Resolution:

All criteria were met, so no action was taken.

Mass Verification:

All criteria were met, so no action was taken.

MS Data Acquisition:

All criteria were met, so no action was taken.

III.) Calibration:

Calibration Range:

All calibration and internal standard concentration levels were used per EPA Method 1613. Comparing to EPA Method 8290, the calibration ranges of two methods were about the same, so no action was taken.

Initial Calibration:

All criteria were met, so no action was required.

Calibration Verifications:

All criteria were met, so no action was required.

IV.) Blanks

Method Blanks:

Three 2,3,7,8-substituted PCDD's and PCDF's were detected in method blanks at the following concentrations:

Method Blank	Compound	Conc. ng/Kg	Action Level ng/Kg
BL021701	OCDD	0.60	3.0
BL021702	123789HxCDF	0.32	1.6
BL022101	OCDD	4.73	23.7

Detections of these compounds in all associated samples below 5X the blank amount were flagged as undetected (U), with the detection limit being raised to the level of contamination in each sample.

Equipment Blanks:

No equipment blank was analyzed.

Field Blanks:

No field blank was analyzed.

V.) Internal Standards Performance:

The Percent Recoveries (%R's) of 13C-2378TCDF and 13C-12378PeCDF for sample 121SB01201 RE were 37.9% and 39.4%, respectively, which were below the 40-135% QC limits. All sample results associated with these internal standards were flagged as estimated (J) and (UJ).

VI.) Spike/Spike Duplicates:

The RPD of OCDD for field sample spike/spike duplicate, 013CB02401MS/MSD, was 606%, which exceeded the 20% QC limit. Since the amount of OCDD spiked (2000 pg or 200 ng/Kg)

was 4X less than the OCDD detected in sample 013CB02401 (980 ng/Kg), no action was required.

VII.) Duplicates:

No field duplicates were analyzed.

VIII.) PCDD/PCDF Identifications:

Retention Times:

All criteria were met, so no action was taken.

Ion Abundance:

All criteria were met, so no action was taken.

S/N Ratio:

All criteria were met, so no action was taken.

PCDPE (Polychlorinated Diphenyl Ether) Interferences:

All criteria were met, so no action was taken.

2nd Column Confirmation:

All criteria were met, so no action was taken.

IX.) Overall Assessment of Data/General:

All data were acceptable with qualifications. Due to higher internal standard recoveries for the re-extracted sample 121SB01201 RE, the results of the re-extraction are considered to be of preferable data quality to the results of the original extract.

VALIDATA

Chemical Services, Inc.

P. O. Box 930422 Norcross, Ga. 30093

DATA VALIDATION SUMMARY REPORT

COMPANY:	Ensafe/Allen & Hoshall
SITE NAME:	Charleston Naval Base
PROJECT NUMBER:	8500.014
CONTRACTED LAB:	PACE, Incorporated
QA/QC LEVEL:	Level III
EPA SOW/METHOD:	EPA 1990 SOW
VALIDATION GUIDELINES:	*National Functional Guidelines for Organic Data Review*, 1994; *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses*, 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*, 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, 1994
SAMPLE MATRIX:	Soil
TYPES OF ANALYSES:	Semivolatile Organics (SVOC), PCB's (PCB), Total Metals (Met)
SDG NUMBER:	CHS35

SAMPLES:

Client Sample #:	Lab Sample #:	Matrix	SVOC	PCB	Met
019SB01601	43326-001	Soil	X	X	X
019SB01601MS	43326-001MS	Soil	X	X	
019SB01601MSD	43326-001MSD	Soil	X	X	
019SB01701	43326-002	Soil	X	X	X
019SB01801	43326-003	Soil	X	X	X
121SB01701	43326-004	Soil	X	X	X
121SB01601	43326-005	Soil	X	X	X
121SB01501	43326-006	Soil	X	X	X
121SB01401	43326-007	Soil	X	X	X
121SB01301	43326-008	Soil	X	X	X
121SB01301MS	43326-008MS	Soil			X
121SB01301MD	43326-008MD	Soil			X
017SB03301	43344-001	Soil		X	
017SB01332	43344-002	Soil		X	
017SB03201	43344-003	Soil		X	
017SB03202	43344-004	Soil		X	

Client Sample #:	Lab Sample #:	Matrix	PCB
017SB003101	43344-005	Soil	X
017SB03102	43344-006	Soil	X
017SB02701	43344-007	Soil	X
017SB02702	43344-008	Soil	X
017SB02801	43344-009	Soil	X
017SB02802	43344-010	Soil	X

MS = MATRIX SPIKE, MSD = MATRIX SPIKE DUPLICATE, MD = MATRIX DUPLICATE

DATA REVIEWER(S): Amy L. Hogan, Marvin L. Smith

RELEASE SIGNATURE: Kevin C. Hamor

Data Qualifier Definitions:

J	-	The associated numerical value is an estimated quantity.
R	-	The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
U	-	The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	-	The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA QUALIFICATION SUMMARY

PACE, Incorporated - CHS35 Organics and Inorganics

SAMPLES: 019SB01601, 019SB01601MS, 019SB01601MSD, 019SB01701, 019SB01801, 121SB01701, 121SB01601, 121SB01501, 121SB01401, 121SB01301, 121SB01301MS, 121SB01301MD, 017SB03301, 017SB03302, 017SB03201, 017SB03202, 017SB03101, 017SB03102, 017SB02701, 017SB02702, 017SB02801, 017SB02802

SEMIVOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria for the method were met. No action was required.

II.) GC/MS Tuning:

All GC/MS Tuning criteria for the method were met, so no action was necessary.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviation (%RSD) for benzo(k)fluoranthene (31.4%) exceeded the 30% QC limit for the initial calibration run on 2/17/95. All positive results for this compound in the associated samples were flagged as estimated (J).

Continuing Calibration:

The Percent Differences (%D's) of the compounds listed below exceeded the 25% QC limit for the Continuing Calibration run on 3/28/95 at 12:30:

hexachlorocyclopentadiene	36.1%
4-chlorophenyl phenyl ether	32.2%
fluorene	26.5%
4,6-dinitro-2-methylphenol	34.1%
benzidine	32.8%
benzo(a)anthracene	26.1%
bis(2-ethylhexyl)phthalate	46.1%
benzo(k)fluoranthene	30.0%

All positive and non-detect results for benzo(a)anthracene, bis(2-ethylhexyl)phthalate and benzo(k)fluoranthene in the associated samples were flagged as estimated (J) and (UJ). All results for the

other compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Differences (%D's) of the compounds listed below exceeded the 25% QC limit for the Continuing Calibration run on 3/29/95 at 10:43:

4-chlorophenyl phenyl ether	27.4%
4,6-dinitro-2-methylphenol	38.2%
bis(2-ethylhexyl)phthalate	45.4%

All positive and non-detect results for bis(2-ethylhexyl)ether in the associated samples were flagged as estimated (J) and (UJ). All results for the other compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

All Method Blank criteria for the method were met. No action was necessary.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria for the method were met. No action was required.

VI.) Matrix Spike/Matrix Spike Duplicate (MS / MSD):

All MS / MSD criteria for the method were met. No action was necessary.

VII.) Field Duplicates:

There were no field duplicates associated with this SDG. No action was required.

VIII.) Internal Standards Performance:

All Internal Standard Performance criteria for the method were met. No action was required.

IX.) TCL Compound Identification:

All criteria for the method were met, so no action was required.

X.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All criteria for the method were met, so no action was required.

XI.) Tentatively Identified Compounds (TIC's):

All TIC criteria for the method were met, so no action was taken.

XII.) System Performance:

All criteria were met, so no action was necessary.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

POLYCHLORINATED BIPHENYLS (PCB's)

I.) Holding Times:

All samples were extracted and analyzed within required holding times. No action was required.

II.) Instrument Performance:

All Instrument Performance criteria for the method were met. No action was necessary.

III.) Calibration:

All Calibration criteria for the method were met. No action was necessary.

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks, so no data qualification was necessary.

V.) Surrogate Recoveries:

All Surrogate Percent Recovery criteria for the method were met. No action was required.

VI.) Matrix Spike/Matrix Spike Duplicate (MS / MSD):

All MS / MSD criteria for the method were met. No action was required.

VII.) TCL Compound Identification:

Pesticide/PCB Identification Summary (PIS):

All PIS criteria for the method were met. No action was required.

VIII.) Field Duplicates:

There were no field duplicates associated with this SDG.

IX.) Pesticide Cleanup Check:

Florisil Cartridge Check:

All criteria for this method were met, so no action was taken.

Gel Permeation Chromatography (GPC):

All GPC criteria for the method were met, so no action was necessary.

X.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All criteria for the method were met, so no action was required.

XI.) Overall Assessment of Data/General:

All data were acceptable without qualification.

TOTAL METALS

I.) Holding Times:

All Holding Time criteria for the method were met, so no action was taken.

II.) Calibration:

All Calibration criteria for the method were met, so no action was required.

III.) Blanks:

The following blank results represent the highest detections associated with the samples and were used for data qualification:

Blank Type/ID#	Element	Max. Conc.	Action Limit mg/kg
CCB2	antimony	27.3 ug/L	27.3
CCB2	arsenic	30.3 ug/L	30.3
CCB8	copper	37.2 ug/L	37.2
CCB9	thallium	33.1 ug/L	33.1
CCB6	potassium	469 ug/L	4689

CCB = Continuing Calibration Blank

All results greater than the IDL but less than 5X the blank amount (Action Level, mg/kg for soil samples) for which the contaminated blank was an associated calibration blank were flagged as undetected (U).

The following analytes had negative results with absolute values greater than the IDL's:

Blank Type/ID#	Analyte	Neg. Conc.	5X Conc. (mg/kg)
CCB2	aluminum	-24.3 ug/L	24.3
CCB5	cadmium	-1.22 ug/L	1.2
CCB2	calcium	-11.2 ug/L	11.2
CCB5	iron	-15.6 ug/L	15.6
CCB5	magnesium	-14.2 ug/L	14.2

CCB = Continuing Calibration Blank

All associated positive sample results less than 5X the absolute value of the negative blank result were flagged as estimated (J) and all non-detects were flagged as estimated (UJ).

IV.) ICP Interference Check Sample Results:

All Interference Check Sample criteria for the method were met. No action was required.

V.) ICP Serial Dilution Analysis:

All Serial Dilution criteria for the method were met, so no action was necessary.

VI.) Laboratory Control Samples (LCS):

All LCS criteria for the method were met. No action was required.

VII.) Duplicate Sample Analysis:

The Relative Percent Differences (RPD's) of the analytes listed below exceeded the 35% QC limit for sample 121SB01301MD:

aluminum	36%
calcium	61%
copper	146%
iron	36%
mercury	47%
nickel	73%

All positive and non-detect results for these analytes in the associated samples were flagged as estimated (J) and (UJ).

VIII.) Matrix Spike Recoveries:

The Percent Recoveries (%R's) for the analytes listed below were outside the 75-125% QC limits for sample 121SB01301MS:

antimony	17.1%

chromium	67.6%
manganese	51.1%
nickel	165%
selenium	73.3%
zinc	420%

The positive results for chromium, manganese, nickel and selenium were flagged as estimated (J) and the non-detect result for antimony was rejected (R) in associated sample 121SB01301.

IX.) Field Duplicates:

No designated field duplicates were associated with this SDG.

X.) Furnace Atomic Absorption QC:

GFAA analysis were not performed for the samples in this SDG.

XI.) Sample Result, Calculation/Transcription Verification:

All criteria for the method were met, so no action was taken.

XII.) Quarterly Verification of Instrumental Parameters:

All criteria for the method were met, so no action was required.

XIII.) Overall Assessment of Data/General:

Antimony was rejected in sample 121SB01301 due to a %R less than the 30% QC limit. All remaining laboratory data were acceptable with qualification.

VALIDATA

Chemical Services, Inc.

P. O. Box 930422 Norcross, Ga. 30093

DATA VALIDATION SUMMARY REPORT

COMPANY:	EnSafe/Allen & Hoshall
SITE NAME:	Charleston Naval Base
PROJECT NUMBER:	8500.014
CONTRACTED LAB:	PACE Inc.
EPA SOW/METHOD:	EPA 8290
VALIDATION GUIDELINES:	EPA 8290, Professional Judgement, Laboratory Statements
SAMPLE MATRIX:	Soil
TYPES OF ANALYSES:	2,3,7,8-substituted PCDD's and PCDF's
SDG NO:	CHS35

SAMPLES:

Client Sample #:	Lab Sample #:	Matrix	PCDD/ PCDF
019SB01601	IL0500-1	Soil	X
019SB01601 MS	IL0500-2 (MS)	Soil	X
019SB01601 MSD	IL0500-3 (MSD)	Soil	X
019SB01701	IL0500-4	Soil	X
019SB01801	IL0500-5	Soil	X
121SB01701	IL0500-6	Soil	X
121SB01601	IL0500-7	Soil	X
121SB01401	IL0500-8	Soil	X
121SB01301	IL0500-9	Soil	X
017SB03301	IL0522-1	Soil	X
017SB03302	IL0522-2	Soil	X
017SB03201	IL0522-3	Soil	X
017SB03202	IL0522-4	Soil	X
017SB03101	IL0522-5	Soil	X
017SB03102	IL0522-6	Soil	X
017SB02701	IL0522-7	Soil	X
017CB02701	IL0522-8	Soil	X
017SB02702	IL0522-9	Soil	X
017SB02801	IL0522-10	Soil	X
017SB02802	IL0522-11	Soil	X
	LCS / (IL0500)	Soil	X
	LCSD / (IL0500)	Soil	X
	LCS / (IL0522)	Soil	X
	LCSD / (IL0522)	Soil	X

VALIDATA

Chemical Services, Inc.

P. O. Box 930422 Norcross, Ga. 30093

EnSafe/Allen & Hoshall
5720 Summer Trees Drive, Suite 8
Memphis, TN 38134
Attn: Tina Cantwell

5/31/95

Dear Ms. Cantwell:

Please find enclosed the data validation narrative for SDG APX17 dioxins. That completes the rush SDGs we had in house. More NWIRP metals will be coming soon as well as 28 Zone I SDGs.

We are pleased to be of service to you. Please call me at (404) 923-3890 if you have any questions.

Sincerely,

Kevin C. Harmon
Client Services Director

MEMORANDUM

TO : Britton Dotson

FROM : Charlie Vernoy

SUBJECT : Zone H Validation Reports

DATE : May 30, 1995

Enclosed you will find the Validation Reports for CHS35, 37 and 40 for dioxin and CHS40 and 45 for non-dioxin analyses. Also, you will find a copy of the sulfur results taken on the wells for the engineering parameters. Validation Report APX17 should be coming in this week. When I receive it I will send you a copy for the report.

If you have any questions, please do not hesitate to call me.

DATA REVIEWER(S): Linda H. Liu, Shawn S. Lin, Ph.D., Kevin C. Harmon

RELEASE SIGNATURE: Kevin C. Harmon

DATA QUALIFICATION SUMMARY

PACE Inc. - CHS35 2,3,7,8-substituted PCDD's and PCDF's

SAMPLES: 019SB01601, 019SB01601 MS, 019SB01601 MSD, 019SB01701, 019SB01801, 121SB01701, 121SB01601, 121SB01401, 121SB01301, 017SB03301, 017SB03302, 017SB03201, 017SB03202, 017SB03101, 017SB03102, 017SB02701, 017CB02701, 017SB02702, 017SB02801, 017SB02802, LCS / (IL0500), LCSD / (IL0500), LCS / (IL0522), LCSD / (IL0522)

2,3,7,8-SUBSTITUTED PCDD'S AND PCDF'S

I.) Holding Times:

All criteria were met, so no action was taken.

II.) HRGC/HRMS System Performance:

GC Column Performance Check:

According to EPA method 8290, a column performance check must be run before the beginning routine calibration run.

The laboratory ran a column performance check after the beginning routine calibration run, which invalidated the beginning routine calibration results. Since the effects of this sequence deviation cannot be verified, all associated positive sample results are recommended to be flagged as estimated (J).

Mass Resolution Check:

The following end of sequence Mass Resolution Checks were run outside the 12-hour QC limit:

I.D.	Date and Time	Total Time
End Mass Res. Check	4/3/95 22:27	13:04
End Mass Res. Check	4/5/95 22:24	12:41

The laboratory did not reanalyze the affected samples; all associated positive sample results are recommended to be flagged as estimated (J).

There was a time "gap" (about 3 hours) between the end of sequence Calibration (4/4/95 5:39) and Mass Resolution Check (4/4/95 8:37) runs. The laboratory certified that there were no instrument adjustments or Resolution Checks in the time "gap", so no action was taken (see Section X).

Mass Verification Check:

Mass Verification was checked at the beginning of each analytical sequence.

Data Acquisition:

The were no Signal-to-Noise Ratios calculated. See Section VIII for data validation action.

III.) Calibration:

Calibration Range:

According to EPA method 8290, if the concentration in the final extract of any of the fifteen PCDD's/PCDF's exceeds the upper MCL (Method Calibration Limit), a second analysis of the sample (using a one tenth aliquot) should be undertaken.

The upper MCL was 2000 pg/g for OCDD for a 10 g soil sample. Several OCDD sample results in this SDG were over the upper MCL and the laboratory did not perform the second analyses. It is believed that the OCDD results are potentially biased low. All positive OCDD sample results higher than 2000 pg/g are recommended to be flagged as estimated (J).

Initial Calibration:

All criteria were met, so no action was required.

Calibration Verifications:

All criteria were met, so no action was required.

IV.) Blanks:

According to EPA method 8290, a method blank must be analyzed immediately after a beginning calibration run to demonstrate freedom from contamination and freedom from carryover from the calibration run. Also according to EPA method 8000, the performance of the entire analytical system must be checked daily, using data gathered from analyses of blanks, standards, and replicated samples.

The laboratory ran a method blank after the beginning calibration run, a column performance check and a nonane blank. The addition of the nonane blank (pure solvent, no internal standards added) invalidated use of the method blanks in determining instrument carryover levels.

The laboratory did not submit nonane blank quantitation results, therefore, no blank results could be used to assess instrument carryover levels.

No method blanks were analyzed for the sequences starting on 4/3/95 at 22:32 and on 4/5/95 at 9:43.

All associated low level (see Section IX) positive sample results are recommended to be designated as EMPC (Estimated Maximum Possible Concentration).

Method Blanks:

Two method blanks were analyzed. There were no positive PCDD's/PCDF's detected, so no action was taken.

Field Blanks:

No field blanks were analyzed for this batch.

V.) Internal Standards Performance:

The Percent Recoveries (%R's) of the following internal standards exceeded the 40-135% QC limits for the samples listed:

Sample	Compound	%R
IL0500-6	13C-1234678-HpCDD	23.74
	13C-OCDD	12.69
	13C-1234678-HpCDF	32.66

All positive and non-detect sample results associated with these internal standards are recommended to be flagged as estimated (J) and (UJ).

VI.) Spike/Spike Duplicates:

Matrix spike/spike duplicates IL0500-2MS and IL0500-3MSD were analyzed. The Percent Recoveries (%R's) and Relative Percent Differences (RPD's) exceeded the QC limits for the following compounds:

	Compound	MS %R	MSD %R	QC Limits %R	RPD	QC Limit RPD
IL0500-2MS / IL0500-3MSD	23478-PeCDF	95.5	145.3	50-150	*41.0	20

* = outside the QC limits.

All results for 23478-PeCDF in the associated samples are recommended to be flagged as estimated (J) and (UJ).

Two sets of LCS/LCSD's were analyzed. All recoveries were within the QC limits, so no action was taken.

VII.) Duplicates:

No field duplicates were analyzed.

VIII.) PCDD/PCDF Identification:

Retention Times:

All criteria were met, so no action was taken.

Ion Abundance:

All criteria were met, so no action was taken.

Signal-to-Noise (S/N) Ratio:

There was no evidence in the raw data that the S/N was checked by the laboratory for all reported positive sample results. The S/N ratios were not printed on the quantitation reports. However, the laboratory certified that all reported positive sample results met method S/N criteria (greater than or equal to 2.5), so no action was taken (see Section X).

Polychlorinated Diphenyl Ether (PCDPE) Interferences:

There was no evidence in the raw data that PCDPE interferences were checked by the lab. The S/N ratios were not printed on the quantitation reports. However, the laboratory certified that there were no signals detected having a S/N ratio greater than or equal to 2.5 at same retention time (+/- 2 seconds), in the corresponding PCDPE channel for all reported positive sample results, so no action was taken (see Section X).

Second Column Confirmation:

Second column confirmation was not run for all reported positive 2378-TCDF results. Since the laboratory cannot resolve the 2378-TCDF isomer from the 2347-TCDF isomer, all reported positive 2378-TCDF sample results are recommended to be designated as EMPC (Estimated Maximum Possible Concentration).

IX.) Overall Assessment of Data/General:

The laboratory did not follow the 12-hour analysis sequence and quality control (QC) procedures specified in EPA Method 8290 (Revision 0, November 1990).

Some reported positive and non-detect sample results are recommended to be flagged according to individual QC problems.

For purposes of blank assessment, all unflagged positive sample results below low level (average PQL) are recommended to be designated as EMPC (Estimated Maximum Possible Concentration).

Level	Matrix	TCDD	PeCDD/PeCDF HxCDD/HxCDF HpCDD/HpCDF	OCDD/OCDF
Low	Soil	< 10 pg/g	< 10 pg/g	< 50 pg/g
High	Soil	> 10 pg/g	> 10 pg/g	> 50 pg/g

All unflagged high level sample results are recommended to be flagged as estimated (J). All positive sample results may be biased high.

All total positive PCDD/PCDF sample results are recommended to be flagged as estimated (J).

X.) Laboratory Certifications Concerning Data Validation Deliverables:

In the validation of the PCDD/PCDF data, several important informational items were not verifiable from the data packages. Pace, Inc. provided certifications concerning the procedures used in the laboratory and in data reporting which address these issues.

The following certifications were made by Pace, Inc.:

1.) Nonane blanks were run before method blanks in the analytical sequence to document instrument condition and integrity.

2.) Nonane blank quantitation reports were not generated because of software limitations.

3.) In the event data for an analysis are unacceptable due to instrumental problems or other unpredictable factors, the analyst will reanalyze the particular extract and include only information from the reanalysis in the data package. The original analysis data is removed and the reanalysis data is inserted in the position in the raw data that would normally be occupied by the original analysis. This causes the data to appear to be out of order chronologically. This procedure was used by Pace, Inc. to report SDG APX01 method blank raw data and LCSD-AQ-IK1409/IK1054 data in the analytical sequence beginning 09/13/94. This procedure is common laboratory practice within Pace's dioxin laboratory.

4.) All positive reported results met all S/N method criteria.

5.) For all positive reported results, there were no S/N ratios greater than 2.5 in the corresponding ether channel.

6.) Pace, Inc. did not perform any analyses, checks or instrument adjustments between the end of sequence Calibration Checks and Mass Resolution Checks in the cases where more than one hour separated the Calibration and Mass Resolution Checks.

Validata Chemical Services, Inc. has incorporated these certifications into its data review as fact, and they have formed the basis for data validation of the unverifiable items. Validata Chemical Services, Inc. takes no responsibility for the validity of these certifications.

VALIDATA

Chemical Services, Inc.

P. O. Box 930422 Norcross, Ga. 30093

DATA VALIDATION SUMMARY REPORT

COMPANY:	EnSafe/Allen & Hoshall
SITE NAME:	Charleston Naval Base
PROJECT NUMBER:	8500.14
CONTRACTED LAB:	PACE, Incorporated
QA/QC LEVEL:	CLP Level IV
EPA SOW/METHOD:	EPA 1990 SOW / SW846: 8240, 8270, 8080
VALIDATION GUIDELINES:	USEPA *Contract Laboratory Program National Functional Guidelines for Organic Data Review, 1994*
SAMPLE MATRIX:	Soil/Water
TYPES OF ANALYSES:	Volatile Organics (VOA), Semivolatile Organics (SVOC), Pesticides/PCB's (P/PCB)
SDG NUMBER:	CHS36

SAMPLES:

Client Sample #:	Lab Sample #:	Matrix	VOA	SVOC	P/PCB
020CB00101	43391-001/002	Soil	X	X	
020CB01101	43415-001/002	Soil	X	X	
020TB00101	43391-003	Water	X		
653CB00701	43455-002	Soil		X	X
663CB00901	43455-001	Soil		X	
684CB04401	43422-001	Soil		X	
017CB02701	43345-001	Soil			X*
LCS1	LCC040695A	Water	X		
	LS-A2290	Soil		X	
	LSP-4247	Soil			X
LCS2	LCG040695	Soil	X		
	LS-A2291	Soil		X	
	LSP-4256	Soil			X
LCS3	LS-A2293	Soil		X	

*Note: Sample analyzed for PCB's only

TB = TRIP BLANK, LCS = LABORATORY CONTROL SAMPLES

DATA REVIEWER(S): Marvin L. Smith, Kevin C. Harmon

RELEASE SIGNATURE: Kevin C. Harmon

Data Qualifier Definitions:

J	-	The associated numerical value is an estimated quantity.
R	-	The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
U	-	The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	-	The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA QUALIFICATION SUMMARY

PACE, Incorporated - CHS36, SW846 Organics

SAMPLES: 020CB00101, 020CB01101, 020TB00101, 653CB00701, 663CB00901, 684CB04401, 017CB02701, LCS1, LCS2, LCS3

VOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria for the method were met, so no action was taken.

II.) GC/MS Tuning:

All GC/MS Tuning criteria were met, so no action was necessary.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviation (%RSD) for carbon disulfide was 33.9%, which exceeded the 30% QC limit for the standards run on 11/28/94 on instrument CMS-HP. Since there were no positive detections of this compound in the associated samples, no action was required.

The Percent Relative Standard Deviations (%RSD's) exceeded the 30% QC limit for the standards run on 4/6/95 on instrument HP-GMS for the following compounds:

chloromethane	33.5 %
bromomethane	37.7 %
acetone	50.1 %
xylene (total)	34.2 %

Since there were no positive detections of these compounds in the associated samples, no action was necessary.

Continuing Calibration:

The Percent Difference (%D) for chloromethane was 36.8% for the standard run on 4/6/95 at 12:07 on instrument CMS-HP, which exceeded the 25% QC limit. There were no positive detections of this compound in the associated samples. The non-detect results for this compound in samples 020CB00101 and 020TB00101 were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

Methylene chloride was detected at 4.0 ug/L in water method blank BC040695A. Since the only associated sample was a trip blank, no action was necessary.

Methylene chloride, acetone and toluene were detected at 4.8 ug/kg, 9.0 ug/kg and 2.7 ug/kg, respectively, in soil method blank BG040695B. Methylene chloride was qualified using the trip blank. Detections of acetone and toluene in the associated soil samples below 10X these amounts were flagged as undetected (U) with the detection limit being raised to the level of contamination in each sample.

Equipment Blanks:

There were no equipment blanks associated with this SDG.

Trip Blanks:

Methylene chloride was detected at 7.0 ug/L in trip blank 020CB00101. Detections of methylene chloride in the associated samples below 10X this amount were flagged as undetected (U) with the detection limit being raised to the level of contamination in each sample.

TIC's:

There were no positive detections of TIC's in the blanks, so no action was required.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria for the method were met, so no action was taken.

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria for the method were met, so no action was necessary.

VII.) Matrix Spike/Matrix Spike Duplicate (MS / MSD):

There were no MS / MSD analyses associated with this SDG. Since the LCS Recoveries met QC criteria, no action was required.

VIII.) Field Duplicates:

There were no field duplicates associated with this SDG.

IX.) Internal Standards Performance:

All Internal Standard criteria for the method were met, so no action was taken.

X.) TCL Compound Identification:

All TCL Compound Identification criteria for the method were met, so no action was taken.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria for the method were met, so no action was taken.

XII.) Tentatively Identified Compounds (TIC's):

All TIC Identification criteria for the method were met, so no action was required.

XIII.) System Performance:

All System Performance criteria for the method were met, so no action was required.

XIV.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

SEMIVOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria for the method were met, so no action was necessary.

II.) GC/MS Tuning:

All GC/MS Tuning criteria for the method were met, so no action was taken.

III.) Calibration:

Initial Calibration:

All Initial Calibration criteria were met. Data qualification was not required.

Continuing Calibration:

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 3/31/95 at 08:12 for the following compounds:

benzidine	40.0 %
benzo(a)anthracene	26.6 %
bis(2-ethylhexyl)phthalate	51.8 %

The positive results for benzo(a)anthracene and bis(2-ethylhexyl)phthalate and the non-detect result for benzidine in sample 020CB00101 were flagged as estimated (J) and (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 4/4/95 at 09:36 for the following compounds:

benzidine	38.9 %
benzoic acid	37.3 %
bis(2-ethylhexyl)phthalate	30.1 %

The positive result for bis(2-ethylhexyl)phthalate and the non-detect results for benzidine and benzoic acid in sample 020CB01101 were flagged as estimated (J) and (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 4/5/95 at 08:57 for the following compounds:

benzidine	60.7 %
benzoic acid	39.9 %
bis(2-ethylhexyl)phthalate	34.4 %

All results for these compounds in sample 684CB04401, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 4/5/95 at 08:57 for the following compounds:

benzidine	53.6 %
benzoic acid	43.2 %
bis(2-ethylhexyl)phthalate	35.0 %

All results for these compounds in samples 653CB00701 and 663CB00901, which consisted entirely of non-detects, were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

Bis(2-ethylhexyl)phthalate was detected at 270 ug/kg in soil method blank B-A2293. Detections of this compound in samples 663CB00901 and 684CB04401 below 10X this amount were flagged as undetected (U) with the detection limit being raised to the level of contamination in each sample.

Equipment Blanks:

There were no equipment blanks associated with this SDG. No action was required.

TIC's:

There were no positive detections of TIC's in the method blanks, so no action was necessary.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria for the method were met, so no action was taken.

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria for the method were met, so no action was necessary.

VII.) Matrix Spike/Matrix Spike Duplicate (MS / MSD):

There were no MS / MSD analyses associated with this SDG. Since the LCS Recoveries met QC criteria, no action was required.

VIII.) Field Duplicates:

There were no field duplicates associated with this SDG.

IX.) Internal Standards Performance:

All Internal Standard criteria for the method were met, so no action was taken.

X.) TCL Compound Identification:

All TCL Compound Identification criteria for the method were met, so no action was taken.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria for the method were met, so no action was taken.

XII.) Tentatively Identified Compounds (TIC's):

All TIC criteria for the method were met, so no action was taken.

XIII.) System Performance:

All System Performance criteria for the method were met, so no action was taken.

XIV.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

PESTICIDES/PCB's

I.) Holding Times:

All samples were extracted and analyzed within the required holding times, so no action was taken.

II.) Instrument Performance:

All Pesticide Instrument Performance criteria for the method were met, so no action was necessary.

III.) Calibration:

Initial Calibration:

All Initial Calibration criteria for the method were met, so no action was required.

Continuing Calibration:

All Continuing Calibration criteria for the method were met, so no action was taken.

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks. Data qualification was not required.

Equipment Blanks:

There were no equipment blanks associated with this SDG.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria for the method were met, so no action was necessary.

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria for the method were met, so no action was required.

VII.) Matrix Spike/Matrix Spike Duplicate (MS / MSD):

There were no MS / MSD analyses associated with this SDG. Since the LCS Recoveries met QC criteria, no action was necessary.

VIII.) TCL Compound Identification:

Pesticide/PCB Identification Summary:

All PIS criteria for the method were met, so no action was taken.

IX.) Field Duplicates:

There were no field duplicates associated with this SDG.

X.) Pesticide Cleanup Check:

Florisil Cartridge Check:

Florisil data was not available for this SDG. No action was taken.

Gel Permeation Chromatography (GPC):

GPC was not performed for this SDG. No action was taken.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria for the method were met, so no action was required..

XII.) Overall Assessment of Data/General:

All laboratory data were acceptable without qualification.

VALIDATA

Chemical Services, Inc.

P. O. Box 930422 Norcross, Ga 30093

DATA VALIDATION SUMMARY REPORT

COMPANY:	Ensafe/Allen & Hoshall
SITE NAME:	Charleston Naval Base
PROJECT NUMBER:	8500.014
CONTRACTED LAB:	PACE, Incorporated
QA/QC LEVEL:	Level III
EPA SOW/METHOD:	EPA 1990 SOW
VALIDATION GUIDELINES:	*National Functional Guidelines for Organic Data Review,* 1994; *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses,* 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review,* 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review,* 1994
SAMPLE MATRIX:	Soil, Water
TYPES OF ANALYSES:	Volatile Organics (VOA), Semivolatile Organics (SVOC), Pesticides/PCB's (P/PCB)
SDG NUMBER:	CHS37

SAMPLES:

Client Sample #:	Lab Sample #:	Matrix	VOA	SVOC	P/PCB
017SB02901	43376-001	Soil			X
017SB02902	43376-002	Soil			X
017SB03001	43376-003	Soil			X
017SB03002	43376-004	Soil			X
020SB00101	43392-001/9	Soil	X	X	
020SB00201	43392-002/10	Soil	X	X	
020SB00201RE	43392-002RE	Soil	X		
020SB00301	43392-003/11	Soil	X	X	
020SB00301RE	43392-003RE	Soil	X		
020SB00401	43392-004/12	Soil	X	X	
020SB00501	43392-005/13	Soil	X	X	
020SB00601	43392-006/14	Soil	X	X	
020SB00701	43392-007/15	Soil	X	X	
020SB00801	43392-008/16	Soil	X	X	
020SB00901	43414-001/6	Soil	X	X	
020SB00901RE	43414-001RE	Soil	X		

Client Sample #:	Lab Sample #:	Matrix	VOA	SVOC
020SB01001	43414-002/7	Soil	X	X
020SB01001RE	43414-002RE	Soil	X	
020SB01101	43414-003/8	Soil	X	X
020SB01101MS	43414-003/8MS	Soil	X	X
020SB01101MSD	43414-003/8MSD	Soil	X	X
020SB01102	43414-004/9	Soil	X	X
020TB00901	43414-005	Water	X	
670SB03301	43414-010	Soil		X
670SB03302	43414-011	Soil		X
670SB03201	43414-012	Soil		X
670SB03202	43414-013	Soil		X

MS = MATRIX SPIKE, MSD = MATRIX SPIKE DUPLICATE, TB = TRIP BLANK
RE = REANALYSIS

DATA REVIEWER(S): Amy L. Hogan, Marvin L. Smith

RELEASE SIGNATURE: Kim C. Hamon

Data Qualifier Definitions:

J	-	The associated numerical value is an estimated quantity.
R	-	The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
U	-	The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	-	The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA QUALIFICATION SUMMARY

PACE, Incorporated - CHS37 Organics and Inorganics

SAMPLES: 017SB02901, 017SB02902, 017SB03001, 017SB03002, 020SB00101, 020SB00201, 020SB00301, 020SB00401, 020SB00501, 020SB00601, 020SB00701, 020SB00801, 020SB00901, 020SB01001, 020SB01101, 020SB01101MS, 020SB01101MSD, 020SB01102, 020TB00901, 670SB03301, 670SB03302, 670SB03201, 670SB03202

VOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria for the method were met. No action was required.

II.) GC/MS Tuning:

All GC/MS Tuning criteria for the method were met, so no action was necessary.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviation (%RSD) of the compounds listed below exceeded the 30% QC limit for the Initial Calibration on 4/06/95 on instrument G:

chloromethane	33.5%
bromomethane	37.7%
acetone	50.1%
xylene (total)	34.2%

Since there were no positive results for these compounds in the associated samples, no action was required.

The Percent Relative Standard Deviation (%RSD) of carbon disulfide (33.9%) exceeded the 30% QC limit for the Initial Calibration run on 11/28/94 on instrument C. Since there were no positive results for this compound in the associated samples, no action was required.

Continuing Calibration:

The Percent Difference (%D) of chloromethane (36.8%) exceeded the 25% QC limit for the Continuing Calibration run on 4/06/95 at 12:07 on instrument C. All results for this compound in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Difference (%D) of chloroethane (40.5%) exceeded the 25% QC limit for the Continiung Calibration run on 4/09/95 at 12:59 on instrument G. All results for this compound in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

Acetone, methylene chloride and toluene were detected at 9 ug/kg, 4.8 ug/kg and 2.7 ug/kg, respectively, in the soil blank for 4/06/95. All positive results for these compounds less than 10X the blank contamination were flagged as undetected (U) with the detection limit being raised to the level of contamination in each sample.

Acetone and methylene chloride were detected at 9 ug/kg and 2.3 ug/kg, respectively, in the soil blank for 4/07/95. All positive results for these compounds less than 10X the blank contamination were flagged as undetected (U) with the detection limit being raised to the level of contamination in each sample.

Acetone and methylene chloride were detected at 6 ug/kg and 2.6 ug/kg, respectively, in the soil blank for 4/09/95. All positive results for these compounds less than 10X the blank concentration were flagged as undetected (U) with the detection limit being raised to the level of contamination in each sample.

Methylene chloride was detected at 4 ug/L in the water blank for 4/06/95. Since the associated sample was a trip blank, no action was necessary.

Trip Blanks:

Methylene chloride was detected at 6 ug/L in trip blank 020TB00901. All positive results for this compound in the associated samples less than 10X the blank amount were flagged as undetected (U) with the detection limit being raised to the level of contamination in each sample.

V.) Surrogate Recoveries:

The Percent Recoveries (%R's) of toluene-d8 for the samples listed below exceeded the 86-114% QC limits:

020SB00201	119%
020SB00301	118%
020SB00901	120%
020SB00901RE	117%
020SB01001	128%
020SB01001RE	121%

All positive results in each of these samples were flagged as estimated (J).

VI.) Matrix Spike/Matrix Spike Duplicate (MS / MSD):

All MS / MSD criteria for the method were met. No action was necessary.

VII.) Field Duplicates:

There were no field duplicate samples associated with this SDG. No action was required.

VIII.) Internal Standards Performance:

The Percent Recoveries (%R's) of bromochloromethane (48%), 1,4-difluorobenzene (42%) and chlorobenzene-d5 (35%) were below the 50-200% QC limits for sample 020SB00901RE. All positive and non-detect results for this sample were flagged as estimated (J) and (UJ).

The Percent Recoveries (%R's) of bromochloromethane (44%), 1,4-difluorobenzene (35%) and chlorobenzene-d5 (29%) were below the 50-200% QC limits for sample 020SB01001RE. All positive and non-detect results for this sample were flagged as estimated (J) and (UJ).

The Percent Recoveries (%R's) of bromochloromethane (33%), 1,4-difluorobenzene (31%) and chlorobenzene-d5 (34%) were below the 50-200% QC limits for sample 020SB00301RE. All positive and non-detect results for this sample were flagged as estimated (J) and (UJ).

IX.) TCL Compound Identification:

All criteria for the method were met, so no action was required.

X.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All criteria for the method were met, so no action was required.

XI.) Tentatively Identified Compounds (TIC's):

All TIC criteria for the method were met, so no action was taken.

XII.) System Performance:

All criteria were met, so no action was necessary.

XIII.) Overall Assessment of Data/General:

The original analysis of sample 020SB00901 is considered by the validator to be of preferable data quality since the re-analysis had low internal standard recoveries and high surrogate recoveries. The original analysis of sample 020SB01001 is also considered by the validator to be of preferable data quality since the re-analysis had low internal standard recoveries and high surrogate recoveries. The original analysis of sample 020SB00301 is considered by the validator to be of preferable data quality since the re-analysis had low internal standard recoveries and high surrogate recoveries. The reanalysis of sample 020SB00201 is considered by the validator to be of preferable data quality since all surrogate recovery criteria were met. All other laboratory data were acceptable with qualification.

SEMIVOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria for the method were met. No action was required.

II.) GC/MS Tuning:

All GC/MS Tuning criteria for the method were met, so no action was necessary.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviation (%RSD) for benzo(k)fluoranthene (31.4%) exceeded the 30% QC limit for the Initial Calibration run on 2/17/95. All positive results for this compound in the associated samples were flagged as estimated (J).

Continuing Calibration:

The Percent Differences (%D's) of the compounds listed below exceeded the 25% QC limit for the Continuing Calibration run on 3/31/95 at 08:12:

4,6-dinitro-2-methylphenol	32.7%
benzidine	40.0%
benzo(a)anthracene	26.6%
bis(2-ethylhexyl)phthalate	51.8%

All results for benzo(a)anthracene and bis(2-ethylhexyl)phthalate in the associated samples, which consisted entirely of positive results, were flagged as estimated (J). All results for the other compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Differences (%D's) of the compounds listed below exceeded the 25% QC limit for the Continuing Calibration run on 4/03/95 at 12:42:

benzoic acid	31.5%
4-chlorophenyl phenyl ether	26.8%
4,6-dinitro-2-methylphenol	26.2%
benzo(a)anthracene	27.1%
bis(2-ethylhexyl)phthalate	46.7%

All positive and non-detect results for benzo(a)anthracene and bis(2-ethylhexyl)phthalate were flagged as estimated (J) and (UJ). All results for the other compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Differences (%D's) of the compounds listed below exceeded the 25% QC limit for the Continuing Calibration run on 4/04/95 at 09:36:

benzoic acid	37.3%
benzidine	38.9%
bis(2-ethylhexyl)phthalate	30.1%

All positive and non-detect results for bis(2-ethylhexyl)phthalate were flagged as estimated (J) and (UJ). All results for the other compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Differences (%D's) of the compounds listed below exceede the 25% QC limit for the Continuing Calibration on 4/05/95 at 08:57:

benzoic acid	39.9%
benzidine	60.7%
bis(2-ethylhexyl)phthalate	34.4%

All positive and non-detect results for bis(2-ethylhexyl)phthalate were flagged as estimated (J) and (UJ). All results for the other compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

All Method Blank criteria for the method were met. No action was necessary.

Field Blanks:

There were no field blanks associated with this SDG. No action was taken.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria for the method were met. No action was required.

VI.) Matrix Spike/Matrix Spike Duplicate (MS / MSD):

All MS / MSD criteria for the method were met. No action was necessary.

VII.) Field Duplicates:

There were no field duplicate samples associated with this SDG. No action was required.

VIII.) Internal Standards Performance:

The Percent Recoveries (%R's) of perylene-d12 in samples 020SB00201 (37%) and 020SB00501 (39%) were below the 50-200 QC limits. All positive and non-detect results for the compounds quantitated with this Internal Standard for both samples were flagged as estimated (J) and (UJ).

IX.) TCL Compound Identification:

All criteria for the method were met, so no action was required.

X.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All criteria for the method were met, so no action was required.

XI.) Tentatively Identified Compounds (TIC's):

All TIC criteria for the method were met, so no action was taken.

XII.) System Performance:

All criteria were met, so no action was necessary.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

PESTICIDES AND POLYCHLORINATED BIPHENYLS

I.) Holding Times:

All samples were extracted and analyzed within required holding times. No action was required.

II.) Instrument Performance:

All Instrument Performance criteria for the method were met. No action was necessary.

III.) Calibration:

All Calibration criteria for the method were met. No action was necessary.

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks, so no data qualification was necessary.

Field Blanks:

There were no field blanks associated with this SDG. No action was required.

V.) Surrogate Recoveries:

All Surrogate Percent Recovery criteria for the method were met. No action was required.

VI.) Matrix Spike/Matrix Spike Duplicate (MS / MSD):

All MS / MSD criteria for the method were met. No action was required.

VII.) TCL Compound Identification:

Pesticide/PCB Identification Summary (PIS):

All PIS criteria for the method were met. No action was required.

VIII.) Field Duplicates:

There were no field duplicates associated with this SDG.

IX.) Pesticide Cleanup Check:

Florisil Cartridge Check:

All criteria for this method were met, so no action was taken.

Gel Permeation Chromatography (GPC):

All GPC criteria for the method were met, so no action was necessary.

X.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All criteria for the method were met, so no action was required.

XI.) Overall Assessment of Data/General:

All data were acceptable without qualification.

VALIDATA

Chemical Services, Inc.

P. O. Box 930422, Norcross, Ga. 30093

DATA VALIDATION SUMMARY REPORT

COMPANY:	EnSafe/Allen & Hoshall
SITE NAME:	Charleston Naval Base
PROJECT NUMBER:	8500.014
CONTRACTED LAB:	PACE Inc.
EPA SOW/METHOD:	EPA 8290
VALIDATION GUIDELINES:	EPA 8290, Professional Judgement, Laboratory Statements
SAMPLE MATRIX:	Soil
TYPES OF ANALYSES:	2,3,7,8-substituted PCDD's and PCDF's

SDG NO: CHS37

SAMPLES:

Client Sample #:	Lab Sample #:	Matrix	PCDD/ PCDF
017SB02901	IL0523-1	Soil	X
017SB02902	IL0523-2	Soil	X
017SB03001	IL0523-3	Soil	X
017SB03002	IL0523-4	Soil	X
013SB02501	IL0523-5	Soil	X
013CB02501	IL0523-6	Soil	X
013SB02502	IL0523-7	Soil	X
013SB02801	IL0523-8	Soil	X
013SB02802	IL0523-9	Soil	X
013SB02701	IL0523-10	Soil	X
013SB02601	IL0523-11	Soil	X
013SB02602	IL0523-12	Soil	X
020CB00101	IL0535-1	Soil	X
020SB00101	IL0535-2	Soil	X
020SB01101	IL0552-1	Soil	X
020SB01101 MS	IL0552-2MS	Soil	X
020SB01101 MSD	IL0552-3MSD	Soil	X
020CB01101	IL0552-4	Soil	X
	LCS-IL0523/535	Soil	X
	LCSD-IL0523/535	Soil	X
	LCS-IL0552	Soil	X
	LCSD-IL0552	Soil	X

DATA REVIEWER(S): Linda H. Liu, Shawn S. Lin, Ph.D., Kevin C. Harmon

RELEASE SIGNATURE: Kevin C. Harmon

DATA QUALIFICATION SUMMARY

PACE Inc. - CHS37 2,3,7,8-substituted PCDD's and PCDF's

SAMPLES: 017SB02901, 017SB02902, 017SB03001, 017SB03002, 013SB02501, 013CB02501, 013SB02502, 013SB02801, 013SB02802, 013SB02701, 013SB02601, 013SB02602, 020CB00101, 020SB00101, 020SB01101, 020SB01101 MS, 020SB01101 MSD, 020CB01101, LCS-IL0523/535, LCSD-IL0523/535, LCS-IL0552, LCSD-IL0552

2,3,7,8-SUBSTITUTED PCDD'S AND PCDF'S

I.) Holding Times:

All criteria were met, so no action was taken.

II.) HRGC/HRMS System Performance:

GC Column Performance Check:

According to EPA method 8290, a column performance check must be run before the beginning routine calibration run.

The laboratory ran a column performance check after the beginning routine calibration run, which invalidated the beginning routine calibration results. Since the effects of this sequence deviation cannot be verified, all associated positive sample results are recommended to be flagged as estimated (J).

Mass Resolution Check:

The following end of sequence Mass Resolution Checks were run outside the 12-hour QC limit:

I.D.	Date and Time	Total Time
End Mass Res. Check	04/09/95 08:49	14:03
End Mass Res. Check	04/11/95 22:32	13:22
End Mass Res. Check	04/12/95 21:51	13:22

The laboratory did not reanalyze the affected samples; all associated positive sample results are recommended to be flagged as estimated (J).

There were time "gaps" (more than one hour) between the End of the Calibration and the End of the Mass Resolution Check runs. The laboratory certified that there were no instrument adjustments or Resolution Check runs in the time "gaps", so no action was taken (see Section X).

Mass Verification Check:

Mass Verification was checked at the beginning of each analytical sequence.

Data Acquisition:

The were no Signal-to-Noise Ratios calculated. See Section VIII for data validation action.

III.) Calibration:

Calibration Range:

According to EPA method 8290, if the concentration in the final extract of any of the fifteen PCDD's/PCDF's exceeds the upper MCL (Method Calibration Limit), a second analysis of the sample (using a one tenth aliquot) should be undertaken.

The upper MCL was 2000 pg/g for OCDD for a 10 g soil sample. Several OCDD sample results in this SDG were over the upper MCL and the laboratory did not perform the second analyses. It is believed that the OCDD results are potentially biased low. All positive OCDD sample results higher than 2000 pg/g are recommended to be flagged as estimated (J).

Initial Calibration:

All criteria were met, so no action was required.

Calibration Verifications:

All criteria were met, so no action was required.

IV.) Blanks:

According to EPA method 8290, a method blank must be analyzed immediately after a beginning calibration run to demonstrate freedom from contamination and freedom from carryover from the calibration run. Also according to EPA method 8000, the performance of the entire analytical system must be checked daily, using data gathered from analyses of blanks, standards, and replicated samples.

The laboratory ran a method blank after the beginning calibration run, a column performance check and a nonane blank. The addition of the nonane blank (pure solvent, no internal standards added) invalidated use of the method blanks in determining instrument carryover levels.

The laboratory did not submit nonane blank quantitation results, therefore, no blank results could be used to assess instrument carryover levels.

No method blank was analyzed for the sequence starting on 4/10/94 at 8:50.

All associated low level (see Section IX) positive sample results are recommended to be designated as EMPC (Estimated Maximum Possible Concentration).

Method Blanks:

1234678-HpCDD was detected in the method blank for the analytical sequence beginning at 09:10 on 4/11/95 at the following concentration:

Blank	Compound	Concentration pg/g	Action Level pg/g
MB-IL0552	1234678-HpCDD	0.37	3.7

Because nonane blanks were run immediately before method blanks in the analytical sequence, it is believed that the method blank detections are biased low. For this reason, a 10X blank rule was used to qualify the data.

Detections of the above compound in all associated samples (all samples in the same analytical sequence) below 10X the blank amounts (Action Level, pg/g for soil samples before percent solids correction) are recommended to be designated as EMPC (Estimated Maximum Possible Concentration).

Field Blanks:

No field blank was analyzed for this batch.

V.) Internal Standards Performance:

The Percent Recovery (%R) of the following internal standard exceeded the 40-135% QC limits for the sample listed:

Sample	Compound	%R
LCS-IL0523	13C-2378-TCDD	38.44

No data qualification action was taken for this QC sample.

VI.) Spike/Spike Duplicates:

Matrix spike/spike duplicates IL0552-2MS and IL0552-3MSD were analyzed. All recoveries were within the QC limits, so no action was taken.

Two sets of LCS/LCSD's were analyzed. All recoveries were within the QC limits, so no action was taken.

VII.) Duplicates:

No field duplicates were analyzed.

VIII.) PCDD/PCDF Identification:

Retention Times:

All criteria were met, so no action was taken.

Ion Abundance:

All criteria were met, so no action was taken.

Signal-to-Noise (S/N) Ratio:

There was no evidence in the raw data that the S/N was checked by the laboratory for all reported positive sample results. The S/N ratios were not printed on the quantitation reports. However, the laboratory certified that all reported positive sample results met method S/N criteria (greater than or equal to 2.5), so no action was taken (see Section X).

Polychlorinated Diphenyl Ether (PCDPE) Interferences:

There was no evidence in the raw data that PCDPE interferences were checked by the lab. The S/N ratios were not printed on the quantitation reports. However, the laboratory certified that there were no signals detected having a S/N ratio greater than or equal to 2.5 at same retention time (+/- 2 seconds), in the corresponding PCDPE channel for all reported positive sample results, so no action was taken (see Section X).

Second Column Confirmation:

Second column confirmation was not run for all reported positive 2378-TCDF results. Since the laboratory cannot resolve the 2378-TCDF isomer from the 2347-TCDF isomer, all reported positive 2378-TCDF sample results are recommended to be designated as EMPC (Estimated Maximum Possible Concentration).

IX.) Overall Assessment of Data/General:

The laboratory did not follow the 12-hour analysis sequence and quality control (QC) procedures specified in EPA Method 8290 (Revision 0, November 1990).

Some reported positive and non-detect sample results are recommended to be flagged according to individual QC problems.

For purposes of blank assessment, all unflagged positive sample results below low level (average PQL) are recommended to be designated as EMPC (Estimated Maximum Possible Concentration).

Level	Matrix	TCDD	PeCDD/PeCDF HxCDD/HxCDF HpCDD/HpCDF	OCDD/OCDF
Low	Soil	< 10 pg/g	< 10 pg/g	< 50 pg/g
High	Soil	> 10 pg/g	> 10 pg/g	> 50 pg/g

All unflagged high level sample results are recommended to be flagged as estimated (J). All positive sample results may be biased high.

All total positive PCDD/PCDF sample results are recommended to be flagged as estimated (J).

X.) Laboratory Certifications Concerning Data Validation Deliverables:

In the validation of the PCDD/PCDF data, several important informational items were not verifiable from the data packages. Pace, Inc. provided certifications concerning the procedures used in the laboratory and in data reporting which address these issues.

The following certifications were made by Pace, Inc.:

1.) Nonane blanks were run before method blanks in the analytical sequence to document instrument condition and integrity.

2.) Nonane blank quantitation reports were not generated because of software limitations.

3.) In the event data for an analysis are unacceptable due to instrumental problems or other unpredictable factors, the analyst will reanalyze the particular extract and include only information from the reanalysis in the data package. The original analysis data is removed and the reanalysis data is inserted in the position in the raw data that would normally be occupied by the original analysis. This causes the data to appear to be out of order chronologically. This procedure was used by Pace, Inc. to report SDG APX01 method blank raw data and LCSD-AQ-IK1409/IK1054 data in the analytical sequence beginning 09/13/94. This procedure is common laboratory practice within Pace's dioxin laboratory.

4.) All positive reported results met all S/N method criteria.

5.) For all positive reported results, there were no S/N ratios greater than 2.5 in the corresponding ether channel.

6.) Pace, Inc. did not perform any analyses, checks or instrument adjustments between the end of sequence Calibration Checks and Mass Resolution Checks in the cases where more than one hour separated the Calibration and Mass Resolution Checks.

Validata Chemical Services, Inc. has incorporated these certifications into its data review as fact, and they have formed the basis for data validation of the unverifiable items. Validata Chemical Services, Inc. takes no responsibility for the validity of these certifications.

VALIDATA

Chemical Services, Inc.

P. O. Box 930422 Norcross, Ga. 30093

DATA VALIDATION SUMMARY REPORT

COMPANY:	EnSafe/Allen & Hoshall
SITE NAME:	Charleston Naval Base
PROJECT NUMBER:	8500.014
CONTRACTED LAB:	PACE Inc.
EPA SOW/METHOD:	EPA 8290
VALIDATION GUIDELINES:	EPA 8290, Professional Judgement, Laboratory Statements
SAMPLE MATRIX:	Soil
TYPES OF ANALYSES:	2,3,7,8-substituted PCDD's and PCDF's

SDG NO: CHS37

SAMPLES:

Client Sample #:	Lab Sample #:	Matrix	PCDD/ PCDF
017SB02901	IL0523-1	Soil	X
017SB02902	IL0523-2	Soil	X
017SB03001	IL0523-3	Soil	X
017SB03002	IL0523-4	Soil	X
013SB02501	IL0523-5	Soil	X
013CB02501	IL0523-6	Soil	X
013SB02502	IL0523-7	Soil	X
013SB02801	IL0523-8	Soil	X
013SB02802	IL0523-9	Soil	X
013SB02701	IL0523-10	Soil	X
013SB02601	IL0523-11	Soil	X
013SB02602	IL0523-12	Soil	X
020CB00101	IL0535-1	Soil	X
020SB00101	IL0535-2	Soil	X
020SB01101	IL0552-1	Soil	X
020SB01101 MS	IL0552-2MS	Soil	X
020SB01101 MSD	IL0552-3MSD	Soil	X
020CB01101	IL0552-4	Soil	X
	LCS-IL0523/535	Soil	X
	LCSD-IL0523/535	Soil	X
	LCS-IL0552	Soil	X
	LCSD-IL0552	Soil	X

DATA REVIEWER(S): Linda H. Liu, Shawn S. Lin, Ph.D., Kevin C. Harmon

RELEASE SIGNATURE: Kevin C. Harmon

DATA QUALIFICATION SUMMARY

PACE Inc. - CHS37 2,3,7,8-substituted PCDD's and PCDF's

SAMPLES: 017SB02901, 017SB02902, 017SB03001, 017SB03002, 013SB02501, 013CB02501, 013SB02502, 013SB02801, 013SB02802, 013SB02701, 013SB02601, 013SB02602, 020CB00101, 020SB00101, 020SB01101, 020SB01101 MS, 020SB01101 MSD, 020CB01101, LCS-IL0523/535, LCSD-IL0523/535, LCS-IL0552, LCSD-IL0552

2,3,7,8-SUBSTITUTED PCDD'S AND PCDF'S

I.) Holding Times:

All criteria were met, so no action was taken.

II.) HRGC/HRMS System Performance:

GC Column Performance Check:

According to EPA method 8290, a column performance check must be run before the beginning routine calibration run.

The laboratory ran a column performance check after the beginning routine calibration run, which invalidated the beginning routine calibration results. Since the effects of this sequence deviation cannot be verified, all associated positive sample results are recommended to be flagged as estimated (J).

Mass Resolution Check:

The following end of sequence Mass Resolution Checks were run outside the 12-hour QC limit:

I.D.	Date and Time	Total Time
End Mass Res. Check	04/09/95 08:49	14:03
End Mass Res. Check	04/11/95 22:32	13:22
End Mass Res. Check	04/12/95 21:51	13:22

The laboratory did not reanalyze the affected samples; all associated positive sample results are recommended to be flagged as estimated (J).

There were time "gaps" (more than one hour) between the End of the Calibration and the End of the Mass Resolution Check runs. The laboratory certified that there were no instrument adjustments or Resolution Check runs in the time "gaps", so no action was taken (see Section X).

Mass Verification Check:

Mass Verification was checked at the beginning of each analytical sequence.

Data Acquisition:

The were no Signal-to-Noise Ratios calculated. See Section VIII for data validation action.

III.) Calibration:

Calibration Range:

According to EPA method 8290, if the concentration in the final extract of any of the fifteen PCDD's/PCDF's exceeds the upper MCL (Method Calibration Limit), a second analysis of the sample (using a one tenth aliquot) should be undertaken.

The upper MCL was 2000 pg/g for OCDD for a 10 g soil sample. Several OCDD sample results in this SDG were over the upper MCL and the laboratory did not perform the second analyses. It is believed that the OCDD results are potentially biased low. All positive OCDD sample results higher than 2000 pg/g are recommended to be flagged as estimated (J).

Initial Calibration:

All criteria were met, so no action was required.

Calibration Verifications:

All criteria were met, so no action was required.

IV.) Blanks:

According to EPA method 8290, a method blank must be analyzed immediately after a beginning calibration run to demonstrate freedom from contamination and freedom from carryover from the calibration run. Also according to EPA method 8000, the performance of the entire analytical system must be checked daily, using data gathered from analyses of blanks, standards, and replicated samples.

The laboratory ran a method blank after the beginning calibration run, a column performance check and a nonane blank. The addition of the nonane blank (pure solvent, no internal standards added) invalidated use of the method blanks in determining instrument carryover levels.

The laboratory did not submit nonane blank quantitation results, therefore, no blank results could be used to assess instrument carryover levels.

No method blank was analyzed for the sequence starting on 4/10/94 at 8:50.

All associated low level (see Section IX) positive sample results are recommended to be designated as EMPC (Estimated Maximum Possible Concentration).

Method Blanks:

1234678-HpCDD was detected in the method blank for the analytical sequence beginning at 09:10 on 4/11/95 at the following concentration:

Blank	Compound	Concentration pg/g	Action Level pg/g
MB-IL0552	1234678-HpCDD	0.37	3.7

Because nonane blanks were run immediately before method blanks in the analytical sequence, it is believed that the method blank detections are biased low. For this reason, a 10X blank rule was used to qualify the data.

Detections of the above compound in all associated samples (all samples in the same analytical sequence) below 10X the blank amounts (Action Level, pg/g for soil samples before percent solids correction) are recommended to be designated as EMPC (Estimated Maximum Possible Concentration).

Field Blanks:

No field blank was analyzed for this batch.

V.) Internal Standards Performance:

The Percent Recovery (%R) of the following internal standard exceeded the 40-135% QC limits for the sample listed:

Sample	Compound	%R
LCS-IL0523	13C-2378-TCDD	38.44

No data qualification action was taken for this QC sample.

VI.) Spike/Spike Duplicates:

Matrix spike/spike duplicates IL0552-2MS and IL0552-3MSD were analyzed. All recoveries were within the QC limits, so no action was taken.

Two sets of LCS/LCSD's were analyzed. All recoveries were within the QC limits, so no action was taken.

VII.) Duplicates:

No field duplicates were analyzed.

VIII.) PCDD/PCDF Identification:

Retention Times:

All criteria were met, so no action was taken.

Ion Abundance:

All criteria were met, so no action was taken.

Signal-to-Noise (S/N) Ratio:

There was no evidence in the raw data that the S/N was checked by the laboratory for all reported positive sample results. The S/N ratios were not printed on the quantitation reports. However, the laboratory certified that all reported positive sample results met method S/N criteria (greater than or equal to 2.5), so no action was taken (see Section X).

Polychlorinated Diphenyl Ether (PCDPE) Interferences:

There was no evidence in the raw data that PCDPE interferences were checked by the lab. The S/N ratios were not printed on the quantitation reports. However, the laboratory certified that there were no signals detected having a S/N ratio greater than or equal to 2.5 at same retention time (+/- 2 seconds), in the corresponding PCDPE channel for all reported positive sample results, so no action was taken (see Section X).

Second Column Confirmation:

Second column confirmation was not run for all reported positive 2378-TCDF results. Since the laboratory cannot resolve the 2378-TCDF isomer from the 2347-TCDF isomer, all reported positive 2378-TCDF sample results are recommended to be designated as EMPC (Estimated Maximum Possible Concentration).

IX.) Overall Assessment of Data/General:

The laboratory did not follow the 12-hour analysis sequence and quality control (QC) procedures specified in EPA Method 8290 (Revision 0, November 1990).

Some reported positive and non-detect sample results are recommended to be flagged according to individual QC problems.

For purposes of blank assessment, all unflagged positive sample results below low level (average PQL) are recommended to be designated as EMPC (Estimated Maximum Possible Concentration).

Level	Matrix	TCDD	PeCDD/PeCDF HxCDD/HxCDF HpCDD/HpCDF	OCDD/OCDF
Low	Soil	< 10 pg/g	< 10 pg/g	< 50 pg/g
High	Soil	> 10 pg/g	> 10 pg/g	> 50 pg/g

All unflagged high level sample results are recommended to be flagged as estimated (J). All positive sample results may be biased high.

All total positive PCDD/PCDF sample results are recommended to be flagged as estimated (J).

X.) Laboratory Certifications Concerning Data Validation Deliverables:

In the validation of the PCDD/PCDF data, several important informational items were not verifiable from the data packages. Pace, Inc. provided certifications concerning the procedures used in the laboratory and in data reporting which address these issues.

The following certifications were made by Pace, Inc.:

1.) Nonane blanks were run before method blanks in the analytical sequence to document instrument condition and integrity.

2.) Nonane blank quantitation reports were not generated because of software limitations.

3.) In the event data for an analysis are unacceptable due to instrumental problems or other unpredictable factors, the analyst will reanalyze the particular extract and include only information from the reanalysis in the data package. The original analysis data is removed and the reanalysis data is inserted in the position in the raw data that would normally be occupied by the original analysis. This causes the data to appear to be out of order chronologically. This procedure was used by Pace, Inc. to report SDG APX01 method blank raw data and LCSD-AQ-IK1409/IK1054 data in the analytical sequence beginning 09/13/94. This procedure is common laboratory practice within Pace's dioxin laboratory.

4.) All positive reported results met all S/N method criteria.

5.) For all positive reported results, there were no S/N ratios greater than 2.5 in the corresponding ether channel.

6.) Pace, Inc. did not perform any analyses, checks or instrument adjustments between the end of sequence Calibration Checks and Mass Resolution Checks in the cases where more than one hour separated the Calibration and Mass Resolution Checks.

Validata Chemical Services, Inc. has incorporated these certifications into its data review as fact, and they have formed the basis for data validation of the unverifiable items. Validata Chemical Services, Inc. takes no responsibility for the validity of these certifications.

TO : Britton Dotson

FROM : Charlie Vernoy

SUBJECT : Zone H Validation Summary Report

DATE : May 25, 1995

Enclosed you will find the diskette containing the Validation Summary Report for the Zone H Investigation. The directory is NAVCHARL.VALH. Also enclosed are the Data Validation reports by Validata. We are still short two reports (SDGs: APX17 & CHS45) which should be completed soon.

If you have any questions, please do not hesitate to telephone me.

VALIDATA

Chemical Services, Inc.

P. O. Box 930422 Norcross, Ga. 30093

DATA VALIDATION SUMMARY REPORT

COMPANY:	EnSafe/Allen & Hoshall
SITE NAME:	Charleston Naval Base
PROJECT NUMBER:	8500.14
CONTRACTED LAB:	PACE, Incorporated
QA/QC LEVEL:	CLP Level III
EPA SOW/METHOD:	EPA 1990 SOW/SW846
VALIDATION GUIDELINES:	USEPA *Contract Laboratory Program National Functional Guidelines for Organic Data Review,* 1994; USEPA *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review,* 1994
SAMPLE MATRIX:	Water
TYPES OF ANALYSES:	Volatile Organics (VOA), Semivolatile Organics (SVOA), Organochlorine Pesticides (PEST), Total Metals, Chloride (CL), Sulfates (SULF), Total Dissolved Solids (TDS)
SDG NUMBER:	CHS38

SAMPLES:

Client Sample #:	Lab Sample #:	Matrix	VOA	SVOA	PEST	Metals
013G131321	43389-7/14	Water		X	X	X
013G131322	43389-5/12	Water		X	X	X
013GW00102	43377-2/5	Water		X	X	X
013GW00202	43377-3/6	Water		X	X	X
013GW00302	43389-2/9	Water		X	X	X
013FW00302	43389-1/8	Water		X	X	X
013GW00402	43389-3/10	Water		X	X	X
013GW00502	43389-6/13	Water		X	X	X
013GW00602	43389-4/11	Water		X	X	X
013GW00702	43377-1/4	Water		X	X	X
017GW00102	43423-9/1/5	Water	X	X		X
017GW00202	43423-12/3/7	Water	X	X		X
017GW00302	43423-10/2/6	Water	X	X		X
017GW00402	43423-13/4/8	Water	X	X		X
017TW00102	43423-11	Water	X			

Client Sample #:	Lab Sample #:	Matrix	VOA	SVOA	PEST	Metals
GDHGW00302	43412-7/3	Water		X		X
GDHGW03D02	43412-8/4	Water		X		X
GDHGW00602	43412-6/2	Water		X		X
GDHGW06D02	43412-5/1	Water		X		X
013GW00702MS	43377-1/4MS	Water		X	X	X
013GW00702MSD	43377-1MSD	Water		X	X	
013GW00702DUP	43377-4D	Water				X

D = FIELD DUPLICATE, FW = FIELD BLANK, TW = TRIP BLANK, MS = MATRIX SPIKE, MSD = MATRIX SPIKE DUPLICATE, DUP = MATRIX DUPLICATE

Client Sample #:	Lab Sample #:	Matrix	CL	SULF	TDS
GDHGW00302	43412-11	Water	X	X	X
GDHGW03D02	43412-12	Water	X	X	X
GDHGW00602	43412-10	Water	X	X	X
GDHGW06D02	43412-9	Water	X	X	X
GDHGW00602DUP	43412-10D	Water	X	X	
GDHGW00602MS	43412-10S	Water	X	X	

MS = MATRIX SPIKE, DUP = MATRIX DUPLICATE, D = FIELD DUPLICATE

DATA REVIEWER(S): Marvin L. Smith, Kevin C. Harmon

RELEASE SIGNATURE: Kevin C. Harmon

Data Qualifier Definitions:

J	-	The associated numerical value is an estimated quantity.
R	-	The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
U	-	The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	-	The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA QUALIFICATION SUMMARY

PACE, Incorporated - CHS38, SW846 Organics and Inorganics

SAMPLES: 013G131321, 013G131322, 013GW00102, 013GW00202, 013GW00302, 013FW00302, 013GW00402, 013GW00502, 013GW00602, 013GW00702, 017GW00102, 017TW00102, 017GW00202, 017GW00302, 017GW00402, GDHGW00302, GDHGW03D02, GDHGW00602, GDHGW06D02, 013GW00702MS, 013GW00702MSD, 013GW00702DUP

VOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) GC/MS Tuning:

All GC/MS Tuning criteria were met, so no action was necessary.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviation (%RSD) for methylene chloride was 33.9% for the standards run on 4/10/95, which exceeded the 30% QC limit. Since there were no positive detections of this compound in the associated samples, no action was required.

Continuing Calibration:

All Continuing Calibration criteria were met, so no action was taken.

IV.) Blanks:

Method Blanks:

Methylene chloride, acetone and toluene were detected at 9 ug/L, 15 ug/L and 2 ug/L, respectively, in water method blank BG041095A. Detections of methylene chloride and acetone in all samples associated with this SDG below 10X the amount of blank contaminations were flagged as undetected (U) with the detection limit being raised to the level of contamination in each sample. There were no positive detections of toluene in the associated samples, so no further action was necessary.

Trip Blanks:

Methylene chloride and acetone were detected at 6 ug/L and 9 ug/L, respectively, in trip blank 017TW00102. Methylene chloride and acetone were qualified using the method blank, so no further action was necessary.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met. No action was taken.

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met, so no action was necessary.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

There were no MS / MSD samples analyzed for VOA's with this SDG. No action was taken.

VIII.) Field Duplicates:

There were no field duplicates associated with this SDG. No action was taken.

IX.) Internal Standards Performance:

All Internal Standard Performance criteria were met, so no action was necessary.

X.) TCL Compound Identification:

All TCL Compound Identification criteria were met, so no action was taken.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria were met, so no action was taken.

XII.) Tentatively Identified Compounds (TIC's):

All TIC Identification criteria were met, so no action was required.

XIII.) System Performance:

All System Performance criteria were met, so no action was required.

XIV.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification

SEMIVOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met. No action was taken.

II.) GC/MS Tuning:

All GC/MS Tuning criteria were met, so no action was taken.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviation (%RSD) was 31.4% for benzo(k)fluoranthene for the standards run on 2/17/95 on insturment FMS, which exceeded the 30% QC limit. There were no positive detections of this compound in the associated samples, so no action was required.

The Percent Relative Standard Deviation (%RSD) was 40.7% for benzo(k)fluoranthene for the standards run, on 2/17/95 on insturment HMS, which exceeded the 30% QC limit. There were no positive detections of this compound in the associated samples, so no action was required.

Continuing Calibration:

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 3/31/95 at 08:12 on instrument FMS for the following compounds:

4,6-dinitro-2-methylphenol	32.7 %
benzidine	40.0 %
benzo(a)anthracene	26.6 %
bis(2-ethylhexyl)phtlalate	51.8 %

There were no positive detections of these compounds in the associated samples. The non-detect results in samples 013GW00102, 013GW00202, 013GW00702 and 017GW00102 were flagged as estimated (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 4/7/95 at 13:52 on instrument HMS for the following compounds:

benzo(k)fluoranthene	37.3 %
benzidine	29.3 %

There were no positive detections of these compounds in the associated samples. The non-detect results in samples 013G131321, 013GW00302, 013FW00302, 013GW00402, 013GW00502 and 013GW00602 were flagged as estimated (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 4/10/95 at 09:29 on instrument FMS for the following compounds:

benzidine	51.7 %
benzoic acid	39.1 %

There were no positive detections of these compounds in the associated samples. The non-detect results in samples 017GW00202, 017GW00402, GDHGW00302, GDHGW03D02 and GDHGW00602 were flagged as estimated (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 4/11/95 at 10:22 on instrument FMS for the following compounds:

benzidine	77.8 %
benzoic acid	56.5 %
hexachlorobutadiene	25.5 %

There were no positive detections of these compounds in the associated samples. The non-detect results in samples 013G131322, 017GW00302 and GDHFW06D02 were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

Bis(2-ethylhexyl)phthalate was detected at 24 ug/L in the method blank run on 3/31/95. Detections of this compound in samples 013GW00102 and 013GW00702 below 10X the amount of blank contamination were flagged as undetected (U) with the detection limit being raised to the level of contamination in each sample.

Bis(2-ethylhexyl)phthalate was detected at 30 ug/L in the method blank run on 4/7/95. Detections of this compound in samples 013G131321, 013GW00302, 013GW00402, 013GW00502 and 013GW00602 below 10X the amount of blank contamination were flagged as undetected (U) with the detection limit being raised to the level of contamination in each sample.

Bis(2-ethylhexyl)phthalate was detected at 2.8 ug/L in the method blank run on 4/10/95. Detections of this compound in samples 013G131322, 017GW00102, 017GW00302, 017GW00402, GDHGW00302 and GDHGW00602 below 10X the amount of blank contamination were flagged as undetected (U) with the detection limit being raised to the level of contamination in each sample.

Field Blanks:

There were no positive detections in the field blank. No action was required.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria for the method were met, so no action was taken.

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria for the method were met, so no action was necessary.

VII.) Matrix Spike/Matrix Spike Duplicate (MS / MSD):

All MS / MSD Recovery criteria were met, so no action was taken.

VIII.) Field Duplicates:

There were no calculable RPD's in the two sets of field duplicate samples associated with this SDG. No action was required.

IX.) Internal Standards Performance:

All Internal Standard Performance criteria were met, so no action was taken.

X.) TCL Compound Identification:

All TCL Compound Identification criteria were met, so no action was taken.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria were met, so no action was taken.

XII.) Tentatively Identified Compounds (TIC's):

All TIC criteria were met, so no action was taken.

XIII.) System Performance:

All System Performance criteria were met, so no action was taken.

XIV.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

ORGANOCHLORINE PESTICIDES

I.) Holding Times:

All samples were extracted and analyzed within the required holding times, so no action was taken.

II.) Instrument Performance:

All Pesticide Instrument Performance criteria were met, so no action was necessary.

III.) Calibration:

Initial Calibration:

All Initial Calibration criteria were met, so no action was required.

Continuing Calibration:

All Continuing Calibration criteria were met, so no action was taken.

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks. No action was required.

Fidld Blanks:

There were no positive detections in the method blanks. No action was necessary.

V.) Surrogate Recoveries:

The Percent Recoveries of decachlorobiphenyl (DCB) were below the 30-150% QC limits for the following samples:

Samples	DCB %R
013FW00302	19
013GW00302	25
013G131321	20
013GW00202	15
013GW00702	24

All results in these samples, which consisted entirely on non-detects, were flagged as estimated (UJ).

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met, so no action was required.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

All MS / MSD criteria were met, so no action was necessary.

VIII.) TCL Compound Identification:

Pesticide / PCB Identification Summary:

All PIS criteria were met, so no action was taken.

IX.) Field Duplicates:

There were no field duplicate samples associated with the pesticides fraction of this SDG. No action was necessary.

X.) Pesticide Cleanup Check:

Florisil Cartridge Check:

Florisil data were not included with this SDG. No action was taken.

Gel Permeation Chromatography (GPC):

GPC was not performed for this SDG. No action was required.

XI.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

TOTAL METALS

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Calibration:

Initial Calibration:

All Initial and Continuing Calibration criteria were met, so no action was taken.

III.) Blanks:

Laboratory and Field Blanks:

The following blank results represent the highest detections associated with the samples and were used for data qualification:

Blank Type	Metal	Max. Conc. ug/L	Action Level ug/L
FB	calcium	80.0	400
PBW	chromium	2.0	10.0
FB	iron	30.0	150
FB	lead	10.0	50.0
FB	sodium	30.0	150
PBW	zinc	5.9	29.5

PBW = Water Preparation Blank, FB = Field Blank 013FW00302

All results greater than the IDL but less than 5X the blank amount (Action Level, ug/L for water samples) for which the contaminated blank was an associated calibration or field blank were flagged as undetected (U).

IV.) ICP Interference Check Sample Results:

All ICP Interference Check Sample criteria were met, so no action was taken

V.) ICP Serial Dilution Analysis:

Serial Dilution Analysis data was not present for this SDG. No action was taken.

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met, so no action was taken.

VII.) Duplicate Sample Analysis:

All Duplicate Sample criteria were met, so no action was necessary.

VIII.) Matrix Spike Recoveries:

All Percent Recovery criteria were met, so no action was required.

IX.) Field Duplicates:

The RPD for arsenic in field duplicate pair GDHGW00302 / GDHGW03D02 was 0% which met the 30% QC limit for water samples. No action was required.

The RPD for manganese was 108% in field duplicate pair GDHGW00602 / GDHGW06D02, which was greater than the 30% QC limit for water samples. The positive results for manganese in these two samples were flagged as estimated (J).

X.) Furnace Atomic Absorption QC:

Furnace Atomic Absorption was not used in this SDG.

XI.) Sample Result, Calculation/Transcription Verification:

All criteria were met, so no action was taken.

XII.) Quarterly Verification of Instrumental Parameters:

All criteria were met, so no action was taken.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

CHLORIDES

I.) Holding Times:

All Holding Time criteria were met. No action was required.

II.) Calibration:

All Calibration criteria were met. No action was necessary.

III.) Blanks:

Method Blanks:

There were no positive detections in the method blanks, so data qualification was not necessary.

IV.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met. No action was required.

V.) Laboratory Duplicates:

All criteria were met, so no action was taken.

VI.) Laboratory Spike Recovery:

All Percent Recovery criteria were met. No action was taken.

VII.) Field Duplicates:

The Relative Percent Differences (RPD's) for chloride were 180% and 199%, respectively, for the two sets of duplicate samples (GDHGW00302 / GDHGW03D02 and GDHGW00602 / GDHGW06D02), which exceeded the 30% QC limit for water samples. The positive results for chloride in these two duplicate pairs were flagged as estimated (J).

VIII.) Overall Assessment of Data/General:

All data were acceptable with qualification.

Chloride data were not present on the spreadsheets. Copies of the analytical results form from the data package are included.

SULFATES

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Calibration:

All Calibration criteria were met. No action was necessary.

III.) Blanks:

Method Blanks:

There were no positive detections in the method blanks, so no data qualification was necessary.

IV.) Laboratory Control Samples (LCS):

All LCS Recovery criteria was met. No action was required.

V.) Laboratory Duplicates:

All criteria were met, so no action was taken.

VI.) Laboratory Spike Recovery:

All Percent Recovery criteria were met. No action was taken.

VII.) Field Duplicates:

The Relative Percent Differences (RPD's) for sulfate were 180% and 200%, respectively, for the two sets of duplicate samples (GDHGW00302 / GDHGW03D02 and GDHGW00602 / GDHGW06D02), which exceeded the 30% QC limit for water samples. The positive results for sulfate in these two duplicate pairs were flagged as estimated (J).

VIII.) Overall Assessment of Data/General:

All data were acceptable with qualification.

The data reported on the spreadsheets were not correct. The results were corrected during the validation process and copies of the analyses report forms from the data package are included with this report.

TOTAL DISSOLVED SOLIDS

I.) Holding Times:

All Holding Time criteria were met. No action was taken.

II.) Calibration:

No Calibration was involved in performing this analysis. No action was necessary.

III.) Blanks:

Method Blanks:

There were no positive detections in the method blanks, so no data qualification was necessary.

IV.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met. No action was required.

V.) Laboratory Duplicates:

Laboratory data from a different SDG was used to verify this parameter. All criteria were met, so no action was taken.

VI.) Laboratory Spike Recovery:

The analysis was neither required nor performed. No action was required.

VII.) Field Duplicates:

The Relative Percent Differences (RPD's) for total dissolved solids (TDS) were 170% and 167%, respectively, for the two sets of duplicate samples GDHGW00302 / GDHGW03D02 and GDHGW00602 / GDHGW06D02, which exceeded the 30% QC limit for water samples. The positive results for TDS in these two duplicate pairs were flagged as estimated (J).

VIII.) Overall Assessment of Data/General:

All data were acceptable with qualification.

Total Dissolved Solids data were not present on the spreadsheets. Copies of the analytical results form from the data package are included with this report.

VALIDATA

Chemical Services, Inc.

P. O. Box 930422, Norcross, Ga. 30093

DATA VALIDATION SUMMARY REPORT

COMPANY:	EnSafe/Allen & Hoshall
SITE NAME:	Charleston Naval Base
PROJECT NUMBER:	8500.14
CONTRACTED LAB:	PACE, Incorporated
QA/QC LEVEL:	CLP Level IV
EPA SOW/METHOD:	EPA 1990 SOW/SW846
VALIDATION GUIDELINES:	USEPA *Contract Laboratory Program National Functional Guidelines for Organic Data Review,* 1994; USEPA *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review,* 1994
SAMPLE MATRIX:	Water
TYPES OF ANALYSES:	Volatile Organics (VOA), Semivolatile Organics (SVOA), Organochlorine Pesticides (PEST), Total Metals, Chloride (CL), Sulfates (SULF), Total Dissolved Solids (TDS)
SDG NUMBER:	CHS39

SAMPLES:

Client Sample #:	Lab Sample #:	Matrix	VOA	SVOA	PEST	Metals
013HW00702	43378-1/2	Water		X	X	X
017HW00102	43453-5/2	Water		X		X
017HW00202	43424-2/1/4	Water	X	X		X
178HW00202	43453-4/1	Water		X		X
655HW00202	43509-4/7/1	Water		X	X	X
656HW00102	43509-8/2	Water	X			X
660HW00202	43453-6/3	Water			X	X
666HW00202	43519-10/3/8	Water	X	X		X
667HW00102	43519-11/8	Water	X			X
GDHHW04D02	43473-13/1/4	Water	X	X		X
GDHHW00702	43473-10/3/6	Water	X	X		X
GDHGW00802	43519-6/1	Water		X		X
GDHHW08D02	43519-7/2	Water		X		X
017TW00202	43424-3	Water	X			
136TW00102	43453-8	Water	X			

Client Sample #:	Lab Sample #:	Matrix	VOA	SVOA	PEST	Metals
656TW00302	43509-9	Water	X			
667TW00102	43519-12	Water	X			
GDHTW00702	43473-11	Water	X			
013EW00702	43390-1/2	Water		X	X	X
655EW00102	43509-5/6/3	Water		X	X	X
GDHEW00302	43413-1/3	Water		X		X
GDHFW07D02	43473--12/2/5	Water	X	X		X
GDHGW00802MS	43519-1MS	Water		X		
GDHGW00802MSD	43519-1MSD	Water		X		
178HW00202MS	43453-4/1MS	Water		X		X
178HW00202MSD	43453-4	Water		X		
178HW00202DUP	43453-1D	Water				X

EW = EQUIPMENT BLANK, FW = FIELD BLANK, TW = TRIP BLANK, MS = MATRIX SPIKE, MSD = MATRIX SPIKE DUPLICATE, DUP = MATRIX DUPLICATE

Client Sample #:	Lab Sample #:	Matrix	CL	SULF	TDS
GDHHW04D02	43473-7	Water	X	X	X
GDHHW00702	43473-9	Water	X	X	X
GDHGW00802	43519-4	Water	X	X	X
GDHHW08D02	43519-5	Water	X	X	X
GDHEW00302	43414-2	Water	X	X	X
GDHFW07D02	43473-8	Water	X	X	X
GDHGW00802DUP	43519-4D	Water	X		
GDHGW00802MS	43519-4MS	Water	X		

MS = MATRIX SPIKE, DUP = MATRIX DUPLICATE, EW = EQUIPMENT BLANK, FW = FIELD BLANK

DATA REVIEWER(S): Marvin L. Smith, Kevin C. Harmon

RELEASE SIGNATURE: Kevin C. Harmon

Data Qualifier Definitions:

J	-	The associated numerical value is an estimated quantity.
R	-	The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
U	-	The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	-	The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA QUALIFICATION SUMMARY

PACE, Incorporated - CHS39, SW846 Organics and Inorganics

SAMPLES: 013HW00702, 017HW00102, 017HW00202, 178HW00202, 655HW00202, 656HW00102, 660HW00202, 666HW00202, 667HW00102, GDHHW04D02, GDHHW00702, GDHGW00802, GDHHW08D02, 017TW00202, 136TW00102, 656TW00302, 667TW00102, GDHTW00702, 013EW00702, 655EW00102, GDHEW00302, GDHFW07D02, GDHGW00802MS, GDHGW00802MSD, 178HW00202MS, 178HW00202MSD, 178HW00202DUP, GDHGW00802DUP

VOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) GC/MS Tuning:

All GC/MS Tuning criteria were met, so no action was necessary.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviation (%RSD) for methylene chloride was 33.9% for the standards run on 4/10/95 on instrument GMS, which exceeded the 30% QC limit. Since there were no positive detections of this compound in the associated samples, no action was required.

The Percent Relative Standard Deviation (%RSD) for carbon disulfide was 33.9% for the standards run on 11/28/94 on instrument CMS, which exceeded the 30% QC limit. Since there were no positive detections of this compound in the associated samples, no action was required.

Continuing Calibration:

The Percent Difference (%D) for chloromethane was 29.9% for the standard run on instrument CMS at 10:50 on 4/11/95, which exceeded the 25% QC limit. The non-detect result for chloromethane in sample GDHFW07D02 was flagged as estimated (UJ).

The Percent Differences (%D's) for chloromethane and carbon disulfide were 36.8% and 40.8%, respectively, for the standard run on instrument CMS at 11:22 on 4/12/95, which exceeded the 25% QC limit. All results for these compounds in samples 136HW00102 and 136TW00102, which consisted entirely on non-detects, were flagged as estimated (UJ).

The Percent Differences (%D's) for chloromethane and tetrahydrofuran were 41.0% and 26.6% for the standard run on instrument CMS at 11:07 on 4/13/95, which exceeded the 25% QC limit. The results for these compounds in sample GDHHW04D02 , which consisted entirely on non-detects, were flagged as estimated (UJ).

The Percent Difference (%D) for chloromethane was 38.3% for the standard run on instrument CMS at 10:46 on 4/14/95, which exceeded the 25% QC limit. The non-detect result for chloromethane in samples 656HW00102 and 656TW00302 were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

Methylene chloride, acetone and toluene were detected in the following laboratory method blanks at the indicated concentrations:

Method Blank	Methylene Chloride	Acetone	Toluene
4/10/95	9 ug/L	15 ug/L	0.2 ug/L
4/12/95	7 ug/L		
4/13/95	10 ug/L		
4/14/95	7 ug/L		

Since the trip blanks were used for blank qualification, no action was taken.

Field Blanks:

Acetone and methylene chloride were detected at 9 ug/L and 8 ug/L, respectively, in field blank GDHFW07D02. Since the trip blanks were used for data qualification, no action was required.

Trip Blanks:

Methylene chloride, acetone and toluene were detected at 8 ug/L, 13 ug/Land 0.2 ug/L, respectively, in trip blank 017TW00202. There were no positive detections of toluene in the samples. The detections of methylene chloride and acetone in all samples in this SDG, which were below 10X the blank amount, were flagged as undetected (U) with the detection limit being raised to the level of contamination in each sample.

Methylene chloride was also detected at 7 ug/L and 9 ug/L, respectively, in trip blanks 656TW00302 and 136TW00102. Since another trip blank was used for data qualification, no action was taken. Acetone was also detected at 8 ug/L in trip blank GDHTW00702. Since another trip blank was used for data qualification, no action was necessary. Chloroform was detected at 6 ug/L in trip blank 136TW00102. Since there were no positive detections of chloroform in the samples of this SDG, no action was taken.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met. No action was taken.

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met, so no action was necessary.

VII.) Matrix Spike/Matrix Spike Duplicate (MS / MSD):

There were no MS / MSD samples analyzed for VOA's with this SDG. No action was taken.

VIII.) Field Duplicates:

There were no field duplicates associated with this SDG. No action was taken.

IX.) Internal Standards Performance:

All Internal Standard Performance criteria were met, so no action was necessary.

X.) TCL Compound Identification:

All TCL Compound Identification criteria were met, so no action was taken.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria were met, so no action was taken.

XII.) Tentatively Identified Compounds (TIC's):

All TIC Identification criteria were met, so no action was required.

XIII.) System Performance:

All System Performance criteria were met, so no action was required.

XIV.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification

Six compounds were listed as undetected (U) but with 0 concentrations on the data spreadsheet. The 0 was replaced with the appropriate CRQL during the validation process.

SEMIVOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met. No action was taken.

II.) GC/MS Tuning:

All GC/MS Tuning criteria were met, so no action was taken.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviation (%RSD) was 31.4% for benzo(k)fluoranthene for the standards run on 2/17/95 on insturment FMS, which exceeded the 30% QC limit. There were no positive detections of this compound in the associated samples, so no action was required.

The Percent Relative Standard Deviation (%RSD) was 40.7% for benzo(k)fluoranthene for the standards run on 2/17/95 on insturment HMS, which exceeded the 30% QC limit. There were no positive detections of this compound in the associated samples, so no action was required.

Continuing Calibration:

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 3/31/95 at 08:12 on instrument FMS for the following compounds:

4,6-dinitro-2-methylphenol	32.7 %
benzidine	40.0 %
benzo(a)anthracene	26.6 %
bis(2-ethylhexyl)phtlalate	51.8 %

There were no positive detections of these compounds in the associated sample. The non-detect results in sample 013HW00702 were flagged as estimated (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 4/7/95 at 13:52 on instrument HMS for the following compounds:

benzo(k)fluoranthene	37.3 %
benzidine	29.3 %

There were no positive detections of these compounds in the associated sample. The non-detect results in sample 013EW00702 were flagged as estimated (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 4/10/95 at 09:29 on instrument FMS for the following compounds:

benzidine	51.7 %
benzoic acid	39.1 %

There were no positive detections of these compounds in the associated samples. The non-detect results in samples 017HW00102, 178HW00202 and GDHEW00302 were flagged as estimated (UJ).

instrument FMS for the following compounds:

benzidine	77.8 %
benzoic acid	56.5 %
hexachlorobutadiene	25.5 %

There were no positive detections of these compounds in the associated samples. The non-detect results in samples 017HW00202, 655EW00102, 655HW00202, GDHHW00702, GDHHW04D02 and GDHHW07D02 were flagged as estimated (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 4/17/95 at 09:59 on instrument FMS for the following compounds:

benzidine	42.1 %
benzoic acid	51.4 %

There were no positive detections of these compounds in the associated samples. The non-detect results in samples 666HW00202, GDHHW00802 and GDHHW08D02 were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

Bis(2-ethylhexyl)phthalate was detected at 24 ug/L, 30 ug/L, 2.8 ug/L and 320 ug/L, respectively, in the method blanks run on 3/31/95, 4/7/95, 4/10/95 and 4/11/95. Since the equipment blanks were used for blank qualification, no action was taken.

Equipment Blanks:

Bis(2-ethylhexyl)phthalate was detected at 30 ug/L in equipment blank 013EW00702. The positive detections of this compound in all samples in this SDG, which were below 10X the blank amount, were flagged as undetected (U) with the detection limit being raised to the level of contamination in each sample. Bis(2-ethylhexyl)phthalate was also detected in equipment blank 655EW00102 at 17 ug/L. Since another equipment blank was used for data qualification, no actio was necessary.

V.) Surrogate Recoveries:

The Percent Recovery (%R) of terphenyl-d14 in sample 013HW00702 was 28%, which was below the 33-141% QC limits. Since only one surrogate was outside QC limits in the sample, no action was required.

The Percent Recovery (%R) of phenol-d5 in sample 017HW00202 was 155%, which was above the 10-110% QC limits. Since only one surrogate in the sample was outside QC limit, no action was required.

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria for the method were met, so no action was necessary.

VII.) Matrix Spike/Matrix Spike Duplicate (MS / MSD):

All MS / MSD Recovery criteria were met, so no action was taken.

VIII.) Field Duplicates:

There were no field duplicates analyzed with this SDG. No action was required.

IX.) Internal Standards Performance:

All Internal Standards Performance criteria were met, so action was taken.

X.) TCL Compound Identification:

All TCL Compound Identification criteria were met, so no action was taken.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria were met, so no action was taken.

XII.) Tentatively Identified Compounds (TIC's):

All TIC criteria were met, so no action was taken.

XIII.) System Performance:

All System Performance criteria were met, so no action was taken.

XIV.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

ORGANOCHLORINE PESTICIDES

I.) Holding Times:

All samples were extracted and analyzed within the required holding times, so no action was taken.

II.) Instrument Performance:

All Pesticide Instrument Performance criteria were met, so no action was necessary.

III.) Calibration:

Initial Calibration:

All Initial Calibration criteria were met, so no action was required.

Continuing Calibration:

The Percent Differences (%D's) for 4,4'-DDT were 35.2% and 46.2%, respectively, on the primary and confirmation columnsfor 4,4'-DDT for the standard run on 4/6/95 at 03:39 on the primary column, which exceeded the 25% QC limit. The non-detect result for 4,4'-DDT in associated sample 013EW00702 was flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks. No action was required.

Equipment Blanks:

There were no positive detections in the equipment blanks. No action was necessary.

V.) Surrogate Recoveries:

The Percent Recoveries of decachlorobiphenyl (DCB) were below the 30-150% QC limits for the following samples:

Sample	DCB %R
013HW00702	26
013EW00702	23
660HW00202	22
655EW00102	24

All results in these samples, which consisted entirely of non-detects, were flagged as estimated (UJ).

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met, so no action was required.

VII.) Matrix Spike/Matrix Spike Duplicate (MS / MSD):

There were no MS / MSD analyses performed for this SDG. No action was necessary.

VIII.) TCL Compound Identification:

Pesticide/PCB Identification Summary:

All PIS criteria were met, so no action was taken.

IX.) Field Duplicates:

There were no field duplicate samples associated with the pesticides fracion of this SDG. No action was necessary.

X.) Pesticide Cleanup Check:

Florisil Cartridge Check:

All criteria were met, so no action was taken.

Gel Permeation Chromatography (GPC):

GPC was not performed for this SDG. No action was required.

XI.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

TOTAL METALS

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Calibration:

Initial Calibration:

All Initial and Continuing Calibration criteria were met, so no action was taken.

III.) Blanks:

Laboratory and Field Blanks:

The following blank results represent the highest detections associated with the samples and were used for data qualification:

Blank Type	Metal	Max. Conc. ug/L	Action Level ug/L
CCB	barium	5.40	27.0
CCB	beryllium	0.20	1.00
PBW	calcium	156	780
CCB	iron	30.2	151
EB1	lead	2.9	14.5
PBW	magnesium	32.9	165
CCB	manganese	1.20	6.00
EB2	selenium	6.00	30.0
PBW	sodium	105	525
CCB	zinc	7.00	35.0

PBW = Water Preparation Blank, CCB = Continuing Calibration Blank, EB1 = Equipment Blank 013EW00701, EB2 = Equipment Blank GDHEW00302

All results greater than the IDL but less than 5X the blank amount (Action Level, ug/L for water samples) for which the contaminated blank is an associated calibration or preparation blank were flagged as undetected (U).

IV.) ICP Interference Check Sample Results:

Negative results at absoluted concentrations greater than the IDL for the following metals:

antimony	-15 ug/L	nickel	-14 ug/L
barium	-16 ug/L	potassium	-852 ug/L
chromium	-7 ug/L	vanadium	-3 ug/L
cobalt	-4 ug/L	silver	-11 ug/L
copper	-8 ug/L		

Since aluminum, calcium, iron and magnesium were not present, or present at concentrations less than 1 percent that of solution A, no action was required.

V.) ICP Serial Dilution Analysis:

The Serial Dilution Percent Differences (%D's) were 14.1% and 13.7%, respectively, for magnesium and sodium for serial dilution sample 178HW00202L. All positive results for these two metals in all samples in this SDG were flagged as estimated (J).

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met, so no action was taken.

VII.) Duplicate Sample Analysis:

All Duplicate Sample criteria were met, so no action was necessary.

VIII.) Matrix Spike Recoveries:

All Percent Recovery criteria were met, so no action was required.

IX.) Field Duplicates:

The RPD for manganese in field duplicate pair GDHGW00802 / GDHGW0D02 was 72%, which exceeded the 30% QC limit for water samples. The positive results for manganese in these two samples were flagged as estimated (J).

X.) Furnace Atomic Absorption QC:

Furnace Atomic Absorption was not used in this SDG.

XI.) Sample Result, Calculation/Transcription Verification:

All criteria were met, so no action was taken.

XII.) Quarterly Verification of Instrumental Parameters:

All criteria were met, so no action was taken.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

CHLORIDES

I.) Holding Times:

All Holding Time criteria were met. No action was required.

II.) Calibration:

All Calibration criteria were met. No action was necessary.

III.) Blanks:

Method Blanks:

There were no positive detections in the method blanks, so data qualification was not necessary.

Field and Equipment Blanks:

Chloride was detected at 2 mg/L in both equipment blank GDHEW00302 and field blank GDHFW07D02. Since the concentrations in all associated samples exceeded 5X this amount, no action was taken.

IV.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met. No action was required.

V.) Laboratory Duplicates:

There were no Laboratory Duplicates associated with this SDG. No action was necessary.

VI.) Laboratory Spike Recovery:

There were no Laboratory Spike sample associated with this SDG. No action was required.

VII.) Field Duplicates:

There were no field duplicate samples associated with this SDG. No action was necessary.

VIII.) Overall Assessment of Data/General:

All data were acceptable without qualification.

Not all data reported on the spreadsheets were correct. The results were corrected during the validation process and copies of the analysis report forms from the data package are included.

SULFATES

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Calibration:

All Calibration criteria were met. No action was necessary.

III.) Blanks:

Method Blanks:

There were no positive detections in the method blanks, so no data qualification was necessary.

Equipment and Field Blanks:

There were no positive detections in the equipment and field blanks, so data qualification was not required.

IV.) Laboratory Control Samples (LCS):

All LCS Recovery criteria was met. No action was required.

V.) Laboratory Duplicates:

There were no Laboratory Duplicates associated with this SDG. No action was necessary.

VI.) Laboratory Spike Recovery:

There were no Laboratory Spike sample associated with this SDG. No action was required.

VII.) Field Duplicates:

There were no field duplicates associated with this SDG. No action was taken.

VIII.) Overall Assessment of Data/General:

All data were acceptable without qualification.

Not all data reported on the spreadsheets were correct. The results were corrected during the validation process and copies of the analysis report forms from the data package are included.

TOTAL DISSOLVED SOLIDS

I.) Holding Times:

All Holding Time criteria were met. No action was taken.

II.) Calibration:

No Calibration was involved in performing this analysis. No action was necessary.

III.) Blanks:

Method Blanks:

There were no positive detections in the method blanks, so no data qualification was necessary.

Equipment and Field Blanks:

There were no positive detections in the equipment and field blanks, so data qualification was not required.

IV.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met. No action was required.

V.) Laboratory Duplicates:

Laboratory data from a different CHS SDG was used to verify this parameter. All criteria were met, so no action was taken.

VI.) Laboratory Spike Recovery:

The analysis was not required, nor performed. No action was required.

VII.) Field Duplicates:

There were no field duplicate samples associated with this SDG. No action was necessary.

VIII.) Overall Assessment of Data/General:

All data were acceptable without qualification.

Total Dissolved Solids data were not present on the appropriate spreadsheet. Data was transferred to a blank spreadsheet allocated to 0-cresol. Also, copies of the analytical results form from the data package are included with this report.

VALIDATA

Chemical Services, Inc.

P. O. Box 930422 Norcross, Ga. 30093

DATA VALIDATION SUMMARY REPORT

COMPANY:	EnSafe / Allen & Hoshall
SITE NAME:	Charleston Naval Base
PROJECT NUMBER:	8500.014
CONTRACTED LAB:	PACE, Inc.
QA/QC LEVEL:	CLP Level III
EPA SOW/METHOD:	EPA 1990 SOW
VALIDATION GUIDELINES:	*USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*, 1994; *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, 1994
SAMPLE MATRIX:	Water
TYPES OF ANALYSES:	Volatile Organics (VOA), Semivolatile Organics (SVOC), Pesticides/PCB's (P/PCB), Total Metals and Cyanide (Me/CN)
SDG NUMBER:	CHS45

SAMPLES:

Client Sample #:	Lab Sample #:	Matrix	VOA	SVOC	P/PCB	Me/CN
009GW01701	43734-001	Water	X			
	43734-003	Water		X		
	43734-005	Water			X	
	43734-007/9	Water				X
009TW01701	43734-002	Water	X			
009GW01601	43734-011	Water	X			
	43734-004	Water		X		
	43734-006	Water			X	
	43734-008/10	Water				X
009GW01601MS	43734-011MS	Water	X			
009GW01601MSD	43734-011MSD	Water	X			
009GW00501	43740-025	Water	X			
	43740-003	Water		X		
	43740-007	Water			X	
	43740-0019/21	Water				X
009GW00601	43740-027	Water	X			
	43740-004	Water		X		
	43740-008	Water			X	
	43740-0020/22	Water				X

Client Sample #:	Lab Sample #:	Matrix	VOA	SVOC	P/PCB	Me/CN
009GW00601D	43740-020D	Water				X
009GW00601S	43740-020S	Water				X
009HW01601	43845-001	Water		X	X	
009HW01601MS	43845-001MS	Water		X	X	
009HW01601MSD	43845-001MSD	Water		X	X	
009TW00601	43740-026	Water	X			
009GW01801	43753-003	Water	X			
	43753-008	Water		X		
	43753-012	Water			X	
	43753-016/26	Water				X
009GW01901	43753-004	Water	X			
	43753-009	Water		X		
	43753-013	Water			X	
	43753-017/27	Water				X
009TW01901	43753-005	Water	X			

S / MS = MATRIX SPIKE, MSD = MATRIX SPIKE DUPLICATE, D = MATRIX DUPLICATE, TW = TRIP BLANK

DATA REVIEWER(S): Jean M. Delashmit, Marvin L. Smith

RELEASE SIGNATURE: Kevin C. Harmon

Data Qualifier Definitions:

J	-	The associated numerical value is an estimated quantity.
R	-	The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
U	-	The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	-	The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA QUALIFICATION SUMMARY

PACE, Incorporated - CHS45 CLP Organics and Inorganics

SAMPLES: 009GW01701, 009TW01701, 009GW01601, 009GW00501, 009GW00601, 009GW01601MS, 009GW01601MSD, 009HW01601, 009HW01601MS, 009HW01601MSD, 009TW00601, 009GW01801, 009GW01901, 009TW01901

VOLATILE ORGANICS

I.) Holding Times:

The holding time from sample date to extraction was 9 days for samples 017SW00501 and 017SW00601, which exceeded the 7-day QC limit for unpreserved aromatic volatile compounds in water. The positive and non-detect results for these compounds in these samples were flagged as estimated (J) and (UJ).

All other Holding Time criteria were met, so no further action was taken.

II.) GC/MS Tuning:

All Tuning criteria were met, so no action was necessary.

III.) Calibration:

Initial Calibration:

All Initial Calibration criteria were within QC limits, so no action was required.

Continuing Calibration:

The Percent Differences (%D's) for the following compounds exceeded the 25% QC limit for the standard run on 05/01/95:

Compound	%D
chloromethane	31.1
bromomethane	49.3

Associated sample results for these compounds, which consisted entirely of non-detects, were flagged as estimated (UJ). The associated samples were 009GW01601, 009GW01701, 009GW01801 and 009GW01901.

IV.) Blanks:

Method Blanks:

Methylene chloride was detected in method blank BI042795A at 1 ug/L. Associated detections of this compound were qualified based on the higher level of contamination in the trip blank. The associated samples were 009GW00501 and 009GW001601.

Rinsate Blanks:

No rinsate blank was analyzed with the samples in this SDG.

Trip Blanks:

Methylene chloride was detected in trip blank 017TW00601 at 8 ug/L. The detection of methylene chloride in the associated sample 017GW00601 below 10X this amount was flagged as undetected (U), and the detection level became the detection limit.

Chloroethane was detected in trip blank 009TW01901 at 10 ug/L. There were no detections of this compound in the associated samples, so no action was required.

TIC's:

Tentatively identified volatile compound chlorofluoromethane was detected in the trip blank 009TW01701 at 6 ug/L. There were no detections of this compound in the associated samples, so no action was required.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met. No action was needed.

VI.) Matrix Spike/Matrix Spike Duplicate (MS/MSD):

All Matrix Spike/Matrix Spike Duplicate criteria were met, so no action was required.

VII.) Field Duplicates:

There were no field duplicates associated with this SDG.

VIII.) Internal Standards Performance:

All Internal Standards Performance criteria were met, so no action was required.

IX.) TCL Compound Identification:

All criteria were met, so no action was necessary.

X.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All criteria were met, so no action was required.

XI.) Tentatively Identified Compounds (TIC's):

All TIC criteria were met, so no action was taken. No blank qualifications were needed.

XII.) System Performance:

All criteria were met, so no action was necessary.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

SEMIVOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) GC/MS Tuning:

All GC/MS Tuning criteria were met, so no action was necessary.

III.) Calibration:

Initial Calibration:

All Initial Calibration criteria were met. No action was required.

Continuing Calibration:

The Percent Difference (%D) for benzidine exceeded the 25% QC limit for the standard run on 04/25/95 at 10:01 on instrument FMS-HP. Sample data, which consisted entirely of non-detects, were flagged as estimated (UJ) in the associated samples 009GW00501 and 009GW01061.

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 05/02/95 at 12:33 on instrument FMS-HP for the following compounds:

benzoic acid	50.0 %
pentachlorophenol	29.9 %

Positive and non-detect data for these compounds were flagged as estimated (J) and (UJ) in the associated samples 009GW01601, 009GW01701, 009GW01801 and 009GW01901.

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 05/05/95 at 09:56 on instrument FMS-HP for the following compounds:

benzoic acid	56.2 %
hexachlorocyclopentadiene	30.8 %
pentachlorophenol	26.0 %

Positive and non-detect data for these compounds were flagged as estimated (J) and (UJ) in associated sample 009HW01601.

IV.) Blanks:

Method Blanks:

No target compounds were detected in any of the method blanks, so no action was required.

TICs:

No Tentatively Identified Compounds were reported as detected in the method blanks.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met, so no action was required.

VI.) Matrix Spike / Matrix Spike Duplicate:

All Matrix Spike / Matrix Spike Duplicate criteria were met. No action was required.

VII.) Field Duplicates:

There were no field duplicates associated with this SDG.

VIII.) Internal Standards Performance:

All Internal Standard criteria were met, so no action was required.

IX.) TCL Compound Identification:

All criteria were met, so no action was required.

X.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All criteria were met, so no action was required.

XI.) Tentatively Identified Compounds (TIC's):

All TIC criteria were met, so no action was taken. No blank qualifications were required.

XII.) System Performance:

All criteria were met, so no action was necessary.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

PESTICIDES/PCB's

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Instrument Performance:

All criteria were met. No data qualification was performed.

III.) Calibration:

All Calibration criteria were met, so no action was required.

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks, so no action was taken.

Equipment Blanks:

There were no equipment blanks associated with this SDG.

V.) Surrogate Recoveries:

Percent Recoveries of decachlorobiphenyl were below the 30-150% QC limits for samples 009GW01601 (20%), 009GW01701 (16%), 009GW01801 (18%) and 009GW01901 (13%). The associated positive and non-detect sample results were flagged as estimated (J) and (UJ).

VI.) Laboratory Control Sample (LCS):

All Laboratory Control Sample criteria were met. No action was required.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

All MS / MSD criteria were met. No data qualification was necessary.

VIII.) TCL Compound Identification:

Pesticide/PCB Identification Summary (PIS):

All PIS criteria were met, so no action was required.

IX.) Field Duplicates:

No field duplicates were analyzed by the laboratory for pesticides and PCB's. No action was required.

X.) Pesticide Cleanup Check:

Florisil Cartridge Check:

Data were not available in the package. No action was taken.

Gel Permeation Chromatography (GPC):

GPC was not required for samples in this SDG.

XI.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

TOTAL METALS AND CYANIDE

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Calibration:

All Calibration criteria were met, no action was required.

III.) Blanks:

The following blank results represent the highest detections associated with the samples and were used for data qualification:

Blank Type/ID#	Element	Max. Conc. ug/L	Action Level ug/L
CCB1	aluminum	16.7	83.5
CCB8	antimony	13.7	8.5
ICB	arsenic	3.4	17.0
CCB5	barium	7.0	35.0
CCB1	beryllium	0.4	2.00
PB	calcium	242	1210

Blank Type/ID#	Element	Max. Conc. ug/L	Action Level ug/L
CCB8	chromium	3.6	18.0
CCB2	copper	3.1	15.5
PB	iron	94.7	474
PB	magnesium	33.3	167
CCB1	manganese	1.7	8.50
CCB5	nickel	8.6	43.0
CCB5	potassium	592	2960
ICB	silver	2.2	11.0
PB	sodium	178	890
CCB1	vanadium	3.3	16.5
CCB11	zinc	18.2	91.0

CCB = Continuing Calibration Blank, PB = Preparation Blank, ICB = Initial Calibration Blank

All results greater than the IDL but less than 5X the blank amount (Action Level, ug/L) for which the contaminated blank was an associated calibration or laboratory preparation blank were flagged as undetected (U).

The following analytes had negative results with absolute values greater than the IDL's:

Blank Type/ID#	Analyte	Neg. Conc.	5X Conc. (ug/L)
CCB3	cadmium	-1.3 ug/L	6.50
PB	thallium	-4.1 ug/L	20.5
ICB2	zinc	-5.8 ug/L	29.0

CCB = Continuing Calibration Blank, PB = Preparation Blank, ICB = Initial Calibration Blank

All associated positive sample results less than 5X the absolute value of the negative blank result were flagged as estimated (J) and all non-detects were flagged as estimated (UJ).

IV.) ICP Interference Check Sample Results:

All Percent Recovery criteria for the method were met, so no action was taken.

Sodium and zinc were present at 86 ug/L and 9 ug/L, respectively, in ICS Solution A, which were concentrations greater than 2X IDL. These analytes should not be present. Since aluminum, calcium, iron or magnesium were not present in any other sample at concentrations greater than their respective concentrations in ICS Solution A, no data qualification was required.

A negative result with an absolute value greater than the IDL was observed for each of the following analytes:

Analyte	Neg. Conc.
antimony	-35 ug/L
arsenic	-3 ug/L

Analyte	Neg. Conc.
barium	-17 ug/L
chromium	-6 ug/L
copper	-8 ug/L
zinc	-4 ug/L

Since aluminum, calcium, iron and magnesium were not present in any other sample at concentrations greater than their respective concentrations in ICS Solution A, no data qualification was required.

V.) ICP Serial Dilution Analysis:

ICP Serial Dilution results were not reported in the laboratory report for this SDG. No action was taken.

VI.) Laboratory Control Samples (LCS):

All Laboratory Control Sample criteria were met, so no action was taken.

VII.) Duplicate Sample Analysis:

The Relative Percent Differences (RPD's) of the following analytes in water duplicate sample 009GW01601D were outside the 20% QC limit and sample results were greater than 5X CRDL:

calcium	23.1 %
iron	21.0 %
manganese	21.4 %
potassium	21.3 %

All positive results for these analytes in sample 009GW01601 were flagged as estimated (J) and (UJ).

The difference between sample and duplicate for zinc in the same sample was greater than the CRDL and the positive detections of zinc were less than 5X CRDL. The detection of zinc in this sample was eliminated as non-detect based on blank contamination and rejected due to zero percent matrix spike recovery. No further action was necessary.

VIII.) Matrix Spike Recoveries:

Matrix Spike recoveries were outside the 75-125% QC limits for the following analytes which had sample concentrations less than 4X spike concentration:

Analyte	Spike Recovery
mercury	826%
zinc	0 %

The result for zinc in sample 009GW01601 was rejected (R). Since there was no positive result for mercury, no further action was required.

IX.) Field Duplicates:

No field duplicates were analyzed by the laboratory with this SDG. No action was necessary.

X.) Furnace Atomic Absorption QC:

Samples in this SDG were not analyzed by Furnace Atomic Absorption.

XI.) Sample Result, Calculation / Transcription Verification:

All criteria were met, so no action was taken.

XII.) Quarterly Verification of Instrumental Parameters:

All criteria were met, so no action was taken.

XIII.) Overall Assessment of Data/General:

The result for zinc in sample 009GW01601 was rejected due to a zero percent Matrix Spike Recovery. All other laboratory data were acceptable with qualification.

VALIDATA

Chemical Services, Inc.

P. O. Box 930422, Norcross, GA 30093

(770) 923-3890
(770) 923-8769 (Fax)

DATA VALIDATION SUMMARY REPORT

COMPANY:	Ensafe/Allen & Hoshall
SITE NAME:	Charleston Navel Base, Zone H
PROJECT NUMBER:	8500.14
CONTRACTED LAB:	Southwest Laboratory of Oklahoma, Inc.
QA/QC LEVEL:	EPA Level III / Level IV
EPA METHOD:	EPA SOW 3-90
VALIDATION GUIDELINES:	*USEPA CLP National Functional Guidelines for Organic Data Review,* 1994; *USEPA CLP National Functional Guidelines for Inorganic Data Review,* 1994
SAMPLE MATRIX:	Water
TYPES OF ANALYSES:	Volatile Organics, Semivolatile Organics, Pesticides/PCB's, Total Metals, Gasoline Range Organics, Diesel Range Organics, Chloride, Hexavalent Chromium
SDG NUMBERS:	25015A (Appendix IX, Level IV) 25015B (Level III)

SAMPLES:

SDG 25015A (Level IV):

Client Sample #	Lab Sample #	Matrix	Semi-volatiles	Pesticides/ PCB's	Total Metals
013HW00704*	25016.01	Water	X	X	X
013D131341	25033.01	Water	X	X	X
013E131341	25033.02	Water	X	X	X

* = Field duplicate was associated with sample 013GW00704 in SDG 25015B.

H = FIELD DUPLICATE, D = DEIONIZED WATER BLANK, E = EQUIPMENT RINSATE BLANK

SDG 25015B (Level III):

Client Sample #	Lab Sample #	Matrix	Volatile Organics	Semi-volatiles	Pesticides/ PCB's	Metals
009GW01604	25015.06	Water	X	X	X	X

Client Sample #	Lab Sample #	Matrix	Volatile Organics	Semi-volatiles	Pesticides/ PCB's	Metals
009GW01604RE	25015.06RE	Water		X		
009GW07D04	25015.05	Water	X	X	X	X
013G131341	25032.05	Water		X	X	X
013G131342	25015.04	Water		X	X	X
013GW00604	25015.01	Water		X	X	X
013GW00504	25015.02	Water		X	X	X
013GW00704*	25015.03	Water		X	X	X
017GW00104	25032.01	Water	X	X	X	X
017GW00304	25048.01	Water	X	X	X	X
017GW00404	25032.02	Water	X	X	X	X
655GW00204	25048.03	Water		X	X	X
009TW01604	25015.07	Water	X			
017TW00104	25032.03	Water	X			
017TW00304	25048.02	Water	X			

Client Sample #	Lab Sample #	Matrix	Gasoline Range Organics	Diesel Range Organics
017GW001FP	25032.04	Water	X	X
017GW00304	25048.01	Water	X	X

Client Sample #	Lab Sample #	Matrix	Chloride	Hexavalent Chromium
009GW07D04	25015.05	Water	X	
009GW01604	25015.06	Water	X	
017GW00104	25032.01	Water		X

* = Sample was associated with field duplicate sample 013HW00704 in SDG 25015A.

RE = REANALYSIS, T = TRIP BLANK

DATA REVIEWER(S): Linda H. Liu, Marvin L. Smith, Jean M. Delashmit

RELEASE SIGNATURE:

DATA QUALIFICATION SUMMARY

Southwest Laboratory of Oklahoma, Inc. - 25015A Appendix IX, CLP Organic and Inorganics

SAMPLE: 013HW00704, 013D131341, 013E131341

SEMIVOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met, so no action was necessary.

II.) GC/MS Tuning:

All GC/MS Tuning criteria were met, so no action was taken.

III.) Calibration:

Initial Calibration:

The average Relative Response Factors (RRF's) for the standards analyzed on 3/29/96 were below the 0.050 QC limit for the following compounds:

aramite	0.030
methapyriline	0.035

The non-detect results for these compounds in associated sample 013HW00704 and blanks 013D131341 and 013E131341 were rejected (R). These blank results were not considered acceptable for use in blank evaluation.

The Percent Relative Standard Deviations (%RSD's) exceeded the 30% QC limit for the initial calibration analyzed on 3/29/96 for the following compounds:

2,3,4,6-tetrachlorophenol	30.8%
4-nitroquinoline-1-oxide	73.0%
2-sec-butyl-4,6-dinitrophenol	36.0%
parathion	47.0%
aramite	39.2%
7,12-dimethylbenz(a)anthracene	33.7%
hexachlorophene	41.9%

The associated non-detect result for aramite was previously rejected due to a low RRF. The other compounds were not detected in associated sample 013HW007104, so no action was taken.

Continuing Calibration:

The Relative Response Factors (RRF's) were below the 0.050 QC limit for the standard analyzed on 3/29/96 at 17:19 for the following compounds:

aramite	0.028
pentachloronitrobenzene	0.039
methapyriline	0.049
hexachlorophene	0.012

Since the only associated sample was a method blank, no action was taken.

The Relative Response Factors (RRF's) for the standard analyzed on 4/01/96 at 11:15 were below the 0.050 QC limit for the following compounds:

aramite	0.024
pentachloronitrobenzene	0.034
methapyriline	0.032
hexachlorophene	0.011
4-nitroquinoline-1-oxide	0.035
1,3,5-trinitrobenzene	0.049

The non-detect results for pentachloronitrobenzene, hexachlorophene, 4-nitroquinoline-1-oxide and 1,3,5-trinitrobenzene in the associated sample 013HW00704 and blank 013D131341 were rejected (R). The associated non-detect results for aramite and methapyriline were previously rejected based on low RRF's in the initial calibration. These blank results were not considered acceptable for use in blank evaluation.

The Percent Differences (%D's) exceeded the 25% QC limit for the standard analyzed on 4/01/96 at 11:15 for the following compounds:

2,4-dinitrophenol	55.5%
4,6-dinitro-2-methylphenol	28.1%
m-cresol	48.0%
hexachloropropene	36.5%
a,a-dimethylphenethylamine	49.1%
4-aminobiphenyl	27.8%
1,3-dinitrobenzene	35.0%
1,2,4,5-tetrachlorobenzene	28.8%
pentachlorobenzene	32.3%
pentachloronitrobenzene	43.9%
chlorobenzilate	31.4%
3,3'-dimethylbenzidine	43.6%
7,12-dimethylbenz(a)anthracene	61.0%
1-naphthylamine	30.6%
sulfotep	31.7%
1,3,5-trinitrobenzene	44.0%
diallate	69.6%
2-naphthylamine	31.5%

pyridine	34.2%
p-phenylenediamine	29.1%
hexachlorophene	86.6%
parathion	45.8%
4-nitroquinoline-1-oxide	56.8%

The associated non-detect results for pentachloronitrobenzene, methapyriline, hexachlorophene, 4-nitroquinoline-1-oxide and1,3,5-trinitrobenzene were previously rejected because of low RRF's in the initial and continuing calibrations. All results for the other compounds in associated sample 013HW00704, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Relative Response Factors (RRF's) for the standard analyzed on 4/02/96 at 9:05 were below the 0.050 QC limit for the following compounds:

aramite	0.020
pentachloronitrobenzene	0.043
methapyriline	0.034
hexachlorophene	0.012
4-nitroquinoline-1-oxide	0.034
1,3,5-trinitrobenzene	0.045

The non-detect results for pentachloronitrobenzene, hexachlorophene, 4-nitroquinoline-1-oxide and 1,3,5-trinitrobenzene in associate blank 013E131341 were rejected (R). The non-detect results for aramite and methapyriline were previously rejected in these samples based on low RRF's in the initial calibration. These blank results were not considered acceptable for use in blank evaluation.

The Percent Differences (%D's) exceeded the 25% QC limit for the standard analyzed on 4/02/96 at 9:05 for the following compounds:

bis(2-chloroethyl)ether	94.9%
2,4-dinitrophenol	50.8%
4,6-dinitro-2-methylphenol	26.4%
3,3'-dichlorobenzidine	37.3%
n-nitrosodimethylamine	46.1%
m-cresol	43.6%
2-sec-butyl-4,6-dinitrophenol	61.6%
aramite	32.0%
hexachloropropene	41.8%
1,3-dinitrobenzene	26.3%
pentachloronitrobenzene	29.9%
3,3'-dimethylbenzidine	34.2%
7,12-dimethylbenz(a)anthracene	42.3%
1-naphthylamine	41.5%
thionazine	28.1%
sulfotep	44.6%
1,3,5-trinitrobenzene	48.9%
diallate	71.0%
methyl parathion	33.1%

2-naphthylamine	34.7%
pyridine	35.6%
hexachlorophene	84.3%
parathion	50.1%
4-nitroquinoline-1-oxide	57.7%

The non-detect results for aramite, pentachloronitrobenzene, methapyriline, hexachlorophene, 4-nitroquinoline-1-oxide and 1,3,5-trinitrobenzene in the associated equipment rinsate blank were previously rejected because of low RRF's in the initial and continuing calibrations. No further action was taken.

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks, so no action was taken.

Equipment Rinsate Blank:

There were no positive detections in the equipment rinsate blank. No action was necessary.

Deionized Water Blank:

There were no positive detections in the deionized water blank. No action was necessary.

TIC's:

1,3-Dimethyl-2-(1-methylethyl)-cyclopentene was detected at 4 ug/L in the method blank SBLK1. Since this TIC was not detected in the associated samples, no action was taken.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met, so no action was necessary.

VI.) Laboratory Control Samples (LCS):

Four LCS's were analyzed by the laboratory. Data validation based on LCS recoveries was not required, so no action was necessary.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

There were no MS / MSD analyses in this SDG. No action was taken.

VIII.) Field Duplicates:

Field duplicate sample 013HW00704 was analyzed in this SDG, while corresponding sample 013GW00704 was analyzed in SDG 25015B. There were no calculable Relative Percent Differences (RPD's) for this set of field duplicate samples. No action was required.

IX.) Internal Standards Performance:

All Internal Standards Performance criteria were met, so no action was required.

X.) TCL Compound Identification:

All TCL Compound Identification criteria were met, so no action was required.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria were met, so no action was taken.

XII.) Tentatively Identified Compounds (TIC's):

All TIC criteria were met, so no action was necessary.

XIII.) System Performance:

All System Performance criteria were met, so no action was taken.

XIV.) Overall Assessment of Data/General:

The non-detect results for aramite, pentachloronitrobenzene, methapyriline, hexachlorophene, 4-nitroquinoline-1-oxide and 1,3,5-trinitrobenzene were rejected in sample 013HW00704 and blanks 013D131341 and 013E131341 because of low RRF's in the initial and continuing calibrations. All other laboratory data were acceptable with qualifications.

PESTICIDES/PCB's

I.) Holding Times:

All Holding Time criteria were met, so no action was required.

II.) Instrument Performance:

All Pesticide Instrument Performance criteria were met, so no action was taken.

III.) Calibration:

Initial Calibration:

All Initial Calibration criteria were met, so no action was necessary.

Continuing Calibration:

All Continuing Calibration criteria were met, so no action was taken.

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks. No action was required.

Equipment Rinsate Blank:

There were no positive detections in the equipment rinsate blank. No action was necessary.

Deionized Water Blank:

There were no positive detections in the deionized water blank. No action was necessary.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met, so no action was taken.

VI.) Laboratory Control Samples (LCS):

Two LCS's were analyzed with this SDG. Data validation based on LCS recoveries was not required, so no action was taken.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

There were no MS / MSD analyses in this SDG. No action was taken.

VIII.) Field Duplicates:

Field duplicate sample 013HW00704 was analyzed in this SDG, while corresponding sample 013GW00704 was analyzed in SDG 25015B. There were no calculable Relative Percent Differences (RPD's) for this set of field duplicate samples. No action was required.

IX.) TCL Compound Identification:

Pesticide/PCB Identification Summary (PIS):

All PIS Identification criteria were met. No action was required.

X.) Pesticide Cleanup Check:

Florisil Cartridge Check:

All criteria were met, so no action was taken.

Gel Permeation Chromatography (GPC):

GPC cleanup was not required for water samples. No action was necessary.

XI.) Overall Assessment of Data/General:

All laboratory data were acceptable without qualification.

TOTAL METALS AND CYANIDE

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Calibration:

Initial Calibration:

All Initial Calibration criteria were met, so no action was necessary.

Continuing Calibration Verification (CCV):

All Continuing Calibration criteria were met, so no action was required.

III.) Blanks:

The following blank results represent the highest detections associated with the sample and were used for data qualification:

Blank Type/ID#	Analyte	Max. Conc.	Action Level
EB	aluminum	40.9 ug/L	204 ug/L
CCB1	antimony	5.20 ug/L	26.0 ug/L
EB	barium	33.7 ug/L	168 ug/L
DB	beryllium	0.40 ug/L	1.80 ug/L
EB	calcium	6390 ug/L	31950 ug/L
EB	magnesium	611 ug/L	3055 ug/L
EB	manganese	1.40 ug/L	7.00 ug/L
EB	sodium	19100 ug/L	95500 ug/L
CCB1	thallium	3.80 ug/L	19.0 ug/L
CCB1	tin	4.90 ug/L	24.5 ug/L
EB	zinc	13.0 ug/L	65.0 ug/L

CCB = Continuing Calibration Blank, DB = Deionized Water Blank (013D131341),
EB = Equipment Rinsate Blank (013E131341)

All results greater than the IDL but less than 5X the blank amount (Action Level, ug/L for water samples) for which the contaminated blank was an associated calibration, equipment rinsate or deionized water blank were flagged as undetected (U).

The following analytes had negative results with absolute values greater than the IDL:

Blank Type/ID#	Analyte	Neg. Conc.	5X Conc.
CCB5	copper	-1.90 ug/L	9.50 ug/L
CCB3	silver	-1.30 ug/L	6.50 ug/L

CCB = Continuing Calibration Blank

All associated positive sample results less than 5X the absolute value of the negative blank results and all associated non-detects were flagged as estimated (J) and (UJ).

IV.) ICP Interference Check Sample Results:

All Percent Recovery criteria were met, so no action was taken.

The following analytes were present in ICS Solution A at concentrations greater than the IDL:

antimony	6 ug/L
barium	9 ug/L
chromium	3 ug/L
vanadium	3 ug/L

These analytes should not be present. Since neither aluminum, calcium, iron nor magnesium was present in the samples at a concentration comparable to or greater than the amount in Solution A, no action was required.

Negative results were observed in ICS Solution A at absolute concentrations greater than the IDL for the following analytes:

cadmium	-2 ug/L
copper	-5 ug/L
manganese	-3 ug/L
thallium	-6 ug/L
zinc	-13 ug/L

Since neither aluminum, calcium, iron nor magnesium was present in the samples at a concentration comparable to or greater than the amount in Solution A, no action was required.

V.) ICP Serial Dilution Analysis:

ICP Serial Dilution Analysis was not required for this SDG. No action was taken.

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met. No action was required.

VII.) Duplicate Sample Analysis:

There were no laboratory duplicate samples analyzed in this SDG. No action was taken.

VIII.) Matrix Spike Recoveries:

There were no Matrix Spike analyses in this SDG. No action was taken.

IX.) Field Duplicates:

Field duplicate water samples 013GW00704 and 013HW00704 were analyzed by the laboratory. Duplicate sample 013HW00704 was analyzed in this SDG, while sample 013GW00704 was analyzed in SDG 25015B. The calculable Relative Percent Differences (RPD's) were:

Analyte	013GW00704, ug/L	013HW00704, ug/L	RPD
barium	19.9	19.5	0.2
calcium	128000	126000	1.6
iron	5330	5140	3.6
magnesium	26500	25500	3.8
manganese	933	897	3.9
potassium	34900	34200	2.0
sodium	56200	53800	4.4

All Relative Percent Differences (RPD's) were within the 30% QC limit for water samples. No action was necessary.

X.) Graphite Furnace Atomic Absorption QC (GFAA):

Graphite Furnace analyses were not used for the samples in this SDG.

XI.) Sample Result, Calculation/Transcription Verification:

All criteria were met. No action was necessary.

XII.) Quarterly Verification of Instrumental Parameters:

All criteria were met, so no action was taken.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualifications.

DATA QUALIFICATION SUMMARY

Southwest Laboratory of Oklahoma, Inc. - 25015B Level III, CLP Organics and Inorganics

SAMPLES: 009GW01604, 009GW01604RE, 009GW07D04, 013G131341, 013G131342, 013GW00604, 013GW00504, 013GW00704, 017GW00104, 017GW00304, 017GW00404, 017GW001FP, 655GW00204, 009TW01604, 017TW00104, 017TW00304

VOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) GC/MS Tuning:

All GC/MS Tuning criteria were met, so no action was required.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviations (%RSD's) exceeded the 30% QC limit for the standards analyzed on 3/29/96 on instrument N for the following compounds:

chloroethane	34.4%
acetone	48.2%
2-butanone	37.6%
2-hexanone	30.8%

Since these compounds were not detected in the associated samples, no further action was necessary.

The Percent Relative Standard Deviations (%RSD's) exceeded the 30% QC limit for the standards analyzed on 3/22/96 on instrument R for the following compounds:

chloroethane	43.7%
acetone	79.5%
2-butanone	58.7%
tetrachloroethene	38.1%
1,1,2,2-tetrachloroethane	30.3%
2-chloroethyl vinyl ether	54.0%

The positive result for acetone in associated sample 009GW01604 was flagged as estimated (J). There were no other associated positive sample results for these compounds. No further action was required.

Continuing Calibration:

The Percent Differences (%D's) exceeded the 25% QC limit for the standard analyzed on 4/01/96 at 10:19 on instrument N for the following compounds:

methylene chloride	26.4%
acetone	37.8%
2-butanone	44.7%
vinyl acetate	35.5%
4-methyl-2-pentanone	34.5%
2-hexanone	38.0%
2-chloroethyl vinyl ether	60.4%

All results for these compounds in associated samples 017GW00304, which consisted entirely of non-detects after blank qualification, were flagged as estimated (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard analyzed on 3/28/96 at 08:39 on instrument R for the following compounds:

acetone	37.2%
2-chloroethyl vinyl ether	57.4%

All positive and non-detect results for these compounds in associated samples 009GW07D04 and 009GW01604 were flagged as estimated (J) and (UJ).

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks. No action was taken.

Equipment Rinsate Blank:

There was no equipment rinsate blank analyzed with this SDG, no action was taken.

Trip Blanks:

Methylene chloride were detected at 4 ug/L and 7 ug/L in trip blanks 017TW00104 and 017TW00304, respectively. Detections of methylene chloride in associated samples less than 10X the blank amounts were flagged as undetected (U) with the analytical results below the CRQL being replaced with the CRQL. The associated samples were 017GW00104, 017GW00404 and 017GW00304.

TIC's:

All TIC criteria were met. No action was required.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met, so no action was required.

VI.) Laboratory Control Samples (LCS):

Six LCS's were analyzed in this SDG. The Percent Recoveries of 2-chloroethyl vinyl ether were below the 73-156% QC limits in four LCS's. Data validation action based on LCS recoveries was not required, so no action was taken.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

MS / MSD's were not analyzed in this SDG. No action was necessary.

VIII.) Field Duplicates:

Field duplicate samples were not analyzed in this SDG. No action was necessary.

IX.) Internal Standards Performance (ISTD):

All Internal Standards Performance criteria were met, so no action was required.

X.) TCL Compound Identification:

All TCL Compound Identification criteria were met, so no action was taken.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria were met, so no action was necessary.

XII.) Tentatively Identified Compounds (TIC's):

All TIC Identification criteria were met, so no action was required.

XIII.) System Performance:

All System Performance criteria were met. No action was taken.

XIV.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualifications.

SEMIVOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) GC/MS Tuning:

All GC/MS Tuning criteria were met, so no action was taken.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviation (%RSD) of bis(2-ethylhexyl)phthalate was 33.7%, which exceeded the 30% QC limit, for the standards analyzed on 3/20/96 on instrument A. Since there were no positive detections of this compound in the associated samples, no action was necessary.

The Percent Relative Standard Deviation (%RSD) of hexachlorocyclopentadiene was 30.1%, which exceeded the 30% QC limit, for the standards analyzed on 4/01/96 on instrument P. Since there were no positive detections of this compound in the associated samples, no action was necessary.

The Percent Relative Standard Deviation (%RSD's) of benzoic acid and 2,4-dinitrotoluene were 31.1% and 48.6%, respectively, which exceeded the 30% QC limit for the standards analyzed on 4/09/96 on instrument V. Since there were no positive detections of these compounds in the associated samples, no action was necessary.

Continuing Calibration:

The Percent Differences (%D's) exceeded the 25% QC limit for the standard analyzed on 4/08/96 at 8:43 on instrument A for the following compounds:

hexachlorocyclopentadiene	29.5%
2,4-dinitrophenol	54.3%
4,6-dinitro-2-methylphenol	32.6%

The non-detect results for these compounds in associated samples 017GW00304 and 655GW00204 were flagged as estimated (UJ).

The Percent Difference (%D) for benzo(g,h,i)perylene was 25.2% in the standard analyzed on 4/02/96 at 7:47 on instrument P, which exceeded the 25% QC limit. The non-detect results for this compound in associated samples 013GW00604, 013GW00504, 013G131342 and 009GW01604 were flagged as estimated (UJ).

The Percent Differences (%D's) for 2,4-dinitrotoluene and butylbenzylphthalate were 26.5% and 27.4%, respectively, for the standard analyzed on 4/10/96 at 9:17 on instrument V, which exceeded the 25% QC limit. The non-detect results for these two compounds in associated samples 017GW00104, 017GW00404 and 013G131341 were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks. No action was taken.

Equipment Rinsate Blank:

There were no positive detections in the equipment rinsate blank. No action was necessary.

Deionized Water Blank:

There were no positive results in the deionized water blank. No action was required.

TIC's:

All TIC criteria were met. No action was taken.

V.) Surrogate Recoveries:

The Percent Recovery (%R) of nitrobenzene-d5 was 28% in sample 017GW00304, which was below the 35-114% QC limits. Since only one surrogate in the base/neutral fraction was outside the QC limits and the %R was greater than 10%, no action was required.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

MS / MSD's were not analyzed with this SDG, no action was taken.

VIII.) Field Duplicates:

There were no calculable Relative Percent Differences (RPD's) for field duplicate sample set 013GW00704 / 013HW00704. Sample 013GW00704 was analyzed in this SDG, while field duplicate sample 013HW00704 was analyzed in SDG 25015A. No action was required.

IX.) Internal Standards Performance:

The internal standard area counts for perylene-d12 were 49% in both analyses of sample 009GW01604, which were below the 50-200% QC limits. The positive and non-detect results for compounds quantitated on this ISTD in this sample and the reanalysis were flagged as estimated (J) and (UJ).

X.) TCL Compound Identification:

All TCL Compound Identification criteria were met, so no action was required.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria were met, so no action was taken.

XII.) Tentatively Identified Compounds (TIC's):

All TIC criteria were met, so no action was necessary.

XIII.) System Performance:

All System Performance criteria were met, so no action was taken.

XIV.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualifications.

PESTICIDES/PCB's

I.) Holding Times:

All Holding Time criteria were met, so no action was required.

II.) Instrument Performance:

All Pesticide Instrument Performance criteria were met, so no action was taken.

III.) Calibration:

All Initial and Continuing Calibration criteria were met. No action was necessary.

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks. No action was required.

Equipment Rinsate Blank:

There were no positive detections in the equipment rinsate blank. No action was necessary.

Deionized Water Blank:

There were no positive detections in the deionized water blank. No action was necessary.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met. No action was taken.

VI.) Laboratory Control Samples (LCS):

Two LCS's were analyzed with this SDG. All Percent Recovery criteria were met. No action was taken.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

MS / MSD's were not analyzed in this SDG. No action was taken.

VIII.) TCL Compound Identification:

Pesticide/PCB Identification Summary (PIS):

All PIS criteria were met, so no action was necessary.

IX.) Field Duplicates:

There were no calculable Relative Percent Differences (RPD's) for field duplicate sample set 013GW00704 / 013HW00704. Sample 013GW00704 was analyzed in this SDG, while field duplicate sample 013HW00704 was analyzed in SDG 25015A. No action was required.

X.) Pesticide Cleanup Check:

Florisil Cartridge Check:

All criteria were met, so no action was taken.

Gel Permeation Chromatography (GPC):

GPC cleanup was no required for water samples. No action was necessary.

XI.) Overall Assessment of Data/General:

All laboratory data were acceptable without qualification.

GASOLINE RANGE ORGANICS

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Instrument Performance:

All Instrument Performance criteria were met, so no action was necessary.

III.) Calibration:

Initial Calibration:

All Initial Calibration criteria were met, so no action was required.

Continuing Calibration:

All Continuing Calibration criteria were met. No action was taken.

IV.) Blanks:

Method Blanks:

There was no positive detections in the method blanks. No action was necessary.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met, so no action was required.

VI.) Laboratory Control Sample (LCS):

Two LCS's were analyzed for this SDG. All Percent Recovery criteria were met. No action was taken.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

MS / MSD's were not analyzed in this SDG. No action was necessary.

VIII.) TCL Compound Identification:

All criteria were met, so no action was required.

IX.) Field Duplicates:

No field duplicate samples were analyzed in this fraction. No action was taken.

X.) Overall Assessment of Data/General:

All laboratory data were acceptable without qualification.

DIESEL RANGE ORGANICS

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Instrument Performance:

All Instrument Performance criteria were met, so no action was necessary.

III.) Calibration:

All Initial and Continuing Calibration criteria were met, so no action was required.

IV.) Blanks:

Method Blank:

There no positive detections in the method blanks. No action was necessary.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met, so no action was required.

VI.) Laboratory Control Sample (LCS):

Two LCS's was analyzed for this SDG. All Percent Recovery criteria were met. No action was taken.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

MS / MSD's were not analyzed in this SDG. No action was necessary.

VIII.) TCL Compound Identification:

All criteria were met, so no action was required.

IX.) Field Duplicates:

No field duplicate samples were analyzed in this fraction. No action was taken.

IX.) Overall Assessment of Data/General:

All laboratory data were acceptable without qualification.

TOTAL METALS AND CYANIDE

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Calibration:

Initial Calibration:

All Initial Calibration criteria were met, so no action was necessary.

Continuing Calibration Verification (CCV):

All Continuing Calibration criteria were met, so no action was necessary.

III.) Blanks:

The following blank results represent the highest detections associated with the samples and were used for data qualification:

Blank Type/ID#	Analyte	Max. Conc.	Action Level
ERB	aluminum	40.9 ug/L	204 ug/L
CCB1	antimony	5.20 ug/L	26.0 ug/L
ERB	barium	33.7 ug/L	168 ug/L
DWB	beryllium	0.40 ug/L	2.00 ug/L
ERB	calcium	6390 ug/L	31950 ug/L
ERB	magnesium	611 ug/L	3055 ug/L
ERB	manganese	1.40 ug/L	7.00 ug/L
ERB	sodium	19100 ug/L	95500 ug/L
CCB1	thallium	3.80 ug/L	19.0 ug/L
CCB1	tin	4.90 ug/L	24.5 ug/L
ERB	zinc	13.0 ug/L	65.0 ug/L

CCB = Continuing Calibration Blank, DWB = Deionized Water Blank (013D131341), ERB = Equipment Rinsate Blank (013E131341).

All results greater than the IDL but less than 5X the blank amount (Action Level, ug/L for water samples) for which the contaminated blank was an associated calibration, equipment rinsate or deionized water blank were flagged as undetected (U).

The following analytes had negative results with absolute values greater than the IDL:

Blank Type/ID#	Analyte	Neg. Conc.	5X Conc.
CCB5	copper	-1.90 ug/L	9.50 ug/L
CCB3	silver	-1.30 ug/L	6.50 ug/L

CCB = Continuing Calibration Blank

All associated positive sample results less than 5X the absolute value of the negative blank results and all associated non-detects were flagged as estimated (J) and (UJ).

IV.) ICP Interference Check Sample Results:

All Percent Recovery criteria were met, so no action was taken.

The following analytes were present in ICS Solution A at concentrations greater than the IDL:

antimony	6 ug/L
barium	9 ug/L
chromium	3 ug/L
vanadium	3 ug/L

These analytes should not be present. Magnesium was detected at a concentration greater than that of ICS Solution A in associated sample 009GW07D04. The positive result for vanadium in this sample was flagged as estimated (J). The other analytes were not detected, so no further action was required.

Negative results were observed in ICS Solution A at absolute concentrations greater than the IDL for the following analytes:

cadmium	-2 ug/L
copper	-5 ug/L
manganese	-3 ug/L
thallium	-6 ug/L
zinc	-13 ug/L

Magnesium was detected at a concentration greater than that of ICS Solution A in associated sample 009GW07D04. The positive and non-detect results for these analytes in this sample were flagged as estimated (J) and (UJ).

V.) ICP Serial Dilution Analysis:

ICP Serial Dilution Analysis was not performed in this SDG. No action was taken.

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met. No action was required.

VII.) Duplicate Sample Analysis:

Duplicate Sample Analysis was not performed in this SDG. No action was taken.

VIII.) Matrix Spike Recoveries:

MS / MSD analyses were not performed in this SDG. No action was taken.

IX.) Field Duplicates:

Field duplicate water samples 013GW00704 and 013HW00704 were analyzed by the laboratory. Sample 013GW00704 was analyzed in this SDG, while field duplicate sample 013HW00704 was analyzed in SDG 25015A. The calculable Relative Percent Differences (RPD's) were:

Analyte	013GW00704, ug/L	013HW00704, ug/L	RPD
barium	19.9	19.5	0.2
calcium	128000	126000	1.6
iron	5330	5140	3.6
magnesium	26500	25500	3.8
manganese	933	897	3.9
potassium	34900	34200	2.0
sodium	56200	53800	4.4

All RPD's were within the 30% QC limit for water samples. No action was necessary.

X.) Graphite Furnace Atomic Absorption QC (GFAA):

Graphite Furnace analyses were not used for the samples in this SDG. No action was required.

XI.) Sample Result, Calculation/Transcription Verification:

All criteria were met, so no action was necessary.

XII.) Quarterly Verification of Instrumental Parameters:

All criteria were met, so no action was taken.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualifications.

CHLORIDES

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Calibration:

All Initial and Continuing Calibration criteria were met, so no action was taken.

III.) Blanks:

Method Blanks:

There were no positive detections in the method blanks. No action was necessary.

IV.) Laboratory Check Samples (LCS):

All LCS Percent Recovery criteria were met. No action was necessary.

V.) Duplicate Sample Analysis:

Duplicate Sample Analysis was not performed in this SDG. No action was taken.

VI.) Matrix Spike / Matrix Spike Duplicates (MS / MSD):

No MS / MSD analyses were performed in this fraction. No action was required.

VII.) Field Duplicates:

No field duplicate samples were associated with this fraction. No action was necessary.

VIII.) Overall Assessment of Data/General:

All laboratory data were acceptable without qualification.

HEXAVALENT CHROMIUM

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Calibration:

All Initial and Continuing Calibration criteria were met. Data qualification was not necessary.

III.) Blanks:

There were no positive detections in the blanks, so no action was required.

IV.) Laboratory Check Samples (LCS):

Two LCS's were analyzed in this SDG. All recoveries were within the QC limits. No action was taken.

V.) Laboratory Duplicates (MD):

Laboratory Duplicate analysis was not perform in this fraction. No action was necessary.

VI.) Matrix Spike Recovery (MS):

There were no Matrix Spikes analyzed in this SDG. No action was taken.

VII.) Field Duplicates:

There were no field duplicates analyzed. No action was taken.

VIII.) Overall Assessment of Data/General:

All laboratory data were acceptable without qualification.

VALIDATA

Chemical Services, Inc.

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DATA VALIDATION SUMMARY REPORT

COMPANY:	EnSafe/Allen & Hoshall
SITE NAME:	Charleston Naval Base, Zone H
PROJECT NUMBER:	8500.014
CONTRACTED LAB:	Southwest Laboratories of Oklahoma
EPA SOW/METHOD:	EPA 8290
VALIDATION GUIDELINES:	EPA 8290, Professional Judgement
SAMPLE MATRIX:	Water
TYPES OF ANALYSES:	2,3,7,8-substituted PCDD's and PCDF's

SDG NO: 25015B

SAMPLES:

Client Sample #:	Lab Sample #:	Matrix	PCDD/ PCDF
009GW01604	25015.06	Water	X

D = DUPLICATE, MS = MATRIX SPIKE, MSD = MATRIX SPIKE DUPLICATE

DATA REVIEWER(S): Shawn S. Lin, Ph.D., Kevin C. Harmon

RELEASE SIGNATURE: Kevin C. Harmon

DATA QUALIFICATION SUMMARY

Southwest Laboratories of Oklahoma - 25015B 2,3,7,8-substituted PCDD's and PCDF's

SAMPLES: 009GW01604

2,3,7,8-SUBSTITUTED PCDD'S AND PCDF'S

I.) Holding Times:

All criteria were met, so no action was taken.

II.) HRGC/HRMS System Performance:

GC Column Performance:

All criteria were met, so no action was taken.

HRMS Resolution:

All criteria were met, so no action was taken.

Mass Verification:

All criteria were met, so no action was required.

MS Data Acquisition:

All criteria were met, so no action was taken.

III.) Calibration:

Calibration Range:

EPA Method 1613A calibration and internal standard concentration levels were used for the analyses. Comparing to EPA Method 8290, the calibration ranges of two methods were not significantly different, so no action was deemed necessary.

Initial Calibration and Continuing Calibration Check:

All criteria were met, so no action was taken.

IV.) Blanks

Method Blanks:

OCDD was detected in a method blank at the following concentration:

Method Blank	Compound	Concentration pg/L	Action Level pg/L
DFBLK1	OCDD	108	540

The detection of OCDD in the associated sample, 009GW01604, below 5X the blank amount was designated as EMPC (Estimated Maximum Possible Concentration).

Field Blanks:

No field blank was analyzed.

V.) Internal Standards Performance:

All criteria were met, so no action was taken.

VI.) Spike/Spike Duplicates:

No MS/MSD were analyzed.

One LCS was analyzed. All criteria were met, so no action was taken.

VII.) Duplicates:

No field duplicates were analyzed.

VIII.) PCDD/PCDF Identifications:

Retention Times:

All criteria were met, so no action was taken.

Ion Abundance:

All criteria were met, so no action was taken.

S/N Ratio:

All criteria were met, so no action was taken.

PCDPE (Polychlorinated Diphenyl Ether) Interferences:

All criteria were met, so no action was taken.

Second Column Confirmation:

All criteria were met, so no action was taken.

IX.) Overall Assessment of Data/General:

All data were acceptable with qualifications.

VALIDATA

Chemical Services, Inc.

P. O. Box 930422, Norcross, GA 30093

(770) 923-3890
(770) 923-8769 (Fax)

DATA VALIDATION SUMMARY REPORT

COMPANY:	Ensafe/Allen & Hoshall
SITE NAME:	Charleston Navel Base, Zone H
PROJECT NUMBER:	8500.14
CONTRACTED LAB:	Southwest Laboratory of Oklahoma, Inc.
QA/QC LEVEL:	EPA Level III / Level IV
EPA METHOD:	EPA SOW 3-90, SW-846
VALIDATION GUIDELINES:	*USEPA CLP National Functional Guidelines for Organic Data Review,* 1994; *USEPA CLP National Functional Guidelines for Inorganic Data Review,* 1994
SAMPLE MATRIX:	Water
TYPES OF ANALYSES:	Volatile Organics, Semivolatile Organics, Pesticides/PCB's, Total Metals, Chloride.
SDG NUMBERS:	25067A (Appendix IX, Level IV) 25067B (Level III)

SAMPLES:

SDG 25067A (Level IV):

Client Sample #	Lab Sample #	Matrix	Semi-volatiles	Pesticides/ PCB's	Total Metals
655HW00304*	25068.01	Water	X	X	X

* = Field duplicate was associated with sample 655GW00304 in SDG 25067B.

SDG 25067B (Level III):

Client Sample #	Lab Sample #	Matrix	Volatile Organics	Semi-Volatiles	Pesticides/ PCB's	Total Metals	Chloride
009GW00104	25130.07	Water	X	X	X	X	X
017GW00204	25067.07	Water	X	X	X	X	
017GW00204DL	25067.07DL	Water		X			
121GW00104	25130.06	Water	X	X	X	X	
136GW00104	25130.05	Water	X	X		X	

Client Sample #	Lab Sample #	Matrix	Volatile Organics	Semi-Volatiles	Pesticides/ PCB's	Total Metals
178GW00104	25067.05	Water		X		X
178GW00204	25083.01	Water		X		X
653GW00104	25083.04	Water		X	X	X
653GW00204	25083.07	Water		X	X	X
653GW00204RE	25083.07RE	Water		X		
655GW00104	25067.01	Water		X	X	X
655GW00304*	25067.02	Water		X	X	X
660GW00104	25083.02	Water			X	X
660GW00204	25083.03	Water			X	X
662GW00104	25130.01	Water	X	X		X
662GW00204	25130.02	Water	X	X		X
666GW00104	25130.03	Water	X	X		X
666GW00204	25130.04	Water	X	X		X
178FW00104	25067.06	Water		X		X
009TW00104	25130.08	Water	X			
017TW00204	25067.08	Water	X			
653EW00204	25083.05	Water		X	X	X
653DW00204	25083.06	Water		X	X	X
653DW00204RE	25083.06RA	Water		X		
655GW00304MS	25067.03	Water		+	+	+
655GW00304MSD	25067.04	Water		+	+	+

+ = Non-billable Quality Control Sample
* = The associated field duplicate sample 655HW00304 was analyzed in SDG 25067A.

DW = DEIONIZED WATER BLANK, DL = DILUTION, EW = EQUIPMENT RINSATE BLANK, FW = FIELD BLANK, MS = MATRIX SPIKE, MSD = MATRIX SPIKE DUPLICATE, RE = REANALYSIS, TW = TRIP BLANK

DATA REVIEWER(S): Linda H. Liu, Marvin L. Smith, Jean M. Delashmit

RELEASE SIGNATURE: Jean M. Delashmit

Data Qualifier Definitions

J	-	The association numerical value is an estimated quantity.
R	-	The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
U	-	The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	-	The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA QUALIFICATION SUMMARY

Southwest Laboratory of Oklahoma, Inc. - 25067A Appendix IX, CLP Organics and Inorganics

SAMPLE: 655HW00304

SEMIVOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met, so no action was necessary.

II.) GC/MS Tuning:

All GC/MS Tuning criteria were met, so no action was taken.

III.) Calibration:

Initial Calibration:

The average Relative Response Factors (RRF's) for the standards analyzed on 3/29/96 were below the 0.050 QC limit for the following compounds:

aramite	0.030
methapyriline	0.034

The non-detect results for these compounds in the associated sample were rejected (R).

The Percent Relative Standard Deviations (%RSD's) for the initial calibration analyzed on 3/29/96 exceeded the 30% QC limit for the following compounds:

2,3,4,6-tetrachlorophenol	30.8%
4-nitroquinoline-1-oxide	73.0%
2-sec-butyl-4,6-dinitrophenol	36.0%
parathion	47.0%
aramite	33.7%
7,12-dimethylbenz(a)anthracene	31.0%
hexachlorophene	41.9%

The non-detect results for aramite and methapyriline in the associated samples were previously rejected because of low RRF's. The other compounds were not detected in the associated sample, so no action was taken.

Continuing Calibration:

The Relative Response Factors (RRF's) for the standard analyzed on 4/12/96 at 9:04 were below the 0.050 QC limit for the following compounds:

aramite	0.025
pentachloronitrobenzene	0.040
methapyriline	0.048
hexachlorophene	0.013

The non-detect results for aramite and methapyriline were previously rejected in these samples based on low RRF's in the initial calibration. The non-detect results for pentachloronitrobenzene and hexachlorophene in associate sample 655HW00304 were rejected (R).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard analyzed on 4/12/96 at 9:04 for the following compounds:

2,4-dinitrophenol	51.0%
m-cresol	52.1%
hexachloropropene	33.2%
hexachlorophene	83.1%
phenacetin	33.4%
pentachloronitrobenzene	35.0%
methapyrilene	37.9%
7,12-dimethylbenz(a)anthrace	50.2%
1-naphthylamine	30.2%
pyridine	27.4%
sulfotep	29.7%
1,3,5-trinitrobenzene	29.0%

The non-detect results for pentachloronitrobenzene, hexachlorophene and methapyriline in the associated sample 655HW00304 were previously rejected because of low RRF's in the initial and continuing calibrations. The results for other compounds in associated sample 655HW00304, which consisted entirely of non-detects, were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blank, so no action was taken.

Equipment Rinsate Blank:

There were no positive detections in the equipment rinsate blank. No action was necessary.

Deionized Water Blank:

Naphthalene was detected at 1 ug/L in deionized water blank 653DW00204RE which was analyzed in

SDG 25067B. The detection of this compound in associated sample 655HW00304, which was less than 5X the blank amount, was flagged as undetected (U) with the analytical result below the CRQL being replaced with the CRQL.

TIC's:

There were no TIC detections in the blanks. No action was taken.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met, so no action was necessary.

VI.) Laboratory Control Samples (LCS):

Two LCS samples were analyzed by the laboratory. All Percent Recovery criteria were met. Data validation based on LCS recoveries was not required, so no action was necessary.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

There were no MS / MSD analyses for this SDG. No action was taken.

VIII.) Field Duplicates:

Samples 655HW00304 was analyzed in this SDG, while sample 655GW00304 was analyzed in SDG 25067B. There were no calculable Relative Percent Differences (RPD's) for this set of field duplicate samples, so no action was required.

IX.) Internal Standards Performance:

All Internal Standards Performance criteria were met, so no action was required.

X.) TCL Compound Identification:

All TCL Compound Identification criteria were met, so no action was required.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria were met, so no action was necessary.

XII.) Tentatively Identified Compounds (TIC's):

All TIC criteria were met, so no action was necessary.

XIII.) System Performance:

All System Performance criteria were met, so no action was taken.

XIV.) Overall Assessment of Data/General:

The non-detect results for aramite, pentachloronitrobenzene, methapyriline and hexachlorophene were rejected in sample 655HW00304 because of low RRF's in the initial and continuing calibrations. All other laboratory data were acceptable with qualifications.

PESTICIDES/PCB's

I.) Holding Times:

All Holding Time criteria were met, so no action was required.

II.) Instrument Performance:

All Pesticide Instrument Performance criteria were met, so no action was taken.

III.) Calibration:

Initial Calibration:

All Initial Calibration criteria were met, so no action was necessary.

Continuing Calibration:

All Continuing Calibration criteria were met, so no action was taken.

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks. No action was required.

Equipment Rinsate Blank:

4,4'-DDT was detected at 0.14 ug/L in the equipment rinsate blank 653EW00204, which was analyzed in SDG 25067B. Since 4,4'-DDT was not detected in the associated sample, no action was required.

Deionized Water Blank:

There were no positive detections in deionized water blank. No action was required.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met, so no action was taken.

VI.) Laboratory Control Samples (LCS):

Two LCS's were analyzed with this SDG. Data validation action based on LCS recoveries was not required. No action was taken.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

There were no MS / MSD analyses for this SDG. No action was taken.

VIII.) TCL Compound Identification:

Pesticide/PCB Identification Summary (PIS):

All PIS Identification criteria were met. No action was required.

IX.) Field Duplicates:

Samples 655HW00304 was analyzed in this SDG, while sample 655GW00304 was analyzed in SDG 25067B. There were no calculable Relative Percent Differences (RPD's) for this set of field duplicate samples, so no action was required.

X.) Pesticide Cleanup Check:

Florisil Cartridge Check:

All criteria were met, so no action was taken.

Gel Permeation Chromatography (GPC):

GPC cleanup was not required for water samples. No action was necessary.

XI.) Overall Assessment of Data/General:

All laboratory data were acceptable without qualification.

TOTAL METALS

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Calibration:

Initial Calibration:

All Initial Calibration criteria were met, so no action was necessary.

Continuing Calibration Verification (CCV):

All Continuing Calibration criteria were met, so no action was necessary.

III.) Blanks:

The following blank results represent the highest detections associated with the samples and were used for data qualification:

Blank Type/ID#	Analyte	Max Conc.	Action Level
DWB	aluminum	62.0 ug/L	310 ug/L
PBW1	antimony	2.67 ug/L	13.4 ug/L
ERB	barium	53.2 ug/L	266 ug/L
FB	cadmium	0.69 ug/L	3.45 ug/L
DWB	calcium	6180 ug/L	30900 ug/L
FB	lead	9.8 ug/L	49.0 ug/L
DWB	magnesium	593 ug/L	2965 ug/L
DWB	manganese	2.0 ug/L	10.0 ug/L
FB	nickel	0.84 ug/L	4.20 ug/L
DWB	sodium	24600 ug/L	123000 ug/L
FB	vanadium	0.81 ug/L	4.05 ug/L
ERB	zinc	10.5 ug/L	52.5 ug/L

DWB = Deionized Water Blank, ERB = Equipment Rinsate Blank, FB = Field Blank, PBW = Preparation Blank (Water)

The deionized water blank, equipment rinsate blank and field blank were analyzed in SDG 25067B. All results greater than the IDL but less than 5X the blank amount (Action Level, ug/L for water samples) for which the contaminated blank was an associated preparation, equipment rinsate, deionized water or field blank were flagged as undetected (U).

The following analytes had negative results with absolute values greater than the IDL in the continuing calibration blanks (CCB's):

Blank Type/ID#	Analyte	Neg. Conc.	5X Conc.
CCB5	copper	-1.30 ug/L	6.50 ug/L
CCB3	selenium	-3.10 ug/L	15.5 ug/L

The associated sample results, which were both non-detects, were flagged as estimated (UJ).

IV.) ICP Interference Check Sample Results:

All Percent Recovery criteria were met, so no action was taken.

The following analytes were present in ICS Solution A at concentrations greater than the IDL:

antimony	8 ug/L
barium	9 ug/L
chromium	3 ug/L
vanadium	3 ug/L

These analytes should not be present. Since neither aluminum, calcium, iron nor magnesium was present in the samples at a concentration comparable to or greater than the amount in Solution A, no action was required.

Negative results were observed in ICS Solution A at absolute concentrations greater than the IDL for the following analytes:

copper	-5 ug/L
manganese	-3 ug/L
selenium	-10 ug/L
thallium	-11 ug/L
zinc	-7 ug/L

Since neither aluminum, calcium, iron nor magnesium was present in the samples at a concentration comparable to or greater than the amount in Solution A, no action was required.

V.) ICP Serial Dilution Analysis:

ICP Serial Dilution was not required for this SDG. No action was taken.

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met. No action was required.

VII.) Duplicate Sample Analysis:

No Duplicate Sample was analyzed in this SDG. No action was taken.

VIII.) Matrix Spike Recoveries:

No Matrix Spike sample was analyzed in this SDG. No action was taken.

IX.) Field Duplicates:

One set of field duplicate water samples, 655GW00304 / 655HW00304, was analyzed by the laboratory. Duplicate sample 655HW00304 was analyzed in this SDG, while corresponding sample 655GW00304 was analyzed in SDG 25067B. The calculable Relative Percent Differences (RPD's) were:

Analyte	655GW00304, ug/L	655HW00304, ug/L	RPD
arsenic	32.7	32.9	0.6
barium	103	106	2.9
calcium	155000	160000	3.2
iron	21600	22300	3.2
magnesium	72700	74900	3.0
manganese	347	357	2.8
potassium	28500	29200	2.4
sodium	787000	813000	3.2

All RPD's were within the 30% QC limit for water samples. No action was necessary.

X.) Graphite Furnace Atomic Absorption QC (GFAA):

Graphite Furnace analyses were not used for the samples in this SDG. No action was required.

XI.) Sample Result, Calculation/Transcription Verification:

All criteria were met, so no action was necessary.

XII.) Quarterly Verification of Instrumental Parameters:

All criteria were met, so no action was taken.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualifications.

DATA QUALIFICATION SUMMARY

Southwest Laboratory of Oklahoma, Inc. - 25067B Level III, CLP Organics and Inorganics

SAMPLES: 009GW00104, 017GW00204, 017GW00204DL, 121GW00104, 136GW00104, 178GW00104, 178GW00204, 653GW00104, 653GW00204, 653GW00204RE, 655GW00104, 655GW00304, 660GW00104, 660GW00204, 662GW00104, 662GW00204666GW00104, 666GW00204, 178FW00104, 009TW00104, 017TW00204, 653EW00204, 653DW00204, 653DW00204RE, 655GW00304MS, 655GW00304MSD

VOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) GC/MS Tuning:

All GC/MS Tuning criteria were met, so no action was required.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviations (%RSD's) exceeded the 30% QC limit for the standards analyzed on 3/29/96 on instrument N for the following compounds:

chloroethane	34.4%
acetone	48.2%
2-butanone	37.6%
2-hexanone	30.8%

Since these compounds were not detected in the associated samples, no action was necessary.

The Percent Relative Standard Deviations (%RSD's) exceeded the 30% QC limit for the standards analyzed on 04/03/96 on instrument R for the following compounds:

chloroethane	31.3%
methylene chloride	38.2%
acetone	88.6%
2-butanone	58.7%
2-hexanone	47.3%
tetrachloroethene	32.1%
styrene	33.2%
2-chloroethyl vinyl ether	30.8%

Since there were no positive detections of these compounds in the associated samples, no action was necessary.

The Percent Relative Standard Deviations (%RSD's) exceeded the 30% QC limit for the standards analyzed on 04/05/96 on instrument R for the following compounds:

bromomethane	60.1%
chloroethane	50.9%
vinyl acetate	34.1%
4-methyl-2-pentanone	39.9%
2-hexanone	59.8%
tetrachloroethene	35.8%
2-chloroethyl vinyl ether	31.9%

Since these compounds were not detected in the associated samples, no action was necessary.

Continuing Calibration:

The Relative Response Factors (RRF's) for 2-chloroethyl vinyl ether were 0.048 and 0.047, respectively, for the standards analyzed on 4/04/96 at 14:49 and 4/09/96 at 12:40 on instrument R, which were below the 0.050 QC limit. The non-detect results for this compound in the associated samples 017GW00204 and 121GW00104 and trip blank 017TW00204 were rejected (R). The result for this compound in the trip blank was not considered acceptable for use in blank evaluation.

The Percent Differences (%D's) exceeded the 25% QC limit for the standard analyzed on 4/8/96 at 11:11 on instrument N for the following compounds:

vinyl acetate	31.7%
2-chloroethyl vinyl ether	63.3%

The results for these two compounds in associated samples 662GW00104 and 666GW00104, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard analyzed on 4/04/96 at 14:49 on instrument R for the following compounds:

chloroethane	25.8%
acetone	39.3%
1,1,1-trichloroethane	25.7%
carbon tetrachloride	30.3%
2-chloroethyl vinyl ether	33.8%

The non-detect results for 2-chloroethyl vinyl ether were previously rejected in associated samples 017GW00204 and 017TW00204 due to very low RRF. The results for other compounds in associated sample 017GW00204, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard analyzed on 4/09/96 at 12:40 on instrument R for the following compounds:

1,1,1-trichloroethane	51.1%
vinyl acetate	34.3%
4-methyl-2-pentanone	37.9%
2-hexanone	28.8%
carbon tetrachloride	30.3%

The results for these compounds in associated sample 121GW00104, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard analyzed on 4/10/96 at 12:10 on instrument R for the following compounds:

chloroethane	29.1%
acetone	30.8%
1,2-dichloroethane	27.5%
1,1,1-trichloroethane	45.3%
4-methyl-2-pentanone	35.4%
2-hexanone	40.7%
1,1,2,2,-tetrachloroethane	26.9%
2-chloroethyl vinyl ether	33.3%

The results for these compounds in associated samples 662GW00204 and 009GW00104, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Differences (%D) of vinyl acetate was 98.8% which exceeded the 25% QC limit for the standard analyzed on 4/11/96 at 15:26 on instrument U. The non-detect results for this compound in the associated samples 666GW00204 and 136GW00104 were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

Methylene chloride was detected at 6 ug/L in method blank VBLK4. Detections of methylene chloride in associated samples less than 10X the blank amount were flagged as undetected (U). The associated samples were 662GW00204 and 009GW00104.

Equipment Rinsate Blank:

There was no equipment rinsate blank analyzed in this fraction. No action was required.

Field Blank:

There was no field blank analyzed in this fraction. No action was required.

Deionized Water Blank:

There was no deionized water blank analyzed in this fraction. No action was required.

Trip Blanks:

There were no positive detections in the trip blanks. No action was taken.

TIC's:

All TIC criteria were met. No action was required.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met, so no action was required.

VI.) Laboratory Control Samples (LCS):

Ten LCS's were analyzed in this SDG. Data validation action based on LCS recoveries was not required, so no action was taken.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

MS / MSD's were not analyzed in this SDG. No action was required.

VIII.) Field Duplicates:

No field duplicate samples were analyzed in this fraction. No action was taken.

IX.) Internal Standards Performance (ISTD):

All Internal Standards Performance criteria were met, so no action was required.

X.) TCL Compound Identification:

All TCL Compound Identification criteria were met, so no action was taken.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria were met, so no action was necessary.

XII.) Tentatively Identified Compounds (TIC's):

All TIC Identification criteria were met, so no action was required.

XIII.) System Performance:

All System Performance criteria were met. No action was taken.

XIV.) Overall Assessment of Data/General:

The non-detect results for 2-chloroethyl vinyl ether in associated samples 017GW00204 and

121GW00104 and trip blank 017TW00204 were rejected because of low RRF's in the continuing calibrations. All other laboratory data were acceptable with qualifications.

SEMIVOLATILE ORGANICS

I.) Holding Times:

The holding time from sample date to re-extraction was 14 days for sample 653GW00204RE, which exceeded the 7 day QC limit for water samples. All positive and non-detect results for this sample were flagged as estimated (J) and (UJ).

II.) GC/MS Tuning:

All GC/MS Tuning criteria were met, so no action was taken.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviation (%RSD) for bis(2-ethylhexyl)phthalate was 33.7%, which exceeded the 30% QC limit for the standards analyzed on 3/20/96 on instrument A. Since there were no positive detections of this compound in the associated samples after blank qualification, no action was necessary.

The Percent Relative Standard Deviations (%RSD's) exceeded the 30% QC limit for the standards analyzed on 4/05/96 on instrument S for the following compounds:

hexachlorocyclopentadiene	48.4%
bis(2-ethylhexyl)phthalate	68.2%

Since there were no positive detections of these compounds in the associated samples after blank qualification, no action was necessary.

Continuing Calibration:

The Percent Difference (%D) of benzo(k)fluoranthene was 28.6%, which exceeded the 25% QC limit for the standard analyzed on 4/16/96 at 09:38 on instrument A. The results for this compound in associated samples 662GW00104, 662GW00204, 666GW00104 and 666GW00204, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard analyzed on 4/17/96 at 09:28 on instrument A for the following compounds:

benzyl alcohol	37.6%
n-nitroso-di-n-propylamine	30.4%
hexachloroethane	31.4%

All results for these compounds in associated samples 136GW00104, 121GW00104 and 009GW00104, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard analyzed on 4/08/96 at 11:50 on instrument S for the following compounds:

n-nitroso-di-n-propylamine	25.9%
2,4-dinitrophenol	28.2%
bis(2-ethylhexyl)phthalate	47.6%
indeno(1,2,3-cd)pyrene	29.7%

All results for these compounds in associated samples 017GW00204DL, 178GW00204 and 653GW00104, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard analyzed on 4/09/96 at 11:49 on instrument S for the following compounds:

benzyl alcohol	28.2%
bis(2-chloroisopropyl)ether	37.5%
n-nitroso-di-n-propylamine	27.7%
2,4-dinitrophenol	27.8%
4-nitrophenol	35.7%
bis(2-ethylhexyl)phthalate	42.3%

All results for associated sample 653GW00204 were rejected due to low surrogate recoveries (%R's). No further action was required.

IV.) Blanks:

Method Blanks:

Bis(2-ethylhexyl)phthalate was detected at 6 ug/L in method blank SBLK1. Detections of this compound in the associated samples less than 10X the blank amount were flagged as undetected (U) with the detection limit being raised to the level of contamination in each sample. The associated samples were 655GW00104, 655GW00304, 178GW00104, 017GW00204 and 017GW00204DL.

Bis(2-ethylhexyl)phthalate was detected at 2 ug/L in method blank SBLK2. Detections of this compound in the associated samples less than 10X the blank amount were flagged as undetected (U) with the analytical results below the CRQL being replaced with the CRQL. The associated samples were 178GW00204, 653GW00104 653GW00204 and 653GW00204RE.

Bis(2-ethylhexyl)phthalate was detected at 3 ug/L in method blank SBLK4. Detections of this compound in the associated samples less than 10X the blank amount were flagged as undetected (U) with the analytical results below the CRQL being replaced with the CRQL. The associated samples were 662GW00104, 662GW00204, 666GW00104, 666GW00204, 136GW00104, 121GW00104 and 009GW00104.

Equipment Rinsate Blank:

There were no positive detections in the equipment rinsate blank. No action was necessary.

Deionized Water Blank:

Naphthalene was detected at 1 ug/L in deionized water blank 653DW00204RE. Detections of this compound in the associated samples less than 5X the blank amounts were flagged as undetected (U) with the analytical results below the CRQL being replaced with the CRQL.

TIC's:

All TIC criteria were met. No action was taken.

V.) Surrogate Recoveries:

The Percent Recoveries (%R's) of following surrogates in sample 653GW00204 were below their respective QC limits.

NBZ	FBP	TPH	PHL	2FP	TBP
(35-114%)	(43-116%)	(33-141%)	(10-94%)	(21-100%)	(10-123%)
4%	4%	2%	3%	3%	3%

All results in this sample were rejected (R) since the six surrogate recoveries were less than 10%.

VI.) Laboratory Control Samples (LCS):

Five LCS's were analyzed in this SDG. All Percent Recovery criteria were met. No action was taken.

VIII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

The Percent Recoveries (%R's) of 4-nitrophenol and pentachlorophenol were 95% and 115%, respectively, in spiked samples 655GW00304MSD, which exceeded their respective 10-80% and 9-103% QC limits. Since there were no positive results for these compounds in unspiked sample 655GW00304, no action was required.

IX.) Field Duplicates:

Sample 655GW00304 was analyzed in this SDG, while field duplicate sample 655HW00304 was analyzed in SDG 25067A. There were no calculable Relative Percent Differences (RPD's) for this set of field duplicate samples, so no action was required.

X.) Internal Standards Performance:

The internal standard area counts were 227%, 212%, 227%, respectively, for phenanthrene-d10, chrysene-d12 and perylene-d12 in blank 653DW00204, which exceeded the 50-200% QC limits. Since this sample was a deionized water blank, no action was taken.

The internal standard area counts were 251%, 260%, 253%, respectively, for phenanthrene-d10, chrysene-d12 and perylene-d12 in sample 653DW00204RE, which exceeded the 50-200% QC limits. Since this sample was a deionized water blank, no action was taken.

XI.) TCL Compound Identification:

All TCL Compound Identification criteria were met, so no action was required.

XII.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

1,3-Dichlorobenzene, 1,4-dichlorobenzene and 1,2,4-trichlorobenzene results for sample 017GW00204 were above the instrument's linear range. The undiluted values for these compounds were replaced with the diluted values with appropriate flagging.

XIII.) Tentatively Identified Compounds (TIC's):

All TIC criteria were met, so no action was necessary.

XIV.) System Performance:

All System Performance criteria were met, so no action was taken.

XV.) Overall Assessment of Data/General:

The original analysis of blank 653DW00204 was considered by the validator to be of preferable data quality to the reanalysis due to slightly better internal standard performance.

All results in the sample 653GW00204 were rejected (R) since all six surrogate recoveries were less than 10%. The holding time from sample date to re-extraction was 14 days for sample 653GW00204RE, which exceeded the 7 day QC limit. The re-extracted/reanalyzed analysis data were considered by the validator to be preferable to the original sample results because all results for the original analysis were rejected due to very low surrogate recoveries. All other laboratory data were acceptable with qualifications.

PESTICIDES/PCB's

I.) Holding Times:

All Holding Time criteria were met, so no action was required.

II.) Instrument Performance:

All Pesticide Instrument Performance criteria were met, so no action was taken.

III.) Calibration:

All Initial and Continuing Calibration criteria were met. No action was necessary.

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks. No action was required.

Equipment Rinsate Blank:

4,4'-DDT was detected at 0.14 ug/L in equipment rinsate blank 653EW00204. Detections of 4,4'-DDT in the associated samples less than 5X the blank amount were flagged as undetected (U) with the detection limit being raised to the level of contamination in each sample.

Field Blank:

There was no field blank in this fraction. No action was required.

Deionized Water Blank:

There were no positive detections in deionized water blank. No action was required.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met, so no action was taken.

VI.) Laboratory Control Samples (LCS):

Six LCS's were analyzed with this SDG. All Percent Recoveries (%R's) criteria were met. No action was taken.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

The Percent Recoveries (%R's) of the following compounds were outside their respective QC limits in spiked samples 655GW00304MS and 655GW00304MSD:

Compound	MS (%R)	MSD (%R)	QC Limits
beta-BHC	-	40	43-133%
4,4'-DDE	63	58	70-122%
endosulfan II	152	-	41-149%
4,4'-DDD	63	59	70-133%
endrin aldehyde	42	-	47-178%

The non-detect results for beta-BHC, 4,4'-DDE, 4,4'-DDD and endrin aldehyde in unspiked sample 655GW00304 were flagged as estimated (UJ). Since endosulfan II was not detected in the unspiked sample, no further action was required.

VIII.) TCL Compound Identification:

Pesticide/PCB Identification Summary (PIS):

The Percent Differences (%D's) between columns 1 and 2 exceeded the 70% QC limit for the following compounds and associated samples:

Sample	Compound	%D
655GW00104	heptachlor	179
017GW00204	4,4'-DDT	96.1

The result for heptachlor in sample 065GW00104 was flagged as estimated (J). The reported analytical result for 4,4'-DDT in sample 017GW00204 was determined to be blank contamination. No further action was required.

IX.) Field Duplicates:

Samples 655GW00304 was analyzed in this SDG, while sample 655HW00304 was analyzed in SDG 25067A. There were no calculable Relative Percent Differences (RPD's) for this set of field duplicate samples, so no action was required.

X.) Pesticide Cleanup Check:

Florisil Cartridge Check:

All criteria were met, so no action was taken.

Gel Permeation Chromatography (GPC):

GPC cleanup was not required for water samples. No action was necessary.

XI.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualifications.

TOTAL METALS AND CYANIDE

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Calibration:

Initial Calibration:

All Initial Calibration criteria were met, so no action was necessary.

Continuing Calibration Verification (CCV):

All Continuing Calibration criteria were met, so no action was necessary.

III.) Blanks:

The following blank results represent the highest detections associated with the samples and were used for data qualification:

Blank Type/ID#	Analyte	Max Conc.	Action Level
DWB	aluminum	62.0 ug/L	310 ug/L
PBW1	antimony	2.67 ug/L	13.4 ug/L
ERB	barium	53.2 ug/L	266 ug/L
FB	cadmium	0.69 ug/L	3.45 ug/L
DWB	calcium	6180 ug/L	30900 ug/L
PBW2	copper	0.80 ug/L	4.00 ug/L
FB	lead	9.80 ug/L	49.0 ug/L
DWB	magnesium	593 ug/L	2965 ug/L
DWB	manganese	2.00 ug/L	10.0 ug/L
FB	nickel	0.84 ug/L	4.20 ug/L
PBW2	potassium	2736 ug/L	13680 ug/L
ICB2	selenium	4.10 ug/L	20.5 ug/L
DWB	sodium	24600 ug/L	123000 ug/L
FB	vanadium	0.81 ug/L	4.05 ug/L
ERB	zinc	10.5 ug/L	52.5 ug/L

DWB = Deionized Water Blank, ERB = Equipment Rinsate blank, FB = Field Blank, ICB = Initial Calibration Blank, PBW = Preparation Blank (Water)

All results greater than the IDL but less than 5X the blank amount (Action Level, ug/L for water samples) for which the contaminated blank was an associated calibration, preparation, equipment rinsate, deionized water or field blank were flagged as undetected (U).

The following analytes had negative results with absolute values greater than the IDL in the continuing calibration blanks (CCB's):

Blank Type/ID#	Analyte	Neg. Conc.	5X Conc.
CCB5	copper	-1.30 ug/L	6.50 ug/L
CCB9	nickel	-1.60 ug/L	8.00 ug/L
CCB3	selenium	-3.10 ug/L	15.5 ug/L
CCB6	silver	-1.20 ug/L	6.00 ug/L
CCB9	potassium	-1603 ug/L	8015 ug/L
CCB6	tin	-2.80 ug/L	14.0 ug/L

All associated positive sample results less than 5X the absolute value of the negative blank results and all associated non-detects were flagged as estimated (J) and (UJ).

IV.) ICP Interference Check Sample Results:

All Percent Recovery criteria were met, so no action was taken.

The following analytes were present in ICS Solution A at concentrations greater than the IDL:

antimony	8 ug/L
barium	9 ug/L
chromium	3 ug/L
potassium	3360 ug/L
vanadium	5 ug/L

These analytes should not be present. Since neither aluminum, calcium, iron nor magnesium was present in the samples at a concentration comparable to or greater than the amount in Solution A, no action was required.

Negative results were observed in ICS Solution A at absolute concentrations greater than the IDL for the following analytes:

copper	-5 ug/L
manganese	-4 ug/L
selenium	-10 ug/L
thallium	-11 ug/L
zinc	-12 ug/L

Since neither aluminum, calcium, iron nor magnesium was present in the samples at a concentration comparable to or greater than the amount in Solution A, no action was required.

V.) ICP Serial Dilution Analysis:

All ICP Serial Dilution criteria were met. No action was taken.

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met. No action was required.

VII.) Duplicate Sample Analysis:

All Duplicate Sample criteria were met, so no action was taken.

VIII.) Matrix Spike Recoveries:

All Percent Recovery criteria were met, so no action was taken.

IX.) Field Duplicates:

One set of field duplicate water samples was analyzed by the laboratory. Sample 655GW00304 was

analyzed in this SDG, while field duplicate sample 655HW00304 was analyzed in SDG 25067A. The calculable Relative Percent Differences (RPD's) were:

Analyte	655GW00304, ug/L	655HW00304, ug/L	RPD
arsenic	32.7	32.9	0.6
barium	103	106	2.9
calcium	155000	160000	3.2
iron	21600	22300	3.2
magnesium	72700	74900	3.0
manganese	347	357	2.8
potassium	28500	29200	2.4
sodium	787000	813000	3.2

All RPD's were within the 30% QC limit for water samples. No action was necessary.

X.) Graphite Furnace Atomic Absorption QC (GFAA):

Graphite Furnace analyses were not used for the samples in this SDG. No action was required.

XI.) Sample Result, Calculation/Transcription Verification:

All criteria were met, so no action was necessary.

XII.) Quarterly Verification of Instrumental Parameters:

All criteria were met, so no action was taken.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualifications.

CHLORIDES

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Calibration:

All Initial and Continuing Calibration criteria were met, so no action was taken.

III.) Blanks:

Method Blanks:

There were no positive detections in the method blanks. No action was necessary.

IV.) Laboratory Check Samples (LCS):

All LCS Percent Recovery criteria were met, so no action was necessary.

V.) Duplicate Sample Analysis:

Duplicate Sample Analysis was not performed in this SDG. No action was taken.

VI.) Matrix Spike / Matrix Spike Duplicates (MS / MSD):

MS / MSD analyses were not performed in this fraction. No action was required.

VII.) Field Duplicates:

No field duplicate samples were analyzed in this fraction. No action was required.

VIII.) Overall Assessment of Data/General:

All laboratory data were acceptable without qualification.

VALIDATA
Chemical Services, Inc.
P. O. Box 930422, Norcross, GA 30093
(770) 923-3890
(770) 923-8769 (Fax)

DATA VALIDATION SUMMARY REPORT

COMPANY:	EnSafe/Allen & Hoshall
SITE NAME:	Charleston Naval Base, Zone H
PROJECT NUMBER:	8500.014
CONTRACTED LAB:	Southwest Laboratories of Oklahoma
EPA SOW/METHOD:	EPA 8290
VALIDATION GUIDELINES:	EPA 8290, Professional Judgement
SAMPLE MATRIX:	Water
TYPES OF ANALYSES:	2,3,7,8-substituted PCDD's and PCDF's

SDG NO: 25067B

SAMPLES:

Client Sample #:	Lab Sample #:	Matrix	PCDD/ PCDF
653GW00104	25083.04	Water	X
136GW00104	25130.05	Water	X

D = DUPLICATE, MS = MATRIX SPIKE, MSD = MATRIX SPIKE DUPLICATE, RE = REANALYZED

DATA REVIEWER(S): Shawn S. Lin, Ph.D., Kevin C. Harmon

RELEASE SIGNATURE:

DATA QUALIFICATION SUMMARY

Southwest Laboratories of Oklahoma - 25067B 2,3,7,8-substituted PCDD's and PCDF's

SAMPLES: 653GW00104, 136GW00104

2,3,7,8-SUBSTITUTED PCDD'S AND PCDF'S

I.) Holding Times:

All criteria were met, so no action was taken.

II.) HRGC/HRMS System Performance:

GC Column Performance:

All criteria were met, so no action was taken.

HRMS Resolution:

All criteria were met, so no action was taken.

Mass Verification:

All criteria were met, so no action was required.

MS Data Acquisition:

All criteria were met, so no action was taken.

III.) Calibration:

Calibration Range:

EPA Method 1613A calibration and internal standard concentration levels were used for the analyses. Comparing to EPA Method 8290, the calibration ranges of two methods were not significantly different, so no action was deemed necessary.

Initial Calibration and Continuing Calibration Check:

All criteria were met, so no action was taken.

IV.) Blanks

Method Blanks:

OCDD was detected in method blanks at the following concentrations:

Method Blank	Compound	Conc. pg/L	Action Level pg/L
DFBLK1	OCDD	108	540
DFBLK2	OCDD	15.2	76.0

Detections of the above compound in all associated samples below 5X the blank amounts were designated as EMPC (Estimated Maximum Possible Concentration).

Field Blanks:

No field blank was analyzed.

V.) Internal Standards Performance:

All criteria were met, so no action was taken.

VI.) Spike/Spike Duplicates:

No MS/MSD were analyzed.

One set of LCS/LCSD was analyzed. All criteria were met, so no action was taken.

VII.) Duplicates:

No field duplicates were analyzed.

VIII.) PCDD/PCDF Identifications:

Retention Times:

All criteria were met, so no action was taken.

Ion Abundance:

All criteria were met, so no action was taken.

S/N Ratio:

All criteria were met, so no action was taken.

PCDPE (Polychlorinated Diphenyl Ether) Interferences:

All criteria were met, so no action was taken.

Second Column Confirmation:

All criteria were met, so no action was taken.

IX.) Overall Assessment of Data/General:

All data were acceptable with qualifications.

VALIDATA

Chemical Services, Inc.

P. O. Box 930422, Norcross, GA 30093

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DATA VALIDATION SUMMARY REPORT

COMPANY:	Ensafe/Allen & Hoshall
SITE NAME:	Charleston Navel Base, Zone H
PROJECT NUMBER:	8500.14
CONTRACTED LAB:	Southwest Laboratory of Oklahoma, Inc.
QA/QC LEVEL:	EPA Level III / Level IV
EPA METHOD:	EPA SOW 3-90, SW-846
VALIDATION GUIDELINES:	*USEPA CLP National Functional Guidelines for Organic Data Review,* 1994; *USEPA CLP National Functional Guidelines for Inorganic Data Review,* 1994
SAMPLE MATRIX:	Water
TYPES OF ANALYSES:	Volatile Organics, Semivolatile Organics, Pesticides/PCB's, Total Metals, Chloride, Sulfate, Total Dissolved Solids (TDS)
SDG NUMBERS:	25286A (Appendix IX, Level IV) 25286B (Level III)

SAMPLES:

SDG 25286A:

Client Sample #	Lab Sample #	Matrix	Volatiles	Semi-volatiles	Metals
009HW01904*	25287.01	Water	X		X
009EW01704	25299.02	Water		X	
009DW01704	25299.01	Water		X	X

* = Field duplicate sample was associated with sample 009GW01904 in SDG 25286B.

SDG 25286B:

Client Sample #	Lab Sample #	Matrix	Volatile Organics	Semi-Volatiles	Pesticides/ PCB's	Metals
009GW00604	25286.01	Water	X	X	X	X
009GW06D04	25286.02	Water	X	X	X	X
009GW01704	25296.02	Water		X		X
009GW01804	25296.05	Water				X

Client Sample #	Lab Sample #	Matrix	Volatile Organics	Semi-Volatiles	Pesticides/ PCB's	Metals
009GW01904*	25286.03	Water	X			X
017GW00504	25318.03	Water	X	X	X	X
017GW00604	25318.04	Water	X	X	X	X
GDHGW01104	25296.01	Water		X		X
GDHGW10D04	25318.01	Water				X
GDHGW11D04	25318.02	Water		X		X
009DW01704	25299.01	Water				X
009FW01704	25296.06	Water		X		X
009TW01904	25286.06	Water	X			
017TW00604	25318.05	Water	X			
009GW01904MS	25286.03MS	Water	+			
009GW01904MSD	25286.03MSD	Water	+			
009GW01904S*	25286.03S*	Water				+
009GW01904D*	25286.03D*	Water				+

Client Sample #	Lab Sample #	Matrix	Chloride	Sulfate	TDS
009GW00604	25286.01	Water	X		
009GW96D04	25286.02	Water	X		
GDHGW01104	25296.01	Water	X	X	X
GDHGW10D04	25318.01	Water	X	X	X
GDHGW11D04	25318.02	Water	X	X	X

+ = Non-billable Quality Control Sample
* = Sample was associated with field duplicate sample 009HW01904 in SDG 25286A.

D* = DUPLICATE, DW = DEIONIZED WATER BLANK, EW = EQUIPMENT RINSATE BLANK, FW = FIELD BLANK, MS/MSD = MATRIX SPIKE/MATRIX SPIKE DUPLICATE, RE = REANALYSIS, S* = MATRIX SPIKE, TW = TRIP BLANK

DATA REVIEWER(S): Linda H. Liu, Marvin L. Smith, Jean M. Delashmit

RELEASE SIGNATURE:

Data Qualifier Definitions

J	-	The association numerical value is an estimated quantity.
R	-	The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
U	-	The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	-	The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA QUALIFICATION SUMMARY

Southwest Laboratory of Oklahoma, Inc - 25286A Appendix IX, CLP Organics and Inorganics

SAMPLE: 009HW01904, 009EW01704, 009DW01704

VOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) GC/MS Tuning:

All GC/MS Tuning criteria were met, so no action was required.

III.) Calibration:

Initial Calibration:

The Relative Response Factors (RRF's) for 2-chloroethyl vinyl ether (0.044), acrolein (0.022), acetonitrile (0.022), isobutyl alcohol (0.006) and 1,4-dioxane (0.001) were below the 0.050 QC limit for the initial calibration analyzed on 4/17/96 on instrument I. The non-detect results for these compounds in associated sample 009HW01904 were rejected (R).

The Percent Relative Standard Deviations (%RSD's) exceeded the 30% QC limit for the standards analyzed on 4/17/96 on instrument I for the following compounds:

bromomethane	41.7%
chloroethane	47.0%
methylene chloride	30.6%
1,4-dioxane	40.7%
trichlorofluoromethane	43.6%

The non-detect result for 1,4-dioxane was previously rejected because of a low RRF. Since there were no positive results for the other compounds in associated sample 009HW01904, no further action was taken.

Continuing Calibration:

The Relative Response Factors (RRF's) for 2-chloroethyl vinyl ether (0.043), acrolein (0.007), acetonitrile (0.020), isobutyl alcohol (0.005) and 1,4-dioxane (0.002) were below the 0.050 QC limit for the continuing calibration analyzed on 4/22/96 at 12:34 on instrument I. The non-detect results for these compounds were previously rejected because of low RRF's in the initial calibration.

The Percent Differences (%D's) exceeded the 25% QC limit for the standard analyzed on 4/22/96 at 12:34 on instrument I for the following compounds:

bromomethane	40.6%
chloroethane	56.4%
acetone	84.2%
acrolein	68.2%
trichlorofluoromethane	38.9%

The non-detect result for acrolein was previously rejected because of a low RRF. The associated sample results for the other compounds, which consisted entirely non-detects after blank qualification, were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks in this SDG. No action was taken.

Equipment Rinsate Blank:

The equipment rinsate blank was not analyzed with this fraction. No action was taken.

Deionized Water Blanks:

The deionized water blank was not analyzed with this fraction. No action was taken.

Trip Blanks:

The following compounds were detected in the trip blank 009TW01904 (analyzed in SDG 25286B) at the concentrations listed:

acetone	5 ug/L
carbon disulfide	2 ug/L
chloroform	2 ug/L
trichloroethene	2 ug/L

Detections of acetone in associated sample 009GW01804 less than 10X the blank amount were flagged as undetected (U) with the analytical result below the CRQL being replaced with the CRQL. There were no positive detections of the other compounds in the sample, so no further action was taken.

TIC's:

All TIC criteria were met. No action was required.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met, so no action was required.

VI.) Laboratory Control Samples (LCS):

Two LCS's were analyzed in this SDG. All Percent Recovery criteria were met. No action was taken.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

There were no MS / MSD analyses in this SDG. No action was taken.

VIII.) Field Duplicates:

Field duplicate sample 009HW01904 was analyzed in this SDG, while corresponding sample 009GW01904 was analyzed in SDG 25286B. The only calculable Relative Percent Difference (RPD) was:

Compound	009GW01904	009HW01904	RPD
chlorobenzene	29 ug/kg	16 ug/kg	58

The RPD for chlorobenzene exceeded the 30% QC limit for water samples. The positive results for this compound in the two field duplicate samples were flagged as estimated (J)

IX.) Internal Standards Performance (ISTD):

All Internal Standards Performance criteria were met, so no action was required.

X.) TCL Compound Identification:

All TCL Compound Identification criteria were met, so no action was taken.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria were met, so no action was necessary.

XII.) Tentatively Identified Compounds (TIC's):

All TIC Identification criteria were met, so no action was required.

XIII.) System Performance:

All System Performance criteria were met. No action was taken.

XIV.) Overall Assessment of Data/General:

The non-detect results for 2-chloroethyl vinyl ether, acrolein, acetonitrile, isobutyl alcohol and 1,4-dioxane in associated sample 009HW01904 were rejected (R). The remaining laboratory data were acceptable with qualifications.

SEMIVOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met, so no action was necessary.

II.) GC/MS Tuning:

All GC/MS Tuning criteria were met, so no action was taken.

III.) Calibration:

Initial Calibration:

The average Relative Response Factors (RRF's) for the standards analyzed on 1/23/96 on instrument A were below the 0.050 QC limit for the following compounds:

aramite	0.030
methapyriline	0.034

The non-detect results for these compounds in the associated blanks were rejected (R).

The Percent Relative Standard Deviations (%RSD's) for the initial calibration run on 1/23/96 on instrument A exceeded the 30% QC limit for the following compounds:

n-nitrosodimethylamine	33.7%
2,6-dinitrotoluene	64.2%
4-nitroquinoline-1-oxide	73.0%
2-sec-butyl-4,6-dinitrophenol	36.0%
parathion	47.0%
aramite	39.2%
7,12-dimethylbenz(a)anthracene	33.7%
hexachlorophene	41.9%

The non-detect results for aramite in the associated blanks were previously rejected because of a low RRF. The other compounds were not detected in the associated blanks, so no action was taken.

Continuing Calibration:

The Relative Response Factors (RRF's) for the standard analyzed on 5/02/96 at 15:53 were below the 0.050 QC limit for the following compounds:

aramite	0.023
pentachloronitrobenzene	0.036
methapyriline	0.032
hexachlorophene	0.024

The non-detect results for pentachloronitrobenzene and hexachlorophene in the associate blanks were

rejected (R). The associated non-detect results for aramite and methapyriline were previously rejected based on low RRF's in the initial calibration.

The Percent Differences (%D's) exceeded the 25% QC limit for the standard run on 5/02/96 at 15:53 for the following compounds:

m-cresol	39.2%
hexachloropropene	31.7%
2-sec-butyl-4,6-dinitrophenol	26.0%
n-nitrospyrrolidine	65.7%
n-nitrosomorpholine	62.5%
a,a-dimethylphenethylamine	46.7%
2-methyl-5-nitroaniline	28.3%
2-acetylaminofluorene	43.8%
hexachlorophene	69.3%
isosafrole	27.4%
1,3-dinitrobenzene	33.0%
pentachloronitrobenzene	40.4%
3,3'-dimethylbenzidine	37.1%
7,12-dimethylbenz(a)anthrace	50.2%
1-naphthylamine	32.6%
sulfotep	37.0%
1,3,5-trinitrobenzene	32.5%
diallate	67.6%
dimethoate	32.0%
pyridine	31.0%
p-phenylenediamine	40.0%

The associated non-detect results for pentachloronitrobenzene and hexachlorophene were previously rejected because of low RRF's in the initial and continuing calibrations. Since only the equipment rinsate and deionized water blanks were associated with this standard, no further action was taken.

IV.) Blanks:

Method Blank:

There were no positive detections in the method blank. No action was required.

Equipment Rinsate Blank:

There were no positive detections in the equipment rinsate blank. No action was necessary.

Deionized Water Blank:

There were no positive detections in the deionized water blank. No action was required.

TIC's:

All TIC criteria were met. No action was taken.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met, so no action was necessary.

VI.) Laboratory Control Samples (LCS):

One LCS sample was analyzed by the laboratory. All criteria were met. No action was necessary.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

There were no MS / MSD analyses in this SDG. No action was taken.

VIII.) Field Duplicates:

No field duplicates were analyzed in this SDG. No action was taken.

IX.) Internal Standards Performance:

All Internal Standards Performance criteria were met, so no action was required.

X.) TCL Compound Identification:

All TCL Compound Identification criteria were met, so no action was required.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria were met, so no action was necessary.

XII.) Tentatively Identified Compounds (TIC's):

All TIC criteria were met, so no action was necessary.

XIII.) System Performance:

All System Performance criteria were met, so no action was taken.

XIV.) Overall Assessment of Data/General:

The non-detect results for aramite, pentachloronitrobenzene, methapyriline and hexachlorophene were rejected in equipment and field blanks because of low RRF's in the initial and continuing calibrations. All other laboratory data were acceptable with qualifications.

TOTAL METALS AND CYANIDE

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Calibration:

Initial Calibration:

All Initial Calibration criteria were met, so no action was necessary.

Continuing Calibration Verification (CCV):

All Continuing Calibration criteria were met, so no action was necessary.

III.) Blanks:

The following blank results represent the highest detections associated with the sample and were used for data qualification:

Blank Type/ID#	Analyte	Max Conc.	Action Level
FB	aluminum	70.8 ug/L	354 ug/L
CCB1	antimony	4.70 ug/L	23.5 ug/L
FB	barium	116 ug/L	580 ug/L
DWB	beryllium	0.58 ug/L	2.90 ug/L
FB	calcium	4850 ug/L	24250 ug/L
DWB	copper	1.70 ug/L	8.50 ug/L
FB	magnesium	531 ug/L	2655 ug/L
FB	manganese	5.60 ug/L	28.0 ug/L
DWB	nickel	2.00 ug/L	10.0 ug/L
DWB	potassium	2570 ug/L	12850 ug/L
ICB2	selenium	4.00 ug/L	20.0 ug/L
CCB3	silver	1.70 ug/L	8.50 ug/L
FB	sodium	28500 ug/L	142500 ug/L
DWB	thallium	4.70 ug/L	23.5 ug/L
DWB	vanadium	0.69 ug/L	3.45 ug/L
FB	zinc	11.6 ug/L	58.0 ug/L

CCB = Continuing Calibration Blank, DWB = Deionized Water Blank, FB = Field Blank, ICB = Initial Calibration Blank

Field blank 009FW01704 was analyzed in SDG 25286B. All sample results greater than the IDL but less than 5X the blank amount (Action Level, ug/L for water samples) for which the contaminated blank was an associated calibration, deionized water or field blank were flagged as undetected (U).

The following analytes had negative results with absolute values greater than the IDL:

Blank Type/ID#	Analyte	Neg. Conc.	5X Conc.
ICB2	antimony	-2.10 ug/L	10.5 ug/L
CCB1	arsenic	-3.00 ug/L	15.0 ug/L
CCB2	chromium	-1.00 ug/L	5.00 ug/L
CCB6	copper	-2.10 ug/L	6.50 ug/L
CCB2	nickel	-1.40 ug/L	7.00 ug/L
CCB6	selenium	-2.90 ug/L	14.5 ug/L
ICB2	silver	-1.60 ug/L	8.00 ug/L
CCB4	sodium	-481 ug/L	2410 ug/L

CCB = Continuing Calibration Blank

All associated positive sample results less than 5X the absolute value of the negative blank results and all associated non-detects were flagged as estimated (J) and (UJ).

IV.) ICP Interference Check Sample Results:

All Percent Recovery criteria were met, so no action was taken.

The following analytes were present in ICS Solution A(1) at concentrations greater than the IDL:

antimony	7 ug/L
chromium	2 ug/L
vanadium	3 ug/L

These analytes should not be present. Since neither aluminum, calcium, iron nor magnesium was present in the samples at a concentration comparable to or greater than the amount in Solution A, no action was required.

Negative results were observed in ICS Solution A(1) at absolute concentrations greater than the IDL for the following analytes:

arsenic	-5 ug/L
cadmium	-2 ug/L
manganese	-4 ug/L
selenium	-11 ug/L
sodium	-760 ug/L
thallium	-5 ug/L
zinc	-10 ug/L

Since neither aluminum, calcium, iron nor magnesium was present in the samples at a concentration comparable to or greater than the amount in Solution A, no action was required.

The following analytes were present in ICS Solution A(2) at concentrations greater than the IDL:

antimony	6 ug/L
barium	3 ug/L
chromium	2 ug/L
vanadium	6 ug/L

These analytes should not be present. Since neither aluminum, calcium, iron nor magnesium was present in the samples at a concentration comparable to or greater than the amount in Solution A, no action was required.

Negative results were observed in ICS Solution A(2) at absolute concentrations greater than the IDL for the following analytes:

copper	-7 ug/L
manganese	-3 ug/L
selenium	-9 ug/L
sodium	-586 ug/L
zinc	-8 ug/L

Since neither aluminum, calcium, iron nor magnesium was present in the samples at a concentration comparable to or greater than the amount in Solution A, no action was required.

V.) ICP Serial Dilution Analysis:

The Serial Dilution Percent Difference (%D) of potassium was 94% in water sample 009DW01904L, which exceeded the 10% QC limit. Positive results for this analyte in all associated water samples were flagged as estimated (J).

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met. No action was required.

VII.) Duplicate Sample Analysis:

All Duplicate Sample criteria were met, so no action was taken.

VIII.) Matrix Spike Recoveries:

MS / MSD samples were not analyzed in this SDG. No action was taken.

IX.) Field Duplicates:

Duplicate sample 009HW01904 was analyzed in this SDG, while corresponding sample 009GW01904 was analyzed in SDG 25286B. The calculable Relative Percent Differences (RPD's) were:

Analyte	009GW01904, ug/L	009HW01904, ug/L	RPD
barium	229	226	1.3
calcium	181000	176000	2.8
iron	21600	21700	0.5

Analyte	009GW01904, ug/L	009HW01904, ug/L	RPD
magnesium	86500	83500	3.5
manganese	380	371	2.4
potassium	49300	48400	1.8
sodium	837000	801000	4.4

All RPD's were within the 30% QC limit for water samples. No action was necessary.

X.) Graphite Furnace Atomic Absorption QC (GFAA):

Graphite Furnace analyses were not used for the samples in this SDG. No action was required.

XI.) Sample Result, Calculation/Transcription Verification:

All criteria were met, so no action was necessary.

XII.) Quarterly Verification of Instrumental Parameters:

All criteria were met, so no action was taken.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualifications.

DATA QUALIFICATION SUMMARY

Southwest Laboratory of Oklahoma, Inc. - 25286B Level III, CLP Organics and Inorganics

SAMPLES: 009GW00604, 009GW96D04, 009GW01904, GDHGW01104, 009GW01704, 009GW01804, 009DW01704, GDHGW10D04, GDHGW11D04, 017GW00504, 017GW00604, 009TW01904, 017TW00604, 009FW01704, 009GW01904MS, 009GW01904MSD

VOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) GC/MS Tuning:

All GC/MS Tuning criteria were met, so no action was required.

III.) Calibration:

Initial Calibration:

The Relative Response Factor (RRF) for 2-chloroethyl vinyl ether was 0.041, which was below the 0.050 QC limit for the initial calibration run on 4/17/96 on instrument I. The non-detect results for this compound in all associated samples and blanks were rejected (R).

The Percent Relative Standard Deviations (%RSD's) exceeded the 30% QC limit for the standards analyzed on 4/17/96 on instrument I for the following compounds:

bromomethane	41.7%
chloroethane	47.0%
methylene chloride	30.6%

Since there were no associated positive sample results for these compounds, no action was taken.

Continuing Calibration:

The Relative Response Factors (RRF's) for 2-chloroethyl vinyl ether were 0.043 and 0.019, respectively, for the standards run on 4/22/96 at 12:34 and 4/23/96 at 11:52 on instrument I, which were below the 0.050 QC limit. The associated sample results for this compound were previously rejected based on a low RRF in the initial calibration. No further action was taken.

The Percent Differences (%D's) exceeded the 25% QC limit for the standard analyzed on 4/22/96 at 12:34 on instrument I for the following compounds:

bromomethane	40.6%
chloroethane	56.4%
acetone	84.2%

The results for these compounds in associated samples 009GW00604 and 009GW06D04, which consisted entirely of non-detects after blank qualifications, were flagged as estimated (UJ).

The Percent Differences (%D's) exceeded the 25% QC limit for the standard analyzed on 4/23/96 at 11:52 on instrument I for the following compounds:

2-hexanone	27.0%
2-chloroethyl vinyl ether	53.7%

The non-detect results for 2-hexanone in associated samples 017GW00604 and 017GW00504 were flagged as estimated (UJ). Since the results for 2-chloroethyl vinyl ether in associated samples were previously rejected, no further action was taken.

IV.) Blanks:

Method Blanks:

Acetone was detected at 2 ug/L in method blank VBLK2. Acetone was flagged using the trip blank. No further action was taken.

Equipment Rinsate Blank:

The equipment rinsate blank was not analyzed in this fraction. No action was taken.

Field Blank:

The field blank was not analyzed in this fraction. No action was taken.

Deionized Water Blanks:

The deionized water blank was not analyzed in this fraction. No action was taken.

Trip Blanks:

The following compounds were detected in trip blank 009TW01904 at the concentrations listed:

acetone	5 ug/L
carbon disulfide	2 ug/L
chloroform	2 ug/L
trichloroethene	2 ug/L

Detections of these compounds in the associated samples less than 10X the blank amounts were flagged as undetected (U) with the analytical results below the CRQL being replaced with the CRQL. The associated samples were 009GW00604 and 009GW06D04.

Acetone was detected at 7 ug/L in trip blank 017TW00604. Detections of acetone in the associated samples less than 10X the blank amounts were flagged as undetected (U) with analytical results below the CRQL being replaced with the CRQL. The associated samples were 017GW00504 and 017GW00604.

TIC's:

All TIC criteria were met. No action was required.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met, so no action was required.

VI.) Laboratory Control Samples (LCS):

Four LCS's were analyzed in this SDG. All Percent Recovery criteria were met. No action was taken.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

Al MS / MSD recovery criteria were met, no action was taken.

VIII.) Field Duplicates:

Sample 009GW01904 was analyzed in this SDG, while the corresponding field duplicate sample 009HW01904 was analyzed in SDG 25286A. The calculable Relative Percent Differences (RPD's) were:

Compound	009GW01904	009HW01904	RPD
chlorobenzene	29 ug/kg	16 ug/kg	58

The RPD for chlorobenzene was 58%, which exceeded the 30% QC limit for water samples. The positive results for this compound in the two field duplicate samples were flagged as estimated (J)

IX.) Internal Standards Performance (ISTD):

All Internal Standards Performance criteria were met, so no action was required.

X.) TCL Compound Identification:

All TCL Compound Identification criteria were met, so no action was taken.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria were met, so no action was necessary.

XII.) Tentatively Identified Compounds (TIC's):

All TIC Identification criteria were met, so no action was required.

XIII.) System Performance:

All System Performance criteria were met. No action was taken.

XIV.) Overall Assessment of Data/General:

The non-detects for 2-chloroethyl vinyl ether in the associated samples were rejected (R) due to very low RRF's in the initial and continuing calibrations. All other laboratory data were acceptable with qualifications.

SEMIVOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) GC/MS Tuning:

All GC/MS Tuning criteria were met, so no action was taken.

III.) Calibration:

Initial Calibration:

The Percent Relative Standard Deviations (%RSD's) exceeded the 30% QC limit for the standards analyzed on 4/25/96 on instrument T for the following compounds:

benzo(k)fluoranthene	42.1%
indeno(1,2,3-cd)pyrene	41.1%

Since these compound were not detected in the associated samples, no action was necessary.

The Percent Relative Standard Deviation (%RSD) of hexachlorocyclopentadiene was 36.4% for the initial calibration run on 4/26/96 on instrument T, which exceeded the 30% QC limit. Since there were no positive detections of this compound in the associated samples, no action was taken.

Continuing Calibration:

All Continuing Calibration criteria were met, no action was taken.

IV.) Blanks:

Method Blanks:

Bis(2-ethylhexyl)phthalate was detected at 14 ug/L in method blanks SBLK2. Detections of this compound in the associated samples less than 10X the blank amount were flagged as undetected (U) with the analytical results below the CRQL being replaced with the CRQL. The associated samples were 009GW00604 and 009GW06D04.

Equipment Rinsate Blank:

There were no positive detections in equipment rinsate blank 009EW01704 which was analyzed in SDG 25286A. No action was required.

Field Blank:

There were no positive detections in field blank 009FW01704. No action was required.

Deionized Water Blank:

There were no positive detections in associated deionized water blank 009DW01704, which was analyzed in SDG 25286A. No action was required.

TIC's:

All TIC criteria were met. No action was taken.

V.) Surrogate Recoveries:

The Percent Recovery (%R) of 2-fluorophenol was 19% in sample 009GW01704, which was below the 21-100% QC limits. Since only one surrogate in the acid fraction was outside QC limits, no action was required.

VI.) Laboratory Control Samples (LCS):

Four LCS's were analyzed in this SDG. LCS4 had two compounds recoveries outside QC limits. Data validation action based on LCS recoveries was not required, so no action was taken.

VIII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

MS / MSD's were not analyzed in this fraction. No action was taken.

IX.) Field Duplicates:

Field duplicate samples were not analyzed for this fraction. No action was taken.

X.) Internal Standards Performance:

All Internal Standards Performance criteria were met, so no action was required.

XI.) TCL Compound Identification:

All TCL Compound Identification criteria were met, so no action was required.

XII.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria were met, so no action was necessary.

XIII.) Tentatively Identified Compounds (TIC's):

All TIC criteria were met, so no action was necessary.

XIV.) System Performance:

All System Performance criteria were met, so no action was taken.

XV.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualifications.

PESTICIDES/PCB's

I.) Holding Times:

All Holding Time criteria were met, so no action was required.

II.) Instrument Performance:

All Pesticide Instrument Performance criteria were met, so no action was taken.

III.) Calibration:

Initial Calibration:

All Initial Calibration criteria were met. No action was necessary.

Continuing Calibration:

All Continuing Calibration criteria were met. No action was necessary.

IV.) Blanks:

Method Blanks:

There were no positive detections in the method blanks. No action was required.

Equipment Rinsate Blank:

There was no equipment rinsate blank in this fraction. No action was required.

Field Blank:

There was no field blank in this fraction. No action was required.

Deionized Water Blank:

There was no deionized water blank in this fraction. No action was required.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met, so no action was taken.

VI.) Laboratory Control Samples (LCS):

Four LCS's were analyzed with this SDG. All Percent Recovery criteria were met. No action was taken.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

MS / MSD's were not analyzed in this fraction. No action was taken.

VIII.) TCL Compound Identification:

Pesticide/PCB Identification Summary (PIS):

All PIS Identification criteria were met. No action was required.

IX.) Field Duplicates:

Field duplicate samples were not analyzed in this fraction. No action was taken.

X.) Pesticide Cleanup Check:

Florisil Cartridge Check:

All criteria were met, so no action was taken.

Gel Permeation Chromatography (GPC):

GPC cleanup was not required for water samples. No action was necessary.

XI.) Overall Assessment of Data/General:

All laboratory data were acceptable without qualification.

TOTAL METALS AND CYANIDE

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Calibration:

Initial Calibration:

All Initial Calibration criteria were met, so no action was necessary.

Continuing Calibration Verification (CCV):

All Continuing Calibration criteria were met, so no action was necessary.

III.) Blanks:

The following blank results represent the highest detections associated with the samples and were used for data qualification:

Blank Type/ID#	Analyte	Max Conc.	Action Level
FB	aluminum	70.8 ug/L	354 ug/L
CCB1	antimony	4.60 ug/L	23.0 ug/L
FB	barium	116 ug/L	580 ug/L
DWB	beryllium	0.58 ug/L	2.90 ug/L
FB	calcium	4850 ug/L	24250 ug/L
DWB	copper	1.70 ug/L	8.50 ug/L
FB	magnesium	531 ug/L	2655 ug/L
FB	manganese	5.60 ug/L	28.0 ug/L
DWB	nickel	2.00 ug/L	10.0 ug/L
DWB	potassium	2570 ug/L	12850 ug/L
ICB2	selenium	4.00 ug/L	20.0 ug/L
CCB3	silver	1.70 ug/L	8.50 ug/L
FB	sodium	28500 ug/L	142500 ug/L
DWB	thallium	4.70 ug/L	23.5 ug/L
DWB	vanadium	0.69 ug/L	3.45 ug/L
FB	zinc	11.6 ug/L	58.0 ug/L

CCB = Continuing Calibration Blank, DWB = Deionized Water Blank, FB = Field Blank, ICB = Initial Calibration Blank

Deionized water blank 009DW01704 was analyzed in SDG 25286A. All results greater than the IDL but less than 5X the blank amount (Action Level, ug/L for water samples) for which the contaminated blank was an associated calibration, deionized water or field blank were flagged as undetected (U).

The following analytes had negative results with absolute values greater than the IDL:

Blank ID#	Analyte	Neg. Conc.	5X Conc.
ICB2	antimony	-2.10 ug/L	10.5 ug/L
CCB1	arsenic	-3.00 ug/L	15.0 ug/L
CCB2	chromium	-1.00 ug/L	5.00 ug/L
CCB6	copper	-2.10 ug/L	6.50 ug/L
CCB2	nickel	-1.40 ug/L	7.00 ug/L
CCB6	selenium	-2.90 ug/L	14.5 ug/L
ICB2	silver	-1.60 ug/L	8.00 ug/L
CCB4	sodium	-481 ug/L	2410 ug/L

CCB = Continuing Calibration Blank, ICB = Initial Calibration Blank

All associated positive sample results less than 5X the absolute value of the negative blank results and all associated non-detects were flagged as estimated (J) and (UJ).

IV.) ICP Interference Check Sample Results:

All Percent Recovery criteria were met, so no action was taken.

The following analytes were present in ICS Solution A(1) at concentrations greater than the IDL:

antimony	7 ug/L
chromium	2 ug/L
vanadium	3 ug/L

These analytes should not be present. Since neither aluminum, calcium, iron nor magnesium was present in the samples at a concentration comparable to or greater than the amount in Solution A, no action was required.

Negative results were observed in ICS Solution A(1) at absolute concentrations greater than the IDL for the following analytes:

arsenic	-5 ug/L
cadmium	-2 ug/L
manganese	-4 ug/L
selenium	-11 ug/L
sodium	-760 ug/L
thallium	-5 ug/L
zinc	-10 ug/L

Since neither aluminum, calcium, iron nor magnesium was present in the samples at a concentration comparable to or greater than the amount in Solution A, no action was required.

The following analytes were present in ICS Solution A(2) at concentrations greater than the IDL:

antimony	6 ug/L
barium	3 ug/L
chromium	2 ug/L
vanadium	6 ug/L

These analytes should not be present. Since neither aluminum, calcium, iron nor magnesium was present in the samples at a concentration comparable to or greater than the amount in Solution A, no action was required.

Negative results were observed in ICS Solution A(2) at absolute concentrations greater than the IDL for the following analytes:

copper	-7 ug/L
manganese	-3 ug/L
selenium	-9 ug/L
sodium	-586 ug/L
zinc	-8 ug/L

Since neither aluminum, calcium, iron nor magnesium was present in the samples at a concentration comparable to or greater than the amount in Solution A, no action was required.

V.) ICP Serial Dilution Analysis:

The Serial Dilution Percent Difference (%D) of sodium was 13.1% in water sample 009GW01904L, which exceeded the 10% QC limit. Positive results for this analyte in all associated water samples were flagged as estimated (J).

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met. No action was required.

VII.) Duplicate Sample Analysis:

All Duplicate Sample criteria were met, so no action was taken.

VIII.) Matrix Spike Recoveries:

All Percent Recovery criteria were met for matrix spike sample 009GW01904S*, so no action was taken.

IX.) Field Duplicates:

Duplicate sample 009GW01904 was analyzed in this SDG, while 009HW01904 was analyzed in SDG 25286A. The calculable Relative Percent Differences (RPD's) were:

Analyte	009GW01904, ug/L	009HW01904, ug/L	RPD
barium	229	226	1.3
calcium	181000	176000	2.8
iron	21600	21700	0.5
magnesium	86500	83500	3.5
manganese	380	371	2.4
potassium	49300	48400	1.8
sodium	837000	801000	4.4

All RPD's were within the 30% QC limit for water samples. No action was necessary.

X.) Graphite Furnace Atomic Absorption QC (GFAA):

Graphite Furnace analyses were not used for the samples in this SDG. No action was required.

XI.) Sample Result, Calculation/Transcription Verification:

All criteria were met, so no action was necessary.

XII.) Quarterly Verification of Instrumental Parameters:

All criteria were met, so no action was taken.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualifications.

WET CHEMISTRY ANALYSES

CHLORIDES

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Calibration:

All Initial and Continuing Calibration criteria were met, so no action was taken.

III.) Blanks:

Method Blanks:

There were no positive detections in the method blanks. No action was necessary.

IV.) Laboratory Check Samples (LCS):

All LCS Percent Recovery criteria were met, so no action was necessary.

V.) Duplicate Sample Analysis:

Duplicate Sample Analysis was not performed. No action was taken.

VI.) Matrix Spike / Matrix Spike Duplicates (MS / MSD):

All Percent Recovery criteria were met, so no action was taken.

VII.) Field Duplicates:

Field duplicate samples were not analyzed in this fraction. No action was required.

VIII.) Overall Assessment of Data/General:

All laboratory data were acceptable without qualification.

SULFATE

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Calibration:

All Initial and Continuing Calibration criteria were met, so no action was taken.

III.) Blanks:

Method Blanks:

There were no sulfate detections in the method blanks. No action was necessary.

IV.) Laboratory Check Samples (LCS):

All LCS Percent Recovery criteria were met, so no action was necessary.

V.) Duplicate Sample Analysis:

No Duplicate Sample Analysis was performed in this SDG. No action was taken.

VI.) Matrix Spike / Matrix Spike Duplicates (MS / MSD):

There were no MS / MSD analyses performed for this fraction. No action was required.

VII.) Field Duplicates:

Field duplicate samples were not analyzed with this fraction. No action was necessary.

VIII.) Overall Assessment of Data/General:

All laboratory data were acceptable without qualification.

TOTAL DISSOLVED SOLIDS (TDS)

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Calibration:

All Initial and Continuing Calibration criteria were met, so no action was taken.

III.) Blanks:

Method Blanks:

There were no TDS detections in the method blanks. No action was necessary.

IV.) Laboratory Check Samples (LCS):

All LCS Percent Recovery criteria were met, so no action was necessary.

V.) Duplicate Sample Analysis:

Duplicate Sample Analysis was not performed in this fraction. No action was taken.

VI.) Matrix Spike / Matrix Spike Duplicates (MS / MSD):

MS / MSD analyses were not required for TDS analysis. No action was taken.

VII.) Field Duplicates:

Field duplicate samples were not analyzed with this fraction. No action was required.

VIII.) Overall Assessment of Data/General:

All laboratory data were acceptable without qualification.

VALIDATA

Chemical Services, Inc.

P. O. Box 930422, Norcross, GA 30093

(770) 923-3890
(770) 923-8769 (Fax)

DATA VALIDATION SUMMARY REPORT

COMPANY:	EnSafe/Allen & Hoshall
SITE NAME:	Charleston Naval Base, Zone H
PROJECT NUMBER:	8500.014
CONTRACTED LAB:	Southwest Laboratories of Oklahoma
EPA SOW/METHOD:	EPA 8290
VALIDATION GUIDELINES:	EPA 8290, Professional Judgement
SAMPLE MATRIX:	Water
TYPES OF ANALYSES:	2,3,7,8-substituted PCDD's and PCDF's

SDG NUMBER: 25286B (Level III)

SAMPLES:

Client Sample #	Lab Sample #	Matrix	PCDD/ PCDF
017GW00504	25318.03	Water	X
017GW00504RE	25318.03RE	Water	X

D = DUPLICATE, MS = MATRIX SPIKE, MSD = MATRIX SPIKE DUPLICATE, RE = REANALYZED

DATA REVIEWER(S): Shawn S. Lin, Ph.D., Kevin C. Harmon

RELEASE SIGNATURE:

DATA QUALIFICATION SUMMARY

Southwest Laboratories of Oklahoma - 25286B 2,3,7,8-substituted PCDD's and PCDF's

SAMPLES: 017GW00504, 017GW00504RE

2,3,7,8-SUBSTITUTED PCDD'S AND PCDF'S

I.) Holding Times:

All criteria were met, so no action was taken.

II.) HRGC/HRMS System Performance:

GC Column Performance:

All criteria were met, so no action was taken.

HRMS Resolution:

All criteria were met, so no action was required.

Mass Verification:

All criteria were met, so no action was taken.

MS Data Acquisition:

All criteria were met, so no action was taken.

III.) Calibration:

Calibration Range:

EPA Method 1613A calibration and internal standard concentration levels were used for the analyses. Comparing to EPA Method 8290, the calibration ranges of the two methods were not significantly different, so no action was deemed necessary.

Initial Calibration and Continuing Calibration Check:

All criteria were met, so no action was taken.

VALIDATA

Chemical Services, Inc.

P. O. Box 930422, Norcross, GA 30003

(770) 923-3890
(770) 923-8769 (Fax)

DATA VALIDATION SUMMARY REPORT

COMPANY:	Ensafe / Allen & Hoshall
SITE NAME:	Charleston Naval Base, Zone H
SERVICE ORDER NUMBER:	0303
CONTRACTED LAB:	Southwest Laboratories, Inc.
QA/QC LEVEL:	EPA Level III
EPA METHOD:	EPA SOW 3-90 or SW-846
VALIDATION GUIDELINES:	*USEPA CLP National Functional Guidelines for Organic Data Review,* 1994; *USEPA CLP National Functional Guidelines for Inorganic Data Review,* 1994
SAMPLE MATRIX:	Water
TYPES OF ANALYSES:	Total Volatiles, Semivolatiles, Pesticides / PCB's, Cyanide
SDG NUMBER:	34942

Client Sample #	Lab Sample #	Matrix	Volatile Organics	Semi-volatiles	Pesticides/ PCB's	Cyanide
014GW00105	34988.01	Water	X			
014GW00205	34988.04	Water	X			
014GW01D05	34988.02	Water	X			
014HW01D05	34988.03	Water	X			
014GW02D05	34988.05	Water	X			
017GW00105	34942.01	Water	X	X	X	X
017GW00205	34942.02	Water	X	X	X	X
017GW00205DL	34942.02DL	Water	+	+	+	
017GW00305	34942.03	Water	X	X	X	X
017GW02D01	34942.04	Water	X	X	X	X
017GW02D01RE	34942.04RE	Water	+			
014TW00205	34988.06	Water	X			
017TW02D01	34942.05	Water	X			
014GW00205MS	64988.04MS	Water	+			
014GW00205MSD	64988.04MSD	Water	+			
017GW02D01MS	64942.04MS	Water		+		
017GW02D01MSD	64942.04MSD	Water		+		
017GW00305MS	34942.03MS	Water			+	
017GW00305MSD	34942.03MSD	Water			+	
017GW00105MS	34942.01MS	Water				+

DL = DILUTION, MS = MATRIX SPIKE, MSD = MATRIX SPIKE DUPLICATE,
RE = REANALYSIS, T = TRIP BLANK

DATA REVIEWER(S): Amy L. Hogan, Marvin L. Smith, Jean M. Delashmit

RELEASE SIGNATURE: Jean M. Delashmit

VIII.) Field Duplicates:

There were no field duplicate samples for this SDG. No action was required.

IX.) Pesticide Cleanup Check:

Florisil Cartridge Check:

Florisil Cleanup data was not submitted for this SDG. No action was taken.

Gel Permeation Chromatography (GPC):

GPC data were not submitted for this SDG. No action was taken.

X.) Overall Assessment of Data/General:

The result for 4,4'-DDT in sample 017GW00205 was taken from a dilution analysis of the sample since the original analysis result was above the instrument's linear calibration range.

The non-detect results for dieldrin, 4,4'-DDE and methoxychlor were rejected in sample 017GW00205 based on Pesticide Identification criteria. All other laboratory data were acceptable with qualifications.

CYANIDE

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) Calibration:

All Initial and Continuing Calibration criteria were met. No action was required.

III.) Blanks:

There were no blanks containing results greater than the IDL. No action was required.

IV.) ICP Interference Check Sample Results:

All Percent Recovery criteria were met, so no action was taken.

V.) ICP Serial Dilution Analysis:

Serial Dilution Analysis was not performed for this SDG. No action was required.

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met. No action was required.

VII.) Duplicate Sample Analysis:

Duplicate Sample Analysis was not performed for this fraction of the SDG. No action was required.

VIII.) Matrix Spike Recoveries:

All Matrix Spike criteria were met. No action was required.

IX.) Field Duplicates:

There were no field duplicate samples identified for this fraction of the SDG. No action was required.

X.) Graphite Furnace Atomic Absorption QC (GFAA):

Graphite Furnace analyses were not used for the samples in this SDG. No action was required.

XI.) Sample Result, Calculation/Transcription Verification:

All criteria were met. No action was required.

XII.) Quarterly Verification of Instrumental Parameters:

All criteria were met, so no action was taken.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable without qualification.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria were met, so no action was necessary.

XII.) Tentatively Identified Compounds (TIC's):

All TIC Identification criteria were met, so no action was required. . Blank qualifications were performed in Section IV.

XIII.) System Performance:

All System Performance criteria were met. No action was taken.

XIV.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

PESTICIDES/PCB's

I.) Holding Times:

All Holding Time criteria were met. No action was required.

II.) Instrument Performance:

All Instrument Performance criteria were met. No action was required.

III.) Calibration:

All Initial and Continuing Calibration criteria were met. No action was required.

IV.) Blanks:

There were no positive detections in the method blanks. No action was required.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met. No action was required.

VI.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

The Relative Percent Differences (RPD's) for spiked samples 017GW00305MS and 017GW00305MSD exceeded the 20% QC limit for the following compounds:

alpha-BHC	45%
beta-BHC	43%
gamma-BHC	43%

delta-BHC	32%
heptachlor	34%
aldrin	60%
heptachlor epoxide	41%
endosulfan I	26%
4,4'-DDE	41%
dieldrin	42%
endrin	46%
endosulfan II	43%
4,4'-DDD	40%
endosulfan sulfate	36%
4,4'-DDT	38%
endrin aldehyde	54%
methoxychlor	42%
alpha-chlordane	28%
gamma-chlordane	62%
endrin ketone	40%

The results for these compounds in associated unspiked sample 017GW00305, which consisted entirely of non-detects, were flagged as estimated (UJ).

The Percent Recoveries (%R's) for spiked sample 017GW00305MS were below their respective QC limits for the following compounds:

Compound	MS, %R	QC Limits
4,4'-DDE	64	70-122%
4,4'-DDD	60	70-133%
endosulfan sulfate	20	22-126%

The results for these compounds in associated sample 017GW00305 were previously flagged, so no further action was necessary.

VII.) TCL Compound Identification:

Pesticide/PCB Identification Summary (PIS):

The Percent Differences (%D's) between column 1 and column 2 exceeded the 70% QC limit for the following sample:

Sample	Compound	Col., %D
017GW00205	heptachlor epoxide	93.3%
	dieldrin	999%
	4,4'-DDE	746%
	4,4'-DDT	190%
	methoxychlor	900%

The results for compounds with %D's between 70% and 300% were flagged as estimated (J). Results for compounds with %D's above 300% were rejected (R).

VIII.) Field Duplicates:

There were no calculable Relative Percent Differences (RPD's) for the field duplicate samples identified in this SDG. No action was required.

IX.) Internal Standards Performance (ISTD):

All ISTD criteria were met. No action was required.

X.) TCL Compound Identification:

The result for chlorobenzene in sample 017GW00205 was taken from a dilution analysis of the sample since the original analysis result was above the instrument's linear calibration range. All other criteria were met. No further action was required.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria were met, so no action was necessary.

XII.) Tentatively Identified Compounds (TIC's):

All TIC Identification criteria were met, so no action was required. Blank qualifications were performed in Section IV.

XIII.) System Performance:

All System Performance criteria were met. No action was taken.

XIV.) Overall Assessment of Data/General:

The non-detect results for acetone and 2-chloroethyl vinyl ether in the samples in this SDG were rejected based on low Relative Response Factors in the initial and continuing calibrations.

The original analysis of sample 017GW02D01 was considered by the validator to be of preferable data quality to the reanalysis based on holding time criteria.

All other laboratory data were acceptable with qualifications.

SEMIVOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met. No action was required.

II.) GC/MS Tuning:

All GC/MS Tuning criteria were met, so no action was required.

III.) Calibration:

Initial Calibration:

All Initial Calibration criteria were met. No action was required.

Continuing Calibration:

The Percent Difference (%D) exceeded the 25% QC limit for the standards run on 8/01/98 at 17:32 on instrument F for diethylphthalate (41.5%). The results for this compound in the samples in this SDG, which consisted entirely of non-detects, were flagged as estimated (UJ).

IV.) Blanks:

Method Blanks:

Diethylphthalate was detected at 9 ug/L in method blank SBLK1. Since there were no positive results for this compound in the associated samples, no action was required.

TIC's:

There were no TIC's detected in the method blanks. No action was required.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met. No action was required.

VI.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

All MS / MSD criteria were met. No action was required.

VII.) Laboratory Control Samples (LCS):

All LCS criteria were met. No action was taken.

VIII.) Field Duplicates:

There were no field duplicate samples for this fraction of the SDG. No action was required.

IX.) Internal Standards Performance (ISTD):

All ISTD criteria were met. No action was required.

X.) TCL Compound Identification:

The results for 1,2-dichlorobenzene, 1,4-dichlorobenzene and 1,3-dichlorobenzene in sample 017GW02D05 were taken from a dilution analysis of the sample since the original analysis results were above the instrument's linear calibration range. All other criteria were met. No further action was required.

bromodichloromethane	29.2%
2-chloroethyl vinyl ether	77.4%
bromoform	37.8%

All results for these compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ) unless previously rejected. The associated samples were 017GW00105, 017GW00205 and 017GW02D01.

The Relative Response Factors (RRF's) for acetone (0.028) and 2-chloroethyl vinyl ether (0.001) were below the 0.050 QC limit for the standards run on 7/31/98 at 09:24 on instrument U. All results for acetone in the associated samples, which consisted entirely of non-detects, were rejected (R). The associated sample was 017GW00305. The results for 2-chloroethyl vinyl ether in the associated samples were previously rejected, so no further action was required.

The Percent Differences (%D's) exceeded the 25% QC limit for the standards run on 7/31/98 at 09:24 on instrument U for the following compounds:

acetone	70.6%
bromomethane	42.9%
carbon disulfide	39.0%
1,2-dichloroethene	88.0%
2-butanone	27.6%
2-chloroethyl vinyl ether	96.5%

All results for these compounds in associated sample 017GW00305, which consisted entirely of non-detects, were flagged as estimated (UJ) unless previously rejected.

The Relative Response Factors (RRF's) for acetone (0.034) and 2-chloroethyl vinyl ether (0.003) were below the 0.050 QC limit for the standards run on 8/3/98 at 08:37 on instrument U. All results for acetone in the associated samples, which consisted entirely of non-detects, were rejected (R). The associated samples were 014GW00105, 014GW01D05, 014HW01D05. The results for 2-chloroethyl vinyl ether in the associated samples were previously rejected, so no further action was required.

The Percent Differences (%D's) exceeded the 25% QC limit for the standards run on 8/3/98 at 08:37 on instrument U for the following compounds:

acetone	48.9%
bromomethane	55.4%
1,2-dichloroethene	108%
2-chloroethyl vinyl ether	80.8%
bromoform	38.4%

All results for these compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ) unless previously rejected. The associated samples were 014GW00105, 014GW01D05 and 014HW01D05.

The Relative Response Factors (RRF's) for acetone (0.029) and 2-chloroethyl vinyl ether (0.004) were below the 0.050 QC limit for the standards run on 8/4/98 at 08:55 on instrument U. All results for

acetone in the associated samples, which consisted entirely of non-detects, were rejected (R). The associated samples were 014GW00205, 014GW02D05 and 014TW00205. The results for 2-chloroethyl vinyl ether in the associated samples were previously rejected, so no further action was required.

The Percent Differences (%D's) exceeded the 25% QC limit for the standards run on 8/4/98 at 08:55 on instrument U for the following compounds:

acetone	67.0%
carbon disulfide	60.2%
2-chloroethyl vinyl ether	68.3%

All results for these compounds in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ) unless previously rejected. The associated samples were 014GW00205 and 014GW02D05.

IV.) Blanks:

Method Blanks:

There were no positive detections in the associated method blanks. No action was required.

Trip Blanks:

Chlorobenzene was detected at 2 ug/L in trip blank 017TW02D01. The positive result for this compound in associated sample 017GW02D01, which was less than 5X the blank amount, was flagged as undetected (U) with the result being raised to the CRQL.

TIC's:

There were no TIC's detected in the method or trip blanks. No action was required.

V.) Surrogate Recoveries:

The Percent Recoveries (%R's) of toluene-d8 exceeded the 88-110% QC limits for samples 017GW00205 (112%) and 017GW02D01 (114%). All positive results for these samples were flagged as estimated (J).

VI.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

The Percent Recovery (%R) of 1,1-dichloroethene in spiked sample 014GW00205MS was 75%, which was below the 76-125% QC limits. The non-detect result for this compound in associated sample 014BW00205 was flagged as estimated (UJ).

VII.) Laboratory Control Samples (LCS):

Four LCS's were analyzed for this SDG Several Recoveries were outside the QC limits. Data validation action based on LCS criteria was not required. No action was taken.

Data Qualifier Definitions

J	-	The association numerical value is an estimated quantity.
R	-	The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
U	-	The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	-	The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA QUALIFICATION SUMMARY

Southwest Laboratories of Oklahoma, Inc. - 34942 CLP Organics and Inorganics

SAMPLES: 014GW00105, 014GW00205, 014GW01D05, 014HW01D05, 014GW02D05, 017GW00105, 017GW00205, 017GW00205DL, 017GW00305, 017GW02D01, 017GW02D01RE, 014TW00205, 017TW02D01, 014GW00205MS, 014GW00205MSD, 017GW02D01MS, 017GW02D01MSD, 017GW00305MS, 017GW00305MSD, 017GW00105MS

VOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met, so no action was taken.

II.) GC/MS Tuning:

All GC/MS Tuning criteria were met, so no action was required.

III.) Calibration:

Initial Calibration:

The Average Relative Response Factor (RRF) for 2-chloroethyl vinyl ether was 0.013 for the standards run on 7/14/98 on instrument U, which was below the 0.050 QC limit. All results for this compound in the samples for this SDG, which consisted entirely of non-detects, were rejected (R).

Continuing Calibration:

The Relative Response Factors (RRF's) for acetone (0.035) and 2-chloroethyl vinyl ether (0.003) were below the 0.050 QC limit for the standards run on 7/31/98 at 14:25 on instrument U. All results for acetone in the associated samples, which consisted entirely of non-detects, were rejected (R). The associated samples were 017GW00105, 017GW00205, 017GW02D01 and 017TW02D01. The results for 2-chloroethyl vinyl ether were previously rejected, so no further action was required.

The Percent Differences (%D's) exceeded the 25% QC limit for the standards run on 7/31/98 at 14:25 on instrument U for the following compounds:

acetone	45.6%
bromomethane	49.9%
carbon disulfide	29.6%
1,2-dichloroethene	89.8%
carbon tetrachloride	25.6%

VALIDATA

Chemical Services, Inc.

P. O. Box 930422, Norcross, GA 30003

(770) 923-3890
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DATA VALIDATION SUMMARY REPORT

COMPANY:	Ensafe/Allen & Hoshall
SITE NAME:	Charleston Navel Base, Zone H
SERVICE ORDER NUMBER:	0304
CONTRACTED LAB:	Southwest Laboratory of Oklahoma, Inc.
QA/QC LEVEL:	EPA Level IV
EPA METHOD:	EPA SOW 3-90 / SW846
VALIDATION GUIDELINES:	*USEPA CLP National Functional Guidelines for Organic Data Review,* 1994; *USEPA CLP National Functional Guidelines for Inorganic Data Review,* 1994
SAMPLE MATRIX:	Water
TYPES OF ANALYSES:	Volatile Organics, Semivolatiles, Pesticides, Total Metals, Cyanide
SDG NUMBER:	34991 (Level III)

SAMPLES:

Client Sample #	Lab Sample #	Matrix	Volatile Organics	Semi-volatiles	Pesticides/ PCBs	Total Metals	Cyanide
014GW03D05	35019-10	Water	X				
014GW06D01	35019-12	Water	X				
017GW00405	34991-01	Water	X	X	X		X
017GW00405RE	34991-01RE	Water		+			
017GW00505	34991-02	Water	X				X
017GW00605	34991-03	Water	X	X	X		X
017HW00605	34991-07	Water	X	X	X		
017GW00801	34991-04	Water	X	X	X		X
017GW01001	34991-05	Water	X	X	X		X
178GW00205	35019-07	Water	X	X		X	
178GW00205RE	35019-07RE	Water		+			
178HW00205	35019-08	Water	X	X		X	
178HW00205RE	35019-08RE	Water		+			
014EW03D05	35019-01	Water	X	X	X	X	X
014EW03D05RE	35019-01RE	Water		+			
014FW03D05	35019-02	Water	X	X	X	X	X
014FW03D05RE	35019-02RE	Water		+			
017DW00405	35019-03	Water	X	X	X	X	X
017DW00405RE	35019-03RE	Water		+			

Client Sample #	Lab Sample #	Matrix	Volatile Organics	Semi-volatiles	Pesticides/ PCBs	Total Metals	Cyanide
017EW00405	34991-06	Water	X	X			
014TW03D05	35019-11	Water	X				
017TW00405	3499108	Water	X				
014EW03D05MS	35019-01MS	Water	+			+	+
014EW03D05MSD	35019-01MSD	Water	+			+	
014EW03D05MD	35019-01MD	Water				+	+
014EW03D05REMS	35019-01REMS	Water		+			
014EW03D05REMSD	35019-01REMSD	Water		+			
017GW00801MS	34991-04MS	Water		+			
017GW00801MSD	34991-04MSD	Water		+			
017HW00605MS	34991-07MS	Water			+		
017HW00605MSD	34991-07MSD	Water			+		
017GW00405MS	34991-01MS	Water					+
017GW00405MD	34991-01MD	Water					+

+ = Non-billable analysis

Note: Total metals consisted of analyses for arsenic and beryllium only.

DW = DEIONIZED WATER BLANK, EW = EQUIPMENT RINSATE BLANK, FW = FIELD BLANK, HW = FIELD DUPLICATE, MD = MATRIX DUPLICATE, MS = MATRIX SPIKE, MSD = MATRIX SPIKE DUPLICATE, RE = REANALYSIS, T = TRIP BLANK

DATA REVIEWER(S): Marvin L. Smith, Jean M. Delashmit

RELEASE SIGNATURE: Kevin C. Harmon

Data Qualifier Definitions

J	-	The associated numerical value is an estimated quantity.
R	-	The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
U	-	The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	-	The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA QUALIFICATION SUMMARY

Southwest Laboratory of Oklahoma, Inc - 34991 CLP Organics and Inorganics

SAMPLES: 014GW03D05, 014GW06D01, 017GW00405, 017GW00405RE, 017GW00505, 017GW00605, 017HW00605, 017GW00801, 017GW01001, 178GW00205, 178GW00205RE, 178HW00205, 178HW00205RE, 014EW03D05, 014EW03D05RE, 014FW03D05, 014FW03D05RE, 017DW00405, 017DW00405RE, 017EW00405, 014TW03D05, 017TW00405, 014EW03D05MS, 014EW03D05MSD, 014EW03D05MD, 014EW03D05REMS, 014EW03D05REMSD, 017GW00801MS, 017GW00801MSD, 017HW00605MS, 017HW00605MSD, 017GW00405MS, 017GW00405MD

VOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met. No action was taken.

II.) GC / MS Tuning:

All GC / MS Tuning criteria were met. No action was required.

III.) Calibration:

Initial Calibration:

The average Relative Response Factor (RRF) was 0.014 for 2-chloroethyl vinyl ether for the standards analyzed on 7/14/98 on instrument U, which was below the 0.050 QC limit. All results for this compound in the associated samples and field blanks, which consisted entirely of non-detects, were rejected (R). The associated samples were 017GW00405, 017GW00505, 017GW00605, 017HW00605, 017GW00801, 017GW01001, 017EW00405 and 017TW00405.

Continuing Calibration:

The Percent Differences (%D's) were 29.5% and 25.9%, respectively, for 1,1,1-trichloroethane and carbon tetrachloride for the standard analyzed on 8/10/98 at 08:44 on instrument K, which exceeded the 25% QC limit. The non-detect results for these two compounds in associated samples 014GW03D05 and 178HW00205 were flagged as estimated (UJ).

The Relative Response Factors (RRF's) were 0.034 and 0.003, respectively, for acetone and 2-chloroethyl vinyl ether for the standard analyzed on 8/3/98 at 08:37 on instrument U, which were below the 0.050 QC limit. The non-detect results for acetone in the associated samples and field blanks were rejected (R). The associated samples were 017GW00405, 017GW00505, 017GW00605, 017HW00605, 017GW00801, 017GW01001, 017EW00405 and 017TW00405. All results for 2-chloroethyl vinyl ether were previously rejected because of a low RRF in the initial calibration. No further action was taken.

The Percent Differences (%D's) of the following compounds exceeded the 25% QC limit for the standard analyzed on 8/3/98 at 08:37 on instrument U:

acetone	48.9%
1,2-dichloroethene	109%
2-chloroethyl vinyl ether	80.8%
total xylenes	122%

All results for total xylenes and 1,2-dichloroethene, which consisted entirely of non-detects, were flagged as estimated (UJ). The associated samples were 017GW00405, 017GW00505, 017GW00605, 017HW00605, 017GW00801 and 017GW01001. All results for acetone and 2-chloroethyl vinyl ether were previously rejected (R) in the associated samples because of low RRF's in the initial and continuing calibrations. No further action was necessary.

The Relative Response Factors (RRF's) were 0.032 and 0.002, respectively, for acetone and 2-chloroethyl vinyl ether for the standard analyzed on 8/6/98 at 10:08 on instrument U, which were below the 0.050 QC limit. All results for these two compounds in the associated samples and field blanks, which consisted entirely of non-detects, were rejected (R). The associated samples were 014GW06D01, 178GW00205, 014EW03D05, 014FW03D05 and 017DW00405.

The Percent Differences (%D's) of the following compounds exceeded the 25% QC limit for the standard analyzed on 8/6/98 at 10:08 on instrument U:

acetone	57.2%
1,2-dichloroethene	109%
2-chloroethyl vinyl ether	83.1%
total xylenes	128%
trans-1,3-dichloropropene	27.3%
carbon disulfide	67.2%
2-butanone	26.2%

All results for 1,2-dichloroethene, total xylenes, trans-1,3-dichloropropene, carbon disulfide and 2-butanone in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ). The associated samples were 014GW06D01 and 178GW00205. All results for acetone and 2-chloroethyl vinyl ether were previously rejected (R) in the associated samples because of low RRF's in this calibration. No further action was necessary.

IV.) Blanks:

Method Blanks:

There were no detections in the method blanks. No action was required.

Field Blanks:

1,2-Dichloroethene and trans-1,3-dichloropropene were detected at 32 ug/L and 2 ug/L, respectively, in equipment rinsate blank 014EW03D05. Since these two compounds were not detected in the associated samples, no action was taken.

Trip Blanks:

Methylene chloride was detected at 4 ug/L in trip blank 014TW03D05. The detections of this compound in associated samples 014GW03D05 and 178HW00205, which were less than 10X the blank amount, were flagged as undetected (U), with detections less than the CRQL, being raised to the CRQL.

Tentatively Identified Compounds (TIC):

There were no TIC's detected in the method, field or trip blanks. No action was necessary.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met. No action was required.

VI.) Laboratory Control Samples (LCS):

Six LCS's were analyzed by the laboratory. Eighteen LCS recoveries were outside their respective QC limits. Data validation action based on LCS Recovery criteria was not required. No action was taken.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

The Percent Recoveries (%R's) in spiked samples equipment rinsate blanks 014EW03D05MS and 014EW3D05MSD were outside the QC limits for the following compounds:

Compound	MS, %R	MSD, %R	QC Limits, %R
acetone	55		60-140
carbon disulfide	58	56	60-140
vinyl acetate	257	260	60-140
2-chloroethyl vinyl ether	19	9	60-140

Since the equipment rinsate blank was used for the MS / MSD samples, no action was taken.

VIII.) Field Duplicates:

Two sets of field duplicate samples were analyzed in this SDG. There were no calculable Relative Percent Differences (RPD's) in either set. No action was required.

IX.) Internal Standards Performance (ISTD):

All ISTD criteria were met. No action was required.

X.) TCL Compound Identification:

All TCL Compound Identification criteria were met. No action was taken.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria were met. No action was necessary.

XII.) Tentatively Identified Compounds (TIC's):

All TIC Identification criteria were met. No action was required.

XIII.) System Performance:

All System Performance criteria were met. No action was taken.

XIV.) Overall Assessment of Data/General:

Twenty-six non-detect results for acetone and 2-chloroethyl vinyl ether were rejected in the SDG samples and field blanks because of low RRF's in the initial and continuing calibrations. All other laboratory data were acceptable with qualifications.

SEMIVOLATILE ORGANICS

I.) Holding Times:

The ten days between sample date and reextraction date exceeded the 7 day QC limit for all reextractions (6 samples) in this fraction of the SDG. Since the original sample data for the six samples were used instead of the reextraction data, no action was necessary.

II.) GC / MS Tuning:

All GC / MS Tuning criteria were met, so no action was taken.

III.) Calibration:

All Initial and Continuing Calibration criteria were met. No action was required.

IV.) Blanks:

Method Blanks:

Bis(2-ethylhexyl)phthalate was detected at 3 ug/L and 1 ug/L, respectively, in method blanks SBLK1 and SBLK3. Detections of this compound in associated samples 17GW00605, 17HW00605, 17GW00801 and 17GW01001, which were less than 10X the blank amounts, were flagged as undetected (U) with the analytical results below the CRQL being replaced with the CRQL. In addition benzoic acid was detected at 8 ug/L in method blank SBLK2, and 7 ug/L in method blank SBLK3. The detection of this compound in associated sample 17GW00405 less than 5X the blank amount (SBLK2), was flagged as undetected (U) with the analytical result below the CRQL being replaced with the CRQL.

Equipment Rinsate Blanks:

Benzoic acid, di-n-butylphthalate and bis(2-ethylhexyl)phthalate were detected at 6 ug/L, 1 ug/L and 6 ug/L, respectively, in equipment rinsate blank 014EW03D05. The detections of benzoic acid in

associated samples 178GW00205 and 178HW00205, which were less than 5X the blank amount were flagged as undetected (U) with the analytical results below the CRQL being replaced with the CRQL. The detection of di-n-butylphthalate in associated sample 178HW00205, which was less than 10X the blank amount was flagged as undetected (U) with the analytical result below the CRQL being replaced with the CRQL. The detection of bis(2-ethylhexyl) phthalate in associated sample 17GW00405 less than 10X the blank amount, was flagged as undetected (U) with the analytical result below the CRQL being replaced with the CRQL. All other detections of this compound were previously qualified using the method blanks.

Phenol was detected at 7 ug/L in equipment rinsate blank 017EW00405. The detections of phenol in associated samples 017GW00605, 017HW00605 and 017GW01001, which were less than 5X the blank amount were flagged as undetected (U) with the analytical results below the CRQL being replaced with the CRQL.

Field Blank:

There were no detections in the field blank. No action was required.

Deionized Water Blank:

Bis(2-ethylhexyl)phthalate and di-n-butylphthalate were detected at 2 ug/L and 1 ug/L, respectively, in deionized water blank 017DW00405. Since these two compounds were previously qualified using the method and equipment rinsate blanks, no further action was required.

TIC's:

Trimethyl hexene was detected in the method and field blanks at sufficient concentrations to eliminate all detections in the SDG samples by applying the 10X Blank Rule.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met. No action was necessary.

VI.) Laboratory Control Samples (LCS):

Five LCS samples were analyzed by the laboratory. Three LCS recoveries were below their respective QC limits. Data validation based on LCS recoveries was not required, so no action was necessary.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

The Percent Recoveries (%R's) in spiked samples 017GW00801MS and 017GW00801MSD exceeded the QC limits for the following compound:

Compound	MS, %R	MSD, %R	QC Limits, %R
pentachlorophenol	120	112	9-103

Since this compound was not detected in unspiked sample 017GW00801, no action was required.

VIII.) Field Duplicates:

Two sets of field duplicate samples were analyzed in this SDG. There were no calculable Relative Percent Differences (RPD's) in either set. No action was required.

IX.) Internal Standards Performance:

All Internal Standards Performance criteria were met. No action was required.

X.) TCL Compound Identification:

All TCL Compound Identification criteria were met. No action was required.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

The original analyses of samples 017GW00405, 178GW00205, 178HW00205, 014EW03D05, 014FW03D05 and 017DW00405 were considered by the validator to be of preferable data quality as compared to the reextractions because of better holding times.

XII.) Tentatively Identified Compounds (TIC's):

All TIC criteria were met. No action was necessary.

XIII.) System Performance:

All System Performance criteria were met. No action was taken.

XIV.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualifications.

PESTICIDES/PCB's

I.) Holding Times:

All Holding Time criteria were met. No action was required.

II.) Instrument Performance:

All Pesticide Instrument Performance criteria were met. No action was taken.

III.) Calibration:

All Initial and Continuing Calibration criteria were met. No action was necessary.

IV.) Blanks:

There were no detections in the method or field blanks. No action was required.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met. No action was taken.

VI.) Laboratory Control Sample (LCS):

Four LCS's were analyzed by the laboratory. Four LCS Percent Recoveries (%R's) of endosulfan II were below the 54-122% QC limits. Data validation based on LCS Recovery criteria was not required. No action was necessary.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

The Percent Recoveries (%R's) in spiked samples 017HW00605MS and 017HW00605MSD were below the QC limits for the following compounds:

Compound	MS, %R	MSD, %R	QC Limits, %R
endosulfan I	36	40	46-134
4,4'-DDE	57	63	70-122
4,4'-DDD	60	67	70-133

The non-detect results for these three compounds in unspiked sample 017HW00605 were flagged as estimated (UJ).

VIII.) Field Duplicates:

One set of field duplicate samples was analyzed in this SDG. There were no calculable Relative Percent Differences (RPD's) for the set. No action was required.

IX.) TCL Compound Identification:

Pesticide/PCB Identification Summary (PIS):

All PIS Identification criteria were met. No action was required.

X.) Pesticide Cleanup Check:

Florisil Cartridge Check:

All criteria were met. No action was taken.

Gel Permeation Chromatography (GPC):

GPC cleanup was not required for this SDG. No action was necessary.

XI.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualification.

TOTAL METALS AND CYANIDE

I.) Holding Times:

All Holding Time criteria were met. No action was taken.

II.) Calibration:

All Initial and Continuing Calibration criteria were met. No action was necessary.

III.) Blanks:

The following blank results represent the highest detections associated with the samples and were used for data qualification:

Blank Type/ID#	Analyte	Max. Conc.	Action Level ug/L
FB	arsenic	12.4 ug/L	62.0
CCB3	beryllium	0.30 ug/L	1.50

CCB = Continuing Calibration Blank, FB = Field Blank 014FW03D05

All results greater than the IDL but less than 5X the blank amounts (Action Level, ug/L for water samples) for which the contaminated blank was an associated calibration or field blank were flagged as undetected (U).

IV.) ICP Interference Check Sample Results:

All Percent Recovery criteria were met, so no action was taken.

Arsenic (3 ug/L) was detected in ICS Solution A at a positive concentration greater than the IDL. This analyte should not be present. Since neither aluminum, calcium, iron nor magnesium results were available in the data package, no action was taken.

V.) ICP Serial Dilution Analysis:

All Serial Dilution Analysis criteria were met. No action was required.

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met. No action was required.

VII.) Duplicate Sample Analysis:

All Duplicate Sample Analysis criteria were met. No action was required.

VIII.) Matrix Spike Recoveries (MS / MSD):

All MS / MSD criteria were met. No action was required.

IX.) Field Duplicates:

One set of field duplicate samples was analyzed in this SDG. There were no calculable Relative Percent Differences (RPD's) for the set. No action was required.

X.) Graphite Furnace Atomic Absorption QC (GFAA):

Graphite Furnace analyses were not used for the samples in this SDG. No action was taken.

XI.) Sample Result, Calculation/Transcription Verification:

All criteria were met for a Level III package. No action was required.

XII.) Quarterly Verification of Instrumental Parameters:

All criteria were met. No action was taken.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualifications.

VALIDATA

Chemical Services, Inc.

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DATA VALIDATION SUMMARY REPORT

COMPANY:	Ensafe, Inc.
SITE NAME:	Charleston Naval Base, Zone H
SERVICE ORDER NUMBER:	0307
CONTRACTED LAB:	Southwest Laboratory of Oklahoma, Inc.
QA/QC LEVEL:	EPA Level III
EPA METHOD:	EPA SOW 3-90 or SW-846
VALIDATION GUIDELINES:	*USEPA CLP National Functional Guidelines for Organic Data Review,* 1994; *USEPA CLP National Functional Guidelines for Inorganic Data Review,* 1994
SAMPLE MATRIX:	Water
TYPES OF ANALYSES:	Total Volatiles, Semivolatiles, Pesticides / PCB's, Total Metals, Cyanide
SDG NUMBER:	35269 (Level III)

Client Sample #	Lab Sample #	Matrix	Volatile Organics	Semi-volatiles	Pesticides/ PCB's	Metals Cyanide
009GW02601	35269.01	Water	X	X	X	X
009GW02901	35269.02	Water	X	X	X	X
017GW00901	35269.05	Water	X	X	X	X*
159GW00101	35269.03	Water	X			
159GW00201	35269.04	Water	X			
653GW00301	35269.06	Water	X			
009GW02601MS	35269.01MS	Water	+			
009GW02601MSD	35269.01MSD	Water	+			

MS = MATRIX SPIKE, MSD = MATRIX SPIKE DUPLICATE

* - Analysis consisted of cyanide only.

DATA REVIEWER(S): Amy L. Hogan, Marvin L. Smith, Jean M. Delashmit

RELEASE SIGNATURE: Jean M. Delashmit

Data Qualifier Definitions

J	-	The associated numerical value is an estimated quantity.
R	-	The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
U	-	The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	-	The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA QUALIFICATION SUMMARY

Southwest Laboratory of Oklahoma, Inc. - 35269 CLP Organics and Inorganics

SAMPLES: 009GW02601, 009GW02901, 017GW00901, 159GW00101, 159GW00201, 653GW00301, 009GW02601MS, 009GW02601MSD

VOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met. No action was required.

II.) GC / MS Tuning:

All GC / MS Tuning criteria were met, so no action was required.

III.) Calibration:

Initial Calibration:

The Average Relative Response Factor (RRF) for 2-chloroethyl vinyl ether was 0.014 for the standards analyzed on 7/27/98 on instrument C, which was below the 0.050 QC limit. All results for this compound in the associated samples, which consisted entirely of non-detects, were rejected (R). The associated samples were 009GW02601, 009GW02901, 017GW00901, 159GW00101, 159GW00201 and 653GW00301.

Continuing Calibration:

The Relative Response Factors (RRF's) for acetone (0.047) and 2-chloroethyl vinyl ether (0.014) were below the 0.050 QC limit for the standard analyzed on 8/18/98 at 08:52 on instrument C. All results for acetone in the associated samples, which consisted entirely of non-detects, were rejected (R). The associated samples were 009GW02601, 009GW02901, 017GW00901, 159GW00101, 159GW00201 and 653GW00301. The results for 2-chloroethyl vinyl ether in the associated samples were previously rejected because of a low RRF in the initial calibration. No further action was required.

The Percent Differences (%D's) exceeded the 25% QC limit for the standard analyzed on 8/18/98 at 08:52 on instrument C for the following compounds:

chloromethane	29.5%
methylene chloride	29.9%
vinyl acetate	53.9%
2-butanone	49.5%
bromoform	27.8%
xylene	187%

All positive and non-detect results for these compounds in the associated samples were flagged as estimated (J) and (UJ). The associated samples were 009GW02601, 009GW02901, 017GW00901, 159GW00101, 159GW00201 and 653GW00301.

IV.) Blanks:

There were no positive detections in the method blanks. No action was required.

Tentatively Identified Compounds (TIC's):

There were no TIC's detected in the method blanks. No action was required.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met. No action was taken.

VI.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

All MS / MSD criteria were met. No action was required.

VII.) Laboratory Control Samples (LCS):

One LCS was analyzed for this SDG. All LCS Recovery criteria were met. No action was necessary.

VIII.) Field Duplicates:

There were no field duplicate samples in this SDG. No action was required.

IX.) Internal Standards Performance (ISTD):

All ISTD criteria were met. No action was required.

X.) TCL Compound Identification:

All TCL criteria were met. No action was required.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria were met. No action was necessary.

XII.) Tentatively Identified Compounds (TIC's):

All TIC Identification criteria were met. No action was required.

XIII.) System Performance:

All System Performance criteria were met. No action was taken.

XIV.) Overall Assessment of Data/General:

All non-detect results for acetone and 2-chloroethyl vinyl ether in the SDG samples were rejected because of low RRF's in the initial and continuing calibrations. All other laboratory data were acceptable with qualifications.

SEMIVOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met. No action was required.

II.) GC / MS Tuning:

All GC / MS Tuning criteria were met, so no action was required.

III.) Calibration:

All Initial and Continuing Calibration criteria were met. No action was required.

IV.) Blanks:

Bis(2-ethylhexyl)phthalate was detected at 2 ug/L in method blank SBLK1. All positive results for this compound in the associated samples, less than 10X the blank amount, were flagged as undetected (U) with the analytical results being replaced with the detection limit. The associated samples were 009GW02601 and 009GW02901.

Tentatively Identified Compounds (TIC')s:

There were no TIC's detected in the method blanks. No action was required.

V.) Surrogate Recoveries:

The Surrogate Percent Recovery (%R) of 2-fluorobiphenyl was below the QC limits of 43-116% in sample 009GW02601. Since only one surrogate recovery was below the QC limits, no action was required.

VI.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

MS / MSD analyses were not performed in this fraction of the SDG. No action was required.

VII.) Laboratory Control Samples (LCS):

One LCS was analyzed for this SDG. Several LCS Recoveries were outside their respective QC limits. Data validation action based on LCS criteria was not required. No action was taken.

VIII.) Field Duplicates:

There were no field duplicate samples this SDG. No action was required.

IX.) Internal Standards Performance (ISTD):

All ISTD criteria were met. No action was required.

X.) TCL Compound Identification:

All TCL criteria were met. No action was required.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria were met. No action was necessary.

XII.) Tentatively Identified Compounds (TIC's):

All TIC Identification criteria were met. No action was required.

XIII.) System Performance:

All System Performance criteria were met. No action was taken.

XIV.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualifications.

PESTICIDES/PCB's

I.) Holding Times:

All Holding Time criteria were met. No action was required.

II.) Instrument Performance:

The Percent Difference (%D) exceeded the 25% QC limit for the PEM analyzed on 8/27/98 at 22:47 on the primary column for 4,4'-DDT (26.0%). All results for this compound in the associated samples, which consisted entirely of non-detects, were flagged as estimated (UJ). The associated samples were 009GW02601, 009GW02901 and 017GW00901.

III.) Calibration:

All Initial and Continuing Calibration criteria were met. No action was required.

IV.) Blanks:

There were no positive detections in the method blanks. No action was required.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met. No action was required.

VI.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

MS / MSD analyses were not performed in this fraction of the SDG. No action was required.

VII.) TCL Compound Identification:

Pesticide/PCB Identification Summary (PIS):

All PIS criteria were met. No action was required.

VIII.) Field Duplicates:

There were no field duplicate samples in this SDG. No action was required.

IX.) Pesticide Cleanup Check:

Florisil Cartridge Check:

Florisil Cleanup data was not submitted for this SDG. No action was taken.

Gel Permeation Chromatography (GPC):

GPC was not required for this SDG. No action was taken.

X.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualifications.

TOTAL METALS AND CYANIDE

I.) Holding Times:

All Holding Time criteria were met. No action was taken.

II.) Calibration:

All Initial and Continuing Calibration criteria were met. No action was necessary.

III.) Blanks:

The following blank results represent the highest detections associated with the samples and were used for data qualification:

Blank Type/ID#	Analyte	Max. Conc.	Action Level
CCB3	antimony	3.50 ug/L	17.5 ug/L
CCB3	beryllium	0.70 ug/L	3.50 ug/L
PBW	cadmium	8.12 ug/L	40.6 ug/L
PBW	chromium	3.86 ug/L	19.3 ug/L
PBW	copper	23.8 ug/L	119 ug/L
PBW	lead	1.85 ug/L	9.25 ug/L
ICB	potassium	586 ug/L	2930 ug/L
CCB3	sodium	497 ug/L	2485 ug/L
PBW	zinc	16.4 ug/L	82.0 ug/L

CCB = Continuing Calibration Blank, ICB = Initial Calibration Blank,
PBW = Preparation Blank (Water)

All results greater than the IDL but less than 5X the blank amounts (Action Level, ug/L for water samples) for which the contaminated blank was an associated calibration or preparation blank were flagged as undetected (U).

The following analytes had negative results with absolute values greater than the IDL:

Blank Type/ID#	Analyte	Neg. Conc.	5X Conc.
CCB1	selenium	-4.10 ug/L	20.5 ug/L
CCB1	cyanide	-2.60 ug/L	13.0 ug/L

CCB = Continuing Calibration Blank

All associated positive sample results less than 5X the absolute value of the negative blank results and all associated non-detects were flagged as estimated (J) and (UJ).

IV.) ICP Interference Check Sample Results:

All Percent Recovery criteria were met. No action was taken.

The following analytes were detected in ICS Solution A at concentrations greater than the IDL:

barium	5 ug/L
chromium	3 ug/L
copper	10 ug/L
manganese	6 ug/L
sodium	177 ug/L

These analytes should not be present. Since neither aluminum, calcium, iron nor magnesium was present in the samples at a concentration comparable to or greater than the amount in Solution A, no action was required.

Negative results were observed in ICS Solution A at an absolute concentration greater than the IDL for the following analytes:

antimony	-15 ug/L
beryllium	-1 ug/L
cadmium	-20 ug/L
cobalt	-3 ug/L
nickel	-10 ug/L
potassium	-337 ug/L
silver	-4 ug/L
tin	-25 ug/L
vanadium	-19 ug/L

Since neither aluminum, calcium, iron nor magnesium was present in the samples at a concentration comparable to or greater than the amount in Solution A, no action was required.

V.) ICP Serial Dilution Analysis:

Serial Dilution analysis was not performed in this SDG. No action was required.

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met. No action was required.

VII.) Duplicate Sample Analysis:

Duplicate Sample Analysis was not performed in this fraction of the SDG. No action was required.

VIII.) Matrix Spike Recoveries:

Matrix Spike Analysis was not performed in this fraction of the SDG. No action was required.

IX.) Field Duplicates:

There were no field duplicate samples in this SDG. No action was required.

X.) Graphite Furnace Atomic Absorption QC (GFAA):

Graphite Furnace analyses were not used for the samples in this SDG. No action was necessary.

XI.) Sample Result, Calculation/Transcription Verification:

All criteria were met. No action was required.

XII.) Quarterly Verification of Instrumental Parameters:

All criteria were met. No action was taken.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualifications.

VALIDATA

Chemical Services, Inc.

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DATA VALIDATION SUMMARY REPORT

COMPANY:	Ensafe, Inc.
SITE NAME:	Charleston Navel Base, Zone H
SERVICE ORDER NUMBER:	0306
CONTRACTED LAB:	Southwest Laboratory of Oklahoma, Inc.
QA/QC LEVEL:	EPA Level III
EPA METHOD:	EPA SOW 3-90 / SW846
VALIDATION GUIDELINES:	*USEPA CLP National Functional Guidelines for Organic Data Review,* 1994; *USEPA CLP National Functional Guidelines for Inorganic Data Review,* 1994
SAMPLE MATRIX:	Water
TYPES OF ANALYSES:	Volatile Organics, Semivolatiles, Pesticides/PCB's, Total Metals, Cyanide
SDG NUMBER:	35271 (Level III)

SAMPLES:

Client Sample #	Lab Sample #	Matrix	Volatile Organics	Semi-volatiles	Pesticides/ PCBs	Total Metals	Cyanide
009GW26D01	35271-01	Water	X	X	X	X	X
017GW00701	35271-02	Water	X	X	X		X
017TW00701	35271-03	Water	X				

T = TRIP BLANK

DATA REVIEWER(S): Marvin L. Smith, Jean M. Delashmit

RELEASE SIGNATURE: Jean M. Delashmit

Data Qualifier Definitions

J	-	The associated numerical value is an estimated quantity.
R	-	The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
U	-	The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	-	The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA QUALIFICATION SUMMARY

Southwest Laboratory of Oklahoma, Inc - 35271 CLP Organics and Inorganics

SAMPLES: 009GW26D01, 017GW00701, 017TW00701

VOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met. No action was taken.

II.) GC / MS Tuning:

All GC / MS Tuning criteria were met. No action was required.

III.) Calibration:

Initial Calibration:

The average Relative Response Factor (RRF) was 0.015 for 2-chloroethyl vinyl ether for the standards analyzed on 7/27/98 on instrument C, which was below the 0.050 QC limit. All results for this compound in the two associated samples and trip blank, which consisted entirely of non-detects, were rejected (R).

Continuing Calibration:

The Relative Response Factors (RRF's) were 0.047 and 0.014, respectively, for acetone and 2-chloroethyl vinyl ether for the standard analyzed on 8/18/98 at 08:52 on instrument C, which were below the 0.050 QC limit. The non-detect results for acetone in the two associated samples and trip blank were rejected (R). All results for 2-chloroethyl vinyl ether were previously rejected because of a low RRF in the initial calibration. No further action was taken.

The Percent Differences (%D's) of the following compounds exceeded the 25% QC limit for the standard analyzed on 8/18/98 at 08:52 on instrument C:

chloroethane	29.5%
methylene chloride	29.9%
vinyl acetate	53.9%
2-butanone	49.5%
bromoform	27.8%

The positive and non-detect results for methylene chloride in the two associated samples were flagged as estimated (J) and (UJ). All results for the four other compound in the two samples, which consisted entirely of non-detects, were flagged as estimated (UJ). The associated samples were 009GW26D01 and 017GW00701.

IV.) Blanks:

There were no detections in the method or trip blanks. No action was required.

Tentatively Identified Compounds (TIC):

There were no TIC's detected in the method or trip blanks. No action was necessary.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met. No action was required.

VI.) Laboratory Control Samples (LCS):

Two LCS's were analyzed by the laboratory. Six LCS recoveries were outside their respective QC limits. Data validation action based on LCS Recovery criteria was not required. No action was taken.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

MS / MSD samples were not analyzed in this SDG. No action was necessary.

VIII.) Field Duplicates:

Field duplicate samples were not analyzed in this SDG. No action was required.

IX.) Internal Standards Performance (ISTD):

All ISTD criteria were met. No action was required.

X.) TCL Compound Identification:

All TCL Compound Identification criteria were met. No action was taken.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria were met. No action was necessary.

XII.) Tentatively Identified Compounds (TIC's):

All TIC Identification criteria were met. No action was required.

XIII.) System Performance:

All System Performance criteria were met. No action was taken.

XIV.) Overall Assessment of Data/General:

Six non-detect results for acetone and 2-chloroethyl vinyl ether were rejected in the two SDG samples

and trip blank because of low RRF's in the initial and continuing calibrations. All other laboratory data were acceptable with qualifications.

SEMIVOLATILE ORGANICS

I.) Holding Times:

All Holding Time criteria were met. No action was required.

II.) GC / MS Tuning:

All GC / MS Tuning criteria were met, so no action was taken.

III.) Calibration:

All Initial and Continuing Calibration criteria were met. No action was required.

IV.) Blanks:

Bis(2-ethylhexyl) phthalate was detected at 2 ug/L in method blank SBLK1. The detection of this compound in sample 009GW26D01, which was less than 10X the blank amount, was flagged as undetected (U) with the analytical result below the CRQL being replaced with the CRQL.

Tentatively Identified Componds (TIC's):

Dimethyl adamantane was detected in the method blank at a sufficient concentration to eliminate the detection in sample 017GW00701 by applying the 10X Blank Rule.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met. No action was necessary.

VI.) Laboratory Control Samples (LCS):

All Recovery criteria were met in the two LCS samples for this SDG. No action was taken.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

MS / MSD samples were not analyzed in this SDG. No action was required.

VIII.) Field Duplicates:

Field duplicate samples were not analyzed in this SDG. No action was required.

IX.) Internal Standards Performance:

All Internal Standards Performance criteria were met. No action was taken.

X.) TCL Compound Identification:

All TCL Compound Identification criteria were met. No action was required.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL's):

All CRQL criteria were met. No action was necessary.

XII.) Tentatively Identified Compounds (TIC's):

All TIC criteria were met. No action was necessary.

XIII.) System Performance:

All System Performance criteria were met. No action was taken.

XIV.) Overall Assessment of Data/General:

All laboratory data were acceptable with one qualification.

PESTICIDES/PCB's

I.) Holding Times:

All Holding Time criteria were met. No action was required.

II.) Instrument Performance:

All Pesticide Instrument Performance criteria were met. No action was taken.

III.) Calibration:

All Initial and Continuing Calibration criteria were met. No action was necessary.

IV.) Blanks:

There were no detections in the method blank. No action was required.

V.) Surrogate Recoveries:

All Surrogate Recovery criteria were met. No action was taken.

VI.) Laboratory Control Sample (LCS):

Two LCS's were analyzed by the laboratory. All LCS Recovery criterea were met. No action was necessary.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

MS / MSD samples were not analyzed in this SDG. No action was taken.

VIII.) Field Duplicates:

Field duplicate samples were not analyzed in this SDG. No action was required.

IX.) TCL Compound Identification:

Pesticide/PCB Identification Summary (PIS):

All PIS criteria were met. No action was taken.

X.) Pesticide Cleanup Check:

Florisil Cartridge Check:

All criteria were met. No action was taken.

Gel Permeation Chromatography (GPC):

GPC cleanup was not required for this SDG. No action was necessary.

XI.) Overall Assessment of Data/General:

All laboratory data were acceptable without qualification.

TOTAL METALS AND CYANIDE

I.) Holding Times:

All Holding Time criteria were met. No action was taken.

II.) Calibration:

All Initial and Continuing Calibration criteria were met. No action was necessary.

III.) Blanks:

The following blank results represent the highest detections associated with the samples and were used for data qualification:

Blank Type/ID#	Analyte	Max. Conc.	Action Level ug/L
CCB3	arsenic	3.50 ug/L	17.5
CCB3	beryllium	0.70 ug/L	3.50

Blank Type/ID#	Analyte	Max. Conc.	Action Level ug/L
PBW	cadmium	8.12 ug/L	40.6
PBW	chromium	3.86 ug/L	19.3
PBW	copper	23.8 ug/L	119
PBW	lead	1.85 ug/L	9.25
CCB7	magnesium	34.3 ug/L	172
ICB	potassium	586 ug/L	2930
CCB7	sodium	497 ug/L	2490
PBW	zinc	16.4 ug/L	82.0

CCB = Continuing Calibration Blank, ICB = Initial Calibration Blank,
PBW = Preparation Blank (Water)

All results greater than the IDL but less than 5X the blank amounts (Action Level, ug/L for water samples) for which the contaminated blank was an associated calibration or preparation blank were flagged as undetected (U).

The following analytes had negative results with absolute values greater than the IDL:

Blank Type/ID#	Analyte	Neg. Conc.	5X Conc.
CCB4	beryllium	-0.60 ug/L	3.00 ug/L
CCB1	selenium	-4.10 ug/L	20.5 ug/L
CCB1	cyanide	-2.60 ug/L	13.0 ug/L

CCB = Continuing Calibration Blank

All associated sample results, which consisted entirely of non-detects, were flagged as estimated (UJ).

IV.) ICP Interference Check Sample Results:

The following analytes were detected in ICS Solution A at concentrations greater than the IDL:

arsenic	3 ug/L
chromium	2 ug/L
copper	10 ug/L
lead	2 ug/L
manganese	6 ug/L
sodium	1560 ug/L
thallium	9 ug/L
zinc	4 ug/L

These analytes should not be present. Since neither aluminum, calcium, iron nor magnesium was detected in the samples at a concentration comparable to or greater than that of ICS Solution A, no action was taken.

Negative results were observed for the following analytes in ICS Solution A at absolute concentrations

greater than the IDL:

beryllium	-1 ug/L
cadmium	-20 ug/L
tin	-25 ug/L
vanadium	-19 ug/L

Since neither aluminum, calcium, iron nor magnesium was present in the samples at a concentration comparable to or greater than the amount in Solution A, no action was required.

V.) ICP Serial Dilution Analysis:

Serial Dilution Analysis was not performed in this SDG. No action was required.

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met. No action was required.

VII.) Duplicate Sample Analysis:

Duplicate Sample Analysis was not performed in this SDG. No action was taken.

VIII.) Matrix Spike Recoveries (MS / MSD):

MS / MSD samples were not analyzed in this SDG. No action was required.

IX.) Field Duplicates:

Field duplicate samples were not analyzed in this SDG. No action was required.

X.) Graphite Furnace Atomic Absorption QC (GFAA):

Graphite Furnace analyses were not used for the samples in this SDG. No action was taken.

XI.) Sample Result, Calculation/Transcription Verification:

All criteria were met. No action was required.

XII.) Quarterly Verification of Instrumental Parameters:

All criteria were met. No action was taken.

XIII.) Overall Assessment of Data/General:

All laboratory data were acceptable with qualifications.

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	40995
Date:	November 29, 1999
Client Name:	Ensafe
Project/Site Name:	Charleston Zone H
Date Sampled:	November 5, 1999
Number of Samples:	3 Non-Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fraction:	PCBs

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Sufton

Paul B. Humburg, President

12-1-99

Date

4127 Plaza 94 South • St Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# 40995

Samples and Fractions Reviewed

Sample Identifications Analytical Fraction

ENSAFE ID	MATRIX	PCB	
017SB03601	SOIL		X
017SB03801	SOIL		X
017SB04001	SOIL		X
Total Billable Samples (Water/Soil)		0	3

PCB= PCBs

DATA ASSESSMENT NARRATIVE

AROCLORS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance, and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Methods 8082; the National Functional Guidelines for Organic Data Validation, February 1994; and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 40995

A validation was performed on the Aroclor Data from SDG 40995. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC Performance
*	•	Calibration
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

System Performance and Overall Assessment

The data did not require qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

NJ = Result is considered presumptively present at an estimated concentration

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL

NO QUALIFICATIONS WERE REQUIRED.

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non-detect result

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	41100
Date:	December 10, 1999
Client Name:	Ensafe
Project/Site Name:	Charleston Zone H
Date Sampled:	November 11, 1999
Number of Samples:	3 Non-Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fraction:	PCBs

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Simpson
for Paul B. Humburg, President

12-14-99
Date

4127 Plaza 94 South • St Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# 41100

Samples and Fractions Reviewed

Sample Identifications Analytical Fraction

ENSAFE ID	MATRIX	PCB	
017SB03501	SOIL		X
017SB03701	SOIL		X
017SB03901	SOIL		X
Total Billable Samples (Water/Soil)		0	3

PCB= PCBs

DATA ASSESSMENT NARRATIVE

AROCLORS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance, and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Methods 8082; the National Functional Guidelines for Organic Data Validation, February 1994; and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41100

A validation was performed on the Aroclor Data from SDG 41100. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC Performance
*	•	Calibration
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

System Performance and Overall Assessment

The data did not require qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

NJ = Result is considered presumptively present at an estimated concentration

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL

NO QUALIFICATIONS WERE REQUIRED.

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non-detect result

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	41152
Date:	January 6, 2000
Client Name:	Ensafe
Project/Site Name:	Charleston Zone H
Date Sampled:	November 17, 1999
Number of Samples:	4 Non-Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fraction:	Volatiles, Semivolatiles and PCBs

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

for Craig G. Scarfoss — 1-10-00

Paul B. Humburg, President — Date

4127 Plaza 94 South • St Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# 41152

Samples and Fractions Reviewed

Sample Identifications Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		PCB	
017SWT0105	SOIL	[illegible]	X	[illegible]	X	[illegible]	X
017SWT0213	SOIL	[illegible]	X	[illegible]	X	[illegible]	X
017SWT0308	SOIL	[illegible]	[illegible]	[illegible]	X	[illegible]	X
017SWT0311	SOIL	[illegible]	X	[illegible]	X	[illegible]	X
Total Billable Samples (Water/Soil)		0	3	0	4	0	4

VOA= Volatiles
SVOA= Semivolatiles
PCB= PCBs

DATA ASSESSMENT NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8260B for GC/MS Volatiles; the National Functional Guidelines for Organic Data Validation, 2/93, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41152

A validation was performed on the Volatile Data from SDG 41152. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
*	•	Blanks
*	•	Internal Standard Performance
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Calibrations

The continuing calibration R35366.D exhibited one (1) compound with a %D greater than 50% but less than 90%. For the following samples and non-compliant compounds, the reported positive and non-detect results are qualified as estimated, J/UJ.

017SWT0213	2-chloroethyl vinyl ether (57.1%)
017SWT0105	
017SWT0311	

Calibrations (continued)

The continuing calibration R35366.D exhibited one (1) compound with a %D greater than 20% but less than 50% for which qualifications were required. For the following sample and non-compliant compounds, the reported positive results are qualified as estimated, J.

017SWT0311	4-methyl-2-pentanone (33.6%)

System Performance and Overall Assessment

The data, as reported, required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWT0213 017SWT0105 017SWT0311	2-chloroethyl vinyl ether (57.1%)	+/-	J/UJ
017SWT0311	4-methyl-2-pentanone (33.6%)	+	J

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

SEMIVOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8270C for GC/MS Semivolatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41152

A validation was performed on the Semivolatile Data from SDG 41152. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibration
	•	Blanks
	•	Internal Standard Performance
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Blanks

The method blank associated with the field sample in this SDG exhibited contamination for which qualifications were required. The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

Blanks (continued)

Associated blank	Compound	Concentration	Action Level
SBLK2	bis(2-ethylhexyl)phthalate	24J ug/Kg	240 ug/Kg

Samples	Compound	Qualifications
017SWT0105 017SWT0311	bis(2-ethylhexyl)phthalate	CRQL

Internal Standards

The following sample exhibited non-compliant EICP area recoveries below the QC limits for the noted internal standards. All reported positive and non-detect results are qualified as estimated, J/UJ.

017SWT0105	acenaphthene-d10 phenanthrene-d10 chrysene-d12 perylene-d12

Compound Quantitation

For the following sample, the reported results are not used in favor of the results reported from the original analyses of the sample. Both analyses of the sample exhibited similar internal standard area recoveries.

017SWT0105RE

System Performance and Overall Assessment

The data, as reported, required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWT0105 017SWT0311	bis(2-ethylhexyl)phthalate	+B	CRQL
017SWT0105	*All associated with* acenaphthene-d10 phenanthrene-d10 chrysene-d12 perylene-d12	+/-	J/UJ
017SWT0105RE	All Compounds	+/-	Do Not Use

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

AROCLORS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance, and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Methods 8082; the National Functional Guidelines for Organic Data Validation, February 1994; and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41152

A validation was performed on the Aroclor Data from SDG 41152. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC Performance
*	•	Calibration
*	•	Blanks
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Surrogate Recoveries

The sample listed below exhibited a high TCX recovery. The positive results are qualified as estimated, J.

Sample ID	Surrogate	% Recovery
017SWT0308	TCX-2	155%

System Performance and Overall Assessment

The data required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

NJ = Result is considered presumptively present at an estimated concentration

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWT0308	ALL	+	J

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non-detect result

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	41176
Date:	January 6, 2000
Client Name:	Ensafe
Project/Site Name:	Charleston Zone H
Date Sampled:	November 18, 1999
Number of Samples:	3 Non-Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fraction:	Volatiles, Semivolatiles and PCBs

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Searfoss — 1-10-00

Paul B. Humburg, President — Date

4127 Plaza 94 South • St. Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# 41176

Samples and Fractions Reviewed

Sample Identifications Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		PCB	
017SWL0104	SOIL		X		X		
017SWL0111	SOIL		X		X		X
017SWL0307	SOIL		X		X		X
Total Billable Samples (Water/Soil)		0	3	0	3	0	2

VOA= Volatiles
SVOA= Semivolatiles
PCB= PCBs

DATA ASSESSMENT NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8260B for GC/MS Volatiles; the National Functional Guidelines for Organic Data Validation, 2/93, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41176

A validation was performed on the Volatile Data from SDG 41176. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
*	•	Blanks
*	•	Internal Standard Performance
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Calibrations

The continuing calibration R35391.D exhibited one (1) compound with a %D greater than 20% but less than 50% for which qualifications were required. For the following sample and non-compliant compound, the reported positive and non-detect results are qualified as estimated, J/UJ.

017SWL0307 acetone (34.9%)

System Performance and Overall Assessment

The data, as reported, required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWL0307	acetone (34.9%)	+	J

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

SEMIVOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8270C for GC/MS Semivolatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41176

A validation was performed on the Semivolatile Data from SDG 41176. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibration
	•	Blanks
*	•	Internal Standard Performance
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Blanks

The method blank associated with the field sample in this SDG exhibited contamination for which qualifications were required. The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

Blanks (continued)

Associated blank	Compound	Concentration	Action Level
SBLK1	bis(2-ethylhexyl)phthalate	100J ug/Kg	1000 ug/Kg

Samples	Compound	Qualifications
017SWL0111 017SWL0104	bis(2-ethylhexyl)phthalate	CRQL

Compound Quantitation

For the following sample, the E flagged results are not used in favor of the corresponding D flagged results reported from the dilution analysis of the sample. All other results in the dilution analysis are not used in favor of the results reported from the undiluted analysis.

017SWL0307

System Performance and Overall Assessment

The data, as reported, required qualifications/rejections.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWL0111 017SWL0104	bis(2-ethylhexyl)phthalate	+B	CRQL
017SWL0307	All E flagged compounds	+E	Do Not Use
017SWL0307DL	All except corresponding D flagged compounds	+/-	Do Not Use

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

AROCLORS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance, and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Methods 8082; the National Functional Guidelines for Organic Data Validation, February 1994; and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41176

A validation was performed on the Aroclor Data from SDG 41176. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC Performance
*	•	Calibration
*	•	Blanks
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Surrogate Recoveries

The sample listed below exhibited DCB recoveries less than 10%. The positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

Sample ID	Surrogate	% Recovery
017SWL0307	TCX-1/TCX-2	0%/0%

Compound Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. The following guidelines were used to qualify the data:

1. No qualifications are required for positive sample results which exhibited column quantitation differences <40%. The "P" flag is removed from the result.

2. The positive sample result which exhibited a column quantitation difference >40%, but ≤100% is qualified as estimated, J.

3. The positive single component pesticide sample result which exhibited a column quantitation difference >100% and is <10X the respective compound CRQL, is qualified as non-detect, U. (All multi-component results are exempt from this rule.)

4. The positive single component pesticide sample result which exhibited a column quantitation difference >100% and >10X the respective compound CRQL, is qualified as presumptively present at an estimated concentration, NJ. (All multi-component results are exempt from this rule.)

5. The positive multi-component pesticide sample result which exhibited a column quantitation difference >100% and <10X the respective multi-component CRQL is qualified as presumptively present at an estimated concentration, NJ.

The following samples and compounds have been qualified for high column quantitation %Ds.

Sample ID	Compound	%D	Lab Qual.	HESI Qual.	Ref. #
017SWL0104DL	Aroclor-1260	45.5%	P	J	2

One (1) sample was diluted to accurately quantitate target compounds. For the following sample, the results for the E-flagged compounds are replaced with the corresponding results from the dilution analysis. All other results from the dilution analysis are not used.

017SWL0104

System Performance and Overall Assessment

The data required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

NJ = Result is considered presumptively present at an estimated concentration

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWL0307	ALL	+/-	J/UR
ALL	All P < 40%	+	
ALL	All P > 40% But ≤ 100%	+	J
ALL	single component pests All P > 100% And < 10X CRQL	+	U
ALL	single component pests All P > 100% And > 10X CRQL	+	NJ
ALL	multi-component pests All P> 100% And < 10X CRQL	+	NJ
017SWL0104	All E-Flagged	+E	D
017SWL0104DL	All except corresponding D-Flagged results	+/-	not used

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non-detect result

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	41186
Date:	January 3, 2000
Client Name:	Ensafe
Project/Site Name:	Charleston - Zone H
Date Sampled:	November 19, 1999
Number of Samples:	2 Non-Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, and PCBs

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Paul E. Humburg, President

1-3-00
Date

4127 Plaza 94 South • St. Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# 41186

Samples and Fractions Reviewed

Sample Identifications Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		PCB	
017SWB0211	SOIL		X		X		X
017SWL0206	SOIL		X		X		X
Total Billable Samples (Water/Soil)		0	2	0	2	0	2

VOA= Volatiles
SVOA= Semivolatiles
PCB= PCBs

DATA ASSESSMENT NARRATIVES

DATA ASSESSMENT NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8260B for GC/MS Volatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41186

A validation was performed on the Volatile Data from SDG 41186. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
*	•	Blanks
*	•	Internal Standard Performance
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Calibrations

The continuing calibration standard R35391.D exhibited one (1) compound with a %D greater than 25% but less than 50% for which qualifications were required. For the following samples and non-compliant compound, the reported positive results are qualified as estimated, J.

017SWB0211	4-methyl-2-pentanone (38.1%)

System Performance and Overall Assessment

The data, as reported, required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWB0211	4-methyl-2-pentanone (38.1%)	+	J

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

SEMIVOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8270C for GC/MS Semivolatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41186

A validation was performed on the Semivolatile Data from SDG 41186. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibration
*	•	Blanks
	•	Internal Standard Performance
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Internal Standards

The following samples exhibited non-compliant EICP area recoveries below the QC limits for the noted internal standards. All reported positive and non-detect results are qualified as estimated, J/UJ.

017SWL0206	phenanthrene-d10
	chrysene-d12
	perylene-d12

Compound Quantitation

For the following sample, the reported results are not used in favor of the results reported from the original analyses of the sample. Both analyses of the sample exhibited similar internal standard area recoveries.

017SWL0206RE

System Performance and Overall Assessment

The data, as reported, required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWL0206	*All associated with* phenanthrene-d10 chrysene-d12 perylene-d12	+/-	J/UJ
017SWL0206RE	All Compounds	+/-	Do Not Use

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

AROCLORS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance, and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Methods 8082; the National Functional Guidelines for Organic Data Validation, February 1994; and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41186

A validation was performed on the Aroclor Data from SDG 41186. The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • GC Performance
* • Calibration
* • Blanks
* • Surrogate Recoveries
* • Matrix Spike/Matrix Spike Duplicates
* • Field Duplicates
* • Compound Identification
* • Compound Quantitation

* - All criteria were met for this parameter.

System Performance and Overall Assessment

The data did not require qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

NJ = Result is considered presumptively present at an estimated concentration

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL

NO QUALIFICATIONS WERE REQUIRED.

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non-detect result

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	41206
Date:	January 6, 2000
Client Name:	Ensafe
Project/Site Name:	Charleston Zone H
Date Sampled:	November 22, 1999
Number of Samples:	4 Non-Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma, Inc.
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles and PCBs

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Surfess
for Paul B. Humburg, President

1-12-00.
Date

4127 Plaza 94 South • St. Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# 41206

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		PCB	
017SWB04~~04~~02	SOIL		X		X		X
017SWB0409	SOIL		X		X		X
017SWL0402	SOIL		X		X		X
017SWL0409	SOIL		X		X		X
Total Billable Samples (Water/Soil)		0	4	0	4	0	4

VOA= Volatiles
SVOA= Semivolatiles
PCB= PCBs

DATA ASSESSMENT NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8260B for GC/MS Volatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41206

A validation was performed on the Volatile Data from SDG 41206. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
*	•	Blanks
	•	Internal Standard Performance
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Calibrations

The continuing calibration standard R35411.D exhibited one (1) compound with a %D greater than 50% but less than 90%. For the following samples and non-compliant compound, the reported positive and non-detect results are qualified as estimated, J/UJ.

017SWB0409	2-hexanone (64.4%)
017SWL0402	
017SWL0409	

Internal Standards

The following sample exhibited non-compliant internal standard area recoveries below the QC limits. All reported positive and non-detect results associated with the non-compliant internal standard compound noted are qualified as estimated, J/UJ.

017SWB0409	pentafluorobenzene 1,4-difluorobenzene

Compound Quantitation

For the following sample, the reported E flagged results are not used in favor of the corresponding D flagged results reported from the dilution analysis of the sample. All other results reported in the dilution analyses are not used in favor of the results reported from the undiluted analyses.

017SWB0409

System Performance and Overall Assessment

The data, as reported, required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWB0409 017SWL0402 017SWL0409	2-hexanone (64.4%)	+/-	J/UJ
017SWB0409	*All associated with* pentafluorobenzene 1,4-difluorobenzene	+/-	J/UJ
017SWB0409	All E flagged compounds	+E	Do Not Use
017SWB0409DL	All except corresponding D flagged results	+/-	Do Not Use

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

SEMIVOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8270C for GC/MS Semivolatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41206

A validation was performed on the Semivolatile Data from SDG 41206. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibration
	•	Blanks
*	•	Internal Standard Performance
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Blanks

The method blank associated with the field samples in this SDG exhibited contamination for which qualifications were required. The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

Blanks (continued)

Associated blank	Compound	Concentration	Action Level
SBLK1	bis(2-ethylhexyl)phthalate	51 ug/Kg	510 ug/Kg
	naphthalene	19J ug/Kg	95 ug/Kg

Samples	Compound	Qualifications
017SWB0409 017SWL0402 017SWL0409	bis(2-ethylhexyl)phthalate	CRQL
017SWB0409 017SWL0402 017SWL0409	naphthalene	CRQL

System Performance and Overall Assessment

The data, as reported, required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWB0409 017SWL0402 017SWL0409	bis(2-ethylhexyl)phthalate	+B	CRQL
017SWB0409 017SWL0402 017SWL0409	naphthalene	+B	CRQL

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

AROCLORS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance, and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Methods 8082; the National Functional Guidelines for Organic Data Validation, February 1994; and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41206

A validation was performed on the Aroclor Data from SDG 41206. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC Performance
*	•	Calibration
*	•	Blanks
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Surrogate Recoveries

The samples listed below exhibited low DCB recoveries. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ.

Sample ID	Surrogate	% Recovery
017SWB0404	DCB-1/DCB-2	46%/45%
017SWB0409	DCB-2	53%

The sample listed below exhibited a high TCX recovery. The positive results are qualified as estimated, J.

Sample ID	Surrogate	% Recovery
017SWL0402	TCX-2	123%

Compound Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. The following guidelines were used to qualify the data:

1. No qualifications are required for positive sample results which exhibited column quantitation differences <40%. The "P" flag is removed from the result.

2. The positive sample result which exhibited a column quantitation difference >40%, but ≤100% is qualified as estimated, J.

3. The positive single component pesticide sample result which exhibited a column quantitation difference >100% and is <10X the respective compound CRQL, is qualified as non-detect, U. (All multi-component results are exempt from this rule.)

4. The positive single component pesticide sample result which exhibited a column quantitation difference >100% and >10X the respective compound CRQL, is qualified as presumptively present at an estimated concentration, NJ. (All multi-component results are exempt from this rule.)

Compound Quantitation, Continued

5. The positive multi-component pesticide sample result which exhibited a column quantitation difference > 100% and < 10X the respective multi-component CRQL is qualified as presumptively present at an estimated concentration, NJ.

The following samples and compounds have been qualified for high column quantitation %Ds.

Sample ID	Compound	%D	Lab Qual.	HESI Qual.	Ref. #
017SWL0402	Aroclor-1260	36.4%	P		1

One (1) sample was diluted to accurately quantitate target compounds. For the following sample, the results for the E-flagged compounds are replaced with the corresponding results from the dilution analysis. All other results from the dilution analysis are not used.

017SWB0404

System Performance and Overall Assessment

The data required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

NJ = Result is considered presumptively present at an estimated concentration

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWB0404 017SWB0409	ALL	+/-	J/UJ
017SWL0402	ALL	+	J
ALL	All P < 40%	+	
ALL	All P > 40% But ≤ 100%	+	J
ALL	single component pests All P > 100% And < 10X CRQL	+	U
ALL	single component pests All P > 100% And > 10X CRQL	+	NJ
ALL	multi-component pests All P> 100% And < 10X CRQL	+	NJ
017SWB0404	All E-Flagged	+E	D
017SWB0404DL	All except corresponding D-Flagged results	+/-	not used

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non-detect result

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	41214
Date:	January 6, 2000
Client Name:	Ensafe
Project/Site Name:	Charleston Zone H
Date Sampled:	November 23, 1999
Number of Samples:	5 Non-Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma, Inc.
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles and PCBs

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

for Craig G. Simpson
Paul B. Humburg, President

1-12-00
Date

4127 Plaza 94 South • St. Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# 41214

Samples and Fractions Reviewed

Sample Identifications Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		PCB	
017SWB0302	SOIL		X		X		X
017SWB0307	SOIL		X		X		X
017SWB0314	SOIL		X		X		X
017SWL0602	SOIL		X		X		X
017SWL0610	SOIL		X		X		X
Total Billable Samples (Water/Soil)		0	5	0	5	0	5

VOA= Volatiles
SVOA= Semivolatiles
PCB= PCBs

DATA ASSESSMENT NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8260B for GC/MS Volatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41214

A validation was performed on the Volatile Data from SDG 41214. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
*	•	Blanks
*	•	Internal Standard Performance
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Calibrations

The continuing calibration standard R35427.D exhibited one (1) compound with a %D greater than 20% but less than 50% for which qualifications were required. For the following samples and non-compliant compound, the reported positive results are qualified as estimated, J.

017SWL0610 acetone (39.6%)

DATA ASSESSMENT NARRATIVE
VOLATILE ORGANICS

Calibrations

The continuing calibration standard R35427.D exhibited one (1) compound with a %D greater than 90%. For the following samples and non-compliant compound, the reported positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

017SWL0314	2-chloroethyl vinyl ether (126.2%)
017SWB0307	
017SWB0610	

System Performance and Overall Assessment

The data, as reported, required qualifications/rejections.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWL0610	acetone (39.6%)	+/-	J/UJ
017SWL0314 017SWB0307 017SWB0610	2-chloroethyl vinyl ether (126.2%)	+/-	J/UR

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

SEMIVOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8270C for GC/MS Semivolatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41214

A validation was performed on the Semivolatile Data from SDG 41214. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibration
	•	Blanks
*	•	Internal Standard Performance
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Blanks

The method blank associated with the field samples in this SDG exhibited contamination for which qualifications were required. The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

Blanks (continued)

Associated blank	Compound	Concentration	Action Level
SBLK1	bis(2-ethylhexyl)phthalate	37J ug/Kg	370 ug/Kg

Samples	Compound	Qualifications
017SWB0314 017SWL0610	bis(2-ethylhexyl)phthalate	CRQL

Compound Quantitation

For the following sample, the E flagged result is not used in favor of the corresponding D flagged result reported in the dilution analysis of the sample. All other results reported in the dilution analysis are not used in favor of the results reported in the lessor dilution of the sample.

017SWB0302

System Performance and Overall Assessment

The data, as reported, required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWB0314 017SWL0610	bis(2-ethylhexyl)phthalate	+B	CRQL
017SWB0302	All E flagged compounds	+E	Do not use
017SWB0302DL	All except corresponding D flagged results	+/-	Do Not use

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

AROCLORS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance, and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Methods 8082; the National Functional Guidelines for Organic Data Validation, February 1994; and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41214

A validation was performed on the Aroclor Data from SDG 41214. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC Performance
*	•	Calibration
*	•	Blanks
	•	Surrogate Recoveries
	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Surrogate Recoveries

The samples listed below exhibited low DCB recoveries. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ.

Sample ID	Surrogate	% Recovery
017SWB0302	DCB-1	22%
017SWB0307	DCB-1/DCB-2	32%/19%
017SWB0314	DCB-1	53%
017SWL0602	DCB-1/DCB-2	23%/20%

Matrix Spike/Matrix Spike Duplicates

The MS/MSD pair of sample 017SWL0602 exhibited 0% MS and MSD recoveries for Aroclor-1260. For the following sample, the positive result is qualified as estimated, J.

017SWL0602 Aroclor-1260

Compound Quantitation

The reported concentration for Aroclor-1260 was above the calibration range of the instrument in three (3) samples. The samples were diluted. For the following samples, the results for Aroclor-1260 are replaced with the corresponding results from the dilution analysis. All other results from the dilution analysis are not used.

017SWB0302
017SWB0307
017SWL0602

System Performance and Overall Assessment

The data required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

NJ = Result is considered presumptively present at an estimated concentration

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWB0302 017SWB0307 017SWB0314 017SWL0602	ALL	+/-	J/UJ
017SWL0602	Aroclor-1260	+	J
017SWB0302 017SWB0307 017SWL0602	Aroclor-1260	+	D
017SWB0302DL 017SWB0307DL 017SWL0602DL	All except corresponding D-Flagged AR1260	+/-	not used

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non-detect result

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	41270
Date:	January 13, 2000
Client Name:	Ensafe
Project/Site Name:	Charleston Zone H
Date Sampled:	December 1, 1999
Number of Samples:	2 Non-Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma, Inc.
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles and PCBs

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Scarpa — 1-14-00.

Paul B. Humburg, President — Date

4127 Plaza 94 South • St Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# 41270

Samples and Fractions Reviewed

Sample Identifications Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		PCB	
017SWB0902	SOIL		X		X		X
017SWB0904	SOIL		X		X		X
Total Billable Samples (Water/Soil)		0	2	0	2	0	2

VOA= Volatiles
SVOA= Semivolatiles
PCB= PCBs

DATA ASSESSMENT NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8260B for GC/MS Volatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41270

A validation was performed on the Volatile Data from SDG 41270. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibration
	•	Blanks
*	•	Internal Standard Performance
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Blanks

The method blank associated with the field sample in this SDG exhibited contamination for which qualifications were required. The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

Blanks (continued)

Associated blank	Compound	Concentration	Action Level
VBLK1	methylene chloride	5J ug/Kg	50 ug/Kg

Samples	Compound	Qualifications
017SWB0902	methylene chloride	U
017SWB0904	methylene chloride	CRQL

System Performance and Overall Assessment

The data, as reported, required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWB0902	methylene chloride	+B	U
017SWB0904	methylene chloride	+B	CRQL

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

SEMIVOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8270C for GC/MS Semivolatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41270

A validation was performed on the Semivolatile Data from SDG 41270. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibration
	•	Blanks
*	•	Internal Standard Performance
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Blanks

The method blank associated with the field sample in this SDG exhibited contamination for which qualifications were required. The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

Associated blank	Compound	Concentration	Action Level
SBLK1	bis(2-ethylhexyl)phthalate	31J ug/L	310 ug/L

Blanks (continued)

Samples	Compound	Qualifications
017SWB0902 017SWB0904	bis(2-ethylhexyl)phthalate	CRQL

System Performance and Overall Assessment

The data, as reported, required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWB0902 017SWB0904	bis(2-ethylhexyl)phthalate	+B	CRQL

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

AROCLORS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance, and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Methods 8082; the National Functional Guidelines for Organic Data Validation, February 1994; and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41270

A validation was performed on the Aroclor Data from SDG 41270. The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • GC Performance
* • Calibration
* • Blanks
* • Surrogate Recoveries
* • Matrix Spike/Matrix Spike Duplicates
* • Field Duplicates
* • Compound Identification
* • Compound Quantitation

* - All criteria were met for this parameter.

System Performance and Overall Assessment

The data did not require qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

NJ = Result is considered presumptively present at an estimated concentration

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL

NO QUALIFICATIONS WERE REQUIRED.

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non-detect result

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	41298
Date:	January 13, 2000
Client Name:	Ensafe
Project/Site Name:	Charleston Zone H
Date Sampled:	December 2, 1999
Number of Samples:	2 Non-Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma, Inc.
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles and PCBs

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

for Craig G. Sexton
Paul B. Humburg, President

1-14-00
Date

4127 Plaza 94 South • St. Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# 41298

Samples and Fractions Reviewed

Sample Identifications Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		PCB	
017SWB0605	SOIL		X		X		X
017SWB0610	SOIL		X		X		X
Total Billable Samples (Water/Soil)		0	2	0	2	0	2

VOA= Volatiles
SVOA= Semivolatiles
PCB= PCBs

DATA ASSESSMENT NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8260B for GC/MS Volatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41298

A validation was performed on the Volatile Data from SDG 41298. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
*	•	Blanks
*	•	Internal Standard Performance
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Calibrations

The continuing calibration standard R35487.D exhibited one (1) compound with a %D greater than 20% but less than 50% for which qualifications were required. For the following samples and non-compliant compound, the reported positive results are qualified as estimated, J.

017SWB0605 acetone (29.7%)

The continuing calibration standard R35487.D exhibited one (1) compound with a %D greater than 50% but less than 90%. For the following samples and non-compliant compound, the reported positive and non-detect results are qualified as estimated, J/UJ.

017SWB0605 2-hexanone (51.8%)
017SWB0610

The continuing calibration standard R35487.D exhibited one (1) compound with a %D greater than 90%. For the following samples and non-compliant compound, the reported positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

017SWB0605 2-chloroethyl vinyl ether (116.7%)
017SWB0610

Surrogate Recoveries

The following sample exhibited a surrogate recovery above the QC limits. The reported positive results are qualified as estimated, J.

Sample	Surrogate	%R
017SWB0605	dibromofluoromethane	126%
	bromofluorobenzene	131%

Compound Quantitation

For the following samples, the E flagged results are not used in favor of the results reported from the dilution analyses of the samples. All other results reported from the dilution analyses are not used in favor of the results reported from the undiluted analyses.

017SWB0605
017SWB0610

System Performance and Overall Assessment

The data, as reported, required qualifications/rejections.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWB0605	acetone (29.7%)	+	J
017SWB0605 017SWB0610	2-hexanone (51.8%)	+	J/UJ
017SWB0605 017SWB0610	2-chloroethyl vinyl ether (116.7%)	+/-	J/UR
017SWB0605	All Compounds	+	J
017SWB0605 017SWB0610	All E flagged results	+E	Do Not Use
017SWB0605DL 017SWB0610DL	All except corresponding D flagged results	+/-	Do Not Use

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

SEMIVOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8270C for GC/MS Semivolatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41298

A validation was performed on the Semivolatile Data from SDG 41298. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibration
	•	Blanks
	•	Internal Standard Performance
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Blanks

One of the method blanks associated with the field samples in this SDG exhibited contamination for which qualifications were required. The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

Associated blank	Compound	Concentration	Action Level
SBLK1	naphthalene	21J ug/Kg	105 ug/Kg
	bis(2-ethylhexyl)phthalate	52 ug/Kg	520 ug/Kg

Blanks (continued)

Samples	Compound	Qualifications
017SWB0605 017SWB0610	naphthalene	CRQL
017SWB0605	bis(2-ethylhexyl)phthalate	U

Internal Standards

The following sample exhibited non-compliant EICP areas for the noted internal standard. All reported positive results associated with the non-compliant internal standard are qualified as estimated, J.

017SWB0605 naphthalene-d8

Compound Quantitation

For the following samples, the E flagged results are not used in favor of the results reported from the dilution analyses of the samples. All other results reported from the dilution analyses are not used in favor of the results reported from the undiluted analyses.

017SWB0605
017SWB0610

System Performance and Overall Assessment

The data, as reported, required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWB0605 017SWB0610	naphthalene	+B	CRQL
017SWB0605	bis(2-ethylhexyl)phthalate	+B	U
017SWB0605	*All associated with* naphthalene-d8	+	J
017SWB0605 017SWB0610	All E flagged results	+E	Do Not Use
017SWB0605DL 017SWB0610DL	All except corresponding D flagged results	+/-	Do Not Use

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

AROCLORS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance, and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Methods 8082; the National Functional Guidelines for Organic Data Validation, February 1994; and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41298

A validation was performed on the Aroclor Data from SDG 41298. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC Performance
*	•	Calibration
*	•	Blanks
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Surrogate Recoveries

The sample listed below exhibited a high TCX recovery. The positive results are qualified as estimated, J.

Sample ID	Surrogate	% Recovery
017SWB0610	TCX-1	116%

Compound Quantitation

In sample 017SWB0605, the reported concentration for Aroclor-1260 was above the calibration range of the instrument but not flagged E by the laboratory. The sample was diluted. For the following sample, the result for Aroclor-1260 is replaced with the corresponding result from the dilution analysis. All other results from the dilution analysis are not used.

017SWB0605

System Performance and Overall Assessment

The data required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

NJ = Result is considered presumptively present at an estimated concentration

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWB0610	ALL	+	J
017SWB0605	Aroclor-1260	+	D
017SWB0605DL	All except corresponding D-Flagged AR1260	+/-	not used

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non-detect result

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	41309
Date:	January 24, 2000
Client Name:	Ensafe
Project/Site Name:	Charleston Zone H
Date Sampled:	December 3, 1999
Number of Samples:	2 Non-Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma, Inc.
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles and PCBs

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Simpson
Paul B. Humburg, President

1-27-00.
Date

4127 Plaza 94 South • St Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# 41309

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		PCB	
017SWD040~~8~~9	SOIL		X		X		X
017SWD0422	SOIL		X		X		X
Total Billable Samples (Water/Soil)		0	2	0	2	0	2

VOA= Volatiles
SVOA= Semivolatiles
PCB= PCBs

DATA ASSESSMENT NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8260B for GC/MS Volatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41309

A validation was performed on the Volatile Data from SDG 41309. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
*	•	Blanks
	•	Internal Standard Performance
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Calibrations

The continuing calibration standard R35501.D exhibited one (1) compound with a %D greater than 90%. For the following samples and non-compliant compound, the reported non-detect result is rejected, UR.

017SWD0407	2-chloroethyl vinyl ether (121.4%)
017SWD0422	

Internal Standards

The following sample exhibited non-compliant EICP area recoveries below the QC limits for the noted internal standards. All reported positive and non-detect results are qualified as estimated, J/UJ.

017SWD0407	chlorobenzene-d5 1,4-dichlorobenzene-d4
017SWD0422	All internal standards

Surrogate Recoveries

The following samples exhibited surrogate recoveries above the QC limits and below 10%. The reported positive results are qualified as estimated, J. The reported non-detect results are not used in favor of the results reported from the dilution analysis.

Sample	Surrogate	%R
017SWD0407	dibromofluorobenzene	126%
	toluene-d8	312%
	bromofluorobenzene	6%

The following samples exhibited surrogate recoveries below the QC limits. The reported positive and non-detect results are qualified as estimated, J/UJ.

017SWD0407DL	dibromofluorobenzene	70%
	1,2-dichloroethane-d4	59%
	toluene-d8	69%
	bromofluorobenzene	69%

Compound Quantitation

For the following sample, the reported E flagged results are not used in favor of the corresponding D flagged results reported from the dilution analysis of the samples where a corresponding dilution result is present. All other results in the dilution analysis are not used in favor of the results reported from the undiluted analysis.

017SWD0407
017SWD0422

For the following sample and noted compound, the reported E flagged results are qualified as estimated, J. The compounds were diluted out of the corresponding dilution and a lessor dilution was not analyzed to accurately quantitate the compounds. The compounds should be considered biased high.

017SWD0407	ethylbenzene
	xylene (total)
	benzene

For the following sample, do not use the reported non-detect results in favor of the non-detect results reported from the dilution analysis. The undiluted analysis exhibited a surrogate recovery less than 10%. The dilution analysis exhibited improved surrogate recoveries (< the QC limit but > 10%).

017SWD0407	All non-detect results

System Performance and Overall Assessment

The data, as reported, required qualifications/rejections.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWD0407 017SWD0422	2-chloroethyl vinyl ether (121.4%)	-	UR
017SWD0407	*All associated with* chlorobenzene-d5 1,4-dichlorobenzene-d4	+	J
017SWD0422	All internal standards	+/-	J/UJ
017SWD0407	All compounds	+	J
017SWD0407DL	All Compounds	+/-	J/UJ
017SWD0407 017SWD0422	E flagged results with corresponding D flagged results	+E	Do Not Use
017SWD0407	ethylbenzene xylene (total) benzene	+E	J
017SWD0407	All non-detect results	-	Do Not Use

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

SEMIVOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8270C for GC/MS Semivolatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41309

A validation was performed on the Semivolatile Data from SDG 41309. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
*	•	Blanks
	•	Internal Standard Performance
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Calibrations

The continuing calibration standard T9120803.D exhibited three (3) compounds with %Ds greater than 50% but less than 90%. For the following samples and non-compliant compounds, the reported positive and non-detect results are qualified as estimated, J/UJ.

017SWD0422	indeno(1,2,3-cd)pyrene (54%)
017SWD0407	dibenz(a,h)anthracene (55.8%)
	benzo(g,h,i)perylene (65.6%)

Internal Standards

The following samples exhibited non-compliant EICP area recoveries below the QC limits for the noted internal standards. All reported positive and non-detect results are qualified as estimated, J/UJ.

017SWD0407	chrysene-d12
	perylene-d12

Compound Quantitation

For the following sample, the E flagged result is not used in favor of the corresponding D flagged result reported in the dilution analysis of the sample. All other results reported in the dilution analysis are not used in favor of the results reported in the lessor dilution of the sample.

017SWD0407

System Performance and Overall Assessment

The data, as reported, required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWD0422 017SWD0407	indeno(1,2,3-cd)pyrene (54%) dibenz(a,h)anthracene (55.8%) benzo(g,h,i)perylene (65.6%)	+/-	J/UJ
017SWD0407	*All associated with* chrysene-d12 perylene-d12	+/-	J/UJ
017SWD0407	All E flagged results	+E	Do Not Use
017SWD0407DL	All except corresponding D flagged results	+/-	Do Not use

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

AROCLORS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance, and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Methods 8082; the National Functional Guidelines for Organic Data Validation, February 1994; and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41309

A validation was performed on the Aroclor Data from SDG 41309. The data was evaluated based on the following parameters:

- * Data Completeness
- * Holding Times
- * GC Performance
- * Calibration
- * Blanks
- * Surrogate Recoveries
- * Matrix Spike/Matrix Spike Duplicates
- * Field Duplicates
- * Compound Identification
- Compound Quantitation

* - All criteria were met for this parameter.

Compound Quantitation

Two (2) samples were diluted to accurately quantitate target compounds. For the following samples, the results for Aroclor 1260 are replaced with the corresponding results from the dilution analysis. All other results from the dilution analysis are not used.

017SWD0407
017SWD0422

System Performance and Overall Assessment

The data required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

NJ = Result is considered presumptively present at an estimated concentration

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWD0407 017SWD0422	Aroclor-1260	+	D
017SWD0407DL 017SWD0422DL	All except corresponding D-Flagged AR1260	+/-	not used

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non-detect result

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	41343
Date:	January 24, 2000
Client Name:	Ensafe
Project/Site Name:	Charleston Zone H
Date Sampled:	December 4 - 6, 1999
Number of Samples:	4 Non-Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma, Inc.
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles and PCBs

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Scarfone
for Paul B. Humburg, President

1-27-00.
Date

4127 Plaza 94 South • St Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# 41343

Samples and Fractions Reviewed

Sample Identifications Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		PCB	
017SWB0504	SOIL	[illegible]	X	[illegible]	X	[illegible]	X
017SWB0806	SOIL	[illegible]	[illegible]	[illegible]	X	[illegible]	X
017SWD0206	SOIL	[illegible]	[illegible]	[illegible]	X	[illegible]	X
017SWL0708	SOIL	[illegible]	[illegible]	[illegible]	X	[illegible]	X
Total Billable Samples (Water/Soil)		0	1	0	4	0	4

VOA= Volatiles
SVOA= Semivolatiles
PCB= PCBs

DATA ASSESSMENT NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8260B for GC/MS Volatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41343

A validation was performed on the Volatile Data from SDG 41343. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
*	•	Blanks
*	•	Internal Standard Performance
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Calibrations

The continuing calibration standard R35501.D exhibited one (1) compound with a %D greater than 90%. For the following samples and non-compliant compound, the reported non-detect result is rejected, UR.

017SWB0504 2-chloroethyl vinyl ether (121.4%)

Compound Quantitation

For the following sample, the reported E flagged results are not used in favor of the corresponding D flagged results reported from the dilution analysis of the samples where a corresponding dilution result is present. All other results in the dilution analysis are not used in favor of the results reported from the undiluted analysis.

017SWB0504

For the following sample and noted compound, the reported E flagged result is qualified as estimated, J. The compound was diluted out of the corresponding dilution and a lessor dilution was not analyzed to accurately quantitate the compound. The compound should be considered biased high.

017SWB0504 benzene

System Performance and Overall Assessment

The data, as reported, required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWB0504	2-chloroethyl vinyl ether (121.4%)	+/-	J/UR
017SWB0504	E flagged results with corresponding D flagged results	+E	Do Not Use
017SWB0504DL	All except corresponding D flagged results	+/-	Do Not Use
017SWB0504	benzene	+E	J

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

SEMIVOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8270C for GC/MS Semivolatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41343

A validation was performed on the Semivolatile Data from SDG 41343. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibration
	•	Blanks
	•	Internal Standard Performance
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Blanks

The method blank associated with the field samples in this SDG exhibited contamination for which qualifications were required. The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

Associated blank	Compound	Concentration	Action Level
SBLK	bis(2-ethylhexyl)phthalate	43J ug/Kg	430 ug/Kg

Samples	Compound	Qualifications
017SWB0806 017SWD0206 017SWL0708	bis(2-ethylhexyl)phthalate	CRQL

Internal Standards

The following samples exhibited non-compliant EICP area recoveries below the QC limits for the noted internal standards. All reported positive and non-detect results are qualified as estimated, J/UJ.

017SWB0504	phenanthrene-d10 chrysene-d12 perylene-d12
017SWL0708	perylene-d12

Compound Quantitation

For the following samples, the E flagged result is not used in favor of the corresponding D flagged result reported in the dilution analysis of the samples. All other results reported in the dilution analysis are not used in favor of the results reported in the lessor dilution of the samples.

017SWB0504
017SWL0708

System Performance and Overall Assessment

The data, as reported, required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWB0806 017SWD0206 017SWL0708	bis(2-ethylhexyl)phthalate	+B	CRQL
017SWB0504	*All associated with* phenanthrene-d10 chrysene-d12 perylene-d12	+/-	J/UJ
017SWL0708	perylene-d12		
017SWB0504 017SWL0708	All E flagged results	+E	Do Not Use
017SWB0504DL 017SWL0708DL	All except corresponding D flagged results	+/-	Do Not use

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

AROCLORS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance, and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Methods 8082; the National Functional Guidelines for Organic Data Validation, February 1994; and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41343

A validation was performed on the Aroclor Data from SDG 41343. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC Performance
*	•	Calibration
*	•	Blanks
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Surrogate Recoveries

The sample listed below exhibited low DCB recoveries. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ.

Sample ID	Surrogate	% Recovery
017SWL0708	DCB-1/DCB-2	31%/29%

The sample listed below exhibited a high TCX recovery. The positive results are qualified as estimated, J.

Sample ID	Surrogate	% Recovery
017SWB0504	TCX-2	130%

Compound Quantitation

Two (2) samples were diluted to accurately quantitate target compounds. For the following samples, the results for Aroclor 1260 are replaced with the corresponding results from the dilution analysis. All other results from the dilution analysis are not used.

017SWB0806
017SWD0206

System Performance and Overall Assessment

The data required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

NJ = Result is considered presumptively present at an estimated concentration

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWL0708	ALL	+/-	J/UJ
017SWB0504	ALL	+	J
017SWB0806 017SWD0206	Aroclor-1260	+	D
017SWB0806DL 017SWD0206DL	All except corresponding D-Flagged AR1260	+/-	not used

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non-detect result

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	41520
Date:	January 28, 2000
Client Name:	Ensafe
Project/Site Name:	Charleston Zone H
Date Sampled:	December 16, 1999
Number of Samples:	3 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma, Inc.
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, and PCBs

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Sewfass

Paul B. Humburg, President

2-3-00.

Date

4127 Plaza 94 South • St. Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# 41520

Samples and Fractions Reviewed

Sample Identifications Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		PCB	
017GWT0201	WATER	X		X		X	
017HWT0201	WATER	X		X		X	
017TWT0201	WATER	X					
Total Billable Samples (Water/Soil)		3	0	2	0	2	0

VOA= Volatiles
SVOA= Semivolatiles
PCB= PCBs

DATA ASSESSMENT AND NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW846 Method 8260B; the National Functional Guidelines for Organic Data Review, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 41520

A validation was performed on the Volatile Data from SDG 41520. The data was evaluated based on the following parameters.

* Data Completeness
* Holding Times
* GC/MS Tuning
  Calibrations
* Internal Standard Performance
* Blanks
  Surrogate Recoveries
* Laboratory Control Samples
* Matrix Spike/Matrix Spike duplicate
* Field Duplicates
  Compound Identification/Quantitation

* - All criteria were met for this parameter

DATA ASSESSMENT AND NARRATIVE

VOLATILE ANALYSIS

Continuing Calibration

The continuing calibration, I54582.D, contained compounds with %Ds greater than 50% and less than 90%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects as estimated (UJ).

017GWT0201RE	2-chloroethyl vinyl ether (70.6%)
017HWT0201RE	

Surrogates

Samples 017GWT0201RE and 017HWT0201RE exhibited low surrogate recoveries for toluene-d8 (86% and 83%, lower limit 88%). Qualify all results for these samples as estimated (J/UJ).

Compound Identification/Quantitation

Do not use sample 017GWT0201 and 017HWT0201, in favor of the re- analysis, due to non compliant surrogate recoveries.

System Performance and Overall Assessment

The data as presented requires qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 10X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017GWT0201RE 017HWT0201RE	2-chloroethyl vinyl ether	+/-	J/UJ
017GWT0201RE 017HWT0201RE	all results	+/-	J/UJ
017GWT0201 017HWT0201	all results	+/-	do not use

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT AND NARRATIVE

SEMIVOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW846 Method 8270C; the National Functional Guidelines for Organic Data Review, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 41520

A validation was performed on the Semivolatile Data from SDG 41520. The data was evaluated based on the following parameters.

* Data Completeness
* Holding Times
* GC/MS Tuning
* Calibrations
* Internal Standard Performance
  Blanks
* Surrogate Recoveries
* Laboratory Control Samples
* Matrix Spike/Matrix Spike duplicate
* Field Duplicates
* Compound Identification/Quantitation

* - All criteria were met for this parameter

Blank

The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

Method Blank

Associated blank	Compound	Concentration	Action Level
SBLK1	bis(2-ethylhexyl)phthalate	1J ug/L	10 ug/L

Samples	Compound	Qualification
017GWT0201 017HWT0201	bis(2-ethylhexyl)phthalate	CRQL

System Performance and Overall Assessment

The data as presented requires qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 10X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017GWT0201 017HWT0201	bis(2-ethylhexyl)phthalate	+	CRQL

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

AROCLORS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance, and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Methods 8082; the National Functional Guidelines for Organic Data Validation, February 1994; and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41520

A validation was performed on the Aroclor Data from SDG 41520. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC Performance
*	•	Calibration
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

System Performance and Overall Assessment

The data did not require qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

NJ = Result is considered presumptively present at an estimated concentration

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL

NO QUALIFICATIONS WERE REQUIRED.

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non-detect result

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	41531
Date:	January 28, 2000
Client Name:	Ensafe
Project/Site Name:	Charleston Zone H
Date Sampled:	December 17, 1999
Number of Samples:	7 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma, Inc.
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, and PCBs

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Seufass
for Paul B. Humburg, President

2-3-00.
Date

4127 Plaza 94 South • St Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# 41531

Samples and Fractions Reviewed

Sample Identifications Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		PCB	
017GWB0501	WATER	X		X		X	
017GWB0601	WATER	X		X		X	
017GWB0801	WATER	X		X		X	
017GWB0901	WATER	X		X		X	
017GWT0101	WATER	X		X		X	
017HWT0101	WATER	X					
017GWT0301	WATER	X		X		X	
Total Billable Samples (Water/Soil)		7	0	6	0	6	0

VOA= Volatiles
SVOA= Semivolatiles
PCB= PCBs

DATA ASSESSMENT AND NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW846 Method 8260B; the National Functional Guidelines for Organic Data Review, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 41531

A validation was performed on the Volatile Data from SDG 41531. The data was evaluated based on the following parameters.

* Data Completeness
* Holding Times
* GC/MS Tuning
  Calibrations
  Internal Standard Performance
* Blanks
* Surrogate Recoveries
* Laboratory Control Samples
* Matrix Spike/Matrix Spike duplicate
* Field Duplicates
  Compound Identification/Quantitation

* - All criteria were met for this parameter

DATA ASSESSMENT AND NARRATIVE

VOLATILE ANALYSIS

Initial Calibration

The initial calibration, analyzed on 12-21-99, contained compounds with RRFs less than 0.050 and correlation coefficients less than 0.850. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects as rejected (UR).

017GWB0801	acetone (0.036)
017GWT0101	bromomethane (0.776)
	chloroethane (0.719)

Continuing Calibration

The continuing calibration, I54582.D, contained compounds with %Ds greater than 50% and less than 90%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects as estimated (UJ).

017HWT0101	2-chloroethyl vinyl ether (70.6%)
017GWB0501	

The continuing calibration, N37823.D, contained compounds with RRFs less than 0.050. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects as rejected (UR).

017GWT0301	acetone (0.036)
017GWB0901	

The continuing calibration, N37823.D, contained compounds with %Ds greater than 50% and less than 90%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects as estimated (UJ).

017GWT0301	2-butanone (52.1%)
017GWB0901	2-chloroethyl vinyl ether (64.8%)
	4-methyl-2-pentanone (55.4%)

DATA ASSESSMENT AND NARRATIVE

VOLATILE ANALYSIS

Continuing Calibration

The continuing calibration, UL11253.D, contained compounds with %Ds greater than 50% and less than 90%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects as estimated (UJ).

017GWB0601	acetone (51.5%)

Internal Standards

Sample 017GWB0601 exhibited low internal standard area recoveries for 1,4-dichlorobenzene-d4. Qualify all associated compounds as estimated (J/UJ).

Compound Identification/Quantitation

Do not use sample 017GWB0601RE, in favor of the initial analysis, due to non compliant internal standard area recoveries.

Do not use the E-flagged compound results in sample 017GWB0501 in favor of the D-flagged compound results in the dilution.

System Performance and Overall Assessment

The data as presented requires qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 10X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017GWB0801 017GWT0101	acetone bromomethane chloroethane	+/-	J/UJ
017HWT0101 017GWB0501	2-chloroethyl vinyl ether	+/-	J/UJ
017GWT0301 017GWB0901	acetone	+/-	J/UR
017GWT0301 017GWB0901	2-butanone 2-chloroethyl vinyl ether 4-methyl-2-pentanone	+/-	J/UJ
017GWB0601	acetone	+/-	J/UJ
017GWB0601	*All Associated Compounds* 1,4-dichlorobenzene-d4	+/-	J/UJ
017GWB0601RE	all results	+/-	do not use
017GWB0501	all E-flagged compounds	+	do not use
017GWB0501DL	all results except D-flagged compounds	+/-	do not use

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT AND NARRATIVE

SEMIVOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW846 Method 8270C; the National Functional Guidelines for Organic Data Review, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 41531

A validation was performed on the Semivolatile Data from SDG 41531. The data was evaluated based on the following parameters.

* Data Completeness
* Holding Times
* GC/MS Tuning
* Calibrations
* Internal Standard Performance
* Blanks
* Surrogate Recoveries
* Laboratory Control Samples
* Matrix Spike/Matrix Spike duplicate
* Field Duplicates
  Compound Identification/Quantitation

* - All criteria were met for this parameter

Compound Identification/Quantitation

Do not use E-flagged compound results for sample 017GWB0601 in favor of the D-flagged compound results in the dilution.

System Performance and Overall Assessment

The data as presented requires qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 10X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017GWB0601	all E-flagged compound results	+	do not use
017GWB0601DL	all results except D-flagged compounds	+/-	do not use

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

AROCLORS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance, and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Methods 8082; the National Functional Guidelines for Organic Data Validation, February 1994; and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41531

A validation was performed on the Aroclor Data from SDG 41531. The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • GC Performance
* • Calibration
* • Blanks
* • Surrogate Recoveries
* • Matrix Spike/Matrix Spike Duplicates
* • Field Duplicates
* • Compound Identification
* • Compound Quantitation

* - All criteria were met for this parameter.

System Performance and Overall Assessment

The data did not require qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

NJ = Result is considered presumptively present at an estimated concentration

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL

NO QUALIFICATIONS WERE REQUIRED.

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non-detect result

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	41554
Date:	January 31, 2000
Client Name:	Ensafe
Project/Site Name:	Charleston Zone H
Date Sampled:	December 20, 1999
Number of Samples:	6 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma, Inc.
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles and PCBs

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Scogoss — 2-3-00.

Paul B. Humburg, President — Date

4127 Plaza 94 South • St. Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# 41554

Samples and Fractions Reviewed

Sample Identifications Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		PCB	
017GWB0201	WATER	X		X		X	
017GWB0401	WATER	X		X		X	
017GWO0101	WATER	X		X		X	
017GWO0201	WATER	X		X		X	
017HWO0201	WATER	X		X		X	
017TWO0201	WATER	X					
Total Billable Samples (Water/Soil)		6	0	5	0	5	0

VOA= Volatiles
SVOA= Semivolatiles
PCB= PCBs

DATA ASSESSMENT AND NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW846 Method 8260B; the National Functional Guidelines for Organic Data Review, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 41554

A validation was performed on the Volatile Data from SDG 41554. The data was evaluated based on the following parameters.

* Data Completeness
* Holding Times
* GC/MS Tuning
  Calibrations
* Internal Standard Performance
* Blanks
* Surrogate Recoveries
* Laboratory Control Samples
  Matrix Spike/Matrix Spike duplicate
* Field Duplicates
* Compound Identification/Quantitation

* - All criteria were met for this parameter

Continuing Calibration

The continuing calibration, I54582.D, contained compounds with %Ds greater than 50% and less than 90%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects as estimated (UJ).

017GWB0401	2-chloroethyl vinyl ether (70.6%)

The continuing calibration, UL11253.D, contained compounds with %Ds greater than 50% and less than 90%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects as estimated (UJ).

017GWB0201	acetone (51.5%)

Matrix Spike/Matrix Spike duplicate

The matrix spike and matrix spike duplicate for sample 017GWB0201 exhibited zero percent recovery for 2-chloroethyl vinyl ether. Qualify the sample 017GWB0201 non detect for compound 2-chloroethyl vinyl ether as rejected (UR).

System Performance and Overall Assessment

The data as presented requires qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 10X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017GWB0401	2-chloroethyl vinyl ether	+/-	J/UJ
017GWB0201	acetone	+/-	J/UJ
017GWB0201	2-chloroethyl vinyl ether	-	UR

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT AND NARRATIVE

SEMIVOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW846 Method 8270C; the National Functional Guidelines for Organic Data Review, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 41554

A validation was performed on the Semivolatile Data from SDG 41554. The data was evaluated based on the following parameters.

* Data Completeness
* Holding Times
* GC/MS Tuning
* Calibrations
* Internal Standard Performance
  Blanks
* Surrogate Recoveries
* Laboratory Control Samples
* Matrix Spike/Matrix Spike duplicate
* Field Duplicates
  Compound Identification/Quantitation

* - All criteria were met for this parameter

Blank

The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

Method Blank

Associated blank	Compound	Concentration	Action Level
SBLK1	bis(2-ethylhexyl)phthalate	1J ug/L	10 ug/L

Samples	Compound	Qualification
017GWO0101	bis(2-ethylhexyl)phthalate	CRQL
017GWO0201		
017HWO0201		
017GWB0401		
017GWB0201		

Compound Identification/Quantitation

Do not use E-flagged compound results for sample 017GWB0401, in favor of the D-flagged compound results in the dilution.

System Performance and Overall Assessment

The data as presented requires qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 10X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017GWO0101 017GWO0201 017HWO0201 017GWB0401 017GWB0201	bis(2-ethylhexyl)phthalate	+	CRQL
017GWB0401	all E-flagged compounds	+	do not use
017GWB040DL	all results except D-flagged compounds	+/-	do not use

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

AROCLORS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance, and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Methods 8082; the National Functional Guidelines for Organic Data Validation, February 1994; and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41554

A validation was performed on the Aroclor Data from SDG 41554. The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • GC Performance
* • Calibration
* • Blanks
* • Surrogate Recoveries
* • Matrix Spike/Matrix Spike Duplicates
* • Field Duplicates
* • Compound Identification
* • Compound Quantitation

* - All criteria were met for this parameter.

System Performance and Overall Assessment

The data did not require qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

NJ = Result is considered presumptively present at an estimated concentration

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL

NO QUALIFICATIONS WERE REQUIRED.

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non-detect result

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	41565
Date:	January 31, 2000
Client Name:	Ensafe
Project/Site Name:	Charleston Zone H
Date Sampled:	December 21, 1999
Number of Samples:	7 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma, Inc.
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles and PCBs

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Safer
for Paul B. Humburg, President

2-3-00.
Date

4127 Plaza 94 South • St. Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# 41565

Samples and Fractions Reviewed

Sample Identifications Analytical Fraction

ENSAFE ID	MATRIX	VOA		SVOA		PCB	
017GW00206	WATER	X					
017GW00506	WATER	X					
017GWB0101	WATER	X		X		X	
017GWL0601	WATER	X		X		X	
017TWL0601	WATER	X					
017GWW0301	WATER	X		X			
017GWW0401	WATER	X		X			
Total Billable Samples (Water/Soil)		7	0	4	0	2	0

VOA= Volatiles
SVOA= Semivolatiles
PCB= PCBs

DATA ASSESSMENT AND NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW846 Method 8260B; the National Functional Guidelines for Organic Data Review, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 41565

A validation was performed on the Volatile Data from SDG 41565. The data was evaluated based on the following parameters.

* Data Completeness
* Holding Times
* GC/MS Tuning
  Calibrations
  Internal Standard Performance
* Blanks
* Surrogate Recoveries
* Laboratory Control Samples
  Matrix Spike/Matrix Spike duplicate
* Field Duplicates
  Compound Identification/Quantitation

* - All criteria were met for this parameter

Continuing Calibration

The continuing calibration, UL11253.D, contained compounds with %Ds greater than 50% and less than 90%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects as estimated (UJ).

017GW00206 acetone (51.5%)

Internal Standards

Sample 017GW00206 exhibited low internal standard area recoveries for pentafluorobenzene. Qualify all associated compounds as estimated (J/UJ).

Matrix Spike/Matrix Spike duplicate

The matrix spike and matrix spike duplicate for sample 017GW00506 exhibited low percent recovery for 2-chloroethyl vinyl ether (0% and 24%). Qualify the sample 017GW00506 non detect for compound 2-chloroethyl vinyl ether as rejected (UR).

Compound Identification/Quantitation

Do not use E-flagged compound results for sample 017GW00206 in favor of the D-flagged compound results in the dilution.

System Performance and Overall Assessment

The data as presented requires qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 10X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017GW00206	acetone	+/-	J/UJ
017GW00206	*All Associated Compounds* pentafluorobenzene	+/-	J/UJ
017GW00506	2-chloroethyl vinyl ether	-	UR
017GW00206	all E-flagged compounds	+	do not use
017GW00206DL	all results except D-flagged compounds	+/-	do not use

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT AND NARRATIVE

SEMIVOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW846 Method 8270C; the National Functional Guidelines for Organic Data Review, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 41565

A validation was performed on the Semivolatile Data from SDG 41565. The data was evaluated based on the following parameters.

* Data Completeness
* Holding Times
* GC/MS Tuning
* Calibrations
* Internal Standard Performance
  Blanks
* Surrogate Recoveries
* Laboratory Control Samples
* Matrix Spike/Matrix Spike duplicate
* Field Duplicates
* Compound Identification/Quantitation

* - All criteria were met for this parameter

Blank

The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

Method Blank

Associated blank	Compound	Concentration	Action Level
SBLK1	bis(2-ethylhexyl)phthalate	2J ug/L	20 ug/L

Samples	Compound	Qualification
017GWL0601	bis(2-ethylhexyl)phthalate	U
017GWB0101	bis(2-ethylhexyl)phthalate	CRQL

System Performance and Overall Assessment

The data as presented requires qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 10X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017GWL0601	bis(2-ethylhexyl)phthalate	+	U
017GWB0101	bis(2-ethylhexyl)phthalate	+	CRQL

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

AROCLORS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance, and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Methods 8082; the National Functional Guidelines for Organic Data Validation, February 1994; and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41565

A validation was performed on the Aroclor Data from SDG 41565. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC Performance
*	•	Calibration
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

System Performance and Overall Assessment

The data did not require qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

NJ = Result is considered presumptively present at an estimated concentration

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL

NO QUALIFICATIONS WERE REQUIRED.

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non-detect result

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	41629
Date:	January 31, 2000
Client Name:	Ensafe
Project/Site Name:	Charleston Zone H
Date Sampled:	January 3, 2000
Number of Samples:	5 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma, Inc.
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Scarfass
Paul B. Humburg, President

2-3-00.
Date

4127 Plaza 94 South • St. Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# 41629

Samples and Fractions Reviewed

Sample Identifications Analytical Fraction

ENSAFE ID	MATRIX	VOA	
017GW00406	WATER	X	
017GW00902	WATER	X	
017GW01002	WATER	X	
017TW01002	WATER	X	
017GWW0101	WATER	X	
Total Billable Samples (Water/Soil)		5	0

VOA= Volatiles

DATA ASSESSMENT AND NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW846 Method 8260B; the National Functional Guidelines for Organic Data Review, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 41629

A validation was performed on the Volatile Data from SDG 41629. The data was evaluated based on the following parameters.

* Data Completeness
* Holding Times
* GC/MS Tuning
  Calibrations
* Internal Standard Performance
  Blanks
* Surrogate Recoveries
* Laboratory Control Samples
* Matrix Spike/Matrix Spike duplicate
* Field Duplicates
* Compound Identification/Quantitation

* - All criteria were met for this parameter

DATA ASSESSMENT AND NARRATIVE

VOLATILE ANALYSIS

Initial Calibration

The initial calibration, analyzed on 01-06-00, contained compounds with %Ds greater than 15% and less than 90%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J).

017GW00406	acetone (29.5%)
017GW00902	
017GW01002	
017GWW0101	

Continuing Calibration

The continuing calibration, K30781.D, contained compounds with %Ds greater than 90%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects as rejected (UR).

017GW01002	bromomethane (93.1%)
017GWW0101	chloroethane (110.9%)
017GW00406	
017GW00902	

Blank

The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

Trip Blank

Associated blank	Compound	Concentration	Action Level
017TW01002	methylene chloride	14 ug/L	140 ug/L

Samples	Compound	Qualification
017GW00406	methylene chloride	U
017GW00902		
017GW01002		
017GWW0101		

DATA ASSESSMENT AND NARRATIVE

VOLATILE ANALYSIS

PAGE - 3

System Performance and Overall Assessment

The data as presented requires qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 10X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017GW00406	acetone	+	J
017GW00902			
017GW01002			
017GWW0101			
017GW01002	bromomethane	+/-	J/UR
017GWW0101	chloroethane		
017GW00406			
017GW00902			
017GW00406	methylene chloride	+	U
017GW00902			
017GW01002			
017GWW0101			

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	41644
Date:	February 7, 2000
Client Name:	Ensafe
Project/Site Name:	Charleston - Zone H
Date Sampled:	January 4, 2000
Number of Samples:	7 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Sengoss
Paul B. Humburg, President

2-8-00.
Date

4127 Plaza 94 South • St. Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# 41644

Samples and Fractions Reviewed

Sample Identifications Analytical Fraction

ENSAFE ID	MATRIX	VOA	
017GW00606	WATER	X	
017HW00606	WATER	X	
017TW00606	WATER	X	
017EW00606	WATER	X	
017GW00702	WATER	X	
017GW00802	WATER	X	
017GWW0201	WATER	X	
Total Billable Samples (Water/Soil)		7	0

VOA= Volatiles

DATA ASSESSMENT NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8260B for GC/MS Volatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41644

A validation was performed on the Volatile Data from SDG 41644. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibration
*	•	Blanks
*	•	Internal Standard Performance
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

System Performance and Overall Assessment

The data, as reported, did not require qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL

NO QUALIFICATIONS WERE REQUIRED

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	41893
Date:	February 17, 2000
Client Name:	Ensafe
Project/Site Name:	Charleston Zone H
Date Sampled:	January 26, 2000
Number of Samples:	2 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Simpson
for Paul B. Humburg, President

2-21-00.
Date

4127 Plaza 94 South • St. Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# 41893

Samples and Fractions Reviewed

Sample Identifications Analytical Fraction

ENSAFE ID	MATRIX	VOA	
017GW00106	WATER	X	
017GW00306	WATER	X	
Total Billable Samples (Water/Soil)		2	0

VOA= Volatiles

DATA ASSESSMENT NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8260B for GC/MS Volatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41893

A validation was performed on the Volatile Data from SDG 41893. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibration
*	•	Blanks
*	•	Internal Standard Performance
*	•	Surrogate Recoveries
	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Matrix Spike/Matrix Spike Duplicates

The MS/MSD pair of the following sample exhibited 0% recoveries for the noted compound. The reported non-detect result in the sample is rejected (UR).

017GW00106 2-chloroethyl vinyl ether

System Performance and Overall Assessment

The data, as reported, required qualifications/rejections

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017GW00106	2-chloroethyl vinyl ether	-	UR

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVES

DATA ASSESSMENT NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8260B for GC/MS Volatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41186

A validation was performed on the Volatile Data from SDG 41186. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
*	•	Blanks
*	•	Internal Standard Performance
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Calibrations

The continuing calibration standard R35391.D exhibited one (1) compound with a %D greater than 25% but less than 50% for which qualifications were required. For the following samples and non-compliant compound, the reported positive results are qualified as estimated, J.

017SWB0211	4-methyl-2-pentanone (38.1%)

System Performance and Overall Assessment

The data, as reported, required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWB0211	4-methyl-2-pentanone (38.1%)	+	J

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

SEMIVOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8270C for GC/MS Semivolatiles; the National Functional Guidelines for Organic Data Validation, 2/94, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41186

A validation was performed on the Semivolatile Data from SDG 41186. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibration
*	•	Blanks
	•	Internal Standard Performance
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Internal Standards

The following samples exhibited non-compliant EICP area recoveries below the QC limits for the noted internal standards. All reported positive and non-detect results are qualified as estimated, J/UJ.

017SWL0206	phenanthrene-d10
	chrysene-d12
	perylene-d12

Compound Quantitation

For the following sample, the reported results are not used in favor of the results reported from the original analyses of the sample. Both analyses of the sample exhibited similar internal standard area recoveries.

017SWL0206RE

System Performance and Overall Assessment

The data, as reported, required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
017SWL0206	*All associated with* phenanthrene-d10 chrysene-d12 perylene-d12	+/-	J/UJ
017SWL0206RE	All Compounds	+/-	Do Not Use

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
+ in the DL column denotes a positive result
- in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

AROCLORS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance, and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Methods 8082; the National Functional Guidelines for Organic Data Validation, February 1994; and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 41186

A validation was performed on the Aroclor Data from SDG 41186. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC Performance
*	•	Calibration
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

System Performance and Overall Assessment

The data did not require qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

NJ = Result is considered presumptively present at an estimated concentration

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL

NO QUALIFICATIONS WERE REQUIRED.

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non-detect result

APPENDIX C
TABLE 1 - QUALIFIED ANALYTICAL DATA - SURFACE SOILS (INORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent (mg/kg)	196SB00101			196SB00201			196SB00301			196SB00401		
	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Inorganics												
Cyanide (CN)	0.1800	U	0.0900	0.1600	U	0.0800	0.1700	U	0.0850	0.1700	U	0.0850
Aluminum (Al)	7570.0000		7570.0000	9040.0000		9040.0000	6520.0000		6520.0000	7250.0000		7250.0000
Antimony (Sb)	0.3200	UJ	0.1600	0.3000	UJ	0.1500	2.8000	J	2.8000	46.3000	J	46.3000
Arsenic (As)	6.6000		6.6000	3.4000		3.4000	4.2000		4.2000	9.9000		9.9000
Barium (Ba)	20.7000		20.7000	48.5000		48.5000	33.9000		33.9000	139.0000		139.0000
Beryllium (Be)	0.2500	J	0.2500	0.4700	J	0.4700	0.3500	J	0.3500	0.6100		0.6100
Cadmium (Cd)	0.0400	U	0.0200	0.0300	U	0.0150	0.3400	J	0.3400	2.5000	J	2.5000
Calcium (Ca)	4520.0000	J	4520.0000	1250.0000	J	1250.0000	25700.0000	J	25700.0000	21100.0000	J	21100.0000
Chromium (Cr)	18.5000		18.5000	10.8000		10.8000	15.1000		15.1000	53.1000		53.1000
Cobalt (Co)	0.8700	J	0.8700	1.7000	J	1.7000	3.5000		3.5000	10.0000		10.0000
Copper (Cu)	2.3000	J	2.3000	7.2000		7.2000	154.0000		154.0000	641.0000		641.0000
Iron (Fe)	19500.0000	J	19500.0000	9270.0000	J	9270.0000	11800.0000	J	11800.0000	13900.0000	J	13900.0000
Lead (Pb)	8.3000		8.3000	19.5000		19.5000	71.5000		71.5000	734.0000		734.0000
Magnesium (Mg)	961.0000		961.0000	553.0000		553.0000	876.0000		876.0000	1020.0000		1020.0000
Manganese (Mn)	18.7000		18.7000	44.8000		44.8000	79.8000		79.8000	111.0000		111.0000
Mercury (Hg)	0.0200	U	0.0100	0.0500		0.0500	0.0900		0.0900	0.9400		0.9400
Nickel (Ni)	1.7000	J	1.7000	4.7000		4.7000	102.0000		102.0000	37.6000		37.6000
Potassium (K)	507.0000		507.0000	195.0000	J	195.0000	229.0000	J	229.0000	363.0000		363.0000
Selenium (Se)	0.3900	UJ	0.1950	0.3600	UJ	0.1800	0.3700	UJ	0.1850	0.4100	J	0.4100
Silver (Ag)	0.1400	U	0.0700	0.1300	U	0.0650	0.1300	U	0.0650	1.9000		1.9000
Sodium (Na)	367.0000		367.0000	278.0000	J	278.0000	330.0000	J	330.0000	406.0000		406.0000
Tin (Sn)	3.4000	U	1.7000	4.4000	U	2.2000	24.7000		24.7000	39.7000		39.7000
Vanadium (V)	21.7000		21.7000	12.8000		12.8000	17.4000		17.4000	34.5000		34.5000
Zinc (Zn)	9.8000		9.8000	48.8000		48.8000	198.0000		198.0000	1040.0000		1040.0000

U - Material was analyzed for, but not detected.
J - The associated numerical value is an estimated quantity.

APPENDIX C
TABLE 1 - QUALIFIED ANALYTICAL DATA - SURFACE SOILS (INORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent (mg/kg)	196SB00501			196SB00601			196SB00701			196SB00801		
	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Inorganics												
Cyanide (CN)	0.1600	U	0.0800	0.1600	U	0.0800	0.1800	U	0.0900	0.1600	U	0.0800
Aluminum (Al)	5870.0000		5870.0000	7660.0000		7660.0000	8710.0000		8710.0000	2740.0000		2740.0000
Antimony (Sb)	8.6000	J	8.6000	1.4000	J	1.4000	0.7600	J	0.7600	8.3000	J	8.3000
Arsenic (As)	11.2000		11.2000	8.0000		8.0000	11.0000		11.0000	8.5000		8.5000
Barium (Ba)	40.8000		40.8000	37.3000		37.3000	34.3000	J	34.3000	50.4000	J	50.4000
Beryllium (Be)	0.4200	J	0.4200	0.5100	J	0.5100	0.5500	J	0.5500	0.3900	J	0.3900
Cadmium (Cd)	0.7000	J	0.7000	0.5400	J	0.5400	0.4700	J	0.4700	0.6200	J	0.6200
Calcium (Ca)	52300.0000	J	52300.0000	30500.0000	J	30500.0000	89200.0000	J	89200.0000	164000.0000	J	164000.0000
Chromium (Cr)	31.1000		31.1000	27.1000		27.1000	21.7000		21.7000	19.9000		19.9000
Cobalt (Co)	3.6000		3.6000	3.5000		3.5000	3.4000	J	3.4000	8.9000	J	8.9000
Copper (Cu)	270.0000		270.0000	226.0000		226.0000	151.0000		151.0000	127.0000		127.0000
Iron (Fe)	8130.0000	J	8130.0000	12600.0000	J	12600.0000	9520.0000	J	9520.0000	9580.0000	J	9580.0000
Lead (Pb)	152.0000		152.0000	76.2000		76.2000	61.8000	J	61.8000	181.0000	J	181.0000
Magnesium (Mg)	1300.0000		1300.0000	1210.0000		1210.0000	2300.0000	J	2300.0000	2460.0000	J	2460.0000
Manganese (Mn)	122.0000		122.0000	107.0000		107.0000	133.0000	J	133.0000	283.0000	J	283.0000
Mercury (Hg)	0.3600		0.3600	0.2700		0.2700	0.3100		0.3100	0.0200	J	0.0200
Nickel (Ni)	21.6000		21.6000	42.0000		42.0000	70.3000	J	70.3000	21.1000	J	21.1000
Potassium (K)	366.0000		366.0000	390.0000		390.0000	512.0000		512.0000	285.0000		285.0000
Selenium (Se)	0.3600	UJ	0.1800	0.3600	UJ	0.1800	0.4200	U	0.2100	0.3600	U	0.1800
Silver (Ag)	0.1300	U	0.0650	0.1300	U	0.0650	0.1500	UJ	0.0750	0.1300	UJ	0.0650
Sodium (Na)	330.0000		330.0000	344.0000		344.0000	516.0000		516.0000	381.0000		381.0000
Tin (Sn)	36.5000		36.5000	11.0000	U	5.5000	4.9000	UJ	2.4500	34.0000	J	34.0000
Vanadium (V)	137.0000		137.0000	39.3000		39.3000	22.0000	J	22.0000	11.8000	J	11.8000
Zinc (Zn)	311.0000		311.0000	254.0000		254.0000	153.0000	J	153.0000	250.0000	J	250.0000

U - Material was analyzed for, but not detected.
J - The associated numerical value is an estimated quantity.

APPENDIX C
TABLE 1 - QUALIFIED ANALYTICAL DATA - SURFACE SOILS (INORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent (mg/kg)	196SB00901			196SB01001			196SB01101			196SB01201		
	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Inorganics												
Cyanide (CN)	0.1600	U	0.0800	1.7000		1.7000	0.1700	U	0.0850	0.1700	U	0.0850
Aluminum (Al)	7930.0000		7930.0000	2420.0000		2420.0000	15200.0000		15200.0000	6930.0000		6930.0000
Antimony (Sb)	1.6000	J	1.6000	0.3700	J	0.3700	0.3100	UJ	0.1550	2.3000	J	2.3000
Arsenic (As)	5.6000		5.6000	5.4000		5.4000	7.9000		7.9000	5.1000		5.1000
Barium (Ba)	31.1000	J	31.1000	10.9000	J	10.9000	44.2000	J	44.2000	69.3000	J	69.3000
Beryllium (Be)	0.4100	J	0.4100	0.3200	J	0.3200	0.6900		0.6900	0.5000	J	0.5000
Cadmium (Cd)	0.1700	U	0.0850	0.4900	J	0.4900	0.1900	UJ	0.0950	0.3800	J	0.3800
Calcium (Ca)	20300.0000	J	20300.0000	197000.0000	J	197000.0000	23500.0000	J	23500.0000	128000.0000	J	128000.0000
Chromium (Cr)	15.7000		15.7000	8.8000		8.8000	49.5000		49.5000	21.2000		21.2000
Cobalt (Co)	2.1000	J	2.1000	3.5000	J	3.5000	3.6000	J	3.6000	3.3000	J	3.3000
Copper (Cu)	41.9000		41.9000	26.2000		26.2000	24.9000		24.9000	116.0000		116.0000
Iron (Fe)	10600.0000	J	10600.0000	5470.0000	J	5470.0000	15200.0000	J	15200.0000	8930.0000	J	8930.0000
Lead (Pb)	42.8000	J	42.8000	19.1000	J	19.1000	56.3000	J	56.3000	49.2000	J	49.2000
Magnesium (Mg)	952.0000	J	952.0000	3050.0000	J	3050.0000	2310.0000	J	2310.0000	2360.0000	J	2360.0000
Manganese (Mn)	79.7000	J	79.7000	332.0000	J	332.0000	194.0000	J	194.0000	188.0000	J	188.0000
Mercury (Hg)	0.1400		0.1400	0.1200		0.1200	0.1000	J	0.1000	0.0300	J	0.0300
Nickel (Ni)	8.0000	J	8.0000	10.2000	J	10.2000	12.1000	J	12.1000	11.7000	J	11.7000
Potassium (K)	261.0000	J	261.0000	395.0000		395.0000	902.0000		902.0000	523.0000		523.0000
Selenium (Se)	0.6700		0.6700	0.3600	U	0.1800	0.6800		0.6800	0.3700	U	0.1850
Silver (Ag)	0.1300	UJ	0.0650	0.1300	UJ	0.0650	0.1400	UJ	0.0700	0.1400	UJ	0.0700
Sodium (Na)	396.0000		396.0000	382.0000		382.0000	430.0000		430.0000	412.0000		412.0000
Tin (Sn)	5.2000	UJ	2.6000	3.2000	UJ	1.6000	4.9000	UJ	2.4500	6.4000	UJ	3.2000
Vanadium (V)	19.8000	J	19.8000	9.9000	J	9.9000	34.4000	J	34.4000	19.0000	J	19.0000
Zinc (Zn)	107.0000	J	107.0000	79.5000	J	79.5000	95.3000	J	95.3000	162.0000	J	162.0000

U - Material was analyzed for, but not detected.
J - The associated numerical value is an estimated quantity.

APPENDIX C
TABLE 1 - QUALIFIED ANALYTICAL DATA - SURFACE SOILS (INORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent (mg/kg)	196SB01301			196SB01401			196SB01501			196SB01601			196SB01701		
	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Inorganics															
Cyanide (CN)	0.1700	U	0.0850	0.1700	U	0.0850	0.1700	U	0.0850	0.1800	UJ	0.0900	0.1700	UJ	0.0850
Aluminum (Al)	10400.0000		10400.0000	7580.0000		7580.0000	8220.0000		8220.0000	9160.0000		9160.0000	8450.0000		8450.0000
Antimony (Sb)	7.6000	J	7.6000	0.4800	J	0.4800	0.9200	J	0.9200	2.0000	J	2.0000	1.2000	J	1.2000
Arsenic (As)	8.1000		8.1000	4.7000		4.7000	5.7000		5.7000	5.9000		5.9000	8.9000		8.9000
Barium (Ba)	43.9000	J	43.9000	28.4000	J	28.4000	31.2000	J	31.2000	34.3000		34.3000	27.8000		27.8000
Beryllium (Be)	0.4600	J	0.4600	0.3800	J	0.3800	0.4400	J	0.4400	0.3800	J	0.3800	0.3400	J	0.3400
Cadmium (Cd)	0.3500	J	0.3500	0.0900	UJ	0.0450	0.1400	UJ	0.0700	0.1600	U	0.0800	0.0300	U	0.0150
Calcium (Ca)	48600.0000	J	48600.0000	35300.0000	J	35300.0000	66200.0000	J	66200.0000	28500.0000		28500.0000	21800.0000		21800.0000
Chromium (Cr)	29.6000		29.6000	15.2000		15.2000	19.4000		19.4000	18.9000		18.9000	16.8000		16.8000
Cobalt (Co)	2.7000	J	2.7000	2.0000	J	2.0000	2.6000	J	2.6000	2.0000	J	2.0000	2.0000	J	2.0000
Copper (Cu)	99.4000		99.4000	22.5000		22.5000	34.0000		34.0000	105.0000		105.0000	26.0000		26.0000
Iron (Fe)	15600.0000	J	15600.0000	10300.0000	J	10300.0000	10300.0000	J	10300.0000	11700.0000		11700.0000	14500.0000		14500.0000
Lead (Pb)	75.8000	J	75.8000	56.9000	J	56.9000	32.4000	J	32.4000	81.6000		81.6000	31.8000		31.8000
Magnesium (Mg)	1800.0000	J	1800.0000	1230.0000	J	1230.0000	1810.0000	J	1810.0000	1320.0000		1320.0000	1120.0000		1120.0000
Manganese (Mn)	111.0000	J	111.0000	71.4000	J	71.4000	139.0000	J	139.0000	82.6000		82.6000	87.0000		87.0000
Mercury (Hg)	0.0800	J	0.0800	0.0400	J	0.0400	0.0500	J	0.0500	0.2900		0.2900	0.1300		0.1300
Nickel (Ni)	11.1000	J	11.1000	5.7000	J	5.7000	7.4000	J	7.4000	6.8000		6.8000	6.2000		6.2000
Potassium (K)	468.0000		468.0000	277.0000		277.0000	423.0000		423.0000	451.0000		451.0000	319.0000		319.0000
Selenium (Se)	0.3700	U	0.1850	0.3600	U	0.1800	0.3600	U	0.1800	0.6400		0.6400	0.3600	U	0.1800
Silver (Ag)	0.1400	UJ	0.0700	0.1300	UJ	0.0650	0.1300	UJ	0.0650	0.1400	UJ	0.0700	0.1300	UJ	0.0650
Sodium (Na)	636.0000		636.0000	402.0000		402.0000	387.0000		387.0000	759.0000		759.0000	451.0000		451.0000
Tin (Sn)	15.0000	J	15.0000	5.0000	UJ	2.5000	3.7000	UJ	1.8500	4.3000	U	2.1500	4.1000	U	2.0500
Vanadium (V)	29.9000	J	29.9000	19.0000	J	19.0000	21.1000	J	21.1000	27.1000		27.1000	23.8000		23.8000
Zinc (Zn)	199.0000	J	199.0000	56.2000	J	56.2000	62.9000	J	62.9000	97.0000		97.0000	63.4000		63.4000

U - Material was analyzed for, but not detected.
J - The associated numerical value is an estimated quantity.

APPENDIX C
TABLE 2 - QUALIFIED ANALYTICAL DATA - SURFACE SOILS (ORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent (ug/kg)	196SB00101			196SB00201			196SB00301			196SB00401			196SB00501			196SB00601		
	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
4,4'-DDD	2.8000	U	1.4000	2.6000	U	1.3000	2.8000	U	1.4000	9.2000	J	9.2000	2.6000	U	1.3000	2.6000	U	1.3000
4,4'-DDE	2.8000	U	1.4000	2.6000	U	1.3000	7.5000		7.5000	27.0000	J	27.0000	13.0000	U	6.5000	2.6000	U	1.3000
4,4'-DDT	2.8000	U	1.4000	2.6000	U	1.3000	17.0000	J	17.0000	24.0000	U	12.0000	18.0000	J	18.0000	2.6000	U	1.3000
alpha-Chlordane	1.5000	U	0.7500	1.4000	U	0.7000	1.4000	U	0.7000	28.0000	DJ	28.0000	1.3000	U	0.6500	1.4000	U	0.7000
Aroclor-1254	40.0000	U	20.0000	36.0000	U	18.0000	93.0000		93.0000	260.0000	J	260.0000	100.0000	J	100.0000	120.0000	J	120.0000
Aroclor-1260	40.0000	U	20.0000	36.0000	U	18.0000	53.0000		53.0000	150.0000	J	150.0000	97.0000	J	97.0000	120.0000	J	120.0000
Dieldrin	2.8000	U	1.4000	2.6000	U	1.3000	5.4000	U	2.7000	7.8000	U	3.9000	2.6000	U	1.3000	2.6000	U	1.3000
Endosulfan I	1.5000	U	0.7500	1.4000	U	0.7000	1.4000	U	0.7000	1.5000	U	0.7500	1.3000	U	0.6500	1.4000	U	0.7000
gamma-Chlordane	1.5000	U	0.7500	1.4000	U	0.7000	6.6000	J	6.6000	34.0000	D	34.0000	5.0000	J	5.0000	1.4000	U	0.7000
Heptachlor	1.5000	U	0.7500	1.4000	U	0.7000	1.4000	U	0.7000	1.5000	U	0.7500	1.3000	U	0.6500	1.4000	U	0.7000
Heptachlor epoxide	1.5000	U	0.7500	1.4000	U	0.7000	1.4000	U	0.7000	4.3000	U	2.1500	1.3000	U	0.6500	1.4000	U	0.7000
1,4-Dichlorobenzene	390.0000	U	195.0000	20.0000	J	20.0000	360.0000	U	180.0000	19.0000	J	19.0000	18.0000	J	18.0000	360.0000	U	180.0000
2,4-Dimethylphenol	390.0000	U	195.0000	370.0000	U	185.0000	360.0000	U	180.0000	380.0000	U	190.0000	38.0000	J	38.0000	360.0000	U	180.0000
2-Methylnaphthalene	390.0000	U	195.0000	370.0000	U	185.0000	360.0000	U	180.0000	380.0000	U	190.0000	340.0000	U	170.0000	360.0000	U	180.0000
4-Methylphenol (p-Cresol)	390.0000	U	195.0000	370.0000	U	185.0000	360.0000	U	180.0000	380.0000	U	190.0000	22.0000	J	22.0000	360.0000	U	180.0000
Acenaphthene	390.0000	U	195.0000	370.0000	U	185.0000	360.0000	U	180.0000	380.0000	U	190.0000	23.0000	J	23.0000	360.0000	U	180.0000
Acenaphthylene	390.0000	U	195.0000	370.0000	U	185.0000	360.0000	U	180.0000	380.0000	U	190.0000	150.0000	J	150.0000	140.0000	J	140.0000
Anthracene	390.0000	U	195.0000	370.0000	U	185.0000	360.0000	U	180.0000	21.0000	J	21.0000	230.0000	J	230.0000	190.0000	J	190.0000
Benzo(a)anthracene	390.0000	U	195.0000	370.0000	U	185.0000	360.0000	U	180.0000	120.0000	J	120.0000	380.0000		380.0000	1000.0000		1000.0000
Benzo(a)pyrene	390.0000	U	195.0000	370.0000	U	185.0000	360.0000	U	180.0000	110.0000	J	110.0000	300.0000	J	300.0000	730.0000		730.0000
Benzo(b)fluoranthene	390.0000	U	195.0000	370.0000	U	185.0000	360.0000	U	180.0000	120.0000	J	120.0000	640.0000		640.0000	1400.0000		1400.0000
Benzo(g,h,i)perylene	390.0000	U	195.0000	370.0000	U	185.0000	21.0000	J	21.0000	78.0000	J	78.0000	250.0000	J	250.0000	490.0000		490.0000
Benzo(k)fluoranthene	390.0000	U	195.0000	370.0000	U	185.0000	360.0000	U	180.0000	110.0000	J	110.0000	390.0000		390.0000	610.0000		610.0000
Benzoic acid	390.0000	U	195.0000	100.0000	J	100.0000	100.0000	J	100.0000	110.0000	J	110.0000	340.0000	U	170.0000	110.0000	J	110.0000
bis(2-Ethylhexyl)phthalate (BEHP)	390.0000	U	195.0000	370.0000	U	185.0000	360.0000	U	180.0000	380.0000	U	190.0000	340.0000	U	170.0000	360.0000	U	180.0000
Butylbenzylphthalate	390.0000	U	195.0000	370.0000	U	185.0000	360.0000	U	180.0000	380.0000	U	190.0000	340.0000	U	170.0000	360.0000	U	180.0000
Chrysene	390.0000	U	195.0000	370.0000	U	185.0000	360.0000	U	180.0000	190.0000	J	190.0000	910.0000		910.0000	1600.0000		1600.0000
Dibenz(a,h)anthracene	390.0000	U	195.0000	370.0000	U	185.0000	360.0000	U	180.0000	380.0000	U	190.0000	94.0000	J	94.0000	230.0000	J	230.0000
Di-n-butylphthalate	390.0000	U	195.0000	370.0000	U	185.0000	360.0000	U	180.0000	380.0000	U	190.0000	20.0000	J	20.0000	360.0000	U	180.0000
Di-n-octyl phthalate	390.0000	U	195.0000	200.0000	J	200.0000	360.0000	U	180.0000	380.0000	U	190.0000	340.0000	U	170.0000	360.0000	U	180.0000
Fluoranthene	390.0000	U	195.0000	370.0000	U	185.0000	19.0000	J	19.0000	200.0000	J	200.0000	2000.0000		2000.0000	1900.0000		1900.0000
Fluorene	390.0000	U	195.0000	370.0000	U	185.0000	360.0000	U	180.0000	380.0000	U	190.0000	34.0000	J	34.0000	23.0000	J	23.0000
Indeno(1,2,3-cd)pyrene	390.0000	U	195.0000	370.0000	U	185.0000	360.0000	U	180.0000	71.0000	J	71.0000	230.0000	J	230.0000	490.0000		490.0000
Naphthalene	390.0000	U	195.0000	370.0000	U	185.0000	360.0000	U	180.0000	380.0000	U	190.0000	340.0000	U	170.0000	360.0000	U	180.0000
Phenanthrene	390.0000	U	195.0000	370.0000	U	185.0000	360.0000	U	180.0000	78.0000	J	78.0000	660.0000		660.0000	400.0000		400.0000
Pyrene	390.0000	U	195.0000	370.0000	U	185.0000	19.0000	J	19.0000	170.0000	J	170.0000	1400.0000		1400.0000	1700.0000		1700.0000
Acetone	5.0000	U	2.5000	6.0000	UJ	3.0000	5.0000	U	2.5000	8.0000	U	4.0000	8.0000	U	4.0000	4.0000	U	2.0000
Chlorobenzene	5.0000	U	2.5000	6.0000	U	3.0000	5.0000	U	2.5000	8.0000	U	4.0000	8.0000	U	4.0000	4.0000	U	2.0000
Methylene chloride	5.0000	U	2.5000	6.0000	U	3.0000	1.0000	J	1.0000	5.0000	J	5.0000	2.0000	J	2.0000	0.9000	J	0.9000

U - Material was analyzed for, but was not detected.
J - The associated numerical value is an estimated quantity.
D - Compound identified in an analysis at a secondary dilution factor.

APPENDIX C
TABLE 2 - QUALIFIED ANALYTICAL DATA - SURFACE SOILS (ORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent (ug/kg)	196SB00701			196SB00801			196SB00901			196SB01001			196SB01101			196SB01201		
	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
4,4'-DDD	2.9000	U	1.4500	2.7000	U	1.3500	6.0000	J	6.0000	2.7000	U	1.3500	2.9000	U	1.4500	6.8000	J	6.8000
4,4'-DDE	2.9000	U	1.4500	8.6000	J	8.6000	14.0000	J	14.0000	4.8000	J	4.8000	2.9000	U	1.4500	6.6000	J	6.6000
4,4'-DDT	6.2000	U	3.1000	8.0000	J	8.0000	6.4000	J	6.4000	18.0000	J	18.0000	5.4000	U	2.7000	4.8000	U	2.4000
alpha-Chlordane	1.5000	U	0.7500	1.4000	U	0.7000	1.5000	U	0.7500	1.4000	U	0.7000	1.5000	U	0.7500	1.4000	U	0.7000
Aroclor-1254	130.0000		130.0000	120.0000	J	120.0000	150.0000	J	150.0000	37.0000	U	18.5000	110.0000		110.0000	35.0000	U	17.5000
Aroclor-1260	130.0000		130.0000	87.0000	J	87.0000	89.0000	J	89.0000	40.0000		40.0000	59.0000		59.0000	55.0000		55.0000
Dieldrin	2.9000	U	1.4500	2.7000	U	1.3500	2.8000	U	1.4000	2.7000	U	1.3500	3.7000	J	3.7000	2.7000	U	1.3500
Endosulfan I	1.5000	U	0.7500	1.4000	U	0.7000	1.5000	U	0.7500	1.4000	U	0.7000	1.5000	U	0.7500	1.4000	U	0.7000
gamma-Chlordane	1.5000	U	0.7500	3.8000	J	3.8000	4.1000	J	4.1000	6.1000	J	6.1000	3.2000	J	3.2000	3.2000	J	3.2000
Heptachlor	1.5000	U	0.7500	1.4000	U	0.7000	1.5000	U	0.7500	5.3000	J	5.3000	4.4000	J	4.4000	1.4000	U	0.7000
Heptachlor epoxide	1.5000	U	0.7500	1.4000	U	0.7000	1.5000	U	0.7500	1.4000	U	0.7000	1.5000	U	0.7500	1.4000	U	0.7000
1,4-Dichlorobenzene	420.0000	U	210.0000	350.0000	U	175.0000	350.0000	U	175.0000	370.0000	U	185.0000	390.0000	U	195.0000	330.0000	U	165.0000
2,4-Dimethylphenol	420.0000	U	210.0000	350.0000	U	175.0000	350.0000	U	175.0000	370.0000	U	185.0000	390.0000	U	195.0000	330.0000	U	165.0000
2-Methylnaphthalene	420.0000	U	210.0000	350.0000	U	175.0000	350.0000	U	175.0000	370.0000	U	185.0000	390.0000	U	195.0000	25.0000	J	25.0000
4-Methylphenol (p-Cresol)	420.0000	U	210.0000	350.0000	U	175.0000	350.0000	U	175.0000	370.0000	U	185.0000	390.0000	U	195.0000	330.0000	U	165.0000
Acenaphthene	420.0000	U	210.0000	350.0000	U	175.0000	350.0000	U	175.0000	370.0000	U	185.0000	390.0000	U	195.0000	24.0000	J	24.0000
Acenaphthylene	420.0000	U	210.0000	22.0000	J	22.0000	350.0000	U	175.0000	370.0000	U	185.0000	390.0000	U	195.0000	330.0000	U	165.0000
Anthracene	420.0000	U	210.0000	28.0000	J	28.0000	350.0000	U	175.0000	370.0000	U	185.0000	390.0000	U	195.0000	330.0000	U	165.0000
Benzo(a)anthracene	420.0000	U	210.0000	100.0000	J	100.0000	350.0000	U	175.0000	370.0000	U	185.0000	28.0000	J	28.0000	23.0000	J	23.0000
Benzo(a)pyrene	75.0000	J	75.0000	160.0000	J	160.0000	350.0000	U	175.0000	46.0000	J	46.0000	390.0000	UJ	195.0000	28.0000	J	28.0000
Benzo(b)fluoranthene	120.0000	J	120.0000	200.0000	J	200.0000	23.0000	J	23.0000	74.0000	J	74.0000	390.0000	UJ	195.0000	27.0000	J	27.0000
Benzo(g,h,i)perylene	420.0000	UJ	210.0000	58.0000	J	58.0000	350.0000	U	175.0000	370.0000	U	185.0000	390.0000	UJ	195.0000	330.0000	U	165.0000
Benzo(k)fluoranthene	67.0000	J	67.0000	180.0000	J	180.0000	350.0000	U	175.0000	64.0000	J	64.0000	390.0000	UJ	195.0000	30.0000	J	30.0000
Benzoic acid	420.0000	U	210.0000	350.0000	U	175.0000	350.0000	U	175.0000	370.0000	U	185.0000	390.0000	U	195.0000	330.0000	U	165.0000
bis(2-Ethylhexyl)phthalate (BEHP)	59.0000	J	59.0000	31.0000	J	31.0000	18.0000	J	18.0000	55.0000	J	55.0000	72.0000	J	72.0000	26.0000	J	26.0000
Butylbenzylphthalate	420.0000	U	210.0000	350.0000	U	175.0000	350.0000	U	175.0000	370.0000	U	185.0000	410.0000	J	410.0000	330.0000	U	165.0000
Chrysene	79.0000	J	79.0000	310.0000	J	310.0000	20.0000	J	20.0000	68.0000	J	68.0000	57.0000	J	57.0000	40.0000	J	40.0000
Dibenz(a,h)anthracene	420.0000	UJ	210.0000	350.0000	U	175.0000	350.0000	U	175.0000	370.0000	U	185.0000	390.0000	UJ	195.0000	330.0000	U	165.0000
Di-n-butylphthalate	420.0000	U	210.0000	350.0000	U	175.0000	350.0000	U	175.0000	370.0000	U	185.0000	390.0000	U	195.0000	330.0000	U	165.0000
Di-n-octyl phthalate	420.0000	UJ	210.0000	350.0000	U	175.0000	350.0000	U	175.0000	370.0000	U	185.0000	390.0000	UJ	195.0000	330.0000	U	165.0000
Fluoranthene	76.0000	J	76.0000	570.0000		570.0000	350.0000	U	175.0000	71.0000	J	71.0000	39.0000	J	39.0000	27.0000	J	27.0000
Fluorene	420.0000	U	210.0000	350.0000	U	175.0000	350.0000	U	175.0000	370.0000	U	185.0000	390.0000	U	195.0000	330.0000	U	165.0000
Indeno(1,2,3-cd)pyrene	420.0000	UJ	210.0000	61.0000	J	61.0000	350.0000	U	175.0000	370.0000	U	185.0000	390.0000	UJ	195.0000	330.0000	U	165.0000
Naphthalene	420.0000	U	210.0000	350.0000	U	175.0000	350.0000	U	175.0000	370.0000	U	185.0000	390.0000	U	195.0000	210.0000	J	210.0000
Phenanthrene	28.0000	J	28.0000	89.0000	J	89.0000	350.0000	U	175.0000	19.0000	J	19.0000	390.0000	U	195.0000	17.0000	J	17.0000
Pyrene	140.0000	J	140.0000	530.0000		530.0000	350.0000	U	175.0000	130.0000	J	130.0000	97.0000	J	97.0000	41.0000	J	41.0000
Acetone	9.0000	U	4.5000	8.0000	U	4.0000	4.0000	U	2.0000	5.0000	U	2.5000	6.0000	U	3.0000	5.0000	U	2.5000
Chlorobenzene	9.0000	U	4.5000	8.0000	U	4.0000	4.0000	U	2.0000	5.0000	U	2.5000	6.0000	U	3.0000	5.0000	U	2.5000
Methylene chloride	9.0000	U	4.5000	8.0000	U	4.0000	4.0000	U	2.0000	5.0000	U	2.5000	6.0000	U	3.0000	5.0000	U	2.5000

U - Material was analyzed for, but was not detected.
J - The associated numerical value is an estimated quantity.
D - Compound identified in an analysis at a secondary dilution factor.

APPENDIX C
TABLE 2 - QUALIFIED ANALYTICAL DATA - SURFACE SOILS (ORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent (ug/kg)	196SB01301			196SB01401			196SB01501			196SB01601			196SB01701		
	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
4,4'-DDD	20.0000	J	20.0000	2.8000	U	1.4000	2.8000	U	1.4000	26.0000	J	26.0000	36.0000	D	36.0000
4,4'-DDE	34.0000	J	34.0000	13.0000	U	6.5000	10.0000	J	10.0000	45.0000	J	45.0000	83.0000	D	83.0000
4,4'-DDT	2.9000	U	1.4500	2.8000	U	1.4000	14.0000	J	14.0000	14.0000	J	14.0000	2.8000	U	1.4000
alpha-Chlordane	1.5000	U	0.7500	1.4000	U	0.7000	1.4000	U	0.7000	1.5000	U	0.7500	1.5000	U	0.7500
Aroclor-1254	38.0000	U	19.0000	36.0000	U	18.0000	36.0000	U	18.0000	38.0000	U	19.0000	37.0000	U	18.5000
Aroclor-1260	150.0000	J	150.0000	68.0000		68.0000	54.0000		54.0000	38.0000	U	19.0000	120.0000		120.0000
Dieldrin	2.9000	U	1.4500	2.8000	U	1.4000	2.8000	U	1.4000	3.1000	U	1.5500	4.1000	U	2.0500
Endosulfan I	19.0000		19.0000	1.4000	U	0.7000	1.4000	U	0.7000	1.5000	U	0.7500	1.5000	U	0.7500
gamma-Chlordane	4.5000		4.5000	3.2000	U	1.6000	5.5000	J	5.5000	5.6000	U	2.8000	13.0000	J	13.0000
Heptachlor	1.5000	U	0.7500	1.4000	U	0.7000	1.4000	U	0.7000	1.5000	U	0.7500	1.5000	U	0.7500
Heptachlor epoxide	1.5000	U	0.7500	1.4000	U	0.7000	1.4000	U	0.7000	5.6000	J	5.6000	7.1000	J	7.1000
1,4-Dichlorobenzene	350.0000	U	175.0000	370.0000	U	185.0000	380.0000	U	190.0000	370.0000	U	185.0000	380.0000	U	190.0000
2,4-Dimethylphenol	350.0000	U	175.0000	370.0000	U	185.0000	380.0000	U	190.0000	370.0000	U	185.0000	380.0000	U	190.0000
2-Methylnaphthalene	350.0000	U	175.0000	370.0000	U	185.0000	380.0000	U	190.0000	370.0000	U	185.0000	380.0000	U	190.0000
4-Methylphenol (p-Cresol)	350.0000	U	175.0000	370.0000	U	185.0000	380.0000	U	190.0000	370.0000	U	185.0000	380.0000	U	190.0000
Acenaphthene	350.0000	U	175.0000	370.0000	U	185.0000	380.0000	U	190.0000	370.0000	U	185.0000	380.0000	U	190.0000
Acenaphthylene	350.0000	U	175.0000	370.0000	U	185.0000	380.0000	U	190.0000	370.0000	U	185.0000	380.0000	U	190.0000
Anthracene	350.0000	U	175.0000	370.0000	U	185.0000	380.0000	U	190.0000	25.0000	J	25.0000	380.0000	U	190.0000
Benzo(a)anthracene	24.0000	J	24.0000	19.0000	J	19.0000	22.0000	J	22.0000	68.0000	J	68.0000	380.0000	U	190.0000
Benzo(a)pyrene	37.0000	J	37.0000	24.0000	J	24.0000	35.0000	J	35.0000	57.0000	J	57.0000	25.0000	J	25.0000
Benzo(b)fluoranthene	60.0000	J	60.0000	37.0000	J	37.0000	42.0000	J	42.0000	72.0000	J	72.0000	57.0000	J	57.0000
Benzo(g,h,i)perylene	350.0000	UJ	175.0000	370.0000	U	185.0000	380.0000	U	190.0000	37.0000	J	37.0000	22.0000	J	22.0000
Benzo(k)fluoranthene	31.0000	J	31.0000	28.0000	J	28.0000	33.0000	J	33.0000	52.0000	J	52.0000	380.0000	U	190.0000
Benzoic acid	350.0000	U	175.0000	370.0000	U	185.0000	280.0000	J	280.0000	370.0000	U	185.0000	380.0000	U	190.0000
bis(2-Ethylhexyl)phthalate (BEHP)	350.0000	U	175.0000	370.0000	U	185.0000	22.0000	J	22.0000	370.0000	U	185.0000	380.0000	U	190.0000
Butylbenzylphthalate	350.0000	U	175.0000	370.0000	U	185.0000	380.0000	U	190.0000	160.0000	J	160.0000	380.0000	U	190.0000
Chrysene	48.0000	J	48.0000	34.0000	J	34.0000	34.0000	J	34.0000	77.0000	J	77.0000	35.0000	J	35.0000
Dibenz(a,h)anthracene	350.0000	UJ	175.0000	370.0000	U	185.0000	380.0000	U	190.0000	370.0000	U	185.0000	380.0000	U	190.0000
Di-n-butylphthalate	350.0000	U	175.0000	370.0000	U	185.0000	380.0000	U	190.0000	370.0000	U	185.0000	380.0000	U	190.0000
Di-n-octyl phthalate	350.0000	UJ	175.0000	370.0000	U	185.0000	380.0000	U	190.0000	200.0000	J	200.0000	380.0000	U	190.0000
Fluoranthene	28.0000	J	28.0000	29.0000	J	29.0000	43.0000	J	43.0000	180.0000	J	180.0000	25.0000	J	25.0000
Fluorene	350.0000	U	175.0000	370.0000	U	185.0000	380.0000	U	190.0000	370.0000	U	185.0000	380.0000	U	190.0000
Indeno(1,2,3-cd)pyrene	350.0000	UJ	175.0000	370.0000	U	185.0000	380.0000	U	190.0000	34.0000	J	34.0000	380.0000	U	190.0000
Naphthalene	350.0000	U	175.0000	370.0000	U	185.0000	380.0000	U	190.0000	370.0000	U	185.0000	380.0000	U	190.0000
Phenanthrene	350.0000	U	175.0000	370.0000	U	185.0000	29.0000	J	29.0000	130.0000	J	130.0000	380.0000	U	190.0000
Pyrene	75.0000	J	75.0000	41.0000	J	41.0000	58.0000	J	58.0000	140.0000	J	140.0000	30.0000	J	30.0000
Acetone	100.0000	U	50.0000	120.0000		120.0000	16.0000	U	8.0000						
Chlorobenzene	5.0000	U	2.5000	5.0000	U	2.5000	94.0000		94.0000	6.0000	U	3.0000	5.0000	U	2.5000
Methylene chloride	5.0000	U	2.5000	5.0000	U	2.5000	5.0000	U	2.5000	6.0000	U	3.0000	5.0000	U	2.5000

U - Material was analyzed for, but was not detected.
J - The associated numerical value is an estimated quantity.
D - Compound identified in an analysis at a secondary dilution factor.

APPENDIX C
TABLE 3 - QUALIFIED ANALYTICAL DATA - SEDIMENT SAMPLES (INORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

CONSTITUENT (mg/kg)	196M000101			196M000102			196M000103			196M000201			196M000202			196M000203		
	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Inorganics																		
Cyanide (CN)	0.14	U	0.07	0.15	U	0.075	0.15	U	0.075	0.15	U	0.075	0.14	U	0.07	0.15	U	0.075
Aluminum (Al)	4610		4610	5700		5700	4040		4040	3610		3610	4950		4950	4240		4240
Iron (Fe)	7850		7850	7650		7650	8020		8020	22600		22600	14600		14600	10700		10700
Lead (Pb)	18.4		18.4	20.3		20.3	17.3		17.3	28		28	150		150	27.2		27.2
Nickel (Ni)	8.3		8.3	7.5		7.5	4.8		4.8	9.5		9.5	6.1		6.1	3.8	J	3.8
Potassium (K)	730		730	595		595	645		645	559		559	800		800	605		605
Sodium (Na)	3360	J	3360	2710	J	2710	2980	J	2980	3240	J	3240	2790	J	2790	2110	J	2110
Thallium (Tl)	0.33	U	0.165	0.33	U	0.165	0.34	U	0.17	0.33	U	0.165	0.33	U	0.165	0.33	U	0.165
Arsenic (As)	6.1		6.1	6.5		6.5	5.6		5.6	6.7		6.7	14.9		14.9	8.7		8.7
Barium (Ba)	8.1		8.1	10.3		10.3	8.5		8.5	7		7	8.3		8.3	8.3		8.3
Beryllium (Be)	0.41	J	0.41	0.44	J	0.44	0.45	J	0.45	0.32	J	0.32	0.43	J	0.43	0.4	J	0.4
Cadmium (Cd)	0.19	J	0.19	0.14	J	0.14	0.1	J	0.1	0.05	J	0.05	0.07	J	0.07	0.03	U	0.015
Cobalt (Co)	1.7	J	1.7	1.5	J	1.5	1.8	J	1.8	2.9		2.9	2.4	J	2.4	1.7	J	1.7
Copper (Cu)	16.3		16.3	11.9		11.9	10.9		10.9	30.6		30.6	13.2		13.2	12.3		12.3
Vanadium (V)	15		15	15.1		15.1	17.7		17.7	13.4		13.4	19.9		19.9	17.2		17.2
Zinc (Zn)	63	J	63	40.4	J	40.4	44.5	J	44.5	69.9	J	69.9	74.1	J	74.1	42	J	42
Selenium (Se)	0.45	J	0.45	0.72		0.72	0.33	U	0.165	0.49	J	0.49	0.49		0.49	0.47	J	0.47
Mercury (Hg)	0.04		0.04	0.12		0.12	0.06		0.06	0.1		0.1	0.04		0.04	0.04		0.04
Magnesium (Mg)	2130		2130	2190		2190	2130		2130	1400		1400	2120		2120	1640		1640
Manganese (Mn)	91.5		91.5	112		112	76.9		76.9	112		112	116		116	139		139
Calcium (Ca)	12800		12800	31900		31900	10800		10800	1470		1470	3400		3400	9680		9680
Chromium (Cr)	45.5	J	45.5	18.3	J	18.3	11.8	J	11.8	38.4	J	38.4	12.9	J	12.9	10.7	J	10.7
Tin (Sn)	4.2	J	4.2	3.8	J	3.8	3.8	J	3.8	129		129	4.8	J	4.8	4.4	J	4.4

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APPENDIX C
TABLE 3 - QUALIFIED ANALYTICAL DATA - SEDIMENT SAMPLES (INORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

CONSTITUENT (mg/kg)	196M000301			196M000302			196M000303		
	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Inorganics									
Cyanide (CN)	0.14	U	0.07	0.16	J	0.16	0.14	U	0.07
Aluminum (Al)	3280		3280	4900		4900	3980		3980
Iron (Fe)	4680		4680	8000		8000	7150		7150
Lead (Pb)	33.6		33.6	25.6		25.6	7.4		7.4
Nickel (Ni)	8.3		8.3	8		8	6.2		6.2
Potassium (K)	322		322	767		767	815		815
Sodium (Na)	1840	J	1840	3550	J	3550	3150	J	3150
Thallium (Tl)	0.34	U	0.17	0.36	J	0.36	0.34	J	0.34
Arsenic (As)	3.6		3.6	5		5	5.4		5.4
Barium (Ba)	9.3		9.3	14		14	7.4		7.4
Beryllium (Be)	0.26	J	0.26	0.45	J	0.45	0.43	J	0.43
Cadmium (Cd)	0.21	J	0.21	0.38	J	0.38	0.23	J	0.23
Cobalt (Co)	1.1	J	1.1	1.9	J	1.9	1.6	J	1.6
Copper (Cu)	31.3		31.3	29.1		29.1	6.9		6.9
Vanadium (V)	7.4		7.4	14.9		14.9	15.3		15.3
Zinc (Zn)	105	J	105	77.7	J	77.7	27.8	J	27.8
Selenium (Se)	0.34	J	0.34	0.68		0.68	0.53		0.53
Mercury (Hg)	0.19		0.19	0.19		0.19	0.02	J	0.02
Magnesium (Mg)	1120		1120	2100		2100	2210		2210
Manganese (Mn)	49.3		49.3	87.1		87.1	85.1		85.1
Calcium (Ca)	3500		3500	8970		8970	16800		16800
Chromium (Cr)	45.4	J	45.4	27.8	J	27.8	14.8	J	14.8
Tin (Sn)	6.9	J	6.9	5.8	J	5.8	3.6	J	3.6

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APPENDIX C
TABLE 4 - QUALIFIED ANALYTICAL DATA - SEDIMENT SAMPLES (ORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

CONSTITUENT (ug/kg)	196M000101			196M000102			196M000103			196M000201		
	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Organics												
Aroclor-1254	84	U	42	82	U	41	86	U	43	96		96
Aroclor-1248	84	U	42	82	U	41	86	U	43	77	U	38.5
Aroclor-1260	84	U	42	82	U	41	86	U	43	110		110
4,4'-DDT	64	U	32	62	U	31	57	U	28.5	60	U	30
4,4'-DDE	64	U	32	62	U	31	57	U	28.5	60	U	30
1,3-Dichlorobenzene	850	U	425	820	U	410	780	U	390	78	J	78
1,4-Dichlorobenzene	850	U	425	820	U	410	780	U	390	420	J	420
1,2-Dichlorobenzene	850	U	425	820	U	410	780	U	390	51	J	51
4-Methylphenol (p-Cresol)	850	U	425	49	J	49	780	U	390	720	U	360
Phenanthrene	850	U	425	81	J	81	79	J	79	70	J	70
Anthracene	850	U	425	87	J	87	64	J	64	110	J	110
Benzoic acid	64	J	64	46	J	46	50	J	50	63	J	63
Di-n-butylphthalate	850	U	425	46	J	46	77	J	77	96	J	96
Fluoranthene	2400		2400	2000		2000	230	J	230	450	J	450
Pyrene	6300		6300	2700		2700	1100		1100	1600		1600
Naphthalene	200	J	200	150	J	150	140	J	140	97	J	97
Butylbenzylphthalate	850	U	425	820	U	410	47	J	47	720	U	360
Benzo(a)anthracene	860		860	360	J	360	220	J	220	250	J	250
Chrysene	970		970	180	J	180	190	J	190	220	J	220
2-Methylnaphthalene	52	J	52	820	U	410	40	J	40	52	J	52
Benzo(b)fluoranthene	850	U	425	270	J	270	190	J	190	250	J	250
Benzo(k)fluoranthene	870		870	220	J	220	140	J	140	140	J	140
Benzo(a)pyrene	1600		1600	290	J	290	220	J	220	590	J	590
Indeno(1,2,3-cd)pyrene	320	J	320	150	J	150	120	J	120	170	J	170
Dibenz(a,h)anthracene	850	U	425	820	U	410	80	J	80	720	U	360
Acenaphthylene	94	J	94	48	J	48	46	J	46	62	J	62
Benzo(g,h,i)perylene	780	J	780	290	J	290	260	J	260	330	J	330
Chlorobenzene	14	U	7	12	U	6	13	U	6.5	300		300
Acetone	14	U	7	12	U	6	10	J	10	12	U	6
Carbon disulfide	14	U	7	9	J	9	4	J	4	8	J	8

U - Material was analyzed for, but not detected.
J - The associated numerical value is an estimated quantity.
D - Compound identified in an analysis at a secondary dilution factor.

APPENDIX C
TABLE 4 - QUALIFIED ANALYTICAL DATA - SEDIMENT SAMPLES (ORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

CONSTITUENT	196M000202			196M000203			196M000301			196M000302			196M000303		
(ug/kg)	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Organics															
Aroclor-1254	96	U	48	75	U	37.5	65	U	32.5	79	U	39.5	81	U	40.5
Aroclor-1248	96	U	48	75	U	37.5	78	J	78	79	U	39.5	81	U	40.5
Aroclor-1260	96	U	48	75	U	37.5	140	J	140	240		240	81	U	40.5
4,4'-DDT	72	U	36	59	U	29.5	50	U	25	64	J	64	65	U	32.5
4,4'-DDE	72	U	36	59	U	29.5	50	U	25	130	J	130	65	U	32.5
1,3-Dichlorobenzene	500	J	500	830		830	660	U	330	810	U	405	890	U	445
1,4-Dichlorobenzene	2300		2300	3900		3900	75	J	75	170	J	170	890	U	445
1,2-Dichlorobenzene	270	J	270	400	J	400	660	U	330	810	U	405	890	U	445
4-Methylphenol (p-Cresol)	920	U	460	770	U	385	660	U	330	810	U	405	890	U	445
Phenanthrene	85	J	85	130	J	130	78	J	78	48	J	48	890	U	445
Anthracene	46	J	46	47	J	47	41	J	41	810	U	405	890	U	445
Benzoic acid	51	J	51	55	J	55	38	J	38	810	U	405	51	J	51
Di-n-butylphthalate	920	U	460	770	U	385	660	U	330	810	U	405	46	J	46
Fluoranthene	210	J	210	140	J	140	270	J	270	360	J	360	50	J	50
Pyrene	380	J	380	770	U	385	320	J	320	370	J	370	890	U	445
Naphthalene	160	J	160	200	J	200	56	J	56	83	J	83	59	J	59
Butylbenzylphthalate	920	U	460	770	U	385	660	U	330	810	U	405	890	U	445
Benzo(a)anthracene	97	J	97	72	J	72	130	J	130	100	J	100	890	U	445
Chrysene	91	J	91	62	J	62	170	J	170	78	J	78	890	U	445
2-Methylnaphthalene	920	U	460	770	U	385	39	J	39	810	U	405	890	U	445
Benzo(b)fluoranthene	130	J	130	67	J	67	230	J	230	140	J	140	45	J	45
Benzo(k)fluoranthene	92	J	92	82	J	82	150	J	150	110	J	110	890	U	445
Benzo(a)pyrene	120	J	120	82	J	82	130	J	130	110	J	110	890	U	445
Indeno(1,2,3-cd)pyrene	84	J	84	44	J	44	93	J	93	65	J	65	890	U	445
Dibenz(a,h)anthracene	920	U	460	770	U	385	44	J	44	810	U	405	890	U	445
Acenaphthylene	920	U	460	46	J	46	660	U	330	810	U	405	890	U	445
Benzo(g,h,i)perylene	130	J	130	75	J	75	110	J	110	77	J	77	890	U	445
Chlorobenzene	10000	D	10000	9200	D	9200	10	U	5	12	U	6	14	U	7
Acetone	15	U	7.5	12	U	6	10	U	5	12	U	6	18		18
Carbon disulfide	10	J	10	3	J	3	5	J	5	5	J	5	8	J	8

U - Material was analyzed for, but not detected.
J - The associated numerical value is an estimated quantity.
D - Compound identified in an analysis at a secondary dilution factor.

APPENDIX C
TABLE 5 - QUALIFIED ANALYTICAL DATA - GROUNDWATER SAMPLES (INORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent	009GW02001 8/11/98			009GW02003 4/27/99			009GW02004 12/7/99			009GW02101 8/11/98			009GW02103 4/27/99		
ug/L	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Cyanide (CN)	2.00	UJ	1.00			(a)	1.00	U	0.50	2.00	UJ	1.00			(a)
Aluminum (Al)	2590.00		2590.00			(a)	300.00		300.00	331.00		331.00			(a)
Antimony (Sb)	4.40	U	2.20			(a)	5.00	U	2.50	4.20	U	2.10			(a)
Arsenic (As)	17.80		17.80			(a)	24.80		24.80	17.80		17.80			(a)
Barium (Ba)	97.40		97.40			(a)	56.40		56.40	161.00		161.00			(a)
Beryllium (Be)	0.33	U	0.17			(a)	0.30	U	0.15	0.26	U	0.13			(a)
Cadmium (Cd)	0.30	U	0.15			(a)	0.30	UJ	0.15	0.58	U	0.29			(a)
Calcium (Ca)	71200.00		71200.00			(a)	89800.00		89800.00	125000.00		125000.00			(a)
Chromium (Cr)	5.50	U	2.75			(a)	0.50	U	0.25	0.71	U	0.36			(a)
Cobalt (Co)	8.20	J	8.20			(a)	2.30	J	2.30	5.20	U	2.60			(a)
Copper (Cu)	7.60	U	3.80			(a)	1.40	U	0.70	6.00	U	3.00			(a)
Iron (Fe)	13000.00		13000.00			(a)	9510.00		9510.00	1520.00		1520.00			(a)
Lead (Pb)	5.00		5.00			(a)	2.10	U	1.05	2.90	J	2.90			(a)
Magnesium (Mg)	37800.00		37800.00			(a)	35700.00		35700.00	59400.00		59400.00			(a)
Manganese (Mn)	1680.00		1680.00			(a)	883.00		883.00	1040.00		1040.00			(a)
Mercury (Hg)	0.13	J	0.13			(a)	0.10	U	0.05	0.13	J	0.13			(a)
Nickel (Ni)	4.90	U	2.45			(a)	2.10	U	1.05	3.90	U	1.95			(a)
Potassium (K)	23900.00		23900.00			(a)	18000.00		18000.00	36600.00		36600.00			(a)
Selenium (Se)	3.10	UJ	1.55			(a)	2.90	U	1.45	3.10	UJ	1.55			(a)
Sodium (Na)	248000.00	J	248000.00			(a)	139000.00		139000.00	610000.00	J	610000.00			(a)
Thallium (Tl)	3.10	U	1.55			(a)	2.30	U	1.15	3.10	U	1.55			(a)
Vanadium (V)	10.50	J	10.50			(a)	1.20	J	1.20	1.90	U	0.95			(a)
Zinc (Zn)	51.30		51.30			(a)	10.50	J	10.50	54.00		54.00			(a)

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APPENDIX C
TABLE 5 - QUALIFIED ANALYTICAL DATA - GROUNDWATER SAMPLES (INORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent ug/L	009GW02104 12/7/99			009GW02201 8/11/98			009GW02203 4/28/99			009GW02204 12/9/99			009GW02301 8/11/98		
	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Cyanide (CN)	1.50	J	1.50	2.00	UJ	1.00			(a)	1.50	U	0.75	2.00	UJ	1.00
Aluminum (Al)	32.10	U	16.05	2500.00		2500.00			(a)	1470.00		1470.00	5970.00		5970.00
Antimony (Sb)	5.50	J	5.50	3.20	U	1.60			(a)	5.00	U	2.50	4.30	U	2.15
Arsenic (As)	17.80		17.80	20.50		20.50			(a)	35.10		35.10	21.60		21.60
Barium (Ba)	133.00		133.00	125.00		125.00			(a)	28.00		28.00	114.00		114.00
Beryllium (Be)	0.30	U	0.15	0.39	U	0.20			(a)	0.30	U	0.15	0.29	U	0.15
Cadmium (Cd)	1.50	J	1.50	1.50	U	0.75			(a)	0.59	J	0.59	0.30	U	0.15
Calcium (Ca)	143000.00		143000.00	34300.00		34300.00			(a)	10600.00		10600.00	71700.00		71700.00
Chromium (Cr)	0.50	U	0.25	4.60	U	2.30			(a)	2.80	J	2.80	13.50		13.50
Cobalt (Co)	6.60	J	6.60	1.70	U	0.85			(a)	1.70	U	0.85	4.40	U	2.20
Copper (Cu)	2.10	U	1.05	6.80	U	3.40			(a)	4.70	J	4.70	8.60	U	4.30
Iron (Fe)	6660.00		6660.00	4980.00		4980.00			(a)	5340.00		5340.00	11900.00		11900.00
Lead (Pb)	2.10	U	1.05	14.10		14.10			(a)	2.10	U	1.05	4.30		4.30
Magnesium (Mg)	65700.00		65700.00	8010.00		8010.00			(a)	5230.00		5230.00	21600.00		21600.00
Manganese (Mn)	1080.00		1080.00	117.00		117.00			(a)	147.00		147.00	657.00		657.00
Mercury (Hg)	0.10	U	0.05	0.12	J	0.12			(a)	0.10	U	0.05	0.11	J	0.11
Nickel (Ni)	4.50	U	2.25	6.80	J	6.80			(a)	4.10	J	4.10	5.50	U	2.75
Potassium (K)	23900.00		23900.00	9420.00		9420.00			(a)	12300.00		12300.00	6470.00		6470.00
Selenium (Se)	2.90	U	1.45	3.10	UJ	1.55			(a)	2.90	U	1.45	3.10	UJ	1.55
Sodium (Na)	570000.00		570000.00	146000.00	J	146000.00			(a)	85700.00		85700.00	17300.00	J	17300.00
Thallium (Tl)	2.30	U	1.15	3.10	U	1.55			(a)	2.30	U	1.15	3.10	U	1.55
Vanadium (V)	1.10	J	1.10	9.50	J	9.50			(a)	6.50	J	6.50	17.80	J	17.80
Zinc (Zn)	138.00		138.00	27.00		27.00			(a)	21.50		21.50	20.10		20.10

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APPENDIX C
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ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent	009GW02303 4/27/99			009GW02304 12/8/99			009GW23D01 8/11/98			009GW23D03 4/27/99			009GW23D04 12/8/99		
ug/L	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Cyanide (CN)			(a)	1.20	J	1.20	2.00	UJ	1.00			(a)	1.00	UJ	0.50
Aluminum (Al)			(a)	1000.00		1000.00	197.00	U	98.50			(a)	32.10	U	16.05
Antimony (Sb)			(a)	5.00	U	2.50	2.70	U	1.35			(a)	5.00	U	2.50
Arsenic (As)			(a)	3.30	U	1.65	2.90	U	1.45			(a)	3.30	U	1.65
Barium (Ba)			(a)	31.20		31.20	87.80		87.80			(a)	71.20		71.20
Beryllium (Be)			(a)	0.50	U	0.25	0.10	U	0.05			(a)	0.50	U	0.25
Cadmium (Cd)			(a)	0.30	U	0.15	0.30	U	0.15			(a)	0.30	U	0.15
Calcium (Ca)			(a)	58900.00		58900.00	93000.00		93000.00			(a)	94400.00		94400.00
Chromium (Cr)			(a)	1.80	U	0.90	1.20	U	0.60			(a)	0.50	U	0.25
Cobalt (Co)			(a)	3.40	J	3.40	1.00	U	0.50			(a)	1.70	U	0.85
Copper (Cu)			(a)	4.00	U	2.00	3.10	U	1.55			(a)	1.00	U	0.50
Iron (Fe)			(a)	2430.00		2430.00	537.00		537.00			(a)	416.00		416.00
Lead (Pb)			(a)	2.10	U	1.05	1.50	U	0.75			(a)	2.10	U	1.05
Magnesium (Mg)			(a)	20400.00		20400.00	19200.00		19200.00			(a)	20100.00		20100.00
Manganese (Mn)			(a)	750.00		750.00	154.00		154.00			(a)	123.00		123.00
Mercury (Hg)			(a)	0.10	U	0.05	0.11	J	0.11			(a)	0.10	U	0.05
Nickel (Ni)			(a)	5.30	U	2.65	1.80	U	0.90			(a)	0.80	U	0.40
Potassium (K)			(a)	7320.00		7320.00	5750.00		5750.00			(a)	7410.00		7410.00
Selenium (Se)			(a)	2.90	U	1.45	3.10	UJ	1.55			(a)	2.90	U	1.45
Sodium (Na)			(a)	27700.00		27700.00	124000.00	J	124000.00			(a)	113000.00		113000.00
Thallium (Tl)			(a)	2.30	U	1.15	3.10	U	1.55			(a)	2.30	U	1.15
Vanadium (V)			(a)	3.90	J	3.90	0.87	U	0.44			(a)	0.90	U	0.45
Zinc (Zn)			(a)	9.90	U	4.95	13.20	J	13.20			(a)	3.40	U	1.70

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ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent ug/L	196GDF0101 6/8/99			196GDF0201 6/8/99			196GDF0301 6/9/99			196GDF0401 6/9/99			196GW00101 12/8/99 (b)
	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	RA
Cyanide (CN)			(a)			(a)			(a)			(a)	0.50
Aluminum (Al)			(a)			(a)			(a)			(a)	111.50
Antimony (Sb)			(a)			(a)			(a)			(a)	2.50
Arsenic (As)			(a)			(a)			(a)			(a)	5.30
Barium (Ba)			(a)			(a)			(a)			(a)	110.05
Beryllium (Be)			(a)			(a)			(a)			(a)	0.25
Cadmium (Cd)			(a)			(a)			(a)			(a)	0.23
Calcium (Ca)			(a)			(a)			(a)			(a)	193500.00
Chromium (Cr)			(a)			(a)			(a)			(a)	0.45
Cobalt (Co)			(a)			(a)			(a)			(a)	27.95
Copper (Cu)			(a)			(a)			(a)			(a)	1.80
Iron (Fe)			(a)			(a)			(a)			(a)	771.00
Lead (Pb)			(a)			(a)			(a)			(a)	1.05
Magnesium (Mg)			(a)			(a)			(a)			(a)	61200.00
Manganese (Mn)			(a)			(a)			(a)			(a)	1205.00
Mercury (Hg)			(a)			(a)			(a)			(a)	0.05
Nickel (Ni)			(a)			(a)			(a)			(a)	7.40
Potassium (K)			(a)			(a)			(a)			(a)	14050.00
Selenium (Se)			(a)			(a)			(a)			(a)	1.45
Sodium (Na)			(a)			(a)			(a)			(a)	592000.00
Thallium (Tl)			(a)			(a)			(a)			(a)	2.80
Vanadium (V)			(a)			(a)			(a)			(a)	2.00
Zinc (Zn)			(a)			(a)			(a)			(a)	13.45

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ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent ug/L	196GW00201 12/7/99			196GW00301 12/7/99			GELGW01501 5/6/98			GELGW01502 8/11/98			GELGW01503 4/27/99		
	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Cyanide (CN)	1.60	J	1.60	1.50	J	1.50			(a)	2.00	UJ	1.00			(a)
Aluminum (Al)	32.10	U	16.05	32.10	U	16.05			(a)	162.00	J	162.00			(a)
Antimony (Sb)	5.00	U	2.50	5.00	U	2.50			(a)	2.70	U	1.35			(a)
Arsenic (As)	7.70	J	7.70	11.00		11.00			(a)	327.00		327.00			(a)
Barium (Ba)	57.20		57.20	51.70		51.70			(a)	215.00		215.00			(a)
Beryllium (Be)	0.40	J	0.40	0.36	J	0.36			(a)	0.13	J	0.13			(a)
Cadmium (Cd)	0.30	UJ	0.15	0.30	UJ	0.15			(a)	0.30	U	0.15			(a)
Calcium (Ca)	174000.00		174000.00	151000.00		151000.00			(a)	130000.00		130000.00			(a)
Chromium (Cr)	0.55	J	0.55	1.40	J	1.40			(a)	0.70	U	0.35			(a)
Cobalt (Co)	1.70	U	0.85	1.70	U	0.85			(a)	20.10	J	20.10			(a)
Copper (Cu)	1.00	U	0.50	1.00	U	0.50			(a)	0.80	U	0.40			(a)
Iron (Fe)	2030.00		2030.00	1630.00		1630.00			(a)	39800.00		39800.00			(a)
Lead (Pb)	2.10	U	1.05	2.10	U	1.05			(a)	1.50	U	0.75			(a)
Magnesium (Mg)	309000.00		309000.00	266000.00		266000.00			(a)	26300.00		26300.00			(a)
Manganese (Mn)	303.00		303.00	366.00		366.00			(a)	2080.00		2080.00			(a)
Mercury (Hg)	0.10	U	0.05	0.10	U	0.05			(a)	0.15	J	0.15			(a)
Nickel (Ni)	2.60	U	1.30	3.60	U	1.80			(a)	3.00	J	3.00			(a)
Potassium (K)	123000.00		123000.00	110000.00		110000.00			(a)	9530.00		9530.00			(a)
Selenium (Se)	2.90	U	1.45	2.90	U	1.45			(a)	3.10	U	1.55			(a)
Sodium (Na)	3200000.00		3200000.00	2860000.00		2860000.00			(a)	187000.00	D	187000.00			(a)
Thallium (Tl)	2.50	J	2.50	3.90	J	3.90			(a)	8.30	J	8.30			(a)
Vanadium (V)	1.20	J	1.20	0.90	U	0.45			(a)	2.80	J	2.80			(a)
Zinc (Zn)	2.90	U	1.45	8.10	J	8.10			(a)	5.50	J	5.50			(a)

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ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent	GELGW01504 12/7/99			196GW00101 12/8/99 (c)		196HW00101 12/8/99 (c)	
ug/L	LAB	Q	RA	LAB	Q	LAB	Q
Cyanide (CN)	1.00	U	0.50	1.00	UJ	1.00	UJ
Aluminum (Al)	32.10	U	16.05	110.00	J	113.00	J
Antimony (Sb)	5.00	U	2.50	5.00	U	5.00	U
Arsenic (As)	118.00		118.00	5.30	J	3.30	U
Barium (Ba)	158.00		158.00	121.00		99.10	
Beryllium (Be)	0.30	U	0.15	0.50	U	0.50	U
Cadmium (Cd)	0.30	UJ	0.15	0.36	U	0.54	U
Calcium (Ca)	130000.00		130000.00	219000.00		168000.00	
Chromium (Cr)	0.50	U	0.25	1.30	U	0.50	U
Cobalt (Co)	21.50	J	21.50	21.20	J	34.70	
Copper (Cu)	1.00	U	0.50	2.60	U	4.60	U
Iron (Fe)	37400.00		37400.00	206.00	U	771.00	
Lead (Pb)	2.10	U	1.05	2.10	U	2.10	U
Magnesium (Mg)	31800.00		31800.00	70300.00		52100.00	
Manganese (Mn)	2350.00		2350.00	1210.00		1200.00	
Mercury (Hg)	0.10	U	0.05	0.10	U	0.10	U
Nickel (Ni)	4.90	U	2.45	6.80	J	8.00	J
Potassium (K)	8430.00		8430.00	16600.00		11500.00	
Selenium (Se)	3.30	J	3.30	2.90	U	2.90	U
Sodium (Na)	228000.00		228000.00	728000.00		456000.00	
Thallium (Tl)	2.30	U	1.15	2.60	J	3.00	J
Vanadium (V)	0.90	U	0.45	2.40	J	1.60	J
Zinc (Zn)	4.80	J	4.80	8.00	U	45.80	U

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APPENDIX C
TABLE 6 - QUALIFIED ANALYTICAL DATA - GROUNDWATER SAMPLES (ORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent	009GW02001 8/11/98			009GW02003 4/27/99			009GW02004 12/7/99			009GW02101 8/11/98			009GW02103 4/27/99			009GW02104 12/7/99		
ug/L	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Heptachlor	0.04	J	0.04	0.04	U	0.02	0.04	U	0.02	0.04	U	0.02	0.04	U	0.02	0.04	U	0.02
1,2,4-Trichlorobenzene	10.00	U	5.00	40.00	U	20.00	10.00	U	5.00	2.00	J	2.00	6.00	J	6.00	2.00	J	2.00
1,2-Dichlorobenzene	1500.00	D	1500.00	140.00		140.00	64.00		64.00	3300.00	D	3300.00	13000.00	D	13000.00	8200.00	D	8200.00
1,3-Dichlorobenzene	58.00		58.00	24.00	J	24.00	23.00		23.00	270.00	D	270.00	1100.00	D	1100.00	690.00	DJ	690.00
1,4-Dichlorobenzene	130.00	D	130.00	92.00		92.00	83.00	D	83.00	510.00	D	510.00	1900.00	D	1900.00	1300.00	DJ	1300.00
2,4-Dichlorophenol	5.00	J	5.00	40.00	U	20.00	1.00	J	1.00	10.00	U	5.00			(a)	1.00	J	1.00
2-Chlorophenol	67.00		67.00	52.00		52.00	40.00		40.00	3.00	J	3.00			(a)	3.00	J	3.00
4-Methylphenol (p-Cresol)	10.00	U	5.00	40.00	U	20.00	10.00	U	5.00	10.00	U	5.00			(a)	10.00	U	5.00
Benzoic acid	7.00	J	7.00	100.00	U	50.00	10.00	U	5.00	7.00	J	7.00			(a)	10.00	U	5.00
Di-n-butylphthalate	10.00	U	5.00	40.00	U	20.00	1.00	J	1.00	10.00	U	5.00	10.00	U	5.00	1.00	J	1.00
Isophorone	1.00	J	1.00	40.00	U	20.00	10.00	U	5.00	10.00	U	5.00	10.00	U	5.00	10.00	U	5.00
Naphthalene	28.00		28.00	40.00	U	20.00	10.00	U	5.00	10.00	U	5.00	10.00	U	5.00	1.00	J	1.00
Phenol	10.00	U	5.00	40.00	U	20.00	10.00	U	5.00	10.00	U	5.00			(a)	10.00	U	5.00
1,1-Dichloroethene	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	2.00	J	2.00	5.00	U	2.50
1,2-Dichloroethene (total)	5.00	UJ	2.50	5.00	U	2.50	5.00	U	2.50	49.00	J	49.00	240.00		240.00	68.00		68.00
2-Butanone (MEK)	5.00	U	2.50			(a)	5.00	U	2.50	5.00	U	2.50			(a)	5.00	U	2.50
4-Methyl-2-Pentanone (MIBK)	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	4.00	J	4.00	5.00	U	2.50
Acetone			(a)			(a)	5.00	U	2.50			(a)			(a)	5.00	U	2.50
Benzene	61.00		61.00	19.00		19.00	17.00		17.00	36.00		36.00	110.00		110.00	39.00		39.00
Carbon disulfide	5.00	J	5.00	5.00	U	2.50	5.00	U	2.50	5.00	UJ	2.50	5.00	UJ	2.50	5.00	U	2.50
Chlorobenzene	5100.00	D	5100.00	16000.00	D	16000.00	12000.00	D	12000.00	4300.00	D	4300.00	19000.00	D	19000.00	8800.00	D	8800.00
Chloroethane	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	UJ	2.50	5.00	U	2.50
Ethylbenzene	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	2.00	J	2.00	5.00	U	2.50
Tetrachloroethene	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	J	5.00	5.00	U	2.50
Toluene	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	6.00	J	6.00	5.00	U	2.50
Trichloroethene	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	4.00	J	4.00	5.00	U	2.50
Vinyl chloride	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	44.00	J	44.00	14.00		14.00
Xylene (Total)	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	4.00	J	4.00	5.00	U	2.50

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(c) Sample is result of averaging values from two duplicate samples (196GW00101 and 196HW00101, see last two columns in this table for values).
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APPENDIX C
TABLE 6 - QUALIFIED ANALYTICAL DATA - GROUNDWATER SAMPLES (ORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent	009GW02201 8/11/98			009GW02203 4/28/99			009GW02204 12/9/99			009GW02301 8/11/98			009GW02303 4/27/99			009GW02304 12/8/99		
ug/L	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Heptachlor	0.04	U	0.02	0.04	U	0.02	0.05	U	0.02	0.04	U	0.02	0.04	U	0.02	0.04	U	0.02
1,2,4-Trichlorobenzene	10.00	U	5.00	10.00	U	5.00	11.00	U	5.50	10.00	U	5.00	10.00	U	5.00	10.00	U	5.00
1,2-Dichlorobenzene	10.00	U	5.00	10.00	U	5.00	11.00	U	5.50	10.00	U	5.00	4.00	J	4.00	10.00	U	5.00
1,3-Dichlorobenzene	10.00	U	5.00	10.00	U	5.00	11.00	U	5.50	10.00	U	5.00	10.00	U	5.00	10.00	U	5.00
1,4-Dichlorobenzene	10.00	U	5.00	15.00		15.00	11.00	U	5.50	10.00	U	5.00	10.00	U	5.00	10.00	U	5.00
2,4-Dichlorophenol	10.00	U	5.00	10.00	U	5.00	11.00	U	5.50	10.00	U	5.00	10.00	UJ	5.00	10.00	U	5.00
2-Chlorophenol	10.00	U	5.00	10.00	U	5.00	11.00	U	5.50	10.00	U	5.00	10.00	UJ	5.00	10.00	U	5.00
4-Methylphenol (p-Cresol)	10.00	U	5.00	10.00	U	5.00	11.00	U	5.50	10.00	U	5.00	10.00	UJ	5.00	10.00	U	5.00
Benzoic acid	8.00	J	8.00	25.00	U	12.50	11.00	U	5.50	7.00	J	7.00	25.00	UJ	12.50	10.00	U	5.00
Di-n-butylphthalate	2.00	J	2.00	10.00	U	5.00	11.00	U	5.50	10.00	U	5.00	10.00	U	5.00	1.00	J	1.00
Isophorone	10.00	U	5.00	10.00	U	5.00	11.00	U	5.50	10.00	U	5.00	10.00	U	5.00	10.00	U	5.00
Naphthalene	10.00	U	5.00	10.00	U	5.00	11.00	U	5.50	10.00	U	5.00	10.00	U	5.00	10.00	U	5.00
Phenol	10.00	U	5.00	10.00	U	5.00	11.00	U	5.50	1.00	J	1.00	10.00	UJ	5.00	10.00	U	5.00
1,1-Dichloroethene	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50
1,2-Dichloroethene (total)	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	45.00	J	45.00	5.00	U	2.50	2.00	J	2.00
2-Butanone (MEK)	5.00	UJ	2.50			(a)	5.00	U	2.50	5.00	U	2.50			(a)	5.00	U	2.50
4-Methyl-2-Pentanone (MIBK)	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50
Acetone	21.00	U	10.50	4.00	J	4.00	5.00	UJ	2.50			(a)			(a)	5.00	UJ	2.50
Benzene	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50
Carbon disulfide	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	UJ	2.50	5.00	U	2.50	5.00	U	2.50
Chlorobenzene	5.00	U	2.50	42.00		42.00	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50
Chloroethane	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50
Ethylbenzene	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50
Tetrachloroethene	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50
Toluene	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50
Trichloroethene	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	24.00		24.00	5.00	U	2.50	1.00	J	1.00
Vinyl chloride	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	50.00		50.00	5.00	U	2.50	5.00	U	2.50
Xylene (Total)	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50

(a) Data omitted from dataset due to "R" qualifier (i.e., data determined to be unuseable).
(b) Compound not analyzed for.
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APPENDIX C
TABLE 6 - QUALIFIED ANALYTICAL DATA - GROUNDWATER SAMPLES (ORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent	009GW23D01 8/11/98			009GW23D03 4/27/99			009GW23D04 12/8/99			196GDF0101 6/8/99			196GDF0201 6/8/99			196GDF0301 6/9/99		
ug/L	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Heptachlor	0.08	U	0.04	0.04	U	0.02	0.04	U	0.02	0.05	U	0.03	0.06	U	0.03	0.05	U	0.03
1,2,4-Trichlorobenzene	10.00	U	5.00	10.00	U	5.00	11.00	U	5.50	6.00	U	3.00	6.00	U	3.00	5.00	U	2.50
1,2-Dichlorobenzene	10.00	U	5.00	10.00	U	5.00	11.00	U	5.50	6.00	U	3.00	6.00	U	3.00	5.00	U	2.50
1,3-Dichlorobenzene	10.00	U	5.00	10.00	U	5.00	11.00	U	5.50	6.00	U	3.00	6.00		6.00	5.00	U	2.50
1,4-Dichlorobenzene	10.00	U	5.00	10.00	U	5.00	11.00	U	5.50	6.00	U	3.00	23.00		23.00	5.00	U	2.50
2,4-Dichlorophenol	10.00	U	5.00	10.00	U	5.00	11.00	U	5.50	6.00	U	3.00	1.00	J	1.00	5.00	U	2.50
2-Chlorophenol	10.00	UJ	5.00	10.00	U	5.00	11.00	U	5.50	6.00	U	3.00	7.00		7.00	5.00	U	2.50
4-Methylphenol (p-Cresol)	10.00	U	5.00	10.00	U	5.00	11.00	U	5.50	6.00	U	3.00	1.00	J	1.00	5.00	U	2.50
Benzoic acid	50.00	U	25.00	25.00	U	12.50	11.00	U	5.50	1.00	J	1.00	8.00	J	8.00	3.00	J	3.00
Di-n-butylphthalate	10.00	U	5.00	10.00	U	5.00	11.00	U	5.50	6.00	U	3.00	6.00	U	3.00	5.00	U	2.50
Isophorone	10.00	U	5.00	10.00	U	5.00	11.00	U	5.50	6.00	U	3.00	6.00	U	3.00	5.00	U	2.50
Naphthalene	10.00	U	5.00	10.00	U	5.00	11.00	U	5.50	6.00	U	3.00	6.00	U	3.00	5.00	U	2.50
Phenol	10.00	U	5.00	10.00	U	5.00	11.00	U	5.50	6.00	U	3.00	2.00	J	2.00	5.00	U	2.50
1,1-Dichloroethene	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	3.00	U	1.50	3.00	U	1.50	3.00	U	1.50
1,2-Dichloroethene (total)	5.00	UJ	2.50	5.00	U	2.50	5.00	U	2.50			(b)			(b)			(b)
2-Butanone (MEK)	5.00	U	2.50			(a)	5.00	U	2.50	7.00	J	7.00	5.00	U	2.50			(a)
4-Methyl-2-Pentanone (MIBK)	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50
Acetone			(a)			(a)	5.00	UJ	2.50			(a)			(a)			(a)
Benzene	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	3.00	U	1.50	7.00		7.00	3.00	U	1.50
Carbon disulfide	5.00	UJ	2.50	5.00	U	2.50	5.00	U	2.50	3.00	U	1.50	2.00	J	2.00	3.00	U	1.50
Chlorobenzene	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	2.00	J	2.00	35.00	D	35.00	3.00	U	1.50
Chloroethane	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	3.00	U	1.50	3.00	U	1.50	3.00	U	1.50
Ethylbenzene	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	3.00	U	1.50	3.00	U	1.50	3.00	U	1.50
Tetrachloroethene	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	3.00	U	1.50	3.00	U	1.50	3.00	U	1.50
Toluene	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	3.00	U	1.50	3.00	U	1.50	3.00	U	1.50
Trichloroethene	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	3.00	U	1.50	3.00	U	1.50	3.00	U	1.50
Vinyl chloride	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50	3.00	U	1.50	3.00	U	1.50	3.00	U	1.50
Xylene (Total)	5.00	U	2.50	5.00	U	2.50	5.00	U	2.50			(b)			(b)			(b)

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APPENDIX C
TABLE 6 - QUALIFIED ANALYTICAL DATA - GROUNDWATER SAMPLES (ORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent	196GDF0401 6/9/99			196GW00101 12/8/99 (c)	196GW00201 12/7/99			196GW00301 12/7/99			GELGW01501 5/6/98			GELGW01502 8/11/98		
ug/L	LAB	Q	RA	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Heptachlor	0.05	U	0.03	0.02	0.04	U	0.02	0.04	U	0.02			(b)	0.04	U	0.02
1,2,4-Trichlorobenzene	5.00	U	2.50	5.00	10.00	U	5.00	10.00	U	5.00			(b)	3.00	J	3.00
1,2-Dichlorobenzene	5.00	U	2.50	5.00	65.00		65.00	10.00	U	5.00			(b)	6000.00	D	6000.00
1,3-Dichlorobenzene	5.00	U	2.50	5.00	5.00	J	5.00	10.00	U	5.00			(b)	140.00	J	140.00
1,4-Dichlorobenzene	5.00	U	2.50	5.00	10.00		10.00	10.00	U	5.00			(b)	220.00	D	220.00
2,4-Dichlorophenol	5.00	U	2.50	5.00	10.00	U	5.00	10.00	U	5.00			(b)	10.00	U	5.00
2-Chlorophenol	5.00	U	2.50	5.00	10.00	U	5.00	10.00	U	5.00			(b)	28.00		28.00
4-Methylphenol (p-Cresol)	5.00	U	2.50	5.00	10.00	U	5.00	10.00	U	5.00			(b)	10.00	U	5.00
Benzoic acid	2.00	J	2.00	5.00	10.00	U	5.00	10.00	U	5.00			(b)	8.00	J	8.00
Di-n-butylphthalate	5.00	U	2.50	1.00	10.00	U	5.00	10.00	U	5.00			(b)	2.00	J	2.00
Isophorone	5.00	U	2.50	5.00	10.00	U	5.00	10.00	U	5.00			(b)	10.00	U	5.00
Naphthalene	5.00	U	2.50	5.00	10.00	U	5.00	10.00	U	5.00			(b)	10.00	U	5.00
Phenol	5.00	U	2.50	5.00	10.00	U	5.00	10.00	U	5.00			(b)	10.00	U	5.00
1,1-Dichloroethene	3.00	U	1.50	2.50	5.00	U	2.50	5.00	U	2.50	1.00	U	0.50	5.00	U	2.50
1,2-Dichloroethene (total)			(b)	2.50	5.00	U	2.50	5.00	U	2.50	2.50		2.50	5.00	UJ	2.50
2-Butanone (MEK)			(a)	2.50	5.00	U	2.50	5.00	U	2.50	10.00	U	5.00	5.00	U	2.50
4-Methyl-2-Pentanone (MIBK)	5.00	U	2.50	2.50	5.00	U	2.50	5.00	U	2.50			(a)	5.00	U	2.50
Acetone			(a)	2.50	5.00	U	2.50	5.00	U	2.50	10.00	U	5.00			(a)
Benzene	3.00	U	1.50	1.00	5.00	U	2.50	5.00	U	2.50	130.00	JD	130.00	200.00		200.00
Carbon disulfide	3.00	U	1.50	2.50	5.00	U	2.50	5.00	U	2.50	1.00	U	0.50	5.00	UJ	2.50
Chlorobenzene	3.00	U	1.50	2.50	23.00		23.00	3.00	J	3.00	14000.00	D	14000.00	5200.00	D	5200.00
Chloroethane	3.00	U	1.50	2.50	5.00	U	2.50	5.00	U	2.50	0.53	J	0.53	5.00	U	2.50
Ethylbenzene	3.00	U	1.50	2.50	5.00	U	2.50	5.00	U	2.50			(a)	5.00	U	2.50
Tetrachloroethene	3.00	U	1.50	2.50	5.00	U	2.50	5.00	U	2.50	2.30	J	2.30	5.00	U	2.50
Toluene	3.00	U	1.50	2.50	5.00	U	2.50	5.00	U	2.50	2.50	J	2.50	5.00	U	2.50
Trichloroethene	3.00	U	1.50	2.50	5.00	U	2.50	5.00	U	2.50	0.81	J	0.81	5.00	U	2.50
Vinyl chloride	3.00	U	1.50	2.50	5.00	U	2.50	5.00	U	2.50	3.80		3.80	5.00	U	2.50
Xylene (Total)			(b)	2.50	5.00	U	2.50	5.00	U	2.50	2.20	J	2.20	5.00	U	2.50

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ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent	GELGW01503 4/27/99			GELGW01504 12/7/99			196GW00101 12/8/99 (d)		196HW00101 12/8/99 (d)	
ug/L	LAB	Q	RA	LAB	Q	RA	LAB	Q	LAB	Q
Heptachlor	0.04	U	0.02	0.04	U	0.02	0.04	U	0.04	U
1,2,4-Trichlorobenzene	5.00	J	5.00	4.00	J	4.00	10.00	U	10.00	U
1,2-Dichlorobenzene	12000.00	D	12000.00	12000.00	D	12000.00	10.00	U	10.00	U
1,3-Dichlorobenzene	120.00	J	120.00	160.00	DJ	160.00	10.00	U	10.00	U
1,4-Dichlorobenzene	310.00	D	310.00	380.00	DJ	380.00	10.00	U	10.00	U
2,4-Dichlorophenol	4.00	J	4.00	12.00		12.00	10.00	U	10.00	U
2-Chlorophenol			(a)	30.00		30.00	10.00	U	10.00	U
4-Methylphenol (p-Cresol)			(a)	10.00	U	5.00	10.00	U	10.00	U
Benzoic acid			(a)	10.00	U	5.00	10.00	U	10.00	U
Di-n-butylphthalate	10.00	U	5.00	10.00	U	5.00	1.00	J	1.00	J
Isophorone	0.80	J	0.80	1.00	J	1.00	10.00	U	10.00	U
Naphthalene	10.00	U	5.00	10.00	U	5.00	10.00	U	10.00	U
Phenol			(a)	10.00	U	5.00	10.00	U	10.00	U
1,1-Dichloroethene	5.00	UJ	2.50	5.00	U	2.50	5.00	U	5.00	U
1,2-Dichloroethene (total)	5.00	UJ	2.50	5.00	U	2.50	5.00	U	5.00	U
2-Butanone (MEK)			(a)	5.00	U	2.50	5.00	U	5.00	U
4-Methyl-2-Pentanone (MIBK)	5.00	UJ	2.50	5.00	U	2.50	5.00	U	5.00	U
Acetone			(a)	5.00	U	2.50	5.00	U	5.00	U
Benzene	140.00	J	140.00	140.00		140.00	5.00	U	1.00	J
Carbon disulfide	5.00	UJ	2.50	5.00	U	2.50	5.00	U	5.00	U
Chlorobenzene	7200.00	D	7200.00	15000.00	D	15000.00	5.00	U	5.00	U
Chloroethane	5.00	UJ	2.50	5.00	U	2.50	5.00	U	5.00	U
Ethylbenzene	5.00	UJ	2.50	5.00	U	2.50	5.00	U	5.00	U
Tetrachloroethene	5.00	UJ	2.50	5.00	U	2.50	5.00	U	5.00	U
Toluene	2.00	J	2.00	5.00	U	2.50	5.00	U	5.00	U
Trichloroethene	5.00	UJ	2.50	5.00	U	2.50	5.00	U	5.00	U
Vinyl chloride	5.00	UJ	2.50	2.00	J	2.00	5.00	U	5.00	U
Xylene (Total)	5.00	UJ	2.50	5.00	U	2.50	5.00	U	5.00	U

(a) Data omitted from dataset due to "R" qualifier (i.e., data determined to be unuseable).
(b) Compound not analyzed for.
(c) Sample is result of averaging values from two duplicate samples
(196GW00101 and 196HW00101, see last two columns in this table for values).

(d) Values from these duplicate samples were averaged to create values used in the risk assessment.

U = Compound analyzed for, but not detected
J = The value represents an estimated quantity.
D = Compound identified at a secondary dilution factor

APPENDIX C
TABLE 7 - QUALIFIED ANALYTICAL DATA - SUBSURFACE SOILS (INORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent (Units in mg/kg)	Sample ID / Date / Depth (ft)	196SB00102 9/1/99 3-5			196SB00202 9/1/99 3-5			196SB00302 9/1/99 3-5		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Cyanide (CN)		0.1700	U	0.0850	0.1700	U	0.0850	0.1700	U	0.0850
Aluminum (Al)		4230.0000		4230.0000	4390.0000		4390.0000	5540.0000		5540.0000
Antimony (Sb)		0.3000	UJ	0.1500	0.3200	UJ	0.1600	0.3100	UJ	0.1550
Arsenic (As)		7.7000		7.7000	4.9000		4.9000	4.2000		4.2000
Barium (Ba)		9.1000		9.1000	11.4000		11.4000	12.2000		12.2000
Beryllium (Be)		0.2000	J	0.2000	0.1300	J	0.1300	0.1100	J	0.1100
Cadmium (Cd)		0.0300	U	0.0150	0.0400	U	0.0200	0.0300	U	0.0150
Calcium (Ca)		1190.0000	J	1190.0000	1780.0000	J	1780.0000	1340.0000	J	1340.0000
Chromium (Cr)		11.8000		11.8000	7.6000		7.6000	10.0000		10.0000
Cobalt (Co)		0.5000	J	0.5000	0.2900	J	0.2900	0.5300	J	0.5300
Copper (Cu)		0.7700	J	0.7700	0.6500	J	0.6500	1.1000	J	1.1000
Iron (Fe)		13300.0000	J	13300.0000	11400.0000	J	11400.0000	5530.0000	J	5530.0000
Lead (Pb)		4.0000		4.0000	4.6000		4.6000	5.8000		5.8000
Magnesium (Mg)		460.0000		460.0000	474.0000		474.0000	511.0000		511.0000
Manganese (Mn)		4.3000		4.3000	3.6000		3.6000	6.8000		6.8000
Mercury (Hg)		0.0200	U	0.0100	0.0200	U	0.0100	0.0200	U	0.0100
Nickel (Ni)		0.4000	U	0.2000	0.4300	U	0.2150	1.0000	J	1.0000
Potassium (K)		229.0000	J	229.0000	300.0000		300.0000	280.0000	J	280.0000
Selenium (Se)		0.3700	UJ	0.1850	0.3900	UJ	0.1950	0.3800	UJ	0.1900
Sodium (Na)		394.0000		394.0000	310.0000	J	310.0000	425.0000		425.0000
Thallium (Tl)		0.3800	U	0.1900	0.4000	U	0.2000	0.4000	U	0.2000
Tin (Sn)		2.3000	U	1.1500	3.3000	U	1.6500	3.6000	U	1.8000
Vanadium (V)		20.8000		20.8000	11.8000		5.9000	11.0000		5.5000
Zinc (Zn)		6.1000		6.1000	7.8000		3.9000	8.7000		4.3500

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APPENDIX C
TABLE 7 - QUALIFIED ANALYTICAL DATA - SUBSURFACE SOILS (INORGANICS)
ZONE H - SWMU 196
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Constituent (Units in mg/kg)	Sample ID / Date / Depth (ft)	196SB00402 9/1/99 3-5			196SB00502 9/1/99 3-5			196SB00702 9/2/99 3-5		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Cyanide (CN)		0.1900	U	0.0950	1.2000		1.2000	0.1800	U	0.0900
Aluminum (Al)		6850.0000		6850.0000	6570.0000		6570.0000	10400.0000		10400.0000
Antimony (Sb)		3.1000	J	3.1000	5.0000	J	5.0000	1.4000	J	1.4000
Arsenic (As)		11.2000		11.2000	13.0000		13.0000	8.9000		8.9000
Barium (Ba)		17.4000		17.4000	54.4000		54.4000	72.3000	J	72.3000
Beryllium (Be)		0.2000	J	0.2000	0.4700	J	0.4700	0.6400		0.6400
Cadmium (Cd)		0.0400	U	0.0200	0.7800	J	0.7800	0.6000	J	0.6000
Calcium (Ca)		5320.0000	J	5320.0000	50900.0000	J	50900.0000	19000.0000	J	19000.0000
Chromium (Cr)		18.3000		18.3000	28.4000		28.4000	25.4000		25.4000
Cobalt (Co)		2.0000	J	2.0000	4.1000		4.1000	2.8000	J	2.8000
Copper (Cu)		19.4000		19.4000	274.0000		274.0000	53.1000		53.1000
Iron (Fe)		9430.0000	J	9430.0000	239000.0000	J	239000.0000	17400.0000	J	17400.0000
Lead (Pb)		49.2000		49.2000	143.0000		143.0000	89.9000	J	89.9000
Magnesium (Mg)		929.0000		929.0000	1330.0000		1330.0000	1420.0000	J	1420.0000
Manganese (Mn)		14.2000		14.2000	122.0000		122.0000	140.0000	J	140.0000
Mercury (Hg)		0.0200	U	0.0100	0.0600		0.0600	0.0700	J	0.0700
Nickel (Ni)		4.0000	J	4.0000	18.6000		18.6000	10.0000	J	10.0000
Potassium (K)		646.0000		646.0000	467.0000		467.0000	389.0000		389.0000
Selenium (Se)		0.4200	UJ	0.2100	0.3900	UJ	0.1950	0.5800	J	0.5800
Sodium (Na)		381.0000	J	381.0000	378.0000		378.0000	494.0000		494.0000
Thallium (Tl)		0.4400	U	0.2200	0.4000	U	0.2000	0.4100	U	0.2050
Tin (Sn)		11.4000	U	5.7000	13.2000	U	6.6000	27.9000	J	27.9000
Vanadium (V)		21.1000		10.5500	96.8000		48.4000	26.0000	J	26.0000
Zinc (Zn)		74.8000		37.4000	347.0000		173.5000	254.0000	J	254.0000

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APPENDIX C
TABLE 7 - QUALIFIED ANALYTICAL DATA - SUBSURFACE SOILS (INORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent (Units in mg/kg)	Sample ID / Date / Depth (ft)	196SB00802 9/2/99 3-5			196SB00902 9/2/99 3-5			196SB01002 9/2/99 3-5		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Cyanide (CN)		0.1700	U	0.0850	0.1900	U	0.0950	0.2100	U	0.1050
Aluminum (Al)		10700.0000		10700.0000	12300.0000		12300.0000	22400.0000		22400.0000
Antimony (Sb)		0.3100	UJ	0.1550	0.8600	J	0.8600	1.2000	J	1.2000
Arsenic (As)		3.2000		3.2000	12.2000		12.2000	18.4000		18.4000
Barium (Ba)		31.2000	J	31.2000	34.7000	J	34.7000	84.4000	J	84.4000
Beryllium (Be)		0.3100	J	0.3100	0.6200	J	0.6200	0.9900		0.9900
Cadmium (Cd)		0.0300	UJ	0.0150	0.0800	U	0.0400	0.3500	J	0.3500
Calcium (Ca)		1380.0000	J	1380.0000	46600.0000	J	46600.0000	19000.0000	J	19000.0000
Chromium (Cr)		16.2000		16.2000	29.3000		29.3000	49.6000		49.6000
Cobalt (Co)		1.8000	J	1.8000	2.5000	J	2.5000	6.8000	J	6.8000
Copper (Cu)		7.4000		7.4000	23.0000		23.0000	103.0000		103.0000
Iron (Fe)		10100.0000	J	10100.0000	16900.0000	J	16900.0000	36900.0000	J	36900.0000
Lead (Pb)		10.2000	J	10.2000	48.7000	J	48.7000	181.0000	J	181.0000
Magnesium (Mg)		1020.0000	J	1020.0000	2380.0000	J	2380.0000	3070.0000	J	3070.0000
Manganese (Mn)		33.4000	J	33.4000	118.0000	J	118.0000	736.0000	J	736.0000
Mercury (Hg)		0.0800	J	0.0800	0.0600	J	0.0600	0.1600		0.1600
Nickel (Ni)		6.7000	J	6.7000	11.2000	J	11.2000	20.2000	J	20.2000
Potassium (K)		320.0000		320.0000	802.0000		802.0000	1270.0000		1270.0000
Selenium (Se)		0.3700	U	0.1850	1.0000		1.0000	0.6300	J	0.6300
Sodium (Na)		453.0000		453.0000	566.0000		566.0000	632.0000		632.0000
Thallium (Tl)		0.4300	J	0.4300	0.4200	U	0.2100	0.4800	U	0.2400
Tin (Sn)		3.7000	UJ	1.8500	8.0000	UJ	4.0000	104.0000	J	104.0000
Vanadium (V)		17.4000	J	17.4000	28.3000	J	28.3000	58.0000	J	58.0000
Zinc (Zn)		22.5000	J	22.5000	70.5000	J	70.5000	398.0000	J	398.0000

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TABLE 7 - QUALIFIED ANALYTICAL DATA - SUBSURFACE SOILS (INORGANICS)
ZONE H - SWMU 196
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Constituent (Units in mg/kg)	Sample ID / Date / Depth (ft)	196SB01202 9/2/99 3-5			196SB01302 9/2/99 3-5			196SB01402 9/2/99 3-5		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Cyanide (CN)		0.1700	U	0.0850	0.1700	U	0.0850	0.1600	U	0.0800
Aluminum (Al)		7710.0000		7710.0000	9150.0000		9150.0000	5120.0000		5120.0000
Antimony (Sb)		2.0000	J	2.0000	1.3000	J	1.3000	0.3000	UJ	0.1500
Arsenic (As)		7.5000		7.5000	3.3000		3.3000	2.0000		2.0000
Barium (Ba)		53.9000	J	53.9000	33.3000	J	33.3000	25.0000	J	25.0000
Beryllium (Be)		0.4000	J	0.4000	0.3300	J	0.3300	0.2800	J	0.2800
Cadmium (Cd)		0.2200	J	0.2200	0.0300	UJ	0.0150	0.0400	UJ	0.0200
Calcium (Ca)		16200.0000	J	16200.0000	5570.0000	J	5570.0000	1740.0000	J	1740.0000
Chromium (Cr)		20.9000		20.9000	16.7000		16.7000	8.1000		8.1000
Cobalt (Co)		2.6000	J	2.6000	1.7000	J	1.7000	1.0000	J	1.0000
Copper (Cu)		84.3000		84.3000	39.3000		39.3000	18.3000		18.3000
Iron (Fe)		14400.0000	J	14400.0000	8820.0000	J	8820.0000	5150.0000	J	5150.0000
Lead (Pb)		113.0000	J	113.0000	32.9000	J	32.9000	13.5000	J	13.5000
Magnesium (Mg)		1030.0000	J	1030.0000	958.0000	J	958.0000	490.0000	J	490.0000
Manganese (Mn)		62.4000	J	62.4000	24.2000	J	24.2000	24.2000	J	24.2000
Mercury (Hg)		0.1700		0.1700	0.0500	J	0.0500	0.0200	UJ	0.0100
Nickel (Ni)		11.2000	J	11.2000	6.2000	J	6.2000	2.8000	J	2.8000
Potassium (K)		394.0000		394.0000	324.0000		324.0000	168.0000	J	168.0000
Selenium (Se)		0.4000	U	0.2000	0.3800	U	0.1900	0.3600	U	0.1800
Sodium (Na)		379.0000		379.0000	425.0000		425.0000	266.0000	J	266.0000
Thallium (Tl)		0.4100	U	0.2050	0.4000	U	0.2000	0.3800	U	0.1900
Tin (Sn)		198.0000	J	198.0000	5.2000	UJ	2.6000	4.0000	UJ	2.0000
Vanadium (V)		19.5000	J	19.5000	18.1000	J	18.1000	10.3000	J	10.3000
Zinc (Zn)		123.0000	J	123.0000	62.0000	J	62.0000	24.9000	J	24.9000

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TABLE 7 - QUALIFIED ANALYTICAL DATA - SUBSURFACE SOILS (INORGANICS)
ZONE H - SWMU 196
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Constituent (Units in mg/kg)	Sample ID / Date / Depth (ft)	196SB01502 9/2/99 3-5 LAB	Q	RA	196SB01702 9/2/99 3-5 LAB	Q	RA
Cyanide (CN)		0.1600	U	0.0800	0.1600	UJ	0.0800
Aluminum (Al)		3060.0000		3060.0000	7280.0000		7280.0000
Antimony (Sb)		0.3000	UJ	0.1500	0.2800	U	0.1400
Arsenic (As)		0.9300	J	0.9300	2.9000		2.9000
Barium (Ba)		13.9000	J	13.9000	28.1000		28.1000
Beryllium (Be)		0.1800	J	0.1800	0.4700	J	0.4700
Cadmium (Cd)		0.0300	UJ	0.0150	0.0300	U	0.0150
Calcium (Ca)		773.0000	J	773.0000	1180.0000		1180.0000
Chromium (Cr)		3.9000		3.9000	9.9000		9.9000
Cobalt (Co)		0.6400	J	0.6400	1.4000	J	1.4000
Copper (Cu)		0.6600	J	0.6600	2.2000	J	2.2000
Iron (Fe)		2230.0000	J	2230.0000	7630.0000		7630.0000
Lead (Pb)		2.0000	J	2.0000	6.1000		6.1000
Magnesium (Mg)		274.0000	J	274.0000	540.0000		540.0000
Manganese (Mn)		16.5000	J	16.5000	20.0000		20.0000
Mercury (Hg)		0.0200	UJ	0.0100	0.0200	U	0.0100
Nickel (Ni)		1.5000	J	1.5000	3.2000	J	3.2000
Potassium (K)		98.4000	J	98.4000	177.0000	J	177.0000
Selenium (Se)		0.3700	U	0.1850	0.3500	U	0.1750
Sodium (Na)		287.0000	J	287.0000	288.0000	J	288.0000
Thallium (Tl)		0.3800	U	0.1900	0.3600	U	0.1800
Tin (Sn)		2.5000	UJ	1.2500	2.5000	U	1.2500
Vanadium (V)		4.3000	J	4.3000	12.9000		12.9000
Zinc (Zn)		4.9000	J	4.9000	10.0000		10.0000

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TABLE 8 - QUALIFIED ANALYTICAL DATA - SUBSURFACE SOILS (ORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent (Units in ug/kg)	Sample ID	196SB00102			196SB00202			196SB00302			196SB00402			196SB00502		
	Date	9/1/99			9/1/99			9/1/99			9/1/99			9/1/99		
	Depth (ft)	3-5			3-5			3-5			3-5			3-5		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
4,4'-DDD		2.8000	UJ	1.4000	2.9000	U	1.4500	2.8000	U	1.4000	3.2000	U	1.6000	2.9000	U	1.4500
4,4'-DDE		2.8000	UJ	1.4000	2.9000	U	1.4500	2.8000	U	1.4000	3.2000	U	1.6000	9.7000	J	9.7000
4,4'-DDT		2.8000	UJ	1.4000	2.9000	U	1.4500	2.8000	U	1.4000	3.2000	U	1.6000	20.0000	J	20.0000
Aroclor-1254		37.0000	U	18.5000	38.0000	U	19.0000	37.0000	U	18.5000	42.0000	U	21.0000	37.0000	U	18.5000
Aroclor-1260		37.0000	U	18.5000	38.0000	U	19.0000	37.0000	U	18.5000	42.0000	U	21.0000	37.0000	U	18.5000
Dieldrin		2.8000	UJ	1.4000	2.9000	U	1.4500	2.8000	U	1.4000	3.2000	U	1.6000	2.9000	U	1.4500
Endosulfan sulfate		2.8000	UJ	1.4000	2.9000	U	1.4500	2.8000	U	1.4000	3.2000	U	1.6000	2.9000	U	1.4500
Endrin		2.8000	UJ	1.4000	2.9000	U	1.4500	2.8000	U	1.4000	3.2000	U	1.6000	2.9000	U	1.4500
gamma-Chlordane		1.4000	UJ	0.7000	1.5000	U	0.7500	1.5000	U	0.7500	1.7000	U	0.8500	1.5000	U	0.7500
Heptachlor		1.4000	UJ	0.7000	1.5000	U	0.7500	1.5000	U	0.7500	1.7000	U	0.8500	1.5000	U	0.7500
1,4-Dichlorobenzene		360.0000	U	180.0000	390.0000	U	195.0000	390.0000	U	195.0000	22.0000	J	22.0000	400.0000	U	200.0000
Acenaphthene		360.0000	U	180.0000	390.0000	U	195.0000	390.0000	U	195.0000	420.0000	U	210.0000	400.0000	U	200.0000
Anthracene		360.0000	U	180.0000	390.0000	U	195.0000	390.0000	U	195.0000	420.0000	U	210.0000	400.0000	U	200.0000
Benzo(a)anthracene		360.0000	U	180.0000	390.0000	U	195.0000	390.0000	U	195.0000	420.0000	U	210.0000	21.0000	J	21.0000
Benzo(a)pyrene		360.0000	U	180.0000	390.0000	U	195.0000	390.0000	U	195.0000	420.0000	U	210.0000	400.0000	U	200.0000
Benzo(b)fluoranthene		360.0000	U	180.0000	390.0000	U	195.0000	390.0000	U	195.0000	420.0000	U	210.0000	47.0000	J	47.0000
Benzo(g,h,i)perylene		360.0000	U	180.0000	390.0000	U	195.0000	390.0000	U	195.0000	420.0000	U	210.0000	400.0000	U	200.0000
Benzo(k)fluoranthene		360.0000	U	180.0000	390.0000	U	195.0000	390.0000	U	195.0000	420.0000	U	210.0000	28.0000	J	28.0000
Benzoic acid		360.0000	U	180.0000	390.0000	U	195.0000	390.0000	U	195.0000	420.0000	U	210.0000	110.0000	J	110.0000
bis(2-Ethylhexyl)phthalate (BEHP)		360.0000	U	180.0000	390.0000	U	195.0000	390.0000	U	195.0000	420.0000	U	210.0000	400.0000	U	200.0000
Butylbenzylphthalate		360.0000	U	180.0000	390.0000	U	195.0000	390.0000	U	195.0000	420.0000	U	210.0000	400.0000	U	200.0000
Chrysene		360.0000	U	180.0000	390.0000	U	195.0000	390.0000	U	195.0000	420.0000	U	210.0000	50.0000	J	50.0000
Dibenz(a,h)anthracene		360.0000	U	180.0000	390.0000	U	195.0000	390.0000	U	195.0000	420.0000	U	210.0000	400.0000	U	200.0000
Dibenzofuran		360.0000	U	180.0000	390.0000	U	195.0000	390.0000	U	195.0000	420.0000	U	210.0000	400.0000	U	200.0000
Diethylphthalate		360.0000	U	180.0000	390.0000	U	195.0000	390.0000	U	195.0000	420.0000	U	210.0000	400.0000	U	200.0000
Fluoranthene		360.0000	U	180.0000	390.0000	U	195.0000	390.0000	U	195.0000	420.0000	U	210.0000	100.0000	J	100.0000
Fluorene		360.0000	U	180.0000	390.0000	U	195.0000	390.0000	U	195.0000	420.0000	U	210.0000	400.0000	U	200.0000
Indeno(1,2,3-cd)pyrene		360.0000	U	180.0000	390.0000	U	195.0000	390.0000	U	195.0000	420.0000	U	210.0000	400.0000	U	200.0000
Phenanthrene		360.0000	U	180.0000	390.0000	U	195.0000	390.0000	U	195.0000	420.0000	U	210.0000	37.0000	J	37.0000
Pyrene		360.0000	U	180.0000	390.0000	U	195.0000	390.0000	U	195.0000	420.0000	U	210.0000	76.0000	J	76.0000
Acetone		6.0000	U	3.0000	6.0000	U	3.0000	5.0000	U	2.5000	18.0000		18.0000	6.0000	U	3.0000
Chlorobenzene		6.0000	U	3.0000	6.0000	U	3.0000	16.0000		16.0000	6.0000	U	3.0000	6.0000	U	3.0000
Methylene chloride		2.0000	J	2.0000	6.0000	U	3.0000	1.0000	J	1.0000	1.0000	J	1.0000	2.0000	J	2.0000

U - Material was analyzed for, but was not detected.
J - The associated numerical value is an estimated quantity.
R- Quality control indicates that the data are unusable.

APPENDIX C
TABLE 8 - QUALIFIED ANALYTICAL DATA - SUBSURFACE SOILS (ORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent (Units in ug/kg)	Sample ID / Date / Depth (ft)	196SB00702 9/2/99 3-5			196SB00802 9/2/99 3-5			196SB00902 9/2/99 3-5			196SB01002 9/2/99 3-5			196SB01202 9/2/99 3-5		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
4,4'-DDD		2.8000	U	1.4000	2.8000	U	1.4000	10.0000	J	10.0000	13.0000	J	13.0000	3.0000	U	1.5000
4,4'-DDE		4.9000	U	2.4500	2.8000	U	1.4000	22.0000	J	22.0000	8.2000	J	8.2000	22.0000	J	22.0000
4,4'-DDT		2.8000	U	1.4000	2.8000	U	1.4000	26.0000	J	26.0000	30.0000	J	30.0000	230.0000	J	230.0000
Aroclor-1254		40.0000	U	20.0000	36.0000	U	18.0000	42.0000	U	21.0000	46.0000	U	23.0000	39.0000	U	19.5000
Aroclor-1260		74.0000	J	74.0000	36.0000	U	18.0000	42.0000	U	21.0000	200.0000		100.0000	39.0000	U	19.5000
Dieldrin		2.8000	U	1.4000	2.8000	U	1.4000	3.2000	U	1.6000	3.3000	U	1.6500	37.0000	J	37.0000
Endosulfan sulfate		2.8000	U	1.4000	2.8000	U	1.4000	3.2000	U	1.6000	12.0000	J	12.0000	3.0000	U	1.5000
Endrin		2.8000	U	1.4000	2.8000	U	1.4000	3.2000	U	1.6000	3.3000	U	1.6500	26.0000	J	26.0000
gamma-Chlordane		1.4000	U	0.7000	1.5000	U	0.7500	11.0000	J	11.0000	3.8000	J	3.8000	1.5000	U	0.7500
Heptachlor		4.3000	J	4.3000	1.5000	U	0.7500	5.9000	J	5.9000	1.7000	U	0.8500	1.5000	U	0.7500
1,4-Dichlorobenzene		390.0000	U	195.0000	380.0000	U	190.0000	430.0000	U	215.0000	470.0000	U	235.0000	380.0000	U	190.0000
Acenaphthene		390.0000	U	195.0000	380.0000	U	190.0000	50.0000	J	50.0000	470.0000	U	235.0000	380.0000	U	190.0000
Anthracene		390.0000	U	195.0000	380.0000	U	190.0000	160.0000	J	160.0000	470.0000	U	235.0000	40.0000	J	40.0000
Benzo(a)anthracene		33.0000	J	33.0000	22.0000	J	22.0000	1000.0000		1000.0000	39.0000	J	39.0000	44.0000	J	44.0000
Benzo(a)pyrene		36.0000	J	36.0000	380.0000	U	190.0000	1100.0000		1100.0000	470.0000	UJ	235.0000	35.0000	J	35.0000
Benzo(b)fluoranthene		40.0000	J	40.0000	380.0000	U	190.0000	1200.0000		1200.0000	72.0000	J	72.0000	46.0000	J	46.0000
Benzo(g,h,i)perylene		390.0000	U	195.0000	380.0000	U	190.0000	570.0000		570.0000	470.0000	UJ	235.0000	380.0000	U	190.0000
Benzo(k)fluoranthene		50.0000	J	50.0000	380.0000	U	190.0000	1000.0000		1000.0000	54.0000	J	54.0000	45.0000	J	45.0000
Benzoic acid		230.0000	J	230.0000	380.0000	U	190.0000	430.0000	U	215.0000	270.0000	J	270.0000	210.0000	J	210.0000
bis(2-Ethylhexyl)phthalate (BEHP)		49.0000	J	49.0000	89.0000	J	89.0000	430.0000	U	215.0000	140.0000	J	140.0000	210.0000	J	210.0000
Butylbenzylphthalate		390.0000	U	195.0000	380.0000	U	190.0000	430.0000	U	215.0000	470.0000	UJ	235.0000	380.0000	U	190.0000
Chrysene		45.0000	J	45.0000	380.0000	U	190.0000	1200.0000		1200.0000	73.0000	J	73.0000	67.0000	J	67.0000
Dibenz(a,h)anthracene		390.0000	U	195.0000	380.0000	U	190.0000	220.0000	J	220.0000	470.0000	UJ	235.0000	380.0000	U	190.0000
Dibenzofuran		390.0000	U	195.0000	380.0000	U	190.0000	24.0000	J	24.0000	470.0000	U	235.0000	380.0000	U	190.0000
Diethylphthalate		390.0000	U	195.0000	380.0000	U	190.0000	28.0000	J	28.0000	470.0000	U	235.0000	380.0000	U	190.0000
Fluoranthene		55.0000	J	55.0000	380.0000	U	190.0000	1600.0000		1600.0000	60.0000	J	60.0000	89.0000	J	89.0000
Fluorene		390.0000	U	195.0000	380.0000	U	190.0000	36.0000	J	36.0000	470.0000	U	235.0000	380.0000	U	190.0000
Indeno(1,2,3-cd)pyrene		390.0000	U	195.0000	380.0000	U	190.0000	520.0000		520.0000	470.0000	UJ	235.0000	380.0000	U	190.0000
Phenanthrene		25.0000	J	25.0000	380.0000	U	190.0000	830.0000		830.0000	39.0000	J	39.0000	51.0000	J	51.0000
Pyrene		87.0000	J	87.0000	380.0000	U	190.0000	2700.0000		2700.0000	140.0000	J	140.0000	120.0000	J	120.0000
Acetone		5.0000	U	2.5000	7.0000	U	3.5000	14.0000	UR	7.0000	9.0000	U	4.5000	16.0000	U	8.0000
Chlorobenzene		5.0000	U	2.5000	7.0000	U	3.5000	6.0000	U	3.0000	7.0000	U	3.5000	5.0000	U	2.5000
Methylene chloride		5.0000	U	2.5000	7.0000	U	3.5000	6.0000	U	3.0000	7.0000	U	3.5000	5.0000	U	2.5000

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J - The associated numerical value is an estimated quantity.
R- Quality control indicates that the data are unusable.

APPENDIX C
TABLE 8 - QUALIFIED ANALYTICAL DATA - SUBSURFACE SOILS (ORGANICS)
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Constituent (Units in ug/kg)	Sample ID / Date / Depth (ft)	196SB01302 9/2/99 3-5			196SB01402 9/2/99 3-5			196SB01502 9/2/99 3-5			196SB01702 9/2/99 3-5		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
4,4'-DDD		2.8000	U	1.4000	2.7000	U	1.3500	2.7000	UJ	1.3500	2.7000	U	1.3500
4,4'-DDE		2.8000	U	1.4000	2.7000	U	1.3500	2.7000	UJ	1.3500	2.7000	U	1.3500
4,4'-DDT		2.8000	U	1.4000	2.7000	U	1.3500	2.7000	UJ	1.3500	2.7000	U	1.3500
Aroclor-1254		66.0000		66.0000	36.0000	U	18.0000	36.0000	U	18.0000	35.0000	U	17.5000
Aroclor-1260		42.0000		21.0000	36.0000	U	18.0000	36.0000	U	18.0000	35.0000	U	17.5000
Dieldrin		2.8000	U	1.4000	2.7000	U	1.3500	2.7000	UJ	1.3500	2.7000	U	1.3500
Endosulfan sulfate		2.8000	U	1.4000	2.7000	U	1.3500	2.7000	UJ	1.3500	2.7000	U	1.3500
Endrin		2.8000	U	1.4000	2.7000	U	1.3500	2.7000	UJ	1.3500	2.7000	U	1.3500
gamma-Chlordane		1.5000	U	0.7500	1.4000	U	0.7000	1.4000	UJ	0.7000	1.4000	U	0.7000
Heptachlor		1.5000	U	0.7500	1.9000	J	1.9000	4.8000	U	2.4000	1.4000	U	0.7000
1,4-Dichlorobenzene		380.0000	U	190.0000	360.0000	U	180.0000	23.0000	J	23.0000	340.0000	U	170.0000
Acenaphthene		380.0000	U	190.0000	360.0000	U	180.0000	350.0000	U	175.0000	340.0000	U	170.0000
Anthracene		380.0000	U	190.0000	360.0000	U	180.0000	350.0000	U	175.0000	340.0000	U	170.0000
Benzo(a)anthracene		56.0000	J	56.0000	360.0000	U	180.0000	350.0000	U	175.0000	340.0000	U	170.0000
Benzo(a)pyrene		49.0000	J	49.0000	360.0000	U	180.0000	26.0000	J	26.0000	340.0000	U	170.0000
Benzo(b)fluoranthene		81.0000	J	81.0000	360.0000	U	180.0000	350.0000	U	175.0000	340.0000	U	170.0000
Benzo(g,h,i)perylene		380.0000	U	190.0000	360.0000	U	180.0000	350.0000	U	175.0000	340.0000	U	170.0000
Benzo(k)fluoranthene		48.0000	J	48.0000	360.0000	U	180.0000	350.0000	U	175.0000	340.0000	U	170.0000
Benzoic acid		210.0000	J	210.0000	200.0000	J	200.0000	350.0000	U	175.0000	340.0000	U	170.0000
bis(2-Ethylhexyl)phthalate (BEHP)		1400.0000		1400.0000	360.0000	U	180.0000	350.0000	U	175.0000	340.0000	U	170.0000
Butylbenzylphthalate		380.0000	U	190.0000	110.0000	J	110.0000	350.0000	U	175.0000	340.0000	U	170.0000
Chrysene		180.0000	J	180.0000	360.0000	U	180.0000	350.0000	U	175.0000	340.0000	U	170.0000
Dibenz(a,h)anthracene		380.0000	U	190.0000	360.0000	U	180.0000	350.0000	U	175.0000	340.0000	U	170.0000
Dibenzofuran		380.0000	U	190.0000	360.0000	U	180.0000	350.0000	U	175.0000	340.0000	U	170.0000
Diethylphthalate		380.0000	U	190.0000	360.0000	U	180.0000	350.0000	U	175.0000	340.0000	U	170.0000
Fluoranthene		100.0000	J	100.0000	360.0000	U	180.0000	350.0000	U	175.0000	340.0000	U	170.0000
Fluorene		380.0000	U	190.0000	360.0000	U	180.0000	350.0000	U	175.0000	340.0000	U	170.0000
Indeno(1,2,3-cd)pyrene		380.0000	U	190.0000	360.0000	U	180.0000	350.0000	U	175.0000	340.0000	U	170.0000
Phenanthrene		41.0000	J	41.0000	360.0000	U	180.0000	350.0000	U	175.0000	340.0000	U	170.0000
Pyrene		210.0000	J	210.0000	360.0000	U	180.0000	350.0000	U	175.0000	340.0000	U	170.0000
Acetone		5.0000	U	2.5000	5.0000	U	2.5000	21.0000	U	10.5000	49.0000	U	24.5000
Chlorobenzene		5.0000	U	2.5000	5.0000	U	2.5000	12.0000		12.0000	5.0000	U	2.5000
Methylene chloride		5.0000	U	2.5000	5.0000	U	2.5000	5.0000	U	2.5000	5.0000	U	2.5000

U - Material was analyzed for, but was not detected.
J - The associated numerical value is an estimated quantity.
R- Quality control indicates that the data are unusable.

0.09	96SB00101
0.08	96SB00201
0.085	96SB00301
0.085	96SB00401
0.08	96SB00501
0.08	96SB00601
0.09	96SB00701
0.08	96SB00801
0.08	96SB00901
1.7	96SB01001
0.085	96SB01101
0.085	96SB01201
0.085	96SB01301
0.085	96SB01401
0.085	96SB01501
0.09	96SB01601
0.085	96SB01701

Appendix C - Table 9
Zone H - SWMU 196
95% UCL Calculations - Cyanide

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	0.18
Censored		Lognormal mean	0.13
Detection limit or PQL		Std. devn.	0.39186207
Method detection limit		Median	0.085
TOTAL	17	Min.	0.08
		Max.	1.7

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Reject lognormal distribution.
W value is 0.3078. This is less than the tabled value of 0.892
Reject normal distribution.
W value is 0.2693. This is less than the tabled value of 0.892

UCL (Land's method) is 0.2

7570	96SB00101
9040	96SB00201
6520	96SB00301
7250	96SB00401
5870	96SB00501
7660	96SB00601
8710	96SB00701
2740	96SB00801
7930	96SB00901
2420	96SB01001
15200	96SB01101
6930	96SB01201
10400	96SB01301
7580	96SB01401
8220	96SB01501
9160	96SB01601
8450	96SB01701

Appendix C - Table 10
Zone H - SWMU 196
95% UCL Calculations - Aluminum

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	7744.12
Censored		Lognormal mean	7896.28
Detection limit or PQL		Std. devn.	2821.67516
Method detection limit		Median	7660
TOTAL	17	Min.	2420
		Max.	15200

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Reject lognormal distribution.
W value is 0.8186. This is less than the tabled value of 0.892
Reject normal distribution.
W value is 0.8915. This is less than the tabled value of 0.892

UCL (Land's method) is 9807.9

6.6	96SB00101
3.4	96SB00201
4.2	96SB00301
9.9	96SB00401
11.2	96SB00501
8	96SB00601
11	96SB00701
8.5	96SB00801
5.6	96SB00901
5.4	96SB01001
7.9	96SB01101
5.1	96SB01201
8.1	96SB01301
4.7	96SB01401
5.7	96SB01501
5.9	96SB01601
8.9	96SB01701

Appendix C - Table 12
Zone H - SWMU 196
95% UCL Calculations - Arsenic

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	7.06
Censored		Lognormal mean	7.10
Detection limit or PQL		Std. devn.	2.34705698
Method detection limit		Median	6.6
TOTAL	17	Min.	3.4
		Max.	11.2

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.9659. This exceeds the tabled value of 0.892

UCL (Land's method) is 8.36

20.7	96SB00101
48.5	96SB00201
33.9	96SB00301
139	96SB00401
40.8	96SB00501
37.3	96SB00601
34.3	96SB00701
50.4	96SB00801
31.1	96SB00901
10.9	96SB01001
44.2	96SB01101
69.3	96SB01201
43.9	96SB01301
28.4	96SB01401
31.2	96SB01501
34.3	96SB01601
27.8	96SB01701

Appendix C - Table 13
Zone H - SWMU 196
95% UCL Calculations - Barium

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	42.71
Censored		Lognormal mean	42.64
Detection limit or PQL		Std. devn.	27.9706871
Method detection limit		Median	34.3
TOTAL	17	Min.	10.9
		Max.	139

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.9229. This exceeds the tabled value of 0.892

UCL (Land's method) is 55.96

0.25	96SB00101
0.47	96SB00201
0.35	96SB00301
0.61	96SB00401
0.42	96SB00501
0.51	96SB00601
0.55	96SB00701
0.39	96SB00801
0.41	96SB00901
0.32	96SB01001
0.69	96SB01101
0.5	96SB01201
0.46	96SB01301
0.38	96SB01401
0.44	96SB01501
0.38	96SB01601
0.34	96SB01701

Appendix C - Table 14
Zone H - SWMU 196
95% UCL Calculations - Beryllium

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	0.44
Censored		Lognormal mean	0.44
Detection limit or PQL		Std. devn.	0.10979928
Method detection limit		Median	0.42
TOTAL	17	Min.	0.25
		Max.	0.69

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.9926. This exceeds the tabled value of 0.892

UCL (Land's method) is 0.49

0.02	96SB00101
0.015	96SB00201
0.34	96SB00301
2.5	96SB00401
0.7	96SB00501
0.54	96SB00601
0.47	96SB00701
0.62	96SB00801
0.085	96SB00901
0.49	96SB01001
0.095	96SB01101
0.38	96SB01201
0.35	96SB01301
0.045	96SB01401
0.07	96SB01501
0.08	96SB01601
0.015	96SB01701

Appendix C - Table 15
Zone H - SWMU 196
95% UCL Calculations - Cadmium

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	0.40
Censored		Lognormal mean	0.52
Detection limit or PQL		Std. devn.	0.58938059
Method detection limit		Median	0.34
TOTAL	17	Min.	0.015
		Max.	2.5

Lognormal distribution?	Normal distribution?
r-squared is:	r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.9301. This exceeds the tabled value of 0.892

UCL (Land's method) is 1.93

4520	96SB00101
1250	96SB00201
25700	96SB00301
21100	96SB00401
52300	96SB00501
30500	96SB00601
89200	96SB00701
164000	96SB00801
20300	96SB00901
197000	96SB01001
23500	96SB01101
128000	96SB01201
48600	96SB01301
35300	96SB01401
66200	96SB01501
28500	96SB01601
21800	96SB01701

Appendix C - Table 16
Zone H - SWMU 196
95% UCL Calculations - Calcium

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	56339.41
Censored		Lognormal mean	71592.33
Detection limit or PQL		Std. devn.	56524.8809
Method detection limit		Median	30500
TOTAL	17	Min.	1250
		Max.	197000

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.9075. This exceeds the tabled value of 0.892

UCL (Land's method) is 185929.33

18.5	96SB00101
10.8	96SB00201
15.1	96SB00301
53.1	96SB00401
31.1	96SB00501
27.1	96SB00601
21.7	96SB00701
19.9	96SB00801
15.7	96SB00901
8.8	96SB01001
49.5	96SB01101
21.2	96SB01201
29.6	96SB01301
15.2	96SB01401
19.4	96SB01501
18.9	96SB01601
16.8	96SB01701

Appendix C - Table 17
Zone H - SWMU 196
95% UCL Calculations - Chromium

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	23.08
Censored		Lognormal mean	23.10
Detection limit or PQL		Std. devn.	12.1556178
Method detection limit		Median	19.4
TOTAL	17	Min.	8.8
		Max.	53.1

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.9539. This exceeds the tabled value of 0.892

UCL (Land's method) is 29.21

0.87	96SB00101
1.7	96SB00201
3.5	96SB00301
10	96SB00401
3.6	96SB00501
3.5	96SB00601
3.4	96SB00701
8.9	96SB00801
2.1	96SB00901
3.5	96SB01001
3.6	96SB01101
3.3	96SB01201
2.7	96SB01301
2	96SB01401
2.6	96SB01501
2	96SB01601
2	96SB01701

Appendix C - Table 18
Zone H - SWMU 196
95% UCL Calculations - Cobalt

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	3.49
Censored		Lognormal mean	3.48
Detection limit or PQL		Std. devn.	2.39522687
Method detection limit		Median	3.3
TOTAL	17	Min.	0.87
		Max.	10

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.9079. This exceeds the tabled value of 0.892

UCL (Land's method) is 4.72

2.3	96SB00101
7.2	96SB00201
154	96SB00301
641	96SB00401
270	96SB00501
226	96SB00601
151	96SB00701
127	96SB00801
41.9	96SB00901
26.2	96SB01001
24.9	96SB01101
116	96SB01201
99.4	96SB01301
22.5	96SB01401
34	96SB01501
105	96SB01601
26	96SB01701

Appendix C - Table 19
Zone H - SWMU 196
95% UCL Calculations - Copper

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	122.02
Censored		Lognormal mean	158.48
Detection limit or PQL		Std. devn.	154.958904
Method detection limit		Median	99.4
TOTAL	17	Min.	2.3
		Max.	641

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.955. This exceeds the tabled value of 0.892

UCL (Land's method) is 510.26

19500	96SB00101
9270	96SB00201
11800	96SB00301
13900	96SB00401
8130	96SB00501
12600	96SB00601
9520	96SB00701
9580	96SB00801
10600	96SB00901
5470	96SB01001
15200	96SB01101
8930	96SB01201
15600	96SB01301
10300	96SB01401
10300	96SB01501
11700	96SB01601
14500	96SB01701

Appendix C - Table 20
Zone H - SWMU 196
95% UCL Calculations - Iron

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	11582.35
Censored		Lognormal mean	11626.70
Detection limit or PQL		Std. devn.	3364.12234
Method detection limit		Median	10600
TOTAL	17	Min.	5470
		Max.	19500

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.9712. This exceeds the tabled value of 0.892

UCL (Land's method) is 13348.55

8.3	96SB00101
19.5	96SB00201
71.5	96SB00301
734	96SB00401
152	96SB00501
76.2	96SB00601
61.8	96SB00701
181	96SB00801
42.8	96SB00901
19.1	96SB01001
56.3	96SB01101
49.2	96SB01201
75.8	96SB01301
56.9	96SB01401
32.4	96SB01501
81.6	96SB01601
31.8	96SB01701

Appendix C - Table 21
Zone H - SWMU 196
95% UCL Calculations - Lead

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	102.95
Censored		Lognormal mean	95.33
Detection limit or PQL		Std. devn.	168.654533
Method detection limit		Median	56.9
TOTAL	17	Min.	8.3
		Max.	734

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.9487. This exceeds the tabled value of 0.892

UCL (Land's method) is 185.78

961	96SB00101
553	96SB00201
876	96SB00301
1020	96SB00401
1300	96SB00501
1210	96SB00601
2300	96SB00701
2460	96SB00801
952	96SB00901
3050	96SB01001
2310	96SB01101
2360	96SB01201
1800	96SB01301
1230	96SB01401
1810	96SB01501
1320	96SB01601
1120	96SB01701

Appendix C - Table 22
Zone H - SWMU 196
95% UCL Calculations - Magnesium

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	1566.59
Censored		Lognormal mean	1580.60
Detection limit or PQL		Std. devn.	704.970395
Method detection limit		Median	1300
TOTAL	17	Min.	553
		Max.	3050

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.9557. This exceeds the tabled value of 0.892

UCL (Land's method) is 1989.12

18.7	96SB00101
44.8	96SB00201
79.8	96SB00301
111	96SB00401
122	96SB00501
107	96SB00601
133	96SB00701
283	96SB00801
79.7	96SB00901
332	96SB01001
194	96SB01101
188	96SB01201
111	96SB01301
71.4	96SB01401
139	96SB01501
82.6	96SB01601
87	96SB01701

Appendix C - Table 23
Zone H - SWMU 196
95% UCL Calculations - Manganese

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	128.47
Censored		Lognormal mean	133.35
Detection limit or PQL		Std. devn.	81.1113491
Method detection limit		Median	111
TOTAL	17	Min.	18.7
		Max.	332

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.9428. This exceeds the tabled value of 0.892

UCL (Land's method) is 194.18

0.01	96SB00101
0.05	96SB00201
0.09	96SB00301
0.94	96SB00401
0.36	96SB00501
0.27	96SB00601
0.31	96SB00701
0.02	96SB00801
0.14	96SB00901
0.12	96SB01001
0.1	96SB01101
0.03	96SB01201
0.08	96SB01301
0.04	96SB01401
0.05	96SB01501
0.29	96SB01601
0.13	96SB01701

Appendix C - Table 24
Zone H - SWMU 196
95% UCL Calculations - Mercury

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	0.18
Censored		Lpgnormal mean	0.19
Detection limit or PQL		Std. devn.	0.22495098
Method detection limit		Median	0.1
TOTAL	17	Min.	0.01
		Max.	0.94

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.9882. This exceeds the tabled value of 0.892

UCL (Land's method) is 0.45

1.7	96SB00101
4.7	96SB00201
102	96SB00301
37.6	96SB00401
21.6	96SB00501
42	96SB00601
70.3	96SB00701
21.1	96SB00801
8	96SB00901
10.2	96SB01001
12.1	96SB01101
11.7	96SB01201
11.1	96SB01301
5.7	96SB01401
7.4	96SB01501
6.8	96SB01601
6.2	96SB01701

Appendix C - Table 25
Zone H - SWMU 196
95% UCL Calculations - Nickel

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	22.36
Censored		Lognormal mean	22.62
Detection limit or PQL		Std. devn.	27.0462784
Method detection limit		Median	11.1
TOTAL	17	Min.	1.7
		Max.	102

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.9629. This exceeds the tabled value of 0.892

UCL (Land's method) is 46.4

507	96SB00101
195	96SB00201
229	96SB00301
363	96SB00401
366	96SB00501
390	96SB00601
512	96SB00701
285	96SB00801
261	96SB00901
395	96SB01001
902	96SB01101
523	96SB01201
468	96SB01301
277	96SB01401
423	96SB01501
451	96SB01601
319	96SB01701

Appendix C - Table 26
Zone H - SWMU 196
95% UCL Calculations - Potassium

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	403.88
Censored		Lognormal mean	404.49
Detection limit or PQL		Std. devn.	163.320193
Method detection limit		Median	390
TOTAL	17	Min.	195
		Max.	902

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.9708. This exceeds the tabled value of 0.892

UCL (Land's method) is 482.46

0.195
0.18
0.185
0.41
0.18
0.18
0.21
0.18
0.67
0.18
0.68
0.185
0.185
0.18
0.18
0.64
0.18

Appendix C - Table 27
Zone H - SWMU 196
95% UCL Calculations - Selenium

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	0.28
Censored		Lognormal mean	0.28
Detection limit or PQL		Std. devn.	0.19001741
Method detection limit		Median	0.185
TOTAL	17	Min.	0.18
		Max.	0.68

Lognormal distribution?
r-squared is:

Normal distribution?
r-squared is:

Recommendations:
Reject lognormal distribution.
W value is 0.6024. This is less than the tabled value of 0.892
Reject normal distribution.
W value is 0.5785. This is less than the tabled value of 0.892

UCL (Land's method) is 0.36

0.07	96SB00101
0.065	96SB00201
0.065	96SB00301
1.9	96SB00401
0.065	96SB00501
0.065	96SB00601
0.075	96SB00701
0.065	96SB00801
0.065	96SB00901
0.065	96SB01001
0.07	96SB01101
0.07	96SB01201
0.07	96SB01301
0.065	96SB01401
0.065	96SB01501
0.07	96SB01601
0.065	96SB01701

Appendix C - Table 28
Zone H - SWMU 196
95% UCL Calculations - Silver

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	0.18
Censored		Lognormal mean	0.11
Detection limit or PQL		Std. devn.	0.44453276
Method detection limit		Median	0.065
TOTAL	17	Min.	0.065
		Max.	1.9

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Reject lognormal distribution.
W value is 0.301. This is less than the tabled value of 0.892
Reject normal distribution.
W value is 0.267. This is less than the tabled value of 0.892

UCL (Land's method) is 0.19

367 96SB0010
278 96SB0020
330 96SB0030
406 96SB00401
330 96SB0050
344 96SB0060
516 96SB0070
381 96SB0080
396 96SB0090
382 96SB0100
430 96SB01101
412 96SB01201
636 96SB01301
402 96SB01401
387 96SB0150
759 96SB0160
451 96SB0170

Appendix C - Table 29
Zone H - SWMU 196
95% UCL Calculations - Sodium

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	423.94
Censored		Lognormal mean	423.65
Detection limit or PQL		Std. devn.	117.726628
Method detection limit		Median	396
TOTAL	17	Min.	278
		Max.	759

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.9001. This exceeds the tabled value of 0.892

UCL (Land's method) is 473.09

1.7	96SB0010
2.2	96SB0020
24.7	96SB0030
39.7	96SB00401
36.5	96SB0050
5.5	96SB0060
2.45	96SB0070
34	96SB0080
2.6	96SB0090
1.6	96SB0100
2.45	96SB01101
3.2	96SB01201
15	96SB01301
2.5	96SB01401
1.85	96SB0150
2.15	96SB0160
2.05	96SB0170

Appendix C - Table 30
Zone H - SWMU 196
95% UCL Calculations - Tin

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	10.60
Censored		Lognormal mean	10.27
Detection limit or PQL		Std. devn.	13.8708605
Method detection limit		Median	2.5
TOTAL	17	Min.	1.6
		Max.	39.7

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Reject lognormal distribution.
W value is 0.7715. This is less than the tabled value of 0.892
Reject normal distribution.
W value is 0.6687. This is less than the tabled value of 0.892

UCL (Land's method) is 25.45

21.7	96SB0010
12.8	96SB0020
17.4	96SB0030
34.5	96SB00401
137	96SB0050
39.3	96SB0060
22	96SB0070
11.8	96SB0080
19.8	96SB0090
9.9	96SB0100
34.4	96SB01101
19	96SB01201
29.9	96SB01301
19	96SB01401
21.1	96SB0150
27.1	96SB0160
23.8	96SB0170

Appendix C - Table 31
Zone H - SWMU 196
95% UCL Calculations - Vanadium

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	29.44
Censored		Lognormal mean	28.17
Detection limit or PQL		Std. devn.	28.9013853
Method detection limit		Median	21.7
TOTAL	17	Min.	9.9
		Max.	137

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Reject lognormal distribution.
W value is 0.8773. This is less than the tabled value of 0.892
Reject normal distribution.
W value is 0.5269. This is less than the tabled value of 0.892

UCL (Land's method) is 38.57

9.8	96SB0010
48.8	96SB0020
198	96SB0030
1040	96SB00401
311	96SB0050
254	96SB0060
153	96SB0070
250	96SB0080
107	96SB0090
79.5	96SB0100
95.3	96SB01101
162	96SB01201
199	96SB01301
56.2	96SB01401
62.9	96SB0150
97	96SB0160
63.4	96SB0170

Appendix C - Table 32
Zone H - SWMU 196
95% UCL Calculations - Zinc

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	187.46
Censored		Lognormal mean	195.25
Detection limit or PQL		Std. devn.	235.350265
Method detection limit		Median	107
TOTAL	17	Min.	9.8
		Max.	1040

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.9509. This exceeds the tabled value of 0.892

UCL (Land's method) is 381.63

0.0014	96SB0010
0.0013	96SB0020
0.0014	96SB0030
0.0092	96SB00401
0.0013	96SB0050
0.0013	96SB0060
0.00145	96SB0070
0.00135	96SB0080
0.006	96SB0090
0.00135	96SB0100
0.00145	96SB01101
0.0068	96SB01201
0.02	96SB01301
0.0014	96SB01401
0.0014	96SB0150
0.026	96SB0160
0.036	96SB0170

Appendix C - Table 33

Zone H - SWMU 196

95% UCL Calculations - 4,4'-DDD (mg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	0.01
Censored		Lognormal mean	0.01
Detection limit or PQL		Std. devn.	0.010384
Method detection limit		Median	0.0014
TOTAL	17	Min.	0.0013
		Max.	0.036

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Reject lognormal distribution.

W value is 0.7192. This is less than the tabled value of 0.892

Reject normal distribution.

W value is 0.6376. This is less than the tabled value of 0.892

UCL (Land's method) is 0.02

0.0014	96SB0010
0.0013	96SB0020
0.0075	96SB0030
0.027	96SB00401
0.0065	96SB0050
0.0013	96SB0060
0.00145	96SB0070
0.0086	96SB0080
0.014	96SB0090
0.0048	96SB0100
0.00145	96SB01101
0.0066	96SB01201
0.034	96SB01301
0.0065	96SB01401
0.01	96SB0150
0.045	96SB0160
0.083	96SB0170

Appendix C - Table 34

Zone H - SWMU 196

95% UCL Calculations - 4,4'-DDE (mg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	0.02
Censored		Lognormal mean	0.02
Detection limit or PQL		Std. devn.	0.02150166
Method detection limit		Median	0.0066
TOTAL	17	Min.	0.0013
		Max.	0.083

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Assume lognormal distribution.

W value is 0.9201. This exceeds the tabled value of 0.892

UCL (Land's method) is 0.05

0.0014	96SB0010
0.0013	96SB0020
0.017	96SB0030
0.012	96SB00401
0.018	96SB0050
0.0013	96SB0060
0.0031	96SB0070
0.008	96SB0080
0.0064	96SB0090
0.018	96SB0100
0.0027	96SB01101
0.0024	96SB01201
0.00145	96SB01301
0.0014	96SB01401
0.014	96SB0150
0.014	96SB0160
0.0014	96SB0170

Appendix C - Table 35

Zone H - SWMU 196

95% UCL Calculations - 4,4'-DDT (mg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	0.01
Censored		Lognormal mean	0.01
Detection limit or PQL		Std. devn.	0.00666004
Method detection limit		Median	0.0031
TOTAL	17	Min.	0.0013
		Max.	0.018

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Reject lognormal distribution.

W value is 0.8325. This is less than the tabled value of 0.892

Reject normal distribution.

W value is 0.8454. This is less than the tabled value of 0.892

UCL (Land's method) is 0.02

0.75	96SB00101
0.7	96SB00201
0.7	96SB00301
28	96SB00401
0.65	96SB00501
0.7	96SB00601
0.75	96SB00701
0.7	96SB00801
0.75	96SB00901
0.7	96SB01001
0.75	96SB01101
0.7	96SB01201
0.75	96SB01301
0.7	96SB01401
0.7	96SB01501
0.75	96SB01601
0.75	96SB01701

Appendix C - Table 36
Zone H - SWMU 196
95% UCL Calculations - alpha-Chlordane (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	2.32
Censored		Lognormal mean	1.32
Detection limit or PQL		Std. devn.	6.61674291
Method detection limit		Median	0.7
TOTAL	17	Min.	0.65
		Max.	28

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Reject lognormal distribution.
W value is 0.3. This is less than the tabled value of 0.892
Reject normal distribution.
W value is 0.2658. This is less than the tabled value of 0.892

UCL (Land's method) is 2.31

20	96SB00101
18	96SB00201
93	96SB00301
260	96SB00401
100	96SB00501
120	96SB00601
130	96SB00701
120	96SB00801
150	96SB00901
18.5	96SB01001
110	96SB01101
17.5	96SB01201
19	96SB01301
18	96SB01401
18	96SB01501
19	96SB01601
18.5	96SB01701

Appendix C - Table 37
Zone H - SWMU 196
95% UCL Calculations - Aoroclor-1254 (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	73.50
Censored		Lognormal mean	77.52
Detection limit or PQL		Std. devn.	69.7296117
Method detection limit		Median	20
TOTAL	17	Min.	17.5
		Max.	260

Lognormal distribution?	Normal distribution?
r-squared is:	r-squared is:

Recommendations:
Reject lognormal distribution.
W value is 0.7664. This is less than the tabled value of 0.892
Reject normal distribution.
W value is 0.7814. This is less than the tabled value of 0.892

UCL (Land's method) is 154.44

20	96SB00101
18	96SB00201
53	96SB00301
150	96SB00401
97	96SB00501
120	96SB00601
130	96SB00701
87	96SB00801
89	96SB00901
40	96SB01001
59	96SB01101
55	96SB01201
150	96SB01301
68	96SB01401
54	96SB01501
19	96SB01601
120	96SB01701

Appendix C - Table 38
Zone H - SWMU 196
95% UCL Calculations - Aroclor-1260 (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	78.18
Censored		Lognormal mean	82.22
Detection limit or PQL		Std. devn.	44.1888494
Method detection limit		Median	68
TOTAL	17	Min.	18
		Max.	150

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.8997. This exceeds the tabled value of 0.892

UCL (Land's method) is 122.21

1.4	96SB0010
1.3	96SB0020
2.7	96SB0030
3.9	96SB00401
1.3	96SB0050
1.3	96SB0060
1.45	96SB0070
1.35	96SB0080
1.4	96SB0090
1.35	96SB0100
3.7	96SB01101
1.35	96SB01201
1.45	96SB01301
1.4	96SB01401
1.4	96SB0150
1.55	96SB0160
2.05	96SB0170

Appendix C - Table 39

Zone H - SWMU 196

95% UCL Calculations - Dieldrin (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	1.79
Censored		Lognormal meán	1.77
Detection limit or PQL		Std. devn.	0.8364293
Method detection limit		Median	1.4
TOTAL	17	Min.	1.3
		Max.	3.9

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Reject lognormal distribution.

W value is 0.6668. This is less than the tabled value of 0.892

Reject normal distribution.

W value is 0.6119. This is less than the tabled value of 0.892

UCL (Land's method) is 2.11

0.75	96SB0010
0.7	96SB0020
0.7	96SB0030
0.75	96SB00401
0.65	96SB0050
0.7	96SB0060
0.75	96SB0070
0.7	96SB0080
0.75	96SB0090
0.7	96SB0100
0.75	96SB01101
0.7	96SB01201
19	96SB01301
0.7	96SB01401
0.7	96SB0150
0.75	96SB0160
0.75	96SB0170

Appendix C - Table 40

Zone H - SWMU 196

95% UCL Calculations - Endosulfan I (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	1.79
Censored		Lognormal mean	1.19
Detection limit or PQL		Std. devn.	4.43395571
Method detection limit		Median	0.7
TOTAL	17	Min.	0.65
		Max.	19

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:
Reject lognormal distribution.
W value is 0.3046. This is less than the tabled value of 0.892
Reject normal distribution.
W value is 0.2675. This is less than the tabled value of 0.892

UCL (Land's method) is 1.92

0.75	96SB0010
0.7	96SB0020
6.6	96SB0030
34	96SB00401
5	96SB0050
0.7	96SB0060
0.75	96SB0070
3.8	96SB0080
4.1	96SB0090
6.1	96SB0100
3.2	96SB01101
3.2	96SB01201
4.5	96SB01301
1.6	96SB01401
5.5	96SB0150
2.8	96SB0160
13	96SB0170

Appendix C - Table 41

Zone H - SWMU 196

95% UCL Calculations - gamma-Chlrodane (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	5.66
Censored		Lognormal mean	5.75
Detection limit or PQL		Std. devn.	7.90566974
Method detection limit		Median	3.8
TOTAL	17	Min.	0.7
		Max.	34

Lognormal distribution?	Normal distribution?
r-squared is:	r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.9258. This exceeds the tabled value of 0.892

UCL (Land's method) is 12.16

0.75	96SB0010
0.7	96SB0020
0.7	96SB0030
0.75	96SB00401
0.65	96SB0050
0.7	96SB0060
0.75	96SB0070
0.7	96SB0080
0.75	96SB0090
5.3	96SB0100
4.4	96SB01101
0.7	96SB01201
0.75	96SB01301
0.7	96SB01401
0.7	96SB0150
0.75	96SB0160
0.75	96SB0170

Appendix C - Table 42
Zone H - SWMU 196
95% UCL Calculations - Heptachlor (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	1.21
Censored		Lognormal mean	1.10
Detection limit or PQL		Std. devn.	1.38110942
Method detection limit		Median	0.75
TOTAL	17	Min.	0.65
		Max.	5.3

Lognormal distribution?	Normal distribution?
r-squared is:	r-squared is:

Recommendations:
Reject lognormal distribution.
W value is 0.4491. This is less than the tabled value of 0.892
Reject normal distribution.
W value is 0.4158. This is less than the tabled value of 0.892

UCL (Land's method) is 1.56

0.75	96SB0010
0.7	96SB0020
0.7	96SB0030
2.15	96SB00401
0.65	96SB0050
0.7	96SB0060
0.75	96SB0070
0.7	96SB0080
0.75	96SB0090
0.7	96SB0100
0.75	96SB01101
0.7	96SB01201
0.75	96SB01301
0.7	96SB01401
0.7	96SB0150
5.6	96SB0160
7.1	96SB0170

Appendix C - Table 43

Zone H - SWMU 196

95% UCL Calculations - Heptachlor Epoxide (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	1.46
Censored		Lognormal mean	1.30
Detection limit or PQL		Std. devn.	1.89114131
Method detection limit		Median	0.7
TOTAL	17	Min.	0.65
		Max.	7.1

Lognormal distribution?	Normal distribution?
r-squared is:	r-squared is:

Recommendations:
Reject lognormal distribution.
W value is 0.5337. This is less than the tabled value of 0.892
Reject normal distribution.
W value is 0.4734. This is less than the tabled value of 0.892

UCL (Land's method) is 2.02

195	96SB0010
20	96SB0020
180	96SB0030
19	96SB00401
18	96SB0050
180	96SB0060
210	96SB0070
175	96SB0080
175	96SB0090
185	96SB0100
195	96SB01101
165	96SB01201
175	96SB01301
185	96SB01401
190	96SB0150
185	96SB0160
190	96SB0170

Appendix C - Table 44

Zone H - SWMU 196

95% UCL Calculations - 1,4-Dichlorobenzene (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	155.41
Censored		Lognormal mean	184.23
Detection limit or PQL		Std. devn.	65.8654489
Method detection limit		Median	180
TOTAL	17	Min.	18
		Max.	210

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Reject lognormal distribution.

W value is 0.5326. This is less than the tabled value of 0.892

Reject normal distribution.

W value is 0.6156. This is less than the tabled value of 0.892

UCL (Land's method) is 323.52

195 Appendix C - Table 45
185 Zone H - SWMU 196
180 95% UCL Calculations - 2,4-Dimethylphenol (μg/kg)

190 MTCA*Stat* 2.1

38 Number of samples		Uncensored values	
180 Uncensored	17	Mean	176.35
210 Censored		Lognormal mean	181.43
175 Detection limit or PQL		Std. devn.	37.0707789
175 Method detection limit		Median	185
185 TOTAL	17	Min.	38
195		Max.	210

165
175
185
190 Lognormal distribution? Normal distribution?
185 r-squared is: r-squared is:
190 Recommendations:
Reject lognormal distribution.
W value is 0.3905. This is less than the tabled value of 0.892
Reject normal distribution.
W value is 0.5216. This is less than the tabled value of 0.892

UCL (Land's method) is 218.76

195	96SB0010
185	96SB0020
180	96SB0030
190	96SB00401
170	96SB0050
180	96SB0060
210	96SB0070
175	96SB0080
175	96SB0090
185	96SB0100
195	96SB01101
25	96SB01201
175	96SB01301
185	96SB01401
190	96SB0150
185	96SB0160
190	96SB0170

Appendix C - Table 46

Zone H - SWMU 196

95% UCL Calculations - 2-Methylnaphthalene ((μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	175.88
Censored		Lognormal mean	185.33
Detection limit or PQL		Std. devn.	40.0482246
Method detection limit		Median	185
TOTAL	17	Min.	25
		Max.	210

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Reject lognormal distribution.

W value is 0.3569. This is less than the tabled value of 0.892

Reject normal distribution.

W value is 0.488. This is less than the tabled value of 0.892

UCL (Land's method) is 237.26

195	96SB0010
185	96SB0020
180	96SB0030
190	96SB00401
22	96SB0050
180	96SB0060
210	96SB0070
175	96SB0080
175	96SB0090
185	96SB0100
195	96SB01101
165	96SB01201
175	96SB01301
185	96SB01401
190	96SB0150
185	96SB0160
190	96SB0170

Appendix C - Table 47

Zone H - SWMU 196

95% UCL Calculations - 4-Methylphenol (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	175.41
Censored		Lognormal mean	186.48
Detection limit or PQL		Std. devn.	40.8167533
Method detection limit		Median	185
TOTAL	17	Min.	22
		Max.	210

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Reject lognormal distribution.

W value is 0.3568. This is less than the tabled value of 0.892

Reject normal distribution.

W value is 0.4965. This is less than the tabled value of 0.892

UCL (Land's method) is 243.46

195	96SB0010
185	96SB0020
180	96SB0030
190	96SB00401
23	96SB0050
180	96SB0060
210	96SB0070
175	96SB0080
175	96SB0090
185	96SB0100
195	96SB01101
24	96SB01201
175	96SB01301
185	96SB01401
190	96SB0150
185	96SB0160
190	96SB0170

Appendix C - Table 48

Zone H - SWMU 196

95% UCL Calculations - Acenaphthene (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	167.18
Censored		Lognormal mean	184.97
Detection limit or PQL		Std. devn.	54.7805112
Method detection limit		Median	185
TOTAL	17	Min.	23
		Max.	210

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Reject lognormal distribution.

W value is 0.4501. This is less than the tabled value of 0.892

Reject normal distribution.

W value is 0.5378. This is less than the tabled value of 0.892

UCL (Land's method) is 272.29

195 Appendix C - Table 49
185 Zone H - SWMU 196
180 95% UCL Calculations - Acenaphthylene (μg/kg)

190 MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	171.59
Censored		Lognormal mean	182.12
Detection limit or PQL		Std. devn.	42.0461931
Method detection limit		Median	185
TOTAL	17	Min.	22
		Max.	210

165
175
185
190 Lognormal distribution? Normal distribution?
185 r-squared is: r-squared is:
190 Recommendations:
Reject lognormal distribution.
W value is 0.4209. This is less than the tabled value of 0.892
Reject normal distribution.
W value is 0.617. This is less than the tabled value of 0.892

UCL (Land's method) is 237.82

195	96SB0010
185	96SB0020
180	96SB0030
21	96SB00401
230	96SB0050
190	96SB0060
210	96SB0070
28	96SB0080
175	96SB0090
185	96SB0100
195	96SB01101
165	96SB01201
175	96SB01301
185	96SB01401
190	96SB0150
25	96SB0160
190	96SB0170

Appendix C - Table 50

Zone H - SWMU 196

95% UCL Calculations - Anthracene (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	160.24
Censored		Lognormal mean	182.30
Detection limit or PQL		Std. devn.	66.2707792
Method detection limit		Median	185
TOTAL	17	Min.	21
		Max.	230

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Reject lognormal distribution.

W value is 0.5699. This is less than the tabled value of 0.892

Reject normal distribution.

W value is 0.6728. This is less than the tabled value of 0.892

UCL (Land's method) is 295.64

195	96SB0010
185	96SB0020
21	96SB0030
78	96SB00401
250	96SB0050
490	96SB0060
210	96SB0070
58	96SB0080
175	96SB0090
185	96SB0100
195	96SB01101
165	96SB01201
175	96SB01301
185	96SB01401
190	96SB0150
37	96SB0160
22	96SB0170

Appendix C - Table 51

Zone H - SWMU 196

95% UCL Calculations - Benzo(g,h,i)perylene (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	165.65
Censored		Lognormal mean	184.80
Detection limit or PQL		Std. devn.	110.476209
Method detection limit		Median	185
TOTAL	17	Min.	21
		Max.	490

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Reject lognormal distribution.

W value is 0.8247. This is less than the tabled value of 0.892

Reject normal distribution.

W value is 0.8213. This is less than the tabled value of 0.892

UCL (Land's method) is 320.57

195	96SB0010
100	96SB0020
100	96SB0030
110	96SB00401
170	96SB0050
110	96SB0060
210	96SB0070
175	96SB0080
175	96SB0090
185	96SB0100
195	96SB01101
165	96SB01201
175	96SB01301
185	96SB01401
280	96SB0150
185	96SB0160
190	96SB0170

Appendix C - Table 52

Zone H - SWMU 196

95% UCL Calculations - Benzoic acid (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	170.88
Censored		Lognormal mean	171.63
Detection limit or PQL		Std. devn.	45.4915959
Method detection limit		Median	175
TOTAL	17	Min.	100
		Max.	280

Lognormal distribution?	Normal distribution?
r-squared is:	r-squared is:

Recommendations:
Reject lognormal distribution.
W value is 0.8525. This is less than the tabled value of 0.892
Reject normal distribution.
W value is 0.8777. This is less than the tabled value of 0.892

UCL (Land's method) is 195.77

195	96SB0010
185	96SB0020
180	96SB0030
190	96SB00401
170	96SB0050
180	96SB0060
59	96SB0070
31	96SB0080
18	96SB0090
55	96SB0100
72	96SB01101
26	96SB01201
175	96SB01301
185	96SB01401
22	96SB0150
185	96SB0160
190	96SB0170

Appendix C - Table 53

Zone H - SWMU 196

95%-UCL Calculations - bis(2-Ethylhexyl)phthalate (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	124.59
Censored		Lognormal mean	139.42
Detection limit or PQL		Std. devn.	73.9434402
Method detection limit		Median	175
TOTAL	17	Min.	18
		Max.	195

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Reject lognormal distribution.

W value is 0.7666. This is less than the tabled value of 0.892

Reject normal distribution.

W value is 0.756. This is less than the tabled value of 0.892

UCL (Land's method) is 244.51

195	96SB0010
185	96SB0020
180	96SB0030
190	96SB00401
20	96SB0050
180	96SB0060
210	96SB0070
175	96SB0080
175	96SB0090
185	96SB0100
195	96SB01101
165	96SB01201
175	96SB01301
185	96SB01401
190	96SB0150
185	96SB0160
190	96SB0170

Appendix C - Table 55

Zone H - SWMU 196

95% UCL Calculations - Di-n-butylphthalate (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	175.29
Censored		Lognormal mean	187.72
Detection limit or PQL		Std. devn.	41.2867483
Method detection limit		Median	185
TOTAL	17	Min.	20
		Max.	210

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Reject lognormal distribution.

W value is 0.3526. This is less than the tabled value of 0.892

Reject normal distribution.

W value is 0.4936. This is less than the tabled value of 0.892

UCL (Land's method) is 248.81

195 Appendix C - Table 56
200 Zone H - SWMU 196
180 95% UCL Calculations - Di-n-octylphthalate (μg/kg)

190 MTCA*Stat* 2.1

170 Number of samples		Uncensored values	
180 Uncensored	17	Mean	185.88
210 Censored		Lognormal mean	185.91
175 Detection limit or PQL		Std. devn.	12.0202036
175 Method detection limit		Median	185
185 TOTAL	17	Min.	165
195		Max.	210

165
175
185
190 Lognormal distribution? Normal distribution?
200 r-squared is: r-squared is:
190 Recommendations:
Assume lognormal distribution.
W value is 0.9795. This exceeds the tabled value of 0.892

UCL (Land's method) is 191.14

195	96SB0010
185	96SB0020
19	96SB0030
200	96SB00401
2000	96SB0050
1900	96SB0060
76	96SB0070
570	96SB0080
175	96SB0090
71	96SB0100
39	96SB01101
27	96SB01201
28	96SB01301
29	96SB01401
43	96SB0150
180	96SB0160
25	96SB0170

Appendix C - Table 57

Zone H - SWMU 196

95% UCL Calculations - Fluoranthene (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	338.94
Censored		Lognormal mean	315.08
Detection limit or PQL		Std. devn.	621.224745
Method detection limit		Median	76
TOTAL	17	Min.	19
		Max.	2000

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.8926. This exceeds the tabled value of 0.892

UCL (Land's method) is 1087.56

195	96SB0010
185	96SB0020
180	96SB0030
190	96SB00401
34	96SB0050
23	96SB0060
210	96SB0070
175	96SB0080
175	96SB0090
185	96SB0100
195	96SB01101
165	96SB01201
175	96SB01301
185	96SB01401
190	96SB0150
185	96SB0160
190	96SB0170

Appendix C - Table 58

Zone H - SWMU 196

95% UCL Calculations - Fluorene (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	166.88
Censored		Lognormal mean	181.10
Detection limit or PQL		Std. devn.	53.0858766
Method detection limit		Median	185
TOTAL	17	Min.	23
		Max.	210

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Reject lognormal distribution.

W value is 0.4782. This is less than the tabled value of 0.892

Reject normal distribution.

W value is 0.5714. This is less than the tabled value of 0.892

UCL (Land's method) is 255.82

195	96SB0010
185	96SB0020
180	96SB0030
190	96SB00401
170	96SB0050
180	96SB0060
210	96SB0070
175	96SB0080
175	96SB0090
185	96SB0100
195	96SB01101
210	96SB01201
175	96SB01301
185	96SB01401
190	96SB0150
185	96SB0160
190	96SB0170

Appendix C - Table 59

Zone H - SWMU 196

95% UCL Calculations - Naphthalene (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	186.76
Censored		Lognormal mean	186.78
Detection limit or PQL		Std. devn.	11.3111085
Method detection limit		Median	185
TOTAL	17	Min.	170
		Max.	210

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Assume lognormal distribution.

W value is 0.9314. This exceeds the tabled value of 0.892

UCL (Land's method) is 191.61

195	96SB0010
185	96SB0020
180	96SB0030
78	96SB00401
660	96SB0050
400	96SB0060
28	96SB0070
89	96SB0080
175	96SB0090
19	96SB0100
195	96SB01101
17	96SB01201
175	96SB01301
185	96SB01401
29	96SB0150
130	96SB0160
190	96SB0170

Appendix C - Table 60

Zone H - SWMU 196

95% UCL Calculations - Phenanthrene (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	172.35
Censored		Lognormal mean	195.62
Detection limit or PQL		Std. devn.	157.725212
Method detection limit		Median	175
TOTAL	17	Min.	17
		Max.	660

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Reject lognormal distribution.

W value is 0.8857. This is less than the tabled value of 0.892

Reject normal distribution.

W value is 0.764. This is less than the tabled value of 0.892

UCL (Land's method) is 399.77

195	96SB0010
185	96SB0020
19	96SB0030
170	96SB00401
1400	96SB0050
1700	96SB0060
140	96SB0070
530	96SB0080
175	96SB0090
130	96SB0100
97	96SB01101
41	96SB01201
75	96SB01301
41	96SB01401
58	96SB0150
140	96SB0160
30	96SB0170

Appendix C - Table 61
Zone H - SWMU 196
95% UCL Calculations - Pyrene (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	301.53
Censored		Lognormal mean	285.10
Detection limit or PQL		Std. devn.	487.093179
Method detection limit		Median	140
TOTAL	17	Min.	19
		Max.	1700

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Assume lognormal distribution.
W value is 0.9369. This exceeds the tabled value of 0.892

UCL (Land's method) is 724.53

2.5	96SB0010
3	96SB0020
2.5	96SB0030
4	96SB00401
4	96SB0050
2	96SB0060
4.5	96SB0070
4	96SB0080
2	96SB0090
2.5	96SB0100
3	96SB01101
2.5	96SB01201
50	96SB01301
120	96SB01401
8	96SB0150

Appendix C - Table 62

Zone H - SWMU 196

95% UCL Calculations - Acetone (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	15	Mean	14.30
Censored		Lognormal mean	9.87
Detection limit or PQL		Std. devn.	31.6407287
Method detection limit		Median	3
TOTAL	15	Min.	2
		Max.	120

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Reject lognormal distribution.

W value is 0.6848. This is less than the tabled value of 0.881

Reject normal distribution.

W value is 0.4426. This is less than the tabled value of 0.881

UCL (Land's method) is 26.22

2.5	96SB0010
3	96SB0020
2.5	96SB0030
4	96SB00401
4	96SB0050
2	96SB0060
4.5	96SB0070
4	96SB0080
2	96SB0090
2.5	96SB0100
3	96SB01101
2.5	96SB01201
2.5	96SB01301
2.5	96SB01401
94	96SB0150
3	96SB0160
2.5	96SB0170

Appendix C - Table 63

Zone H - SWMU 196

95% UCL Calculations - Chlorobenzene (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	8.29
Censored		Lognormal mean	5.16
Detection limit or PQL		Std. devn.	22.0985427
Method detection limit		Median	2.5
TOTAL	17	Min.	2
		Max.	94

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Reject lognormal distribution.

W value is 0.5037. This is less than the tabled value of 0.892

Reject normal distribution.

W value is 0.2893. This is less than the tabled value of 0.892

UCL (Land's method) is 8.95

2.5	96SB0010
3	96SB0020
1	96SB0030
5	96SB00401
2	96SB0050
0.9	96SB0060
4.5	96SB0070
4	96SB0080
2	96SB0090
2.5	96SB0100
3	96SB01101
2.5	96SB01201
2.5	96SB01301
2.5	96SB01401
2.5	96SB0150
3	96SB0160
2.5	96SB0170

Appendix C - Table 64

Zone H - SWMU 196

95% UCL Calculations - Methylene chloride (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	2.70
Censored		Lognormal mean	2.74
Detection limit or PQL		Std. devn.	1.05711873
Method detection limit		Median	2.5
TOTAL	17	Min.	0.9
		Max.	5

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Reject lognormal distribution.

W value is 0.8689. This is less than the tabled value of 0.892

Assume normal distribution.

W value is 0.9042. This exceeds the tabled value of 0.892

UCL (Land's method) is 3.41

450.645	96SB0010
27.535	96SB0020
415.98	96SB0030
332.39	96SB00401
523.81	96SB0050
1256.7	96SB0060
339.749	96SB0070
373.21	96SB0080
389.07	96SB0090
276.108	96SB0100
433.807	96SB01101
214.84	96SB01201
238.258	96SB01301
233.414	96SB01401
250.764	96SB0150
259.997	96SB0160
260.635	96SB0170

Appendix C - Table 65
Zone H - SWMU 196
95% UCL Calculations - BEQs (μg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	17	Mean	392.76
Censored		Lognormal mean	386.89
Detection limit or PQL		Std. devn.	240.698472
Method detection limit		Median	339.749
TOTAL	17	Min.	214.84
		Max.	1256.7

Lognormal distribution? Normal distribution?
r-squared is: r-squared is:

Recommendations:
Reject lognormal distribution.
W value is 0.8535. This is less than the tabled value of 0.892
Reject normal distribution.
W value is 0.6156. This is less than the tabled value of 0.892

UCL (Land's method) is 476.66

APPENDIX C
TABLE 66
BENZO(A)PYRENE EQUIVALENT CALCULATIONS FOR SURFACE SOIL (0-1')
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Sample ID	Reported Concentration (ug/kg)	Validation Qualifier	Actual or Estimated Concentration (ug/kg)	TEF	Parameter	BEQ (ug/kg)
196SB00101	390	U	195	0.1	Benzo(a)anthracene	19.5
	390	U	195	1	Benzo(a)pyrene	195
	390	U	195	0.1	Benzo(b)fluoranthene	19.5
	390	U	195	0.01	Benzo(k)fluoranthene	1.95
	390	U	195	0.001	Chrysene	0.195
	390	U	195	1	Dibenz(a,h)anthracene	195
	390	U	195	0.1	Indeno(1,2,3-cd)pyrene	19.5
					Total for Sample	450.645
196SB00201	370	U	185	0.1	Benzo(a)anthracene	18.5
	370	U	185	1	Benzo(a)pyrene	185
	370	U	185	0.1	Benzo(b)fluoranthene	18.5
	370	U	185	0.01	Benzo(k)fluoranthene	1.85
	370	U	185	0.001	Chrysene	0.185
	370	U	185	1	Dibenz(a,h)anthracene	185
	370	U	185	0.1	Indeno(1,2,3-cd)pyrene	18.5
					Total for Sample	427.535
196SB00301	360	U	180	0.1	Benzo(a)anthracene	18
	360	U	180	1	Benzo(a)pyrene	180
	360	U	180	0.1	Benzo(b)fluoranthene	18
	360	U	180	0.01	Benzo(k)fluoranthene	1.8
	360	U	180	0.001	Chrysene	0.18
	360	U	180	1	Dibenz(a,h)anthracene	180
	360	U	180	0.1	Indeno(1,2,3-cd)pyrene	18
					Total for Sample	415.98
196SB00401	120	J	120	0.1	Benzo(a)anthracene	12
	110	J	110	1	Benzo(a)pyrene	110
	120	J	120	0.1	Benzo(b)fluoranthene	12
	110	J	110	0.01	Benzo(k)fluoranthene	1.1
	190	J	190	0.001	Chrysene	0.19
	380	U	190	1	Dibenz(a,h)anthracene	190
	71	J	71	0.1	Indeno(1,2,3-cd)pyrene	7.1
					Total for Sample	332.39
196SB00501	380		380	0.1	Benzo(a)anthracene	38
	300	J	300	1	Benzo(a)pyrene	300
	640		640	0.1	Benzo(b)fluoranthene	64
	390		390	0.01	Benzo(k)fluoranthene	3.9
	910		910	0.001	Chrysene	0.91
	94	J	94	1	Dibenz(a,h)anthracene	94
	230	J	230	0.1	Indeno(1,2,3-cd)pyrene	23
					Total for Sample	523.81
196SB00601	1000		1000	0.1	Benzo(a)anthracene	100
	730		730	1	Benzo(a)pyrene	730
	1400		1400	0.1	Benzo(b)fluoranthene	140
	610		610	0.01	Benzo(k)fluoranthene	6.1
	1600		1600	0.001	Chrysene	1.6
	230	J	230	1	Dibenz(a,h)anthracene	230
	490		490	0.1	Indeno(1,2,3-cd)pyrene	49
					Total for Sample	1256.7
196SB00701	420	U	210	0.1	Benzo(a)anthracene	21
	75	J	75	1	Benzo(a)pyrene	75
	120	J	120	0.1	Benzo(b)fluoranthene	12
	67	J	67	0.01	Benzo(k)fluoranthene	0.67
	79	J	79	0.001	Chrysene	0.079
	420	UJ	210	1	Dibenz(a,h)anthracene	210
	420	UJ	210	0.1	Indeno(1,2,3-cd)pyrene	21
					Total for Sample	339.749

APPENDIX C
TABLE 66
BENZO(A)PYRENE EQUIVALENT CALCULATIONS FOR SURFACE SOIL (0-1')
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Sample ID	Reported Concentration (ug/kg)	Validation Qualifier	Actual or Estimated Concentration (ug/kg)	TEF	Parameter	BEQ (ug/kg)
196SB00801	100	J	100	0.1	Benzo(a)anthracene	10
	160	J	160	1	Benzo(a)pyrene	160
	200	J	200	0.1	Benzo(b)fluoranthene	20
	180	J	180	0.01	Benzo(k)fluoranthene	1.8
	310	J	310	0.001	Chrysene	0.31
	350	U	175	1	Dibenz(a,h)anthracene	175
	61	J	61	0.1	Indeno(1,2,3-cd)pyrene	6.1
					Total for Sample	373.21
196SB00901	350	U	175	0.1	Benzo(a)anthracene	17.5
	350	U	175	1	Benzo(a)pyrene	175
	23	J	23	0.1	Benzo(b)fluoranthene	2.3
	350	U	175	0.01	Benzo(k)fluoranthene	1.75
	20	J	20	0.001	Chrysene	0.02
	350	U	175	1	Dibenz(a,h)anthracene	175
	350	U	175	0.1	Indeno(1,2,3-cd)pyrene	17.5
					Total for Sample	389.07
196SB01001	370	U	185	0.1	Benzo(a)anthracene	18.5
	46	J	46	1	Benzo(a)pyrene	46
	74	J	74	0.1	Benzo(b)fluoranthene	7.4
	64	J	64	0.01	Benzo(k)fluoranthene	0.64
	68	J	68	0.001	Chrysene	0.068
	370	U	185	1	Dibenz(a,h)anthracene	185
	370	U	185	0.1	Indeno(1,2,3-cd)pyrene	18.5
					Total for Sample	276.108
196SB01101	28	J	28	0.1	Benzo(a)anthracene	2.8
	390	UJ	195	1	Benzo(a)pyrene	195
	390	UJ	195	0.1	Benzo(b)fluoranthene	19.5
	390	UJ	195	0.01	Benzo(k)fluoranthene	1.95
	57	J	57	0.001	Chrysene	0.057
	390	UJ	195	1	Dibenz(a,h)anthracene	195
	390	UJ	195	0.1	Indeno(1,2,3-cd)pyrene	19.5
					Total for Sample	433.807
196SB01201	23	J	23	0.1	Benzo(a)anthracene	2.3
	28	J	28	1	Benzo(a)pyrene	28
	27	J	27	0.1	Benzo(b)fluoranthene	2.7
	30	J	30	0.01	Benzo(k)fluoranthene	0.3
	40	J	40	0.001	Chrysene	0.04
	330	U	165	1	Dibenz(a,h)anthracene	165
	330	U	165	0.1	Indeno(1,2,3-cd)pyrene	16.5
					Total for Sample	214.84
196SB01301	24	J	24	0.1	Benzo(a)anthracene	2.4
	37	J	37	1	Benzo(a)pyrene	37
	60	J	60	0.1	Benzo(b)fluoranthene	6
	31	J	31	0.01	Benzo(k)fluoranthene	0.31
	48	J	48	0.001	Chrysene	0.048
	350	UJ	175	1	Dibenz(a,h)anthracene	175
	350	UJ	175	0.1	Indeno(1,2,3-cd)pyrene	17.5
					Total for Sample	238.258
196SB01401	19	J	19	0.1	Benzo(a)anthracene	1.9
	24	J	24	1	Benzo(a)pyrene	24
	37	J	37	0.1	Benzo(b)fluoranthene	3.7
	28	J	28	0.01	Benzo(k)fluoranthene	0.28
	34	J	34	0.001	Chrysene	0.034
	370	U	185	1	Dibenz(a,h)anthracene	185
	370	U	185	0.1	Indeno(1,2,3-cd)pyrene	18.5
					Total for Sample	233.414
196SB01501	22	J	22	0.1	Benzo(a)anthracene	2.2
	35	J	35	1	Benzo(a)pyrene	35
	42	J	42	0.1	Benzo(b)fluoranthene	4.2
	33	J	33	0.01	Benzo(k)fluoranthene	0.33
	34	J	34	0.001	Chrysene	0.034
	380	U	190	1	Dibenz(a,h)anthracene	190
	380	U	190	0.1	Indeno(1,2,3-cd)pyrene	19
					Total for Sample	250.764

APPENDIX C
TABLE 66
BENZO(A)PYRENE EQUIVALENT CALCULATIONS FOR SURFACE SOIL (0-1')
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Sample ID	Reported Concentration (ug/kg)	Validation Qualifier	Actual or Estimated Concentration (ug/kg)	TEF	Parameter	BEQ (ug/kg)
196SB01601	68	J	68	0.1	Benzo(a)anthracene	6.8
	57	J	57	1	Benzo(a)pyrene	57
	72	J	72	0.1	Benzo(b)fluoranthene	7.2
	52	J	52	0.01	Benzo(k)fluoranthene	0.52
	77	J	77	0.001	Chrysene	0.077
	370	U	185	1	Dibenz(a,h)anthracene	185
	34	J	34	0.1	Indeno(1,2,3-cd)pyrene	3.4
					Total for Sample	259.997
196SB01701	380	U	190	0.1	Benzo(a)anthracene	19
	25	J	25	1	Benzo(a)pyrene	25
	57	J	57	0.1	Benzo(b)fluoranthene	5.7
	380	U	190	0.01	Benzo(k)fluoranthene	1.9
	35	J	35	0.001	Chrysene	0.035
	380	U	190	1	Dibenz(a,h)anthracene	190
	380	U	190	0.1	Indeno(1,2,3-cd)pyrene	19
					Total for Sample	260.635

APPENDIX C
TABLE 67
BENZO(A)PYRENE EQUIVALENT CALCULATIONS FOR SEDIMENTS
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Sample ID	Reported Concentration (ug/kg)	Validation Qualifier	Actual or Estimated Concentration (ug/kg)	TEF	Parameter	BEQ (ug/kg)
196M000101	860		860	0.1	Benzo(a)anthracene	86
	970		970	0.001	Chrysene	0.97
	850	U	425	0.1	Benzo(b)fluoranthene	42.5
	870		870	0.01	Benzo(k)fluoranthene	8.7
	1600		1600	1	Benzo(a)pyrene	1600
	320	J	320	0.1	Indeno(1,2,3-cd)pyrene	32
	850	U	425	1	Dibenz(a,h)anthracene	425
					Total for Sample	2195.17
196M000102	360	J	360	0.1	Benzo(a)anthracene	36
	180	J	180	0.001	Chrysene	0.18
	270	J	270	0.1	Benzo(b)fluoranthene	27
	220	J	220	0.01	Benzo(k)fluoranthene	2.2
	290	J	290	1	Benzo(a)pyrene	290
	150	J	150	0.1	Indeno(1,2,3-cd)pyrene	15
	820	U	410	1	Dibenz(a,h)anthracene	410
					Total for Sample	780.38
	190	J	190	0.001	Chrysene	0.19
	190	J	190	0.1	Benzo(b)fluoranthene	19
	140	J	140	0.01	Benzo(k)fluoranthene	1.4
	220	J	220	1	Benzo(a)pyrene	220
	120	J	120	0.1	Indeno(1,2,3-cd)pyrene	12
	80	J	80	1	Dibenz(a,h)anthracene	80
					Total for Sample	332.59
196M000201	250	J	250	0.1	Benzo(a)anthracene	25
	220	J	220	0.001	Chrysene	0.22
	250	J	250	0.1	Benzo(b)fluoranthene	25
	140	J	140	0.01	Benzo(k)fluoranthene	1.4
	590	J	590	1	Benzo(a)pyrene	590
	170	J	170	0.1	Indeno(1,2,3-cd)pyrene	17
	720	U	360	1	Dibenz(a,h)anthracene	360
					Total for Sample	1018.62
196M000202	97	J	97	0.1	Benzo(a)anthracene	9.7
	91	J	91	0.001	Chrysene	0.091
	130	J	130	0.1	Benzo(b)fluoranthene	13
	92	J	92	0.01	Benzo(k)fluoranthene	0.92
	120	J	120	1	Benzo(a)pyrene	120
	84	J	84	0.1	Indeno(1,2,3-cd)pyrene	8.4
	920	U	460	1	Dibenz(a,h)anthracene	460
					Total for Sample	612.111
196M000203	72	J	72	0.1	Benzo(a)anthracene	7.2
	62	J	62	0.001	Chrysene	0.062
	67	J	67	0.1	Benzo(b)fluoranthene	6.7
	82	J	82	0.01	Benzo(k)fluoranthene	0.82
	82	J	82	1	Benzo(a)pyrene	82
	44	J	44	0.1	Indeno(1,2,3-cd)pyrene	4.4
	770	U	385	1	Dibenz(a,h)anthracene	385
					Total for Sample	486.182

APPENDIX C
TABLE 67
BENZO(A)PYRENE EQUIVALENT CALCULATIONS FOR SEDIMENTS
ZONE H - SWMU 196
CHARLESTON NAVAL COMPLEX

Sample ID	Reported Concentration (ug/kg)	Validation Qualifier	Actual or Estimated Concentration (ug/kg)	TEF	Parameter	BEQ (ug/kg)
196M000301	130	J	130	0.1	Benzo(a)anthracene	13
	170	J	170	0.001	Chrysene	0.17
	230	J	230	0.1	Benzo(b)fluoranthene	23
	150	J	150	0.01	Benzo(k)fluoranthene	1.5
	130	J	130	1	Benzo(a)pyrene	130
	93	J	93	0.1	Indeno(1,2,3-cd)pyrene	9.3
	44	J	44	1	Dibenz(a,h)anthracene	44
					Total for Sample	220.97
196M000302	100	J	100	0.1	Benzo(a)anthracene	10
	78	J	78	0.001	Chrysene	0.078
	140	J	140	0.1	Benzo(b)fluoranthene	14
	110	J	110	0.01	Benzo(k)fluoranthene	1.1
	110	J	110	1	Benzo(a)pyrene	110
	65	J	65	0.1	Indeno(1,2,3-cd)pyrene	6.5
	810	U	405	1	Dibenz(a,h)anthracene	405
					Total for Sample	546.678
196M000303	890	U	445	0.1	Benzo(a)anthracene	44.5
	890	U	445	0.001	Chrysene	0.445
	45	J	45	0.1	Benzo(b)fluoranthene	4.5
	890	U	445	0.01	Benzo(k)fluoranthene	4.45
	890	U	445	1	Benzo(a)pyrene	445
	890	U	445	0.1	Indeno(1,2,3-cd)pyrene	44.5
	890	U	445	1	Dibenz(a,h)anthracene	445
					Total for Sample	988.395

APPENDIX C - TABLE 68
AIR CONCENTRATION CALCULATIONS: SURFACE SOIL (0-1')
ZONE H - SWMU 196 - CHARLESTON NAVAL COMPLEX

Variable	Air Concentration		Soil Concentration			Particulate Emissions Factor			Volatilization Factor	
Abbreviation	CA	=	CS	* [(1 /		PEF	) + (1 /		VF	)]
Units	mg/m^3		mg/kg			m^3/kg			m^3/kg	
Inorganics										
Antimony	1.60E-08	=	2.12E+01	* [(1 /		1.32E+09	) + (1 /		N/A	)]
Copper	3.87E-07	=	5.10E+02	* [(1 /		1.32E+09	) + (1 /		N/A	)]
Lead	1.41E-07	=	1.86E+02	* [(1 /		1.32E+09	) + (1 /		N/A	)]
Vanadium	2.92E-08	=	3.86E+01	* [(1 /		1.32E+09	) + (1 /		N/A	)]
SVOCs										
B(a)P equiv.	2.73E-08	=	4.77E-01	* [(1 /		1.32E+09	) + (1 /		1.77E+07	)]

Notes:

N/A = Not Applicable

Equations from U.S. EPA (1996), Soil Screening Guide: User's Guide (EPA/540/R-96/018) (Eq. 8)

VF(m3/kg) = Q/C * (3.14*Da*T)0.5 * 0.0001(m2/cm2) / (2*rb*Da)

qa(Lair/Lsoil) = n - qw

Da (cm2/s) = [(qa3.33 * Di * H + qw3.33 * Dw) / n2] / (rb * Koc * foc + qw + qa

APPENDIX C - TABLE 69
AIR CONCENTRATION CALCULATIONS: SURFACE SOIL (0-1')
ZONE H - SWMU 196 - CHARLESTON NAVAL COMPLEX
DERIVATION OF VOLATILIZATION FACTOR

CHEMICALS	VF (m3/kg)	Inverse Mean Soil Concentration Q/C (g/m2-s / kg/m3)	Exposure Interval T (s)	Dry Soil Bulk Density pb (g/cm3)	Water-filled Soil Porosity Ow (Lwater/Lsoil)	Soil Particle Density ps (g/cm3)	Diffusivity in Air Di (cm2/s)	Henry's Law Constant (H) (-)	Diffusivity in Water Dw (cm2/s)	Soil Organic Carbon Partition Coefficient Koc (cm3/g)	Fraction Organic Carbon Foc (g/g)	Apparent Diffusivity Da (cm2/s)	Total Soil Porosity n (Lpore/Lsoil)	Air-Filled Soil Porosity Oa (Lair/Lsoil)
Benzo(a)pyrene	1.77E+07	50.17	9.50E+08	1.5	0.15	2.65	4.30E-02	4.63E-05	9.00E-06	1.02E+06	0.006	2.66666E-11	0.433962264	0.283962264

Equations from U.S. EPA (1996), Soil Screening Guide: User's Guide (EPA/540/R-96/018) (Eq. 8)

VF (m3/kg) = Q/C * (3.14*Da*T)^0.5 * 0.0001 (m2/cm2) / (2*pb*Da)

Oa (Lair/Lsoil) = n - Ow

Da (cm2/s) = [(Oa^3.33*Di*H + Ow^3.33*Dw)/n^2] / (pb*Koc*foc+Ow+Oa*H)

Q/C = inverse of mean concentration at center of source (g/m^2-s per kg/m^3) If area is 0.5 acre, Q/C = 53.89. If area is > 0.5 acre and 1 acre, Q/C = 47.24.

If area is > 1 acre and 2 acres, Q/C = 41.83.

APPENDIX C
TABLE 70
DERIVATION OF VOLATILIZATION FACTOR BY MASS LIMIT MODEL
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Equation	VF	=	(	(	Q/C	)	x	[	(	T	x	3.15E+07	)	/	(	pb	x	ds	x	1.00E+06	)	]
Units	mg^3/kg				g/m^2-s per kg/m^3					yr		s/yr				kg/l		meters		g/Mg		
EVALUATED AREAS																						
Aroclor-1260/TEQs	1.20E+05	=	[	(	5.81E+01	)	x	[	(	30	x	3.15E+07	)	/	(	1.5	x	3.05E-01	x	1.00E+06	)	]

Notes:
VF = volatilization factor (m^3/kg)
Q/C = inverse of mean concentration at center of source (g/m^2-s per kg/m^3)
T = exposure interval (years)
pb = dry soil bulk density (kg/l)
ds = average source depth (meters)
† Assumed average plume depth of 2 feet.

APPENDIX C
TABLE 1
QUALIFIED ANALYTICAL DATA - INORGANICS
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Site	017			017			017			017			017		
Sample ID	017SB00101			017SB00201			017SB00301			017SB00401			017SB00501		
Constituent Date	08/16/94			08/16/94			08/16/94			8/16/94			8/17/94		
(Units in mg/kg) Depth	0-1			0-1			0-1			0-1			0-1		
	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Aluminum (Al)	4510.00	J	4510.00	13700.00		13700.00	2980.00		2980.00	7950.00		7950.00	10500.00		10500.00
Antimony (Sb)	1.10	U	0.55	7.60	U	3.80	1.20	U	0.60	1.50	U	0.75	1.20	U	0.60
Arsenic (As)	2.90		2.90	5.80		5.80	4.30		4.30	2.80		2.80	0.90	J	0.90
Barium (Ba)	16.90	J	16.90	8.30	J	8.30	0.08	U	0.04	14.70		14.70	16.40		16.40
Beryllium (Be)	0.24	J	0.24	0.53	J	0.53	0.19	J	0.19	0.19	J	0.19	0.32	J	0.32
Cadmium (Cd)	0.50		0.50	0.93	U	0.47	0.25	J	0.25	0.20	J	0.20	0.15	U	0.08
Calcium (Ca)	57300.00		57300.00	103000.00		103000.00	136000.00		136000.00	19500.00		19500.00	66800.00		66800.00
Chromium (Cr)	13.50		13.50	28.70		28.70	5.90		5.90	14.30		14.30	7.20		7.20
Cobalt (Co)	2.30	J	2.30	2.30	J	2.30	2.60	J	2.60	1.00	J	1.00	0.69	J	0.69
Copper (Cu)	19.60	U	9.80	1.50	U	0.75	15.20	U	7.60	11.10	U	5.55	0.43	U	0.22
Cyanide (CN)	0.90	U	0.45	1.00	U	0.50	1.00	U	0.50	1.00	U	0.50	0.90	U	0.45
Hexavalent Chromium	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS
Iron (Fe)	5260.00	J	5260.00	12300.00	J	12300.00	3590.00	J	3590.00	7200.00	J	7200.00	3050.00		3050.00
Lead (Pb)	19.60	J	19.60	9.80	U	4.90	29.40		29.40	30.00		30.00	2.20	J	2.20
Magnesium (Mg)	1200.00	J	1200.00	3790.00		3790.00	1250.00		1250.00	635.00		635.00	495.00	J	495.00
Manganese (Mn)	65.10	J	65.10	138.00		138.00	84.90		84.90	55.40		55.40	21.60		21.60
Mercury (Hg)	0.02	U	0.01	0.05	J	0.05	0.04	J	0.04	0.02	J	0.02	0.03	U	0.02
Nickel (Ni)	10.40	J	10.40	12.00	J	12.00	4.60		4.60	5.70		5.70	2.00	J	2.00
Potassium (K)	550.00	U	275.00	673.00	U	336.50	198.00	U	99.00	359.00	U	179.50	233.00	U	116.50
Selenium (Se)	0.77	U	0.39	0.90	U	0.45	0.86	U	0.43	0.24	U	0.12	0.65	U	0.33
Silver (Ag)	0.22	U	0.11	1.60	U	0.80	0.25	U	0.13	0.31	U	0.16	0.25	U	0.13
Sodium (Na)	333.00	J	333.00	341.00	J	341.00	77.60	J	77.60	186.00		186.00	138.00		138.00
Thallium (Tl)	0.77	U	0.39	0.90	U	0.45	0.86	U	0.43	0.35	U	0.18	0.65	U	0.33
Tin (Sn)	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS
Vanadium (V)	18.10		18.10	36.40		36.40	6.50		6.50	16.90		16.90	12.40	J	12.40
Zinc (Zn)	137.00	J	137.00	67.30		67.30	41.10		41.10	28.70		28.70	3.50		3.50

NS - Not Samples
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APPENDIX C
TABLE 1
QUALIFIED ANALYTICAL DATA - INORGANICS
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Constituent (Units in mg/kg)	Site	017			017			017			017			017		
	Sample ID	017SB00601			017SB00701			017SB00801			017SB00901			017SB01001		
	Date	8/16/94			8/17/94			8/17/94			8/17/94			8/18/94		
	Depth	0-1			0-1			0-1			0-1			0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Aluminum (Al)		5870.00		5870.00	9470.00		9470.00	9800.00		9800.00	13200.00		13200.00	5250.00		5250.00
Antimony (Sb)		1.60	U	0.80	1.20	U	0.60	1.10	U	0.55	1.20	U	0.60	1.50	U	0.75
Arsenic (As)		1.00	J	1.00	2.30		2.30	2.70		2.70	6.20		6.20	3.10	J	3.10
Barium (Ba)		7.40	J	7.40	13.20		13.20	17.20		17.20	15.30		15.30	12.20	J	12.20
Beryllium (Be)		0.09	J	0.09	0.12	J	0.12	0.14	J	0.14	0.46		0.46	0.19	J	0.19
Cadmium (Cd)		0.20	U	0.10	0.15	U	0.08	0.14	U	0.07	0.15	U	0.08	0.18	U	0.09
Calcium (Ca)		25600.00		25600.00	11800.00		11800.00	1320.00		1320.00	14500.00		14500.00	9710.00		9710.00
Chromium (Cr)		6.70		6.70	7.90		7.90	11.70		11.70	21.10		21.10	12.40		12.40
Cobalt (Co)		0.75	U	0.38	0.82	J	0.82	0.79	J	0.79	2.80		2.80	1.30	J	1.30
Copper (Cu)		3.00		3.00	0.24	U	0.12	0.23	U	0.12	23.00	U	11.50	10.80		10.80
Cyanide (CN)		3.00	J	3.00	1.00	U	0.50	1.00	U	0.50	1.00		1.00	1.00	U	0.50
Hexavalent Chromium		NS		NS	NS		NS	NS		NS	NS		NS	NS		NS
Iron (Fe)		2280.00	J	2280.00	5890.00		5890.00	7630.00		7630.00	14700.00		14700.00	4550.00		4550.00
Lead (Pb)		8.40		8.40	4.80		4.80	6.60		6.60	19.60		19.60	17.20		17.20
Magnesium (Mg)		492.00		492.00	214.00		214.00	253.00		253.00	1560.00		1560.00	630.00		630.00
Manganese (Mn)		38.30		38.30	16.40		16.40	10.70		10.70	168.00		168.00	64.50		64.50
Mercury (Hg)		0.03	U	0.02	0.03	U	0.02	0.03	U	0.02	0.13		0.13	0.04	J	0.04
Nickel (Ni)		2.80	J	2.80	1.30	J	1.30	1.10	J	1.10	8.30		8.30	4.70		4.70
Potassium (K)		292.00	U	146.00	261.00	U	130.50	326.00	U	163.00	589.00	U	294.50	347.00	J	347.00
Selenium (Se)		0.78	U	0.39	0.34	U	0.17	0.33	U	0.17	0.70	U	0.35	0.35	U	0.18
Silver (Ag)		0.34	U	0.17	0.25	U	0.13	0.23	U	0.12	0.25	U	0.13	0.30	U	0.15
Sodium (Na)		41.80	J	41.80	167.00		167.00	92.40		92.40	113.00		113.00	75.80	J	75.80
Thallium (Tl)		0.39	U	0.20	0.33	U	0.17	0.33	U	0.17	0.36	U	0.18	0.35	U	0.18
Tin (Sn)		NS		NS	NS		NS	NS		NS	NS		NS	NS		NS
Vanadium (V)		7.50		7.50	14.10		14.10	16.30		16.30	30.00		30.00	18.80		18.80
Zinc (Zn)		13.10		13.10	3.70		3.70	4.70		4.70	63.00		63.00	54.60		54.60

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APPENDIX C
TABLE 1
QUALIFIED ANALYTICAL DATA - INORGANICS
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Constituent (Units in mg/kg)	Site	017			017			017			017			017		
	Sample ID	017SB01101			017SB01201			017SB01301			017SB01401			017SB01501		
	Date	8/18/94			1/12/95			1/13/95			1/12/95			1/12/95		
	Depth	0-1			0-1			0-1			0-1			0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Aluminum (Al)		3460.00		3460.00	11300.00		11300.00	8110.00		8110.00	7680.00		7680.00	938.00		938.00
Antimony (Sb)		10.10		10.10	1.50	U	0.75	1.60	U	0.80	1.60	U	0.80	2.20	J	2.20
Arsenic (As)		4.80	J	4.80	2.10	U	1.05	3.70		3.70	3.50		3.50	4.00		4.00
Barium (Ba)		12.10	J	12.10	23.90	U	11.95	17.10	U	8.55	18.20	U	9.10	4.40	U	2.20
Beryllium (Be)		0.12	J	0.12	0.21	U	0.11	0.14	U	0.07	0.14	U	0.07	0.14	U	0.07
Cadmium (Cd)		0.35	J	0.35	0.20	U	0.10	0.21	U	0.11	0.21	U	0.11	0.53	J	0.53
Calcium (Ca)		4150.00		4150.00	16600.00		16600.00	1950.00		1950.00	2850.00		2850.00	347000.00		347000.00
Chromium (Cr)		12.30		12.30	13.90		13.90	9.00		9.00	18.00		18.00	6.50		6.50
Cobalt (Co)		1.50	J	1.50	1.20	U	0.60	0.67	U	0.34	0.69	U	0.35	3.30	U	1.65
Copper (Cu)		20.70		20.70	5.10	U	2.55	2.00	U	1.00	1.90	U	0.95	2.10	U	1.05
Cyanide (CN)		1.00	U	0.50	NA		NA	NA		NA	NA		NA	NA		NA
Hexavalent Chromium		NS		NS	NS		NS	NS		NS	NS		NS	NS		NS
Iron (Fe)		4780.00		4780.00	7600.00		7600.00	9470.00		9470.00	8960.00		8960.00	4380.00		4380.00
Lead (Pb)		41.00		41.00	9.40		9.40	7.00		7.00	6.40		6.40	25.10	U	12.55
Magnesium (Mg)		556.00		556.00	339.00		339.00	263.00		263.00	442.00		442.00	3160.00		3160.00
Manganese (Mn)		62.80		62.80	19.80		19.80	10.40	U	5.20	19.60		19.60	167.00		167.00
Mercury (Hg)		0.66		0.66	0.03	U	0.02	0.03	U	0.02	0.03	J	0.03	0.24		0.24
Nickel (Ni)		7.70		7.70	3.00		3.00	1.70	U	0.85	1.80	U	0.90	6.70	U	3.35
Potassium (K)		200.00	J	200.00	323.00		323.00	327.00	U	163.50	316.00	U	158.00	522.00	U	261.00
Selenium (Se)		0.28	U	0.14	0.32	U	0.16	0.52	U	0.26	0.69	U	0.35	0.30	U	0.15
Silver (Ag)		0.24	U	0.12	0.33	U	0.17	0.35	U	0.18	0.35	U	0.18	0.31	U	0.16
Sodium (Na)		56.40	J	56.40	58.90	U	29.45	23.50	U	11.75	85.90	U	42.95	278.00		278.00
Thallium (Tl)		0.28	U	0.14	0.56	U	0.28	0.59	U	0.30	0.59	U	0.30	0.53	U	0.27
Tin (Sn)		NS		NS	NS		NS	NS		NS	NS		NS	NS		NS
Vanadium (V)		44.10		44.10	17.10		17.10	21.70		21.70	21.00		21.00	4.60		4.60
Zinc (Zn)		108.00		108.00	21.90	U	10.95	8.20	U	4.10	6.60	U	3.30	14.30	U	7.15

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APPENDIX C
TABLE 1
QUALIFIED ANALYTICAL DATA - INORGANICS
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Constituent (Units in mg/kg)	Site	017			017			017			017			017		
	Sample ID	017SB01601			017SB001701			017SB01801			017SB01901			017SB02001		
	Date	1/12/95			1/12/95			1/12/95			1/11/95			1/11/95		
	Depth	0-1			0-1			0-1			0-1			0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Aluminum (Al)		14000.00		14000.00	11700.00		11700.00	7440.00		7440.00	13100.00		13100.00	9280.00		9280.00
Antimony (Sb)		1.70	U	0.85	7.30	U	3.65	1.90	U	0.95	2.80	U	1.40	1.50	U	0.75
Arsenic (As)		4.70		4.70	1.00	U	0.50	1.60	U	0.80	4.60		4.60	4.30		4.30
Barium (Ba)		21.70	U	10.85	35.90	U	17.95	23.50	U	11.75	20.60	U	10.30	17.70	U	8.85
Beryllium (Be)		0.14	U	0.07	0.39	U	0.20	0.19	U	0.10	0.34	U	0.17	0.21	U	0.11
Cadmium (Cd)		0.22	U	0.11	4.70		4.70	3.20		3.20	0.24	U	0.12	0.20	U	0.10
Calcium (Ca)		2040.00		2040.00	59200.00		59200.00	15500.00		15500.00	12600.00		12600.00	34800.00		34800.00
Chromium (Cr)		14.50		14.50	9.70		9.70	19.65		19.65	21.90		21.90	17.50		17.50
Cobalt (Co)		1.00	U	0.50	1.10	U	0.55	9.80	U	4.90	1.90	U	0.95	1.50	U	0.75
Copper (Cu)		1.20	U	0.60	14.40	U	7.20	4.70	U	2.35	74.10		74.10	7.70	U	3.85
Cyanide (CN)		NA	NA		NA	NA		NA		NA	NA		NA	NA		NA
Hexavalent Chromium		NS		NS	NS		NS	NS		NS	NS		NS	NS		NS
Iron (Fe)		17600.00		17600.00	3110.00		3110.00	4150.00		4150.00	9410.00		9410.00	9480.00		9480.00
Lead (Pb)		6.20		6.20	12.50	U	6.25	4.45		4.45	26.60		26.60	34.20		34.20
Magnesium (Mg)		296.00		296.00	318.00		318.00	417.00		417.00	1400.00		1400.00	1460.00		1460.00
Manganese (Mn)		11.90	U	5.95	25.10		25.10	21.00		21.00	117.00		117.00	69.00		69.00
Mercury (Hg)		0.02	U	0.01	0.02	U	0.01	0.04	J	0.04	0.10	J	0.10	0.04	J	0.04
Nickel (Ni)		2.30	U	1.15	4.80	U	2.40	7.10	U	3.55	9.80	U	4.90	9.90	U	4.95
Potassium (K)		421.00	U	210.50	286.00	U	143.00	224.00	U	112.00	600.00		600.00	434.00	U	217.00
Selenium (Se)		1.60	U	0.80	0.30	U	0.15	0.38	U	0.19	0.36	U	0.18	0.32	U	0.16
Silver (Ag)		0.35	U	0.18	34.40		34.40	10.00	U	5.00	0.43	U	0.22	0.33	U	0.17
Sodium (Na)		29.80	U	14.90	310.00		310.00	63.40	U	31.70	126.00		126.00	97.90		97.90
Thallium (Tl)		0.60	U	0.30	0.53	U	0.27	0.68	U	0.34	0.63	U	0.32	0.56	U	0.28
Tin (Sn)		NS		NS	NS		NS	NS		NS	NS		NS	NS		NS
Vanadium (V)		33.00		33.00	12.90		12.90	17.15		17.15	32.50		32.50	21.00		21.00
Zinc (Zn)		9.30	U	4.65	16.30	U	8.15	7.00	U	3.50	93.30		93.30	77.50		77.50

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APPENDIX C
TABLE 1
QUALIFIED ANALYTICAL DATA - INORGANICS
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

	Site	017			017			017		
	Sample ID	017SB02101			017SB02201			017SB02301		
Constituent	Date	1/11/95			10/15/118			10/15/120		
(Units in mg/kg)	Depth	0-1			0-1			0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Aluminum (Al)		7030.00		7030.00	14500.00		14500.00	8350.00		8350.00
Antimony (Sb)		1.40	U	0.70	2.50	U	1.25	2.10	U	1.05
Arsenic (As)		3.00		3.00	7.90		7.90	4.40		4.40
Barium (Ba)		12.60	U	6.30	20.80	U	10.40	23.00	U	11.50
Beryllium (Be)		0.20	U	0.10	0.64	U	0.32	0.31	U	0.16
Cadmium (Cd)		0.19	U	0.10	0.15		0.15	0.38	U	0.19
Calcium (Ca)		7480.00		7480.00	16900.00		16900.00	16000.00		16000.00
Chromium (Cr)		11.40		11.40	34.60		34.60	25.30		25.30
Cobalt (Co)		0.95	U	0.48	3.80	U	1.90	1.80	U	0.90
Copper (Cu)		15.70	U	7.85	39.95		39.95	49.40		49.40
Cyanide (CN)		NA		NA	NA		NA	NA		NA
Hexavalent Chromium		NS		NS	NS		NS	NS		NS
Iron (Fe)		5670.00		5670.00	17800.00		17800.00	7930.00		7930.00
Lead (Pb)		26.30		26.30	34.75		34.75	20.60		20.60
Magnesium (Mg)		600.00		600.00	2550.00		2550.00	1310.00		1310.00
Manganese (Mn)		53.40		53.40	203.00		203.00	113.00		113.00
Mercury (Hg)		0.04	J	0.04	0.14	J	0.14	0.11	J	0.11
Nickel (Ni)		3.50	U	1.75	18.55		18.55	8.40	U	4.20
Potassium (K)		361.00	U	180.50	1050.00		1050.00	556.00		556.00
Selenium (Se)		0.29	U	0.15	0.84	U	0.42	0.36	U	0.18
Silver (Ag)		0.30	U	0.15	0.35	U	0.18	0.37	U	0.19
Sodium (Na)		68.10	U	34.05	205.00		205.00	147.00		147.00
Thallium (Tl)		0.52	U	0.26	0.60	U	0.30	0.63	U	0.32
Tin (Sn)		NS		NS	NS		NS	NS		NS
Vanadium (V)		14.90		14.90	61.80		61.80	26.10		26.10
Zinc (Zn)		34.70	U	17.35	171.50		171.50	267.00		267.00

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APPENDIX C
TABLE 2
QUALIFIED ANALYTICAL DATA - DIOXINS
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Constituent (Units in ng/kg)	Site / Sample ID / Date / Depth	017 017SB01301 01/13/95 0-1			017 017SB01802 01/12/95 0-1			017 017SB02201 01/11/95 0-1			017 609SB02701 03/23/95 0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
1234678-HpCDD		10.79	J	10.79	9.13	J	9.13	3268.95	J	3268.95	214.84	J	214.84
1234678-HpCDF		0.67	J	0.67	0.89	J	0.89	415.76	J	415.76	37.83	J	37.83
1234789-HpCDF		1.52	U	0.76	0.22	U	0.11	57.77	J	57.77	2.61	J	2.61
123478-HxCDD		0.36	U	0.18	0.32	U	0.16	18.88	J	18.88	1.83	U	0.92
123478-HxCDF		0.26	U	0.13	0.32	J	0.32	16.59	J	16.59	2.84	J	2.84
123678-HxCDD		0.45	U	0.22	0.43	J	0.43	117.03	J	117.03	7.84	J	7.84
123678-HxCDF		0.96	U	0.48	0.22	U	0.11	17.74	J	17.74	1.82	J	1.82
123789-HxCDD		1.02	J	1.02	0.56	J	0.56	51.94	J	51.94	9.08	J	9.08
123789-HxCDF		1.60	U	0.80	1.52	U	0.76	19.80	J	19.80	1.20	J	1.20
12378-PeCDD		0.39	U	0.20	0.35	U	0.17	8.84	J	8.84	2.78	J	2.78
12378-PeCDF		0.33	J	0.33	0.28	J	0.28	14.04	J	14.04	3.60	J	3.60
234678-HxCDF		1.19	U	0.60	0.25	U	0.13	34.16	J	34.16	2.56	J	2.56
23478-PeCDF		0.19	U	0.09	0.24	J	0.24	3.52	J	3.52	2.57	J	2.57
2378-TCDD		0.13	U	0.07	0.12	U	0.06	0.97	J	0.97	0.37	J	0.37
2378-TCDF		0.17	J	0.17	0.29	U	0.14	4.70	J	4.70	1.57	J	1.57
OCDD		1464.65	J	1464.65	503.07	J	503.07	52652.89	J	52652.89	4249.05	J	4249.05
OCDF		1.34	J	1.34	1.31	U	0.66	1020.79	J	1020.79	99.86	J	99.86
Total Hepta-Dioxins		30.32	J	30.32	22.63	J	22.63	7207.34	J	7207.34	673.77	J	673.77
Total Hepta-Furans		0.78	J	0.78	2.06	J	2.06	2329.50	J	2329.50	153.35	J	153.35
Total Hexa-Dioxins		7.43	J	7.43	4.14	J	4.14	882.23	J	882.23	155.31	J	155.31
Total Hexa-Furans		1.33	J	1.33	1.68	J	1.68	914.61	J	914.61	98.79	J	98.79
Total Penta-Dioxins		0.00	U	0.00	0.00	U	0.00	8.84	J	8.84	36.32	J	36.32
Total Penta-Furans		1.89	J	1.89	1.04	J	1.04	140.10	J	140.10	43.69	J	43.69
Total Tetra-Dioxins		0.26	J	0.26	0.07	J	0.07	30.70	J	30.70	9.59	J	9.59
Total Tetra-Furans		1.31	J	1.31	0.78	J	0.78	52.52	J	52.52	14.68	J	14.68

APPENDIX C
TABLE 2
QUALIFIED ANALYTICAL DATA - DIOXINS
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Constituent (Units in ng/kg)	Site	017			017			017			017		
	Sample ID	609SB02801			609SB02901			609SB03001			609SB03101		
	Date	03/23/95			03/24/95			03/24/95			03/23/95		
	Depth	0-1			0-1			0-1			0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
1234678-HpCDD		118.43	J	118.43	102.54	J	102.54	451.90	J	451.90	215.06	J	215.06
1234678-HpCDF		17.29	J	17.29	14.75	J	14.75	93.81	J	93.81	38.51	J	38.51
1234789-HpCDF		59.85	U	29.93	1.31	J	1.31	9.69	J	9.69	3.08	U	1.54
123478-HxCDD		2.36	U	1.18	2.12	J	2.12	3.58	J	3.58	1.89	U	0.94
123478-HxCDF		1.94	J	1.94	2.02	J	2.02	2.80	J	2.80	3.23	U	1.62
123678-HxCDD		4.44	J	4.44	3.54	J	3.54	18.25	J	18.25	9.16	J	9.16
123678-HxCDF		0.93	U	0.47	0.58	J	0.58	1.96	J	1.96	1.27	J	1.27
123789-HxCDD		5.45	J	5.45	5.30	J	5.30	7.28	J	7.28	6.52	U	3.26
123789-HxCDF		0.82	U	0.41	0.52	U	0.26	3.64	J	3.64	1.70	U	0.85
12378-PeCDD		30.75	U	15.38	1.16	U	0.58	1.42	J	1.42	1.18	J	1.18
12378-PeCDF		2.21	J	2.21	0.48	U	0.24	0.35	J	0.35	2.10	J	2.10
234678-HxCDF		1.05	U	0.52	1.21	J	1.21	4.93	J	4.93	2.30	J	2.30
23478-PeCDF		0.80	U	0.40	0.83	J	0.83	0.49	J	0.49	1.13	J	1.13
2378-TCDD		0.29	U	0.15	2.47	U	1.24	0.58	U	0.29	0.26	U	0.13
2378-TCDF		1.22	J	1.22	0.84	J	0.84	0.57	J	0.57	1.23	U	0.62
OCDD		1625.69	J	1625.69	1195.63	J	1195.63	3992.77	J	3992.77	2739.81	J	2739.81
OCDF		47.76	J	47.76	37.24	J	37.24	265.88	J	265.88	116.88	J	116.88
Total Hepta-Dioxins		391.86	J	391.86	322.14	J	322.14	828.73	J	828.73	636.14	J	636.14
Total Hepta-Furans		53.85	J	53.85	49.23	J	49.23	431.73	J	431.73	188.06	J	188.06
Total Hexa-Dioxins		173.42	J	173.42	76.24	J	76.24	109.77	J	109.77	120.55	J	120.55
Total Hexa-Furans		31.23	J	31.23	23.55	J	23.55	143.22	J	143.22	59.62	J	59.62
Total Penta-Dioxins		0.00	U	0.00	0.00	U	0.00	4.85	J	4.85	9.32	J	9.32
Total Penta-Furans		13.12	J	13.12	13.81	J	13.81	23.24	J	23.24	17.56	J	17.56
Total Tetra-Dioxins		6.55	J	6.55	5.62	J	5.62	1.69	J	1.69	2.65	J	2.65
Total Tetra-Furans		10.76	J	10.76	8.41	J	8.41	6.72	J	6.72	9.76	J	9.76

APPENDIX C
TABLE 2
QUALIFIED ANALYTICAL DATA - DIOXINS
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Constituent (Units in ng/kg)	Site / Sample ID / Date / Depth	017 609SB03201 03/23/95 0-1			017 609SB03301 03/23/95 0-1			17 609SB03401 03/23/95 0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
1234678-HpCDD		101.00	J	101.00	74.68	J	74.68	12.87		12.87
1234678-HpCDF		18.74	J	18.74	15.22	J	15.22	4.55		4.55
1234789-HpCDF		65.25	U	32.63	1.59	J	1.59	0.41	U	0.20
123478-HxCDD		1.50	U	0.75	1.01	J	1.01	0.59	U	0.30
123478-HxCDF		1.35	U	0.67	1.40	J	1.40	0.59		0.59
123678-HxCDD		4.83	J	4.83	3.85	J	3.85	2.90		2.90
123678-HxCDF		1.87	J	1.87	0.81	J	0.81	2.17	J	2.17
123789-HxCDD		6.09	J	6.09	3.72	J	3.72	0.33	J	0.33
123789-HxCDF		0.84	J	0.84	1.08	U	0.54	0.39	U	0.20
12378-PeCDD		6.67	U	3.34	1.94	U	0.97	1.94	J	1.94
12378-PeCDF		2.39	J	2.39	2.44	J	2.44	1.82		1.82
234678-HxCDF		1.30	J	1.30	1.32	U	0.66	0.20	U	0.10
23478-PeCDF		1.42	J	1.42	0.75	J	0.75	0.32	U	0.16
2378-TCDD		0.44	J	0.44	0.13	J	0.13	0.81	J	0.81
2378-TCDF		1.46	J	1.46	1.26	J	1.26	0.49	U	0.24
OCDD		1286.73	J	1286.73	998.14	J	998.14	405.74		405.74
OCDF		59.77	J	59.77	44.35	J	44.35	6.78		6.78
Total Hepta-Dioxins		336.58	J	336.58	213.78	J	213.78	34.20		34.20
Total Hepta-Furans		63.70	J	63.70	66.29	J	66.29	6.67		6.67
Total Hexa-Dioxins		140.95	J	140.95	83.62	J	83.62	2.90		2.90
Total Hexa-Furans		37.02	J	37.02	47.01	J	47.01	1.62		1.62
Total Penta-Dioxins		7.42	J	7.42	8.31	J	8.31	0.74	U	0.37
Total Penta-Furans		36.87	J	36.87	31.76	J	31.76	1.82		1.82
Total Tetra-Dioxins		11.41	J	11.41	6.42	J	6.42	0.41	U	0.20
Total Tetra-Furans		11.38	J	11.38	15.89	J	15.89	0.00	U	0.00

APPENDIX C
TABLE 3
QUALIFIED ANALYTICAL DATA - PCBs
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Constituent (Units in ug/kg)	Site	017			017			017			017		
	Sample ID	017SB01201			017SB01401			017SB01501			017SB01601		
	Date	1/12/95			1/12/95			1/12/95			1/12/95		
	Depth	0-1			0-1			0-1			0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Aroclor-1254		40.00	U	20.00	40.00	U	20.00	40.00	U	20.00	40.00	U	20.00
Aroclor-1260		40.00	U	20.00	340.00		340	54.00		54.00	67.00		67.00

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APPENDIX C
TABLE 3
QUALIFIED ANALYTICAL DATA - PCBs
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Constituent (Units in ug/kg)	Site	017			017			017			017		
	Sample ID	017SB01701			017SB01801			017SB01901			017SB02001		
	Date	1/12/95			1/12/95			1/11/95			1/11/95		
	Depth	0-1			0-1			0-1			0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Aroclor-1254		40.00	U	20.00	40.00	U	20.00	400.00	U	200.00	40000.00	U	20000.00
Aroclor-1260		40.00	U	20.00	NS		NS	1900.00	J	1900.00	180000.00	J	180000.00

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APPENDIX C
TABLE 3
QUALIFIED ANALYTICAL DATA - PCBs
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

	Site	017			017			017			017		
	Sample ID	017SB02101			017SB02201			017SB02301			017SB02401		
Constituent	Date	1/11/95			1/11/95			1/11/95			1/13/95		
(Units in ug/kg)	Depth	0-1			0-1			0-1			0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Aroclor-1254		40.00	U	20.00	40.00	U	20.00	80.00	U	40.00	42.00		42.00
Aroclor-1260		36.00	J	36.00	NS		NS	1000.00		1000.00	61.00		61.00

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APPENDIX C
TABLE 3
QUALIFIED ANALYTICAL DATA - PCBs
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

	Site	017			017			017			017		
	Sample ID	017SB02501			017SB02701			017SB02801			017SB02901		
Constituent	Date	1/13/95			3/23/95			3/23/95			3/24/95		
(Units in ug/kg)	Depth	0-1			0-1			0-1			0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Aroclor-1254		40.00	U	20.00	40.00	U	20.00	40.00	U	20.00	40.00	U	20.00
Aroclor-1260		160.00		160.00	NS		NS	180.00		180.00	530.00		530.00

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APPENDIX C
TABLE 3
QUALIFIED ANALYTICAL DATA - PCBs
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

	Site	017			017			017			017		
	Sample ID	017SB03001			017SB03101			017SB03201			017SB03301		
Constituent	Date	3/24/95			3/23/95			3/23/95			3/23/95		
(Units in ug/kg)	Depth	0-1			0-1			0-1			0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Aroclor-1254		40.00	U	20.00	40.00	U	20.00	40.00	U	20.00	40.00	U	20.00
Aroclor-1260		310.00		310.00	96.00		96.00	50.00		50.00	40.00	U	20.00

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APPENDIX C
TABLE 3
QUALIFIED ANALYTICAL DATA - PCBs
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

	Site	017			017			017			017		
	Sample ID	017SB03501			017SB03601			017SB03701			017SB03801		
Constituent	Date	11/11/99			11/5/99			11/11/99			11/5/95		
(Units in ug/kg)	Depth	0-1			0-1			0-1			0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Aroclor-1254		37.00	U	18.50	38.00	U	19.00	37.00	U	18.50	33.00	U	16.50
Aroclor-1260		79.00		79.00	38.00	U	19.00	37.00	U	18.50	33.00	U	16.50

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APPENDIX C
TABLE 3
QUALIFIED ANALYTICAL DATA - PCBs
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

	Site	017			017		
	Sample ID	017SB03901			017SB04001		
Constituent	Date	11/11/99			11/5/99		
(Units in ug/kg)	Depth	0-1			0-1		
		LAB	Q	RA	LAB	Q	RA
Aroclor-1254		36.00	U	18.00	36.00	U	18.00
Aroclor-1260		36.00	U	18.00	36.00	U	18.00

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APPENDIX C
TABLE 4
QUALIFIED ANAYLYTICAL DATA - PESTICIDES and HERBICIDES
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

	Site	017			017			017			017		
	Sample ID	017SB00101			017SB00201			017SB00301			017SB00401		
Constituent	Date	08/16/94			08/16/94			08/16/94			8/16/94		
(Units in ug/kg)	Depth	0-1			0-1			0-1			0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
alpha-Chlordane		33.00	U	16.50	NA	R	NA	3.50	U	1.75	NA	R	NA
gamma-Chlordane		33.00	U	16.5	NA	R	NA	12.10	J	12.10	NA	R	NA
4,4'-DDD		66.00	U	33	NA	R	NA	6.90	U	3.45	NA	R	NA
4,4'-DDE		37.00	U	18.5	581.00	J	581.00	14.20	J	14.20	NA	R	NA
Endrin		37.00	U	18.5	NA	R	NA	3.80	U	1.90	NA	R	NA

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APPENDIX C
TABLE 4
QUALIFIED ANAYLYTICAL DATA - PESTICIDES and HERBICIDES
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Constituent (Units in mg/kg)	Site	017			017			017			017		
	Sample ID	017SB00501			017SB00601			017SB00701			017SB00801		
	Date	8/17/94			8/16/94			8/17/94			8/17/94		
	Depth	0-1			0-1			0-1			0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
alpha-Chlordane		3.30	U	1.65	NA	R	NA	3.60	U	1.80	3.70	U	1.85
gamma-Chlordane		3.30	U	1.65	NA	R	NA	3.60	U	1.80	3.70	U	1.85
4,4'-DDD		6.70	U	3.35	NA	R	NA	7.10	U	3.55	7.40	U	3.70
4,4'-DDE		3.70	U	1.85	NA	R	NA	4.00	U	2.00	4.10	U	2.05
Endrin		3.70	U	1.85	NA	R	NA	4.00	U	2.00	4.10	U	2.05

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APPENDIX C
TABLE 4
QUALIFIED ANAYLYTICAL DATA - PESTICIDES and HERBICIDES
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Constituent (Units in mg/kg)	Site	017			017			017		
	Sample ID	017SB00901			017SB01001			017SB01101		
	Date	8/17/94			8/17/94			8/17/94		
	Depth	0-1			0-1			0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
alpha-Chlordane		NA	R	NA	4.00	U	2.00	5.10	J	5.10
gamma-Chlordane		NA	R	NA	4.00	U	2.00	12.30	J	12.30
4,4'-DDD		NA	R	NA	7.30	U	3.65	NA	R	NA
4,4'-DDE		NA	R	NA	4.60		4.60	NA	R	NA
Endrin		NA	R	NA	4.00	U	2.00	NA	R	NA

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APPENDIX C
TABLE 4
QUALIFIED ANAYLYTICAL DATA - PESTICIDES and HERBICIDES
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Site	017			017			017		
Sample ID	017SB01301			017SB01801			017SB02201		
Constituent Date	1/13/95			1/12/95			1/11/95		
(Units in mg/kg) Depth	0-1			0-1			0-1		
	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
alpha-Chlordane	1.70	U	0.85	1.70	U	0.85	3.40	J	3.40
gamma-Chlordane	1.70	U	0.85	1.70	U	0.85	2.80	J	2.80
4,4'-DDD	3.30	U	1.65	3.30	U	1.65	2.90	J	2.90
4,4'-DDE	3.30	U	1.65	3.30	U	1.65	11.50	J	11.50
Endrin	3.30	U	1.65	3.30	U	1.65	2.70	J	2.70
2,4,5-T	7.50	J	7.50	10.20	U	5.10	10.00	U	5.00

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APPENDIX C
TABLE 5
QUALIFIED ANALYTICAL DATA - SVOCs
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

	Site	017			017			017			017		
	Sample ID	017SB00101			017SB00201			017SB00301			017SB00401		
Constituent	Date	08/16/94			08/16/94			08/16/94			8/16/94		
(Units in ug/kg)	Depth	0-1			0-1			0-1			0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Benzo(g,h,i)perylene		370.00	U	185.00	450.00	U	225.00	370.00	U	185.00	380.00	U	190.00
Benzoic acid		1800.00	U	900.00	2200.00	U	1100.00	1800.00	U	900.00	1800.00	U	900.00
Benzo(a)anthracene		370.00	U	185.00	76.10	J	76.10	53.70	J	53.70	380.00	U	190.00
Benzo(a)pyrene		370.00	U	185.00	450.00	U	225.00	370.00	U	185.00	380.00	U	190.00
Benzo(b)fluoranthene		370.00	U	185.00	450.00	U	225.00	370.00	U	185.00	380.00	U	190.00
Benzo(k)fluoranthene		370.00	U	185.00	450.00	U	225.00	370.00	U	185.00	380.00	U	190.00
Chrysene		370.00	U	185.00	95.50	J	95.50	64.60	J	64.60	380.00	U	190.00
Indeno(1,2,3-cd)pyrene		370.00	U	185.00	450.00	U	225.00	370.00	U	185.00	380.00	U	190.00
bis(2-Ethylhexyl)phthalate (BEHP)		267.00	J	267.00	233.00	J	233.00	370.00	U	185.00	380.00	U	190.00
Butylbenzylphthalate		370.00	U	185.00	450.00	U	225.00	370.00	U	185.00	380.00	U	190.00
1,3-Dichlorobenzene		370.00	U	185.00	450.00	U	225.00	370.00	U	185.00	380.00	U	190.00
Di-n-butylphthalate		370.00	U	185.00	450.00	U	225.00	370.00	U	185.00	380.00	U	190.00
Fluoranthene		370.00	U	185.00	119.00	J	119.00	57.80	J	57.80	380.00	U	190.00
Phenanthrene		370.00	U	185.00	63.10	J	63.10	370.00	U	185.00	380.00	U	190.00
Pyrene		370.00	U	185.00	95.00	J	95.00	57.50	J	57.50	380.00	U	190.00

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APPENDIX C
TABLE 5
QUALIFIED ANALYTICAL DATA - SVOCs
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Constituent (Units in ug/kg)	Site / Sample ID / Date / Depth	017 017SB00501 8/17/94 0-1			017 017SB00601 8/16/94 0-1			017 017SB00701 8/17/94 0-1			017 017SB00801 8/17/94 0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Benzo(g,h,i)perylene		370.00	U	185.00	430.00	U	215.00	400.00	U	200.00	410.00	U	205.00
Benzoic acid		1800.00	U	900.00	2100.00	U	1050.00	1900.00	U	950.00	2000.00	U	1000.00
Benzo(a)anthracene		370.00	U	185.00	430.00	U	215.00	400.00	U	200.00	410.00	U	205.00
Benzo(a)pyrene		370.00	U	185.00	430.00	U	215.00	400.00	U	200.00	410.00	U	205.00
Benzo(b)fluoranthene		370.00	U	185.00	430.00	U	215.00	400.00	U	200.00	410.00	U	205.00
Benzo(k)fluoranthene		370.00	U	185.00	430.00	U	215.00	400.00	U	200.00	410.00	U	205.00
Chrysene		370.00	U	185.00	430.00	U	215.00	400.00	U	200.00	410.00	U	205.00
Indeno(1,2,3-cd)pyrene		370.00	U	185.00	430.00	U	215.00	400.00	U	200.00	410.00	U	205.00
bis(2-Ethylhexyl)phthalate (BEHP)		370.00	U	185.00	430.00	U	215.00	400.00	U	200.00	410.00	U	205.00
Butylbenzylphthalate		370.00	U	185.00	430.00	U	215.00	400.00	U	200.00	410.00	U	205.00
1,3-Dichlorobenzene		370.00	U	185.00	43.60	J	43.60	400.00	U	200.00	410.00	U	205.00
Di-n-butylphthalate		370.00	U	185.00	430.00	U	215.00	400.00	U	200.00	410.00	U	205.00
Fluoranthene		370.00	U	185.00	430.00	U	215.00	400.00	U	200.00	410.00	U	205.00
Phenanthrene		370.00	U	185.00	430.00	U	215.00	400.00	U	200.00	410.00	U	205.00
Pyrene		370.00	U	185.00	430.00	U	215.00	400.00	U	200.00	410.00	U	205.00

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APPENDIX C
TABLE 5
QUALIFIED ANALYTICAL DATA - SVOCs
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Constituent (Units in ug/kg)	Site / Sample ID / Date / Depth	017 / 017SB00901 / 8/17/94 / 0-1			017 / 017SB01001 / 8/17/94 / 0-1			017 / 017SB01101 / 8/17/94 / 0-1			017 / 017SB01201 / 1/12/95 / 0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Benzo(g,h,i)perylene		420.00	U	210.00	400.00	U	200.00	420.00	U	210.00	390.00	U	195.00
Benzoic acid		2000.00	U	1000.00	215.00	J	215.00	146.00	J	146.00	1900.00	U	950.00
Benzo(a)anthracene		143.00	J	143.00	400.00	U	200.00	420.00	U	210.00	390.00	U	195.00
Benzo(a)pyrene		116.00	J	116.00	400.00	U	200.00	420.00	U	210.00	390.00	U	195.00
Benzo(b)fluoranthene		89.60	J	89.60	51.60	J	51.60	420.00	U	210.00	390.00	U	195.00
Benzo(k)fluoranthene		420.00	U	210.00	400.00	U	200.00	420.00	U	210.00	390.00	U	195.00
Chrysene		119.00	J	119.00	400.00	U	200.00	420.00	U	210.00	390.00	U	195.00
Indeno(1,2,3-cd)pyrene		420.00	U	210.00	400.00	U	200.00	420.00	U	210.00	390.00	U	195.00
bis(2-Ethylhexyl)phthalate (BEHP)		609.00		609.00	157.00	J	157.00	228.00	J	228.00	390.00	U	195.00
Butylbenzylphthalate		420.00	U	210.00	400.00	U	200.00	420.00	U	210.00	390.00	U	195.00
1,3-Dichlorobenzene		420.00	U	210.00	400.00	U	200.00	420.00	U	210.00	390.00	U	195.00
Di-n-butylphthalate		420.00	U	210.00	71.40	J	71.40	64.20	J	64.20	390.00	U	195.00
Fluoranthene		346.00	J	346.00	400.00	U	200.00	420.00	U	210.00	390.00	U	195.00
Phenanthrene		188.00	J	188.00	400.00	U	200.00	420.00	U	210.00	390.00	U	195.00
Pyrene		280.00	J	280.00	400.00	U	200.00	420.00	U	210.00	390.00	U	195.00

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APPENDIX C
TABLE 5
QUALIFIED ANALYTICAL DATA - SVOCs
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

	Site	017			017			017			017		
	Sample ID	017SB01301			017SB01401			017SB01501			017SB01601		
Constituent	Date	1/13/95			1/12/95			1/12/95			1/12/95		
(Units in ug/kg)	Depth	0-1			0-1			0-1			0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Benzo(g,h,i)perylene		390.00	U	195.00	380.00	U	190.00	370.00	U	185.00	410.00	U	205.00
Benzoic acid		2000.00	U	1000.00	1900.00	U	950.00	1900.00	U	950.00	2000.00	U	1000.00
Benzo(a)anthracene		390.00	U	195.00	380.00	U	190.00	370.00	U	185.00	410.00	U	205.00
Benzo(a)pyrene		390.00	U	195.00	380.00	U	190.00	370.00	U	185.00	410.00	U	205.00
Benzo(b)fluoranthene		390.00	U	195.00	380.00	U	190.00	370.00	U	185.00	410.00	U	205.00
Benzo(k)fluoranthene		390.00	U	195.00	380.00	U	190.00	370.00	U	185.00	410.00	U	205.00
Chrysene		390.00	U	195.00	380.00	U	190.00	370.00	U	185.00	410.00	U	205.00
Indeno(1,2,3-cd)pyrene		390.00	U	195.00	380.00	U	190.00	370.00	U	185.00	410.00	U	205.00
bis(2-Ethylhexyl)phthalate (BEHP)		390.00	U	195.00	380.00	U	190.00	370.00	U	185.00	410.00	U	205.00
Butylbenzylphthalate		390.00	U	195.00	380.00	U	190.00	370.00	U	185.00	410.00	U	205.00
1,3-Dichlorobenzene		390.00	U	195.00	380.00	U	190.00	370.00	U	185.00	410.00	U	205.00
Di-n-butylphthalate		390.00	U	195.00	380.00	U	190.00	370.00	U	185.00	410.00	U	205.00
Fluoranthene		390.00	U	195.00	380.00	U	190.00	370.00	U	185.00	410.00	U	205.00
Phenanthrene		390.00	U	195.00	380.00	U	190.00	370.00	U	185.00	410.00	U	205.00
Pyrene		390.00	U	195.00	380.00	U	190.00	370.00	U	185.00	410.00	U	205.00

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APPENDIX C
TABLE 5
QUALIFIED ANALYTICAL DATA - SVOCs
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Constituent (Units in ug/kg)	Site	017			017			017			017		
	Sample ID	017SB001701			017SB01801			017SB01901			017SB02001		
	Date	1/12/95			1/12/95			1/11/95			1/11/95		
	Depth	0-1			0-1			0-1			0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Benzo(g,h,i)perylene		360.00	U	180.00	390.00	U	195.00	400.00	U	200.00	780.00	U	390.00
Benzoic acid		1800.00	U	900.00	2000.00	U	1000.00	2000.00	U	1000.00	3900.00	U	1950.00
Benzo(a)anthracene		360.00	U	180.00	390.00	U	195.00	400.00	U	200.00	780.00	U	390.00
Benzo(a)pyrene		360.00	U	180.00	390.00	U	195.00	400.00	U	200.00	780.00	U	390.00
Benzo(b)fluoranthene		360.00	U	180.00	390.00	U	195.00	400.00	U	200.00	780.00	U	390.00
Benzo(k)fluoranthene		360.00	U	180.00	390.00	U	195.00	400.00	U	200.00	780.00	U	390.00
Chrysene		360.00	U	180.00	390.00	U	195.00	400.00	U	200.00	780.00	U	390.00
Indeno(1,2,3-cd)pyrene		360.00	U	180.00	390.00	U	195.00	400.00	U	200.00	780.00	U	390.00
bis(2-Ethylhexyl)phthalate (BEHP)		360.00	U	180.00	390.00	U	195.00	830.00		830.00	780.00	U	390.00
Butylbenzylphthalate		360.00	U	180.00	390.00	U	195.00	400.00	U	200.00	780.00	U	390.00
1,3-Dichlorobenzene		360.00	U	180.00	390.00	U	195.00	400.00	U	200.00	780.00	U	390.00
Di-n-butylphthalate		360.00	U	180.00	390.00	U	195.00	400.00	U	200.00	780.00	U	390.00
Fluoranthene		360.00	U	180.00	390.00	U	195.00	400.00	U	200.00	780.00	U	390.00
Phenanthrene		360.00	U	180.00	390.00	U	195.00	400.00	U	200.00	780.00	U	390.00
Pyrene		360.00	U	180.00	390.00	U	195.00	400.00	U	200.00	780.00	U	390.00

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APPENDIX C
TABLE 5
QUALIFIED ANALYTICAL DATA - SVOCs
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Constituent (Units in ug/kg)	Site / Sample ID / Date / Depth	017 017SB02101 1/11/95 0-1			017 017SB02201 1/11/95 0-1			017 017SB02301 1/11/95 0-1			017 017SB02401 1/13/95 0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Benzo(g,h,i)perylene		400.00	U	200.00	440.00	U	220.00	410.00	U	205.00	400.00	U	200.00
Benzoic acid		2000.00	U	1000.00	2200.00	U	1100.00	2000.00	U	1000.00	2000.00	U	1000.00
Benzo(a)anthracene		400.00	U	200.00	440.00	U	220.00	410.00	U	205.00	400.00	U	200.00
Benzo(a)pyrene		400.00	U	200.00	440.00	U	220.00	410.00	U	205.00	400.00	U	200.00
Benzo(b)fluoranthene		400.00	U	200.00	440.00	U	220.00	410.00	U	205.00	400.00	U	200.00
Benzo(k)fluoranthene		400.00	U	200.00	440.00	U	220.00	410.00	U	205.00	400.00	U	200.00
Chrysene		400.00	U	200.00	440.00	U	220.00	410.00	U	205.00	400.00	U	200.00
Indeno(1,2,3-cd)pyrene		400.00	U	200.00	440.00	U	220.00	410.00	U	205.00	400.00	U	200.00
bis(2-Ethylhexyl)phthalate (BEHP)		400.00	U	200.00	260.00	J	260.00	150.00	J	150.00	670.00		670.00
Butylbenzylphthalate		400.00	U	200.00	440.00	U	220.00	410.00	U	205.00	130.00	J	130.00
1,3-Dichlorobenzene		400.00	U	200.00	440.00	U	220.00	410.00	U	205.00	400.00	U	200.00
Di-n-butylphthalate		400.00	U	200.00	440.00	U	220.00	410.00	U	205.00	400.00	U	200.00
Fluoranthene		400.00	U	200.00	440.00	U	220.00	410.00	U	205.00	400.00	U	200.00
Phenanthrene		400.00	U	200.00	440.00	U	220.00	410.00	U	205.00	400.00	U	200.00
Pyrene		400.00	U	200.00	440.00	U	220.00	410.00	U	205.00	400.00	U	200.00

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APPENDIX C
TABLE 5
QUALIFIED ANALYTICAL DATA - SVOCs
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Constituent (Units in ug/kg)	Site	017			017		
	Sample ID	017SB02501			017SB02601		
	Date	1/13/95			1/11/98		
	Depth	0-1			0-1		
		LAB	Q	RA	LAB	Q	RA
Benzo(g,h,i)perylene		440.00	U	220.00	430.00	U	215.00
Benzoic acid		2200.00	U	1100.00	2100.00	U	1050.00
Benzo(a)anthracene		440.00	U	220.00	430.00	U	215.00
Benzo(a)pyrene		440.00	U	220.00	430.00	U	215.00
Benzo(b)fluoranthene		90.00	J	90.00	430.00	U	215.00
Benzo(k)fluoranthene		440.00	U	220.00	430.00	U	215.00
Chrysene		440.00	U	220.00	430.00	U	215.00
Indeno(1,2,3-cd)pyrene		440.00	U	220.00	430.00	U	215.00
bis(2-Ethylhexyl)phthalate (BEHP)		250.00	J	250.00	200.00	J	200.00
Butylbenzylphthalate		440.00	U	220.00	430.00	U	215.00
1,3-Dichlorobenzene		440.00	U	220.00	430.00	U	215.00
Di-n-butylphthalate		440.00	U	220.00	430.00	U	215.00
Fluoranthene		440.00	U	220.00	430.00	U	215.00
Phenanthrene		440.00	U	220.00	430.00	U	215.00
Pyrene		440.00	U	220.00	430.00	U	215.00

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APPENDIX C
TABLE 6
QUALIFIED ANALYTICAL DATA - VOCs
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

	Site	017			017			017			017			017		
	Sample ID	017SB00101			017SB00201			017SB00301			017SB00401			017SB00501		
Constituent	Date	08/16/94			08/16/94			08/16/94			8/16/94			8/17/94		
(Units in ug/kg)	Depth	0-1			0-1			0-1			0-1			0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Acetone		28.00	U	14.00	34.00	U	17.00	13.00	J	13.00	31.20		31.20	28.00	U	14.00
Toluene		5.50	U	2.75	6.80	U	3.40	5.70	U	2.85	5.70	U		5.60	U	2.80
Trichloroethene		5.50	U	2.75	6.80	U	3.40	5.70	U	2.85	5.70	U		5.60	U	2.80

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APPENDIX C
TABLE 6
QUALIFIED ANALYTICAL DATA - VOCs
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

	Site	017			017			017			017			017		
	Sample ID	017SB00601			017SB00701			017SB00801			017SB00901			017SB01001		
Constituent	Date	8/16/94			8/17/94			8/17/94			8/17/94			8/18/94		
(Units in ug/kg)	Depth	0-1			0-1			0-1			0-1			0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Acetone		14.40	J	14.40	23.30	J	23.30	34.70		34.70	31.00	U	15.50	30.00	U	15.00
Toluene		6.40	U	3.20	5.90	U	2.95	6.10	U	3.05	6.20	U	3.10	6.10	U	3.05
Trichloroethene		6.40	U	3.20	5.90	U	2.95	6.10	U	3.05	6.20	U	3.10	6.10	U	3.05

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APPENDIX C
TABLE 6
QUALIFIED ANALYTICAL DATA - VOCs
SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

	Site	017			017			017			017		
	Sample ID	017SB01101			017SB01301			017SB01801			017SB02201		
Constituent	Date	8/18/94			1/13/95			1/12/95			1/11/95		
(Units in ug/kg)	Depth	0-1			0-1			0-1			0-1		
		LAB	Q	RA	LAB	Q	RA	LAB	Q	RA	LAB	Q	RA
Acetone		195.00		195.00	26.30	U	13.15	10.00	U	5.00	10.00	U	5.00
Toluene		6.30	U	3.15	4.40	J	4.40	8.80		8.80	9.60		9.60
Trichloroethene		6.30	U	3.15	5.00	U	2.50	5.00	U	2.50	1.80	J	1.80

J - The numerical value is an estimated concentration.
U - Material was analyzed for but not detected.

0.55	017SB001
3.8	017SB002
0.6	017SB003
0.75	017SB004
0.6	017SB005
0.8	017SB006
0.6	017SB007
0.55	017SB008
0.6	017SB009
0.75	017SB010
10.1	017SB011
0.75	017SB012
0.8	017SB013
0.8	017SB014
2.2	017SB015
0.85	017SB016
3.65	017SB017
0.95	017SB018
1.4	017SB019
0.75	017SB020
0.7	017SB021
1.25	017SB022
1.05	017SB023

Appendix C - Table 7

Zone H - SWMU 17

95% UCL Calculations - Antimony (mg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	23	Mean	1.52
Censored		Lognormal mean	1.35
Detection limit or PQL		Std. devn.	2.075420811
Method detection limit		Median	0.8
TOTAL	23	Min.	0.55
		Max.	10.1

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Reject lognormal distribution.

W value is 0.7576. This is less than the tabled value of 0.914

Reject normal distribution.

W value is 0.4862. This is less than the tabled value of 0.914

UCL (Land's method) is 1.92

0.07	017SB008
0.075	017SB005
0.075	017SB007
0.075	017SB009
0.09	017SB010
0.095	017SB021
0.1	017SB006
0.1	017SB012
0.1	017SB020
0.105	017SB013
0.105	017SB014
0.11	017SB016
0.12	017SB019
0.15	017SB022
0.19	017SB023
0.2	017SB004
0.25	017SB003
0.35	017SB011
0.465	017SB002
0.5	017SB001
0.53	017SB015
3.2	017SB018
4.7	017SB01701

Appendix C - Table 8

Zone H - SWMU 17

95% UCL Calculations - Cadmium (mg/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	23	Mean	0.51
Censored		Lognormal mean	0.37
Detection limit or PQL		Std. devn.	1.11743106
Method detection limit		Median	0.11
TOTAL	23	Min.	0.07
		Max.	4.7

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Reject lognormal distribution.

W value is 0.7769. This is less than the tabled value of 0.914

Reject normal distribution.

W value is 0.4278. This is less than the tabled value of 0.914

UCL (Land's method) is 0.71

1860	017SB001
23100	017SB002
160	017SB003
3850	017SB004
33.5	017SB005
18000	017SB006
35.5	017SB007
37	017SB008
6420	017SB009
367	017SB010
187	017SB011
20	017SB012
59.2	017SB013
340	017SB014
54	017SB015
67	017SB016
20	017SB017
66.1	017SB018
1900	017SB019
180000	017SB020
36	017SB021
710	017SB022
1000	017SB023
61	017SB024
160	017SB025
20	017SB026
295	017SB027
180	017SB028
530	017SB029
310	017SB030
96	017SB031
50	017SB032
20	017SB033
79	017SB035
19	017SB036
18.5	017SB037
16.5	017SB038
18	017SB039
18	017SB040

Appendix C - Table 9

Zone H - SWMU 17

95% UCL Calculation - Arochlor-1260 (ug/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	39	Mean	6159.32
Censored		Lognormal mean	2384.62
Detection limit or PQL		Std. devn.	28948.02567
Method detection limit		Median	79
TOTAL	39	Min.	16.5
		Max.	180000

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Reject lognormal distribution.

W value is 0.8701. This is less than the tabled value of 0.939

Reject normal distribution.

W value is 0.2295. This is less than the tabled value of 0.939

UCL (Land's method) is 10921.82

242.535	017SB001
279.9555	017SB002
229.2846	017SB003
249.09	017SB004
242.535	017SB005
281.865	017SB006
262.2	017SB007
268.755	017SB008
162.479	017SB009
247.36	017SB010
275.31	017SB011
255.645	017SB012
255.645	017SB013
249.09	017SB014
242.535	017SB015
268.755	017SB016
235.98	017SB017
255.645	017SB018
262.2	017SB019
511.29	017SB020
262.2	017SB021
220.301	017SB022
268.755	017SB023
262.25	017SB024
275.42	017SB025
281.865	017SB026

Appendix C - Table 10

Zone H - SWMU 17

95% UCL Calculations - BEQs (ug/kg)

MTCA*Stat* 2.1

Number of samples		Uncensored values	
Uncensored	26	Mean	263.42
Censored		Lognormal mean	263.14
Detection limit or PQL		Std. devn.	56.17651619
Method detection limit		Median	258.9225
TOTAL	26	Min.	162.479
		Max.	511.29

Lognormal distribution? Normal distribution?

r-squared is: r-squared is:

Recommendations:

Reject lognormal distribution.

W value is 0.7151. This is less than the tabled value of 0.92

Reject normal distribution.

W value is 0.5878. This is less than the tabled value of 0.92

UCL (Land's method) is 279.87

APPENDIX C
TABLE 11
BENZO(A)PYRENE EQUIVALENT CALCULATIONS FOR SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Sample ID	Reported Concentration (mg/kg)	Validation Qualifier	Actual or Estimated Concentration[a] (mg/kg)	TEF[b]	Parameter	BEQ[c] (mg/kg)
017SB00101	3.70E-01	U	1.85E-01	0.1	Benzo(a)anthracene	1.85E-02
	3.70E-01	U	1.85E-01	1	Benzo(a)pyrene	1.85E-01
	3.70E-01	U	1.85E-01	0.1	Benzo(b)fluoranthene	1.85E-02
	3.70E-01	U	1.85E-01	0.01	Benzo(k)fluoranthene	1.85E-03
	3.70E-01	U	1.85E-01	0.001	Chrysene	1.85E-04
	3.70E-01	U	1.85E-01	0.1	Indeno(1,2,3-cd)pyrene	1.85E-02
					Total for Sample	2.43E-01
017SB00201	7.61E-02	J	7.61E-02	0.1	Benzo(a)anthracene	7.61E-03
	5.50E-01	U	2.25E-01	1	Benzo(a)pyrene	2.25E-01
	5.50E-01	U	2.25E-01	0.1	Benzo(b)fluoranthene	2.25E-02
	5.50E-01	U	2.25E-01	0.01	Benzo(k)fluoranthene	2.25E-03
	9.55E-02	J	9.55E-02	0.001	Chrysene	9.55E-05
	5.50E-01	U	2.25E-01	0.1	Indeno(1,2,3-cd)pyrene	2.25E-02
					Total for Sample	2.80E-01
017SB00301	5.37E-02	J	5.37E-02	0.1	Benzo(a)anthracene	5.37E-03
	3.70E-01	U	1.85E-01	1	Benzo(a)pyrene	1.85E-01
	3.70E-01	U	1.85E-01	0.1	Benzo(b)fluoranthene	1.85E-02
	3.70E-01	U	1.85E-01	0.01	Benzo(k)fluoranthene	1.85E-03
	6.46E-02	J	6.46E-02	0.001	Chrysene	6.46E-05
	3.70E-01	U	1.85E-01	0.1	Indeno(1,2,3-cd)pyrene	1.85E-02
					Total for Sample	2.29E-01
017SB00401	3.80E-01	U	1.90E-01	0.1	Benzo(a)anthracene	1.90E-02
	3.80E-01	U	1.90E-01	1	Benzo(a)pyrene	1.90E-01
	3.80E-01	U	1.90E-01	0.1	Benzo(b)fluoranthene	1.90E-02
	3.80E-01	U	1.90E-01	0.01	Benzo(k)fluoranthene	1.90E-03
	3.80E-01	U	1.90E-01	0.001	Chrysene	1.90E-04
	3.80E-01	U	1.90E-01	0.1	Indeno(1,2,3-cd)pyrene	1.90E-02
					Total for Sample	2.49E-01
017SB00501	3.70E-01	U	1.85E-01	0.1	Benzo(a)anthracene	1.85E-02
	3.70E-01	U	1.85E-01	1	Benzo(a)pyrene	1.85E-01
	3.70E-01	U	1.85E-01	0.1	Benzo(b)fluoranthene	1.85E-02
	3.70E-01	U	1.85E-01	0.01	Benzo(k)fluoranthene	1.85E-03
	3.70E-01	U	1.85E-01	0.001	Chrysene	1.85E-04
	3.70E-01	U	1.85E-01	0.1	Indeno(1,2,3-cd)pyrene	1.85E-02
					Total for Sample	2.43E-01

APPENDIX C
TABLE 11
BENZO(A)PYRENE EQUIVALENT CALCULATIONS FOR SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Sample ID	Reported Concentration (mg/kg)	Validation Qualifier	Actual or Estimated Concentration[a] (mg/kg)	TEF[b]	Parameter	BEQ[c] (mg/kg)
017SB00601	4.30E-01	U	2.15E-01	0.1	Benzo(a)anthracene	2.15E-02
	4.30E-01	U	2.15E-01	1	Benzo(a)pyrene	2.15E-01
	4.30E-01	U	2.15E-01	0.1	Benzo(b)fluoranthene	2.15E-02
	4.30E-01	U	2.15E-01	0.01	Benzo(k)fluoranthene	2.15E-03
	4.30E-01	U	2.15E-01	0.001	Chrysene	2.15E-04
	4.30E-01	U	2.15E-01	0.1	Indeno(1,2,3-cd)pyrene	2.15E-02
					Total for Sample	2.82E-01
017SB00701	4.00E-01	U	2.00E-01	0.1	Benzo(a)anthracene	2.00E-02
	4.00E-01	U	2.00E-01	1	Benzo(a)pyrene	2.00E-01
	4.00E-01	U	2.00E-01	0.1	Benzo(b)fluoranthene	2.00E-02
	4.00E-01	U	2.00E-01	0.01	Benzo(k)fluoranthene	2.00E-03
	4.00E-01	U	2.00E-01	0.001	Chrysene	2.00E-04
	4.00E-01	U	2.00E-01	0.1	Indeno(1,2,3-cd)pyrene	2.00E-02
					Total for Sample	2.62E-01
017SB00801	4.10E-01	U	2.05E-01	0.1	Benzo(a)anthracene	2.05E-02
	4.10E-01	U	2.05E-01	1	Benzo(a)pyrene	2.05E-01
	4.10E-01	U	2.05E-01	0.1	Benzo(b)fluoranthene	2.05E-02
	4.10E-01	U	2.05E-01	0.01	Benzo(k)fluoranthene	2.05E-03
	4.10E-01	U	2.05E-01	0.001	Chrysene	2.05E-04
	4.10E-01	U	2.05E-01	0.1	Indeno(1,2,3-cd)pyrene	2.05E-02
					Total for Sample	2.69E-01
017SB00901	1.43E-01	J	1.43E-01	0.1	Benzo(a)anthracene	1.43E-02
	1.16E-01	J	1.16E-01	1	Benzo(a)pyrene	1.16E-01
	8.96E-02	J	8.96E-02	0.1	Benzo(b)fluoranthene	8.96E-03
	4.20E-01	U	2.10E-01	0.01	Benzo(k)fluoranthene	2.10E-03
	1.19E-01	J	1.19E-01	0.001	Chrysene	1.19E-04
	4.20E-01	U	2.10E-01	0.1	Indeno(1,2,3-cd)pyrene	2.10E-02
					Total for Sample	1.62E-01
017SB01001	4.00E-01	U	2.00E-01	0.1	Benzo(a)anthracene	2.00E-02
	4.00E-01	U	2.00E-01	1	Benzo(a)pyrene	2.00E-01
	5.16E-02	J	5.16E-02	0.1	Benzo(b)fluoranthene	5.16E-03
	4.00E-01	U	2.00E-01	0.01	Benzo(k)fluoranthene	2.00E-03
	4.00E-01	U	2.00E-01	0.001	Chrysene	2.00E-04
	4.00E-01	U	2.00E-01	0.1	Indeno(1,2,3-cd)pyrene	2.00E-02
					Total for Sample	2.47E-01

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TABLE 11
BENZO(A)PYRENE EQUIVALENT CALCULATIONS FOR SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Sample ID	Reported Concentration (mg/kg)	Validation Qualifier	Actual or Estimated Concentration[a] (mg/kg)	TEF[b]	Parameter	BEQ[c] (mg/kg)
017SB01101	4.20E-01	U	2.10E-01	0.1	Benzo(a)anthracene	2.10E-02
	4.20E-01	U	2.10E-01	1	Benzo(a)pyrene	2.10E-01
	4.20E-01	U	2.10E-01	0.1	Benzo(b)fluoranthene	2.10E-02
	4.20E-01	U	2.10E-01	0.01	Benzo(k)fluoranthene	2.10E-03
	4.20E-01	U	2.10E-01	0.001	Chrysene	2.10E-04
	4.20E-01	U	2.10E-01	0.1	Indeno(1,2,3-cd)pyrene	2.10E-02
					Total for Sample	2.75E-01
017SB01201	3.90E-01	U	1.95E-01	0.1	Benzo(a)anthracene	1.95E-02
	3.90E-01	U	1.95E-01	1	Benzo(a)pyrene	1.95E-01
	3.90E-01	U	1.95E-01	0.1	Benzo(b)fluoranthene	1.95E-02
	3.90E-01	U	1.95E-01	0.01	Benzo(k)fluoranthene	1.95E-03
	3.90E-01	U	1.95E-01	0.001	Chrysene	1.95E-04
	3.90E-01	U	1.95E-01	0.1	Indeno(1,2,3-cd)pyrene	1.95E-02
					Total for Sample	2.56E-01
017SB01301	3.90E-01	U	1.95E-01	0.1	Benzo(a)anthracene	1.95E-02
	3.90E-01	U	1.95E-01	1	Benzo(a)pyrene	1.95E-01
	3.90E-01	U	1.95E-01	0.1	Benzo(b)fluoranthene	1.95E-02
	3.90E-01	U	1.95E-01	0.01	Benzo(k)fluoranthene	1.95E-03
	3.90E-01	U	1.95E-01	0.001	Chrysene	1.95E-04
	3.90E-01	U	1.95E-01	0.1	Indeno(1,2,3-cd)pyrene	1.95E-02
					Total for Sample	2.56E-01
017SB01401	3.80E-01	U	1.90E-01	0.1	Benzo(a)anthracene	1.90E-02
	3.80E-01	U	1.90E-01	1	Benzo(a)pyrene	1.90E-01
	3.80E-01	U	1.90E-01	0.1	Benzo(b)fluoranthene	1.90E-02
	3.80E-01	U	1.90E-01	0.01	Benzo(k)fluoranthene	1.90E-03
	3.80E-01	U	1.90E-01	0.001	Chrysene	1.90E-04
	3.80E-01	U	1.90E-01	0.1	Indeno(1,2,3-cd)pyrene	1.90E-02
					Total for Sample	2.49E-01
017SB01501	3.70E-01	U	1.85E-01	0.1	Benzo(a)anthracene	1.85E-02
	3.70E-01	U	1.85E-01	1	Benzo(a)pyrene	1.85E-01
	3.70E-01	U	1.85E-01	0.1	Benzo(b)fluoranthene	1.85E-02
	3.70E-01	U	1.85E-01	0.01	Benzo(k)fluoranthene	1.85E-03
	3.70E-01	U	1.85E-01	0.001	Chrysene	1.85E-04
	3.70E-01	U	1.85E-01	0.1	Indeno(1,2,3-cd)pyrene	1.85E-02
					Total for Sample	2.43E-01

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TABLE 11
BENZO(A)PYRENE EQUIVALENT CALCULATIONS FOR SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Sample ID	Reported Concentration (mg/kg)	Validation Qualifier	Actual or Estimated Concentration[a] (mg/kg)	TEF[b]	Parameter	BEQ[c] (mg/kg)
017SB01601	4.10E-01	U	2.05E-01	0.1	Benzo(a)anthracene	2.05E-02
	4.10E-01	U	2.05E-01	1	Benzo(a)pyrene	2.05E-01
	4.10E-01	U	2.05E-01	0.1	Benzo(b)fluoranthene	2.05E-02
	4.10E-01	U	2.05E-01	0.01	Benzo(k)fluoranthene	2.05E-03
	4.10E-01	U	2.05E-01	0.001	Chrysene	2.05E-04
	4.10E-01	U	2.05E-01	0.1	Indeno(1,2,3-cd)pyrene	2.05E-02
					Total for Sample	2.69E-01
017SB01701	3.60E-01	U	1.80E-01	0.1	Benzo(a)anthracene	1.80E-02
	3.60E-01	U	1.80E-01	1	Benzo(a)pyrene	1.80E-01
	3.60E-01	U	1.80E-01	0.1	Benzo(b)fluoranthene	1.80E-02
	3.60E-01	U	1.80E-01	0.01	Benzo(k)fluoranthene	1.80E-03
	3.60E-01	U	1.80E-01	0.001	Chrysene	1.80E-04
	3.60E-01	U	1.80E-01	0.1	Indeno(1,2,3-cd)pyrene	1.80E-02
					Total for Sample	2.36E-01
017SB01801	3.90E-01	U	1.95E-01	0.1	Benzo(a)anthracene	1.95E-02
	3.90E-01	U	1.95E-01	1	Benzo(a)pyrene	1.95E-01
	3.90E-01	U	1.95E-01	0.1	Benzo(b)fluoranthene	1.95E-02
	3.90E-01	U	1.95E-01	0.01	Benzo(k)fluoranthene	1.95E-03
	3.90E-01	U	1.95E-01	0.001	Chrysene	1.95E-04
	3.90E-01	U	1.95E-01	0.1	Indeno(1,2,3-cd)pyrene	1.95E-02
					Total for Sample	2.56E-01
017SB01901	4.00E-01	U	2.00E-01	0.1	Benzo(a)anthracene	2.00E-02
	4.00E-01	U	2.00E-01	1	Benzo(a)pyrene	2.00E-01
	4.00E-01	U	2.00E-01	0.1	Benzo(b)fluoranthene	2.00E-02
	4.00E-01	U	2.00E-01	0.01	Benzo(k)fluoranthene	2.00E-03
	4.00E-01	U	2.00E-01	0.001	Chrysene	2.00E-04
	4.00E-01	U	2.00E-01	0.1	Indeno(1,2,3-cd)pyrene	2.00E-02
					Total for Sample	2.62E-01
017SB02001	7.80E-01	U	3.90E-01	0.1	Benzo(a)anthracene	3.90E-02
	7.80E-01	U	3.90E-01	1	Benzo(a)pyrene	3.90E-01
	7.80E-01	U	3.90E-01	0.1	Benzo(b)fluoranthene	3.90E-02
	7.80E-01	U	3.90E-01	0.01	Benzo(k)fluoranthene	3.90E-03
	7.80E-01	U	3.90E-01	0.001	Chrysene	3.90E-04
	7.80E-01	U	3.90E-01	0.1	Indeno(1,2,3-cd)pyrene	3.90E-02
					Total for Sample	5.11E-01

APPENDIX C
TABLE 11
BENZO(A)PYRENE EQUIVALENT CALCULATIONS FOR SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Sample ID	Reported Concentration (mg/kg)	Validation Qualifier	Actual or Estimated Concentration[a] (mg/kg)	TEF[b]	Parameter	BEQ[c] (mg/kg)
017SB02101	4.00E-01	U	2.00E-01	0.1	Benzo(a)anthracene	2.00E-02
	4.00E-01	U	2.00E-01	1	Benzo(a)pyrene	2.00E-01
	4.00E-01	U	2.00E-01	0.1	Benzo(b)fluoranthene	2.00E-02
	4.00E-01	U	2.00E-01	0.01	Benzo(k)fluoranthene	2.00E-03
	4.00E-01	U	2.00E-01	0.001	Chrysene	2.00E-04
	4.00E-01	U	2.00E-01	0.1	Indeno(1,2,3-cd)pyrene	2.00E-02
					Total for Sample	2.62E-01
017SB02201	1.86E-01	J	1.86E-01	0.1	Benzo(a)anthracene	1.86E-02
	1.75E-01	J	1.75E-01	1	Benzo(a)pyrene	1.75E-01
	1.68E-01	J	1.68E-01	0.1	Benzo(b)fluoranthene	1.68E-02
	1.60E-01	J	1.60E-01	0.01	Benzo(k)fluoranthene	1.60E-03
	2.21E-01	J	2.21E-01	0.001	Chrysene	2.21E-04
	8.08E-02	J	8.08E-02	0.1	Indeno(1,2,3-cd)pyrene	8.08E-03
					Total for Sample	2.20E-01
017SB02301	4.10E-01	U	2.05E-01	0.1	Benzo(a)anthracene	2.05E-02
	4.10E-01	U	2.05E-01	1	Benzo(a)pyrene	2.05E-01
	4.10E-01	U	2.05E-01	0.1	Benzo(b)fluoranthene	2.05E-02
	4.10E-01	U	2.05E-01	0.01	Benzo(k)fluoranthene	2.05E-03
	4.10E-01	U	2.05E-01	0.001	Chrysene	2.05E-04
	4.10E-01	U	2.05E-01	0.1	Indeno(1,2,3-cd)pyrene	2.05E-02
					Total for Sample	2.69E-01
017SB02401	4.00E-01	U	2.00E-01	0.1	Benzo(a)anthracene	2.00E-02
	4.00E-01	U	2.00E-01	1	Benzo(a)pyrene	2.00E-01
	4.00E-01	U	2.00E-01	0.1	Benzo(b)fluoranthene	2.00E-02
	4.00E-01	U	2.05E-01	0.01	Benzo(k)fluoranthene	2.05E-03
	4.00E-01	U	2.00E-01	0.001	Chrysene	2.00E-04
	4.00E-01	U	2.00E-01	0.1	Indeno(1,2,3-cd)pyrene	2.00E-02
					Total for Sample	2.62E-01
017SB02501	4.40E-01	U	2.20E-01	0.1	Benzo(a)anthracene	2.20E-02
	4.40E-01	U	2.20E-01	1	Benzo(a)pyrene	2.20E-01
	9.00E-02	J	9.00E-02	0.1	Benzo(b)fluoranthene	9.00E-03
	4.40E-01	U	2.20E-01	0.01	Benzo(k)fluoranthene	2.20E-03
	4.40E-01	U	2.20E-01	0.001	Chrysene	2.20E-04
	4.40E-01	U	2.20E-01	0.1	Indeno(1,2,3-cd)pyrene	2.20E-02
					Total for Sample	2.75E-01

APPENDIX C
TABLE 11
BENZO(A)PYRENE EQUIVALENT CALCULATIONS FOR SURFACE SOIL (0-1')
ZONE H - SWMU 17
CHARLESTON NAVAL COMPLEX

Sample ID	Reported Concentration (mg/kg)	Validation Qualifier	Actual or Estimated Concentration[a] (mg/kg)	TEF[b]	Parameter	BEQ[c] (mg/kg)
017SB02601	4.30E-01	U	2.15E-01	0.1	Benzo(a)anthracene	2.15E-02
	4.30E-01	U	2.15E-01	1	Benzo(a)pyrene	2.15E-01
	4.30E-01	U	2.15E-01	0.1	Benzo(b)fluoranthene	2.15E-02
	4.30E-01	U	2.15E-01	0.01	Benzo(k)fluoranthene	2.15E-03
	4.30E-01	U	2.15E-01	0.001	Chrysene	2.15E-04
	4.30E-01	U	2.15E-01	0.1	Indeno(1,2,3-cd)pyrene	2.15E-02
					Total for Sample	2.82E-01

Notes:

TEF = Toxicity Equivalent Factor
J = Estimated value
U = Chemical was not detected at reported sample quantitation limit.

a = Actual or estimated concentration represents parameter detections and one-half the sample quantitation limits for nondetects.
b = TEFs are as provided in USEPA, 1993.
c = BEQ is the product of the actual or estimated concentration and the TEF.

APPENDIX C
TABLE 12
DIOXIN EQUIVALENT CALCULATIONS FOR SUBSURFACE SOIL (3-5')
ZONE H- SWMU 17
CHARLESTON NAVAL COMPLEX

Sample ID	Reported Concentration (mg/kg)	Validation Qualifier	Actual or Estimated Concentration[a] (mg/kg)	TEF[b]	Parameter	TEQ (mg/kg)
017SB00402	0.00045052	J	4.51E-04	0.01	1234678-HpCDD	4.51E-06
	0.000091027	J	9.10E-05	0.01	1234678-HpCDF	9.10E-07
	0.00002231	EMPC	2.23E-05	0.01	1234789-HpCDF	2.23E-07
	5.3982E-06	EMPC	5.40E-06	0.1	123478-HxCDD	5.40E-07
	0.000064711	EMPC	6.47E-05	0.1	123478-HxCDF	6.47E-06
	0.000012942	EMPC	1.29E-05	0.1	123678-HxCDD	1.29E-06
	8.5563E-06	EMPC	8.56E-06	0.1	123678-HxCDF	8.56E-07
	0.000019346	U	9.67E-06	0.1	123789-HxCDD	9.67E-07
	6.7144E-06	U	3.36E-06	0.1	123789-HxCDF	3.36E-07
	5.6614E-06	U	2.83E-06	0.5	12378-PeCDD	1.42E-06
	3.3471E-06	EMPC	3.35E-06	0.05	12378-PeCDF	1.67E-07
	0.000016455	EMPC	1.65E-05	0.1	234678-HxCDF	1.65E-06
	0.000023776	EMPC	2.38E-05	0.5	23478-PeCDF	1.19E-05
	1.1588E-06	U	5.79E-07	1	2378-TCDD	5.79E-07
	0.000023429	EMPC	2.34E-05	0.1	2378-TCDF	2.34E-06
	0.022695	J	2.27E-02	0.001	OCDD	2.27E-05
	0.00038284	J	3.83E-04	0.001	OCDF	3.83E-07
					Total for Sample	5.72E-05
017SB02602	0.000006623		6.62E-06	0.01	1234678-HpCDD	6.62E-08
	0.000004165		4.17E-06	0.01	1234678-HpCDF	4.17E-08
	0.000002094		2.09E-06	0.01	1234789-HpCDF	2.09E-08
	0.000002522	U	1.26E-06	0.1	123478-HxCDD	1.26E-07
	0.00000414	EMPC	4.14E-06	0.1	123478-HxCDF	4.14E-07
	0.000001572	U	7.86E-07	0.1	123678-HxCDD	7.86E-08
	0.000000638		6.38E-07	0.1	123678-HxCDF	6.38E-08
	0.000001584	U	7.92E-07	0.1	123789-HxCDD	7.92E-08
	0.000000327	U	1.64E-07	0.1	123789-HxCDF	1.64E-08
	0.000002447	U	1.22E-06	0.5	12378-PeCDD	6.12E-07
	0.000000318	U	1.59E-07	0.05	12378-PeCDF	7.95E-09
	0.000000836		8.36E-07	0.1	234678-HxCDF	8.36E-08
	0.000001574		1.57E-06	0.5	23478-PeCDF	7.87E-07
	0.000001087	U	5.44E-07	1	2378-TCDD	5.44E-07
	0.000000423	U	2.12E-07	0.1	2378-TCDF	2.12E-08
	0.000178858		1.79E-04	0.001	OCDD	1.79E-07
	0.000016346		1.63E-05	0.001	OCDF	1.63E-08
					Total for Sample	3.16E-06
017SB02602	0.000254669	J	2.55E-04	0.01	1234678-HpCDD	2.55E-06
	2.66593E-05	J	2.67E-05	0.01	1234678-HpCDF	2.67E-07
	0.00009489	U	4.74E-05	0.01	1234789-HpCDF	4.74E-07
	5.3586E-06	EMPC	5.36E-06	0.1	123478-HxCDD	5.36E-07
	2.8666E-06	U	1.43E-06	0.1	123478-HxCDF	1.43E-07
	9.0258E-06	EMPC	9.03E-06	0.1	123678-HxCDD	9.03E-07
	1.0039E-06	EMPC	1.00E-06	0.1	123678-HxCDF	1.00E-07
	1.83796E-05	J	1.84E-05	0.1	123789-HxCDD	1.84E-06
	1.0165E-06	U	5.08E-07	0.1	123789-HxCDF	5.08E-08
	3.3728E-06	EMPC	3.37E-06	0.5	12378-PeCDD	1.69E-06
	7.9812E-06	EMPC	7.98E-06	0.05	12378-PeCDF	3.99E-07
	1.8416E-06	EMPC	1.84E-06	0.1	234678-HxCDF	1.84E-07
	1.6442E-06	U	8.22E-07	0.5	23478-PeCDF	4.11E-07
	0.000000691	U	3.46E-07	1	2378-TCDD	3.46E-07
	1.7723E-06	EMPC	1.77E-06	0.1	2378-TCDF	1.77E-07
	0.004619002	J	4.62E-03	0.001	OCDD	4.62E-06
	5.97007E-05	J	5.97E-05	0.001	OCDF	5.97E-08
					Total for Sample	1.47E-05

APPENDIX C
TABLE 12
DIOXIN EQUIVALENT CALCULATIONS FOR SUBSURFACE SOIL (3-5')
ZONE H- SWMU 17
CHARLESTON NAVAL COMPLEX

Sample ID	Reported Concentration (mg/kg)	Validation Qualifier	Actual or Estimated Concentration[a] (mg/kg)	TEF[b]	Parameter	TEQ (mg/kg)
017SB00402	0.00045052	J	4.51E-04	0.01	1234678-HpCDD	4.51E-06
017SB02602	0.000301729	J	3.02E-04	0.01	1234678-HpCDD	3.02E-06
	0.000030916	J	3.09E-05	0.01	1234678-HpCDF	3.09E-07
	0.00010996	U	5.50E-05	0.01	1234789-HpCDF	5.50E-07
	5.1191E-06	EMPC	5.12E-06	0.1	123478-HxCDD	5.12E-07
	2.8321E-06	EMPC	2.83E-06	0.1	123478-HxCDF	2.83E-07
	1.15736E-05	J	1.16E-05	0.1	123678-HxCDD	1.16E-06
	1.5383E-06	EMPC	1.54E-06	0.1	123678-HxCDF	1.54E-07
	2.26737E-05	J	2.27E-05	0.1	123789-HxCDD	2.27E-06
	8.433E-07	EMPC	8.43E-07	0.1	123789-HxCDF	8.43E-08
	3.7834E-06	EMPC	3.78E-06	0.5	12378-PeCDD	1.89E-06
	5.9129E-06	EMPC	5.91E-06	0.05	12378-PeCDF	2.96E-07
	2.4058E-06	EMPC	2.41E-06	0.1	234678-HxCDF	2.41E-07
	1.1831E-06	EMPC	1.18E-06	0.5	23478-PeCDF	5.92E-07
	1.0365E-06	U	5.18E-07	1	2378-TCDD	5.18E-07
	2.1476E-06	EMPC	2.15E-06	0.1	2378-TCDF	2.15E-07
	0.005426331	J	5.43E-03	0.001	OCDD	5.43E-06
	0.00004427	J	4.43E-05	0.001	OCDF	4.43E-08
					Total for Sample	1.76E-05
017SB02602	0.000281381	J	2.81E-04	0.01	1234678-HpCDD	2.81E-06
	5.63024E-05	J	5.63E-05	0.01	1234678-HpCDF	5.63E-07
	0.000003155	EMPC	3.16E-06	0.01	1234789-HpCDF	3.16E-08
	7.2268E-06	EMPC	7.23E-06	0.1	123478-HxCDD	7.23E-07
	3.5017E-06	EMPC	3.50E-06	0.1	123478-HxCDF	3.50E-07
	1.10102E-05	J	1.10E-05	0.1	123678-HxCDD	1.10E-06
	3.6296E-06	EMPC	3.63E-06	0.1	123678-HxCDF	3.63E-07
	2.04886E-05	J	2.05E-05	0.1	123789-HxCDD	2.05E-06
	1.1596E-06	EMPC	1.16E-06	0.1	123789-HxCDF	1.16E-07
	3.4273E-06	EMPC	3.43E-06	0.5	12378-PeCDD	1.71E-06
	8.489E-07	EMPC	8.49E-07	0.05	12378-PeCDF	4.24E-08
	5.0021E-06	EMPC	5.00E-06	0.1	234678-HxCDF	5.00E-07
	1.2755E-06	EMPC	1.28E-06	0.5	23478-PeCDF	6.38E-07
	6.966E-07	U	3.48E-07	1	2378-TCDD	3.48E-07
	2.0573E-06	EMPC	2.06E-06	0.1	2378-TCDF	2.06E-07
	0.003922824	J	3.92E-03	0.001	OCDD	3.92E-06
	7.08693E-05	J	7.09E-05	0.001	OCDF	7.09E-08
					Total for Sample	1.56E-05
017SB02602	0.000281311	J	2.81E-04	0.01	1234678-HpCDD	2.81E-06
	2.86928E-05	J	2.87E-05	0.01	1234678-HpCDF	2.87E-07
	1.9463E-06	EMPC	1.95E-06	0.01	1234789-HpCDF	1.95E-08
	6.9741E-06	EMPC	6.97E-06	0.1	123478-HxCDD	6.97E-07
	1.6252E-06	EMPC	1.63E-06	0.1	123478-HxCDF	1.63E-07
	9.2178E-06	EMPC	9.22E-06	0.1	123678-HxCDD	9.22E-07
	1.5232E-06	EMPC	1.52E-06	0.1	123678-HxCDF	1.52E-07
	2.10549E-05	J	2.11E-05	0.1	123789-HxCDD	2.11E-06
	7.995E-07	U	4.00E-07	0.1	123789-HxCDF	4.00E-08
	3.6951E-06	EMPC	3.70E-06	0.5	12378-PeCDD	1.85E-06
	5.843E-07	EMPC	5.84E-07	0.05	12378-PeCDF	2.92E-08
	2.4133E-06	EMPC	2.41E-06	0.1	234678-HxCDF	2.41E-07
	8.409E-07	EMPC	8.41E-07	0.5	23478-PeCDF	4.20E-07
	5.864E-07	U	2.93E-07	1	2378-TCDD	2.93E-07
	1.0795E-06	U	5.40E-07	0.1	2378-TCDF	5.40E-08
	0.005171151	J	5.17E-03	0.001	OCDD	5.17E-06
	4.38276E-05	J	4.38E-05	0.001	OCDF	4.38E-08
					Total for Sample	1.53E-05

APPENDIX C
TABLE 12
DIOXIN EQUIVALENT CALCULATIONS FOR SUBSURFACE SOIL (3-5')
ZONE H- SWMU 17
CHARLESTON NAVAL COMPLEX

Sample ID	Reported Concentration (mg/kg)	Validation Qualifier	Actual or Estimated Concentration[a] (mg/kg)	TEF[b]	Parameter	TEQ (mg/kg)
017SB00402	0.00045052	J	4.51E-04	0.01	1234678-HpCDD	4.51E-06
017SB02602	0.000157662	J	1.58E-04	0.01	1234678-HpCDD	1.58E-06
	2.38045E-05	J	2.38E-05	0.01	1234678-HpCDF	2.38E-07
	0.00008726	U	4.36E-05	0.01	1234789-HpCDF	4.36E-07
	4.2483E-06	EMPC	4.25E-06	0.1	123478-HxCDD	4.25E-07
	1.9248E-06	EMPC	1.92E-06	0.1	123478-HxCDF	1.92E-07
	0.000006358	EMPC	6.36E-06	0.1	123678-HxCDD	6.36E-07
	2.1011E-06	EMPC	2.10E-06	0.1	123678-HxCDF	2.10E-07
	0.000014804	U	7.40E-06	0.1	123789-HxCDD	7.40E-07
	1.1707E-06	EMPC	1.17E-06	0.1	123789-HxCDF	1.17E-07
	3.0672E-06	EMPC	3.07E-06	0.5	12378-PeCDD	1.53E-06
	3.7161E-06	EMPC	3.72E-06	0.05	12378-PeCDF	1.86E-07
	2.6772E-06	EMPC	2.68E-06	0.1	234678-HxCDF	2.68E-07
	1.1585E-06	EMPC	1.16E-06	0.5	23478-PeCDF	5.79E-07
	5.995E-07	U	3.00E-07	1	2378-TCDD	3.00E-07
	0.000001463	EMPC	1.46E-06	0.1	2378-TCDF	1.46E-07
	0.002267835	J	2.27E-03	0.001	OCDD	2.27E-06
	3.74974E-05	J	3.75E-05	0.001	OCDF	3.75E-08
					Total for Sample	9.89E-06
017SB02602	2.50E-04	J	2.50E-04	0.01	1234678-HpCDD	2.50E-06
	2.38E-05	J	2.38E-05	0.01	1234678-HpCDF	2.38E-07
	7.78E-05	U	3.89E-05	0.01	1234789-HpCDF	3.89E-07
	4.67E-06	U	2.34E-06	0.1	123478-HxCDD	2.34E-07
	1.88E-06	EMPC	1.88E-06	0.1	123478-HxCDF	1.88E-07
	9.12E-06	EMPC	9.12E-06	0.1	123678-HxCDD	9.12E-07
	1.15E-06	U	5.77E-07	0.1	123678-HxCDF	5.77E-08
	2.04E-05	J	2.04E-05	0.1	123789-HxCDD	2.04E-06
	1.04E-06	U	5.18E-07	0.1	123789-HxCDF	5.18E-08
	3.56E-06	EMPC	3.56E-06	0.5	12378-PeCDD	1.78E-06
	4.38E-06	EMPC	4.38E-06	0.05	12378-PeCDF	2.19E-07
	2.48E-06	U	1.24E-06	0.1	234678-HxCDF	1.24E-07
	1.08E-06	EMPC	1.08E-06	0.5	23478-PeCDF	5.40E-07
	7.64E-07	U	3.82E-07	1	2378-TCDD	3.82E-07
	1.57E-06	U	7.85E-07	0.1	2378-TCDF	7.85E-08
	4.11E-03	J	4.11E-03	0.001	OCDD	4.11E-06
	3.57E-05	J	3.57E-05	0.001	OCDF	3.57E-08
					Total for Sample	1.39E-05
017SB02602	0.000233438	J	2.33E-04	0.01	1234678-HpCDD	2.33E-06
	2.58953E-05	J	2.59E-05	0.01	1234678-HpCDF	2.59E-07
	0.00009095	U	4.55E-05	0.01	1234789-HpCDF	4.55E-07
	0.000007579	U	3.79E-06	0.1	123478-HxCDD	3.79E-07
	2.2429E-06	EMPC	2.24E-06	0.1	123478-HxCDF	2.24E-07
	9.2675E-06	EMPC	9.27E-06	0.1	123678-HxCDD	9.27E-07
	1.1245E-06	EMPC	1.12E-06	0.1	123678-HxCDF	1.12E-07
	2.07308E-05	J	2.07E-05	0.1	123789-HxCDD	2.07E-06
	0.00000529	U	2.65E-06	0.1	123789-HxCDF	2.65E-07
	4.1192E-06	EMPC	4.12E-06	0.5	12378-PeCDD	2.06E-06
	6.9792E-06	EMPC	6.98E-06	0.05	12378-PeCDF	3.49E-07
	2.1498E-06	EMPC	2.15E-06	0.1	234678-HxCDF	2.15E-07
	1.3527E-06	EMPC	1.35E-06	0.5	23478-PeCDF	6.76E-07
	1.0562E-06	EMPC	1.06E-06	1	2378-TCDD	1.06E-06
	2.6158E-06	EMPC	2.62E-06	0.1	2378-TCDF	2.62E-07
	0.003858315	J	3.86E-03	0.001	OCDD	3.86E-06
	3.93138E-05	J	3.93E-05	0.001	OCDF	3.93E-08
					Total for Sample	1.55E-05

APPENDIX C - TABLE 13
AIR CONCENTRATION CALCULATIONS: SURFACE SOIL (0-1')
ZONE H - SWMU 17 - CHARLESTON NAVAL COMPLEX

Variable Abbreviation	Air Concentration CA	=	Soil Concentration CS	* [(1 /	Particulate Emissions Factor PEF	) + (1 /	Volatilization Factor VF	)]
Units	mg/m^3		mg/kg		m^3/kg		m^3/kg	
Inorganics								
Antimony	1.45E-09	=	1.92E+00	* [(1 /	1.32E+09	) + (1 /	N/A	)]
Cadmium	5.38E-10	=	7.10E-01	* [(1 /	1.32E+09	) + (1 /	N/A	)]
PCBs								
Aroclor-1260	9.08E-05	=	1.09E+01	* [(1 /	1.32E+09	) + (1 /	1.20E+05	)]
Dioxin								
TEQs	5.00E-10	=	6.00E-05	* [(1 /	1.32E+09	) + (1 /	1.20E+05	)]
SVOCs								
BEQs	1.39E-08	=	2.80E-01	* [(1 /	1.32E+09	) + (1 /	2.05E+07	)]

Equations from U.S. EPA (1996), Soil Screening Guide: User's Guide (EPA/540/R-96/018) (Eq. 8)

$$VF(m^3/kg) = Q/C * (3.14*Da*T)^{0.5} * 0.0001(m^2/cm^2) / (2*\rho b*Da)$$

$$\theta a(Lair/Lsoil) = n - \theta w$$

$$Da\ (cm^2/s) = [(\theta a^{3.33} * Di * H + \theta w^{3.33} * Dw) / n^2] / (\rho b * Koc * foc + \theta w + \theta a * H)$$

N/A: Not Applicable

APPENDIX C - TABLE 14
AIR CONCENTRATION CALCULATIONS: SURFACE SOIL (0-1')
ZONE H - SWMU 17 - CHARLESTON NAVAL COMPLEX
DERIVATION OF VOLATILIZATION FACTOR

CHEMICALS	VF (m3/kg)	Inverse Mean Soil Concentration Q/C (g/m2-s / kg/m3)	Exposure Interval T (s)	Dry Soil Bulk Density pb (g/cm3)	Water-filled Soil Porosity Ow (Lwater/Lsoil)	Soil Particle Density ps (g/cm3)	Diffusivity in Air Di (cm2/s)	Henry's Law Constant (H) (-)	Diffusivity in Water Dw (cm2/s)	Soil Organic Carbon Partition Coefficient Koc (cm3/g)	Fraction Organic Carbon Foc (g/g)	Apparent Diffusivity Da (cm2/s)	Total Soil Porosity n (Lpore/Lsoil)	Air-Filled Soil Porosity Oa (Lair/Lsoil)
BEQs	2.05E+07	58.13	9.50E+08	1.5	0.15	2.65	4.30E-02	4.63E-05	9.00E-06	1.02E+06	0.006	2.66666E-11	0.433962264	0.283962264
Aroclor-1260	(VF Calculated by Mass Limit Model)													

Equations from U.S. EPA (1996), Soil Screening Guide: User's Guide (EPA/540/R-96/018) (Eq. 8)

VF (m3/kg) = Q/C * (3.14*Da*T)^0.5 * 0.0001 (m2/cm2) / (2*pb*Da)

Oa (Lair/Lsoil) = n - Ow

Da (cm2/s) = [(Oa^3.33*Di*H + Ow^3.33*Dw)/n^2] / (pb*Koc*foc+Ow+Oa*H)

Q/C = inverse of mean concentration at center of source (g/m^2-s per kg/m^3) If area is 0.5 acre, Q/C = 53.89. If area is > 0.5 acre and 1 acre, Q/C = 47.24.

If area is > 1 acre and 2 acres, Q/C = 41.83.

Appendix C - Table 1
Calculation of Soil to Groundwater Soil Screening Levels
Charleston Naval Complex, Zone H, SWMUs 17 and 196
Charleston, South Carolina

Site-Specific Parameters:		Chemical-Specific Variables						Partitioning Method			
Fraction Organic Carbon (--) :	0.002										
Dilution Factor [DF] (--) :	1	Dimension-		Organic						Calculated	
Dry Soil Bulk Density (kg/L) :	1.5	less		Carbon		Water				Soil to GW	USEPA
Water-filled Soil Porosity (--) :	0.3	Henry's		Water		Health-		Acceptable	Target	SSL -	Generic
Air-filled Soil Porosity (--) :	0.13	Law		Part.		based		GW	Leachate	Partition	Soil to GW
Soil Porosity (--) :	0.43	Constant		Coeff.		Limit	MCL/	Conc.	Conc.	Method	SSL
		[H']		[Koc]		[HBL]	MCLG				[DF=20]
		(--)		(L/kg)		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/kg)	(mg/kg)
Volatile Organic Compounds											
Acetone (2-propanone)		1.59E-03	a	5.75E-01	a	3.7	NL	3.7	3.7	0.745	16
Acetonitrile (methyl cyanide)		1.40E-03	d	4.70E-01	d	NL	NL	0.12	0.12	0.024	NL
Acrolein (propenal)		4.90E-03	d	1.00E+00	d	0.73	NL	0.73	0.73	0.148	NL
Acrylonitrile (vinyl cyanide) x		4.10E-03	d	1.80E+00	d	0.00016	NL	0.00016	0.00016	3.26E-05	NL
Benzene (coal naphtha) x		2.28E-01	a	5.89E+01	a	0.0029	0.005	0.005	0.01	1.69E-03	0.03
Bromodichloromethane x		6.56E-02	a	5.50E+01	a	0.0014	0.1	0.1	0.10	3.16E-02	0.6
Bromoform (tribromomethane) x		2.19E-02	a	8.71E+01	a	0.011	0.1	0.1	0.10	3.76E-02	0.8
Bromomethane (methylbromide)		2.50E-01	d	1.10E+01	d	0.051	NL	0.051	0.051	1.24E-02	0.2
2-Butanone (methyl ethyl ketone; MEK)		2.30E-03	d	1.91E+00	d	22	NL	22	22	4.49	NL
Carbon disulfide		1.24E+00	a	4.57E+01	a	3.7	NL	3.7	3.7	1.48	32
Carbon tetrachloride (tetrachloromethane) x		1.25E+00	a	1.74E+02	a	0.00066	0.005	0.005	0.01	3.28E-03	0.07
Chlorobenzene (monochlorobenzene)		1.52E-01	a	2.19E+02	a	0.73	0.1	0.1	0.10	6.51E-02	1
Chloroethane (ethyl chloride) x		3.60E-01	d	1.60E+01	d	NL	NL	0.0036	0.0036	9.48E-04	NL
2-Chloroethyl vinyl ether		1.00E-02	f	6.60E+00	f	NL	NL	0.15	0.15	3.21E-02	NL
Chloroform (trichloromethane) x		1.50E-01	a	3.98E+01	a	0.014	0.1	0.1	0.1	2.93E-02	0.6
Chloromethane (methyl chloride) x		3.60E-01	d	6.50E+00	d	0.0066	NL	0.0066	0.0066	1.61E-03	NL
Dibromochloromethane x		3.21E-02	a	6.31E+01	a	0.001	0.06	0.06	0.06	1.97E-02	0.4
Dichlorodifluoromethane (Freon 12)		1.40E+01	d	6.00E+01	d	7.3	NL	7.3	7.3	11.2	NL
1,1-Dichloroethane		2.30E-01	a	3.16E+01	a	3.7	NL	3.7	3.7	1.05	23
1,2-Dichloroethane (ethylene chloride; EDC) x		4.01E-02	a	1.74E+01	a	0.00094	0.005	0.005	0.005	1.19E-03	0.02
1,1-Dichloroethene x		1.07E+00	a	5.89E+01	a	0.00014	0.007	0.007	0.007	2.87E-03	0.06
cis-1,2-Dichloroethene		1.67E-01	a	3.55E+01	a	0.37	0.07	0.07	0.07	2.00E-02	0.4
trans-1,2-Dichloroethene		3.85E-01	a	5.25E+01	a	0.73	0.1	0.1	0.1	3.38E-02	0.7
1,2-Dichloroethene (total)		NDA		2.87E+00	e	0.33	NL	0.33	0.33	6.79E-02	NL
1,2-Dichloropropane (propylene chloride) x		1.15E-01	a	4.37E+01	a	0.0013	0.005	0.005	0.005	1.49E-03	0.03
1,3-Dichloropropene x		7.26E-01	a	4.57E+01	a	0.00047	NL	0.00047	0.00047	1.67E-04	0.004
Ethylbenzene (phenylethane)		3.23E-01	a	3.63E+02	a	3.7	0.7	0.7	0.7	0.668	13
2-Hexanone (methyl butyl ketone; MBK)		7.18E-02	f	2.40E+01	d	NL	NL	1.5	1.5	0.381	NL
4-Methyl-2-pentanone (MIBK)		5.70E-03	d	1.50E+01	d	2.9	NL	2.9	2.9	0.668	NL
Methylene chloride (dichloromethane) x		8.98E-02	a	1.17E+01	a	0.011	0.005	0.005	0.005	1.16E-03	0.02
Propionitrile (ethyl cyanide)		NDA		NDA		NL	NL	NA	NA	NA	NL
Styrene (vinylbenzene)		1.13E-01	a	7.76E+02	a	7.3	0.1	0.1	0.1	0.176	4
1,1,2,2-Tetrachloroethane x		1.41E-02	a	9.33E+01	a	0.00043	NL	0.00043	0.00043	1.67E-04	0.003
Tetrachloroethene (PCE) x		7.54E-01	a	1.55E+02	a	0.0016	0.005	0.005	0.005	2.88E-03	0.06
Tetrahydrofuran		9.80E-03	d	2.90E+00	d	NL	NL	0.0088	0.0088	1.82E-03	NL
Toluene (methyl benzene)		2.72E-01	a	1.82E+02	a	7.3	1	1	1	0.588	12
1,1,1-Trichloroethane (methyl chloroform)		7.05E-01	a	1.10E+02	a	7.3	0.2	0.2	0.2	9.62E-02	2
1,1,2-Trichloroethane (vinyl trichloride) x		3.74E-02	a	5.01E+01	a	0.0015	0.003	0.003	0.003	9.10E-04	0.02
Trichloroethene (TCE) x		4.22E-01	a	1.66E+02	a	0.0077	0.005	0.005	0.005	2.84E-03	0.06
Trichlorofluoromethane (CFC-11)		4.00E+00	d	1.20E+02	d	11	NL	11	11	8.65	NL
1,2,3-Trichloropropane x		1.70E-02	d	7.00E+01	d	1.2E-05	NL	1.2E-05	1.2E-05	4.10E-06	NL
Trichlorotrifluoroethane (Freon 113)		2.00E+01	d	3.80E+02	d	1100	NL	1100	1100	2963	NL
Vinyl acetate		2.10E-02	a	5.25E+00	a	37	NL	37	37	7.86	170
Vinyl chloride (chloroethene) x		1.11E+00	a	1.86E+01	a	4.50E-05	0.002	0.002	0.002	6.67E-04	0.01
m-Xylene		3.01E-01	a	4.07E+02	a	73	10	10	10	10.4	210
o-Xylene		2.13E-01	a	3.63E+02	a	73	10	10	10	9.44	190
p-Xylene		3.14E-01	a	3.89E+02	a	NL	10	10	10	10.1	200
Xylene (total)		2.48E-01	g	2.40E+02	g	73	10	10	10	7.01	NL
Semivolatile Organic Compounds											
Acenaphthene		6.36E-03	a	7.08E+03	a	2.2	NL	2.2	2.2	31.6	570
Acenaphthylene		4.50E-03	d	3.10E+03	d	0.73	NL	0.73	0.73	4.67	NL
Acetophenone		4.50E-04	d	4.10E+01	d	3.7	NL	3.7	3.7	1.04	NL
4-Aminobiphenyl		NDA		NDA		NL	NL	NA	NA	NA	NL
Aniline (benzeneamine) x		7.80E-05	d	9.00E+00	d	0.015	NL	0.015	0.015	3.27E-03	NL

Appendix C - Table 1
Calculation of Soil to Groundwater Soil Screening Levels
Charleston Naval Complex, Zone H, SWMUs 17 and 196
Charleston, South Carolina

Site-Specific Parameters:		Chemical-Specific Variables						Partitioning Method			
Fraction Organic Carbon (--) :	0.002										
Dilution Factor [DF] (--) :	1	Dimension-		Organic						Calculated	
Dry Soil Bulk Density (kg/L) :	1.5	less		Carbon		Water				Soil to GW	USEPA
Water-filled Soil Porosity (--) :	0.3	Henry's		Water		Health-		Acceptable	Target	SSL -	Generic
Air-filled Soil Porosity (--) :	0.13	Law		Part.		based		GW	Leachate	Partition	Soil to GW
Soil Porosity (--) :	0.43	Constant		Coeff.		Limit	MCL/	Conc.	Conc.	Method	SSL
		[H']		[Koc]		[HBL]	MCLG				[DF=20]
		(--)		(L/kg)		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/kg)	(mg/kg)
Anthracene (paranaphthalene)		2.67E-03	a	2.95E+04	a	11	NL	11	11	651	12000
Azobenzene x		2.04E-04	e	2.69E+03	e	0.00077	NL	0.00077	0.00077	4.30E-03	NL
Benzidine x		1.60E-09	d	4.30E+01	d	3.7E-07	NL	3.7E-07	3.7E-07	1.06E-07	NL
Benzoic acid (benzoate)		6.31E-05	a	6.00E-01	a	150	NL	150	150	30.2	400
Benzo(g,h,i)perylene		5.70E-06	d	3.90E+06	d	0.73	NL	0.73	0.73	5694	NL
Benzo(a)pyrene equivalents (BEQs) x		NA		NA		1.2E-05	0.0002	0.0002	0.0002	NA	NL
Benzo(a)anthracene x		1.37E-04	a	3.98E+05	a	0.00012	NL	0.00012	0.00012	9.55E-02	2
Benzo(a)pyrene x		4.63E-05	a	1.02E+06	a	1.2E-05	0.0002	0.0002	0.0002	0.408	8
Benzo(b)fluoranthene x		4.55E-03	a	1.23E+06	a	0.00012	NL	0.00012	0.00012	0.295	5
Benzo(k)fluoranthene x		3.40E-05	a	1.23E+06	a	0.0012	NL	0.0012	0.0012	2.95	49
Chrysene x		3.88E-03	a	3.98E+05	a	0.012	NL	0.012	0.012	9.55	160
Dibenzo(a,h)anthracene x		6.03E-07	a	3.80E+06	a	1.2E-05	NL	1.2E-05	1.2E-05	9.12E-02	2
Indeno(1,2,3-cd)pyrene x		6.56E-05	a	3.47E+06	a	0.00012	NL	0.00012	0.00012	0.833	14
Benzyl alcohol		1.60E-05	g	1.30E+01	d	11	NL	11	11	2.49	NL
4-Bromophenyl phenyl ether		4.90E-03	d	8.00E+04	d	NL	NL	2.1	2.1	336	NL
Butylbenzylphthalate		5.17E-05	a	5.75E+04	a	7.3	NL	7.3	7.3	841	930
Carbazole x		6.26E-07	a	3.39E+03	a	0.0043	NL	0.0043	0.0043	3.00E-02	0.6
4-Chloroaniline		1.36E-05	a	6.61E+01	a	0.15	NL	0.15	0.15	4.98E-02	0.7
Chlorobenzilate x		3.70E-06	g	2.00E+04	d	0.00032	NL	0.00032	0.00032	1.29E-02	NL
bis(2-Chloroethyl)ether x		7.38E-04	a	1.55E+01	a	7.7E-05	NL	7.7E-05	7.7E-05	1.78E-05	0.0004
4-Chloro-3-methylphenol		1.60E-05	d	1.10E+03	d	NL	NL	0.03	0.03	7.20E-02	NL
2-Chlorophenol (2-hydroxychlorobenzene)		1.60E-02	a	3.88E+02	a	0.18	NL	0.18	0.18	0.176	4
Dibenz(a,j)acridine		NDA		NDA		NL	NL	NA	NA	NA	NL
Dibenzofuran		5.30E-04	d	1.40E+04	d	NL	NL	0.024	0.024	0.677	NL
Di-n-butylphthalate		3.85E-08	a	3.39E+04	a	3.7	NL	3.7	3.7	252	2300
1,2-Dichlorobenzene (o-)		7.79E-02	a	6.17E+02	a	3.3	0.6	0.6	0.6	0.864	17
1,3-Dichlorobenzene (m-)		1.30E-01	d	7.00E+02	d	NL	NL	0.0055	0.0055	8.86E-03	NL
1,4-Dichlorobenzene (p-) x		9.96E-02	a	6.17E+02	a	0.0035	0.075	0.075	0.075	0.108	2
3,3'-Dichlorobenzidine (o,o-) x		1.64E-07	a	7.24E+02	a	0.00019	NL	0.00019	0.00019	3.13E-04	0.007
2,4-Dichlorophenol (4,6-dichlorophenol)		1.30E-04	a	1.47E+02	a	0.11	NL	0.11	0.11	5.43E-02	1
Diethylphthalate		1.85E-05	a	2.88E+02	a	29	NL	29	29	22.5	470
7,12-Dimethylbenz(a)anthracene		1.30E-06	d	3.20E+06	d	NL	NL	NA	NA	NA	NL
2,4-Dimethylphenol		8.20E-05	a	2.09E+02	a	0.73	NL	0.73	0.73	0.451	9
Dimethylphthalate		4.50E-06	d	3.50E+01	d	370	NL	370	370	99.9	NL
2,4-Dinitrophenol		1.82E-05	a	1.02E-02	b	0.073	NL	0.073	0.073	1.46E-02	0.3
2,4-Dinitrotoluene		3.80E-06	a	9.55E+01	a	NL	NL	NA	NA	NA	0.0008
2,4-Dinitrotoluene in dinitrotoluene mix		3.80E-06	a	9.55E+01	a	0.00013	NL	0.00013	0.00013	5.08E-05	0.0008
2,6-Dinitrotoluene		3.06E-05	a	6.92E+01	a	NL	NL	NA	NA	NA	0.0007
2,6-Dinitrotoluene in dinitrotoluene mix		3.06E-05	a	6.92E+01	a	0.00013	NL	0.00013	0.00013	4.40E-05	0.0007
Di-n-octylphthalate		2.74E-03	a	8.32E+07	a	0.73	NL	0.73	0.73	121472	10000
Diphenylamine		2.10E-05	d	2.70E+03	d	0.91	NL	0.91	0.91	5.10	NL
bis(2-Ethylhexyl)phthalate (BEHP) x		4.18E-06	a	1.51E+07	a	0.0061	0.006	0.006	0.006	181	3600
Ethyl methacrylate		3.40E-02	d	3.70E+01	d	3.3	NL	3.3	3.3	0.914	NL
Fluoranthene		6.60E-04	a	1.07E+05	a	1.5	NL	1.5	1.5	321	4300
Fluorene		2.61E-03	a	1.38E+04	a	1.5	NL	1.5	1.5	41.7	560
Hexachlorobenzene (perchlorobenzene) x		5.41E-02	a	5.50E+04	a	5.3E-05	0.001	0.001	0.001	0.110	2
Hexachlorobutadiene (perchlorobutadiene) x		3.34E-01	a	5.37E+04	a	0.0011	0.001	0.001	0.001	0.108	2
Hexachlorocyclopentadiene		1.11E+00	a	2.00E+05	a	0.26	0.05	0.05	0.05	20.0	400
Hexachloroethane (perchloroethane) x		1.59E-01	a	1.78E+03	a	0.0061	NL	0.0061	0.0061	2.30E-02	0.5
Isodrin		NDA		NDA		NL	NL	NA	NA	NA	NL
Isophorone x		2.72E-04	a	4.68E+01	a	0.09	NL	0.09	0.09	2.64E-02	0.5
Methapyrilene		NDA		NDA		NL	NL	NA	NA	NA	NL
1-Methylnaphthalene		1.62E-02	g	2.29E+03	g	NL	NL	1.500	1.5	7.17	NL
2-Methylnaphthalene		2.10E-02	d	7.50E+03	d	NL	NL	0.120	0.12	1.82	NL
2-Methylphenol (o-cresol)		4.92E-05	a	9.12E+01	a	1.8	NL	1.8	1.8	0.688	15
3-Methylphenol (m-cresol)		3.50E-05	d	8.50E+01	d	1.8	NL	1.8	1.8	0.666	NL
4-Methylphenol (p-cresol)		3.20E-05	d	8.50E+01	d	0.18	NL	0.18	0.18	0.067	NL

Appendix C - Table 1
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Charleston Naval Complex, Zone H, SWMUs 17 and 196
Charleston, South Carolina

Site-Specific Parameters:		Chemical-Specific Variables						Partitioning Method			
Fraction Organic Carbon (--) :	0.002										
Dilution Factor [DF] (--) :	1	Dimension-		Organic						Calculated	
Dry Soil Bulk Density (kg/L) :	1.5	less		Carbon		Water				Soil to GW	USEPA
Water-filled Soil Porosity (--) :	0.3	Henry's		Water		Health-		Acceptable	Target	SSL -	Generic
Air-filled Soil Porosity (--) :	0.13	Law		Part.		based		GW	Leachate	Partition	Soil to GW
Soil Porosity (--) :	0.43	Constant		Coeff.		Limit	MCL/	Conc.	Conc.	Method	SSL
		[H']		[Koc]		[HBL]	MCLG				[DF=20]
		(--)		(L/kg)		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/kg)	(mg/kg)
Naphthalene		1.98E-02	a	2.00E+03	a	0.73	NL	0.73	0.73	3.07	84
3-Nitroaniline		5.70E-06	d	2.20E+01	d	NL	NL	0.110	0.11	2.68E-02	NL
Nitrobenzene		9.84E-04	a	6.46E+01	a	0.018	NL	0.018	0.018	5.93E-03	0.1
4-Nitrophenol		1.70E-08	d	4.90E+01	d	NL	NL	0.290	0.29	8.64E-02	NL
N-Nitrosodimethylamine x		4.90E-05	d	2.80E-01	d	1.7E-06	NL	1.7E-06	1.7E-06	3.41E-07	NL
N-Nitrosodiphenylamine x		2.05E-04	a	1.29E+03	a	0.017	NL	0.017	0.017	4.73E-02	1
N-Nitroso-di-n-propylamine x		9.23E-05	a	2.40E+01	a	1.2E-05	NL	1.2E-05	1.2E-05	2.98E-06	5E-05
N-Nitroso-methylethylamine x		3.65E-05	g	7.50E-01	d	3.9E-06	NL	3.9E-06	3.9E-06	7.86E-07	NL
Pentachlorophenol x		1.00E-06	a	5.92E+02	a	0.00071	0.001	0.001	0.001	1.38E-03	0.03
Phenanthrene		9.40E-04	d	3.00E+04	d	1.1	NL	1.1	1.1	66.2	NL
Phenol (phenyl alcohol)		1.63E-05	a	2.88E+01	a	22	NL	22	22	5.67	100
Pyrene		4.51E-04	a	1.05E+05	a	1.1	NL	1.1	1.1	231	4200
Safrole		7.80E-04	d	4.10E+02	d	NL	NL	NA	NA	NA	NL
1,2,4,5-Tetrachlorobenzene		1.10E-01	d	5.50E+03	d	0.011	NL	0.011	0.011	0.123	NL
2,3,4,6-Tetrachlorophenol		1.80E-04	d	2.80E+02	b	1.1	NL	1.1	1.1	0.836	NL
1,2,4-Trichlorobenzene		5.82E-02	a	1.78E+03	a	0.37	0.07	0.07	0.07	0.264	5
2,4,5-Trichlorophenol (TCP)		1.78E-04	a	1.60E+03	a	3.7	NL	3.7	3.7	12.6	270
2,4,6-Trichlorophenol x		3.19E-04	a	3.81E+02	a	0.0077	NL	0.0077	0.0077	7.41E-03	0.2
Pesticide/PCB Compounds											
Aldrin x		6.97E-03	a	2.45E+06	a	5.0E-06	NL	5E-06	5E-06	2.45E-02	0.5
Aroclor-1016 x		1.10E-01	d	3.09E+05	a	0.00021	0.0005	0.0005	0.0005	0.309	1y
Aroclor-1248 x		1.10E-01	d	3.09E+05	a	0.00021	0.0005	0.0005	0.0005	0.309	1y
Aroclor-1254 x		1.10E-01	d	3.09E+05	a	0.00021	0.0005	0.0005	0.0005	0.309	1y
Aroclor-1260 x		1.10E-01	d	3.09E+05	a	0.00021	0.0005	0.0005	0.0005	0.309	1y
alpha-BHC (alpha-HCH) x		4.35E-04	a	1.23E+03	a	1.4E-05	NL	1.4E-05	1.4E-05	3.72E-05	0.0005
beta-BHC (beta-HCH) x		3.05E-05	a	1.26E+03	a	4.7E-05	NL	4.7E-05	4.7E-05	1.28E-04	0.003
delta-BHC (delta-HCH) x		1.80E-05	d	2.30E+03	d	4.7E-05	NL	4.7E-05	4.7E-05	2.26E-04	NL
gamma-BHC (Lindane) x		5.74E-04	a	1.07E+03	a	6.6E-05	0.0002	0.0002	0.0002	4.68E-04	0.009
Chlordane x		1.99E-03	a	1.20E+05	a	0.00024	0.002	0.002	0.002	0.480	10
alpha-Chlordane (cis-chlordane) x		1.99E-03	S	7.00E+04	d	0.00024	0.002	0.002	0.002	0.280	10
gamma-Chlordane (trans-chlordane) x		1.99E-03	S	1.40E+05	d	0.00024	0.002	0.002	0.002	0.560	10
4,4'-DDD x		1.64E-04	a	1.00E+06	a	0.00035	NL	0.00035	0.00035	0.700	16
4,4'-DDE x		8.61E-04	a	4.47E+06	a	0.00025	NL	0.00025	0.00025	2.24	54
4,4'-DDT x		3.32E-04	a	2.63E+06	a	0.00025	NL	0.00025	0.00025	1.32	32
Dieldrin (aldrin epoxide) x		6.19E-04	a	2.14E+04	a	5.3E-06	NL	5.3E-06	5.3E-06	2.28E-04	0.004
Dinoseb		1.90E-05	d	1.90E+01	d	0.037	0.007	0.007	0.007	1.67E-03	NL
Endosulfan I		4.59E-04	a	2.14E+03	a	0.22	NL	0.22	0.22	0.986	18
Endosulfan II		4.59E-04	a	2.14E+03	a	0.22	NL	0.22	0.22	0.986	18
Endosulfan sulfate		8.60E-02	d	9.50E+02	d	0.22	NL	0.22	0.22	0.464	NL
Endrin		3.08E-04	a	1.23E+04	a	0.011	0.002	0.002	0.002	4.96E-02	1
Endrin aldehyde		1.58E-05	f	8.50E+03	d	0.011	0.002	0.002	0.002	3.44E-02	NL
Endrin ketone		NDA		8.50E+03	S	0.011	0.002	0.002	0.002	3.44E-02	NL
Heptachlor x		6.07E+01	a	1.41E+06	a	1.9E-05	0.0004	0.0004	0.0004	1.13	23
Heptachlor epoxide x		3.90E-04	a	8.32E+04	a	9.4E-06	0.0002	0.0002	0.0002	3.33E-02	0.7
Kepone x		1.00E-06	d	1.60E+05	d	NL	NL	3.7E-06	3.7E-06	1.18E-03	NL
Methoxychlor		6.48E-04	a	9.77E+04	a	0.18	0.04	0.04	0.04	7.82	160
Toxaphene x		2.46E-04	a	2.57E+05	a	7.7E-05	0.003	0.003	0.003	1.54	31
Organophosphate Pesticides											
Dimethoate		2.50E-09	d	4.80E+00	d	0.0073	NL	0.0073	0.0073	1.53E-03	NL
Disulfoton		1.60E-04	d	8.00E+03	d	0.0015	NL	0.0015	0.0015	2.43E-02	NL
Famphur		NDA		NDA		NL	NL	NA	NA	NA	NL
Methyl parathion		4.10E-06	d	7.00E+02	d	0.0091	NL	0.0091	0.0091	1.46E-02	NL
Parathion (ethyl parathion)		2.30E-05	d	6.00E+03	d	0.22	NL	0.22	0.22	2.68	NL
Phorate		4.92E-04	g	5.50E+03	d	0.0073	NL	0.0073	0.0073	8.18E-02	NL
Sulfotep (tetraethyldithiopyrophosphate)		2.95E-07	e	7.41E+02	g	0.018	NL	0.018	0.018	3.03E-02	NL

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Site-Specific Parameters:		Chemical-Specific Variables						Partitioning Method			
Fraction Organic Carbon (–) :	0.002										
Dilution Factor [DF] (–) :	1	Dimension-		Organic						Calculated	
Dry Soil Bulk Density (kg/L) :	1.5	less		Carbon		Water				Soil to GW	USEPA
Water-filled Soil Porosity (–) :	0.3	Henry's		Water		Health-		Acceptable	Target	SSL -	Generic
Air-filled Soil Porosity (–) :	0.13	Law		Part.		based		GW	Leachate	Partition	Soil to GW
Soil Porosity (–) :	0.43	Constant		Coeff.		Limit	MCL/	Conc.	Conc.	Method	SSL
		[H']		[Koc]		[HBL]	MCLG				[DF=20]
		(–)		(L/kg)		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/kg)	(mg/kg)
Herbicides											
2,4-D (2,4-dichlorophenoxyacetic acid)		4.10E-07	d	1.70E+02	d	0.37	0.07	0.07	0.07	3.78E-02	NL
2,4-DB (4-(2,4-dichlorophenoxy)butyric acid)		9.00E-07	d	3.00E+03	d	0.29	NL	0.29	0.29	1.80	NL
2,4,5-T (2,4,5-trichlorophenoxyacetic acid)		3.60E-07	d	3.40E+01	d	0.37	NL	0.37	0.37	9.92E-02	NL
2,4,5-TP (Silvex)		3.20E-09	d	5.50E+03	d	0.29	0.05	0.05	0.05	0.560	NL
Dioxin Compounds											
2378-TCDD Equivalents (TEQs) x		NA		NA		5.7E-10	NL	5.7E-10	5.7E-10	NA	NL
2378-TCDD x		3.2E-03	d	2.7E+06	d	5.7E-10	3E-08	3E-08	3E-08	1.62E-04	NL
12378-PeCDD x		1.1E-04	g	3.4E+06	d	1.1E-09	NL	1.1E-09	1.1E-09	7.48E-06	NL
123478-HxCDD x		1.8E-03	g	4.6E+07	d	5.7E-09	NL	5.7E-09	5.7E-09	5.24E-04	NL
123678-HxCDD x		1.8E-03	S	4.6E+07	S	5.7E-09	NL	5.7E-09	5.7E-09	5.24E-04	NL
123789-HxCDD x		1.8E-03	S	4.6E+07	S	5.7E-09	NL	5.7E-09	5.7E-09	5.24E-04	NL
1234678-HpCDD x		3.1E-04	g	1.2E+08	d	5.7E-08	NL	5.7E-08	5.7E-08	1.37E-02	NL
OCDD x		2.8E-04	g	1.2E+07	g	5.7E-07	NL	5.7E-07	5.7E-07	1.37E-02	NL
2378-TCDF x		6.1E-04	g	2.7E+06	d	5.7E-09	NL	5.7E-09	5.7E-09	3.08E-05	NL
12378-PeCDF x		2.1E-04	g	4.3E+06	d	1.1E-08	NL	1.1E-08	1.1E-08	9.46E-05	NL
23478-PeCDF x		2.4E-04	g	6.5E+06	d	1.1E-09	NL	1.1E-09	1.1E-09	1.43E-05	NL
123478-HxCDF x		5.9E-04	g	2.4E+09	d	5.7E-09	NL	5.7E-09	5.7E-09	2.74E-02	NL
123678-HxCDF x		2.5E-04	g	2.4E+09	S	5.7E-09	NL	5.7E-09	5.7E-09	2.74E-02	NL
234678-HxCDF x		3.1E-04	g	2.4E+09	S	5.7E-09	NL	5.7E-09	5.7E-09	2.74E-02	NL
123789-HxCDF x		2.5E-04	S	2.4E+09	S	5.7E-09	NL	5.7E-09	5.7E-09	2.74E-02	NL
1234678-HpCDF x		6.2E-03	g	6.0E+07	d	5.7E-08	NL	5.7E-08	5.7E-08	6.84E-03	NL
1234789-HpCDF x		1.7E-03	g	2.3E+06	g	5.7E-08	NL	5.7E-08	5.7E-08	2.67E-04	NL
OCDF x		7.8E-05	g	5.6E+06	g	5.7E-07	NL	5.7E-07	5.7E-07	6.41E-03	NL
Hydrazine											
Hydrazine (diamine) x		7.09E-08	g	9.00E-03	d	2.8E-05	NL	2.8E-05	2.8E-05	5.60E-06	NL
Explosives											
Tetryl (trinitrophenylmethylnitramine)		8.20E-11	g	2.34E+02	g	0.37	NL	0.37	0.37	0.247	NL
Organotin											
Dibutyltin		NDA		NDA		0.011	NL	0.011	0.011	NA	NL
Monobutyltin		NDA		NDA		0.011	NL	0.011	0.011	NA	NL
Tetrabutyltin		NDA		NDA		0.011	NL	0.011	0.011	NA	NL
Tributyltin		NDA		NDA		0.011	NL	0.011	0.011	NA	NL
Inorganics				*Kd (6.8 pH)*							
Aluminum		NA		1.50E+03	d	NL	NL	37	37	55507	NL
Antimony		NA		4.50E+01	c	0.015	0.006	0.006	0.006	0.271	5
Arsenic x		NA		2.90E+01	c	5.7E-05	0.05	0.05	0.05	1.46	29
Barium		NA		4.10E+01	c	2.6	2	2	2	82.4	1600
Beryllium		NA		7.90E+02	c	NL	0.004	0.004	0.004	3.16	63
Cadmium		NA		7.50E+01	c	0.018	0.005	0.005	0.005	0.376	8
Chromium (total)		NA		1.90E+01	c	0.11	0.1	0.1	0.1	1.92	38
Chromium (trivalent)		NA		1.80E+06	c	55	NL	55	55	99000011	NL
Chromium (hexavalent)		NA		1.90E+01	c	0.11	0.1	0.1	0.1	1.92	38
Cobalt		NA		4.50E+01	d	NL	NL	2.2	2.2	99.4	NL
Copper		NA		4.30E+02	d	NL	1.3	1.3	1.3	559	NL
Cyanide		NA		9.90E+00	c	0.73	0.2	0.2	0.2	2.02	40
Iron		NA		2.50E+01	d	NL	NL	11	11	277	NL
Lead		NA		9.00E+02	d	NL	0.015	0.015	0.015	400z	400z
Manganese		NA		6.50E+01	d	1.7	NL	1.7	1.7	111	NL
Mercury		4.67E-01	a	5.20E+01	c	0.011	0.002	0.002	0.002	0.104	2
Nickel		NA		6.50E+01	c	0.73	0.1	0.1	0.1	6.52	130

Appendix C - Table 1
Calculation of Soil to Groundwater Soil Screening Levels
Charleston Naval Complex, Zone H, SWMUs 17 and 196
Charleston, South Carolina

Site-Specific Parameters:		Chemical-Specific Variables					Partitioning Method			
Fraction Organic Carbon (--) :	0.002									
Dilution Factor [DF] (--) :	1	Dimension-	Organic						Calculated	
Dry Soil Bulk Density (kg/L) :	1.5	less	Carbon	Water					Soil to GW	USEPA
Water-filled Soil Porosity (--) :	0.3	Henry's	Water	Health-			Acceptable	Target	SSL -	Generic
Air-filled Soil Porosity (--) :	0.13	Law	Part.	based			GW	Leachate	Partition	Soil to GW
Soil Porosity (--) :	0.43	Constant	Coeff.	Limit	MCL/		Conc.	Conc.	Method	SSL
		[H']	[Koc]	[HBL]	MCLG					[DF=20]
		(--)	(L/kg)	(mg/L)	(mg/L)		(mg/L)	(mg/L)	(mg/kg)	(mg/kg)
Selenium		NA	5.00E+00	c	0.18	0.05	0.05	0.05	0.260	5
Silver		NA	8.30E+00	c	0.18	NL	0.18	0.18	1.53	34
Thallium		NA	7.10E+01	c	0.0029	0.0005	0.0005	0.0005	3.56E-02	0.7
Tin		NA	2.50E+02	h	22	NL	22	22	5504	NL
Vanadium		NA	1.00E+03	c	0.26	NL	0.26	0.26	260	6000
Zinc		NA	6.20E+01	c	11	NL	11	11	684	12000

Notes:

Water Health-based Limit - Preliminary Remediation Goal based on the ingestion pathway, residential scenario; obtained from Oak Ridge National Laboratory Risk Assessment Information System (RAIS) website

MCL/MCLG - From USEPA Drinking Water Regulations and Health Advisories, October 1996

Acceptable GW Concentration - MCL/MCLG if available, otherwise Water Health-based Limit; if neither available, then tap water risk-based concentration from April 1999 Region 3 RBC Table

Target Leachate Concentration - Acceptable Groundwater Concentration multiplied by Dilution Factor

USEPA Generic Soil to GW SSL - From USEPA Soil Screening Guidance, Technical Background Document (1996), Appendix A, Table A-1

Sources of H' and Koc values:

a = 1996 Soil Screening Guidance: User's Guide, Table C-1
b = 1996 Soil Screening Guidance: User's Guide, Table C-2
c = 1996 Soil Screening Guidance: User's Guide, Table C-4
d = Superfund Chemical Data Matrix (SCDM) - User Version, September 1997
e = Oak Ridge National Laboratory Risk Assessment Information System (RAIS) website
f = Knox, Sabatini, and Canter (1993); Subsurface Transport and Fate Processes
g = Texas Natural Resources Conservation Commission (TNRCC) Risk Reduction Program Concept Document 2, Vol. 1; Appendix VII, Chemical/Physical Properties Table
h = TERRA model (Baes, et al., Oak Ridge National Laboratory, 1984)
S = Surrogate

x - Carcinogen
y - USEPA SSL is a preliminary remediation goal of 1 mg/kg based on separate 1990 guidance for PCBs
z - USEPA SSL of 400 mg/kg based on separate 1994 guidance for lead
GW - Groundwater
SSL - Soil screening level

NA - Not applicable
ND - Not detected
NDA - No data available
NL - Not listed
NS - Not sampled

Appendix C - Table 2
Calculation of Sediment to Surface Water Screening Levels
Charleston Naval Complex, Zone H, SWMU 196
Charleston, South Carolina

Site-Specific Parameters:		Chemical-Specific Variables						Partitioning Method			
Fraction Organic Carbon (--) :	0.0254										
Dilution Factor [DF] (--) :	3.30	Dimension-		Organic						Calculated	Calculated
Dry Soil Bulk Density (kg/L) :	0.88	less		Carbon		Water				Sed to SW	Site-specific
Water-filled Soil Porosity (--) :	0.3	Henry's		Water		Health-		Acceptable	Target	SSL -	Sed to SW
Air-filled Soil Porosity (--) :	0.355	Law		Part.		based	Saltwater	GW	Leachate	Partition	SSL -
Soil Porosity (--) :	0.655	Constant		Coeff.		Limit	Surf. Wtr.	Conc.	Conc.	Method	Partition
		[H']		[Koc]		[HBL]	Chronic			[DAF=1]	Method
		(--)		(L/kg)		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/kg)	(mg/kg)
Volatile Organic Compounds											
Acetone (2-propanone)		1.59E-03	a	5.75E-01	a	3.7	NA	3.7	12.2	1.32E+00	4.34E+00
Acetonitrile (methyl cyanide)		1.40E-03	d	4.70E-01	d	NL	NA	0.12	0.40	4.23E-02	1.40E-01
Acrolein (propenal)		4.90E-03	d	1.00E+00	d	0.73	0.00055	0.00055	1.8E-03	2.01E-04	6.65E-04
Acrylonitrile (vinyl cyanide) x		4.10E-03	d	1.80E+00	d	0.00016	NA	0.00016	5.3E-04	6.19E-05	2.04E-04
Benzene (coal naphtha) x		2.28E-01	a	5.89E+01	a	0.0029	0.109	0.109	0.36	2.00E-01	6.61E-01
Bromodichloromethane x		6.56E-02	a	5.50E+01	a	0.0014	NA	0.0014	4.6E-03	2.43E-03	8.03E-03
Bromoform (tribromomethane) x		2.19E-02	a	8.71E+01	a	0.011	0.64	0.64	2.112	1.63E+00	5.39E+00
Bromomethane (methylbromide)		2.50E-01	d	1.10E+01	d	0.051	0.12	0.12	0.396	7.44E-02	2.46E-01
2-Butanone (methyl ethyl ketone; MEK)		2.30E-03	d	1.91E+00	d	22	NA	22	72.6	8.57E+00	2.83E+01
Carbon disulfide		1.24E+00	a	4.57E+01	a	3.7	NA	3.7	12.2	5.56E+00	1.83E+01
Carbon tetrachloride (tetrachloromethane) x		1.25E+00	a	1.74E+02	a	0.00066	1.5	1.5	4.95	7.14E+00	2.36E+01
Chlorobenzene (monochlorobenzene)		1.52E-01	a	2.19E+02	a	0.73	0.105	0.105	0.35	6.20E-01	2.05E+00
Chloroethane (ethyl chloride) x		3.60E-01	d	1.60E+01	d	NL	NA	0.0036	1.2E-02	2.69E-03	8.88E-03
2-Chloroethyl vinyl ether		1.00E-02	f	6.60E+00	f	NL	NA	0.15	0.49	7.63E-02	2.52E-01
Chloroform (trichloromethane) x		1.50E-01	a	3.98E+01	a	0.014	0.815	0.815	2.69	1.10E+00	3.64E+00
Chloromethane (methyl chloride) x		3.60E-01	d	6.50E+00	d	0.0066	2.7	2.7	8.91	1.37E+00	4.51E+00
Dibromochloromethane x		3.21E-02	a	6.31E+01	a	0.001	NA	0.001	3.3E-03	1.94E-03	6.41E-03
Dichlorodifluoromethane (Freon 12)		1.40E+01	d	6.00E+01	d	7.3	NA	7.3	24.1	1.36E+01	4.49E+01
1,1-Dichloroethane		2.30E-01	a	3.16E+01	a	3.7	NA	3.7	12.2	4.23E+00	1.40E+01
1,2-Dichloroethane (ethylene chloride; EDC) x		4.01E-02	a	1.74E+01	a	0.00094	1.13	1.13	3.73	8.85E-01	2.92E+00
1,1-Dichloroethene x		1.07E+00	a	5.89E+01	a	0.00014	2.24	2.24	7.39	4.11E+00	1.36E+01
cis-1,2-Dichloroethene		1.67E-01	a	3.55E+01	a	0.37	NA	0.37	1.22	4.60E-01	1.52E+00
trans-1,2-Dichloroethene		3.85E-01	a	5.25E+01	a	0.73	NA	0.73	2.41	1.22E+00	4.03E+00
1,2-Dichloroethene (total)		NDA		2.87E+00	e	0.33	NA	0.33	1.09	1.37E-01	4.51E-01
1,2-Dichloropropane (propylene chloride) x		1.15E-01	a	4.37E+01	a	0.0013	2.4	2.4	7.92	3.48E+00	1.15E+01
1,3-Dichloropropene x		7.26E-01	a	4.57E+01	a	0.00047	0.0079	0.0079	2.6E-02	1.19E-02	3.91E-02
Ethylbenzene (phenylethane)		3.23E-01	a	3.63E+02	a	3.7	0.0043	0.0043	1.4E-02	4.11E-02	1.36E-01
2-Hexanone (methyl butyl ketone; MBK)		7.18E-02	f	2.40E+01	d	NL	NA	1.5	4.95	1.43E+00	4.71E+00
4-Methyl-2-pentanone (MIBK)		5.70E-03	d	1.50E+01	d	2.9	NA	2.9	9.57	2.09E+00	6.91E+00
Methylene chloride (dichloromethane) x		8.98E-02	a	1.17E+01	a	0.011	2.56	2.56	8.45	1.63E+00	5.39E+00
Propionitrile (ethyl cyanide)		NDA		NDA		NL	NA	NA	NA	NA	NA
Styrene (vinylbenzene)		1.13E-01	a	7.76E+02	a	7.3	NA	7.3	24.1	1.46E+02	4.83E+02
1,1,2,2-Tetrachloroethane x		1.41E-02	a	9.33E+01	a	0.00043	0.0902	0.0902	0.30	2.45E-01	8.07E-01
Tetrachloroethene (PCE) x		7.54E-01	a	1.55E+02	a	0.0016	0.045	0.045	0.15	1.93E-01	6.35E-01
Tetrahydrofuran		9.80E-03	d	2.90E+00	d	NL	NA	0.0088	2.9E-02	3.65E-03	1.20E-02
Toluene (methyl benzene)		2.72E-01	a	1.82E+02	a	7.3	0.037	0.037	0.12	1.84E-01	6.06E-01
1,1,1-Trichloroethane (methyl chloroform)		7.05E-01	a	1.10E+02	a	7.3	0.312	0.312	1.03	9.78E-01	3.23E+00
1,1,2-Trichloroethane (vinyl trichloride) x		3.74E-02	a	5.01E+01	a	0.0015	NA	0.0015	5.0E-03	2.42E-03	7.99E-03
Trichloroethene (TCE) x		4.22E-01	a	1.66E+02	a	0.0077	NA	0.0077	2.5E-02	3.51E-02	1.16E-01
Trichlorofluoromethane (CFC-11)		4.00E+00	d	1.20E+02	d	11	NA	11	36.3	3.73E+01	1.23E+02
1,2,3-Trichloropropane x		1.70E-02	d	7.00E+01	d	1.2E-05	NA	1.2E-05	4.0E-05	2.54E-05	8.39E-05
Trichlorotrifluoroethane (Freon 113)		2.00E+01	d	3.80E+02	d	1100	NA	1100	3630	1.10E+04	3.63E+04
Vinyl acetate		2.10E-02	a	5.25E+00	a	37	NA	37	122	1.75E+01	5.79E+01
Vinyl chloride (chloroethene) x		1.11E+00	a	1.86E+01	a	4.5E-05	NA	4.5E-05	1.5E-04	3.66E-05	1.21E-04
m-Xylene		3.01E-01	a	4.07E+02	a	73	NA	73	241	7.80E+02	2.57E+03
o-Xylene		2.13E-01	a	3.63E+02	a	73	NA	73	241	6.98E+02	2.30E+03
p-Xylene		3.14E-01	a	3.89E+02	a	NL	NA	NL	0	NA	NA
Xylene (total)		2.48E-01	g	2.40E+02	g	73	NA	73	241	4.70E+02	1.55E+03
Semivolatile Organic Compounds											
Acenaphthene		6.36E-03	a	7.08E+03	a	2.2	0.0097	0.0097	0.03	1.75E+00	5.77E+00
Acenaphthylene		4.50E-03	d	3.10E+03	d	0.73	NA	0.73	2.41	5.77E+01	1.91E+02
Acetophenone		4.50E-04	d	4.10E+01	d	3.7	NA	3.7	12.2	5.11E+00	1.69E+01
4-Aminobiphenyl		NDA		NDA		NL	NA	NA	NA	NA	0.00E+00
Aniline (benzeneamine) x		7.80E-05	d	9.00E+00	d	0.015	NA	0.015	5.0E-02	8.54E-03	2.82E-02
Anthracene (paranaphthalene)		2.67E-03	a	2.95E+04	a	11	NA	11	36.3	8.25E+03	2.72E+04
Azobenzene x		2.04E-04	e	2.69E+03	e	0.00077	NA	0.00077	2.5E-03	5.29E-02	1.75E-01
Benzidine x		1.60E-09	d	4.30E+01	d	3.7E-07	NA	3.7E-07	1.2E-06	5.30E-07	1.75E-06

Appendix C - Table 2
Calculation of Sediment to Surface Water Screening Levels
Charleston Naval Complex, Zone H, SWMU 196
Charleston, South Carolina

Site-Specific Parameters:		Chemical-Specific Variables						Partitioning Method			
Fraction Organic Carbon (--) :	0.0254										
Dilution Factor [DF] (--) :	3.30	Dimension-		Organic						Calculated	Calculated
Dry Soil Bulk Density (kg/L) :	0.88	less		Carbon		Water				Sed to SW	Site-specific
Water-filled Soil Porosity (--) :	0.3	Henry's		Water		Health-		Acceptable	Target	SSL -	Sed to SW
Air-filled Soil Porosity (--) :	0.355	Law		Part.		based	Saltwater	GW	Leachate	Partition	SSL -
Soil Porosity (--) :	0.655	Constant		Coeff.		Limit	Surf. Wtr.	Conc.	Conc.	Method	Partition
		[H']		[Koc]		[HBL]	Chronic			[DAF=1]	Method
		(--)		(L/kg)		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/kg)	(mg/kg)
Benzoic acid (benzoate)		6.31E-05	a	6.00E-01	a	150	NA	150	495	5.34E+01	1.76E+02
Benzo(g,h,i)perylene		5.70E-06	d	3.90E+06	d	0.73	NA	0.73	2.41	7.23E+04	2.39E+05
Benzo(a)pyrene equivalents (BEQs) x		NA		NA		1.2E-05	NA	1.2E-05	4.0E-05	NA	NA
Benzo(a)anthracene x		1.37E-04	a	3.98E+05	a	0.00012	NA	0.00012	4.0E-04	1.21E+00	4.00E+00
Benzo(a)pyrene x		4.63E-05	a	1.02E+06	a	1.2E-05	NA	1.2E-05	4.0E-05	3.11E-01	1.03E+00
Benzo(b)fluoranthene x		4.55E-03	a	1.23E+06	a	0.00012	NA	0.00012	4.0E-04	3.75E+00	1.24E+01
Benzo(k)fluoranthene x		3.40E-05	a	1.23E+06	a	0.0012	NA	0.0012	4.0E-03	3.75E+01	1.24E+02
Chrysene x		3.88E-03	a	3.98E+05	a	0.012	NA	0.012	4.0E-02	1.21E+02	4.00E+02
Dibenzo(a,h)anthracene x		6.03E-07	a	3.80E+06	a	1.2E-05	NA	1.2E-05	4.0E-05	1.16E+00	3.82E+00
Indeno(1,2,3-cd)pyrene x		6.56E-05	a	3.47E+06	a	0.00012	NA	0.00012	4.0E-04	1.06E+01	3.49E+01
Benzyl alcohol		1.60E-05	g	1.30E+01	d	11	NA	11	36.3	7.38E+00	2.44E+01
4-Bromophenyl phenyl ether		4.90E-03	d	8.00E+04	d	NL	NA	2.1	6.93	4.27E+03	1.41E+04
Butylbenzylphthalate		5.17E-05	a	5.75E+04	a	7.3	0.0294	0.0294	0.09702	4.29E+01	1.42E+02
Carbazole x		6.26E-07	a	3.39E+03	a	0.0043	NA	0.0043	1.4E-02	3.72E-01	1.23E+00
4-Chloroaniline		1.36E-05	a	6.61E+01	a	0.15	NA	0.15	0.49	3.03E-01	1.00E+00
Chlorobenzilate x		3.70E-06	g	2.00E+04	d	0.00032	NA	0.00032	1.1E-03	1.63E-01	5.37E-01
bis(2-Chloroethyl)ether x		7.38E-04	a	1.55E+01	a	7.7E-05	NA	7.7E-05	2.5E-04	5.66E-05	1.87E-04
4-Chloro-3-methylphenol		1.60E-05	d	1.10E+03	d	NL	NA	0.03	9.9E-02	8.48E-01	2.80E+00
2-Chlorophenol (2-hydroxychlorobenzene)		1.60E-02	a	3.88E+02	a	0.18	NA	0.18	0.59	1.84E+00	6.06E+00
Dibenz(a,j)acridine		NDA		NDA		NL	NA	NA	NA	NA	NA
Dibenzofuran		5.30E-04	d	1.40E+04	d	NL	NA	0.024	7.9E-02	8.54E+00	2.82E+01
Di-n-butylphthalate		3.85E-08	a	3.39E+04	a	3.7	0.0034	0.0034	1.1E-02	2.93E+00	9.66E+00
1,2-Dichlorobenzene (o-)		7.79E-02	a	6.17E+02	a	3.3	0.0197	0.0197	0.07	3.15E-01	1.04E+00
1,3-Dichlorobenzene (m-)		1.30E-01	d	7.00E+02	d	NL	0.0285	0.0285	0.09	5.16E-01	1.70E+00
1,4-Dichlorobenzene (p-) x		9.96E-02	a	6.17E+02	a	0.0035	0.0199	0.0199	0.07	3.19E-01	1.05E+00
3,3'-Dichlorobenzidine (o,o-) x		1.64E-07	a	7.24E+02	a	0.00019	NA	1.9E-04	6.3E-04	3.56E-03	1.17E-02
2,4-Dichlorophenol (4,6-dichlorophenol)		1.30E-04	a	1.47E+02	a	0.11	NA	0.11	0.36	4.48E-01	1.48E+00
Diethylphthalate		1.85E-05	a	2.88E+02	a	29	0.0759	0.0759	0.25	5.81E-01	1.92E+00
7,12-Dimethylbenz(a)anthracene		1.30E-06	d	3.20E+06	d	NL	NA	NA	NA	NA	NA
2,4-Dimethylphenol		8.20E-05	a	2.09E+02	a	0.73	NA	0.73	2.41	4.12E+00	1.36E+01
Dimethylphthalate		4.50E-06	d	3.50E+01	d	370	0.58	0.58	1.91	7.13E-01	2.35E+00
2,4-Dinitrophenol		1.82E-05	a	1.02E-02	b	0.073	0.0485	0.0485	0.16	1.65E-02	5.46E-02
2,4-Dinitrotoluene		3.80E-06	a	9.55E+01	a	NL	NA	NA	NA	NA	NA
2,4-Dinitrotoluene in dinitrotoluene mix		3.80E-06	a	9.55E+01	a	0.00013		1.3E-04	4.3E-04	3.60E-04	1.19E-03
2,6-Dinitrotoluene		3.06E-05	a	6.92E+01	a	NL	NA	NA	NA	NA	NA
2,6-Dinitrotoluene in dinitrotoluene mix		3.06E-05	a	6.92E+01	a	0.00013		1.3E-04	4.3E-04	2.73E-04	9.00E-04
Di-n-octylphthalate		2.74E-03	a	8.32E+07	a	0.73	NA	0.73	2.409	1.54E+06	5.09E+06
Diphenylamine		2.10E-05	d	2.70E+03	d	0.91	NA	0.91	3.00	6.27E+01	2.07E+02
bis(2-Ethylhexyl)phthalate (BEHP) x		4.18E-06	a	1.51E+07	a	0.0061	NA	6.1E-03	2.0E-02	2.34E+03	7.72E+03
Ethyl methacrylate		3.40E-02	d	3.70E+01	d	3.3	NA	3.3	10.89	4.23E+00	1.39E+01
Fluoranthene		6.60E-04	a	1.07E+05	a	1.5	0.0016	1.60E-03	5.28E-03	4.35E+00	1.44E+01
Fluorene		2.61E-03	a	1.38E+04	a	1.5	NA	1.5	4.95	5.26E+02	1.74E+03
Hexachlorobenzene (perchlorobenzene) x		5.41E-02	a	5.50E+04	a	5.3E-05	NA	5.3E-05	1.7E-04	7.41E-02	2.44E-01
Hexachlorobutadiene (perchlorobutadiene) x		3.34E-01	a	5.37E+04	a	0.0011	3.20E-04	3.2E-04	1.1E-03	4.37E-01	1.44E+00
Hexachlorocyclopentadiene		1.11E+00	a	2.00E+05	a	0.26	7E-05	7E-05	2.3E-04	3.56E-01	1.17E+00
Hexachloroethane (perchloroethane) x		1.59E-01	a	1.78E+03	a	0.0061	0.0094	0.0094	3.1E-02	4.28E-01	1.41E+00
Isodrin		NDA		NDA		NL	NA	NA	NA	NA	NA
Isophorone x		2.72E-04	a	4.68E+01	a	0.09	0.129	0.129	0.43	1.97E-01	6.51E-01
Methapyrilene		NDA		NDA		NL	NA	NA	NA	NA	NA
1-Methylnaphthalene		1.62E-02	g	2.29E+03	g	NL	NA	1.500	4.95	8.78E+01	2.90E+02
2-Methylnaphthalene		2.10E-02	d	7.50E+03	d	NL	NA	0.120	0.40	2.29E+01	7.56E+01
2-Methylphenol (o-cresol)		4.92E-05	a	9.12E+01	a	1.8	NA	1.8	5.94	4.78E+00	1.58E+01
3-Methylphenol (m-cresol)		3.50E-05	d	8.50E+01	d	1.8	NA	1.8	5.94	4.50E+00	1.48E+01
4-Methylphenol (p-cresol)		3.20E-05	d	8.50E+01	d	0.18	NA	0.18	0.59	4.50E-01	1.48E+00
Naphthalene		1.98E-02	a	2.00E+03	a	0.73	0.0235	0.0235	0.08	1.20E+00	3.97E+00
3-Nitroaniline		5.70E-06	d	2.20E+01	d	NL	NA	0.110	0.36	9.90E-02	3.27E-01
Nitrobenzene		9.84E-04	a	6.46E+01	a	0.018	0.0668	0.0668	0.22	1.32E-01	4.37E-01
4-Nitrophenol		1.70E-08	d	4.90E+01	d	NL	0.0717	0.290	0.96	4.60E-01	1.52E+00
N-Nitrosodimethylamine x		4.90E-05	d	2.80E-01	d	1.7E-06	NA	1.7E-06	5.6E-06	5.92E-07	1.95E-06
N-Nitrosodiphenylamine x		2.05E-04	a	1.29E+03	a	0.017	33	33	109	1.09E+03	3.61E+03

Appendix C - Table 2
Calculation of Sediment to Surface Water Screening Levels
Charleston Naval Complex, Zone H, SWMU 196
Charleston, South Carolina

Site-Specific Parameters:		Chemical-Specific Variables						Partitioning Method			
Fraction Organic Carbon (--) :	0.0254										
Dilution Factor [DF] (--) :	3.30	Dimension-		Organic						Calculated	Calculated
Dry Soil Bulk Density (kg/L) :	0.88	less		Carbon		Water				Sed to SW	Site-specific
Water-filled Soil Porosity (--) :	0.3	Henry's		Water		Health-		Acceptable	Target	SSL -	Sed to SW
Air-filled Soil Porosity (--) :	0.355	Law		Part.		based	Saltwater	GW	Leachate	Partition	SSL -
Soil Porosity (--) :	0.655	Constant		Coeff.		Limit	Surf. Wtr.	Conc.	Conc.	Method	Partition
		[H']		[Koc]		[HBL]	Chronic			[DAF=1]	Method
		(--)		(L/kg)		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/kg)	(mg/kg)
N-Nitroso-di-n-propylamine x		9.23E-05	a	2.40E+01	a	1.2E-05	NA	1.2E-05	4.0E-05	1.14E-05	3.76E-05
N-Nitroso-methylethylamine x		3.65E-05	g	7.50E-01	d	3.9E-06	NA	3.9E-06	1.3E-05	1.40E-06	4.63E-06
Pentachlorophenol x		1.00E-06	a	5.92E+02	a	0.00071	0.0079	0.0079	0.03	1.21E-01	4.01E-01
Phenanthrene		9.40E-04	d	3.00E+04	d	1.1	NA	1.1	3.63	8.39E+02	2.77E+03
Phenol (phenyl alcohol)		1.63E-05	a	2.88E+01	a	22	0.058	0.058	0.19	6.22E-02	2.05E-01
Pyrene		4.51E-04	a	1.05E+05	a	1.1	NA	1.1	3.63	2.93E+03	9.68E+03
Safrole		7.80E-04	d	4.10E+02	d	NL	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene		1.10E-01	d	5.50E+03	d	0.011	0.129	0.129	4.3E-01	1.81E+01	5.96E+01
2,3,4,6-Tetrachlorophenol		1.80E-04	d	2.80E+02	b	1.1	NA	1.1	3.63	8.20E+00	2.71E+01
1,2,4-Trichlorobenzene		5.82E-02	a	1.78E+03	a	0.37	0.0045	0.0045	0.015	2.05E-01	6.76E-01
2,4,5-Trichlorophenol (TCP)		1.78E-04	a	1.60E+03	a	3.7	NA	3.7	12.2	1.52E+02	5.00E+02
2,4,6-Trichlorophenol x		3.19E-04	a	3.81E+02	a	0.0077	NA	0.0077	2.5E-02	7.71E-02	2.55E-01
Pesticide/PCB Compounds											
Aldrin x		6.97E-03	a	2.45E+06	a	5.0E-06	1.30E-04	1.3E-04	4.3E-04	8.09E+00	2.67E+01
Aroclor-1016 x		1.10E-01	d	3.09E+05	a	0.00021	3E-05	3E-05	9.9E-05	2.35E-01	7.77E-01
Aroclor-1248 x		1.10E-01	d	3.09E+05	a	0.00021	3E-05	3E-05	9.9E-05	2.35E-01	7.77E-01
Aroclor-1254 x		1.10E-01	d	3.09E+05	a	0.00021	3E-05	3E-05	9.9E-05	2.35E-01	7.77E-01
Aroclor-1260 x		1.10E-01	d	3.09E+05	a	0.00021	3E-05	3E-05	9.9E-05	2.35E-01	7.77E-01
alpha-BHC (alpha-HCH) x		4.35E-04	a	1.23E+03	a	1.4E-05	1.4	1.4	4.62	4.42E+01	1.46E+02
beta-BHC (beta-HCH) x		3.05E-05	a	1.26E+03	a	4.7E-05	NA	4.7E-05	1.6E-04	1.52E-03	5.02E-03
delta-BHC (delta-HCH) x		1.80E-05	d	2.30E+03	d	4.7E-05	NA	4.7E-05	1.6E-04	2.76E-03	9.11E-03
gamma-BHC (Lindane) x		5.74E-04	a	1.07E+03	a	6.6E-05	1.60E-05	1.6E-05	5.3E-05	4.40E-04	1.45E-03
Chlordane x		1.99E-03	a	1.20E+05	a	0.00024	4E-06	4E-06	1.3E-05	1.22E-02	4.02E-02
alpha-Chlordane (cis-chlordane) x		1.99E-03	S	7.00E+04	d	0.00024	NA	0.00024	7.9E-04	4.27E-01	1.41E+00
gamma-Chlordane (trans-chlordane) x		1.99E-03	S	1.40E+05	d	0.00024	NA	0.00024	7.9E-04	8.54E-01	2.82E+00
4,4'-DDD x		1.64E-04	a	1.00E+06	a	0.00035	2.50E-05	2.5E-05	8.3E-05	6.35E-01	2.10E+00
4,4'-DDE x		8.61E-04	a	4.47E+06	a	0.00025	1.40E-04	1.4E-04	4.6E-04	1.59E+01	5.25E+01
4,4'-DDT x		3.32E-04	a	2.63E+06	a	0.00025	1E-06	1E-06	3.3E-06	6.68E-02	2.20E-01
Dieldrin (aldrin epoxide) x		6.19E-04	a	2.14E+04	a	5.3E-06	1.90E-06	1.9E-06	6.3E-06	1.03E-03	3.41E-03
Dinoseb		1.90E-05	d	1.90E+01	d	0.037	NA	0.037	0.12	3.05E-02	1.01E-01
Endosulfan I		4.59E-04	a	2.14E+03	a	0.22	8.70E-06	8.7E-06	2.9E-05	4.76E-04	1.57E-03
Endosulfan II		4.59E-04	a	2.14E+03	a	0.22	8.70E-06	8.7E-06	2.9E-05	4.76E-04	1.57E-03
Endosulfan sulfate		8.60E-02	d	9.50E+02	d	0.22	NA	0.22	0.73	5.38E+00	1.78E+01
Endrin		3.08E-04	a	1.23E+04	a	0.011	2.30E-06	2.3E-06	7.6E-06	7.19E-04	2.37E-03
Endrin aldehyde		1.58E-05	f	8.50E+03	d	0.011	NA	0.011	3.6E-02	2.38E+00	7.85E+00
Endrin ketone		NDA		8.50E+03	S	0.011	NA	0.011	3.6E-02	2.38E+00	7.85E+00
Heptachlor x		6.07E+01	a	1.41E+06	a	1.9E-05	3.60E-06	3.6E-06	1.2E-05	1.29E-01	4.25E-01
Heptachlor epoxide x		3.90E-04	a	8.32E+04	a	9.4E-06	3.60E-06	3.6E-06	1.2E-05	7.61E-03	2.51E-02
Kepone x		1.00E-06	d	1.60E+05	d	NL	NA	3.7E-06	1.2E-05	1.50E-02	4.96E-02
Methoxychlor		6.48E-04	a	9.77E+04	a	0.18	3E-05	3E-05	9.9E-05	7.45E-02	2.46E-01
Toxaphene x		2.46E-04	a	2.57E+05	a	7.7E-05	2E-07	2E-07	6.6E-07	1.31E-03	4.31E-03
Organophosphate Pesticides											
Dimethoate		2.50E-09	d	4.80E+00	d	0.0073	NA	0.0073	2.4E-02	3.38E-03	1.11E-02
Disulfoton		1.60E-04	d	8.00E+03	d	0.0015	NA	0.0015	5.0E-03	3.05E-01	1.01E+00
Famphur		NDA		NDA		NL	NA	NA	NA	NA	NA
Methyl parathion		4.10E-06	d	7.00E+02	d	0.0091	NA	0.0091	3.0E-02	1.65E-01	5.44E-01
Parathion (ethyl parathion)		2.30E-05	d	6.00E+03	d	0.22	1.8E-04	1.8E-04	5.9E-04	2.72E-02	8.97E-02
Phorate		4.92E-04	g	5.50E+03	d	0.0073	NA	0.0073	2.4E-02	1.02E+00	3.37E+00
Sulfotep (tetraethyldithiopyrophosphate)		2.95E-07	e	7.41E+02	g	0.018	NA	0.018	5.9E-02	3.45E-01	1.14E+00
Herbicides											
2,4-D (2,4-dichlorophenoxyacetic acid)		4.10E-07	d	1.70E+02	d	0.37	NA	0.37	1.22	1.72E+00	5.69E+00
2,4-DB (4-(2,4-dichlorophenoxy)butyric acid)		9.00E-07	d	3.00E+03	d	0.29	NA	0.29	0.96	2.22E+01	7.32E+01
2,4,5-T (2,4,5-trichlorophenoxyacetic acid)		3.60E-07	d	3.40E+01	d	0.37	NA	0.37	1.22	4.46E-01	1.47E+00
2,4,5-TP (Silvex)		3.20E-09	d	5.50E+03	d	0.29	NA	0.29	0.96	4.06E+01	NA
Dioxin Compounds											
2378-TCDD Equivalents (TEQs) x		NA		NA		5.7E-10	NA	5.7E-10	1.9E-09	NA	NA

Appendix C - Table 2
Calculation of Sediment to Surface Water Screening Levels
Charleston Naval Complex, Zone H, SWMU 196
Charleston, South Carolina

Site-Specific Parameters:		Chemical-Specific Variables						Partitioning Method			
Fraction Organic Carbon (--) :	0.0254										
Dilution Factor [DF] (--) :	3.30	Dimension-		Organic						Calculated	Calculated
Dry Soil Bulk Density (kg/L) :	0.88	less		Carbon		Water				Sed to SW	Site-specific
Water-filled Soil Porosity (--) :	0.3	Henry's		Water		Health-		Acceptable	Target	SSL -	Sed to SW
Air-filled Soil Porosity (--) :	0.355	Law		Part.		based	Saltwater	GW	Leachate	Partition	SSL -
Soil Porosity (--) :	0.655	Constant		Coeff.		Limit	Surf. Wtr.	Conc.	Conc.	Method	Partition
		[H']		[Koc]		[HBL]	Chronic			[DAF=1]	Method
		(--)		(L/kg)		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/kg)	(mg/kg)
2378-TCDD x		3.2E-03	d	2.7E+06	d	5.7E-10	1E-08	1E-08	3.3E-08	6.86E-04	2.26E-03
12378-PeCDD x		1.1E-04	g	3.4E+06	d	1.1E-09	NA	1.1E-09	3.6E-09	9.50E-05	3.13E-04
123478-HxCDD x		1.8E-03	g	4.6E+07	d	5.7E-09	NA	5.7E-09	1.9E-08	6.66E-03	2.20E-02
123678-HxCDD x		1.8E-03	S	4.6E+07	S	5.7E-09	NA	5.7E-09	1.9E-08	6.66E-03	2.20E-02
123789-HxCDD x		1.8E-03	S	4.6E+07	S	5.7E-09	NA	5.7E-09	1.9E-08	6.66E-03	2.20E-02
1234678-HpCDD x		3.1E-04	g	1.2E+08	d	5.7E-08	NA	5.7E-08	1.9E-07	1.74E-01	5.73E-01
OCDD x		2.8E-04	g	1.2E+07	g	5.7E-07	NA	5.7E-07	1.9E-06	1.74E-01	5.73E-01
2378-TCDF x		6.1E-04	g	2.7E+06	d	5.7E-09	NA	5.7E-09	1.9E-08	3.91E-04	1.29E-03
12378-PeCDF x		2.1E-04	g	4.3E+06	d	1.1E-08	NA	1.1E-08	3.6E-08	1.20E-03	3.96E-03
23478-PeCDF x		2.4E-04	g	6.5E+06	d	1.1E-09	NA	1.1E-09	3.6E-09	1.82E-04	5.99E-04
123478-HxCDF x		5.9E-04	g	2.4E+09	d	5.7E-09	NA	5.7E-09	1.9E-08	3.47E-01	1.15E+00
123678-HxCDF x		2.5E-04	g	2.4E+09	S	5.7E-09	NA	5.7E-09	1.9E-08	3.47E-01	1.15E+00
234678-HxCDF x		3.1E-04	g	2.4E+09	S	5.7E-09	NA	5.7E-09	1.9E-08	3.47E-01	1.15E+00
123789-HxCDF x		2.5E-04	S	2.4E+09	S	5.7E-09	NA	5.7E-09	1.9E-08	3.47E-01	1.15E+00
1234678-HpCDF x		6.2E-03	g	6.0E+07	d	5.7E-08	NA	5.7E-08	1.9E-07	8.69E-02	2.87E-01
1234789-HpCDF x		1.7E-03	g	2.3E+06	g	5.7E-08	NA	5.7E-08	1.9E-07	3.39E-03	1.12E-02
OCDF x		7.8E-05	g	5.6E+06	g	5.7E-07	NA	5.7E-07	1.9E-06	8.14E-02	2.69E-01
Hydrazine											
Hydrazine (diamine) x		7.09E-08	g	9.00E-03	d	2.8E-05	NA	2.8E-05	9.2E-05	9.55E-06	3.15E-05
Explosives											
Tetryl (trinitrophenylmethylnitramine)		8.20E-11	g	2.34E+02	g	0.37	NA	0.37	1.22	2.33E+00	7.67E+00
Organotin											
Dibutyltin		NDA		NDA		0.011	NA	0.011	3.6E-02	NA	1.24E-02
Monobutyltin		NDA		NDA		0.011	NA	0.011	3.6E-02	NA	1.24E-02
Tetrabutyltin		NDA		NDA		0.011	NA	0.011	3.6E-02	NA	1.24E-02
Tributyltin		NDA		NDA		0.011	1E-05	1E-05	3.3E-05	NA	1.13E-05
Inorganics				*Kd (6.8 pH)*							
Aluminum		NA		1.50E+03	d	NL	NA	37.00	122	1.42E+03	4.69E+03
Antimony		NA		4.50E+01	c	0.015	NA	0.015	0.050	2.23E-02	7.35E-02
Arsenic x		NA		2.90E+01	c	5.7E-05	0.036	0.036	0.12	3.88E-02	1.28E-01
Barium		NA		4.10E+01	c	2.6	NA	2.60	8.58	3.59E+00	1.19E+01
Beryllium		NA		7.90E+02	c	NL	NA	NL	0	0.00E+00	NA
Cadmium		NA		7.50E+01	c	0.018	9.3E-03	9.3E-03	0.03	2.09E-02	6.89E-02
Chromium (total)		NA		1.90E+01	c	0.11	NA	0.11	0.36	9.06E-02	2.99E-01
Chromium (trivalent)		NA		1.80E+06	c	55	0.103	0.103	0.34	4.71E+03	1.55E+04
Chromium (hexavalent)		NA		1.90E+01	c	0.11	0.05	0.05	0.17	4.12E-02	1.36E-01
Cobalt		NA		4.50E+01	d	NL	NA	2.20	7.26	3.26E+00	1.08E+01
Copper		NA		4.30E+02	d	NL	2.9E-03	2.9E-03	9.6E-03	3.27E-02	1.08E-01
Cyanide		NA		9.90E+00	c	0.73	1.0E-03	1.0E-03	3.3E-03	5.92E-04	1.95E-03
Iron		NA		2.50E+01	d	NL	NA	11.00	36.3	1.07E+01	3.54E+01
Lead		NA		9.00E+02	d	NL	8.5E-03	8.5E-03	0.03	1.97E-01	6.51E-01
Manganese		NA		6.50E+01	d	1.7	NA	1.70	5.61	3.39E+00	1.12E+01
Mercury		4.67E-01	a	5.20E+01	c	0.011	2.5E-05	2.5E-05	8.3E-05	4.15E-05	1.37E-04
Nickel		NA		6.50E+01	c	0.73	8.3E-03	8.3E-03	0.03	1.65E-02	5.46E-02
Selenium		NA		5.00E+00	c	0.18	0.071	0.071	0.23	3.32E-02	1.10E-01
Silver		NA		8.30E+00	c	0.18	2.3E-04	2.3E-04	7.6E-04	1.27E-04	4.19E-04
Thallium		NA		7.10E+01	c	0.0029	2.1E-02	2.1E-02	0.07	4.57E-02	1.51E-01
Tin		NA		2.50E+02	h	22	NA	22.00	72.6	1.47E+02	4.86E+02
Vanadium		NA		1.00E+03	c	0.26	NA	0.26	0.86	6.69E+00	2.21E+01
Zinc		NA		6.20E+01	c	11	0.086	0.086	0.28	1.65E-01	5.44E-01

Notes:

Water Health-based Limit - Preliminary Remediation Goal based on the ingestion pathway, residential scenario; obtained from Oak Ridge National Laboratory Risk Assessment Information System (RAIS) website

MCL/MCLG - From USEPA Drinking Water Regulations and Health Advisories, October 1996

Appendix C - Table 2
Calculation of Sediment to Surface Water Screening Levels
Charleston Naval Complex, Zone H, SWMU 196
Charleston, South Carolina

Site-Specific Parameters:		Chemical-Specific Variables				Partitioning Method			
Fraction Organic Carbon (--) :	0.0254								
Dilution Factor [DF] (--) :	3.30	Dimension-	Organic					Calculated	Calculated
Dry Soil Bulk Density (kg/L) :	0.88	less	Carbon	Water				Sed to SW	Site-specific
Water-filled Soil Porosity (--) :	0.3	Henry's	Water	Health-		Acceptable	Target	SSL -	Sed to SW
Air-filled Soil Porosity (--) :	0.355	Law	Part.	based	Saltwater	GW	Leachate	Partition	SSL -
Soil Porosity (--) :	0.655	Constant	Coeff.	Limit	Surf. Wtr.	Conc.	Conc.	Method	Partition
		[H']	[Koc]	[HBL]	Chronic			[DAF=1]	Method
		(--)	(L/kg)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/kg)	(mg/kg)

Acceptable GW Concentration - Surface water Salt water Chronic if available, otherwise Water Health-based Limit; if neither available, then tap water risk-based concentration from April 1999 Region 3 RBC Table

Target Leachate Concentration - Acceptable Groundwater Concentration multiplied by Dilution Factor

Calculated Site-specific Soil to GW SSL - From Equation 10 (partitioning equation) of the USEPA Soil Screening Guidance: User's Guide (1996), using the site-specific parameters shown above

SPLP Leach Ratio - Contaminant concentration in leach sample (mg/L) divided by corresponding concentration in bulk sample (mg/kg)

Calculated Soil to GW SSL - SPLP Method [DAF=1] - Acceptable Groundwater Concentration divided by SPLP Leach Ratio

Calculated Site-specific Soil to GW SSL - SPLP Method - Calculated SPLP SSL multiplied by Dilution Factor

USEPA Generic Soil to GW SSL - From USEPA Soil Screening Guidance, Technical Background Document (1996), Appendix A, Table A-1

Sources of H' and Koc values:

a = 1996 Soil Screening Guidance: User's Guide, Table C-1
b = 1996 Soil Screening Guidance: User's Guide, Table C-2
c = 1996 Soil Screening Guidance: User's Guide, Table C-4
d = Superfund Chemical Data Matrix (SCDM) - User Version, September 1997
e = Oak Ridge National Laboratory Risk Assessment Information System (RAIS) website
f = Knox, Sabatini, and Canter (1993); Subsurface Transport and Fate Processes
g = Texas Natural Resources Conservation Commission (TNRCC) Risk Reduction Program Concept Document 2, Vol. 1; Appendix VII, Chemical/Physical Properties Table
h = TERRA model (Baes, et al., Oak Ridge National Laboratory, 1984)
S = Surrogate

x - Carcinogen
y - USEPA SSL is a preliminary remediation goal of 1 mg/kg based on separate 1990 guidance for PCBs
z - USEPA SSL of 400 mg/kg based on separate 1994 guidance for lead
GW - Groundwater
SSL - Soil screening level

NA - Not applicable
ND - Not detected
NDA - No data available
NL - Not listed
NS - Not sampled

SOIL BORING/WELL CONSTRUCTION LOGS

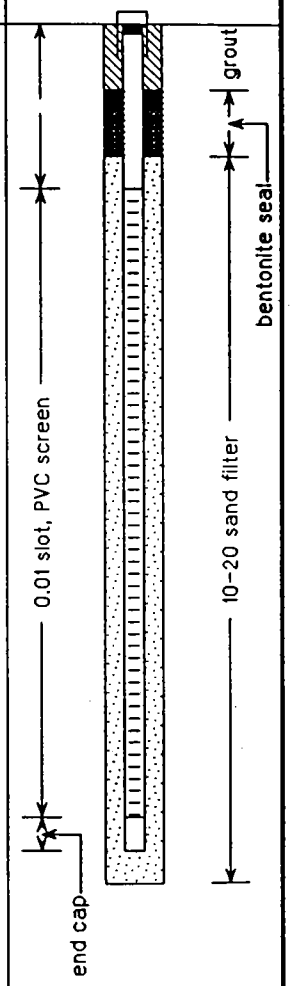
ENSAFE

Monitoring Well NBCH009020

Project: *Zone H-Naval Base Charleston*	Coordinates: *2321478.45 E, 370135.25 N*
Location: *Charleston, SC*	Surface Elevation: *8.3 feet msl*
Started at *1040 on 7-15-98*	TOC Elevation: *8.07 feet msl*
Completed at *1200 on 7-15-98*	Depth to Groundwater: *4.58 feet TOC* Measured: *7/21/98*
Drilling Method: *4.25 ID (8.5" OD HSA with splitspoon sampler)*	Groundwater Elevation: *3.49 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *12.5 feet*
Geologist: *J. Lunceford*	Well Screen: *2.5 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)
	X		1	100	0		ML CL	Silt; dark brown to tan; sandy - fine, clayey; w/some glass fragments.	5.8
	X		2	100	0		CL	Clay: blue grey: sandy: moist.	4.3
5	X		3	100	6		SC	Sand: blue grey; clayey; w/organic odor.	.3
	X		4	100	3		OL OH	Clay: dark grey; silty, sandy; wet, organic odor (Marsh Clay). Poor Sample Recovery.	1.7
10	X		5	-	3		CL	Clay: olive green; silty, sandy: wet. Poor Sample Recovery.	4
	X		6	-	2		CL CH	Clay: tan w/brown organic lense at base: sandy. Clay: blue w/tan mottling; stiff.	5.7
	X		7	100	0				
15									
20									

WELL DIAGRAM



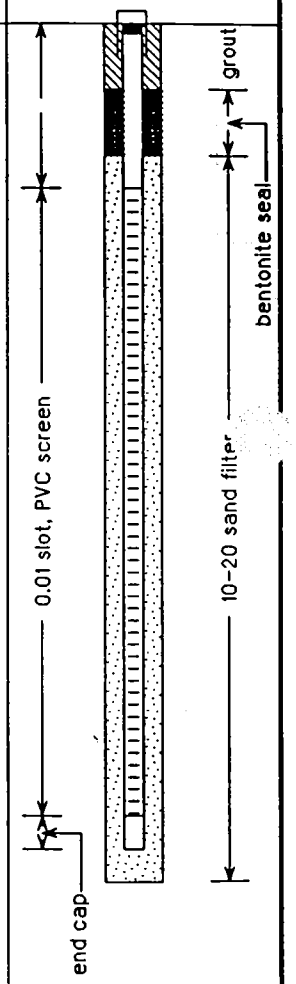
ENSAFE

Monitoring Well NBCH009021

Project: *Zone H-Naval Base Charleston*	Coordinates: *2321449.92 E, 370080.55 N*
Location: *Charleston, SC*	Surface Elevation: *7.9 feet msl*
Started at *1545 on 7-14-98*	TOC Elevation: *7.68 feet msl*
Completed at *0850 on 7-15-98*	Depth to Groundwater: *4.63 feet TOC* Measured: *7/21/98*
Drilling Method: *4.25 ID (8.5" OD HSA with splitspoon sampler)*	Groundwater Elevation: *3.05 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *12.5 feet*
Geologist: *J. Lunceford*	Well Screen: *2.5 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)
	X		1	100	0		ML CL	Silt: orange brown; sandy, clayey.	
							SP	Silt: dark brown: clayey; with glass fragments.	4.7
	X		2	100	0		SM	Sand: dark grey; fine, silty.	4.2
							CL	Clay: lt grey and orange mottled; sandy; moist, stiff.	2.9
5								Clay: orange tan; silty.	
	X		3	50	0		SC	Sand: blue grey; fine, clayey.	1.9
									.9
	X		4	50	0				.1
10	X		5	100	0		SC	@11.0 to 12.0 ft.:With frequent stiff clay lenses.	
								@ 11.9 ft.: minor shell hash.	
	X		6	100	0		OL	Clay: grey; silty, sandy; w/interspersed shell hash.	4.1
									4.9
	X		7	100	0		CL CH	Shell Hash: grey; pebbley; w/silty matrix; w/organic odor.	5.3
15								Clay: grey; stiff; w/1 cm dark brown clay laminae, and minor shell hash interspersed; moderately plastic.	6.1
20									

WELL DIAGRAM



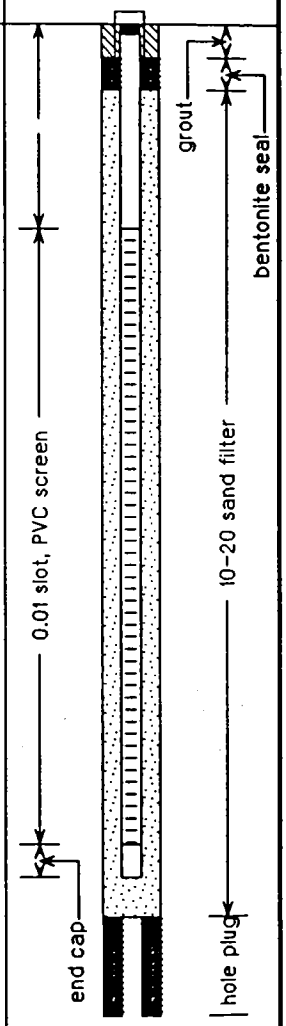
ENSAFE

Monitoring Well NBCH009022

Project: *Zone H-Naval Base Charleston*	Coordinates: *2321395.73 E, 370134.13 N*
Location: *Charleston, SC*	Surface Elevation: *9.8 feet msl*
Started at *1500 on 6-08-98*	TOC Elevation: *9.78 feet msl*
Completed at *1645 on 6-08-98*	Depth to Groundwater: *7.86 feet TOC* Measured: *7/21/98*
Drilling Method: *Rotasonic (7.5" OD casing, 3.8" ID coring bit)*	Groundwater Elevation: *1.92 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *12.9 feet*
Geologist: *P. Bayley*	Well Screen: *3.1 to 12.9 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							FILL	ROC - Gravel Parking Area.	
							CL CH	Clay: orange brown, w/dark brown mottle; some silt to silty, moist , stiff, plastic.	
							ML CL	Clay: dark grey to black; trace to some silt; damp, stiff, plastic; w/ occasional pebble; glass shard at 1.4 ft. @ 2.0 - 2.1 ft.: wood plank fragment.	7.7
							SP SM		7.3
									6.9
									6.3
							ML CL	Clay: grey brown and brown; very thinly faint laminations, silty, some very fine sand.	
5			1	70	-			Sand: brown grey; very fine to fine, some silt to silty; wet, soft.	
								Clay: lt brown; sandy -very fine, silty; damp.	
								very soft - no recovery from top of run.	
10									
							SP SM	Sand: brown w/some olive drab mottle; very fine to fine, silty; wet, soft, very slight plasticity. @13.6 to 14.0 ft.: becomes clayey.	3.1
									3.8
							SM SC		4.2
15			2	26	-		ML CL	Clay: grey green, w/some orange brown; some sand-very fine, w/some sandy indistinct pits; moist to wet, stiff, plastic. @14.6 to 15.0 ft.: increase in sand to very sandy; soft, plastic.	5.2
20									

WELL DIAGRAM



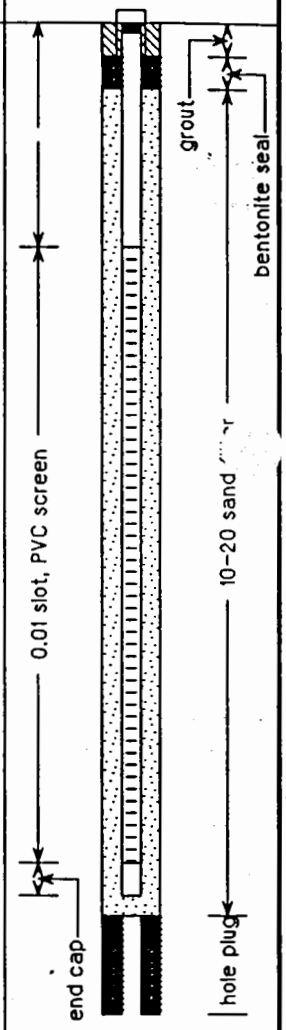
ENSAFE

Monitoring Well NBCH009023

Project: *Zone H-Naval Base Charleston*	Coordinates: *2321362.75 E, 370023.50 N*
Location: *Charleston, SC*	Surface Elevation: *8.2 feet msl*
Started at *1300 on 6-08-98*	TOC Elevation: *8.27 feet msl*
Completed at *1400 on 6-08-98*	Depth to Groundwater: *4.60 feet TOC* Measured: *7/21/98*
Drilling Method: *Rotasonic (7.5" OD casing, 3.8" ID coring bit)*	Groundwater Elevation: *3.67 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *13.2 feet*
Geologist: *P. Bayley*	Well Screen: *3.4 to 12.7 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							GM	ROC - Gravel Parking Area.	7.5
							SM SC	Sand: orange brown; very fine to fine, silty, some clay; wet, soft, plastic; w/occasional thin grey clay laminations.	6.4
5			1	36	-		ML CL	Clay: orange brown; very silty, some sand to sandy; wet, soft to firm, plastic.	3.2
							SP SM	Clay: grey green; silty, sandy; wet, soft to firm, plastic.	2.2
							CL CH	Sand: grey green; very fine to fine, some silt to silty, trace clay decreasing w/depth to no clay; wet.	1.2
							SC	Clay: grey green w/orange brown mottle; moist to wet, plastic, stiff; w/occasional indistinct sandy pits.	1
10								Clay: orange brown w/grey green mottle; moist to wet, plstic, stiff; w/occasional indistinct sandy pits.	.4
								Shells: very fine to coarse, w/occasional very small intact shells; white; w/clay matrix: orange brown; silty; wet, soft, plastic.	
15			2	36	-			bottom of boring	
20									

WELL DIAGRAM



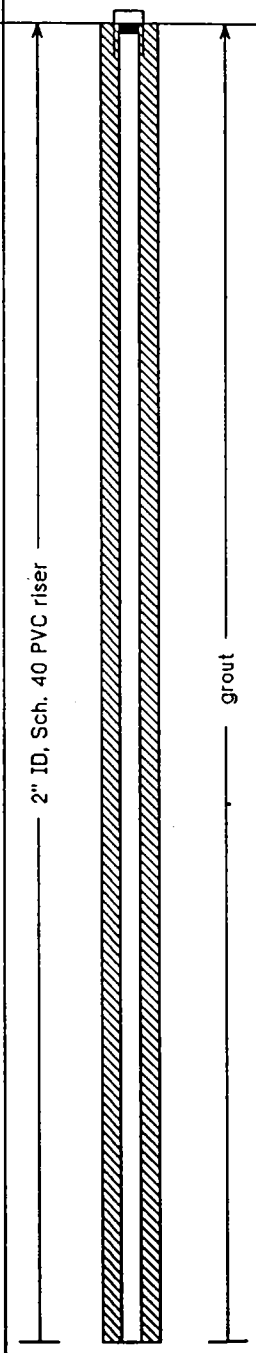
ENSAFE

Monitoring Well NBCH00923D

Project: *Zone H-Naval Base Charleston*	Coordinates: *2321365.71 E, 370017.86 N*
Location: *Charleston, SC*	Surface Elevation: *8.2 feet msl*
Started at *0830 on 6-08-98*	TOC Elevation: *8.28 feet msl*
Completed at *1130 on 6-08-98*	Depth to Groundwater: *4.09 feet TOC* Measured: *7/21/98*
Drilling Method: *Rotasonic (7.5" OD casing, 3.8" ID coring bit)*	Groundwater Elevation: *4.19 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *36.8 feet*
Geologist: *P. Bayley*	Well Screen: *27.0 to 36.3 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							GP	Gravel on surface - remnant from stockpile.	
							GM	Gravel: grey; to 2 cm; silty matrix.	7.4
							CL	Clay: brown; silty, some sand - very fine, w/thin very sandy laminae; stiff.	6.8
							GM	Gravel: grey; to 2 cm; silty matrix.	
							CL	Clay: orange brown; silty, some sand - very fine; w/occasional, thin, very sandy pods/laminae; stiff.	5.2
5			1	60	-		SP SM	Sand: lt brown; very fine to fine, some silt to silty; w/trace to some white shell fragments; fine to coarse; wet, loose.	3.2 3 2.7
							CL	Clay; green grey, w/some brown mottle; very sandy; moist plastic, stiff.	
							SP SM	Sand: green grey, w/some brown mottle; very fine to fine, trace to some silt; occasional white shell fragment; medium to coarse.	.7
							SC SM	Sand: brown w/some green grey mottle decreasing w/depth; clayey, silty; w/shell fragments and small shells throughout; wet, soft to firm, plastic.	.2
10							CL CH	Clay: brown, w/some green grey mottle; some silt; w/shell fragments and small shells throughout.	2.8
							GC	@9.1 to 11.0 ft.: w/few shells.	3.8
							CL CH	Shells: white; fine to very coarse, some small intact shells; silty clay matrix; wet, soft.	4.3
								@11.6 to 12.0 ft.: grain supported w/some matrix.	
15			2	100	-			Clay: brown; wet, plastic, soft to firm; very shelly upper 0.3 ft.	
							OL OH	Silt: dark grey to black; clayey; wet, firm, plastic. @12.7, 12.8-12.9, 13.1, 13.3, 13.5, & 14.1 ft.: Shells: white; coarse fragments to small intact shells.	
								Silt: grey green w/some dark grey mottle; trace to some sand as indistinct pits disseminated throughout interval, and becomes clayey with depth; wet, plastic, stiff.	10.7
20							SM	Sand: grey green w/some grey mottle-laminae; very fine, silty; w/some indistinct, thin, clay laminae.	

WELL DIAGRAM



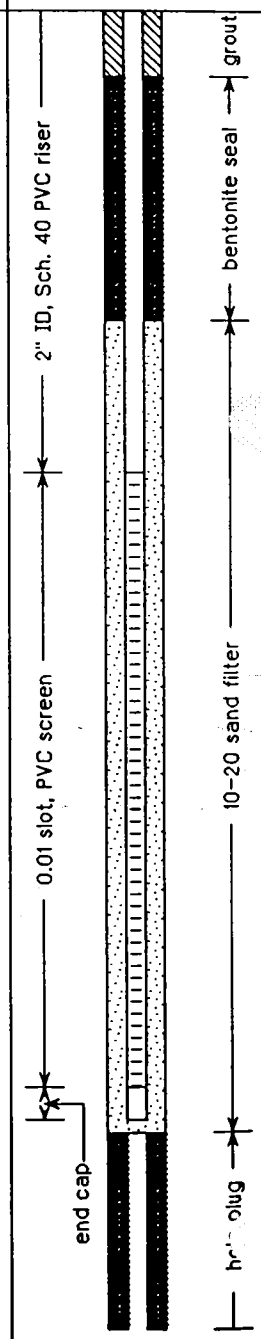
ENSAFE

Monitoring Well NBCH00923D

Project: *Zone H-Naval Base Charleston*	Coordinates: *2321365.71 E, 370017.86 N*
Location: *Charleston, SC*	Surface Elevation: *8.2 feet msl*
Started at *0830 on 6-08-98*	TOC Elevation: *8.28 feet msl*
Completed at *1130 on 6-08-98*	Depth to Groundwater: *4.09 feet TOC* Measured: *7/21/98*
Drilling Method: *Rotasonic (7.5" OD casing, 3.8" ID coring bit)*	Groundwater Elevation: *4.19 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *36.8 feet*
Geologist: *P. Bayley*	Well Screen: *27.0 to 36.3 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							SM / SC SM	Sand: olive brown; very fine, silty, trace to some clay; wet, soft, plastic/sticky; w/trace to some very fine Phosphatic sand.	11.9
									13.6
25			3	68	-		SC SM	Shelby Tube: 25.0 to 27.5 ft. Top and bottom of tube: Sand as above.	16.8
			4	100			SM	Sand: as above w/slight decrease in fines.	19.3
30								@30.0 to 35 ft.: slight increase in Phosphate sand content.	
35			5	100	-			Sand: olive brown; very fine, silty, trace clay; wet, soft, sticky; w/some small shells. At 35.8 ft.: a 4x2 cm bone fragment; brown.	27.6
							ML CL	Silt: olive brown; clayey; stiff, moist, plastic. (Ashley Formation) @35.8-38.3 ft.: w/occasional sandy pods-peppery (very fine black Phosphatic sand), and w/occasional shells and shell fragments.	
40									

WELL DIAGRAM



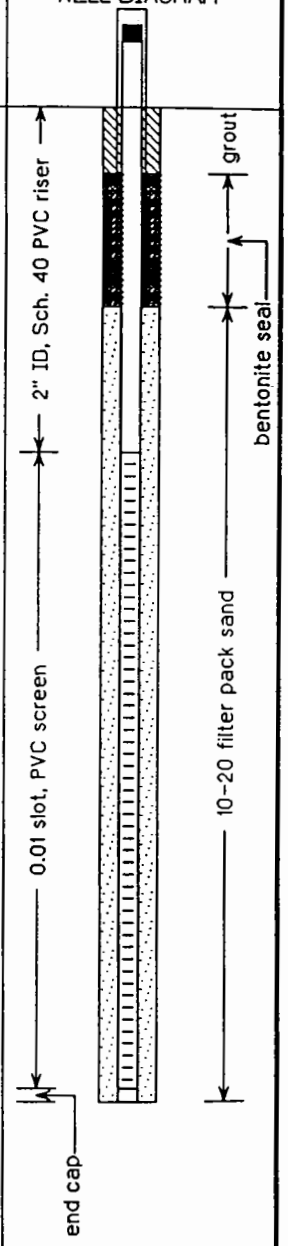
ENSAFE

Monitoring Well NBCH196001

Project: *Zone H-Naval Base Charleston*	Coordinates: *232143.189 E, 370189.96 N*
Location: *Charleston, SC*	Surface Elevation: *10.5 feet msl*
Started at *0840 on 12-1-99*	TOC Elevation: *13.32 feet msl*
Completed at *0950 on 12-1-99*	Depth to Groundwater: *9.76 feet TOC* Measured: *1/5/00*
Drilling Method: *4.25 ID (8.5" OD HSA with splitspoon sampler)*	Groundwater Elevation: *3.56 feet msl*
Drilling Company: *Alliance Environmental SC Cert # 963*	Total Depth: *15.0 feet*
Geologist: *T. Streufert*	Well Screen: *5.2 to 14.8 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							ML CL	Surface Conditions: Soil Silt: brownish grey; clayey; some glass fragments.	9.5
			1	50			SC	Sand: dark grey to bluish grey; clayey; slightly moist.	8.5 8.1
			2	20			SC	Sand: lt bluish to greenish grey, w/yellowish brown mottle; moist.	6.5 5.5
5			3	50			SP	Sand: brown to yellowish brown; fine to some medium grained; wet; water at 7 ft. (bgs).	4.5 3.5
			4	50			OL	Clay: dark grey to dark greenish-grey; some silt, trace sand; wet.	2.5 1.9
10			5	30			SP CL	Sand: yellowish brown; some silt, trace clay; grading to lt brown sandy clay.	.5 -.3
			6	40			CL	Clay: brown to yellowish-brown; some sand.	-1.5 -2.1
			7	30			OL	Clay: greenish to bluish-grey; trace silt; wet.	-3.5 -4.3
15			8	40					
20									

WELL DIAGRAM



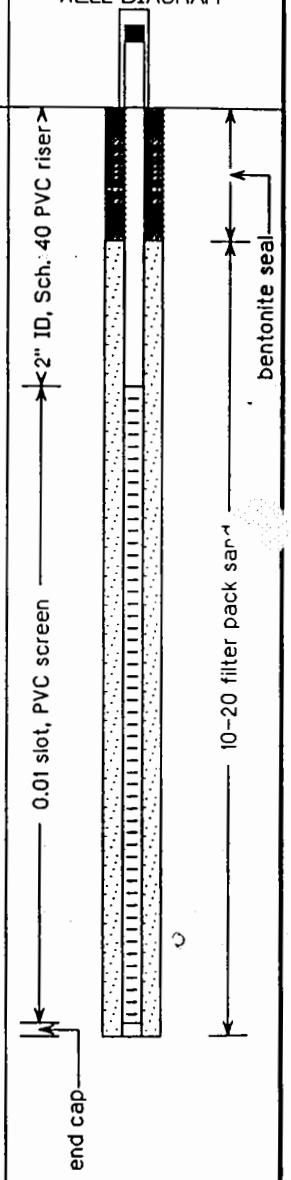
ENSAFE

Monitoring Well NBCH196002

Project: *Zone H-Naval Base Charleston*	Coordinates: *232152.70 E, 370205.67 N*
Location: *Charleston, SC*	Surface Elevation: *8.1 feet msl*
Started at *1144 on 12-1-99*	TOC Elevation: *11.15 feet msl*
Completed at *1219 on 12-1-99*	Depth to Groundwater: *8.01 feet TOC* Measured: *1/5/00*
Drilling Method: *4.25 ID (8.5" OD HSA with splitspoon sampler)*	Groundwater Elevation: *3.14 feet msl*
Drilling Company: *Alliance Environmental SC Cert # 963*	Total Depth: *14.0 feet*
Geologist: *T. Streufert*	Well Screen: *4.2 to 13.8 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							ML	Surface Conditions: Soil Silt: yellowish-brown grading to dark brown; some glass fragments.	7.1
			1	50			SP	Sand: trace to some silt, trace clay; slightly moist; some glass fragments.	6.1 5.7
			2	20			OL	Clay: greyish-blue to grey; trace to some silt, trace to some sand; wet; organic odor.	4.1
5			3	10			OL	Clay: grey to dark grey; trace silt; wet; sulfur odor.	2.1 1.1
			4	50			OL	Clay: as above.	.1 -1.1
10			5	60			OL	Clay: as above.	-1.9 -3.1
			6	60			OL	Clay as above.	-3.9 -4.9
			7	50					
15									
20									

WELL DIAGRAM



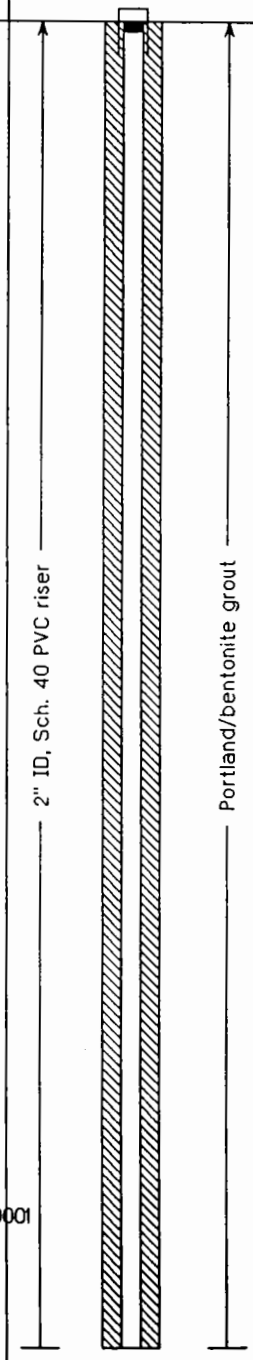
ENSAFE

Monitoring Well NBCH19602D

Project: *Zone H-Naval Base Charleston*	Coordinates: *2321514.7 E, 370210.7 N*
Location: *Charleston, SC*	Surface Elevation: *8.1 feet msl*
Started at *0845 on 02-27-99*	TOC Elevation: *8.02 feet msl*
Completed at *1630 on 02-27-99*	Depth to Groundwater: *5.19 feet TOC* Measured: *3-01-00*
Drilling Method: *4.25 ID (8.5" OD HSA with splitspoon sampler)*	Groundwater Elevation: *2.83 feet msl*
Drilling Company: *Miller Drilling SC Cert # 1532*	Total Depth: *36.5 feet*
Geologist: *P. Bayley*	Well Screen: *26.5 to 35.9 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Surface Conditions: Grass	
								Augered to 4.0 ft. bgs before collecting first lithologic sample. Cuttings had bits of glass and other fill.	
							GM	Gravel: brown; coarse sand to small pebbles; sandy silt matrix; w/piece of aluminum trash.	4.1 / 3.7
5			1		15			No Recovery.	
			2		0		OL OH	Silt: dark grey-black; clayey; wet, soft, plastic. @8.0 to 8.9 ft.: bits of peaty vegetation.	.1
10			3		100		SM	Sand: lt green-grey; very fine, silty; wet, soft.	1.9
							CL CH	Clay: green-grey w/some orange-brown mottle; wet, soft, plastic; w/occasional very thin sand parting.	2.5 / 3.1
			4		65		SM		3.9
							CL CH	Sand: lt grey; very fine, silty; wet, soft, sticky; w/some coarse white shell fragments.	4.2
			5		90		SM	Clay: yellow-brown w/some lt grey mottle; wet, soft, plastic; w/trace very thin sand partings and <2mm sand pits.	5.4 / 5.8 / 5.9
							SM		6.3
15								Sand: lt grey; very fine, silty, trace clay; wet, soft, sticky; w/some white shell fragments.	
			6		20		CH OH	Clay: grey w/dark grey mottle; moist, stiff, plastic; w/trace <2mm sandy pits.	7.9
			7		90		CL	Clay: lt green-grey w/yellow-brown; some silt; wet, soft, plastic.	9.7 / 9.900001 / 10.6
							CH OH	Clay: dark grey; moist, firm to stiff, plastic; w/trace to some sandy pits. @19.1 to 19.8 ft.: color change to blue-green.	11
20			8		90		CH CL		11.7 / 11.9

WELL DIAGRAM



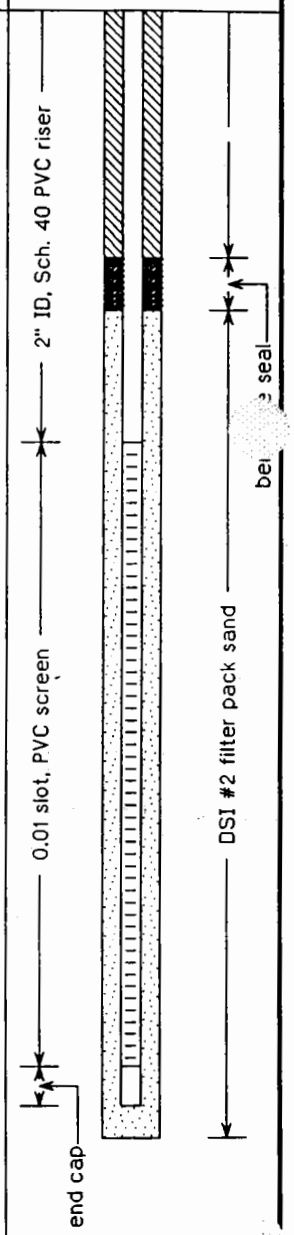
ENSAFE

Monitoring Well NBCH19602D

Project: *Zone H-Naval Base Charleston*	Coordinates: *2321514.7 E, 370210.7 N*
Location: *Charleston, SC*	Surface Elevation: *8.1 feet msl*
Started at *0845 on 02-27-99*	TOC Elevation: *8.02 feet msl*
Completed at *1630 on 02-27-99*	Depth to Groundwater: *5.19 feet TOC* Measured: *3-01-00*
Drilling Method: *4.25 ID (8.5" OD HSA with splitspoon sampler)*	Groundwater Elevation: *2.83 feet msl*
Drilling Company: *Miller Drilling SC Cert # 1532*	Total Depth: *36.5 feet*
Geologist: *P. Bayley*	Well Screen: *26.5 to 35.9 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							CL	Clay: lt grey w/yellow-brown mottle grading to dark grey by 12.6 ft; some silt; wet, soft, plastic.	11.9
							SM		12.7
							CL	Sand: green-grey; very fine, silty, trace clay; wet, soft. @21.0 to 21.2 ft.: Clay: blue-green. @21.2 to 21.8 ft.: slight decrease in silt content.	12.9 / 13.1
			9		90		SM / SP		13.7 / 13.9
							ML / CL	Silt: olive-brown; trace to some clay, trace sand-very fine; wet, plastic. @23.1 to 24.0 ft.: Sand: olive brown; very fine, silty, trace to some clay; wet, soft to firm, plastic; trace very small white shells.	15
			10		100		SM / SC		15.9
25							ML / CL		16.7
			11		100			Sand: olive-brown; very fine, silty, trace to some clay; wet, soft to firm, plastic; trace very fine white shells.	
			12		100		SM / SC	Augers dropped a foot between samples 12 and 13 due possibly to a very soft interval.	
30									
			13		100				23.3
							SM	@31.4 to 33.0 ft.: decrease in clay content to trace. @31.4 to 35.0 ft.: some very fine black Phosphatic sand.	
			14		100				24.9
							SM / SC	@34.5 to 35.0 ft.: some white shell fragments and small Phosphate nodules; matrix supported.	
35			15		100				26.9
							ML / CL	Silt: olive-brown; clayey; moist, firm to stiff, plastic. (Ashley Fm.)	
			16		100				28.9
40									

WELL DIAGRAM



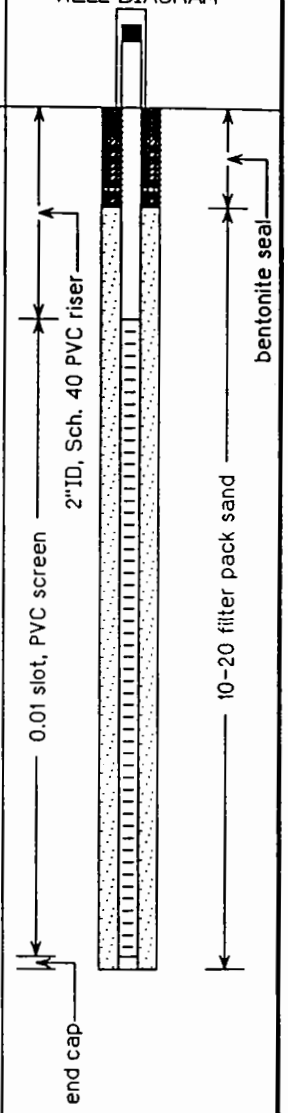
ENSAFE

Monitoring Well NBCH196003

Project: *Zone H–Naval Base Charleston*	Coordinates: *2321490.77 E, 370281.82 N*
Location: *Charleston, SC*	Surface Elevation: *8.22 feet msl*
Started at *1025 on 12–1–99*	TOC Elevation: *11.21 feet msl*
Completed at *1110 on 12–1–99*	Depth to Groundwater: *8.33 feet TOC* Measured: *1/5/00*
Drilling Method: *4.25 ID (8.5" OD HSA with splitspoon sampler)*	Groundwater Elevation: *2.88 feet msl*
Drilling Company: *Alliance Environmental SC Cert # 963*	Total Depth: *13.0 feet*
Geologist: *T. Streufert*	Well Screen: *3.2 to 12.8 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft–msl)
							SP SM	Surface Conditions: Soil Sand: brown to greyish-brown; fine grained, some silt, trace to some clay; moist; some glass fragments.	7
			1	60			CL	Clay: greyish to dark brown; trace to some sand; moist; some glass fragments.	6.2 5.8
			2	20				4 to 6 ft run: No Recovery. Water @ 5 ft. (bgs).	
5			3	0			OL	Clay: dark bluish-grey; trace to some sand, trace to some silt; wet; strong organic odor.	2.2 1.2
			4	50			OL	Clay: grey to bluish-grey; trace silt; wet; strong sulfur odor.	2 .8
10			5	50			OL	Clay: as above.	1.8 2.8
			6	50			OL	Clay: as above.	3.8 4.3
			7	50					
15									
20									

WELL DIAGRAM



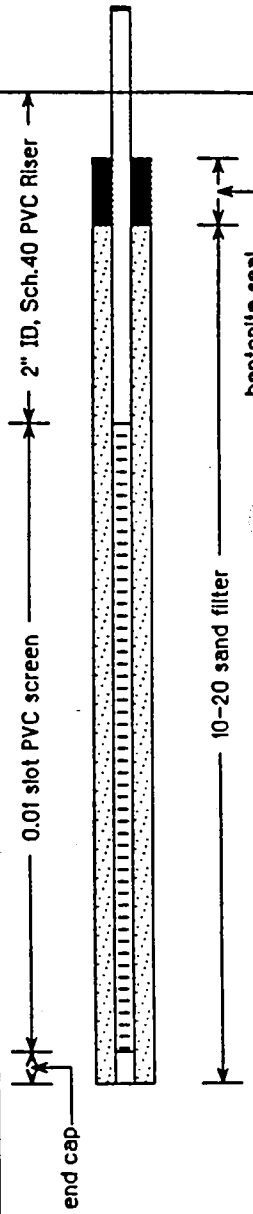
EnSafe/Allen & Hoshall

Monitoring Well NBCH20TW12

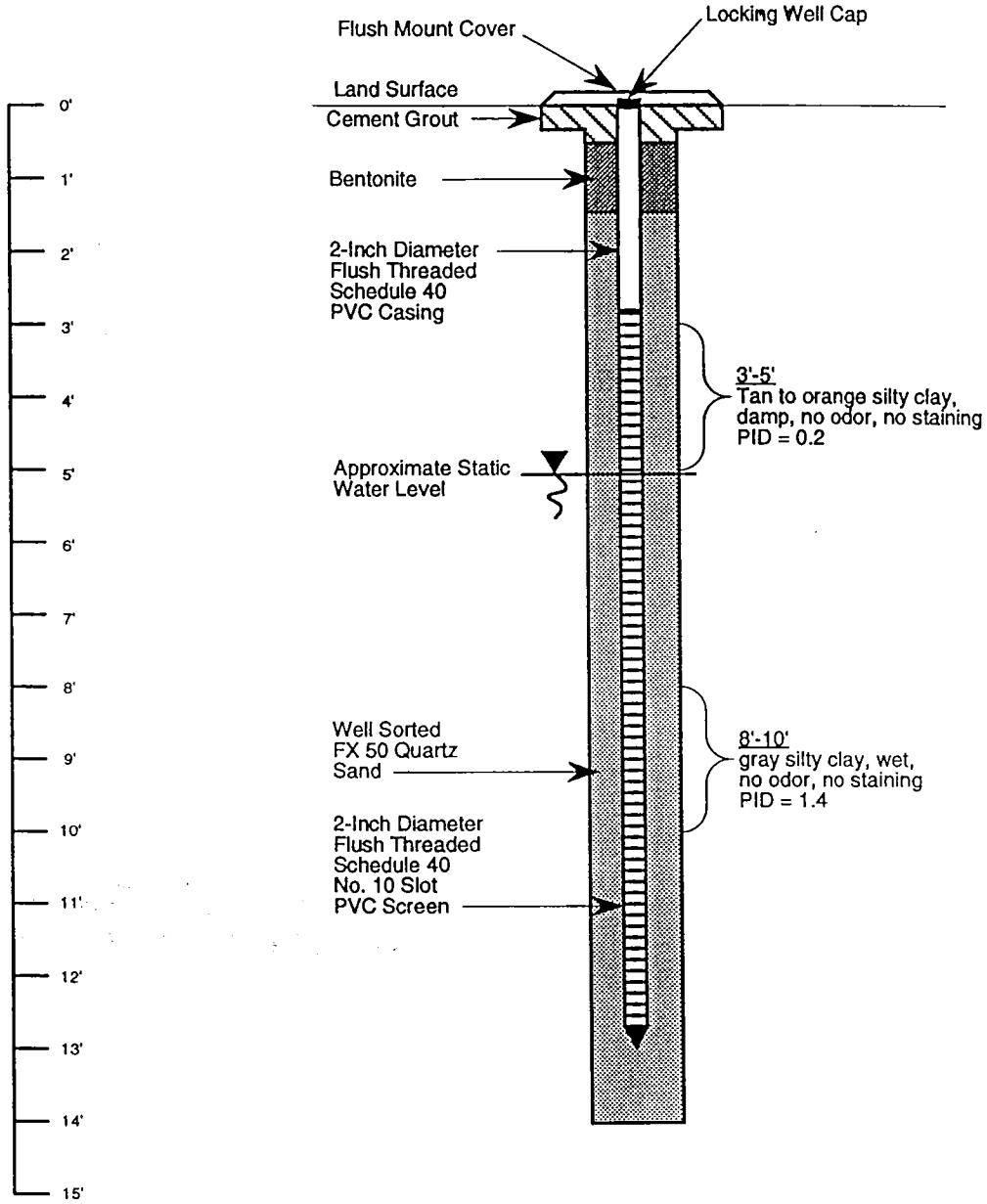
Project: *ZONE H - Naval Base Charleston*	Coordinates: *2321478.14 E, 370233.11 N*
Location: *Charleston, SC*	Surface Elevation: *9.5 feet msl*
Started at *0850 on 10-7-94*	TOC Elevation: *Unknown feet msl*
Completed at *0910 on 10-7-94*	Depth to Groundwater: *Unknown feet TOC* Measured: *none*
Drilling Method: *4.25" ID (7.5" OD) HSA*	Groundwater Elevation: *Unknown feet msl*
Drilling Company: *Alliance Environmental*	Total Well Depth: *15 feet bgs*
Geologist: *S. Weatherford*	Well Screen: *5 to 14.5 feet bgs*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Lithology determined from drill cuttings.	
5								Auger cuttings 0-15'-- Sand: brown-yellow, medium, clayey, loose,wet.	
							SC		
10								Water table at ~ 9' bgs.	
15								TD = 15'.	5.5
20									

WELL DIAGRAM



Date Installed: 6/14/96
Method: Hollow Stem Auger Drill Rig
Latitude: 32°50'45"
Longitude: 79°57'10"
SC Certified Well Driller: Mark Welsh, #1113



NOTE: PID Measured With HNu Photoionization Detector, Model# P1-101
PID Concentrations Reported In Parts Per Million (ppm)

GENERAL ENGINEERING LABORATORIES, INC. environmental consulting and analytical services P.O. BOX 30712 CHARLESTON, SC 29417 (803) 556-8171	PROJECT: cpwc00296		
	EVALUATION OF BASELINE ENVIRONMENTAL CONDITIONS PROPSED CPW LEASE AREAS NAVAL BASE CHARLESTON CHARLESTON, SOUTH CAROLINA	WELL CONSTRUCTION LOG	MW-15
	DATE: June 19, 1996	DRAWN BY: KEC / APPRV. BY: TDJ	

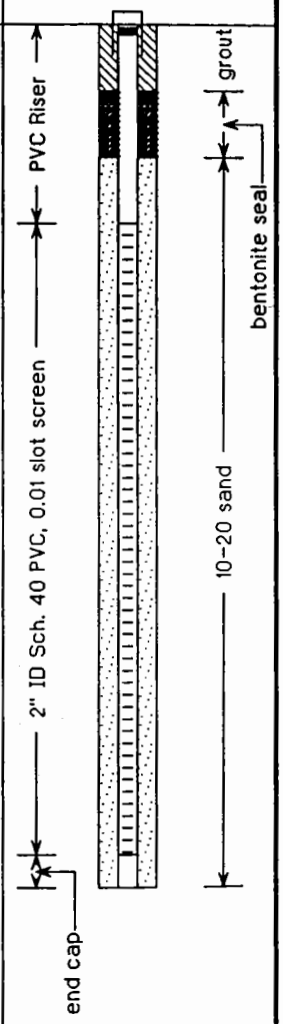
ENSAFE

Monitoring Well NBCH017001

Project: *Zone H–Naval Base Charleston*	Coordinates: *2324956.64 E, 370310.59 N*
Location: *Charleston, SC*	Surface Elevation: *11.6 feet msl*
Started at *1435 on 9–7–94*	TOC Elevation: *11.45 feet msl*
Completed at *1535 on 9–7–94*	Depth to Groundwater: *5.99 feet TOC* Measured: *6–21–95*
Drilling Method: *4.25" ID (7.5" OD) HSA with split spoon*	Groundwater Elevation: *5.46 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *13 feet*
Geologist: *S. Howard*	Well Screen: *3 to 12.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft–msl)
								Auger cuttings 0–3'-- Sand: brown with black clay and hydrocarbon odor.	
5							CL	Clay: brown to black, slightly sandy, strong hydrocarbon odor	6.6 6.3
			1	38	17				
							CL/SC	Clay: brown with strong hydrocarbon odor, grading to fine green sand; bottom 0.3' is brown, stiff clay.	3.6 2
10			2	0	83				
							CL	Clay: green–gray, some silt, very soft.	1.4 2.4
							SM	Sand: brown, fine, silty.	3.1
15			3	0	83				
20									

WELL DIAGRAM



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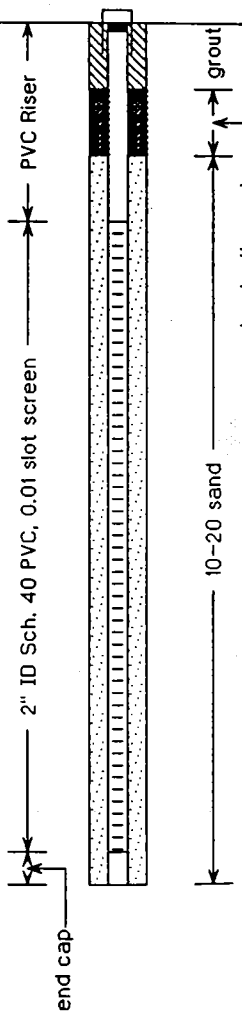
Monitoring Well NBCH017002

Project: *Zone H-Naval Base Charleston*	Coordinates: *2324930.77 E, 370399.29 N*
Location: *Charleston, SC*	Surface Elevation: *10.6 feet msl*
Started at *0825 on 9-8-94*	TOC Elevation: *10.47 feet msl*
Completed at *0915 on 9-8-94*	Depth to Groundwater: *4.66 feet TOC* Measured: *6-21-95*
Drilling Method: *4.25" ID (7.5" OD) HSA with split spoon*	Groundwater Elevation: *5.81 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *13 feet*
Geologist: *S. Howard*	Well Screen: *3 to 12.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							SP	Sand: brown, fine to medium with gravel, poorly sorted.	7.6 / 7.3
5			1	0	13				
				25				*Black sludge on auger flights with strong solvent-like odor.*	2.6
							OH	Clay: black to dark gray, fat, minor sand and shell hash at base, no odor.	
10			2	0	100				.6
							OH	Silt: green-brown, organic-rich with plant fragments and dark gray to black, soft clay with occasional small plant roots, sulfurous odor.	2.4
15			3	0	100				4.4
20									

WELL DIAGRAM



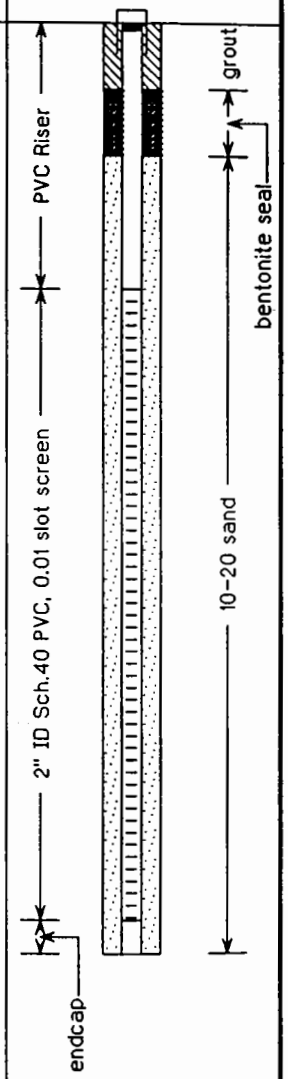
ENSAFE

Monitoring Well NBCH017003

Project: *Zone H-Naval Base Charleston*	Coordinates: *2324850.65 E, 370346.19 N*
Location: *Charleston, SC*	Surface Elevation: *11.5 feet msl*
Started at *1045 on 9-8-94*	TOC Elevation: *11.39 feet msl*
Completed at *1145 on 9-8-94*	Depth to Groundwater: *4.29 feet TOC* Measured: *6-21-95*
Drilling Method: *4.25" ID (7.5" OD) HSA with split spoon*	Groundwater Elevation: *7.10 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *14 feet*
Geologist: *S. Howard*	Well Screen: *4 to 13.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							SC	From posthole cuttings-- Sand: light brown, fine, with some clay and gravel--fill.	9.5
							GC	Sand: light brown, poorly sorted, gravelly, and clayey.	8.5
5			1	0	100				6.5
							ML OH	Clay: black, soft, with high organic content.	3.5
							OH	Silt: green, organic rich, crude horizontal layering, sulfurous odor.	2.5
10			2	0	75				2
							OH	Silt: brown-green, organic-rich, with gray clay and plant fragments throughout.	1.5
15			3	0	100				3.5
20									

WELL DIAGRAM



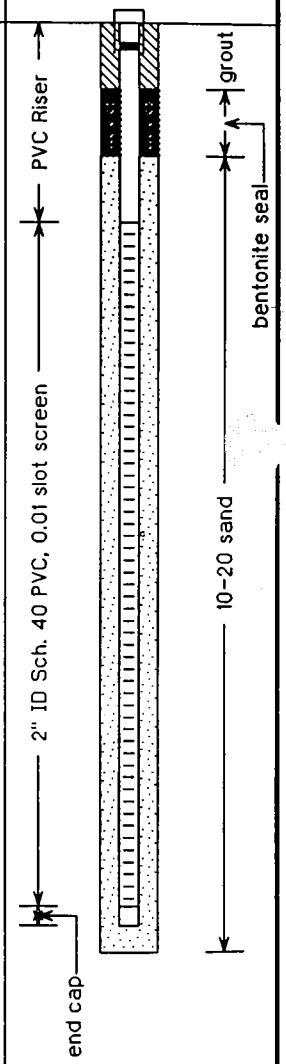
ENSAFE

Monitoring Well NBCH017004

Project: *Zone H–Naval Base Charleston*	Coordinates: *2324906.63 E, 370122.05 N*
Location: *Charleston, SC*	Surface Elevation: *10.2 feet msl*
Started at *1545 on 9–10–94*	TOC Elevation: *9.80 feet msl*
Completed at *1610 on 9–10–94*	Depth to Groundwater: *3.25 feet TOC* Measured: *12–8–94*
Drilling Method: *4.25" ID (7.5" OD) HSA with split spoon*	Groundwater Elevation: *6.55 feet msl*
Drilling Company: *Alliance*	Total Depth: *13 feet*
Geologist: *S. Weatherford*	Well Screen: *3 to 13.3 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft–msl)
									7.2
							OH	Auger cuttings 3–5'-- Clay: black to dark gray-green, soft, fat.	
5			1	0	0				5.2
									2.2
							SM	Sand: gray-green, fine, with shell hash.	
									1.2
							OH	Clay: gray-green with black staining.	.7
10			2	0	83				
			3	0	100				1.8
							SM	Auger cuttings 12–14'-- Sand: gray-green, fine, wet.	
									3.8
15									
20									

WELL DIAGRAM



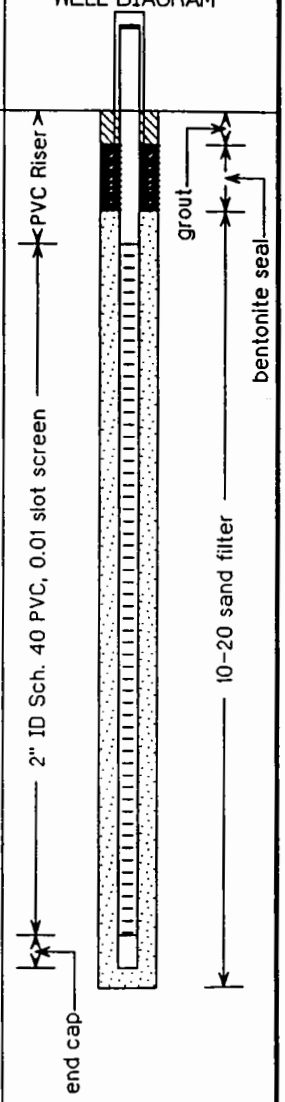
ENSAFE

Monitoring Well NBCH017005

Project: *ZONE H – Naval Base Charleston*	Coordinates: *2324989.88 E, 370448.46 N*
Location: *Charleston, SC*	Surface Elevation: *10.5 feet msl*
Started at *1015 on 4-7-95*	TOC Elevation: *10.29 feet msl*
Completed at *1100 on 4-7-95*	Depth to Groundwater: *4.42 feet TOC* Measured: *4-12-95*
Drilling Method: *4.25" ID (7.5" OD) HSA with split spoon*	Groundwater Elevation: *5.87 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *12.9 feet*
Geologist: *Peter Bayley*	Well Screen: *2 to 12 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
									7.5
							SM SC	Sand: orange with trace of gray, very fine to fine, silty, some clay to clayey, moist with sand, gray, very fine to fine.	6.9
							CH OH	Clay: black, some silt, moist to wet, plastic, firm, olive colored laminae at 3.5-4.5'.	5.5
5			1	0	100				
									2.5
							SP	Sand: dark gray, very fine to fine, trace to some silt, wet, soft.	2.1
10			2	0	25				
									2.5
							CH	Clay: dark brown-gray, some silt, wet, firm, plastic, wood (root) at 13.3-13.8' and 14.8' interbedded with 1" silt, yellow-brown, clayey with very fine sand, wet, firm, plastic.	
15			3	0	100				4.5
20									

WELL DIAGRAM



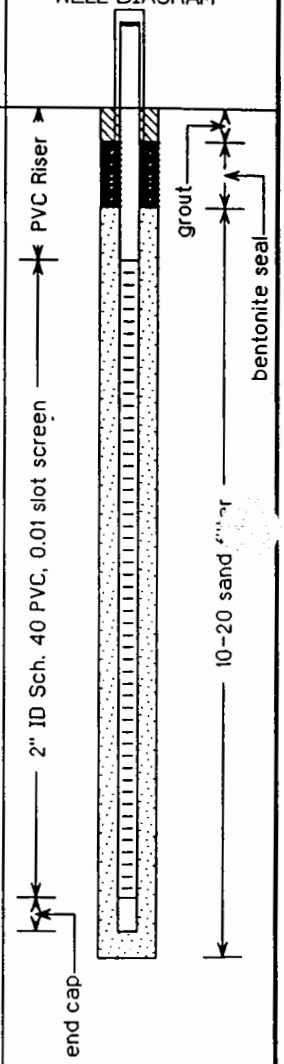
ENSAFE

Monitoring Well NBCH017006

Project: *ZONE H – Naval Base Charleston*	Coordinates: *2324905.25 E, 37048.59 N*
Location: *Charleston, SC*	Surface Elevation: *10.4 feet msl*
Started at *0850 on 4-7-95*	TOC Elevation: *10.26 feet msl*
Completed at *0930 on 4-7-95*	Depth to Groundwater: *4.24 feet TOC* Measured: *4-12-95*
Drilling Method: *4.25" ID (7.5" OD) HSA with split spoon*	Groundwater Elevation: *6.02 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *12.4 feet*
Geologist: *Peter Bayley*	Well Screen: *2.4 to 12.4 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							SM / SC	Sand: orange, very fine to fine, silty, clayey, moist, slight plasticity.	7.4 / 6.7
							CH	Clay: grayish-black to olive, some silt, wet, plastic, firm.	6.1
5			1	0	66				
							SC	Sand: gray with trace of black, very fine to fine, some silt to silty clayey, wet, grades to very clayey at base.	2.4 / 2.2
							CH	Clay: gray, some silt, wet, soft to firm, plastic; with 2" sand lense, gray, very fine to fine, soft, wet.	.6
10			2	0	92				
							CH	Clay: brown to dark gray-black, some silt, wet, plastic, firm.	2.6 / 3.1
							SC	Sand: yellow-brown grading to yellow gray at basal 2", very fine to fine, some silt to silty clay, trace of CaCO-in upper 3", soft, wet.	4.1
							CH	Clay: yellow to gray brown with banding and gray mottle, some silt, plastic, wet.	4.6
15			3	0	100				
20									

WELL DIAGRAM



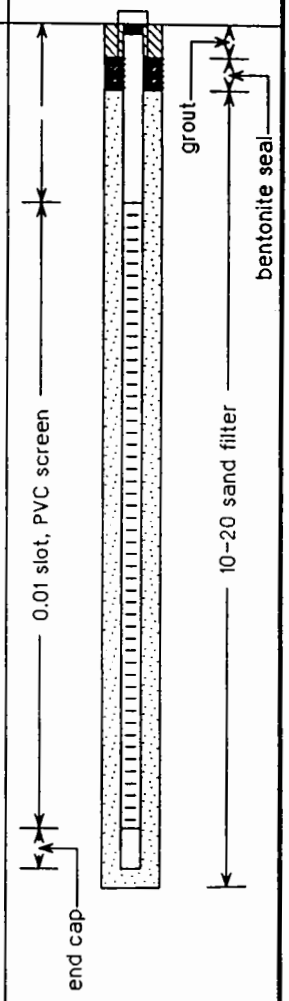
ENSAFE

Monitoring Well NBCH017007

Project: *Zone H–Naval Base Charleston*	Coordinates: *2324817.05 E, 370438.39 N*
Location: *Charleston, SC*	Surface Elevation: *11.2 feet msl*
Started at *1400 on 6–04–98*	TOC Elevation: *11.13 feet msl*
Completed at *1540 on 6–04–98*	Depth to Groundwater: *5.16 feet TOC* Measured: *7/21/98*
Drilling Method: *Rotasonic (7.5" OD casing, 3.8" ID coring bit)*	Groundwater Elevation: *5.97 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *12.7 feet*
Geologist: *P. Bayley*	Well Screen: *2.7 to 12.1 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft–msl)
							FILL	Asphalt – Parking Area.	
							SM SC	Sand: lt brown and grey brown; faintly laminated –variable; very fine to fine, silty, clayey; w/occasional <1 cm clay lamination at irregular intervals. @2.4 ft.: piece of wire.	8
5			1		64		SM SC	Sand: lt brown and grey brown; very fine to fine, silty, clayey; wet, soft, plastic; w/some black grains. @ 5.8 ft.: wood – root or stick.	6.2 / 5.4
							CL ML	Clay: dark brown; silty, trace to some sand – very fine; wet, soft, plastic.	3.2
							SP SM	@5.9 to 6.8 ft.: w/ some sand pods: lt yellow brown; vert fine to fine , trace to some silt; moist, soft.	2
10							OL	Sand: yellow brown; very fine to fine, silty, trace to some clay; wet, soft, plastic. @8.0 to 8.8 ft.: w/ clay: dark brown; moist to wet, plastic, soft; as thin, irregular pods and laminae.	2 / .5
							SP SM		.9
							SP	Silt: dark brown grey; some clay to clayey, some sand to sandy; wet, soft, plastic. @9.6. 10.4, and 11.0 ft.: w/ sandy lamniae; very fine to fine, and some very fine white shell fragments.	
15			2		71			Sand: dark brown grey; very fine to fine, silty, w/trace very thin clay laminae; wet, soft. @11.7 to 12.1 ft.: w/ trace silt.	
20									

WELL DIAGRAM



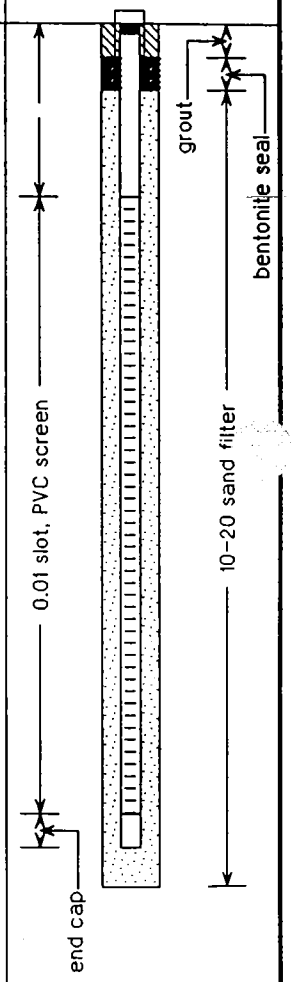
ENSAFE

Monitoring Well NBCH017008

Project: *Zone H-Naval Base Charleston*	Coordinates: *2325028.50 E, 370367.48 N*
Location: *Charleston, SC*	Surface Elevation: *11.1 feet msl*
Started at *1600 on 6-04-98*	TOC Elevation: *10.96 feet msl*
Completed at *1715 on 6-04-98*	Depth to Groundwater: *5.90 feet TOC* Measured: *7/21/98*
Drilling Method: *Rotasonic (7.5" OD casing, 3.8" ID coring bit)*	Groundwater Elevation: *5.06 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *12.4 feet*
Geologist: *P. Bayley*	Well Screen: *2.6 to 12.4 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							FILL	Asphalt - Parking Area.	
							ML CL	Silt: red-orange; some clay to clayey, some sand - very fine; damp, stiff, slightly plastic.	10.3
									7.8
5			1		66		OL OH	Clay: dark grey black; silty; wet, plastic, very soft.	6.1
								@ 5.0 to 6.1 ft.: w/ occasional 1-2 cm sandy pits: yellow brown; very fine, silty.	4.6
							SM	Sand: yellow brown; very fine to fine, silty, trace clay; moist to wet , soft.	
							SP SW	@7.1 to 8.2 ft.: change in color to grey brown. @7.6 ft.: trace of very fine to fine white shell fragments.	2.9
10							SM SC	Sand: grey; very fine to fine/medium. @9.0 ft.: trace silt as indistinct 1-2 cm laminations.	1.2
								Sand: yellow brown; trace to some clay, some silt to silty; wet, soft, plastic.	
								@10.2 to 10.4 ft.: black.	1.9
								@10.7 to 11.4 ft.: Slight increase in grainsize to very fine to fine.	
15			2		80			@11.4 ft.: clay: pits; grey. @11.4 to 11.7 ft.: incerase in grainsize to very fine to medium.	
								@11.7 to 13.0 ft.: alternating 1-2 cm sand and clay laminations.	
								Clay lams yellow brown and grey brown; wet, plastic, soft. Sand is brown; very fine to fine/medium; trace to silty, and trace of very fine white shell fragments.	
20									

WELL DIAGRAM



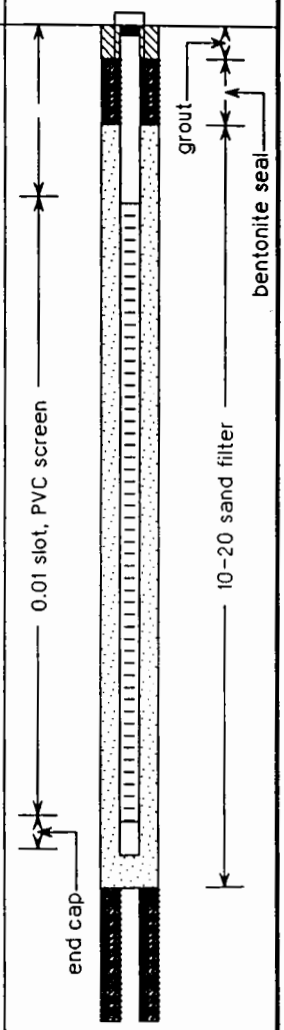
ENSAFE

Monitoring Well NBCH017009

Project: *Zone H-Naval Base Charleston*	Coordinates: *2325072.44 E, 370053.52 N*
Location: *Charleston, SC*	Surface Elevation: *8.2 feet msl*
Started at *1045 on 6-07-98*	TOC Elevation: *8.10 feet msl*
Completed at *1220 on 6-07-98*	Depth to Groundwater: *3.38 feet TOC* Measured: *7/21/98*
Drilling Method: *Rotasonic (7.5" OD casing, 3.8" ID coring bit)*	Groundwater Elevation: *4.72 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *12.5 feet*
Geologist: *P. Bayley*	Well Screen: *2.7 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)
							FILL	Asphalt - Parking Area.	
							SP SM	ROC: gravel with silty matrix as fill below road pavement.	7.2
							SP	Sand: yellow brown; very fine to fine, trace to some silt, w/occasional pebble; loose.	6.8
								Sand: brown; very fine to fine, trace medium, trace silt; wet, soft.	5.7
5			1		50				
10							SP SW	Sand: brown grey; very fine to fine/medium, trace silt; with some fine black grains and some white shell fragments - medium to coarse; wet, soft - loose.	1.8
								@10.1 to 11.5 ft.: w/ a few clay pods: dark grey black.	
							OL OH	@11.5 to 12.5 ft.: some clay pods: dark grey black.	4.3
								Silt: dark grey black; clayey; wet, soft, plastic; w/occasional scattered grasses - brown.	
15			2		50			Shelby Tube sample - Silt as above.	6.8
			3		100				
20									

WELL DIAGRAM



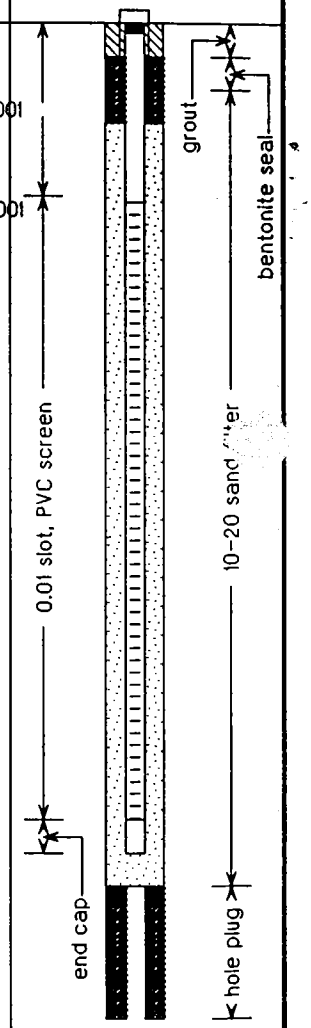
ENSAFE

Monitoring Well NBCH017010

Project: *Zone H-Naval Base Charleston*	Coordinates: *2324767.85 E, 370151.23 N*
Location: *Charleston, SC*	Surface Elevation: *11.2 feet msl*
Started at *1440 on 6-07-98*	TOC Elevation: *10.97 feet msl*
Completed at *1600 on 6-07-98*	Depth to Groundwater: *5.88 feet TOC* Measured: *7/21/98*
Drilling Method: *Rotasonic (7.5" OD casing, 3.8" ID coring bit)*	Groundwater Elevation: *5.09 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *12.5 feet*
Geologist: *P. Bayley*	Well Screen: *2.7 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)
								Concrete - Parking Area.	
							SP	Sand: lt brown; very fine to fine; loose.	9.900001
									8.400001
5			1		56				
10							SP SM	Sand: lt brown; very fine to fine, trace to some silt -variable; wet, loose.	2
								@9.4 to 9.8 ft.: some dark grey black, very thin laminations.	1.4
							SP SW	Sand: dark grey; very fine to fine/trace medium, w/occasional coarse to 1 cm white shell fragments disseminated throughout; wet, loose.	1.1
							OL OH	Silt: dark grey black; clayey; wet soft, plastic; H2S odor. @12.8 to 13.0 ft.: some grasses, brown. @13.1 and 13.8 ft.: bits of brown grass.	
15			2		58			Shelby Tube sample - Silt as above.	3.8
			3		100				
20									

WELL DIAGRAM



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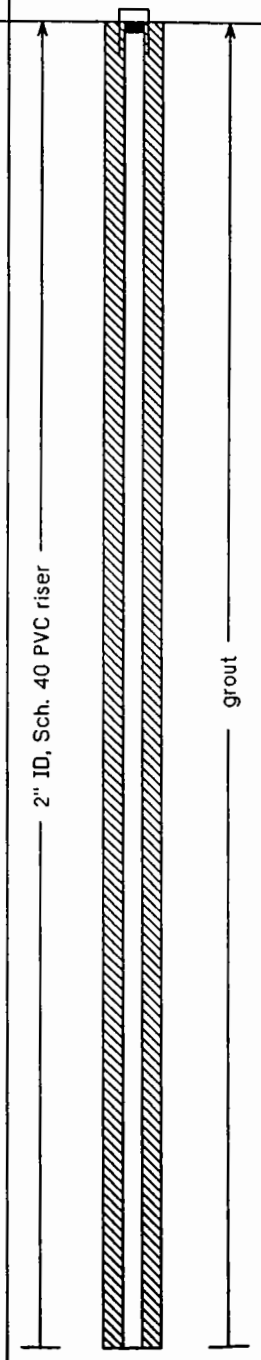
Monitoring Well NBCH01702D

Project: *Zone H–Naval Base Charleston*	Coordinates: *2324944.48 E, 370420.77 N*
Location: *Charleston, SC*	Surface Elevation: *10.2 feet msl*
Started at *0955 on 6–04–98*	TOC Elevation: *10.12 feet msl*
Completed at *1200 on 6–04–98*	Depth to Groundwater: *7.31 feet TOC* Measured: *7/21/98*
Drilling Method: *Rotasonic (7.5" OD casing, 3.8" ID coring bit)*	Groundwater Elevation: *2.81 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *44.0 feet*
Geologist: *P. Bayley*	Well Screen: *34.1 to 43.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Asphalt – Parking Area.	
							SM SC	Sand: orange w/trace grey; very fine, silty, trace to some clay; firm.	9.2 / 8.7
							ML CL	Silt: grey and brown; trace to some sand – very fine, some clay; slight plasticity, firm.	8.2
							SM SC	Sand: orange w/trace grey; very fine, silty; w/occasional clay lamination; trace mica.	6.8
							OL OH	Silt: dark grey black; clayey; soft, sticky.	
5			1		100		SM SP	@4.6 to 5.0 ft.: color change to dark brown and dark grey.	5.2
							OL OH	Sand: brown; very fine to fine; some silt to silty; w/occasional very thin black parting along bedding; firm.	4.1
								Silt: dark grey black; clayey; soft, sticky.	2.3
							SM SP	Sand: brown; very fine to fine, some silt to silty; firm, trace very fine mica; occasional clay pods–dark grey black.	
10									2
15			2		50		SM SP	Sand: brown: very fine to fine; some silt to silty; trace very fine mica.	4.8
							OL OH	@15.4 to 15.5 ft.: Silt: dark grey black; clayey; soft, sticky.	5.6 / 6.4
							SM	Silt: dark grey black; clayey; soft, sticky.	6.7
							OL OH	@16.6 to 16.9 ft.: Sand: lt brown; very fine, silty; soft to firm.	
								Silt; dark grey black w/slight green cast; clayey; soft, sticky.	
20								@17.8 to 19.1 ft.: color change to brown and dark grey; w/some peaty vegetation.	
								Silt: grey green; clayey; soft, sticky.	

WELL DIAGRAM



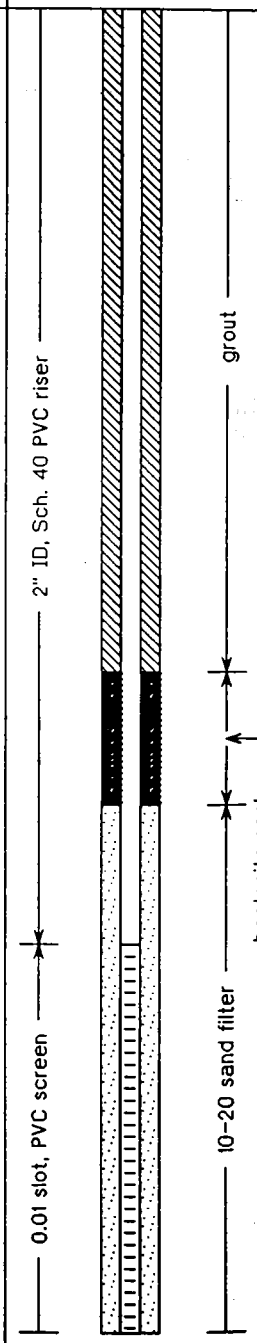
ENSAFE

Monitoring Well NBCH01702D

Project: *Zone H-Naval Base Charleston*	Coordinates: *2324944.48 E, 370420.77 N*
Location: *Charleston, SC*	Surface Elevation: *10.2 feet msl*
Started at *0955 on 6-04-98*	TOC Elevation: *10.12 feet msl*
Completed at *1200 on 6-04-98*	Depth to Groundwater: *7.31 feet TOC* Measured: *7/21/98*
Drilling Method: *Rotasonic (7.5" OD casing, 3.8" ID coring bit)*	Groundwater Elevation: *2.81 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *44.0 feet*
Geologist: *P. Bayley*	Well Screen: *34.1 to 43.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							OL OH	@21.5 ft.:sand pits: to 1 cm dia.; very fine, silty. @22.0 to 22.4 ft.: trace bivalve shells to 1 cm dia.	13.5
25			3		87		OL OH	Silt: grey green; clayey; soft, sticky. @27.0 ft.: 1 cm parting of vegetation. @29.0 to 30.0 ft.: some bivalve shells to 1 cm, and fragments of larger shells; tan.	14.8
30								@30.6 to 30.8 ft.: shelly pod.	20.6
							CL	Clay: blue green, w/some brown; some sand - very fine; firm, plastic. @33.4 ft.: phosphatized shell fragment.	23.5
							SP	Sand: lt brown; very fine, trace silt; soft.	
35			4		100				24.8
							SP	Sand: lt brown; very fine; trace silt.	27.5 27.8
							CL SP	Clay: lt grey green; firm to stiff; plastic; w/some 0.1 to 0.3 ft thick sand laminations/pods - brown, as at 37.7 ft.	
40									

WELL DIAGRAM



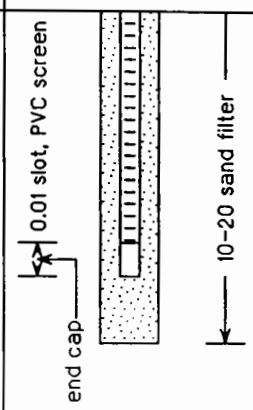
ENSAFE

Monitoring Well NBCH01702D

Project: *Zone H–Naval Base Charleston*	Coordinates: *2324944.48 E, 370420.77 N*
Location: *Charleston, SC*	Surface Elevation: *10.2 feet msl*
Started at *0955 on 6–04–98*	TOC Elevation: *10.12 feet msl*
Completed at *1200 on 6–04–98*	Depth to Groundwater: *7.31 feet TOC* Measured: *7/21/98*
Drilling Method: *Rotasonic (7.5" OD casing, 3.8" ID coring bit)*	Groundwater Elevation: *2.81 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *44.0 feet*
Geologist: *P. Bayley*	Well Screen: *34.1 to 43.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft–msl)
							CL SP		30.7
							SP SM	Sand: dark brown; very fine to fine, trace silt; soft; trace mica.	
							GM GC	@40.9 to 41.7 ft.: Clay laminations: thinly interbedded – frequency and thickness decreasing w/depth.	32.4
							ML CL	Gravel: pebbles to 2 cm, average 0.5 cm; black; in sand matrix; very fine to coarse – granule, some silt to silty, trace to some clay; gradational upper contact.	33.3
45			5		71			Silt: brown; some clay to clayey; damp, very stiff. (Ashley Fm)	34.8
50									
55									
60									

WELL DIAGRAM



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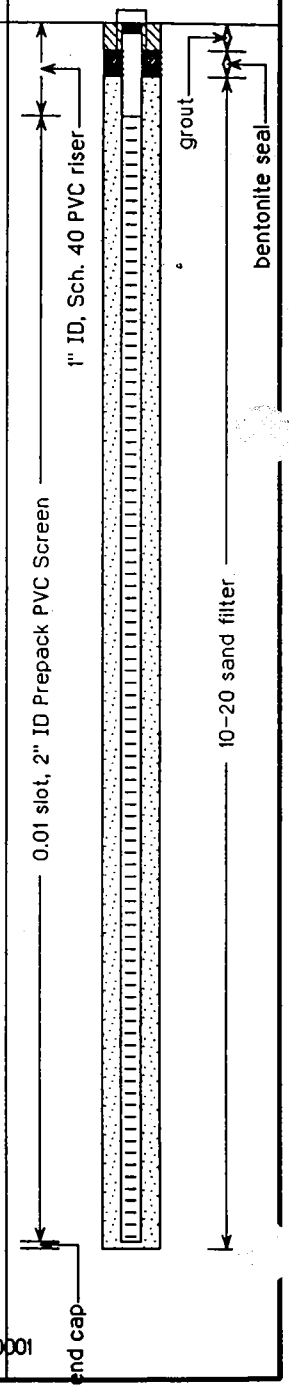
Monitoring Well NBCH017B01

Project: *Zone H-Charleston Naval Complex*	Coordinates: *2325007.0 E, 370336.3 N*
Location: *Charleston, SC*	Surface Elevation: *11.6 feet msl*
Started at *0915 on 04 Dec 99*	TOC Elevation: *11.49 feet msl*
Completed at *1315 on 04 Dec 99*	Depth to Groundwater: *6.31 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *5.18 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *18.5 feet*
Geologist: *P. Bayley*	Well Screen: *1.4 to 18.4 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Surface Conditions: Concrete	
							CL ML	Silt: brown; clayey, trace sand-very fine; moist to wet, soft, plastic.	10.8
			1		25			No Recovery	
5			2		0			No Recovery	
			3		0		OL OH	Silt: dark grey-black; clayey; wet, soft, plastic.	3.6
							SP	@8.3 ft.: lt grey, non-calcareous hard streak.	3.2
							ML CL	Sand: dark brown; very fine, trace to some silt; wet, loose.	2.8
10							SP	Silt: yellow brown; clayey; wet, firm, plastic; calcareous.	2.1
			4		80		SP	Sand: grey; very fine to fine, trace silt; wet, loose; trace very fine black grains. @13.1 ft.: peaty vegetation. @13.1 to 13.5 ft.: trace to some silt, trace to some clay. @13.5 to 13.9 ft.: w/yellow-brown clay.	1.2
							SM SC		.6
			5		100		SC		1.5
15							SP	Sand: brown: very fine, trace to some silt; wet, loose.	1.9
							ML	Silt: yellow-brown; trace clay, trace sand-very fine; wet, soupy- sticky.	2.3
							SM ML	Silt: yellow-brown; sandy-very fine, trace clay; wet, soft to firm; slight plasticity. @16.0 to 18.7 ft.: some yellow-brown vegetation.	3
			6		80		OL OH	Silt: dark grey-black, w/slight greenish cast; wet, soft, plastic. @18.4 amd 19.3 ft.: brown vegetation. @19.5 to 20.0 ft.: color change to brown w/trace brown vegetation.	3.8
20			7		83				4.4
									5.4
									5.9
									8.400001

WELL DIAGRAM



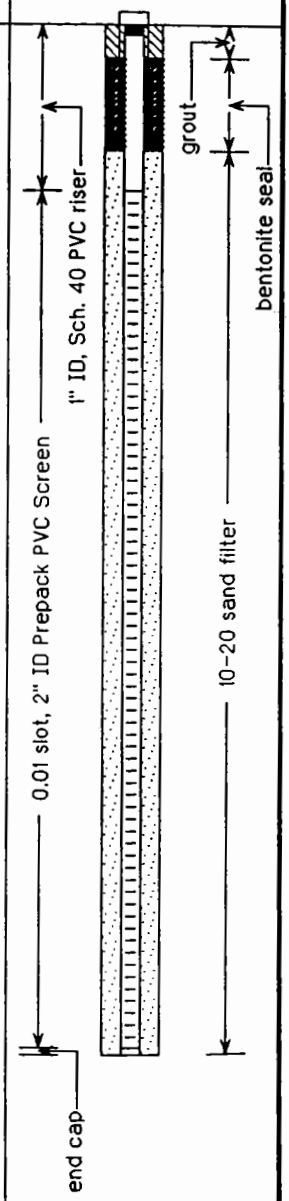
ENSAFE

Monitoring Well NBCH017B02

Project: *Zone H–Charleston Naval Complex*	Coordinates: *2324966.4 E, 370351.1 N*
Location: *Charleston, SC*	Surface Elevation: *11.7 feet msl*
Started at *0900 on 21 Nov 99*	TOC Elevation: *11.52 feet msl*
Completed at *1000 on 21 Nov 99*	Depth to Groundwater: *6.04 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *5.48 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *15.5 feet*
Geologist: *P. Bayley*	Well Screen: *2.5 to 15.4 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Surface Conditions: Grass/silty soil	11
							SP	Sand: tan; very fine; dry, loose.	10.7
							ML CL	Silt: dark grey and yellow-brown; trace to some sand-very fine, clayey; moist to wet, soft, plastic.	8.6
							SM	Sand: lt brown-grey; very fine, silty; wet, loose.	8.1
			1		90		OL OH	Silt: dark grey-black w/slight greenish cast; clayey; wet, soft, plastic. @5.1 to 5.4 ft.: yellow-brown coloration.	7.7
5							SM	Sand: yellow-brown; very fine, silty; wet, loose.	5.6 / 5.4
			2		77		SM	Sand: yellow-brown; very fine, silty; wet, soft, slight plasticity; w/some very fine black grains.	4.7
							OL OH	Silt: dark grey-black w/slight greenish cast; clayey; wet, soft, plastic.	3.1
10			3		100		SP	Sand: grey; very fine to fine w/trace medium, trace silt, trace to some very fine white shell fragments; wet, loose; fuel odor.	1.8
									.1
			4		53				
							SP SM	Sand: grey; very fine to fine, some silt, w/trace very fine white shell fragments and trace very fine black grains; wet, loose.	1.9 / 2.4
15			5		80		OL OH	Silt: dark grey-black w/slight greenish cast; clayey; wet, soft, plastic. @14.3, 14.9 to 15.4, and 15.6 ft.: yellow-brown coloration.	4.3
20									

WELL DIAGRAM



ENSAFE

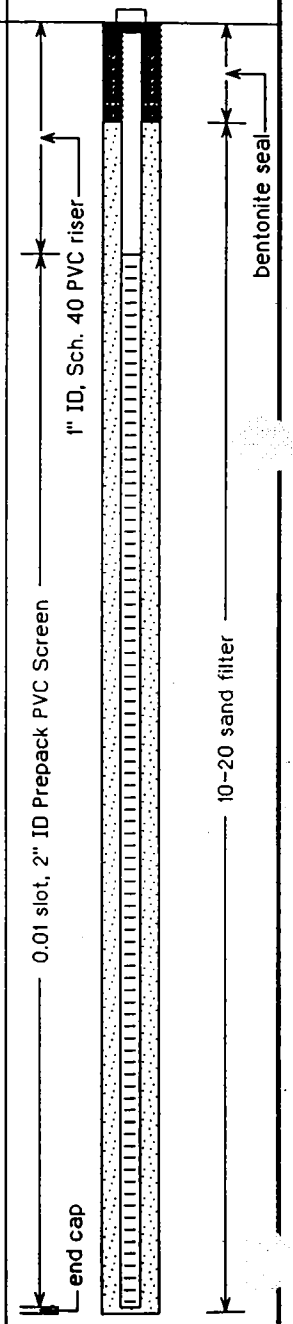
Monitoring Well NBCH017B03

Project: *Zone H–Charleston Naval Complex*	Coordinates: *2324937.1 E, 370354.7 N*
Location: *Charleston, SC*	Surface Elevation: *11.4 feet msl*
Started at *0900 on 23 Nov 99*	TOC Elevation: *12.64 feet msl*
Completed at *1215 on 23 Nov 99*	Depth to Groundwater: *6.93 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *5.71 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *19.5 feet*
Geologist: *P. Bayley*	Well Screen: *3.5 to 19.4 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							SP	Surface Conditions: 1.5 ft. elevated concrete floor Sand: brown; very fine to fine, trace to some silt, trace very fine mica; damp, loose; oil wet-strong fuel odor; sampler tube stained at 1.3 to 1.8 ft (bgs).	8.5
			1		73		SP	Sand: as above; with oil and fuel odor.	7.4 6.5
5									
			2		30		SP	Sand: as above: with oil and fuel odor; @7.2 to 7.6 ft.: color change to dark grey.	4.4 3.8
							OL	Silt: dark brown with dark grey-black mottle; clayey; wet, soft to firm, plastic.	
10			3		93		OL	Silt: dark brown with occasional very thin dark laminae; clayey; wet, soft, plastic. @10.1 to 10.3 ft.: color change to yellow brown.	1.6 1.4 .4
							SP SM	Sand: yellow-brown; very fine, some silt to silty; wet, loose.	.8
			4		73		SP SM SP OL SP OL SP	Sand: grey; very fine to fine, trace to some silt, trace very fine black grains, trace very fine white shell fragments; wet, loose. @14.2 to 14.5, and 14.9 to 15.3 ft.: Silt: dark grey-black; clayey. @14.5 to 14.6 ft.: oil pocket.	1.6 2 2.8 3.1 3.5 3.9 4.1
15									
			5		83				
							SP	Sand: grey; very fine to fine, trace to some silt; trace very fine black grains, trace very fine to medium white shell fragments, trace very fine mica; wet, loose.	6.1 7.4
			6		43		OL	Silt: dark grey-black; clayey; wet, soft, plastic; w/a thin yellow- brown laminae at top.	
20									

@19.0 ft.: color develops slight greenish cast.

WELL DIAGRAM



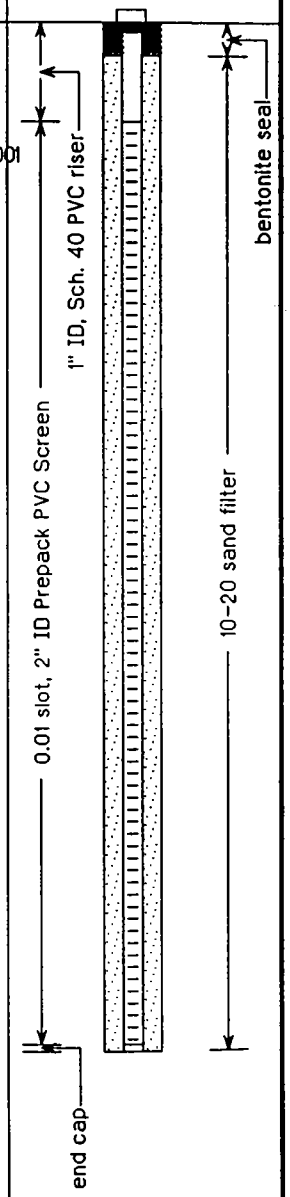
ENSAFE

Monitoring Well NBCH017B04

Project: *Zone H-Charleston Naval Complex*	Coordinates: *2324909.3 E, 370362.4 N*
Location: *Charleston, SC*	Surface Elevation: *11.4 feet msl*
Started at *1135 on 22 Nov 99*	TOC Elevation: *12.54 feet msl*
Completed at *1400 on 22 Nov 99*	Depth to Groundwater: *6.18 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *6.36 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *15.5 feet*
Geologist: *P. Bayley*	Well Screen: *1.5 to 15.4 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							SP	Surface Conditions: 1.5 ft. elevated concrete floor Sand: brown and dark brown; very fine, trace very fine mica; dry, loose; slight fuel odor. @0.6 to 2.0 ft.: very strong fuel odor, possibly oil wet.	9.400001
			1		50		SP	Sand: dark brown; as above; strong fuel odor.	7.4 7.2
5							OL	Silt: dark brown w/black mottle; clayey; damp, firm, plastic. @5.0 to 5.6 ft.: oil spots - free product.	
			2		100		SP SM	Sand: yellow-brown; very fine, some silt to silty, trace clay; wet, loose-sticky; w/very fine black grains; fuel odor. @8.3 ft.: oil stain in sampler.	4.4 2.9
10			3		50		SP SM	Sand: yellow-brown; as at 7.0 ft; faint fuel odor.	1.4 1
							SP	Sand: dark grey; very fine to fine, trace to some silt - variable, w/ trace very fine to fine white shell fragments; wet, loose.	.1
							SP OL	@11.5 to 12.0 ft.: interbedded w/Silt: dark grey-black; clayey.	.6
			4		66		OL		1.6
							SP SM OL	Silt: dark grey-black w/slight greenish cast; clayey; wet, soft, plastic; occasional very small sandy pits. @13.5 ft.: peaty vegetation. @13.8 to 14.4 ft.: Sand: yellow-brown; very fine to fine, some silt to silty. @14.6 to 15.0 ft.: some yellow-brown grass.	2.4 3 3.6
15			5		63				
20									

WELL DIAGRAM



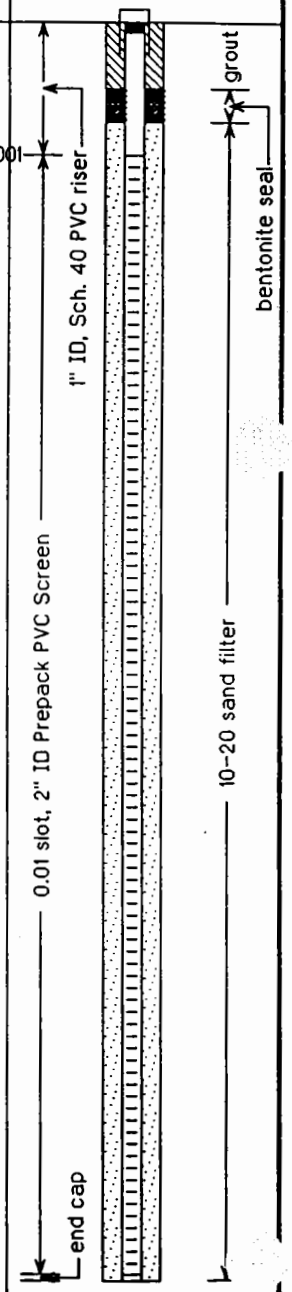
ENSAFE

Monitoring Well NBCH017B05

Project: *Zone H–Charleston Naval Complex*	Coordinates: *2324893.8 E, 370365.1 N*
Location: *Charleston, SC*	Surface Elevation: *11.9 feet msl*
Started at *0910 on 06 Dec 99*	TOC Elevation: *11.68 feet msl*
Completed at *1600 on 06 Dec 99*	Depth to Groundwater: *5.30 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *6.38 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *19.0 feet*
Geologist: *P. Bayley*	Well Screen: *2.0 to 18.9 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	
							GM	Gravel: ROC	10.9
							SP	Sand: lt brown; very fine to fine, trace silt; dry, loose.	10.5
			1		40		OL		9.900001
							ML CL	Silt: dark grey–black; clayey; moist, soft, plastic.	9.6
							SP SM	Silt: olive yellow–brown w/some red–orange; clayey; moist, firm, plastic; pebble at base.	9.1
5			2		66		SP SM	Sand: yellow–brown w/black; very fine to fine, some silt to silty; moist, loose; faint fuel odor.	7.9
							OL OH	Silt: dark grey–black w/faint yellow–brown mottle; clayey; wet, soft, plastic.	6.9 / 6.6
			3		100		SP	Sand: yellow–brown; very fine to fine, trace to some silt; wet, loose. @7.4 to 7.5 ft.: some very thin intebedded silt; grey–black.	4.5
							SP SM	@8.0 to 8.8 ft.: very fine, some silt to silty.	3.9 / 3.1
10			4		27		SP	Sand: grey; very fine, trace to some silt, trace very fine white shell fragments, trace very fine black grains; wet, loose.	.9 / .1
			5		33		SP	Sand: olive yellow–brown; very fine, trace to some silt; trace very fine white shell fragments, trace very fine black grains; wet, loose.	2.1 / 3.1
15			6		33		SP	Sand: olive yellow–brown; as at 14.3 ft.	5.1
							OL OH	Silt: dark grey–black; clayey; wet, soft, plastic. @19.4 to 19.7 ft.: trace brown vegetation.	6.7
20			7		100				8.1

WELL DIAGRAM



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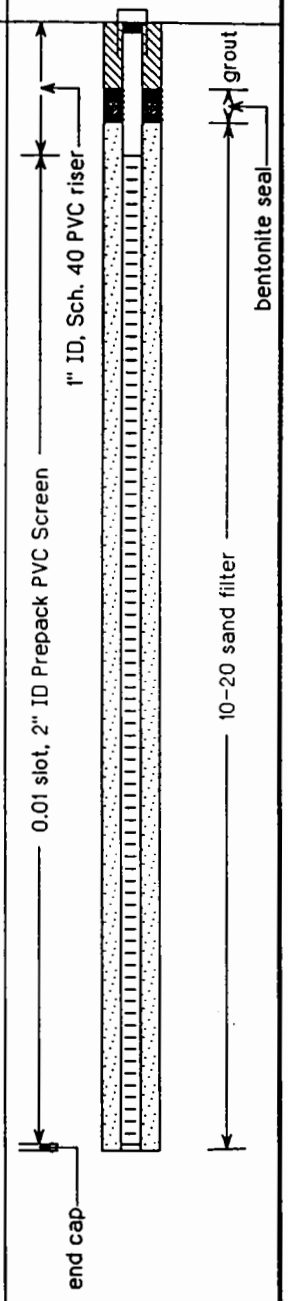
Monitoring Well NBCH017B06

Project: *Zone H–Charleston Naval Complex*	Coordinates: *2324888.7 E, 370343.9 N*
Location: *Charleston, SC*	Surface Elevation: *11.9 feet msl*
Started at *0810 on 02 Dec 99*	TOC Elevation: *11.62 feet msl*
Completed at *1000 on 02 Dec 99*	Depth to Groundwater: *5.03 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *6.59 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *17.0 feet*
Geologist: *P. Bayley*	Well Screen: *2.0 to 16.9 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	
							GM	Gravel: ROC	11.3
							SP		10.9
							SP SM	Sand: lt brown; very fine, trace to some silt; dry, loose.	10.7
								Sand: olive-brown; very fine, some silt to silty; moist, loose; chemical odor.	
5			1		30		SP SM	Sand: olive-brown; as at 1.0 ft; chemical odor.	6.9 / 6.5
							OL OH	Silt: dark olive-brown and black-mottled; clayey; moist, soft, plastic.	
							SM	Sand: olive-brown; very fine, silty, w/trace very fine black grains; wet, loose – slightly sticky; very faint chem odor.	5.1 / 4.9
			2		66		SM	Sand: olive-brown as at 6.8 ft; very faint chem odor.	3.9
10								@10.3 to 10.7 ft.: a few very thin silt laminae; olive-brown; clayey.	1.2
			3		100		OL OH	Silt: dark grey-black; clayey; wet, soft, plastic.	0
							SP	Sand: grey; very-fine to fine, trace very fine black grains, trace very fine white shell fragments; wet, loose.	.7
							OL OH		1.1
			4		66			@12.6 to 13.0 ft.: Silt: dark grey-black; clayey; wet, soft, plastic; trace yellow grass.	2.1
							SP	@14.0 to 16.1 ft.: slightly coarser shell fragments.	
15							SM	@14.9 to 15.1 ft.: silty; w/some peaty vegetation.	3 / 3.2
							SP	@15.1 to 16.1 ft.: color change to brown.	4.2
			5		100		OL OH	Silt: dark grey-black; clayey; wet, soft, plastic.	5.1
20									

WELL DIAGRAM



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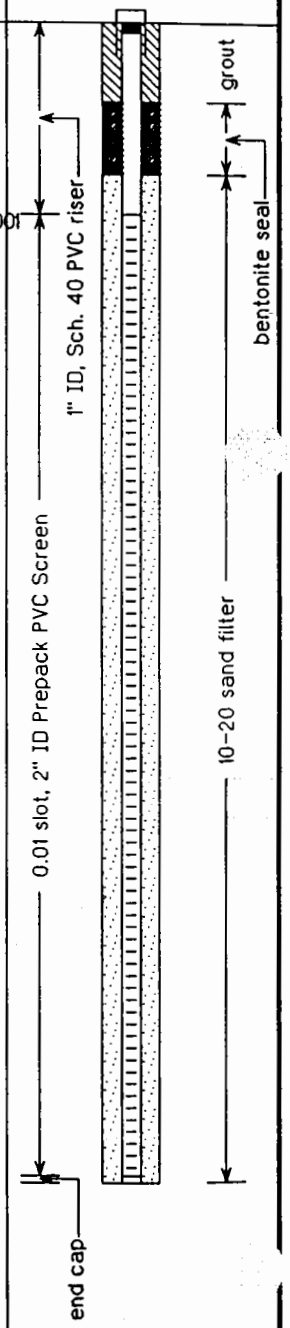
Monitoring Well NBCH017B08

Project: *Zone H–Charleston Naval Complex*	Coordinates: *2324843.3 E, 370319.2 N*
Location: *Charleston, SC*	Surface Elevation: *12.4 feet msl*
Started at *1435 on 04 Dec 99*	TOC Elevation: *12.35 feet msl*
Completed at *1700 on 04 Dec 99*	Depth to Groundwater: *5.44 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *6.91 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *17.5 feet*
Geologist: *P. Bayley*	Well Screen: *2.9 to 17.4 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	
							GM	Gravel: ROC	11.4
								Pushed to 2.0 ft to clear ROC for sampler.	
							ML CL	Silt: brown; clayey; moist, soft, plastic. hit obstruction at 3.0 ft.: Concrete footing.	10.4
			1		100			Offset and push to 5.0 feet before resuming sample collection.	9.400001
5							ML OL	Silt: dark grey–black; clayey; wet, soft, plastic; w/brown, clayey silt; faint chemical odor. @5.5 ft.: ROC pebble.	7.4
							OL OH		6.9
							SM ML	Silt: dark grey–black w/olive drab banding at irregular intervals; clayey; wet, soft, plastic.	6.4
			2		57			Sand: olive drab; very fine, silty; wet, loose.	5.7
							SM ML		4.4
10							OL OH	Silt: olive drab grading rapidly to dark grey–black; clayey; wet, soft, plastic.	2
			3		100		SP	Sand: grey; very fine to fine, trace to some silt, trace very fine white shell fragments, trace very fine black grains; wet, loose.	1.4
									.4
			4		66		SP SM	Sand: grey–brown; very fine, some silt to silty, w/trace very fine white shell fragments, trace very fine black grains; wet, loose– slightly sticky.	1.6
15							OL OH	Silt: dark grey–black; clayey; wet, soft, plastic.	2.4
			5		100			@15.1, 15.2, 15.3, 16.0, and 16.6 ft.: yellow vegetation.	4.6
20									

WELL DIAGRAM



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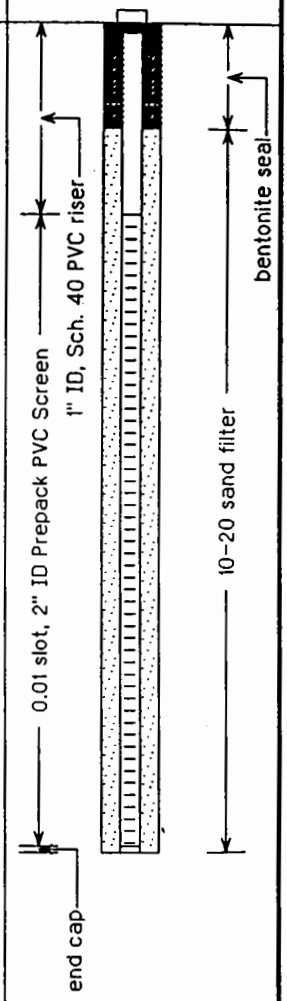
Monitoring Well NBCH017B09

Project: *Zone H–Charleston Naval Complex*	Coordinates: *2324829.0 E, 370258.7 N*
Location: *Charleston, SC*	Surface Elevation: *10.2 feet msl*
Started at *0815 on 01 Dec 99*	TOC Elevation: *12.58 feet msl*
Completed at *1030 on 01 Dec 99*	Depth to Groundwater: *5.32 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *7.26 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *12.5 feet*
Geologist: *P. Bayley*	Well Screen: *2.9 to 12.4 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							SP	Surface Conditions: 2.5 ft. elevated concrete floor.	
							SP SM	Sand: orange; very fine, trace silt; damp, loose.	
								Sand: grey and dark brown; very fine, some silt to silty; damp, firm, slight plasticity. @ 0.5 ft.: plastic sheeting.	7.6
								@1.9 to 2.1 ft.: some black rootlets. @ 2.3 to 2.6 ft.: grades to olive-brown; wet.	
			1	65			SP SM	Sand: olive-brown; very fine, some silt to silty; wet, soft, slight plasticity.	6.2
5							OL OH	Silt: dark grey-black w/slight greenish cast; clayey; wet, soft, plastic.	5.6
			2	100			SP	@6.5 to 6.9 ft.: Sand: grey; very fine to fine, trace to some silt, trace very fine black grains; yellow vegetation; wet, loose.	3.7
							OL OH	@7.2 to 7.6 ft.: yellow-brown coloration w/bits of vegetation. @7.8 to 8.0 ft.: some yellow vegetation. @8.0 to 9.7 ft.: occasional bits of yellow grass.	3.3
10			3	90					2.5
								@11.2 to 12.2 ft.: trace peaty vegetation. @12.2 to 12.8 ft.: increase in peaty veg. @12.8 to 13.0 ft.: peat. @12.0 to 12.8 ft.: color change to brown-grey.	
			4	100				@13.0 to 16.0 ft.: grey w/brown mottle. @13.9 to 15.7 ft.: some peaty veg.	
15							OL OH		
			5	100				@16.0 to 19.0 ft.: w/trace brown mottle and trace random peaty veg.	
								@17.5 & 18.8 ft.: small white bivalve.	
			6	100					8.8
20									

WELL DIAGRAM



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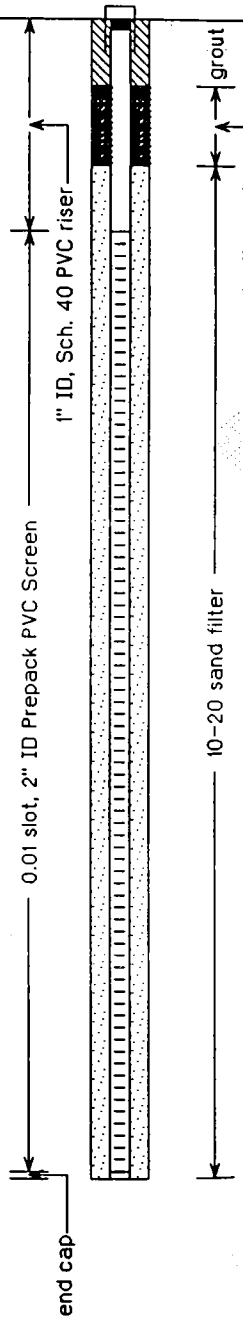
Monitoring Well NBCH017D01

Project: *Zone H-Charleston Naval Complex*	Coordinates: *2324912.9 E, 370402.7 N*
Location: *Charleston, SC*	Surface Elevation: *11.0 feet msl*
Started at *1130 on 03 Dec 99*	TOC Elevation: *10.67 feet msl*
Completed at *1440 on 03 Dec 99*	Depth to Groundwater: *4.69 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *5.98 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *17.5 feet*
Geologist: *P. Bayley*	Well Screen: *3.2 to 17.4 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	
							GM	Gravel: ROC	10
			1		0		GM SM	Gravel: grey; size to 1cm: w/Sand: orange-brown; very fine, silty, trace clay; as matrix.	8 / 7.4
							OL OH	Silt: dark grey-black; clayey; wet, soft, plastic.	7
5			2		33		OL OH	Silt: as at 4.6 ft; w/woody fibers.	5 / 4.9
			3		3		SM	Sand: dark grey; very fine, silty, w/trace to some very fine black grains; wet, loose.	2 / 1.6
10			4		13				
							OL SM	Silt: dark grey; some sand to sandy-very fine, clayey; trace vegetation; wet, soft, plastic.	2 / 2.9
							OL	Silt: dark grey-black, slight mottle; clayey; wet, soft, plastic. @14.2 to 14.3 ft.: traces of yellow-brown vegetation. @14.3 ft.: 1cm sand parting.	3.6
15			5		66		SM	Sand: yellow-brown; very fine, silty; wet, loose-sticky.	4
			6		100		OL OH	Silt: dark grey-black w/slight greenish cast; clayey; wet, soft, plastic. @16.1 to 16.2, and 18.5 to 19.1 ft.: trace brown vegetation. @17.7 to 19.7 ft.: brown mottle.	
20									

WELL DIAGRAM



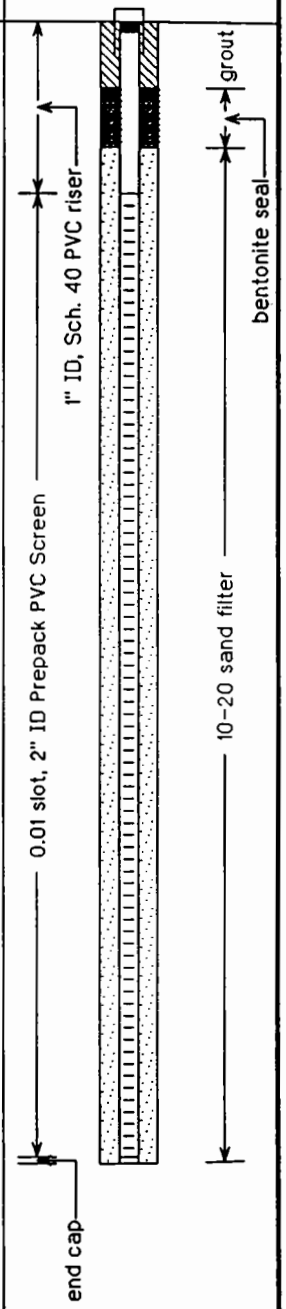
ENSAFE

Monitoring Well NBCH017D02

Project: *Zone H–Charleston Naval Complex*	Coordinates: *2324938.8 E, 370409.6 N*
Location: *Charleston, SC*	Surface Elevation: *10.5 feet msl*
Started at *1715 on 04 Dec 99*	TOC Elevation: *10.34 feet msl*
Completed at *0835 on 05 Dec 99*	Depth to Groundwater: *4.45 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *5.89 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *17.2 feet*
Geologist: *P. Bayley*	Well Screen: *2.6 to 16.9 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	
							GM	Gravel: ROC	9.5
								No Sample Recovery: only traces of Gravel/ROC.	
5			1		0		OL OH	Silt: dark grey–black; clayey; wet, soft, plastic.	5.5
							SM	Sand: olive; very fine, silty; wet, loose–sticky; chemical/fuel odor.	5.1
							OL OH	Silt: dark grey–black; clayey; wet, soft, plastic.	3.6 / 3.2
			2		77		OL OH		2.5
10							SP SM	Sand: grey; very fine, some silt to silty, trace very fine black grains; wet, loose.	.4
			3		100		OL OH	Silt: dark grey–black; clayey; wet, soft, plastic.	.5
							SM	Sand: olive; very fine, silty; wet, loose–sticky; H2S odor.	1.1 / 1.8
			4		43		OL OH	Silt: dark grey–black; clayey; wet, soft, plastic.	3.5
15								@15.8 to 16.5 ft.: peaty vegetation.	
			5		100				6.5
20									

WELL DIAGRAM



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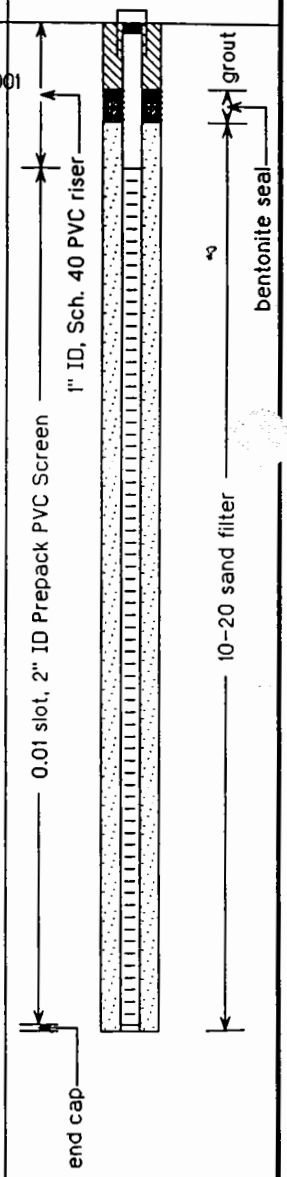
Monitoring Well NBCH017D03

Project: *Zone H–Charleston Naval Complex*	Coordinates: *2324947.8 E, 370389.5 N*
Location: *Charleston, SC*	Surface Elevation: *10.8 feet msl*
Started at *1015 on 21 Nov 99*	TOC Elevation: *10.62 feet msl*
Completed at *1100 on 21 Nov 99*	Depth to Groundwater: *4.73 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *5.89 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *15.2 feet*
Geologist: *P. Bayley*	Well Screen: *2.2 to 15.1 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	
							GM	Gravel: ROC	9.900001
								No Sample Recovery.	
			1		0		ML CL	Silt: yellow-brown; clayey; wet, soft, plastic.	6.8 / 6.5
5							SP SM	Sand: yellow-brown w/some thin black laminae (very fine black grains), and disseminated very fine black grains; very fine, some silt to silty; wet, loose.	5.2
			2		53		SP SM	Sand: yellow-brown; as at 4.3 ft.	3.8 / 3.4
							OL OH	Silt: dark grey-black w/slight greenish cast; clayey; wet, soft, plastic.	
							SP	Sand: grey; very fine to fine, trace silt; trace very fine mica, trace very fine black grains, occasional very thin silty laminae; wet, loose; very faint fuel odor.	1.8 / 1.3* / .8
10			3		83		SP	Sand: dark grey; very fine to fine, trace to some silt, trace very fine white shell fragments, trace to some very fine black grains; wet, loose.	.3
			4		37		SP SM	Sand: yellow-brown; very fine, some silt to silty; wet, loose, plastic.	2.5 / 2.8
							OL		3.3
15							OL OH	Silt: yellow-brown and dark grey-black; clayey; wet, soft, plastic.	
			5		90			Silt: dark grey-black; clayey; wet, soft to firm, plastic. @15.3 to 1.6 ft.: some yellow-brown vegetation.	5.2
20									

WELL DIAGRAM



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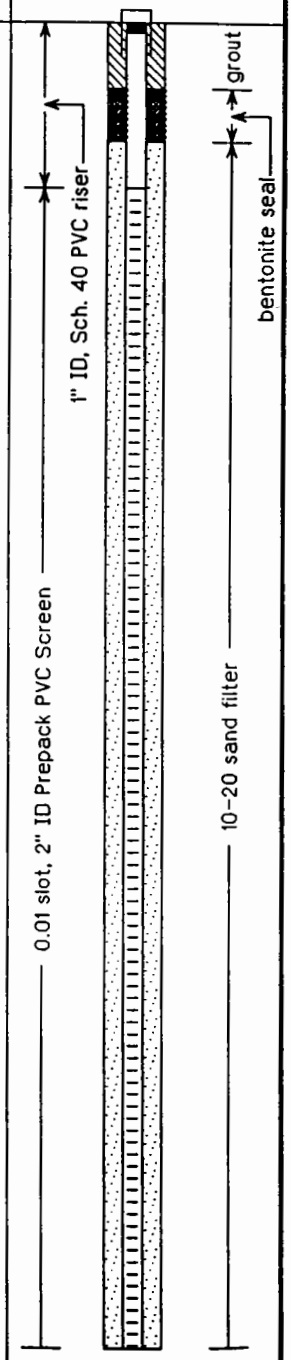
Monitoring Well NBCH017D04

Project: *Zone H–Charleston Naval Complex*	Coordinates: *2324926.6 E, 370386.7 N*
Location: *Charleston, SC*	Surface Elevation: *11.5 feet msl*
Started at *1515 on 03 Dec 99*	TOC Elevation: *11.18 feet msl*
Completed at *1725 on 03 Dec 99*	Depth to Groundwater: *5.15 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *6.03 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *24.4 feet*
Geologist: *P. Bayley*	Well Screen: *2.5 to 24.4 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	
							GM	Gravel: ROC	10.5
							ML CL	Silt: brown and grey; clayey w/occasional pebble; moist, soft, plastic; faint fuel odor.	10 / 9.7
			1		15		SP SM	Sand: yellow-brown, occasional grey; very fine to fine, some silt to silty; wet, loose, slight plasticity; very faint fuel odor.	8 / 7.5
5							OL OH	Silt: dark grey-black; clayey; wet, soft to firm, plastic.	7.1
							SP SM	Sand: brown; very fine to fine, some silt to silty; wet, loose, slight plasticity; some oil, strong fuel odor. @4.9 to 5.5 ft.: color change to grey w/some olive-yellow; faint fuel odor.	6 / 5
			2		66		OL OH		
							SP SM	Silt: dark grey-black; clayey; wet, soft, plastic. @7.1 and 7.6 ft.: olive-yellow color.	3.5 / 3
			3		66		SP SM	Sand: yellow-brown; very fine; some silt to silty; wet, loose; very faint fuel odor.	2
10							OL OH	9.5 to 10.0 ft.: no fuel odor.	1.5
								Silt: dark grey-black; clayey; wet, soft, plastic.	1
							SP	Sand: grey; very fine to fine, trace to some silt, trace very fine white shell fragments; wet, loose.	3
			4		77			No Sample Recovery	
15			5		0		SP	Sand: grey; very fine to fine, trace silt, trace to some very fine black grains, trace very fine white shell fragments; wet, loose.	4 / 5.7
			6		56			No Sample Recovery	
20									

WELL DIAGRAM



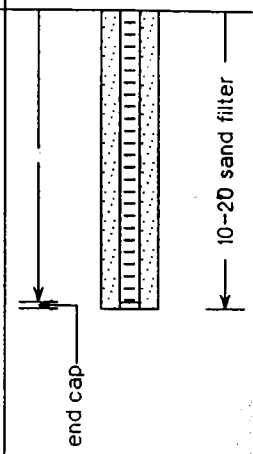
ENSAFE

Monitoring Well NBCH017D04

Project: *Zone H-Charleston Naval Complex*	Coordinates: *2324926.6 E, 370386.7 N*
Location: *Charleston, SC*	Surface Elevation: *11.5 feet msl*
Started at *1515 on 03 Dec 99*	TOC Elevation: *11.18 feet msl*
Completed at *1725 on 03 Dec 99*	Depth to Groundwater: *5.15 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *6.03 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *24.4 feet*
Geologist: *P. Bayley*	Well Screen: *2.5 to 24.4 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
	X		7		0		SP	Sand: grey-brown; very fine to fine, trace to some silt, trace very fine black grains, trace very fine white shell fragments; wet, loose; faint fuel odor.	10
	X		8		100		OL OH	Silt: dark grey-black w/slight greenish cast; clayey; wet, soft, plastic. @23.0 to 24.2 ft.: trace to some peaty vegetation.	10.7
25									13
30									
35									
40									

WELL DIAGRAM



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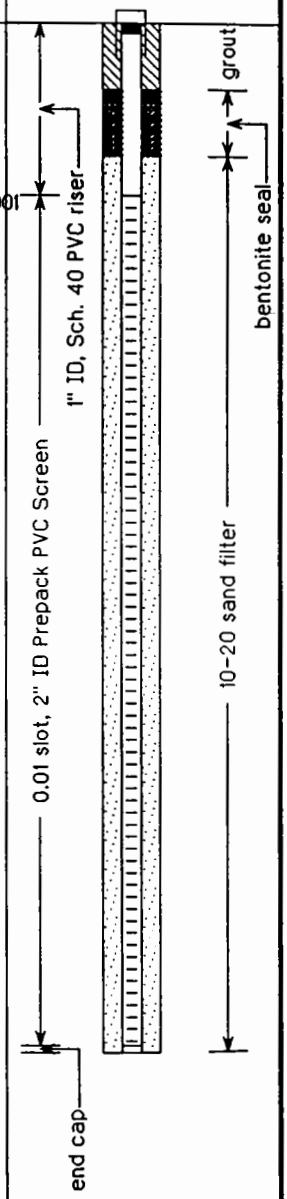
Monitoring Well NBCH017L01

Project: *Zone H–Charleston Naval Complex*	Coordinates: *2324962.0 E, 370324.9 N*
Location: *Charleston, SC*	Surface Elevation: *11.6 feet msl*
Started at *0815 on 21 Nov 99*	TOC Elevation: *11.56 feet msl*
Completed at *0900 on 21 Nov 99*	Depth to Groundwater: *6.14 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *5.42 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *15.5 feet*
Geologist: *P. Bayley*	Well Screen: *2.6 to 15.4 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Surface Conditions: Grass/silty soil	
							ML CL	Silt: brown and dark brown; trace sand–very fine, trace to some clay; dry.	10.7
							GP	@1.9 to 2.1 ft.:Gravel/ concrete fragments:	9.7
							ML CL	w/Sand: tan; very fine; dry. loose.	9.5
							OL ML	Silt: olive–drab, grey, and black; clayey; damp, soft to firm, plastic; very faint fuel odor.	8.900001 / 8.5
			1		78				7.6
5							OL OH	Silt: dark grey w/trace yellow–brown mottle; clayey; wet, soft, plastic.	6.2
							ML SM	Silt: yellow–brown; trace to some sand–very fine; wet, soft–loose.	5.7
			2		63				4.6
							ML SM	Silt: dark grey–black; clayey; wet, soft, plastic.	4.2
							OL OH	@7.7 ft.: a 1 cm Sand: grey; very fine; lamination.	3.3
							SP SM	Sand: grey; very fine to fine; some silt to silty decreasing with depth to trace to some, w/trace very fine black grains, trace coarse white shell fragments; wet, loose.	2.3
10			3		77		SP SM	@10.0 to 10.8 ft.: w/trace very fine shell fragments; slight fuel odor.	1.6 / .8
			4		27				
							SP SM	Sand: grey; as at 10.0 ft.	2
							ML CL	Silt: olive–yellow; trace to some clay; wet, soft, plastic.	2.5 / 2.8
15			5		80		OL OH	Silt: dark grey–black; clayey; wet, soft, plastic. @15.2 and 15.8 ft.: yellow–brown grass.	4.4
20									

WELL DIAGRAM



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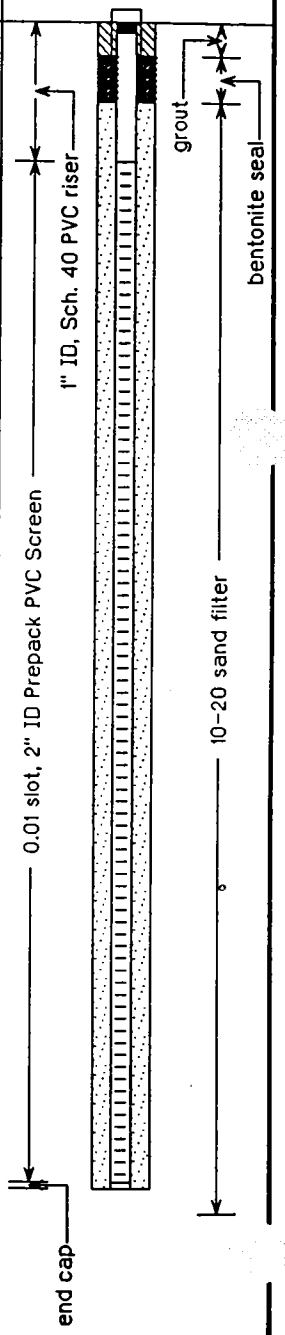
Monitoring Well NBCH017L02

Project: *Zone H–Charleston Naval Complex*	Coordinates: *2324969.4 E, 370302.6 N*
Location: *Charleston, SC*	Surface Elevation: *11.9 feet msl*
Started at *1320 on 21 Nov 99*	TOC Elevation: *11.80 feet msl*
Completed at *1400 on 21 Nov 99*	Depth to Groundwater: *6.51 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *5.29 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *17.6 feet*
Geologist: *P. Bayley*	Well Screen: *2.1 to 17.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							ML	Surface Conditions: Grass/silty soil Silt: brown; trace clay; trace sand–very fine.	11.2
			1		23		OL	Silt: red-brown grading rapidly to dark grey and yellow-brown; clayey; wet, soft, plastic. @4.2 and 4.4 ft.: sand lams: grey; very fine.	7.9
5							SM		7
							SP SM	Sand: grey; very fine to fine; silty; wet, soft, slight plasticity; trace fuel odor. @5.3 ft.: 1cm Silt lam: black. @5.4 to 6.1 ft: dark grey; some silt to silty, w/trace fine to medium white shell fragments.	6.5 5.8
			2		70		SP		4.9
							SM	@7.0 to 7.7 ft.: grey; trace to some silt, trace very fine to coarse white shell fragments; loose.	4.2
							ML CL	@7.7 to 8.5 ft.: silty; soft; w/yellow-brown at top; faint fuel odor.	3.4 2.9
							SP		2.5
10			3		80		SP	Silt: yellow-brown; trace to some clay, trace sand–very fine; wet, soft, plastic.	1.9
							SM	Sand: grey; very fine, trace silt, trace very fine white shell fragments, black grains, and mica; wet, loose; faint fuel odor.	.6
							SP SM		.1 .5
			4		80		SP SM	Sand: yellow-brown and grey; very fine to fine/medium, trace to some silt; wet, loose; w/several very thin clayey silt laminae.	1.1
15								@11.3 to 14.3 ft.: grades to yellow brown; very fine. @11.3 to 12.0 ft.: silty. @12.0 to 14.3 ft.: some silt to silty.	2.4
			5		43			@14.0 to 14.1 ft.: Silt: dark grey-black; clayey. @14.2 ft.: yellow-brown grass.	4.1
							OL OH	Silt: dark grey-black w/slight greenish cast; clayey; wet, soft, plastic.	6.4
			6		77				
20									

WELL DIAGRAM



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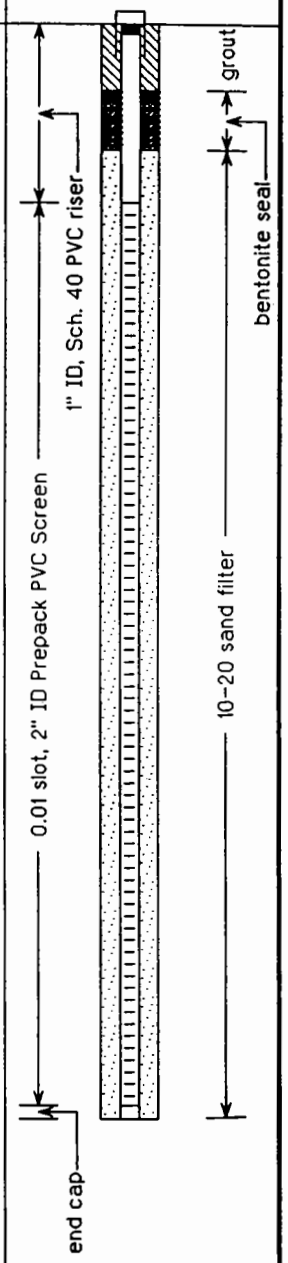
Monitoring Well NBCH017L03

Project: *Zone H-Charleston Naval Complex*	Coordinates: *2324954.7 E, 370301.5 N*
Location: *Charleston, SC*	Surface Elevation: *12.0 feet msl*
Started at *1545 on 20 Nov 99*	TOC Elevation: *11.90 feet msl*
Completed at *1635 on 20 Nov 99*	Depth to Groundwater: *7.05 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *4.85 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *16.5 feet*
Geologist: *P. Bayley*	Well Screen: *2.7 to 16.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Surface Conditions: Grass/silty soil	
							ML SM	Silt: olive and yellow-grey; some sand to sandy-very fine, trace clay; wet, soft, plastic; fuel odor.	11
			1		25				
5									
							SP SM	Sand: brown; very fine, some silt to silty; wet, soft, sticky; oily, strong fuel odor.	6.1
			2		37			@6.8 to 7.0 ft.: color change to yellow brown; no obvious oil/product, still fuel odor.	5
							SM	Sand: yellow-brown and grey; very fine, silty, w/trace very fine white shell fragments; wet, very soft, sticky; fuel odor.	3.4
10			3		47				2
			4		13		SM	Sand: grey; very fine, silty, w/trace very fine white shell fragments; wet, very soft, slightly sticky; faint fuel odor.	.6 / 1
15							SM SC	Sand: yellow-brown; very fine, silty, some clay; wet, soft, sticky- slight plasticity.	2.4 / 2.9
			5		53		OL OH	Silt: dark grey-black w/slight greenish cast; clayey; wet, soft, plastic.	
			6		90				6.7
20									

WELL DIAGRAM



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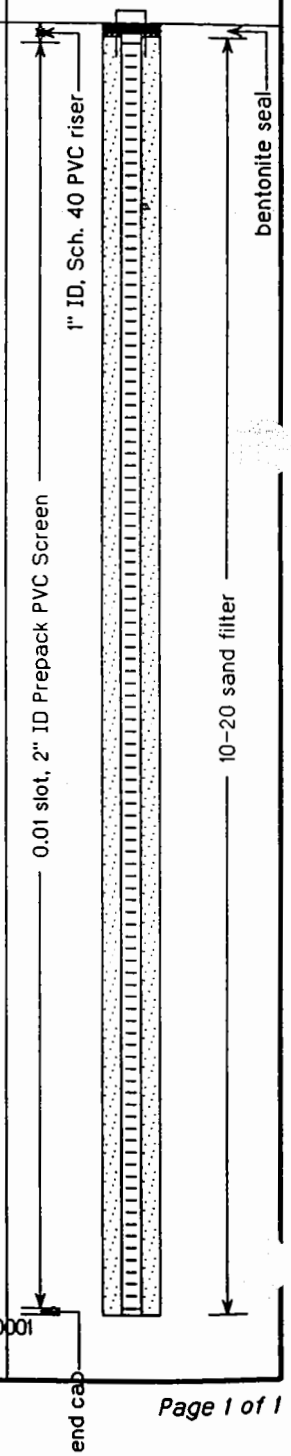
Monitoring Well NBCH017L04

Project: *Zone H–Charleston Naval Complex*	Coordinates: *2324940.7 E, 370319.3 N*
Location: *Charleston, SC*	Surface Elevation: *11.3 feet msl*
Started at *1510 on 22 Nov 99*	TOC Elevation: *12.42 feet msl*
Completed at *1700 on 22 Nov 99*	Depth to Groundwater: *6.75 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *5.67 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *19.5 feet*
Geologist: *P. Bayley*	Well Screen: *0.3 to 19.4 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							SP	Surface Conditions: 1.6 ft. elevated concrete floor Sand: brown w/occasional very thin dark brown laminations; very fine to fine, trace silt; dry, loose; thin, stiff black coating on surface.	9
								Sand: grey-green; very fine to fine, trace to some silt, trace very fine mica; wet, loose; very faint fuel odor.	7.3
			1		58		OL	Silt: dark brown and black – mottled; clayey; wet, firm, plastic. @4.1 to 4.6 ft.: slight decrease in clay.	
5								@5.6 to 6.2 ft.: soft; color change to yellow-brown/grey.	5.1
			2		73		OL OH	Silt: dark grey-black w/slight greenish cast; clayey; wet, soft, plastic.	4.3
							SP	@7.0 to 7.7 ft.: w/occasional yellow-grey lamination.	2.7 2.5
10			3		73		SP	Sand: yellow-brown; very fine to fine, trace to some silt, trace clay, trace to some very fine black grains; wet, loose-sticky.	1.3 1.1
							OL OH	Silt: dark grey-black; clayey; wet, soft, plastic.	.4
			4		100		SP	Sand: dark grey; very fine to fine, trace silt, trace very fine white shell fragments; wet, loose.	1.7
								No Recovery. Only traces of very fine, olive yellow-brown sand in sampler.	
15									
			5		0		SP SM	Sand: olive-brown; very fine to fine; some silt, trace very fine mica, trace to some very fine black grains; wet, loose.	4.7 5.4
			6		23		SP	Sand: yellow-brown w/slight greenish cast; very fine to fine, trace to some silt, trace very fine black grains, trace very fine white shell fragments; wet, loose.	7.7
20							OL OH	Silt: dark grey-black; clayey; wet, soft, plastic.	8.400001

WELL DIAGRAM



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Monitoring Well NBCH017L05

Project: *Zone H-Charleston Naval Complex*	Coordinates: *2324982.6 E, 370298.2 N*
Location: *Charleston, SC*	Surface Elevation: *12.0 feet msl*
Started at *1400 on 19 Nov 99*	TOC Elevation: *feet msl*
Completed at *1450 on 19 Nov 99*	Depth to Groundwater: *feet TOC* Measured:
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *feet*
Geologist: *P. Bayley*	Well Screen: *to feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
								Surface Conditions: Grass/silty soil		
							ML CL	Silt: brown; clayey, trace sand-very fine, occasional granule; damp, firm, plastic. @1.4 to 1.5 ft.: Sand: orange brown; very fine.	
							OL OH	Clay: brown; some silt to silty; wet, soft, plastic. @1.8 to 1.9 and 2.1 to 2.3 ft: Sand: orange-brown; very fine.	9.7	
									8.900001	
			1	78				Silt: dark grey-black; clayey; wet, soft, plastic.	8	
5							OL OH	Silt: dark grey-black; as at 2.3 ft. @4.7 to 5.0 ft.: several 1cm sandy pits.		
							ML OL	Silt: dark grey; trace sand-very fine, trace clay; wet, soft, slight plasticity.	5.7	
			2	93					5.2	
							ML OL	Thinly Interbedded Silt: dark grey-black and olive drab; clayey.	5	
							SP	Sand: grey; very fine to fine, trace silt, trace very fine white shell fragments, trace very fine black grains; wet, loose.	3.7	
									3	
10			3	66					2	
							SP	Sand: grey; as at 8.3 ft.		
									2	
			4	60					1	
							SP SM	Sand: grey and yellow-grey; very fine to fine, some silt to silty; wet, loose.		
									2.5	
15										
			5	50						
							SM	Sand: yellow-grey; very fine, silty; wet, loose, slight plasticity.	4.5	
									4.7	
							OL OH	Silt: dark grey-black w/slight greenish cast; clayey; wet, soft, plastic.		
			6	83				@17.4 to 18.4 ft.: occasional yellow-brown grass.	7	
20										

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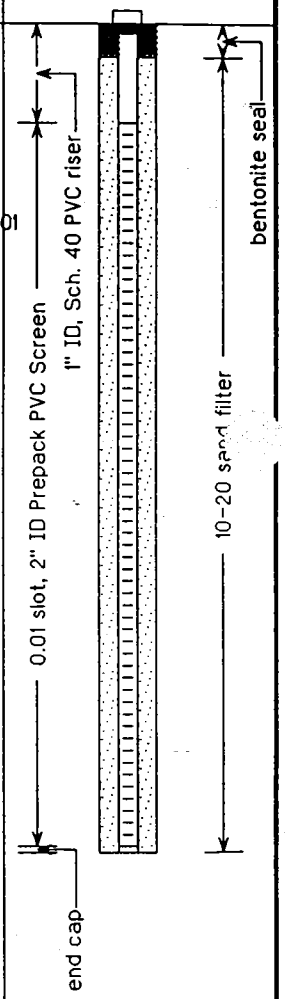
Monitoring Well NBCH017L06

Project: *Zone H–Charleston Naval Complex*	Coordinates: *2324926.9 E, 370324.2 N*
Location: *Charleston, SC*	Surface Elevation: *11.4 feet msl*
Started at *1435 on 23 Nov 99*	TOC Elevation: *12.72 feet msl*
Completed at *0810 on 24 Nov 99*	Depth to Groundwater: *5.04 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *7.68 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *12.5 feet*
Geologist: *P. Bayley*	Well Screen: *1.5 to 12.4 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft–msl)
							SP	Surface Conditions: 1.5 ft. elevated concrete floor Sand: brown; very fine to fine, trace to some silt; damp, loose. @0.6 to 1.7 ft.: color change to lt grey w/occasional brown laminae.	8.400001
			1		75		OL SM	@1.7 to 2.2 ft.: brown-oily, strong fuel odor. @2.2 to 3.0 ft.: lt grey, brown, and trace yellow-orange color laminae.	7.4
5							OL OH	Silt: dark grey-black; clayey; wet, soft, plastic; w/Sand laminae; yellow-brown; very fine, silty; damp, loose.	6.9
			2		90			Silt: dark brown w/black mottle; clayey; wet, firm, plastic.	4.7 4.4
							OL OH	Silt: olive yellow-brown; clayey; wet, soft, plastic.	
							SP SM	Silt: dark olive-brown/grey w/faint darker laminae; clayey; wet, soft, plastic.	2.5 1.8
10			3		87		SP SM	Sand: yellow-brown; very fine, some silt to silty, trace very fine black grains, trace very fine mica, some thin laminae predominantly very fine black grains; wet, loose.	1.4 .5
			4		100		OL OH	Silt: dark grey-black w/slight greenish cast; clayey; wet, soft, plastic. @11.4 ft.: yellow grass. @12.4 to 12.7 ft.: bits of peaty vegetation.	
15									4.1
			5		83		OL OH		4.6
			6		100				7.6
20									

WELL DIAGRAM



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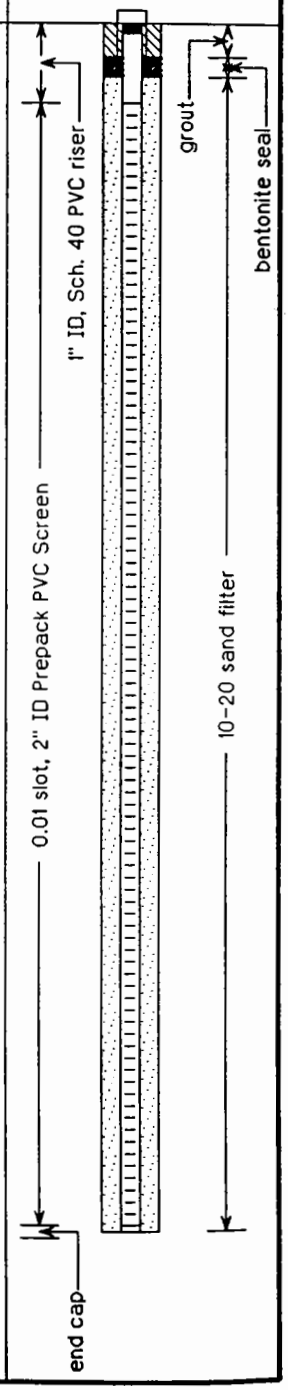
Monitoring Well NBCH017L07

Project: *Zone H–Charleston Naval Complex*	Coordinates: *2324938.8 E, 370271.0 N*
Location: *Charleston, SC*	Surface Elevation: *12.5 feet msl*
Started at *1430 on 05 Dec 99*	TOC Elevation: *12.26 feet msl*
Completed at *1620 on 05 Dec 99*	Depth to Groundwater: *7.03 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *5.23 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *18.2 feet*
Geologist: *P. Bayley*	Well Screen: *1.2 to 18.1 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							ML	Surface Conditions: Grass/silty soil Silt: dark brown; trace sand–very fine; damp, soft, non-plastic.	11.7
			1		40		ML	Silt: dark brown; as above.	10.5 10.2
							OL OH	Silt: dark grey–black w/some grey–brown mottle; clayey; wet, soft, plastic. @2.2 ft.: pebble @2.4 to 2.5 ft.: Sand: grey; very fine.	8
5			2		83		OL OH	Silt: dark grey–black as at 2.3 ft.	7.5 6.8
							SM	Sand: olive yellow–brown; very fine, silty, w/trace very fine black grains; wet, soft, sticky. @6.4 to 6.8 ft.: color change to grey. @6.7 to 6.8 ft.: some <5mm white bivalves.	5.7
							ML CL		4.8 4.5
			3		90		ML CL	Silt: olive yellow–brown; clayey; wet, firm, plastic. @7.0 ft.: yellow–brown vegetation. @7.2 ft.: pocket of free oil/fuel odor. @8.0 ft.: oil at top of run.	3
10							SP SM	Sand: grey; very fine to fine, some silt to silty, trace very fine white shell fragments; slight irridescence in pore water/fuel odor. @9.6 ft.: 1 cm oil stain.	2.4
			4		70		SP	@11.0 ft.: faint fuel odor at top of run. @11.0 to 13.2 ft.: decrease in silt to trace; white shell fragments, coarser and greater quantity.	1.5 .7
			5		73		SM	@14.0 to 15.7 ft.: Silty, trace clay; w/occasional random coarse white shell fragment.	1.5
15							ML CL	Silt: olive yellow–brown; clayey; wet, soft to firm, plastic.	2.3 3.2
			6		57		ML	Silt: olive yellow–brown; some clay; wet, very soft–sticky. @17.0 ft.: trace fine to coarse white shell fragments.	4.5
							OL OH	Silt: dark grey–black; clayey; wet, soft, plastic. @18.8 to 19.0 ft.: trace brown vegetation.	5.9
20			7		100				7.5

WELL DIAGRAM



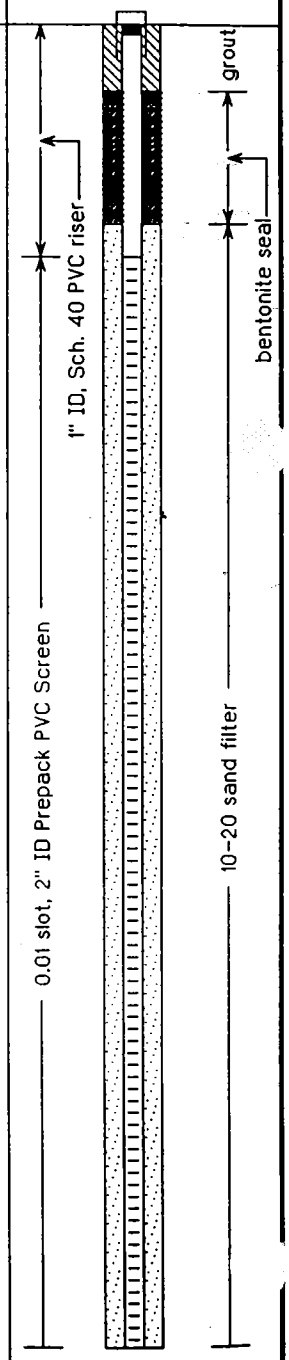
ENSAFE

Monitoring Well NBCH017001

Project: *Zone H-Charleston Naval Complex*	Coordinates: *2324841.3 E, 370359.6 N*
Location: *Charleston, SC*	Surface Elevation: *11.7 feet msl*
Started at *1600 on 02 Dec 99*	TOC Elevation: *11.58 feet msl*
Completed at *1640 on 02 Dec 99*	Depth to Groundwater: *4.46 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *7.12 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *28.5 feet*
Geologist: *P. Bayley*	Well Screen: *3.5 to 28.3 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							GM	Surface Conditions: Asphalt Gravel: ROC	11.1
			1		20				
									7.2
5			2		17		SM SP SP SM	Sand: grey; very fine, silty; wet, loose, slight plasticity. @4.5 ft.: a piece of very thin plastic sheeting.	6.7 6.4 6.1
							OL SP	Sand: grey; very fine to fine, trace medium, w/trace to some very fine white shell fragments; wet, loose.	5.5 5.3
			3		47			Silt: dark grey-black; clayey; wet, soft, plastic.	3.7
								Sand: dark brown; trace to some clay, trace silt; wet.	
10							SP	No Sample Recovery: Sample catcher covered with wet, dark grey, very fine sand.	
			4		0				.7
									1.6
			5		23		SP SM	Sand: grey; very fine, some silt to silty; wet, loose; w/trace very fine white shell fragments.	2.3
15								No Sample Recovery: Sample catcher covered with wet, grey, very fine sand.	
			7		0		SP	Sand heaving into sampler rods. Basal contact for sand inferred at 20 ft. based on heave into sample rods when retracted to 19-20 ft (bgs) to check borehole conditions and lack of sample recovery.	
20			8		0		OL		8.3

WELL DIAGRAM



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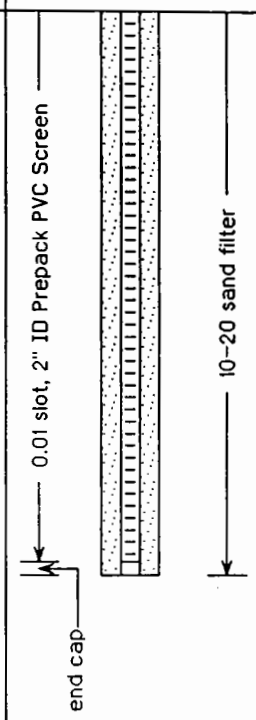
Monitoring Well NBCH017001

Project: *Zone H-Charleston Naval Complex*	Coordinates: *2324841.3 E, 370359.6 N*
Location: *Charleston, SC*	Surface Elevation: *11.7 feet msl*
Started at *1600 on 02 Dec 99*	TOC Elevation: *11.58 feet msl*
Completed at *1640 on 02 Dec 99*	Depth to Groundwater: *4.46 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *7.12 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *28.5 feet*
Geologist: *P. Bayley*	Well Screen: *3.5 to 28.3 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							OL	Silt: inferred from lack of formation heave into sampler rods between runs.	8.3
			9		0				11.3
25									13.7
			10		20		OL	Silt: dark grey-brown; some sand-very fine, trace to some clay; wet, very soft, slight plasticity; w/trace very fine white shell fragments.	14.3
							OL	Silt: dark grey; clayey; wet, soft, plastic.	16.1
			11		40				17.3
30									
35									
40									

WELL DIAGRAM



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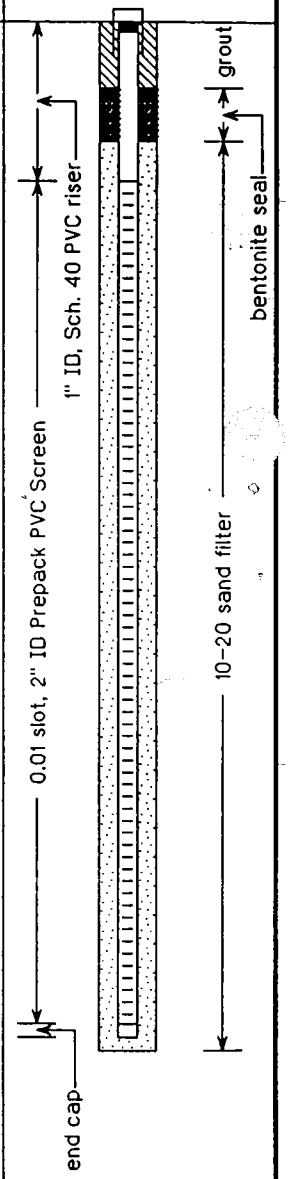
Monitoring Well NBCH017002

Project: *Zone H-Charleston Naval Complex*	Coordinates: *2324845.5 E, 370374.0 N*
Location: *Charleston, SC*	Surface Elevation: *11.7 feet msl*
Started at *1235 on 02 Dec 99*	TOC Elevation: *11.46 feet msl*
Completed at *1335 on 02 Dec 99*	Depth to Groundwater: *4.38 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *7.08 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *15.3 feet*
Geologist: *P. Bayley*	Well Screen: *2.4 to 15.1 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							GM	Surface Conditions: Asphalt Gravel: ROC	
			1		10		SP	Sand: brown; very fine to fine, trace to some silt, trace very fine white shell fragments.	9.7 8.8
5			2		30		SM	Sand: dark grey; very fine, silty; wet, loose.	6.7 6.3
			3		20		OL OH	Silt: dark grey-black; clayey; wet, very soft.	3.7 2.6
10			4		37		SP	Sand: grey; very fine to fine; wet, loose; w/trace of very fine shell fragments.	.7
							ML SM	Silt: yellow brown; sandy-very fine, trace to some clay; wet, soft, plastic.	.4 .0
			5		40		OL OH	Silt: dark grey-brown; clayey; wet, soft, plastic.	2.3
15			7		97		OL OH	Silt: dark grey-black w/trace brown; clayey; wet, soft, plastic. @17.6 to 17.8 ft.: very fine rootlets. @19.3 to 19.5 ft.: some dark brown vegetation partings.	5.3 5.0 8
20			8		90				

WELL DIAGRAM



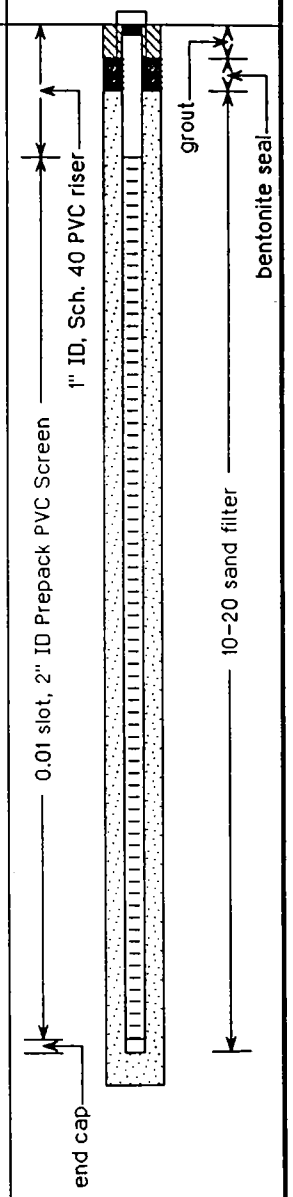
ENSAFE

Monitoring Well NBCH017T01

Project: *Zone H–Charleston Naval Complex*	Coordinates: *2325075.1 E, 370328.5 N*
Location: *Charleston, SC*	Surface Elevation: *11.8 feet msl*
Started at *1615 on 21 Nov 99*	TOC Elevation: *11.68 feet msl*
Completed at *1645 on 21 Nov 99*	Depth to Groundwater: *5.77 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *5.91 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *15.5 feet*
Geologist: *P. Bayley*	Well Screen: *2.0 to 15.3 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft–msl)
								Surface Conditions: Grass/silty soil	
							CL	Clay: orange–brown w/occasional grey laminations; some sand–very fine; damp, soft to firm, plastic.	10.8
			1		100		OL OH	Silt: dark grey–black; clayey; moist to wet, soft, plastic; slight chemical odor.	7.8
5							SP	Sand: grey w/occasional thin orange laminae; very fine to fine, w/trace silt; wet, loose; w/occasional silty laminae.	6.7
									5.7
			2		70		SP	Sand: grey; very fine to fine, trace silt; wet, loose; w/trace very fine to coarse white shell fragments.	4.8
							OL OH		3.9
							SP	@8.3 to 8.5 ft.: slightly coarser.	3.6
							OL OH	@7.9 to 8.2 and 9.4 to 9.6 ft.: Silt: dark grey; clayey.	2.4 2.2
10			3		100		SP SP SM	Sand: grey; very fine to fine; wet, loose; w/variable silt content from trace to some (as indistinct laminae).	1.8
									2
			4		53				
							SP SM	Sand: grey; as at 10.0 ft.	2
15							OL OH	Silt: dark grey–black; clayey; wet, soft, plastic. @14.8 and 15.3 ft.: marsh grass.	2.5
			5		73				4.2
20									

WELL DIAGRAM



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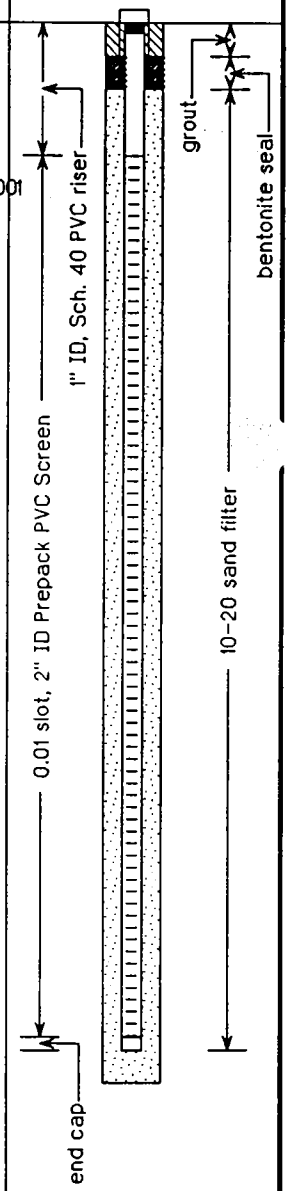
Monitoring Well NBCH017T02

Project: *Zone H–Charleston Naval Complex*	Coordinates: *2325066.2 E, 370298.1 N*
Location: *Charleston, SC*	Surface Elevation: *11.9 feet msl*
Started at *1520 on 21 Nov 99*	TOC Elevation: *11.66 feet msl*
Completed at *1600 on 21 Nov 99*	Depth to Groundwater: *6.65 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *5.01 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *15.5 feet*
Geologist: *P. Bayley*	Well Screen: *2.0 to 15.3 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft–msl)
								Surface Conditions: Grass/silty soil	
							CL	Clay: orange-brown w/some grey; trace to some sand-very fine, occasionally sandy; damp, soft to firm, plastic.	
							SP	Sand: orange-brown, w/some red-orange; very fine to fine; damp, loose.	9.400001 9.3
			1		75		SM CL SC OL OH	@3.6 to 3.7 ft.: silty, trace clay; wet, soft, trace plasticity. Clay: orange-brown w/some lt grey; some sand to sandy-very fine; wet, soft, plastic.	8.3 8.2 7.9 7.7
5							SP	Sand: orange-brown; very fine to fine, some clay; wet, soft, plastic.	6.2 5.5
			2		80			Silt: black w/trace olive-brown; organic odor.	4.9
							SP	Sand: grey; very fine to fine, trace medium; wet, loose; trace very fine white shell fragments. @6.1 to 9.4 ft.: grades very fine to fine, trace silt.	
10			3		87			@9.3 ft.: 0.5 cm black Sand lamination.	2.3
									.6
			4		17		SP	Sand: black; very fine to fine, trace to some silt; wet; some chemical odor.	1.1
							SP SM	Sand: grey; very fine to fine, some silt to silty; wet, loose, trace plasticity.	1.9 2.1
15			5		73		OL OH	Silt: olive-brown grading rapidly to grey; clayey; wet, soft, plastic. @15.6 to 15.8 ft.: grasses.	
			6		90				6.8
20									

WELL DIAGRAM



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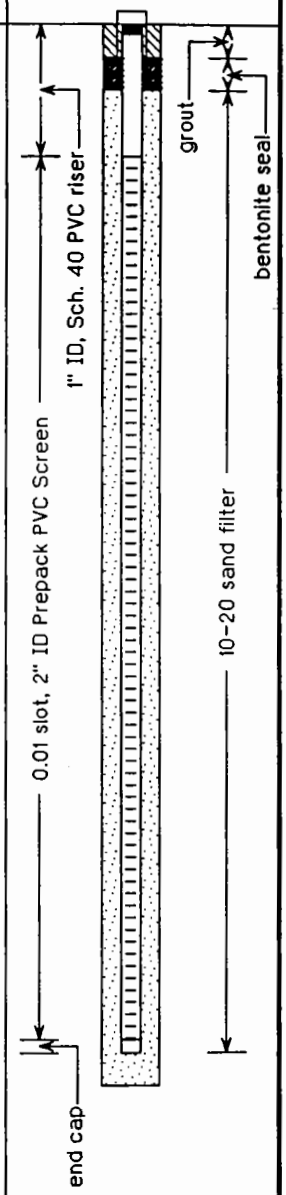
Monitoring Well NBCH017T03

Project: *Zone H-Charleston Naval Complex*	Coordinates: *2325025.0 E, 370332.8 N*
Location: *Charleston, SC*	Surface Elevation: *11.9 feet msl*
Started at *1420 on 21 Nov 99*	TOC Elevation: *11.74 feet msl*
Completed at *1515 on 21 Nov 99*	Depth to Groundwater: *6.66 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *5.08 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *15.5 feet*
Geologist: *P. Bayley*	Well Screen: *2.0 to 15.3 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Surface Conditions: Grass/silty soil	
							CL SC	Clay: orange and lt grey; some sand to very sandy-very fine; damp, soft, plastic-variable.	9.8
							SP	Sand: orange; very fine to fine, trace to some silt; wet, loose, trace plasticity.	9
							OL OH	Silt: dark grey-black; clayey; wet, soft, plastic.	8.7
			1	80			OL OH	Silt: dark grey-black; as above; with chem odor.	7.9
5							SP	Sand: grey; very fine to fine, w/trace very fine to coarse white shell fragments, silt as occasional indistinct thin laminae; wet, loose.	6.8
			2	90					5.2
							GP GM	Gravel: granule to pebble; black; coarse sand matrix; silty; wet.	3.9
							ML CL	Silt: olive drab; clayey; moist to wet, stiff, plastic.	3.4
10			3	60			SP	Sand: grey; very fine to fine, trace to some silt; wet, loose; w/2-1cm black laminae.	2.9
							SP	Sand: grey as above; w/trace very fine black grains, trace very fine white shell fragments; very faint chem odor.	2.1 / 1.9 / .3
			4	53			SP	Sand: grey as above; w/ slight increase in grainsize at base.	1.4
15							OL OH	Silt: dark grey-black; clayey; wet, soft, plastic. @14.4 to 14.8, and 15.4 ft.: some marsh grass.	2.2
			5	90					4.1
20									

WELL DIAGRAM



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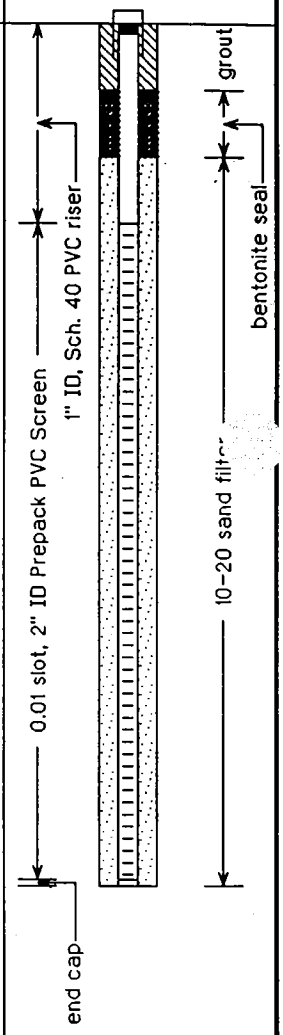
Monitoring Well NBCH017W01

Project: *Zone H–Charleston Naval Complex*	Coordinates: *2324699.5 E, 370074.8 N*
Location: *Charleston, SC*	Surface Elevation: *9.7 feet msl*
Started at *1030 on 20 Nov 99*	TOC Elevation: *9.60 feet msl*
Completed at *1055 on 20 Nov 99*	Depth to Groundwater: *4.59 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *5.01 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *13.0 feet*
Geologist: *P. Bayley*	Well Screen: *3.0 to 12.9 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft–msl)
							ML	Surface Conditions: Grass/silty soil	9
							CL, SP	Silt: brown; some clay to clayey; moist, firm, plastic.	8.6
							GM	Sand: brown; very fine, trace silt; moist, loose.	8.3
								Gravel: grey; w/sand matrix: brown; very fine.	
			1		35		SP/SM	Sand: lt brown; very fine, trace to some silt increasing with depth; damp, loose.	5.7
5							SM	Sand: yellow brown; very fine, some silt to silty; wet, loose. @ 5.3 ft.: a 1 cm Silt: dk grey–black; clayey lamination.	4.4
							OL/OH		3.9
			2		70			Silt: dark grey–black; clayey; wet, soft, plastic. @6.1 ft.: wood fragment.	3.6
							OL/OH	Silt: dark grey w/slight greenish cast; clayey; wet, soft, plastic.	2.7
							SP	Sand: grey; very fine, trace silt; wet, loose.	.3
10			3		90		SP	Sand: grey; very fine to fine, trace silt; wet, loose; trace very fine white shell fragments and very fine black grains.	0
									.3
									1.6
			4		43		SP	Sand: as at 10.0 ft.	3.3
								@13.9 to 14.0 ft.: w/occasional very thin Silt: dk grey–black; clayey; laminae.	4.3
15							OL/OH	Silt: dark grey w/slight greenish cast; clayey; wet, soft, plastic.	
			5		93			@14.8 and 15.0 ft.: trace yellow–brown grasses.	6.1
20									

WELL DIAGRAM



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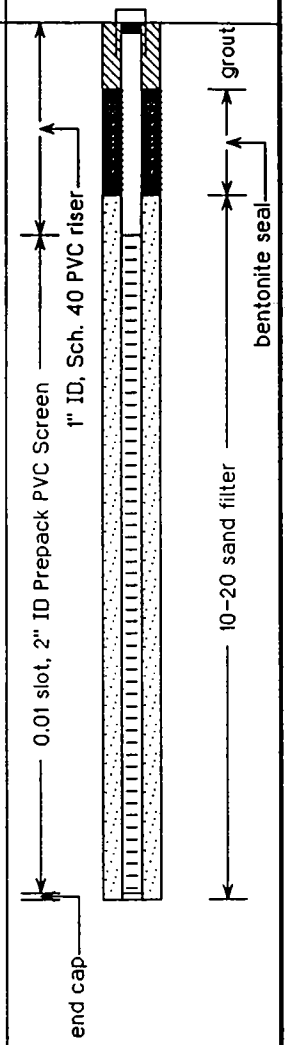
Monitoring Well NBCH017W02

Project: *Zone H-Charleston Naval Complex*	Coordinates: *2324668.9 E, 370292.8 N*
Location: *Charleston, SC*	Surface Elevation: *11.6 feet msl*
Started at *1630 on 06 Dec 99*	TOC Elevation: *11.60 feet msl*
Completed at *1705 on 06 Dec 99*	Depth to Groundwater: *4.56 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *7.04 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *13.2 feet*
Geologist: *P. Bayley*	Well Screen: *3.2 to 13.1 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Surface Conditions: Grass/silty soil	
							ML CL	Silt: brown; clayey, trace sand-very fine, occasional, pebble; damp, firm, plastic.	10.8
							SP SM	Sand: grey, yellow-orange, and dark grey -very thinly laminated; very fine to fine, some silt; wet, loose.	9.5
			1		53		OL OH	Silt: dark grey-black & brown mottled; clayey; wet, soft, plastic. @5.9-6.0 & 6.3 to 6.5 ft.: yellow-brown. @6.9 ft.: black vegetation remnants.	7.6
5			2		100		SM	Sand: olive-drab; very fine, some silt to silty; wet, loose, soupy; w/some very fine black grains.	4.6
									3.6
10			3		33		OL	Silt: brown; some clay to clayey; wet, soft, plastic.	1.6
							SM	@11.0 ft.: dk brown tree root.	.6
								Sand: brown-grey; very fine, some silt to silty; wet, loose; w/some roots.	.4
			4		66		SM	Sand: as above; w/trace to some very fine white shell fragments.	-1.4
									-2.1
15			5		23		SP SM	Sand: brown-grey; very fine to fine, trace to some silt; wet, loose; w/trace very fine white shell fragments and very fine black grains.	-4.4
							OL OH	Silt: dark brown; clayey; wet, soft, plastic.	-5.1
			6		100				-7.4
20									

WELL DIAGRAM



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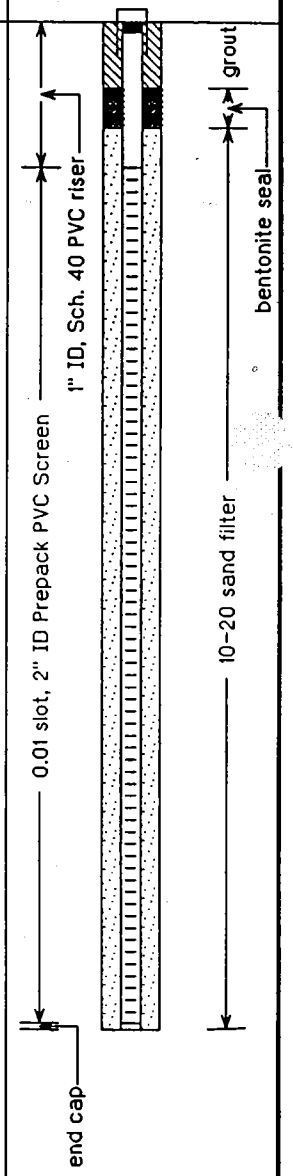
Monitoring Well NBCH017W03

Project: *Zone H-Charleston Naval Complex*	Coordinates: *2324928.4 E, 370220.6 N*
Location: *Charleston, SC*	Surface Elevation: *12.0 feet msl*
Started at *1045 on 05 Dec 99*	TOC Elevation: *12.05 feet msl*
Completed at *1135 on 05 Dec 99*	Depth to Groundwater: *6.97 feet TOC* Measured: *16 Dec 99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *5.08 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *15.2 feet*
Geologist: *P. Bayley*	Well Screen: *2.2 to 15.1 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							ML CL	Surface Conditions: Grass/silty soil Silt and Clay: brown and orange brown: interbedded.	12
			1		99		OL OH	Silt: dark grey-black; clayey; wet, plastic, firm. @2.5 to 4.0 ft.: predominantly dark grey-brown w/some black mottle.	10.2 10 8
5			2		90		OL OH	Silt: dark grey-black; clayey; wet, soft, plastic. @5.6 to 5.7 ft.: two 1 cm sandy pods: grey; very fine.	7 5.5
							SP		5.2
							ML CL	Sand: grey; very fine to fine, trace to some silt; wet, loose;trace very fine to medium white shell fragments.	4.7
			3		77		ML CL	Silt: olive/yellow-brown; clayey; wet, firm, plastic.	4 3.3
10							SP	Sand: grey; very fine to fine, trace to some silt; wet, loose; w/trace very fine to medium white shell fragments and trace very fine black grains.	
			4		97		SP SM		1
							SP	@11.0 to 11.8 ft.: dark grey-black; some silt to silty.	2 1
			5		53		ML	Silt: yellow-brown; some clay; wet, very soft, sticky.	2
15								@ 14.1 ft.: small gastropod shell. @14.6 to 15.4 ft.: mottled yellow-brown and dark grey.	3.4
			7		100		OL OH	Silt: dark grey-black w/lt brown; wet, soft, plastic. @16.2 ft.: w/trace brown vegetation. Silt: dark grey-black w/lt brown cast; clayey; wet, soft, plastic.	
20			8		93				7.8

WELL DIAGRAM



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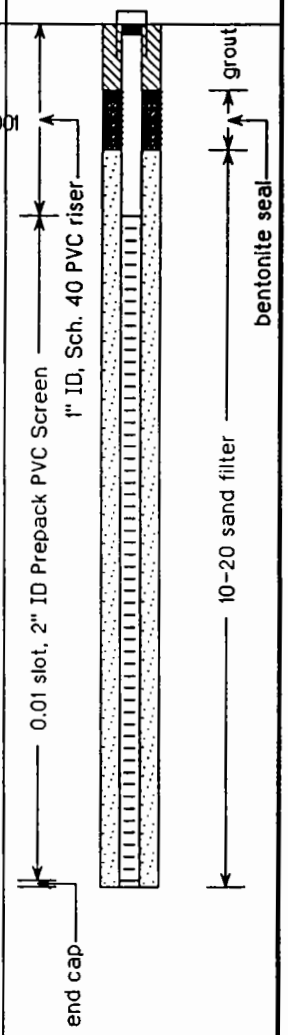
Monitoring Well NBCH017W04

Project: *Zone H–Charleston Naval Complex*	Coordinates: *2325019.4 E, 370280.2 N*
Location: *Charleston, SC*	Surface Elevation: *10.9 feet msl*
Started at *1500 on 20 Nov 99*	TOC Elevation: *10.83 feet msl*
Completed at *1535 on 20 Nov 99*	Depth to Groundwater: *5.77 feet TOC* Measured: *16Dec99*
Drilling Method: *DPT Continuous Sampler w/3.5"OD Boring*	Groundwater Elevation: *5.06 feet msl*
Drilling Company: *Precision SC Cert #57*	Total Depth: *13.0 feet*
Geologist: *P. Bayley*	Well Screen: *2.9 to 12.9 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft–msl)
								Surface Conditions: Grass/silty soil	10.3
			1		100		CL CH	Clay: brown w/occasional orange–brown sandy pits; damp, firm to stiff, plastic.	9.7
							SP	Sand: lt. grey and orange; very fine to fine, occasional clayey parting; damp, loose.	9.400001
			2		100		OL	Silt: dk brown w/black mottle; clayey; moist, firm, plastic.	
5							SW SP	@2.3 ft.: color change to black w/trace brown; wet. @2.3 to 3.2 ft.: soft @3.2 to 3.7 ft.: very soft	6.5
								Sand: grey; very fine to fine, trace medium; wet, loose; w/trace very fine black grains inceasing w/depth, and a very small white shell fragment.	5.7
			3		50		SP	@5.0 ft.: Sand grades very fine to fine.	4.2
								Sand: grey; very fine to fine; wet, loose; w/trace to some very fine black grains.	3
10			4		100		SW SP	Sand: dark grey; very fine to fine, trace medium; wet, loose; w/trace very small white shell fragments and very fine black grains.	.6
			5		60		SW SP	Sand: as above.	1.8
							OL OH	Silt: dark grey; clayey; wet, soft, plastic; w/trace of grasses at top of interval.	2.5 / 3.1
15			6		43		OL OH	Silt: dark grey–black; clayey; damp, soft, plastic.	4.8
			7		100				7.8
20									

WELL DIAGRAM



ENSAFE

CHECKLIST FOR ECOLOGICAL SITE ASSESSMENT
(Adapted from USEPA Guidance, May 1997)

I. SITE DESCRIPTION Date: **8/24/99**

1. Site Name: **Building 1838 - Public Works Laydown Yard (GEL 15 MW)**

   Location : **Charleston Naval Complex/Zone H**

   County: **Charleston** City: **Charleston** State: **SC**

2. What is the approximate area of the site? **4 acres (including adjacent lot to west of Bldg. 1838)**

3. Is this the first site visit? If no, record date(s) of previous site visit(s): **No**

   This area was included in the 1996 basewide habitat and biota survey, but no AOC/SWMU was identified at this area. The area was included in the Zone H RFI, but as a potential part of nearby SWMU 9, not as a standalone site. This assessment serves as a site-specific update for a focused ERA.

4. Are aerial or other site photographs available? If yes, please attach any available photo(s) to the site map at the conclusion of this section. Also, please attach USGS topographic map(s) of the site, if available. **Yes**

5. The current land use on the site is:

_____	% Urban
_____	% Rural
_____	% Residential
100	% Industrial
(☒ light ☐ heavy)	
_____	% Agricultural
Crops:	
_____	% Recreational
Describe; note if it is a park, etc.	
_____	% Undisturbed
_____	% Other: _____

The area surrounding the site (0.25 mile radius) is:

_____	% Urban
_____	% Rural
_____	% Residential
60	% Industrial
(☒ light ☐ heavy)	
_____	% Agricultural
Crops:	
40	% Recreational
Describe; note if it is a park, etc.	
Athletic fields (baseball/soccer)	
20	% Undisturbed
_____	% Other: _____

6. Has any movement of soil taken place at the site? **Yes**

If yes, please identify the most likely cause of this disturbance:

_____	Agricultural Use	X	Heavy Equipment
_____	Mining	_____	Erosion
_____	Natural Events	_____	Other

Please describe: **Soil movement is historic. According to aerial photos, the site was once a marsh. In the 1940s, it became one of numerous areas filled with dredge material.**

7. Do any potentially sensitive environmental areas exist adjacent to or in proximity to the site, e.g., Federal and State parks, National and State monuments, wetlands, prairie potholes, etc.? **Yes**
(Remember, flood plains and wetlands are not always obvious; do not answer "no" without confirming information.)

8. Please describe these sensitive areas, indicate their general location on the site map, and provide the source(s) of information used to identify them.

Based on observations, the headwaters and small tributaries of Shipyard Creek are adjacent to the site and the marsh-like characteristics likely function as valuable nursery habitat and forage sites for piscivorous wildlife. This creek is currently under a State fish advisory due to elevated levels of chromium in shellfish (oysters, clams, crab and shrimp).

9. What type of facility is located at the site?

Building 1838 is used for storage of public works equipment and the adjacent 3-walled covered structure is for segregated storage of fill soil, gravel, and sand. At the time of the site visit, the open area to the west of the building was being used by the City of Charleston Public Works. Waste asphalt, concrete, and soil from road repairs was being processed by a sorting machine (hopper and conveyor belt).

Another fenced area with a structure (Building 903) was at the northern end of the cleared area which apparently was being used by a utility company. Large spools of underground cable were being stored in the structure and numerous (80-100) transformers (pole and pad mounted types) were stored directly on the ground. Of those with labels legible through the fence, most were designated as transformers with low level PCBs.

10. What are the suspected contaminants of concern at the site? If known, what are the maximum concentration levels?

Several groundwater samples from site monitoring wells contain elevated concentrations of VOCs (benzene at 200 ug/L, chlorobenzene at 19000 ug/L, and1,2-DCE at 240 ug/L), SVOCs (2-chlorophenol at 52 ug/l, 1,2-DCB at 13000 ug/L, 1,3-DCB at 1100 ug/L, and 1,4-DCB at 1900 ug/L).

Soil samples also contained VOCs (chlorobenzene, 1,1-DCE, TCE, and PCE) and SVOCs (benzo(a)pyrene at 490 ug/L and dibenzo(a,h)anthracene at 120 ug/L).

**During the SWMU 9 RFI, several sediment samples were collected in Shipyard Creek. Two were in the vicinity of Bldg 1838 and the open storage area. Compared to up- and downgradient samples, these two samples exhibited elevated levels of metals, pesticides,
PCBs, and SVOCs.**

11. Check any potential routes of off-site migration of contaminants observed at the site:

swales drainage ditches

X	runoff		windblown particulates
	depressions		vehicular traffic
X	other (specify): **Groundwater**		

12. If known, what is the approximate depth to the water table? **4' bgs**

13. Is the direction of surface runoff apparent from site observation? **Yes**

    If yes, to which of the following does the surface runoff discharge? Indicate all that apply.

X	surface water	X	groundwater
	sewer		collection impoundment

14. Is there a waterbody anywhere on or in the vicinity of the site? **Yes**

    Approximate distance? **10 ft. to the southeast**

    If yes, also complete Section III: Aquatic Habitat Checklist - Non-Flowing Systems and/or Section IV: Aquatic Habitat Checklist - Flowing Systems.

15. Is there a navigable waterbody or tributary to a navigable waterbody? **Yes**

16. Is there evidence of flooding? **No**

    Wetlands and flood plains are not always obvious; do not answer "no" without confirming information. If yes, complete Section V: Wetland Habitat Checklist

17. Please provide a list of any field guides used to aid in identifying site flora/fauna. Also, estimate the time spent identifying flora/fauna.

    Assorted R.T. Peterson and Audubon Society Field Guides for trees, shrubs, wildflowers and U.S. birds (eastern); ID Time: approx. 1 hr(s).

18. Are any threatened and/or endangered species (plant or animal) known to inhabit the area of the site? **Yes**

    If yes, it is required to verify this information with the U.S. Fish and Wildlife Service. If species' identity is known please list them below:

    A colony of Least Terns is on record to nest on the roof of Bldg. 224, approx. 2,400 feet west of Bldg. 1838. At this time, no significant impacts to this colony from Bldg. 1838 contaminants in anticipated.

19. Weather conditions at the time this checklist was prepared:

88	Temperature (°F)	**90**	Normal daily high temperature
S/gentle	Wind (Direction/Speed)	**dry**	Precipitation (rain, snow)
p.cldy	Cloud cover (clear, partly cloudy, partly sunny, overcast)		

IA. SUMMARY OF OBSERVATIONS AND SITE SETTING

The site consists of two structures located at the southeast end of a long narrow bare, open lot. Building 1838 is a metal walled structure with 5 bay doors on a concrete floor (no floor drains) currently being used to store equipment. Floors were clean with no visible cracks or stains. To make a level base for the walls, a concrete berm (6-14" high) was constructed arouhd the side and back walls. Only two 1" holes were observed in the base of the berm (near the southeast corner) that would allow water or other media to drain to the building's exterior.

To the west of the site is a distribution container storage yard. At this facility, hundreds of large containers (those used by trucks and rail cars) were stacked 8 to 10 high, well above the treetops. A small pond (approx. 2-acre) is also immediately west of the site but has not been investigated. It is likely that this pond was man made and may serve as a detention basin for storm water. Its riparian zone is heavily vegetated and is known to support both frogs and turtles, therefore it may be a freshwater pond.

Lacking any significant terrestrial habitat, the primary ecological concern is impact from the site to receptors in Shipyard Creek and possibly the adjacent pond.

Completed by:	Jay Cornelius, EnSafe	Date:	08/23/99
Additional Preparers:	Andrew Wertz, EnSafe		

II. TERRESTRIAL HABITAT CHECKLIST

IIA. WOODED

1. Are there any wooded areas at the site? **Yes**

   If no, go to Section B: Scrub/Shrub.

2. What percentage or area of the site is wooded? __5__% (____ **acres)**

   Indicate the wooded area on the site map attached to a copy of this checklist.
   Please identify what information was used to determine the wooded area of the site.

   There are some mixed scrub/shrub/wooded areas are outside the fenced site boundaries but near the area being investigated (sampled).

3. What is the dominant type of vegetation (evergreen, deciduous, mixed) in the wooded area? Provide a photograph, if available. **Deciduous**

   Dominant plant, if known: **Willow, wax myrtle, Chinese tallow tree.**

4. What is the predominant size of the trees at the site? Use diameter at breast height.

   ___X___ 0-6 in. _____ 6-12 in. _____ > 12 in.

5. Specify type of understory present, if known. Provide a photograph, if available.

   Herbaceous vegetation (wax myrtle, honeysuckle, trumpet creeper)

IIB. SCRUB/SHRUB

1. Is scrub/shrub vegetation present at the site? **Yes** If no, go to Section C: Open Field.

2. What percentage of the site is covered by scrub/shrub vegetation? __5__% (____ **acres)**

   Indicate the areas of scrub/shrub on the site map. Please identify what information was used to determine this area

   As with the wooded areas, the scrub/shrub is outside the fenced area, but this narrow fringe of vegetation runs nearly the entire length of both sides of the site, either between the site and the marsh or the site and the adjacent facility.

3. What is the dominant type of scrub/shrub vegetation, if known? Provide a photograph if available.

   Wax myrtle

4. What is the approximate average height of the scrub/shrub vegetation?

   _____ 0-2 ft. _____ 2-5 ft. ___X___ > 5 ft.

5. Based on site observations, how dense is the scrub/shrub vegetation?

   ___X___ dense _____ patchy _____ sparse

IIC. OPEN FIELD

1. Are there open (bare, barren) field areas present at the site? **Yes**
   If yes, please indicate the type below:

_____	prairie/plains	_____	savannah	_____	old field
X	other (specify):	**active sorter operations and (bare soil/gravel)**		**laydown yard**	
_____					

2. What percentage of the site is open field? Indicate fields on the site map. **80**

3. What is/are the dominant plant(s)? Provide a photograph, if available.

   Site is bare dirt, subject to frequent traffic by heavy equipment and other vehicles. Currently, area is used for open storage and a road waste sorting . Mixed materials such as asphalt, soil, and concrete (apparently from excavations or road demolitions) are carried in by dump trucks and transferred to the hopper of the sorter by large front-end loader. The various end products are piled on site for reuse.

   Vegetation within the site compound was minimal (a few isolated weeds in the undisturbed portions). Encroaching vegetation was managed by the use of herbicides. Several distinct areas of such "stressed" vegetation were noted: the front of Bldg. 1838, along the southern fenceline, and around the piles of soil/sand/gravel in clear pattern of a sprayer-type applicator.

4. What is the approximate average height of the dominant plant?

   No vegetation is inside the fenced area.

5. Describe the vegetation cover: _____ dense X sparse _____ patchy _____

IID. MISCELLANEOUS

1. Are other types of terrestrial habitats present at the site other than woods, scrub/shrub, and open field? **No**

2. Describe any miscellaneous terrestrial habitat(s) and identify these area(s) on the site map.

   No such habitats were present.

3. What observations, if any, were made at the site regarding the presence and/or absence of insects, fish, birds, mammals, etc.?

   Wildlife at the site was minimal. Insects (mosquitos, midges, spiders, butterflies) were present and racoon tracks were observed in the mud next to a small tributary to the creek. During a previous site visit, EnSafe observed a turtle in this small tidal area as well. The adjacent offsite pond supports turtles and frogs and likely other aquatic wildlife. The marsh fringe along the main channel supports fiddler crabs and these are preyed upon by other birds (herons, kites) and mammals. Mourning doves, mockingbirds, kildeer, belted kingfishers, starlings, loggerhead shrikes, and red-winged blackbirds were observed at or near the site proper.

Review the questions in Section I to determine if any additional habitat checklists should be completed for this site.

III. AQUATIC HABITAT CHECKLIST - NON-FLOWING SYSTEMS

Note: Aquatic systems are often associated with wetland habitats. Please refer to Section V, Wetland Habitat Checklist.

1. Are there any open-water, non-flowing systems present at the site? **Yes**
   If yes, what type?

   ____ Natural (pond, lake) X Man-made (lagoon, reservoir, canal, impoundment)

2. If known, what is the name(s) of the waterbody(ies) on or adjacent to the site?

   Unknown

3. If a waterbody is present, what are the known uses of it (e.g.: recreation, navigation, etc.)?

   Since it is offsite, not much is known about this water body. It is likely a retention pond created for flood control.

4. What is the approximate size of the waterbody(s)? **2 acres**

5. Is any aquatic vegetation present? If yes, please identify the type of vegetation present (if known). **Yes**

   X emergent X submergent X floating

6. If known, what is the depth of the water? **Unknown. Estimated about 7-10'**

7. What is the general composition of the substrate? Check all that apply.

____	Bedrock	____	Sand (coarse)	____	Muck (fine/black)
____	Boulder (>10 in.)	____	Silt (fine)	____	Debris
____	Cobble (2.5-10 in.)	____	Marl (shells)	____	Detritus
____	Gravel (0.1-2.5 in.)	____	Clay (slick)	____	Concrete
X	Other (specify):	**Unknown**			

8. What is the primary source of water in the waterbody?

____	River/stream/creek	____	Groundwater
X	Surface runoff	____	Other (specify):

9. Is there any additional discharge (stormwater, industrial, etc.) from the site to the waterbody? **No**

   If yes, please describe this discharge and its path.

   Along the southern boundary of the site, a 8-10" berm separates the site from the pond and likely diverts surface runoff to Shipyard Creek. This berm was overgrown with tall grass which had recently been sprayed with an herbicide, but the abundant foliage, even though brown and dry, concealed most of the berm. Although it was not evident that stormwater flow was toward the pond, It is possible that some localized surface water runoff may migrate offsite through a hidden gap.

10. Is there a discharge from the waterbody? **Unknown**

If yes, and the information is available, identify from the list below the environment into which the waterbody discharges.

_____	River/stream/creek	____ on-site	____ off-site	Distance: _____
_____	Groundwater	____ on-site	____ off-site	
_____	Wetland	____ on-site	____ off-site	Distance: _____
_____	Impoundment	____ on-site	____ off-site	

11. Identify any field measurements and observations of water quality that were made. For those parameters for which data were collected provide the measurement and the units of measure below:

_____ Area _____ Depth (average) _____ pH _____ Dissolved Oxygen

_____ Salinity _____ Other (specify):

_____ Temp. _____ Depth of the water at which temperature reading was taken

_____ Turbidity (clear, slightly turbid, turbid, opaque) _____ Secchi disk depth

12. Describe observed color and if distinct, the area of coloration.

The water was relatively clear with algae growth at several nearshore areas.

13. What observations, if any, were made at the waterbody regarding the presence and/or absence of benthic macroinvertebrates, fish, birds, mammals, etc.?

No detailed observations were made regarding this offsite pond. Turtles and amphibians were obviously present (on exposed logs and in riparian areas).

Mark the open-water, non-flowing system on the site map which will be attached to this checklist.

IV. AQUATIC HABITAT CHECKLIST - FLOWING SYSTEMS

Note: Aquatic systems are often associated with wetland habitats. Please refer to Section V, Wetland Habitat Checklist.

1. Are any flowing water system present at the site? If yes, what type?

____	River	____	Stream	X	Creek
____	Dry wash	____	Arroyo	____	Brook
____	Man-made (ditch, etc.)	____	Intermittent Stream	____	Channeling
____	Other (specify):				

2. If known, what is the name of the waterbody? **Shipyard Creek (tributary/headwaters)**

3. For natural systems, are there any indicators of physical alteration (e.g., channeling, debris, etc.)? If yes, please describe indicators that were observed. **Yes**

   Along the site's shoreline, large pieces of concrete debris were present, suggesting that the reports of a roadway/bridge over the creek in this area may be accurate. Such debris is also commonly used for fill.

4. What is the general composition of the substrate? Check all that apply.

____	Bedrock	____	Sand (coarse)	X	Muck (fine/black)
____	Boulder (>10 in.)	____	Silt (fine)	____	Debris
____	Cobble (2.5-10 in.)	____	Marl (shells)	____	Detritus
____	Gravel (0.1-2.5 in.)	____	Clay (slick)	____	Concrete
____	Other (specify):				

5. What is the condition of the bank (e.g., height, slope, extent of vegetative cover)?

   The bank adjacent to the site is approx. 2-3' above the mean water line, steeply sloped,and heavily vegetated.

6. Is the system influenced by tides? **Yes**
   If yes, please note the information used to make this determination.

   Shipyard Creek is part of the Charleston Harbor Estuary and discharges into the Cooper River, which empties into the Atlantic Ocean.

7. Is the flow intermittent? **No**
   If yes, please note the information used to make this determination.

   Even at low tide, flow is present.

8. Is there a discharge from the site to the water body? If yes, please describe the discharge and its path. **Yes**

   Surface water runoff flows to Shipyard Creek.

9. Is there a discharge from the waterbody? If yes, and the information is available, please identify what the waterbody discharges to and whether the discharge is on site or off site. **Yes**

   The offsite Shipyard Creek ultimately empties into the Cooper River.

10. Identify any field measurements and observations of water quality that were made. For those parameters for which data were collected provide the measurement and the units of measure in the appropriate space below:

75	Width (ft.)	3	Depth (ft.)		pH		Dissolved oxygen
	Salinity		Velocity (ft/sec.)		Other (specify):		
	Temp.		Depth of the water at which temperature reading was taken				
s.t.	Turbidity (clear, slightly turbid, turbid, opaque)			n/a	Secchi disk depth		

11. Describe observed color and if distinct, the area of coloration.

No discoloration. Depending on tide direction water is slightly turbid to clear.

12. Is any aquatic vegetation present? If yes, please identify the type of vegetation present (if known). **Yes**

X	emergent		submergent		floating

14. What observations, if any, were made at the waterbody regarding the presence and/or absence of benthic macroinvertebrates, fish, birds, mammals, etc.?

Previous sediment sampling identified the presence of BMI, and fish in the creek channel. Herons and other piscivorous wildlife have been seen foraging in the marsh areas.

Mark the flowing water system on the site map which will be attached to this checklist.

V. WETLAND HABITAT CHECKLIST

1. Based on observations and/or available information, are designated or known wetlands definitely present at the site? Please note the sources of observations and information used (e.g., USGS Topographic Maps, National Wetland Inventory; Federal or State Agency, etc.) to make this determination. **Yes**

   Based on Cowardin's classification system, the tidal marshes in Shipyard Creek are estuarine emergent wetlands

2. Based on the location of the site (e.g., along a waterbody, in a floodplain, etc.) and site conditions (e.g., standing water; dark, wet soils; mud cracks; debris line; water marks), are wetland habitats suspected? If yes, proceed with the remainder of the wetland habitat identification checklist. **Yes**

3. What type(s) of vegetation are present in the wetland?

   ____ Submergent X Emergent ____ Wooded

   X Scrub/Shrub ____ Other (specify):

4. Provide a general description of the vegetation present in and around the wetland (height, color, etc.). Provide a photograph of the known or suspected wetlands, if available.

   Dominant vegetation is *Spartina alterniflora*.

5. Is standing water present? **Yes** If yes, is this water fresh or brackish? **Brackish**

   What is the approximate area of the water? **Varies with tide, part of a large system**

   Please complete questions 4, 11, 12 in Checklist III - Aquatic Habitat - Non-Flowing Systems

6. Is there evidence of flooding at the site? **No**
   What observations were noted?

   ____ Buttressing ____ Water marks ____ Mud cracks ____ Debris line

   ____ Other (describe below):

7. If known, what is the source of the water in the wetland?

   X Stream/River/Creek/Lake/Pond ____ Groundwater

   ____ Flooding ____ Surface Runoff

8. Is there a discharge from the site to a known or suspected wetland? **Unknown**
   If yes, please describe

   This pathway is being investigated with the installation of monitoring wells and the collection of sediment and soil samples.

9. Is there a discharge from the wetland? **Yes**
If yes, to what waterbody is discharge released?

X Stream/River _____ Groundwater _____ Lake/Pond _____ Marine

10. If a soil/sediment sample was collected, describe the appearance of the soil in the wetland area. Write in the best response.

Color (blue/gray, brown, black, mottled) **black muck**

Water content (dry, wet, saturated/unsaturated) **saturated**

Mark the observed wetland area(s) on the attached site map.

EXPLANATION OF TERMS USED IN THIS CHECKLIST

Arroyo	Dry gulch, brook, or creek. A deep gully cut by an intermittent brook or stream.
Benthic	Pertaining to the bottom of a waterbody.
Detritus	Loose fragments or particles formed by the disintegration of rocks.
Marl	A mixture of clays, carbonates of calcium and magnesium and remnants of shells.
Riparian	Of, or on the bank of a natural course of water.
Secchi (disk)	Basic measure of turbidity, visibility or transparency of water.
Submergent Vegetation	Hidden, obscure vegetation which is inundated with water.
Swales	Low traces of land which are often moist or marshy.
Wet Weather Conveyance	Man-made or natural watercourses, including natural watercourses that have been modified by channelization, that flow only in direct response to precipitation runoff in their immediate locality and whose channels are above the groundwater table and which do not support fish or aquatic life, and are not suitable for drinking water supplies.

D.1 Derivation of Site-Specific Soil Screening Levels

This appendix generally describes how SSLs were developed for SWMU 136/AOC 663. The procedures are consistent with the *Soil Screening Guidance: Technical Background Document* (USEPA, 1996), and combine site-specific variables and leaching tests with literature values and the general soil-to-water partitioning equation.

Purpose

SSLs are developed to support the RFI and provide the framework for evaluating soil contaminants and their leaching potential to groundwater. SSLs are the concentration at which a contaminant is considered a threat to groundwater. SSLs were first conservatively developed for contaminants assuming a DAF of 1 (i.e., no dilution or attenuation of leach concentrations prior to the receptor exposure point in the aquifer). Contaminant concentrations measured in onsite surface and subsurface soil were screened against this first set of SSLs, resulting in a list of fate and transport COPCs. In the next step, chemicals that were not screened out the first time were compared to a second set of SSLs derived from the first set, but modified by site-specific DAFs. This second set of soil COCs for soil defines soil contaminants that pose a threat to groundwater at the site and require further evaluation.

D.2 First-level SSL Development

The first level SSLs were developed using a combination of site-specific leach tests, site-specific soil and hydrogeological variables, and the general soil-to-water partitioning equation.

Leach-test SSLs

Leach tests were particularly applicable to inorganics in soil due to the complicating factors associated with this constituent class's leachability: soil pH, cation exchange capacity, porosity, permeability, water content, etc. Leach testing allowed contaminant leachability to be emperically evaluated without having to directly define values for these complicating soil factors. An empirical approach is especially important for inorganics because the USEPA's *Soil Screening Guidance* makes no allowance for two of the most important variables affecting inorganic leaching: fraction organic carbon and clay content (expressed as

cation exchange capacity). Thus, for inorganics, the leach analytical results could be compared to bulk media results, and be proportionately and directly applicable to SSL development. Specifically, the leach test results can be represented as:

$$C(soil) * LR = C(leach)$$

Where:

C(soil)	=	concentration sorbed to soil
C(leach)	=	concentration in leachate
LR	=	leachability ratio

In this usage, LR is the reciprocal of the Freundlich adsorption constant, which is assumed to be linear. C(soil) and C(leach) are measured in the bulk and leach samples, respectively. The LR equation can be used to derive an SSL (assuming a DAF of 1) by making C(leach) equivalent to the maximum acceptable groundwater concentration in the aquifer, and then calculating the corresponding C(soil). When a site-specific DAF is used, the maximum acceptable groundwater concentration is simply multiplied by the DAF before calculating C(soil). Multiplying the calculated SSL with DAF = 1 by the site-specific DAF yields the same results: a site-specific SSL.

Using this methodology presents special circumstances, which are addressed as outlined below:

- Parameter detected in bulk, but nondetect in the leach. Used one-half the detection limit for leach samples as the leach value.

- Parameter detected in the leach, but nondetect in the bulk. Used the detection limit for bulk samples as the bulk value.

- Parameter nondetect in both the bulk and the leach. No value assigned.

- Re-extraction analyses. Either used the re-extraction result; or, if the original analysis used lower detection limits, assigned the original value to the bulk and/or leach.

LRs were calculated for detected parameters at each sample location and averaged geometrically to assign a central-tendency LR value to each parameter. This averaged LR was then used to calculate the parameter's first-level SSL, with the equation shown above. Uncorrected geometric means were chosen as estimates because sample sizes were small and the underlying LR distributions were assumed to be lognormal (Parkhurst, 1998).

Because arsenic had been identified as a fate-and-transport COC in the RFI, leach test results were used to derive its SSL, using the first method in list of special circumstances above. Upper and lower-interval soil samples were collected from two locations at SWMU 136 in June 1998 for bulk analysis of arsenic. Additional upper and lower-interval soil samples were collected from the same two locations in October 1999 for corresponding leachate analysis. All other inorganic and organic parameter SSLs were derived using the soil-to-water partitioning equation, as described below.

Soil-to-water Partitioning Equation

The general partitioning equation (Equation 10, *Soil Screening Guidance: User's Guide*, USEPA, 1996) for migration from soil to groundwater was used to derive SSLs for organics and for inorganics other than arsenic. The derivation and use of this equation are presented in the referenced volume, and not repeated here. Several variables in the equation can be measured in site soil samples, including fraction organic carbon (sampled as total organic carbon, [TOC]), dry soil bulk density, and soil porosity.

Fraction organic carbon: Because the partitioning equation is the one most sensitive to variations in K_d (soil-water partition coefficient), and K_d for organics is the product of K_{oc} (organic carbon-water partition coefficient) and f_{oc} (fraction organic carbon). During the October 1999 soil sampling round, an attempt was made to collect enough TOC samples to adequately characterize the fraction organic carbon at the site. To allow for the possibility that

f_{oc} in soil is lognormally distributed, geometric means were calculated and used as the central tendency f_{oc} value for each site grouping. Separate geometric means were obtained for overall f_{oc} (for use in the soil-to-groundwater SSL partitioning equation) and for surface soil f_{oc} (for use in the soil-to-air SSL equations). The central-tendency f_{oc} values were used to calculate a site-specific K_d value for each organic compound for use in the SSL equation. The geometric mean of four TOC samples collected at SWMU 136 is 13,300 mg/kg; therefore, overall f_{oc} = 0.0133. The geometric mean of the two surface soil TOC samples is 15,800 mg/kg; surface soil f_{oc} is 0.0158.

Dilution attenuation factor: The DAF represents the reduction in contaminant concentration between soil leachate and groundwater at a receptor point downgradient of the site. The reduction is caused by attenuation — adsorption, degradation, dispersion — and dilution by groundwater as the leachate enters the aquifer. In USEPA's soil screening methodology, only the reduction caused by dilution is considered. For a lithologic environment such as that at CNC, which has extensive organic marsh clays and high percentages of dispersed clay in sandier sediments, ignoring the contributions of attenuation results in very conservative SSLs. Under these circumstances, it should be anticipated that empirically derived SSLs such as the SPLP-based SSL for arsenic will be higher than SSLs derived from the partition-equation method.

Table D.1 presents the DAF derivation (more properly, the dilution factor [DF]) used in the partition-equation SSL calculations for the site, along with the sources of the values entered into the DF equation. The weighted geometric mean hydraulic conductivity that was used represents professional judgment based on the spatial distribution of available K_h values relative to the site location.

Soil pH: The geometric mean of four pH samples collected at AOC 663 in May 1995 is 8.11 standard units. K_d for most inorganics varies with soil pH, most often directly. According to Figure 10 (p.154) of the *USEPA Soil Screening Guidance* (1996), K_d for arsenic is estimated to be 31.6 L/kg when pH = 8.1. It should be noted that other standard references list K_d for arsenic as high as 200 L/kg (Baes, et al., 1984).

Table D.1
Derivation of Dilution Factor Used in SSL Calculations
Site-specific Physical and Hydrogeological Parameters
Charleston Naval Complex, Zone H: AOC 663/SWMU 136, Shallow Aquifer
Charleston, South Carolina

Site Groups	K Hydraulic Conductiv. (m/yr)	i Hydraulic Gradient (--)	da Aquifer Thickness (m)	L Source Length (m)	I Infiltration Rate (m/yr)	dc alc. Mixin Zone Depth (m)	d Mixing Zone Depth (m)	DF Dilution Factor (--)
AOC 663	375	0.00183	18	35	0.0076	3.87	3.87	11

Notes:
Sources of table values:

Kh from slug tests at and near site:

017001 =	0.863 ft/d	
178001 =	0.145 ft/d	
662001 =	6.97 ft/d	
663001 =	22.4 ft/d	
arithmetic mean =	7.59 ft/d	
weighted geomean =	3.37 ft/d =	**375 m/yr**

Value for 663001 is counted twice because 663001 is the only well at the site.

Gradient from water level map:

Distance from 017002 (5.85' elev.) to 178001 (4.53' elev.) is approx. 720 ft.

(5.85-4.53)/720 = **0.00183**

Aquifer thickness from map of top of Ashley Formation:

Top of Ashley at site is approximately -55 ft. MSL
Water level at site is approximately 5 ft. MSL
Saturated thickness = 55 + 5 = 60 ft. = **18 m**

Source length from site map:

Source length perpendicular to groundwater flow is approx. 115 ft. = **35 m**

Infiltration rate from USGS groundwater modeling report:

For "semi-industrial" areas of the base, infiltration rate is
approximately 0.3 in/yr = **0.0076 m/yr**

The spreadsheet calculation shown above follows Equations 11 and 12 from the Soil Screening Guidance: User's Guide, USEPA 1996

D.3 Second-level SSLs

Table D.2 shows the calculation of SSLs based on both the partition-equation method (all chemicals) and the SPLP method (arsenic only). For each method, SSLs are calculated for a DF of 1 (first-level SSLs) and for the site-specific DF of 11 (second-level SSLs). In each case, the site-specific SSLs are simply the SSLs for DF = 1, multiplied by 11. Sources of physical/chemical values and explanations of the calculation procedures appear in the notes at the end of the table. Note that all soil constituent concentrations in the table are shown as mg/kg, consistent with comparable tables in the *USEPA's Soil Screening Guidance*.

The SPLP-based SSL for arsenic (134 mg/kg for DF = 1; 1475 mg/kg for site-specific DF = 11) is nearly two orders of magnitude higher than the corresponding partition-equation SSL (1.6 mg/kg for DF = 1; 17.5 mg/kg for site-specific DF = 11), as explained above in the discussion of dilution attenuation factors. Because bulk and leachate analyses were performed on different samples from the same locations and depths, the SPLP-based SSLs should not be considered definitive for arsenic; however, the partition-equation SSLs should be considered in light of the much higher SPLP SSLs based on empirical leaching results from the site in question.

Table D.2
Calculation of Soil to Groundwater Soil Screening Levels
Charleston Naval Complex, Zone H: SWMU 136 and AOC 663
Charleston, South Carolina

Site-Specific Parameters:		**Chemical-Specific Variables**					**Partitioning Method**				**SPLP Method**			
Fraction Organic Carbon (--) :	0.0133													
Dilution Factor [DF] (--) :	11	Dimension-	Organic						Calculated	Calculated		Calculated	Calculated	
Dry Soil Bulk Density (kg/L) :	1.5	less	Carbon	Water					Soil to GW	Site-specific		Soil to GW	Site-specific	USEPA
Water-filled Soil Porosity (--) :	0.3	Henry's	Water	Health-			Acceptable	Target	SSL -	Soil to GW		SSL -	Soil to GW	Generic
Air-filled Soil Porosity (--) :	0.13	Law	Part.	based			GW	Leachate	Partition	SSL -	SPLP	SPLP	SSL -	Soil to GW
Soil Porosity (--) :	0.43	Constant	Coeff.	Limit	MCL/		Conc.	Conc.	Method	Partition	Leach	Method	SPLP	SSL
		[H']	[Koc]	[HBL]	MCLG				[DF=1]	Method	Ratio	[DF=1]	Method	[DF=20]
		(--)	(L/kg)	(mg/L)	(mg/L)		(mg/L)	(mg/L)	(mg/kg)	(mg/kg)	(kg/L)	(mg/kg)	(mg/kg)	(mg/kg)
Inorganics			*Kd (8.1 pH)*											
Arsenic		NA	3.16E+01	c 5.7E-05	0.05		0.05	0.55	1.59	17.49	3.73E-04	134	1475	29

Notes:

Water Health-based Limit - Preliminary Remediation Goal based on the ingestion pathway, residential scenario; obtained from Oak Ridge National Laboratory Risk Assessment Information System (RAIS) website

MCL/MCLG - From USEPA Drinking Water Regulations and Health Advisories, October 1996

Acceptable GW Concentration - MCL/MCLG if available, otherwise Water Health-based Limit; if neither available, then tap water risk-based concentration from April 1999 Region 3 RBC Table

Target Leachate Concentration - Acceptable Groundwater Concentration multiplied by Dilution Factor

Calculated Soil to GW SSL - Partition Method - From Equation 10 (partitioning equation) of the USEPA Soil Screening Guidance: User's Guide (1996)

Calculated Site-specific Soil to GW SSL Partition Method - From Equation 10 (partitioning equation) of the USEPA Soil Screening Guidance: User's Guide (1996), using the site-specific parameters shown above

SPLP Leach Ratio - Contaminant concentration in leach sample (mg/L) divided by corresponding concentration in bulk sample (mg/kg)

Calculated Soil to GW SSL - SPLP Method [DAF=1] - Acceptable Groundwater Concentration divided by SPLP Leach Ratio

Calculated Site-specific Soil to GW SSL - SPLP Method - Calculated SPLP SSL multiplied by Dilution Factor

USEPA Generic Soil to GW SSL - From USEPA Soil Screening Guidance, Technical Background Document (1996), Appendix A, Table A-1

Sources of H' and Koc values: 1996 Soil Screening Guidance: User's Guide, Table C-4

GW - Groundwater

SSL - Soil screening level

NA - Not applicable

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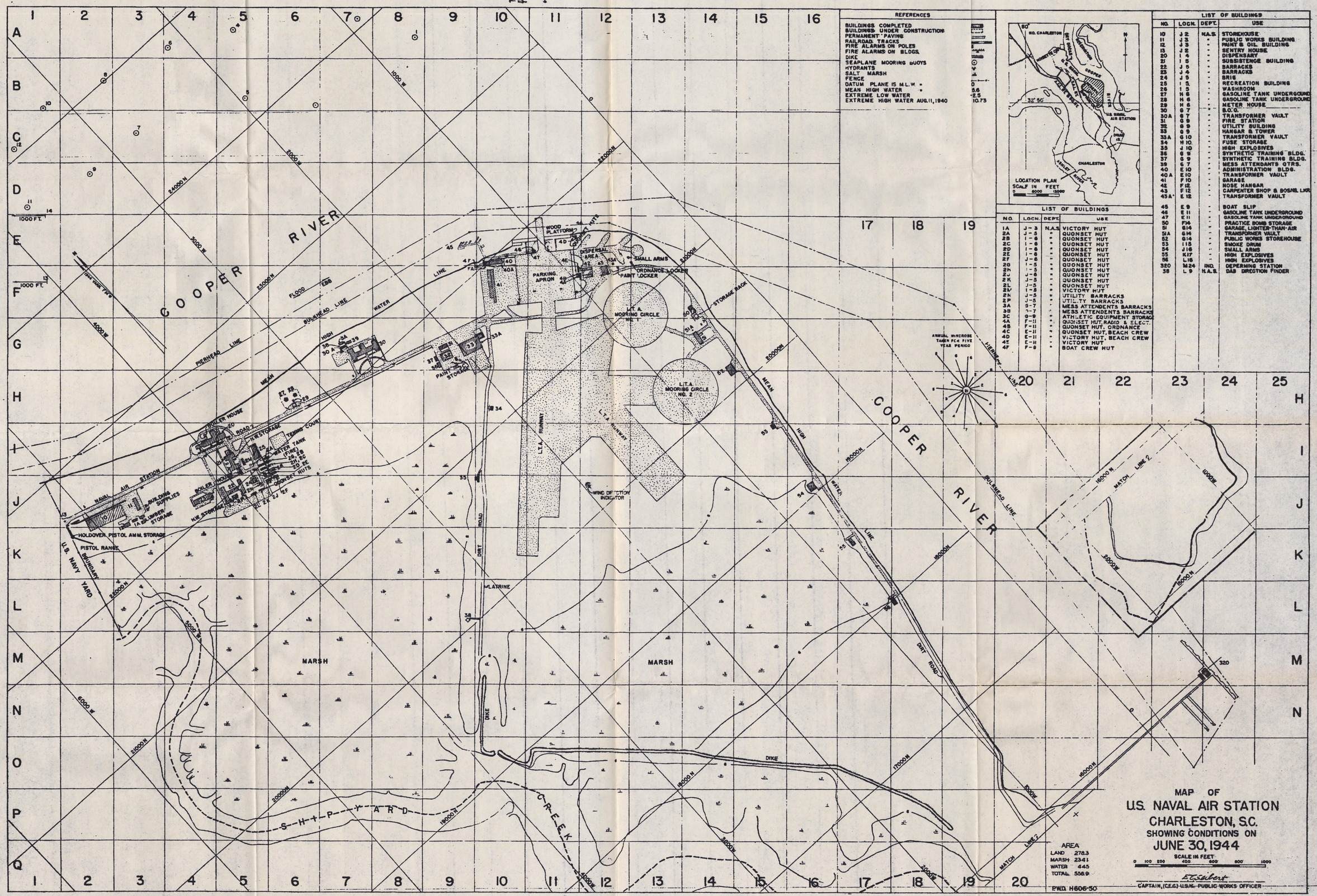


REFERENCES

BUILDINGS COMPLETED	
BUILDINGS UNDER CONSTRUCTION	
PERMANENT PAVING	
RAILROAD TRACKS	
FIRE ALARMS ON POLES	
FIRE ALARMS ON BLDGS.	
DIKE	
SEAPLANE MOORING BUOYS	
HYDRANTS	
SALT MARSH	
FENCE	
DATUM PLANE IS M.L.W. =	0
MEAN HIGH WATER =	5.6
EXTREME LOW WATER	-2.5
EXTREME HIGH WATER AUG. 11, 1940	10.73

LIST OF BUILDINGS

NO.	LOCN.	DEPT.	USE
1A	J-3	N.A.S.	VICTORY HUT
2A	J-5	"	QUONSET HUT
2B	I-6	"	QUONSET HUT
2C	I-6	"	QUONSET HUT
2D	I-6	"	QUONSET HUT
2E	I-6	"	QUONSET HUT
2F	J-6	"	QUONSET HUT
2G	I-5	"	QUONSET HUT
2H	I-5	"	QUONSET HUT
2J	J-6	"	QUONSET HUT
2K	J-5	"	QUONSET HUT
2L	J-5	"	QUONSET HUT
2V	I-5	"	VICTORY HUT
2N	J-5	"	UTILITY BARRACKS
2P	J-5	"	UTILITY BARRACKS
3A	G-7	"	MESS ATTENDENTS BARRACKS
3B	G-7	"	MESS ATTENDENTS BARRACKS
3C	G-9	"	ATHLETIC EQUIPMENT STORAGE
4A	F-11	"	QUONSET HUT, RADIO & ELECT.
4B	F-11	"	QUONSET HUT, ORDNANCE
4C	E-11	"	QUONSET HUT, BEACH CREW
4D	E-11	"	VICTORY HUT, BEACH CREW
4E	E-11	"	VICTORY HUT
4F	F-9	"	BOAT CREW HUT

LIST OF BUILDINGS

NO.	LOCN.	DEPT.	USE
10	J 2	N.A.S.	STOREHOUSE
11	J 3	"	PUBLIC WORKS BUILDING
12	J 3	"	PAINT & OIL BUILDING
13	J 2	"	SENTRY HOUSE
20	I 4	"	DISPENSARY
21	I 5	"	SUBSISTENCE BUILDING
22	J 5	"	BARRACKS
23	J 4	"	BARRACKS
24	J 5	"	BRIG
25	I 5	"	RECREATION BUILDING
26	I 5	"	WASHROOM
27	H 6	"	GASOLINE TANK UNDERGROUND
28	H 6	"	GASOLINE TANK UNDERGROUND
29	H 6	"	METER HOUSE
30	G 7	"	B.O.Q.
30A	G 7	"	TRANSFORMER VAULT
31	G 9	"	FIRE STATION
32	G 9	"	UTILITY BUILDING
33	G 9	"	HANGAR & TOWER
33A	G 10	"	TRANSFORMER VAULT
34	H 10	"	FUSE STORAGE
35	J 10	"	HIGH EXPLOSIVES
36	G 9	"	SYNTHETIC TRAINING BLDG.
37	G 9	"	SYNTHETIC TRAINING BLDG.
39	G 7	"	MESS ATTENDANTS QTRS.
40	E 10	"	ADMINISTRATION BLDG.
40A	E 10	"	TRANSFORMER VAULT
41	F 10	"	GARAGE
42	F 12	"	NOSE HANGAR
43	F 12	"	CARPENTER SHOP & BOSNS. LKR.
43A*	E 12	"	TRANSFORMER VAULT
45	E 9	"	BOAT SLIP
46	E 11	"	GASOLINE TANK UNDERGROUND
47	E 11	"	GASOLINE TANK UNDERGROUND
50	F 14	"	PRACTICE BOMB STORAGE
51	G 14	"	GARAGE, LIGHTER-THAN-AIR
51A	G 14	"	TRANSFORMER VAULT
52	G 14	"	PUBLIC WORKS STOREHOUSE
53	I 15	"	SMOKE DRUM
54	J 16	"	SMALL ARMS
55	K 17	"	HIGH EXPLOSIVES
56	L 18	"	HIGH EXPLOSIVES
320	M 24	IND.	DEPERMING STATION
38	L 9	N.A.S.	DAB DIRECTION FINDER

AREA	
LAND	278.3
MARSH	2341
WATER	445
TOTAL	5569

PWD. H606-30

MAP OF U.S. NAVAL AIR STATION CHARLESTON, S.C. SHOWING CONDITIONS ON JUNE 30, 1944

SCALE IN FEET

0 100 200 400 600 800 1000

E. G. Seibert
CAPTAIN, (C.E.C.) U.S.N. PUBLIC WORKS OFFICER

RESTRICTED (FOR OFFICIAL USE ONLY)

BUILDINGS - NAVAL SHIPYARD

NO.	LOC'N	DEPT	USE
1	✱G-24		VACANT
2-P	✱H-21	NRAO	STOREHOUSE
2-S	✱J-21	ATL R F	BUS SHELTER
4-S	✱L-19	A	YARD CRAFT OPERATIONS MAINT SHOP
8	✱J-22	ATL R F	OFFICE
9	✱J-21	ATL R F	BOILER HOUSE
10	✱H-23	DPW-S	STOREHOUSE
11	✱H-22	PLAN.	STOREHOUSE
12	✱H-23	END	STOREHOUSE
13	✱H-24	A	SENTRY HOUSE
14	✱H-13	PW	STANDBY GENERATOR
18	✱H-21		BOILER HOUSE (VACANT)
20	✱J-21	ATL R F	COMMANDING OFFICER, SUB GROUP TWO
22	✱H-21		VACANT
23	✱H-21	NRAO	DISBURSING OFFICE
24	✱H-20	ATL R F	STOREHOUSE
25	✱J-20	ATL R F	STOREHOUSE
30-A	✱L-19	PW	TRANSFORMER VAULT
31	✱L-17	MED	MOSQUITO CONTROL
32	✱L-17	S	STOREHOUSE
33	✱L-5	S	OFFICE & STOREHOUSE
33-A	✱L-16	PW	TRANSFORMER VAULT
39-K	H-24	S	STRIPPER PUMPHOUSE
40-A	N-15	PW	TRANSFORMER VAULT
43	✱M-14	S	STOREHOUSE
43-A	✱M-14	PW	TRANSFORMER VAULT
44	✱M-15		SEAPLANE RAMP & PLATFOR (VACANT)
50	✱M-12		STOREHOUSE (VACANT)
51-A	✱M-12	PW	TRANSFORMER VAULT
52	✱L-11	COMINLANT	STOREHOUSE
57	E-2	DEGN STA	DEPERMING STATION
123	H-23	PW	BOILER HOUSE
124	H-23	PW	SUBSTATION & PRESSURE REDUCING STA
125	H-23	PW	SUBSTATION
126	J-20	PW	SUBSTATION
127	J-28	PW	PUMPHOUSE (SALT WATER)
128	J-23	PW	PRESSURE REDUCING STATION
129	K-20	PW	PRESSURE REDUCING STATION
131	D-29	P	ACETYLENE PLANT
132	G-26	P	TORPEDO SHOP (INSIDE MACHINE SHOP)
149	D-28	P	PUMPHOUSE (PRESSURE SEWER)
160	G-25	S	TORPEDO MAGAZINE
161	F-25	S	TORPEDO MAGAZINE
162	F-25	S	TORPEDO MAGAZINE
169	K-20	ATL R F	PAINT & OIL STOREHOUSE
171	H-27	ATL R F	TOOL HOUSE
320	E-2	DEGN STA	DEPERMING PIER
322	J-25	S	FUEL OIL PIER
322-A	J-25	S	FIELD OFFICE, PIER 322
323	N-16	A	BOAT SLIP
325	K-28	ATL R F	CONCRETE PIER
326	K-27	ATL R F	CONCRETE PIER
327	K-23	ATL R F	CONCRETE PIER
328	K-22	ATL R F	CONCRETE PIER
329	M-20	ATL R F	CONCRETE PIER
330	L-19	A	CONCRETE PIER
1254	J-21	A	BUS SHELTER
1268	D-2	DEGN STA	INSTRUMENT HOUSE
3902	G-27	PW	PAINT & OIL STOREHOUSE
3905-A	N-15	S	AVIATION GAS (AQUA) TANK (UG)
3905-B	N-15	S	AVIATION GAS (AQUA) TANK (UG)
3905-C	K-20	S	AVIATION GAS TANK 25,000 GALS (UG)
3905-D	K-20	S	AVIATION GAS TANK 25,000 GALS (UG)
3905-G	K-20	PW	METER HOUSE (GASOLINE)

U.S. FLEET TRAINING CENTER

NO.	LOC'N	USE
36	✱M-16	RADIO SCHOOL
40	✱M-16	DAMAGE CONTROL SCHOOL
61	✱M-16	FIRE FIGHTING SCHOOL
60	✱L-16	GUNNERY TRAINER
176	L-15	FRESH WATER BOOSTER PUMPHOUSE
200	L-16	FLEET TRAINING CENTER BUILDING
201	M-15	COBALT STORAGE
1303	M-16	DAMAGE CONTROL MOCK-UP
1304	M-15	ENGINE ROOM MOCK-UP
1305	M-15	CARRIER COMPARTMENT MOCK-UP
1306	M-15	FIRE FIGHTING TANK
1307	M-15	FIRE FIGHTING TANK
3905-E	M-15	NO. 2 FUEL OIL TANK 5,000 GAL (UG)
3905-F	M-15	AVIATION GAS AQUA TANK 10,000 GAL (UG)

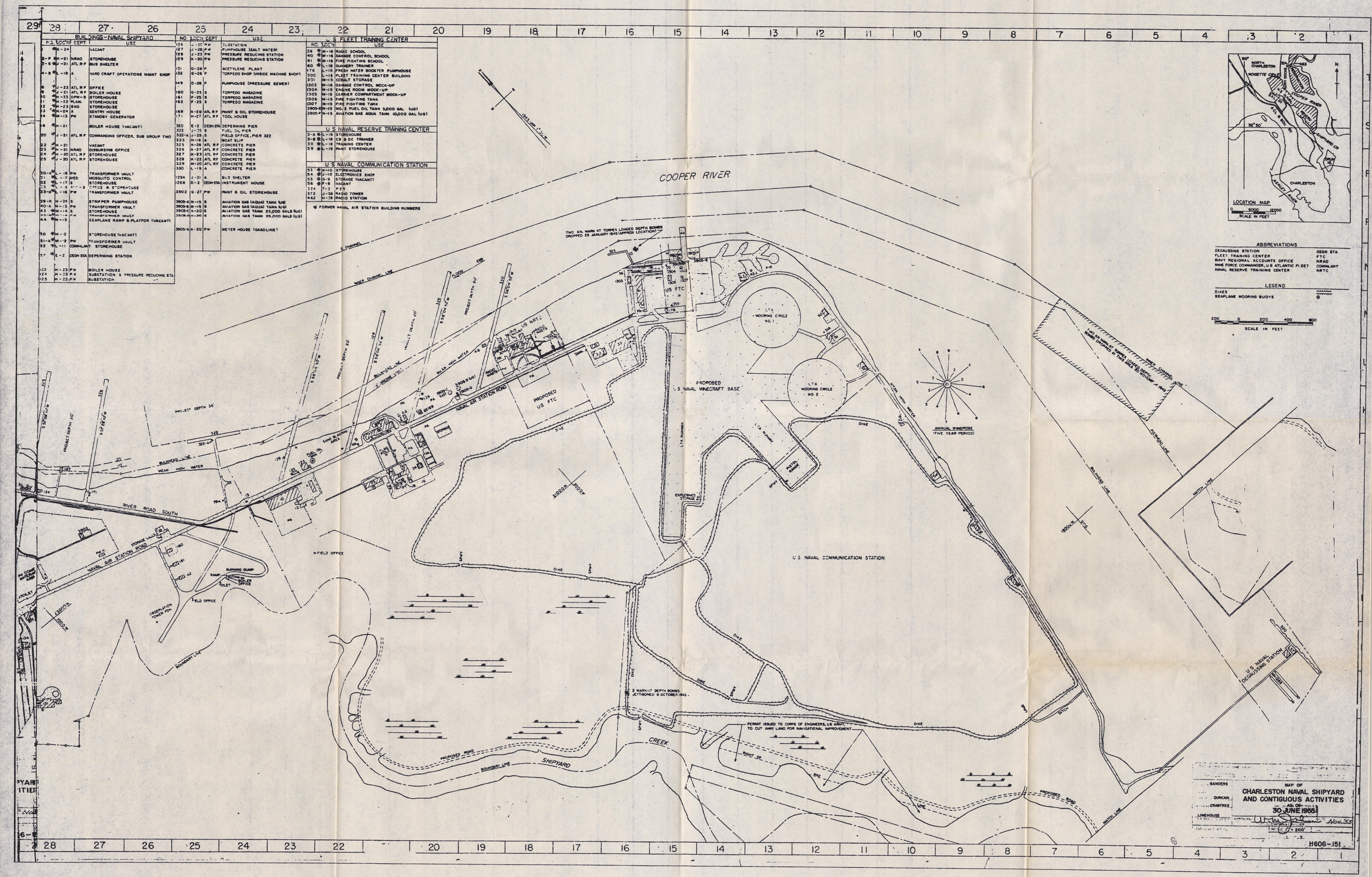
U.S. NAVAL RESERVE TRAINING CENTER

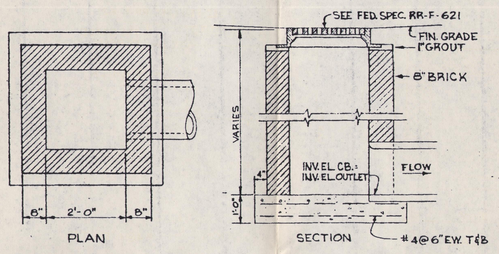
3-A	✱L-18	STOREHOUSE
3-B	✱L-19	CB & DC TRAINER
30	✱L-18	TRAINING CENTER
39	✱L-19	PAINT STOREHOUSE

U.S. NAVAL COMMUNICATION STATION

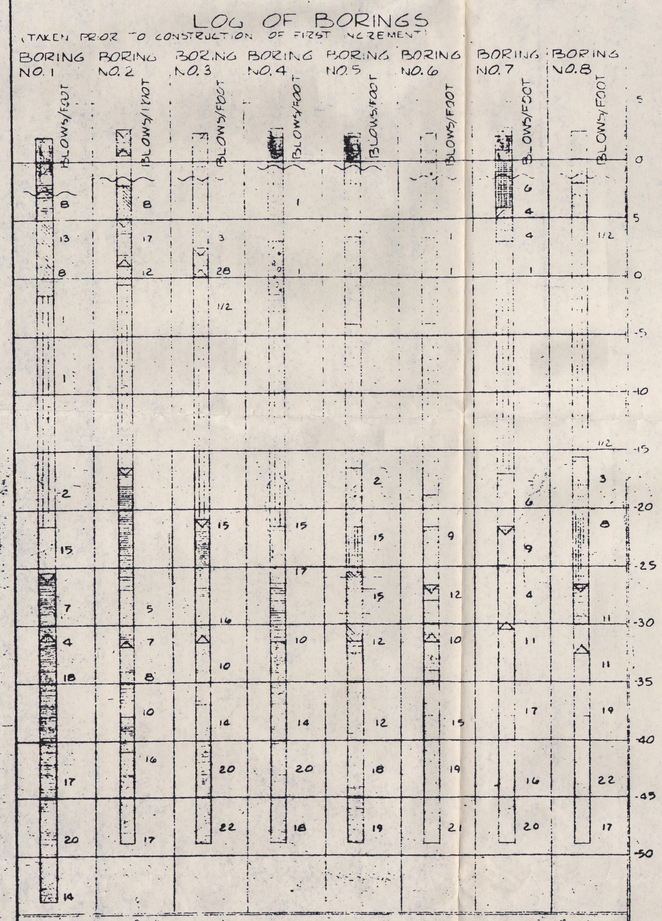
53	✱H-10	STOREHOUSE
54	✱J-10	ELECTRONICS SHOP
55	✱J-9	STORAGE (VACANT)
56	✱F-8	VACANT
324	T-2	PIER
372	J-38	RADIO TOWER
462	H-28	RADIO STATION

✱ FORMER NAVAL AIR STATION BUILDING NUMBERS

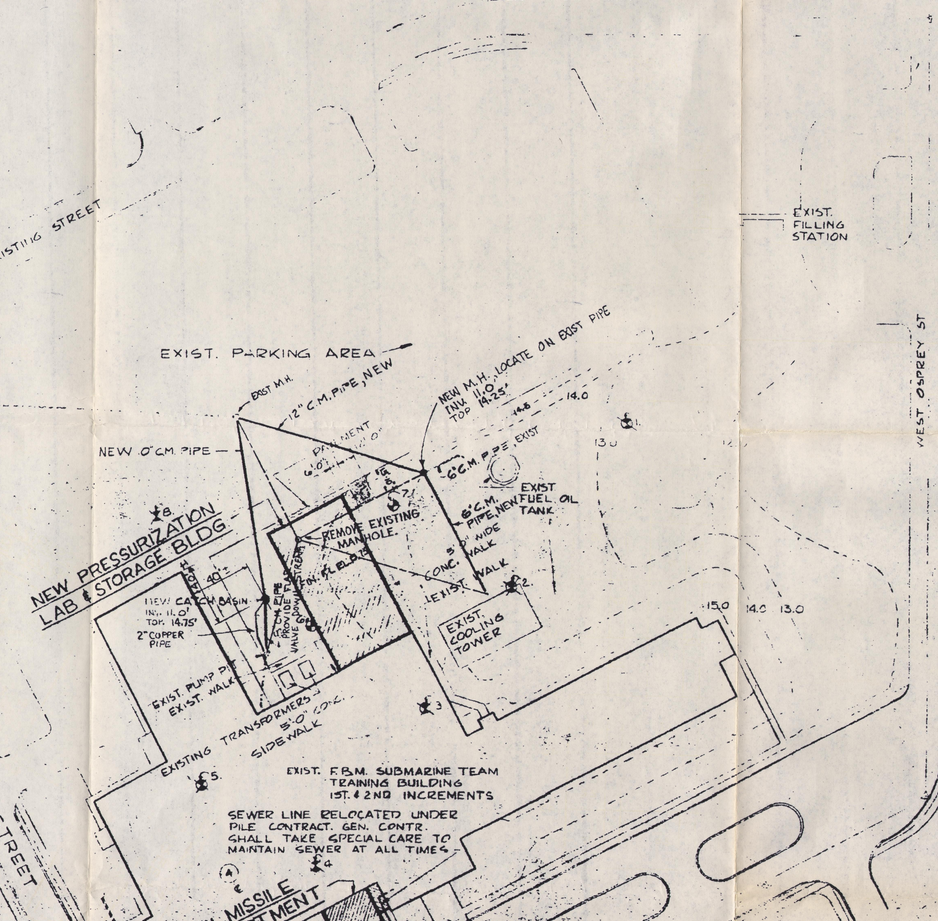




TYPICAL CATCH BASIN DETAIL
NO SCALE



DARK GRAY ORGANIC CLAY
" " " W/SAND & ROOTS
BLUE GRAY ORGANIC CLAY
" " " W/SAND
" " " W/SAND & SHELL
" " " W/WOOD PARTICLES
BROWN GRAY ORGANIC CLAY
BROWN GREEN CALCAREOUS CLAY W/SAND
" " " W/PEAT
" " INORGANIC CLAY
DARK GRAY SAND
BLUE GRAY SAND W/ORGANIC CLAY
" " " W/FINE SHELL
" " " W/SLIGHT MICA
" " " & FINE SHELL
" " " W/WOOD PARTICLES
GROUND WATER LEVEL
BLOWS PER FOOT: 140 LB. HAMMER DROPPED 30 IN. (W/2 IN. SPLIT SPOON)



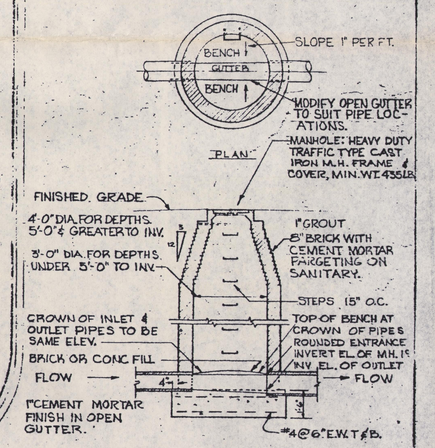
PLOT PLAN
SCALE 1" = 40'-0"

GRAPHIC SCALES
1/8" = 1'-0"
3/64" = 1'-0"
1/16" = 1'-0"
1" = 40'

LEGEND

- 5 — EXIST. CONTOUR
- EXIST. STORM AND OR SANITARY SEWER
- NEW SEWER
- EXISTING SEWER, TO BE REMOVED.

NOTES:
1- THIS DRAWING IS TO INDICATE SEWER CHANGES TO BE DONE BY FOUNDATION CONTRACTOR.
2- CONTRACTOR SHALL INSTALL NEW SEWER, MANHOLES, AND CATCH BASIN BEFORE REMOVING EXISTING IN ORDER TO KEEP INTERRUPTED SERVICE TO A MINIMUM.



TYPICAL MANHOLE DETAIL
NO SCALE

RECORD DRAWING
DATE 11 MAR 1965

SYMBOL	DESCRIPTION	DATE	APPROVED
	AS BUILT DWG. NO CORRECTIONS		

REVISIONS

J. E. SIRRINE CO.
Engineers - Architects
GREENVILLE, S.C.

DEPARTMENT OF THE NAVY
SOUTHEAST DIVISION - BUREAU OF YARDS AND DOCKS
U.S. NAVAL BASE CHARLESTON, S.C.

U.S. NAVAL BASE CHARLESTON, S.C.
FOUNDATIONS FOR BUILDINGS
FBM SUBMARINE TRAINING CENTER
MISSILE COMPARTMENT & STORAGE BLDG.
PLOT PLAN

DR. CWE CK. JMD
ARCH. JOB NO. 6388
SCALE 1" = 40'
DATE 3-30-64
SUBMITTED BY
VICE PRESIDENT
CHIEF ENGINEER
APPROVED
CHIEF DIRECTOR FOR ACTIVITIES CHIEF
APPROVED FOR BUREAU
DIRECTOR FOR CHIEF OF BUREAU

CONT. SHEET NO. 8009E
SHEET NO. E-1
NO. 1025464
NO. 62456 A64
NOTED 62456
REV. 01

NS 61-192
6-665-73-329
JOB ORDER NUMBER