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RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT
ZONE G VOLUME VI OF VI APPENDIX E CNC CHARLESTON SC
2/20/1998
ENSAFE

ZONE G
RCRA FACILITY
INVESTIGATION REPORT
NAVBASE CHARLESTON

VOLUME VI of VI
APPENDIX E

CONTRACT N62467-89-D-0318
CTO-029

Prepared for:

Comprehensive Long-Term Environmental Action Navy (CLEAN)
Charleston Naval Shipyard
Charleston, South Carolina

Prepared by:

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February 20, 1998
Revision: 0

Appendix E
Zone G
Data Validation Reports

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27016A
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	September 19, 1996
Number of Samples:	1 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Organophosphorus Pesticides, Herbicides, Dioxin/Furans, Hexavalent Chromium, Metals, Cyanide

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 in 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. Seaman
Paul B. Humburg, President

11/15/96
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27016A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
006CB00201	SOIL		X		X		X		X		X		X		X		X		X
Total Billable Samples	(Water/Soil)	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1

VOA= SW846 Volatiles
SV= SW846 Semivolatiles
P/P= SW846 Pesticide/PCBs
OPP= SW846 Organophosphorus Pesticides
HERB= SW846 Herbicides
D/F= SW846 Dioxin/Furans
HCR= SW846 Hexavalent Chromium
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA 8240; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level IV. All comments made within this report should be considered when examining the analytical results.

SDG # 27016A

A validation was performed on the Volatile Data from SDG 27016A. 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
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, I21291.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).

006CB00201	2-chloroethyl vinyl ether (0.042)
	Acrolein (0.027)
	Isobutyl alcohol (0.006)
	1,4-dioxane (0.002)

The continuing calibration, I21291.D, contained compounds with %Ds greater than 25% and less than 50%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J).

006CB00201	acetone (26.4%)

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
006CB00201	2-chloroethyl vinyl ether Acrolein Isobutyl alcohol 1,4-dioxane	+/-	J/UR
006CB00201	acetone	+	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 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 U.S. EPA SW846, Method 8270 with CLP deliverables; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27016A

A validation was performed on the Semivolatile Data from SDG 27016A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibrations
*	•	Internal Standard Performance
	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within %D continuing calibration criteria. All RRFs were not within calibration criteria.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A6161,-62,-63, contained compounds with %Ds greater than 50% D but less than 90% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and all non detects as estimated (UJ).

006CB00201	ethyl methanesulfonate (55.1)
	2-picoline (63.0)
	safrole (61.8)
	isosafrole (67.7)
	1,3-dinitrobenzene (88.2)
	2-naphthylamine (63.1)
	5-nitro-o-toluidine (71.8)
	4-aminobiphenyl (57.9)
	pronamide (74.9)
	pentachloronitrobenzene (76.5)
	methyl parathion (64.6)
	parathion (64.9)
	chlorobenzilate (54.4)
	3,3'-dimethylbenzidine (76.0)
	famphur (55.0)
	2-acetylaminofluorene (73.8)
	diphenylamine (74.6)
	sulfotepp (73.6)
	kepone (83.6)
	7,12-dimethylbenz(a)anthracene (58.5)

The continuing calibration,A6161,-62,-63, contained compounds with %Ds greater than 90% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and reject all non detects (UR).

006CB00201	1,4-naphthoquinone (91.5)

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A6161,-62,-63, contained compounds with RRFs less than 0.05. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and reject all non detects (UR).

006CB00201	aramite hexachlorophene (70.2)

Field Blanks

Associated blank	Compound	Conc.	Action level
008EB00201	naphthalene	1J ug/L	165 ug/Kg
	acenaphthene	1J ug/L	.165 ug/Kg
	phenanthrene	1J ug/L	165 ug/Kg
	bis(2-ethylhexyl) phthalate	5JB ug/L	1670 ug/Kg
008DB00201	bis(2-ethylhexyl) phthalate	5JB ug/L	1670 ug/Kg

Samples	Compound	Qualification
006CB00201	naphthalene	CRQL
006CB00101 006CB00201	bis(2-ethylhexyl)phthalate	CRQL

Field Duplicates

The field duplicates exhibited a high RPD for anthracene and benzo(k)fluoranthene. For sample 006CB00201, qualify positive results as estimated (J).

Compound Identification/Quantitation

Specific Finding:

The laboratory did not include the following compounds in there calibration curve or continuing calibration, compounds carbazole, 3-methyl-cholanthrene and 1,2-dibromo-3-chloropropane. For all samples, qualify all positive results estimated (J) and reject all non detects (UR).

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
006CB00201	ethyl methanesulfonate (55.1)	+/-	J/UJ
	2-picoline (63.0)		
	safrole (61.8)		
	isosafrole (67.7)		
	1,3-dinitrobenzene (88.2)		
	2-naphthylamine (63.1)		
	5-nitro-o-toluidine (71.8)		
	4-aminobiphenyl (57.9)		
	pronamide (74.9)		
	pentachloronitrobenzene (76.5)		
	methyl parathion (64.6)		
	parathion (64.9)		
	chlorobenzilate (54.4)		
	3,3'-dimethylbenzidine (76.0)		
	famphur (55.0)		
	2-acetylaminofluorene (73.8)		
	diphenylamine (74.6)		
	sulfotepp (73.6)		
	kepone (83.6)		
	7,12-dimethylbenz(a)anthracene (58.5)		
006CB00201	1,4-naphthoquinone (91.5)	+/-	J/UR
006CB00201	aramite		
	hexachlorophene (70.2)	+/-	J/UR
006CB00201	anthracene	+	J
	benzo(k)fluoranthene		
006CB00201	carbazole	+/-	J/UR
	3-methyl-cholanthrene		
	1,2-dibromo-3-chloropropane		
006CB00201	naphthalene	+	CRQL
006CB00101	bis(2-ethylhexyl)phthalate	+	CRQL
006CB00201			

* 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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27016A

A validation was performed on the Pesticide/Aroclor Data from SDG 27016A. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Field Duplicates

The field duplicate pair of samples 006SB00201/DL and 006CB00201/DL exhibited positive results for several compounds in the field sample and field duplicate. Qualifications were required.

Specific Finding

The field duplicate pair of samples 006SB00201/DL and 006CB00201/DL exhibited positive results above the CRQL for Beta-BHC and Endrin in the field sample. These compounds were not detected in the field duplicate. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ, due to poor duplicate precision.

006CB00201/DL	Beta-BHC (200%) Endrin (200%)

The field duplicate pair of samples 006SB00201/DL and 006CB00201/DL exhibited positive results above the CRQL for Gamma-BHC and Alpha-Chlordane in the field sample and field duplicate. The positive results are qualified as estimated, J, due to poor duplicate precision.

006CB00201/DL	Gamma-BHC (51%) Alpha-Chlordane (64%)

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion). One (1) sample was diluted to accurately quantitate target compounds. It is the professional opinion of the data validator that single component pesticides reported in the samples with high concentrations of aroclors should be considered suspect.

Compound Identification/Quantitation, Continued

Specific Findings

For the following samples, the results for the E flagged compounds are replaced with the corresponding results from the DL analysis. All other results from the dilution are rejected, UR, in favor of the results reported from the undiluted analysis.

006CB00201

The positive results reported in all samples which exhibited column quantitation differences greater than 40% but less than 70% are qualified as presumptively present at an estimated concentration, NJ.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results less than 10X the CRQL are reported as undetected, U.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results greater than 10X the CRQL are qualified as presumptively present at an estimated concentration, NJ.

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates less than 10% of 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 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
006CB00201/DL	Beta-BHC Endrin	+/-	J/UJ
006CB00201/DL	Gamma-BHC Alpha-Chlordane	+	J
006CB00201	All E Flagged	+E	D
006CB00201DL	All except corresponding D flagged results	+/-	UR
ALL	All P >40% But ≤ 70%	+	NJ
ALL	All P > 70% And < 10X CRQL	+	U
ALL	All P > 70% And > 10X CRQL	+	NJ

* 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

ORGANOPHOSPHORUS PESTICIDES

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 Method 8140; the National Functional Guidelines for Organic Data Validation, June 1991, and DQO Level IV 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 # 27016A

A validation was performed on the Organophosphorus Pesticides from SDG 27016A. The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • 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

Overall performance was acceptable. 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

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

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

DATA ASSESSMENT NARRATIVE

CHLORINATED HERBICIDES

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 Method 8150; the National Functional Guidelines for Organic Data Validation, June 1991, and DQO Level IV 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 # 27016A

A validation was performed on the Chlorinated Herbicides from SDG 27016A. The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • 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

Overall performance was acceptable. 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

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

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

DATA ASSESSMENT NARRATIVE
METALS, HEXAVALENT CHROMIUM and CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level IV 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 # 27016B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 27016B. The data was evaluated based on the following parameters for field duplicate sample only.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Cobalt	0.12 mg/kg	no impact

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Antimony	4.8 ug/l	all soil samples below 4.8 mg/kg
Copper	1.2 ug/l	no impact
Sodium	532 ug/l	all soil samples below 532 mg/kg

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Aluminum	-1.63 mg/kg	no impact
Lead	-0.24 mg/kg	no impact

The USEPA requires that the reviewer review and qualify data bias on negative bias. This reviewer qualifies all non-detect and positive results below ten times the absolute value as estimated, "J" or "UJ".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
all soil samples below 4.8 mg/kg	Sb.	+	U
all soil samples below 532 mg/kg	Na.		
All "B" results	all analytes	B	J

DATA ASSESSMENT AND NARRATIVE

Dioxin/Furans

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, matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard recoveries. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. EPA SW846, Method 8290; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27016

A validation was performed on the Dioxin/Furans Data from SDG 27016. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Mass Resolution Checks
*	•	Column Performance
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Congener Identification /Quantitation

* - All criteria were met for this parameter

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. No qualifications were required.

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 the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL

No qualifications are 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#:	27016B
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	September 19, 1996
Number of Samples:	1 Aqueous Sample(s) with 0 MS/MSD(s) 18 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Gasoline Range Organics, Diesel Range Organics, Metals

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 in 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 H. Simpson

Paul B. Humburg, President

11/15/96

Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27016B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		DRO		GRO		TAL	
006SB00101	SOIL		X		X		X						X
006SB00102	SOIL		X		X		X						X
006SB00201	SOIL		X		X		X						X
006SB00301	SOIL		X		X		X						X
006SB00401	SOIL		X		X		X						X
006TB00401	WATER	X											
006SB00402	SOIL		X		X		X						X
638SB00301	SOIL		X		X		X						X
638SB00302	SOIL		X		X		X						X
638SB00401	SOIL		X		X		X						X
638SB00402	SOIL		X		X		X						X
FDSSC03001	SOIL								X		X		
FDSSC03101	SOIL								X		X		
FDSSC03201	SOIL								X		X		
FDSSC03301	SOIL								X		X		
FDSSC03401	SOIL								X		X		
FDSSC03501	SOIL								X		X		
FDSSC03601	SOIL								X		X		
FDSSC03602	SOIL								X		X		
Total Billable Samples (Water/Soil)		1	10	0	10	0	10	0	8	0	8	0	10

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
GRO= Gasoline Range Organics
DRO= Diesel Range Organics
TAL= SW846 Metals

DATA ASSESSMENT NARRATIVES

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 U.S. EPA 8240; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 27016B

A validation was performed on the Volatile Data from SDG 27016B. 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
*	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, I21342.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).

006SB00402	2-chloroethyl vinyl ether (0.023)
006SB00301	
638SB00301	
638SB00401	

The continuing calibration, I21371.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).

006SB00401	2-chloroethyl vinyl ether (0.030)
638SB00301RE	
638SB00302	
638SB00402	
006SB00101	
006SB00102	
006SB00201	
638SB00302RE	
006SB00101RE	
006SB00201RE	

The continuing calibration, I21392.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).

638SB00402DL	vinyl acetate (56.0%)
006SB00102DL	

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, I21392.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).

638SB00402DL	2-chloroethyl vinyl ether (0.024)
006SB00102DL	

Internal Standards

All internal standard EICP areas did not meet the internal standard EICP area QA/QC criteria. Qualifications are required.

Specific Finding:

The Samples listed below, exhibited low internal standard areas. Qualify all associated positive results as estimated (J) and all non detects as estimated(UJ).

006SB00102	bromochloromethane
	1,4-difluorobenzene
	chlorobenzene-d_5
638SB00301RE	1,4-difluorobenzene
006SB00201	chlorobenzene-d_5
638SB00302RE	
006SB00201RE	
638SB00301	chlorobenzene-d_5
638SB00302	
638SB00402	
006SB00101	
006SB00101RE	

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
VBLK2	acetone	2J ug/kg	20 ug/kg
VBLK3	acetone	1J ug/kg	10 ug/kg
VBLK4	methyiene chloride Acetone	5 ug/kg 4J ug/kg	50 ug/kg 40 ug/kg

Samples	Compound	Qualification
638SB00301 006SB00301 638SB00301RE	acetone	CRQL
638SB00401 638SB00402DL	acetone	U
006SB00102DL 638SB00402DL	methylene chloride	CRQL

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
008EB00201	methylene chloride	12 ug/L	120 ug/L
	Chloroform	15 ug/L	150 ug/L

Samples	Compound	Qualification
006SB00101 006SB00102 006SB00201RE 006SB00301 638SB00301 638SB00302 638SB00302RE	methylene chloride	CRQL
638SB00402 006SB00201	methylene chloride	U
006SB00201RE	chloroform	CRQL

Compound Identification /Quantitation

Replace E-flagged results in samples 006SB00102 and 638SB00402, in favor of the diluted sample D-flag result. Reject all compounds in samples 006SB00102DL and 638SB00402DL except for D-flagged compounds.

Reject samples 006SB00201RE, 638SB00301RE, 638SB00302RE, and 006SB00101RE, in favor of the initial analysis, due to non compliant internal standard area recoveries.

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 10% of the data is qualified.

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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
006SB00402 006SB00301 638SB00301 638SB00401	2-chloroethyl vinyl ether	+/-	J/UR
006SB00401 638SB00301RE 638SB00302 638SB00402 006SB00101 006SB00102 006SB00201 638SB00302RE 006SB00101RE 006SB00201RE	2-chloroethyl vinyl ether	+/-	J/UR
638SB00402DL 006SB00102DL	vinyl acetate	+/-	J/UJ
638SB00402DL 006SB00102DL	2-chloroethyl vinyl ether	+/-	J/UR
006SB00102	All associated compounds bromochloromethane 1,4-difluorobenzene chlorobenzene-d_5	+/-	J/UJ
638SB00301RE 006SB00201 638SB00302RE 006SB00201RE	1,4-difluorobenzene chlorobenzene-d_5		

* 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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
	All associated compounds	+/-	J/UJ
638SB00301	chlorobenzene-d_5		
638SB00302			
638SB00402			
006SB00101			
006SB00101RE			
638SB00301	acetone	+	CRQL
006SB00301			
638SB00301RE			
638SB00401	acetone	+	U
638SB00402DL			
006SB00102DL	methylene chloride	+	CRQL
638SB00402DL			
006SB00101	methylene chloride	+	CRQL
006SB00102			
006SB00201RE			
006SB00301			
638SB00301			
638SB00302			
638SB00302RE			
638SB00402	methylene chloride	+	U
006SB00201			
006SB00201RE	chloroform	+	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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
006SB00102 638SB00402	all E-flagged compounds	+	D
006SB00102DL 638SB00402DL	all compounds except D-flagged compounds	+/-	UR
006SB00201RE 638SB00301RE 638SB00302RE 006SB00101RE	all results	+/-	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 U.S. EPA SW846, Method 8270 with CLP deliverables; 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 (Form I's).

SDG # 27016B

A validation was performed on the Semivolatile Data from SDG 27016B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Field Blanks

Associated blank	Compound	Conc.	Action level
008EB00201	naphthalene	1J ug/L	165 ug/Kg
	acenaphthene	1J ug/L	165 ug/Kg
	phenanthrene	1J ug/L	165 ug/Kg
	bis(2-ethylhexyl) phthalate	5JB ug/L	1670 ug/Kg
008DB00201	bis(2-ethylhexyl) phthalate	5JB ug/L	1670 ug/Kg

Samples	Compound	Qualification
006SB00101 006SB00201	naphthalene	CRQL
006SB00101 006SB00201	acenaphthene	CRQL
006SB00101 006SB00201 638SB00302 638SB00402	bis(2-ethylhexyl) phthalate	CRQL
006SB00102 006SB00301 006SB00401	phenanthrene	CRQL

Field Duplicates

The field duplicates exhibited a high RPD for anthracene and benzo(k)fluoranthene. For sample 006SB00201, qualify positive results as estimated (J).

Compound Identification /Quantitation

Qualify all E-flagged results as estimated (J) for sample 006SB00201.

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
006SB00101 006SB00201	naphthalene	+	CRQL
006SB00101 006SB00201	acenaphthene	+	CRQL
006SB00101 006SB00201 638SB00302 638SB00402	bis(2-ethylhexyl) phthalate	+	CRQL
006SB00102 006SB00301 006SB00401	phenanthrene	+	CRQL
006SB00201	anthracene benzo(k)fluoranthene	+	J
006SB00201	all E-flagged compounds	+	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27016B

A validation was performed on the Pesticide/Aroclor Data from SDG 27016B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Field Duplicates

The field duplicate pair of samples 006SB00201/DL and 006CB00201/DL exhibited positive results for several compounds in the field sample and field duplicate. Qualifications were required.

Specific Finding

The field duplicate pair of samples 006SB00201/DL and 006CB00201/DL exhibited positive results above the CRQL for Beta-BHC and Endrin in the field sample. These compounds were not detected in the field duplicate. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ, due to poor duplicate precision.

006SB00201/DL	Beta-BHC (200%) Endrin (200%)

The field duplicate pair of samples 006SB00201/DL and 006CB00201/DL exhibited positive results above the CRQL for Gamma-BHC and Alpha-Chlordane in the field sample and field duplicate. The positive results are qualified as estimated, J, due to poor duplicate precision.

006SB00201/DL	Gamma-BHC (51%) Alpha-Chlordane (64%)

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion). In addition several results with high %Ds were not flagged with a P on the Form 1 or sample spreadsheet. The data validator qualified the data based on the %Ds on the sample Form 10s. Four (4) samples were diluted to accurately quantitate target compounds. Sample 006SB00201 exhibited results for Alpha Chlordane and Gamma Chlordane that were above the calibration range of the instrument. However, these results were not detected in the DL analysis, therefore, this result is qualified as estimated. It is the professional opinion of the data validator that single component pesticides reported in the samples with high concentrations of aroclors should be considered suspect.

Compound Identification/Quantitation, Continued

Specific Findings

For the following samples, the results for the E flagged compounds are replaced with the corresponding results from the DL analysis. All other results from the dilution are rejected, UR, in favor of the results reported from the undiluted analysis.

006SB00101
006SB00102
006SB00201
006SB00301

For the following sample, the results for Alpha and Gamma Chlordane are qualified as estimated, J, as they are above the calibration range of the instrument.

006SB00201	Alpha Chlordane
	Gamma Chlordane

The positive results reported in all samples which exhibited column quantitation differences greater than 40% but less than 70% are qualified as presumptively present at an estimated concentration, NJ.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results less than 10X the CRQL are reported as undetected, U.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results greater than 10X the CRQL are qualified as presumptively present at an estimated concentration, NJ.

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates less than 10% of 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 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
006SB00201/DL	Beta-BHC Endrin	+/-	J/UJ
006SB00201/DL	Gamma-BHC Alpha-Chlordane	+	J
006SB00101 006SB00102 006SB00201 006SB00301	All E Flagged	+E	D
006SB00101DL 006SB00102DL 006SB00201DL 006SB00301DL	All except corresponding D flagged results	+/-	UR
006SB00201	Alpha Chlordane Gamma Chlordane	+	J
ALL	All P >40% But ≤ 70%	+	NJ
ALL	All P > 70% And < 10X CRQL	+	U
ALL	All P > 70% And > 10X CRQL	+	NJ

* 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

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27016B

A validation was performed on the TPH (DRO) data from SDG 27016B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. The data did not require qualification. Miscellaneous fuels were reported in samples FDSSC03001, FDSSC03401, FDSSC03201, FDSSC03601, and FDSSC03602. This result was not present on the spreadsheet results but was present on the Form I equivalent submitted by the laboratory.

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

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

DATA ASSESSMENT NARRATIVE

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27016B

A validation was performed on the TPH (GRO) data from SDG 27016B. The data was evaluated based on the following parameters.

* • Data Completeness
* • Holding Times
* • GC/MS Tuning
* • Calibrations
* • Internal Standard Performance
* • Blanks
* • Surrogate Recoveries
* • Matrix Spike/Matrix Spike Duplicate
* • Field Duplicates
* • Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. The data did not require qualification.

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

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

DATA ASSESSMENT NARRATIVE
METALS

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 27016A

A validation was performed on the Metals Data from SDG 27016A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Cobalt	0.12 mg/kg	no impact

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Antimony	4.8 ug/l	all soil samples below 4.8 mg/kg
Copper	1.2 ug/l	no impact
Sodium	532 ug/l	all soil samples below 532 mg/kg

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Aluminum	-1.63 mg/kg	no impact
Lead	-0.24 mg/kg	no impact

The USEPA requires that the reviewer review and qualify data bias on negative bias. This reviewer qualifies all non-detect and positive results below ten times the absolute value as estimated, "J" or "UJ".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
all soil samples below 4.8 mg/kg	Sb.	+	U
all soil samples below 532 mg/kg	Na.		
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27034A
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	September 20, 1996
Number of Samples:	1 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Diesel Range Organics, Gasoline Range Organics

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 in 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 K. Simpson

Paul B. Humburg, President

11/14/96
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27034A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	DRO		GRO	
FDSCC04002	SOIL		X		X
Total Billable Samples (Water/Soil)		0	1	0	1

DRO= Diesel Range Organics
GRO= Gasoline Range Organics

DATA ASSESSMENT NARRATIVES

DATA ASSESSMENT NARRATIVE

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level IV requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27034A

A validation was performed on the TPH (DRO) data from SDG 27034A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. The data did not require qualification.

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

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

DATA ASSESSMENT NARRATIVE

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level IV requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27034A

A validation was performed on the TPH (GRO) data from SDG 27034A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. 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

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

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#:	27034B
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	September 20, 1996
Number of Samples:	1 Aqueous Sample(s) with 0 MS/MSD(s) 16 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Gasoline Range Organics, Diesel Range Organics, Metals, Cyanide, pH

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 in 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

11/14/96
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27034B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		DRO		GRO		TAL		CN		pH	
011SB00401	SOIL												X				X
011SB00501	SOIL												X				X
011SB00502	SOIL												X				X
706SB00501	SOIL		X		X		X						X				
FDSOE00101	SOIL		X		X		X						X		X		
FDSTB00101	WATER	X															
706TB00501	SOIL		X														
FDSSC03701	SOIL								X		X						
FDSSC03702	SOIL								X		X						
FDSSC03801	SOIL								X		X						
FDSSC03802	SOIL								X		X						
FDSSC03901	SOIL								X		X						
FDSSC03902	SOIL								X		X						
FDSSC04001	SOIL								X		X						
FDSSC04002	SOIL								X		X						
FDSSC04101	SOIL								X		X						
FDSSC04102	SOIL								X		X						
Total Billable Samples (Water/Soil)		1	3	0	2	0	2	0	10	0	10	0	5	0	1	0	3

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
GRO= Gasoline Range Organics
DRO= Diesel Range Organics
TAL= SW846 Metals
CN= SW846 Cyanide
pH= pH

DATA ASSESSMENT NARRATIVES

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 U.S. EPA 8240; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 27034B

A validation was performed on the Volatile Data from SDG 27034B. 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
*	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within continuing calibration criteria. Average RRFs exhibited that were within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, I21291.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).

FDSOE00101	2-chloroethyl vinyl ether (0.042)

The continuing calibration, I21315.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).

FDSOE00101RE	2-chloroethyl vinyl ether (0.038)

Internal Standards

All internal standard EICP areas did not meet the internal standard EICP area QA/QC criteria. Qualifications are required.

Specific Finding:

The Samples listed below, exhibited low internal standard areas. Qualify all associated positive results as estimated (J) and all non detects as estimated(UJ).

FDSOE00101	bromochloromethane
FDSOE00101RE	1,4-difluorobenzene
	chlorobenzene-d_5

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
VBLK2	acetone	5J ug/L	50 ug/L
VBLK3	methylene chloride Acetone	2J ug/L 12 ug/L	20 ug/L 120 ug/L

Samples	Compound	Qualification
706SB00501	methylene chloride	U
706SB00501	acetone	CRQL
FDSOE00101RE FDSOE00101	acetone	U

Surrogates

All of the surrogate recoveries for these samples were not within QA/QC limits. Qualifications are required.

Specific Finding:

Sample listed below exhibited high recoveries for toluene-d_8. Qualify all positive results as estimated (J).

FDSOE00101 (180%)
FDSOE00101RE (178%)

Compound Identification /Quantitation

Reject sample FDSOE00101RE, in favor of the initial analysis, due to non compliant surrogate and internal standard area recoveries.

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
FDSOE00101	2-chloroethyl vinyl ether	+/-	J/UR
FDSOE00101RE	2-chloroethyl vinyl ether	+/-	J/UR
FDSOE00101 FDSOE00101RE	All associated compounds bromochloromethane 1,4-difluorobenzene chlorobenzene-d_5	+/-	J/UJ
706SB00501	methylene chloride	+	U
706SB00501	acetone	+	CRQL
FDSOE00101RE FDSOE00101	acetone	+	U
FDSOE00101 FDSOE00101RE	all compounds	+	J
FDSOE00101RE	all results	+/-	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 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 U.S. EPA SW846, Method 8270 with CLP deliverables; 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 (Form I's).

SDG # 27034B

A validation was performed on the Semivolatile Data from SDG 27034B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Internal Standards

Specific Finding:

The samples listed below, exhibited low internal standard areas. Qualify all associated positive results as estimated (J) and all non detects as estimated (UJ).

FDS0E00101	chrysene-d_{12}
	perylene-d_{12}

Internal Standards (continued)

Specific Finding:

The samples listed below, exhibited low internal standard areas. Qualify all associated positive results as estimated (J) and all non detects as estimated (UJ).

FDS0E00101RE	phenanthrene-d_{10}
	chrysene-d_{12}
	perylene-d_{12}

Compound Identification/Quantitation

Specific Finding:

Reject all results for the sample FDS0E00101RE, due to non compliant internal standard areas.

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
	All associated compounds	+/-	J/UJ
FDS0E00101	chrysene-d_{12} perylene-d_{12}		
FDS0E00101RE	phenanthrene-d_{10} chrysene-d_{12} perylene-d_{12}		
FDS0E00101RE	All results	+/-	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27034B

A validation was performed on the Pesticide/Aroclor Data from SDG 27034B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Surrogate Recoveries

One (1) field sample exhibited non-compliant TCX and DCB recoveries.

Specific Finding

The sample listed below exhibited low TCX and DCB recoveries. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimate, UJ.

Sample ID	Surrogate	% Recovery
FDSOE00101	TCX-1/TCX-2	27%/16%
	DCB-1/DCB-2	26%/33%

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates less than 10% of 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 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
FDSOE00101	ALL	+/-	J/UJ

* 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

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27034B

A validation was performed on the TPH (DRO) data from SDG 27034B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. The data did not require qualification. Miscellaneous fuels were reported in samples FDSSC04001, FDSSC03902, and FDSSC04101. These results were not present on the spreadsheet results but were present on the Form I equivalent submitted by the laboratory.

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

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

DATA ASSESSMENT NARRATIVE

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27034B

A validation was performed on the TPH (GRO) data from SDG 27034B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Surrogate Recoveries

One (1) sample exhibited a surrogate recovery less than the QC limits.

Specific Finding

The reported positive result reported in the following sample for gasoline is qualified as estimated, J, due to surrogate recoveries below the QC limit.

Sample	Surrogate	% Recovery
FDSSC04101	naphthalene	15%

DATA ASSESSMENT NARRATIVE
TPH - PURGEABLES (GRO)

Overall Performance

Overall performance was acceptable. The reviewer estimates that less than 10% of the data required qualification.

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
FDSSC04101	gasoline	+	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
METALS, pH AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 27034

A validation was performed on the Metals, pH and Cyanide Data from SDG 27034. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
	•	Matrix Spike Recovery
	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Cyanide	0.14 mg/kg	all soil samples below 0.7 mg/kg

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Antimony	4.8 ug/l	no impact
Copper	1.2 ug/l	no impact
Sodium	532 ug/l	all soil samples below 532 mg/kg

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Aluminum	-1.63 mg/kg	no impact
Lead	-0.24 mg/kg	no impact

The USEPA requires that the reviewer review and qualify data bias on negative bias. This reviewer qualifies all non-detect and positive results below ten times the absolute value as estimated, "J" or "UJ".

Matrix Spike recovery

Specific Finding

The Matrix Spike recoveries for soils for Antimony (54), Selenium (73%) and Thallium (70%) were below the lower control limits (>30% but <75%). All positive and non-detect results are qualified as estimated, "J" or "UJ".

The Matrix Spike recovery for soils for Manganese (138%) was above the upper control limits (>125%). All positive results are qualified as estimated, "J".

Field and Duplicate Analysis

Specific Finding

The RPD for the laboratory duplicate samples for soils for Calcium (80%) was greater than 35%. All positive results are qualified as estimated, "J". The RPDs for Iron (22%) and Manganese (34%) were not greater than 35% and will not be qualified.

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All soil samples below 0.7 mg/kg	Cn.	+	U
All soil samples below 532 mg/kg	Na.		
All soil samples	Sb, Se and Tl.	+/U	J/UJ
All soil samples	Mn.	+	J
All soil samples	Ca.	+	J
All "B" results	all analytes	B	J

ANNOTATED FORM Is

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27045A
Date:	October 23, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	September 22, 1996
Number of Samples:	1 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Diesel Range Organics, Gasoline Range Organics

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 in 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 S. Fuson

Paul B. Humburg, President

10/31/96

Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27045A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	DRO		GRO	
FDSCC05101	SOIL		X		X
Total Billable Samples (Water/Soil)		0	1	0	1

DRO= Diesel Range Organics
GRO= Gasoline Range Organics

DATA ASSESSMENT NARRATIVES

DATA ASSESSMENT NARRATIVE

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level IV requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27045A

A validation was performed on the TPH (DRO) data from SDG 27045A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Surrogate Recoveries

The surrogate recovery for the sample was reported as I indicating interferences. This was due to the presence of a miscellaneous fuel eluting beyond diesel but within the retention time of the surrogate. The sample required a 1:5 dilution due to the interference. Therefore, it is the professional opinion of the reviewer that the sample results be qualified as estimated.

Specific Finding

The non-detect results for sample FDSCC05101 are qualified as estimated, UJ, due to the presence of non-target interferences.

DATA ASSESSMENT NARRATIVE
TPH - EXTRACTABLES (DRO)

PAGE 2

Overall Performance

Overall performance was acceptable. The data required qualification. A miscellaneous fuel (C16-C22) was reported in the sample. This result was not present on the spreadsheet results but was present on the Form I equivalent submitted by the laboratory.

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
FDSCC05101	All compounds	-	UJ

* 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

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level IV requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27045A

A validation was performed on the TPH (GRO) data from SDG 27045A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Field Duplicates

The field duplicate pair of samples FDSSC05101/FDSCC05101 exhibited positive results for the target compound. The compound was reported above the CRQL in the field sample and below the CRQL in the duplicate. The RPD for the results was 163%. The field duplicate result was reported in SDG 27045B.

Specific Finding

The positive result reported for gasoline in sample FDSCC05101 is qualified as estimated, J, due to non-compliant field duplicate precision.

Overall Performance

Overall performance was acceptable. The reviewer estimates that less than 15% of the data required qualification.

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
FDSCC05101	gasoline	+	J

* DL denotes the Form 1 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#:	27045B
Date:	October 23, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	September 22-23, 1996
Number of Samples:	16 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Diesel Range Organics, Gasoline Range Organics

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 in 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 B. Simpson
Paul B. Humburg, President

10/31/96
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27045B

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	DRO		GRO	
FDSSC04201	SOIL		X		X
FDSSC04202	SOIL		X		X
FDSSC04301	SOIL		X		X
FDSSC04401	SOIL		X		X
FASSC04501	SOIL		X		X
FDSSC04601	SOIL		X		X
FDSSC04701	SOIL		X		X
FDSSC04801	SOIL		X		X
FDSSC04901	SOIL		X		X
FDSSC05001	SOIL		X		X
FDSSC05101	SOIL		X		X
FDSSC05201	SOIL		X		X
FDSSC05301	SOIL		X		X
FDSSC05401	SOIL		X		X
FDSSC05501	SOIL		X		X
FDSSC05601	SOIL		X		X
Total Billable Samples (Water/Soil)		0	16	0	16

DRO= Diesel Range Organics
GRO= Gasoline Range Organics

DATA ASSESSMENT NARRATIVES

DATA ASSESSMENT NARRATIVE

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27045B

A validation was performed on the TPH (DRO) data from SDG 27045B. The data was evaluated based on the following parameters.

- * Data Completeness
- * Holding Times
- * GC/MS Tuning
- * Calibrations
- * Internal Standard Performance
- * Blanks
- Surrogate Recoveries
- * Matrix Spike/Matrix Spike Duplicate
- * Field Duplicates
- * Identification/Quantitation

* - All criteria were met for this parameter.

Surrogate Recoveries

The surrogate recovery for sample FDSSC05101 was reported as I indicating interferences. This was due to the presence of a miscellaneous fuel eluting beyond diesel but within the retention time of the surrogate. The sample required a 1:4 dilution due to the interference. Therefore, it is the professional opinion of the reviewer that the sample results be qualified as estimated.

Specific Finding

The non-detect results for sample FDSSC05101 are qualified as estimated, UJ, due to the presence of non-target interferences.

DATA ASSESSMENT NARRATIVE
TPH - EXTRACTABLES (DRO)

Overall Performance

Overall performance was acceptable. The reviewer estimates that less than 5% of the data required qualification. Miscellaneous fuels were reported in samples FDSSC05401, FDSSC05301, FDSSC05101, FDSSC04701 and FDSSC04201. This result was not present on the spreadsheet results but was present on the Form I equivalent submitted by the laboratory.

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
FDSSC05101	All compounds	-	UJ

* 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

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27045B

A validation was performed on the TPH (GRO) data from SDG 27045B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Field Duplicates

The field duplicate pair of samples FDSSC05101/FDSCC05101 exhibited positive results for the target compound. The compound was reported above the CRQL in the field sample and below the CRQL in the duplicate. The RPD for the results was 163%. The field duplicate result was reported in SDG 27045A.

Specific Finding

The positive result reported for gasoline in sample FDSSC05101 is qualified as estimated, J, due to non-compliant field duplicate precision.

DATA ASSESSMENT NARRATIVE
TPH - PURGEABLES (GRO)

Overall Performance

Overall performance was acceptable. The reviewer estimates that less than 15% of the data required qualification.

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
FDSSC05101	gasoline	+	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#:	27065A
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	September 24, 1996
Number of Samples:	1 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Diesel Range Organics, Gasoline Range Organics

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 in 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 B. Simpson
Paul B. Humburg, President

11/15/96
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27065A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	DRO		GRO	
FDSCC06101	SOIL		X		X
Total Billable Samples (Water/Soil)		0	1	0	1

DRO= Diesel Range Organics
GRO= Gasoline Range Organics

DATA ASSESSMENT NARRATIVES

DATA ASSESSMENT NARRATIVE

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level IV requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27065A

A validation was performed on the TPH (DRO) data from SDG 27065A. The data was evaluated based on the following parameters.

* • Data Completeness
* • Holding Times
* • GC/MS Tuning
* • Calibrations
* • Internal Standard Performance
* • Blanks
* • Surrogate Recoveries
* • Matrix Spike/Matrix Spike Duplicate
* • Field Duplicates
* • Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. The data did not require qualification.

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

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

DATA ASSESSMENT NARRATIVE

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level IV requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27065A

A validation was performed on the TPH (GRO) data from SDG 27065A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. The data did not require qualification.

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

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#:	27065B
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	September 24, 1996
Number of Samples:	3 Aqueous Sample(s) with 0 MS/MSD(s) 14 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticides/PCB's, Gasoline Range Organics, Diesel Range Organics, Metals, Cyanide

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 in 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 B. Sexton

Paul B. Humburg, President

11/15/96
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27065B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		GRO		DRO		TAL		CN	
120SB00601	SOIL		X		X		X						X		
643SB00101	SOIL		X		X		X						X		
643SB00102	SOIL		X		X		X						X		
643SB00401	SOIL		X		X		X						X		
643SB00402	SOIL		X		X		X						X		
643SB00701	SOIL		X		X		X						X		
643TB00701	SOIL		X												
643SB00702	SOIL		X		X		X						X		
FDSSC05801	SOIL		X		X		X		X		X		X		
FDSTC05801	WATER	X													
FDSSC47A01	SOIL		X		X		X		X		X		X		
FDSESC4702	WATER	X		X		X		X		X		X		X	
FDSFSC4702	WATER	X		X		X		X		X		X		X	
FDSSC05701	SOIL								X		X				
FDSSC05901	SOIL								X		X				
FDSSC06001	SOIL								X		X				
FDSSC06101	SOIL								X		X				
Total Billable Samples (Water/Soil)		3	10	2	9	2	9	2	6	2	6	2	9	2	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= Pesticide/PCB's
GRO= Gasoline Range Organics
DRO= Diesel Range Organics
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA 8240; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 27065B

A validation was performed on the Volatile Data from SDG 27065B. 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
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, I21465.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).

643SB00402 2-chloroethyl vinyl ether (0.037)

The continuing calibration, I21465.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).

643SB00402 vinyl acetate (63.4%)

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
VBLK4	acetone	12 ug/kg	120 ug/kg

Samples	Compound	Qualification
643SB00402	acetone	CRQL

Trip Blank

Associated blank	Compound	Concentration	Action Level
FDSTC05801	methlyene chloride	16 ug/L	160 ug/L
	Acetone	10 ug/L	100 ug/L

Samples	Compound	Qualification
FDSSC05801 FDSSC047A01	methylene chloride	CRQL
FDSSC05801 FDSSC047A01	acetone	U

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
008EB00201	methylene chloride	10 ug/L	100 ug/L
FDSESC4702	acetone	16 ug/L	160 ug/L

Samples	Compound	Qualification
643SB00101 643SB00102 643SB00401 643SB00702	methylene chloride	CRQL
120SB00601 643SB00101 643SB00102 643SB00701 643SB00702	acetone	U

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
643SB00402	2-chloroethyl vinyl ether	+/-	J/UR
643SB00402	vinyl acetate	+/-	J/UJ
643SB00402	acetone	+	CRQL
FDSSC05801 FDSSC047A01	methylene chloride	+	CRQL
FDSSC05801 FDSSC047A01	acetone	+	U
643SB00101 643SB00102 643SB00401 643SB00702	methylene chloride	+	CRQL
120SB00601 643SB00101 643SB00102 643SB00701 643SB00702	acetone	+	U

* 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 U.S. EPA SW846, Method 8270 with CLP deliverables; 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 (Form I's).

SDG # 27065B

A validation was performed on the Semivolatile Data from SDG 27065B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibrations
	•	Internal Standard Performance
	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within %D continuing calibration criteria. All RRFs were within calibration criteria.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, JJT066, contained compounds with %Ds greater than 25% D but less than 50% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J).

643SB00401 benzo(b)fluoranthene (-28.1)

Internal Standards

Specific Finding:

The Samples listed below, exhibited low internal standard areas. Qualify all associated positive results as estimated (J) and all non detects as estimated (UJ).

643SB00401 perylene-d_{12}
643SB00401RE

Field Blanks

Associated blank	Compound	Conc.	Action level
FDSFSC4702	bis(2-ethylhexyl) phthalate	2J ug/L	670 ug/Kg

Samples	Compound	Qualification
120SB00601	bis(2-ethylhexyl) phthalate	CRQL
643SB00101		
643SB00102		
643SB00401		
643SB00401RE		
643SB00402		
643SB00702		
FDSSC05801		
FDSSC47A01		

Compound Identification/Quantitation

Specific Finding:

Reject all results for sample 643SB00401RE, due to non compliant internal standard areas.

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings wiii be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
643SB00401	benzo(b)fluoranthene (-28.1)	+	J
643SB00401 643SB00401RE	All associated compounds perylene-d_{12}	+/-	J/UJ
120SB00601 643SB00101 643SB00102 643SB00401 643SB00401RE 643SB00402 643SB00702 FDSSC05801 FDSSC47A01	bis(2-ethylhexyl) phthalate	+	CRQL
643SB00401RE	All results	+/-	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27065B

A validation was performed on the Pesticide/Aroclor Data from SDG 27065B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion). Three (3) samples were diluted to accurately quantitate target compounds. The result for Aroclor 1260 in sample 643SB00701 was slightly above the calibration range of the instrument. Therefore, the data validator reported the result from the dilution analysis. It is the professional opinion of the data validator that single component pesticides reported in the samples with high concentrations of aroclors should be considered suspect.

Specific Findings

For the following samples, the results for the E flagged compounds are replaced with the corresponding results reported from the DL analysis. All other results from the dilution are rejected, UR, in favor of the results reported from the original analysis.

120SB00601
643SB00401
643SB00701

The positive results reported in all samples which exhibited column quantitation differences greater than 40% but less than 70% are qualified as presumptively present at an estimated concentration, NJ.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results less than 10X the CRQL are reported as undetected, U.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results greater than 10X the CRQL are qualified as presumptively present at an estimated concentration, NJ.

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates less than 10% of 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 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
120SB00601 643SB00401 643SB00701	All E Flagged	+E	D
120SB00601DL 643SB00401DL 643SB00701DL	All except corresponding D flagged results	+/-	UR
ALL	All P >40% But ≤ 70%	+	NJ
ALL	All P > 70% And < 10X CRQL	+	U
ALL	All P > 70% And > 10X CRQL	+	NJ

* 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

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27065B

A validation was performed on the TPH (GRO) data from SDG 27065B. The data was evaluated based on the following parameters.

* • Data Completeness
* • Holding Times
* • GC/MS Tuning
* • Calibrations
* • Internal Standard Performance
* • Blanks
* • Surrogate Recoveries
* • Matrix Spike/Matrix Spike Duplicate
* • Field Duplicates
* • Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. The data did not require qualification.

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

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

DATA ASSESSMENT NARRATIVE

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27065B

A validation was performed on the TPH (DRO) data from SDG 27065B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. The data did not require qualification. Miscellaneous fuels were reported in samples FDSSC05701, FDSSC05801, FDSSC05901, and FDSSC47A01. This result was not present on the spreadsheet results but was present on the Form I equivalent submitted by the laboratory.

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

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

DATA ASSESSMENT NARRATIVE
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 27065

A validation was performed on the Metals and Cyanide Data from SDG 27065. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Beryllium	0.04 mg/kg	no impact
Chromium	0.20 mg/kg	no impact
Iron	6.27 mg/kg	no impact
Tin	1.52 mg/kg	all soil samples below 7.6 mg/kg

The field and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Copper	7.0 ug/l	all soil samples below 7.0 mg/kg
Iron	58.2 ug/l	no impact
Nickel	16.4 ug/l	all soil samples below 16.4 mg/kg
Sodium	882 ug/l	all soil samples below 882 mg/kg
Thallium	2.8 ug/l	all soil samples below 2.8 mg/kg
Zinc	49.7 ug/l	all soil samples below 49.7 mg/kg

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Thallium	-0.43 mg/kg	all soil samples below 4.3 mg/kg

The USEPA requires that the reviewer review and qualify data bias on negative bias. This reviewer qualifies all non-detect and positive results below ten times the absolute value as estimated, "J" or "UJ".

Serial Dilutions

Specific Finding

The Serial dilution RPDs for Chromium and Nickel were greater than 10%. All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27090B
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	September 25, 1996
Number of Samples:	3 Aqueous Sample(s) with 15 MS/MSD(s) 15 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Gasoline Range Organics, Diesel Range Organics, Metals, Cyanide

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 in 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
Paul B. Humburg, President

11/15/96
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27090B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		GRO		DRO		TAL		CN	
120SB00401	SOIL		X		X		X						X		
120EB00401	WATER	X		X		X						X		X	
120DB00401	WATER	X		X		X						X		X	
120SB00402	SOIL		X		X		X						X		
120SB00501	SOIL		X		X		X						X		
643SB00201	SOIL		X		X		X								
643TB00201	WATER		X												
643SB00202	SOIL		X		X		X								
643SB00501	SOIL		X		X		X								
643SB00502	SOIL		X		X		X								
643SB00601	SOIL		X		X		X								
643SB00602	SOIL		X		X		X								
FDSSC06501	SOIL		X		X		X		X		X		X		
FDSTC06701	WATER	X													
FDSSC06301	SOIL								X		X				
FDSSC06401	SOIL								X		X				
FDSSC06601	SOIL								X		X				
FDSSC06701	SOIL								X		X				
Total Billable Samples (Water/Soil)		3	11	2	10	2	10	0	5	0	5	2	4	2	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= Pesticide/PCB's
GRO= Gasoline Range Organics
DRO= Diesel Range Organics
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA 8240; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 27090B

A validation was performed on the Volatile Data from SDG 27090B. 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
*	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, I21435.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).

120SB00501	2-chloroethyl vinyl ether (0.028)
643SB00201	
120SB00401	
120SB00402	
643SB00601	
643SB00602	
643SB00501	
643SB00502	

The continuing calibration, I21435.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).

120SB00501	vinyl acetate (60.9%)
643SB00201	
120SB00401	
120SB00402	
643SB00601	
643SB00602	
643SB00501	
643SB00502	

The continuing calibration, I21465.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).

643SB00201RE	2-chloroethyl vinyl ether (0.037)
643SB00202	
643SB00501RE	
FDSSC06501	

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, I21465.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).

643SB00201RE	vinyl acetate (63.4%)
643SB00202	
643SB00501RE	
FDSSC06501	

Internal Standards

All internal standard EICP areas did not meet the internal standard EICP area QA/QC criteria. Qualifications are required.

Specific Finding:

The Samples listed below, exhibited low internal standard areas. Qualify all associated positive results as estimated (J) and all non detects as estimated(UJ).

643SB00201	chlorobenzene-d_5
643SB00501	
643SB00201RE	
643SB00501RE	

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
VBLK2	acetone	6J ug/kg	60 ug/kg
VBLK3	acetone	12 ug/kg	120 ug/kg

Samples	Compound	Qualification
643SB00602 643SB00501	acetone	CRQL
120SB00501 120SB00401 120SB00402 643SB00201 643SB00601 643SB00201RE 643SB00202 643SB00501RE FDSSC06501	acetone	U

Trip Blank

Associated blank	Compound	Concentration	Action Level
643TB00201	acetone	30 ug/L	300 ug/L
	2-butanone	3J ug/L	30 ug/L

Samples	Compound	Qualification
643SB00502	acetone	U
120SB00401 120SB00402 120SB00501 643SB00201	2-butanone	U

Trip Blank (continued)

Associated blank	Compound	Concentration	Action Level
643TB00201	acetone	30 ug/L	300 ug/L
	2-butanone	3J ug/L	30 ug/L

Samples	Compound	Qualification
643SB00502 FDSSC06501	2-butanone	U
643SB00601	2-butanone	CRQL

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
120EB00401	methylene chloride	14 ug/L	140 ug/L

Samples	Compound	Qualification
120SB00401 120SB00402 120SB00501 643SB00201 643SB00501 643SB00601 FDSSC06501	methylene chloride	CRQL
643SB00502	methylene chloride	U

Compound Identification /Quantitation

Reject samples 643SB00201RE and 643SB00501RE, in favor of the initial analysis, due to non compliant internal standard area recoveries.

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 10% of the data is qualified.

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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
120SB00501	2-chloroethyl vinyl ether	+/-	J/UR
643SB00201			
120SB00401			
120SB00402			
643SB00601			
643SB00602			
643SB00501			
643SB00502			
120SB00501	vinyl acetate	+/-	J/UJ
643SB00201			
120SB00401			
120SB00402			
643SB00601			
643SB00602			
643SB00501			
643SB00502			
643SB00201RE	2-chloroethyl vinyl ether	+/-	J/UR
643SB00202			
643SB00501RE			
FDSSC06501			
643SB00201RE	vinyl acetate	+/-	J/UJ
643SB00202			
643SB00501RE			
FDSSC06501			
	All associated compounds	+/-	J/UJ
643SB00201	chlorobenzene-d_5		
643SB00501			
643SB00201RE			
643SB00501RE			

* 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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
643SB00602	acetone	+	CRQL
643SB00501			
120SB00501	acetone	+	U
120SB00401			
120SB00402			
643SB00201			
643SB00601			
643SB00201RE			
643SB00202			
643SB00501RE			
FDSSC06501			
643SB00502	acetone	+	U
120SB00401	2-butanone	+	U
120SB00402			
120SB00501			
643SB00201			
643SB00502			
FDSSC06501			
643SB00601	2-butanone	+	CRQL
120SB00401	methylene chloride	+	CRQL
120SB00402			
120SB00501			
643SB00201			
643SB00501			
643SB00601			
FDSSC06501			

* 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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
643SB00502	methylene chloride	+	U
643SB00201RE 643SB00501RE	all results	+/-	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 U.S. EPA SW846, Method 8270 with CLP deliverables; 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 (Form I's).

SDG # 27090B

A validation was performed on the Semivolatile Data from SDG 27090B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within %D continuing calibration criteria. All RRFs were within calibration criteria.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, M2521, contained compounds with %Ds greater than 25% D but less than 50% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J).

643SB00201	benzo(b)fluoranthene (33.7)
643SB00202	benzo(k)fluoranthene (-29.4)
643SB00501	
643SB00502	
643SB00602	

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
643SB00201	benzo(b)fluoranthene (33.7)	+	J
643SB00202	benzo(k)fluoranthene (-29.4)		
643SB00501			
643SB00502			
643SB00602			

* 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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27090B

A validation was performed on the Pesticide/Aroclor Data from SDG 27090B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Surrogate Recoveries

One (1) field sample exhibited non-compliant TCX and DCB recoveries.

Specific Finding

The sample listed below exhibited low TCX and DCB recoveries. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimate, UJ.

Sample ID	Surrogate	% Recovery
FDSSC06501	TCX-1/TCX-2	18%/14%
	DCB-1/DCB-2	24%/23%

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion). Two (2) samples were diluted to accurately quantitate target compounds.

Specific Findings

For the following samples, the results for the E flagged compounds are replaced with the corresponding results reported from the DL analysis. All other results from the dilution are rejected, UR, in favor of the results reported from the original analysis.

643SB00201
643SB00601

The positive results reported in all samples which exhibited column quantitation differences greater than 40% but less than 70% are qualified as presumptively present at an estimated concentration, NJ.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results less than 10X the CRQL are reported as undetected, U.

Compound Identification/Quantitation, Continued

Specific Findings, Continued

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results greater than 10X the CRQL are qualified as presumptively present at an estimated concentration, NJ.

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates less than 10% of 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 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
FDSSC06501	ALL	+/-	J/UJ
643SB00201 643SB00601	All E Flagged	+E	D
643SB00201DL 643SB00601DL	All except corresponding D flagged results	+/-	UR
ALL	All P >40% But ≤ 70%	+	NJ
ALL	All P > 70% And < 10X CRQL	+	U
ALL	All P > 70% And > 10X CRQL	+	NJ

* 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

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27090B

A validation was performed on the TPH (GRO) data from SDG 27090B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. The data did not require qualification.

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

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

DATA ASSESSMENT NARRATIVE

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27090B

A validation was performed on the TPH (DRO) data from SDG 27090B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. The data did not require qualification. Miscellaneous fuels were reported in samples FDSSC06401, FDSSC06501, FDSSC06601, and FDSSC06701. This result was not present on the spreadsheet results but was present on the Form I equivalent submitted by the laboratory.

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

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

DATA ASSESSMENT NARRATIVE
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 27090

A validation was performed on the Metals and Cyanide Data from SDG 27090. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
	•	Matrix Spike Recovery
*	•	Matrix Duplicates
	•	Field Duplicates
*	•	Laboratory Control Samples
	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Beryllium	0.04 mg/kg	all soil samples below 0.2 mg/kg
Chromium	0.12 mg/kg	no impact
Iron	4.9 mg/kg	no impact
Tin	1.71 mg/kg	all soil samples below 8.55 mg/kg

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Barium	0.41 ug/l	no impact
Copper	4.2 ug/l	all soil samples below 4.2 mg/kg
Sodium	3560 ug/l	all soil samples below 3560 mg/kg
Zinc	7.3 ug/l	all soil samples below 7.3 mg/kg

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Thallium	-0.47 mg/kg	all soil samples below 4.7 mg/kg
Vanadium	-0.05 mg/kg	no impact

The USEPA requires that the reviewer review and qualify data bias on negative bias. This reviewer qualifies all non-detect and positive results below ten times the absolute value as estimated, "J" or "UJ".

Matrix Spike recovery

Specific Finding

The Matrix Spike recoveries for soils for Antimony (71%), Selenium (65%) and Thallium (59%) were below the lower control limits (>30% but <75%). All positive and non-detect results are qualified as estimated, "J" or "UJ".

Field and Duplicate Analysis

Specific Finding

The RPDs for Aluminum (22%) and Calcium (27%) were not greater than 35% and will not be qualified.

Serial Dilution

Specific Finding

The serial dilution RPD for soils for Chromium was greater than 10%. All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All soil samples below 0.2 mg/kg	Be.	+	U
All soil samples below 8.55 mg/kg	Sn.		
All soil samples below 4.2 mg/kg	Cu.		
All soil samples below 3560 mg/kg	Na.		
All soil samples below 7.3 mg/kg	Zn.		
All soil samples below 4.7 mg/kg	Tl.	+/U	J/UJ
All soil samples	Sb, Se and Tl.	+/U	J/UJ
All soil samples	Cr.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27115B
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	September 26, 1996
Number of Samples:	21 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Metals

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 in 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 B. Swyan

Raul B. Humburg, President

11/15/96

Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27115B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL	
633TB00601	SOIL		X						
011M000101	SOIL								X
011M000201	SOIL								X
633M000101	SOIL		X		X		X		X
633M000201	SOIL		X		X		X		X
633M000301	SOIL		X		X		X		X
633M000401	SOIL		X		X		X		X
633M000501	SOIL		X		X		X		X
633M000601	SOIL		X		X		X		X
003SB00401	SOIL						X		X
003SB00402	SOIL						X		X
003SB00501	SOIL						X		X
003SB00502	SOIL						X		X
003SB00601	SOIL						X		X
003SB00602	SOIL						X		X
003SB00801	SOIL						X		X
003SB00802	SOIL						X		X
003SB00901	SOIL						X		X
003SB00902	SOIL						X		X
003SB01001	SOIL						X		X
003SB01002	SOIL						X		X
Total Billable Samples (Water/Soil)		0	7	0	6	0	18	0	20

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
TAL= SW846 Metals

DATA ASSESSMENT NARRATIVES

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 U.S. EPA 8240; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 27115B

A validation was performed on the Volatile Data from SDG 27115B. 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
*	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Initial Calibrations

The initial calibration that was analyzed by the laboratory for these samples was not acceptable for all average RRFs and %RSDs. Qualifications are required.

Initial Calibrations (continued)

Specific Finding:

The initial calibration, analyzed on 10-04-96, 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).

633MO00601	2-chloroethyl vinyl ether (0.031)
633MO00101	
633MO00201	
633MO00301	
633MO00501	
633MO00401	

The initial calibration, analyzed on 10-04-96, contained compounds with %RSDs greater than 30%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J).

633MO00101	acetone (46.7%)
633MO00301	

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were within continuing calibration criteria. Average RRFs exhibited results not within calibration criteria. Qualifications are required.

Specific Finding:

The continuing calibration, I21522.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).

633MO00301RE	2-chloroethyl vinyl ether (0.023)
633MO00501RE	
633MO00401RE	

Internal Standards

All internal standard EICP areas did not meet the internal standard EICP area QA/QC criteria. Qualifications are required.

Specific Finding:

The Samples listed below, exhibited low internal standard areas. Qualify all associated positive results as estimated (J) and all non detects as estimated(UJ).

633MO00201	bromochloromethane
633MO00301	1,4-difluorobenzene
633MO00301RE	chlorobenzene-d_5
633MO00201RE	1,4-difluorobenzene
633MO00501	chlorobenzene-d_5
633MO00401	chlorobenzene-d_5
633MO00501RE	
633MO00401RE	

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
VBLK1	acetone	2J ug/kg	20 ug/kg
VBLK2	methylene chloride	2J ug/kg	20 ug/kg
	Acetone	5J ug/kg	50 ug/kg
VBLK3	acetone	3J ug/kg	30 ug/kg
	Chloroform	1J ug/kg	10 ug/kg

Samples	Compound	Qualification
633MO00201 633MO00401RE 633MO00201RE	acetone	CRQL
633MO00601 633MO00501 633MO00401 633MO00501RE	acetone	U
633MO00301RE	methylene chloride	CRQL
633MO00201RE	chloroform	CRQL

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
120EB00401	methylene chloride	14 ug/L	140 ug/L

Samples	Compound	Qualification
633MO00101 633MO00401 633MO00601	methylene chloride	CRQL
633MO00201 633MO00201RE	methylene chloride	U

Surrogates

All of the surrogate recoveries for these samples were not within QA/QC limits. Qualifications are required.

Specific Finding:

Sample listed below exhibited high recoveries for toluene-d_8. Qualify all positive results as estimated (J).

633MO00201 (119%)

Sample listed below exhibited high recoveries for 1,2-dichloroethane-d_4. Qualify all positive results as estimated (J).

633MO00301 (128%)

Compound Identification /Quantitation

Reject samples 633MO00201, 633MO00301RE, 633MO00401RE, and 633MO00501, in favor of the initial or reanalyzed samples, due to non compliant internal standard area recoveries.

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 10% of the data is qualified.

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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
633MO00601 633MO00101 633MO00201 633MO00301 633MO00501 633MO00401	2-chloroethyl vinyl ether	+/-	J/UR
633MO00101 633MO00301	acetone	+	J
633MO00301RE 633MO00501RE 633MO00401RE	2-chloroethyl vinyl ether	+/-	J/UR
	All associated compounds	+/-	J/UJ
633MO00201	bromochloromethane		
633MO00301	1,4-difluorobenzene		
633MO00301RE	chlorobenzene-d_5		
633MO00201RE	1,4-difluorobenzene		
633MO00501	chlorobenzene-d_5		
633MO00401 633MO00501RE 633MO00401RE	chlorobenzene-d_5		
633MO00201 633MO00401RE 633MO00201RE	acetone	+	CRQL
633MO00601 633MO00501 633MO00401 633MO00501RE	acetone	+	U

* 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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
633MO00301RE	methylene chloride	+	CRQL
633MO00201RE	chloroform	+	CRQL
633MO00101 633MO00401 633MO00601	methylene chloride	+	CRQL
633MO00201 633MO00201RE	methylene chloride	+	U
633MO00201 633MO00301	all compounds	+	J
633MO00201 633MO00301RE 633MO00401RE 633MO00501	all results	+/-	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 U.S. EPA SW846, Method 8270 with CLP deliverables; 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 (Form 1's).

SDG # 27115B

A validation was performed on the Semivolatile Data from SDG 27115B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibrations
	•	Internal Standard Performance
*	•	Blanks
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within %D continuing calibration criteria. All RRFs were within calibration criteria.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, JJT117, contained compounds with %Ds greater than 25% D but less than 50% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J).

633MO00601	di-n-butylphthalate (-36.6)
633MO00101	bis(2-ethylhexyl)phthalate (-31.0)

Internal Standards

Specific Finding:

The Samples listed below, exhibited low internal standard areas. Qualify all associated positive results as estimated (J) and all non detects as estimated (UJ).

633MO00501RE	perylene-d_{12}
633MO00301RE	
633MO00301	
633MO00501	chrysene-d_{12}
	perylene-d_{12}

Surrogates

Specific Finding:

Samples 633MO00301 and 633MO00501, exhibited high surrogate recoveries for all base/neutral surrogates. Qualify all positive results as estimated (J).

nitrobenzene-d_5	121	132
2-fluorobiphenyl	130	140
terphenyl-d_{14}	211	233

Compound Identification/Quantitation

Specific Finding:

Reject all results for sample 633MO00301 and 633MO00501, due to non compliant internal standard areas and non compliant surrogate recoveries.

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
633MO00601 633MO00101	di-n-butylphthalate (-36.6) bis(2-ethylhexyl)phthalate (-31.0)	+	J
633MO00501RE 633MO00301RE 633MO00301	All associated compounds perylene-d_{12}	+/-	J/UJ
633MO00501	chrysene-d_{12} perylene-d_{12}		
633MO00301 633MO00501	All base/neutral results	+	J
633MO00301 633MO00501	All results	+/-	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27115B

A validation was performed on the Pesticide/Aroclor Data from SDG 27115B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion). Five (5) samples were diluted to accurately quantitate target compounds. It is the professional opinion of the data validator that single component pesticides reported in the samples with high concentrations of aroclors should be considered suspect.

Specific Findings

For the following samples, the results for the E flagged compounds are replace with the corresponding results from the DL analysis. All other results from the dilution are rejected, UR, in favor of the results reported from the dilution analysis.

633MO00201
003SB00801
003SB00802
003SB00901
003SB00902

The positive results reported in all samples which exhibited column quantitation differences greater than 40% but less than 70% are qualified as presumptively present at an estimated concentration, NJ.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results less than 10X the CRQL are reported as undetected, U.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results greater than 10X the CRQL are qualified as presumptively present at an estimated concentration, NJ.

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates less than 10% of 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 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
633MO00201 003SB00801 003SB00802 003SB00901 003SB00902	All E Flagged	+E	D
633MO00201DL 003SB00801DL 003SB00802DL 003SB00901DL 003SB00902DL	All except corresponding D flagged results	+/-	UR
ALL	All P >40% But ≤ 70%	+	NJ
ALL	All P > 70% And < 10X CRQL	+	U
ALL	All P > 70% And > 10X CRQL	+	NJ

* 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
METALS

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 27115

A validation was performed on the Metals Data from SDG 27115. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Beryllium	0.05 mg/kg	no impact
Chromium	0.11 mg/kg	no impact
Lead	0.25 mg/kg	no impact
Manganese	0.14 mg/kg	no impact
Tin	1.70 mg/kg	all soil samples below 8.5 mg/kg

The field and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Copper	7.3 ug/l	all soil samples below 7.3 mg/kg
Iron	58.2 ug/l	no impact
Nickel	16.4 ug/l	all soil samples below 16.4 mg/kg
Sodium	882 ug/l	all soil samples below 882 mg/kg
Thallium	2.8 ug/l	no impact
Zinc	49.7 ug/l	all soil samples below 49.7 mg/kg

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Aluminum	-1.91 mg/kg	no impact
Cobalt	-0.15 mg/kg	all soil samples below 1.5 mg/kg
Silver	-0.27 mg/kg	all soil samples below 2.7 mg/kg
Vanadium	-0.11 mg/kg	no impact

The USEPA requires that the reviewer review and qualify data bias on negative bias. This reviewer qualifies all non-detect and positive results below ten times the absolute value as estimated, "J" or "UJ".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All soil samples below 0.25 mg/kg	Be.	+	U
All soil samples below 8.5 mg/kg	Sn.		
All soil samples below 7.0 mg/kg	Cu.		
All soil samples below 16.4 mg/kg	Ni.		
All soil samples below 882 mg/kg	Na.		
All soil samples below 49.7 mg/kg	Zn.		
All soil samples below 1.5 mg/kg	Co.	+/U	J/UJ
All soil samples below 2.7 mg/kg	Ag.		
All "B" results	all analytes	B	J

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 U.S. EPA 8240 Appendix IX; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level IV. All comments made within this report should be considered when examining the analytical results.

SDG # 27133A

A validation was performed on the Volatile Data from SDG 27133A. 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
	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Initial calibrations

The initial calibrations that were analyzed with this data package exhibited %RSDs and average RRFs that were not within calibration criteria. Qualifications are required.

Initial calibrations (continued)

Specific Finding:

The initial calibration analyzed on 10-04-96, 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).

609CB00101	2-chloroethyl vinyl ether (0.031)
609CB00201	acrolein (0.046)
609CB00301	acetonitrile (0.021)
	isobutyl alcohol (0.011)
	1,4-dioxane (0.002)

The initial calibration analyzed on 10-04-96, contained compounds with %RSDs greater than 30% and less than 90%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J).

609CB00101	acetone (46.7%)
609CB00201	
609CB00301	

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within calibration criteria. Qualifications are required.

Specific Finding:

The continuing calibration, I21522.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).

613NO00101	acrolein (0.046)
609CB00101DL	2-chloroethyl vinyl ether (0.023)
609CB00301DL	Acetonitrile (0.020)
	isobutyl alcohol (0.010)
	1,4-dioxane (0.002)

Internal Standards

All internal standard EICP areas did not meet the internal standard EICP area QA/QC criteria. Qualifications are required.

Specific Finding:

The Samples listed below, exhibited low internal standard areas. Qualify all associated positive results as estimated (J) and all non detects as estimated(UJ).

609CB00101	bromochloromethane 1,4-difluorobenzene chlorobenzene-d_5
609CB00301	1,4-difluorobenzene chlorobenzene-d_5

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
VBLK3	acetone	5J ug/kg	50 ug/kg

Samples	Compound	Qualification
613NO00101	acetone	CRQL

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
609EB00401	chloroform	16 ug/kg	160 ug/kg

Samples	Compound	Qualification
609CB00101DL	chloroform	CRQL

Field Duplicates

Sample 609SB00101 and duplicate sample 609CB00101 exhibited positive results for acetone and 2-butanone. When sample results were compared the %RPD was greater than the 50% criteria for acetone; therefore, qualify positive results for acetone in both samples as estimated (J).

Sample 609SB00301 and duplicate sample 609CB00301 exhibited positive results for acetone and 2-butanone. When sample results were compared the %RPD was greater than the 50% criteria for 2-butanone; therefore, qualify positive results for 2-butanone in both samples as estimated (J).

Compound Identification /Quantitation

Reject all E-flagged compounds in samples 609CB00101 and 609CB00301, in favor of the D-flagged compound in the diluted samples.

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 10% of the data is qualified.

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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
609CB00101 609CB00201 609CB00301	2-chloroethyl vinyl ether acrolein acetonitrile isobutyl alcohol 1,4-dioxane	+/-	J/UR
609CB00101 609CB00201 609CB00301	acetone	+	J
613NO00101 609CB00101DL 609CB00301DL	acrolein 2-chloroethyl vinyl ether Acetonitrile isobutyl alcohol 1,4-dioxane	+/-	J/UR
609CB00101	All associated compounds bromochloromethane 1,4-difluorobenzene chlorobenzene-d_5	+/-	J/UJ
609CB00301	1,4-difluorobenzene chlorobenzene-d_5		
613NO00101	acetone	+	CRQL
609CB00101DL	chloroform	+	CRQL
609CB00101	acetone	+	J
609CB00301	2-butanone	+	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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
609CB00101 609CB00301	All E-flagged compounds	+	UR
609CB00101DL 609CB00301DL	All compounds except D-flagged compounds	+/-	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 U.S. EPA SW846, Method 8270 with CLP deliverables; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27133A

A validation was performed on the Semivolatile Data from SDG 27133A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within %D continuing calibration criteria. All RRFs were not within calibration criteria.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A6361,-62,-63,-64, contained compounds with %Ds greater than 50% D but less than 90% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and all non detects as estimated (UJ).

609CB00101	2,6-dichlorophenol (62.1)
609CB00201	1,2,4,5-tetrachlorobenzene (57.6)
609CB00301	pentachlorobenzene (57.9)
613N000101	safrole (64.4)
	isosafrole (51.6)
	1,4-naphthoquinone (77.6)
	1-naphthylamine (75.4)
	4-aminobiphenyl (50.6)
	pentachloronitrobenzene (59.9)
	methapyrilene (58.5)
	diphenylamine (54.5)

The continuing calibration, A6361,-62,-63,-64, contained compounds with %Ds greater than 90% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and reject all non detects (UR).

609CB00101	kepone (145.3)
609CB00201	
609CB00301	
613N000101	

The continuing calibration, A6361,-62,-63,-64, contained compounds with RRFs less than 0.05. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and reject all non detects (UR).

609CB00101	aramite
609CB00201	hexachlorophene (58.8)
609CB00301	
613N000101	

Field Duplicates

The field duplicates exhibited a high RPD for fluoranthene. For sample 609CB00101, qualify positive results as estimated (J).

Compound Identification/Quantitation

Specific Finding:

The laboratory did not include the following compounds in there calibration curve or continuing calibration, compounds carbazole, 3-methyl-cholanthrene and 1,2-dibromo-3-chloropropane. For all samples, qualify all positive results estimated (J) and reject all non detects (UR).

System Performance and Overall Assessment

The overall system performance was acceptable. The iaboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
609CB00101	2,6-dichlorophenol (62.1)	+/-	J/UJ
609CB00201	1,2,4,5-tetrachlorobenzene (57.6)		
609CB00301	pentachlorobenzene (57.9)		
613N000101	safrole (64.4)		
	isosafrole (51.6)		
	1,4-naphthoquinone (77.6)		
	1-naphthylamine (75.4)		
	4-aminobiphenyl (50.6)		
	pentachloronitrobenzene (59.9)		
	methapyrilene (58.5)		
	diphenylamine (54.5)		
609CB00101	kepone (145.3)	+/-	J/UR
609CB00201			
609CB00301			
613N000101			
609CB00101	aramite	+/-	J/UR
609CB00201	hexachlorophene (58.8)		
609CB00301			
613N000101			
609CB00101	fluoranthene	+	J
609CB00101	carbazole	+/-	J/UR
609CB00201	3-methyl-cholanthrene		
609CB00301	1,2-dibromo-3-chloropropane		
613N000101			

* 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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27133A

A validation was performed on the Pesticide/Aroclor Data from SDG 27133A. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve or a single point curve (in one (1) sequence) for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration or with no calibration, therefore the data did not require qualification. The continuing calibration standards were not always run with the frequency required by the SW-846 method. The method requires that a CCV be analyzed every 10 sample injections. However, periods of time ranging from 12 to 24 hours passed before a CCV was analyzed on one (1) of the analytical sequences. It is not clear how many injections were run during this time as the Form 8s only listed those samples related to this SDG. No qualifications were required.

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion). One (1) sample required dilution to accurately quantitate target compounds.

Specific Findings

For the following sample, the results for the E flagged compounds are rejected and replaced with the results reported from the DL analysis. All other results from the dilution are rejected, UR.

609CB00201

The positive results reported in all samples which exhibited column quantitation differences greater than 40% but less than 70% are qualified as presumptively present at an estimated concentration, NJ.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and less than 10X the CRQL are reported as undetected, U.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and one of the following: results greater than 10X the CRQL, outside the calibration range, or the result of a dilution, are qualified as presumptively present at an estimated concentration, NJ.

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates less than 10% of 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 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
609CB00201	All E Flagged	+E	D
609CB00201DL	All except corresponding D flagged results	+/-	UR
ALL	All P >40% But ≤ 70%	+	NJ
ALL	All P > 70% And < 10X CRQL, > cal. range, or due to dilution.	+	U
ALL	All P > 70% And > 10X CRQL	+	NJ

* 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

ORGANOPHOSPHOROUS PESTICIDES

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 Method 8140; the National Functional Guidelines for Organic Data Validation, June 1991, and DQO Level IV 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 # 27133A

A validation was performed on the Organophosphorous Pesticide Data from SDG 27133A. The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • 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

Overall performance was acceptable. 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

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

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

DATA ASSESSMENT NARRATIVE

CHLORINATED HERBICIDES

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 Method 8150; the National Functional Guidelines for Organic Data Validation, June 1991, and DQO Level IV 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 # 27133A

A validation was performed on the Chlorinated Herbicides from SDG 27133A. The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • 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

Overall performance was acceptable. 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

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

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

DATA ASSESSMENT NARRATIVE
METALS, HEXAVALENT CHROMIUM AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level IV 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 # 27133B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 27133B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Beryllium	0.05 mg/kg	no impact
Chromium	0.13 mg/kg	no impact
Iron	3.55 mg/kg	no impact
Lead	0.26 mg/kg	no impact
Manganese	0.10 mg/kg	no impact

Tin	1.46 mg/kg	all soil samples below 7.3 mg/kg
Vanadium	0.04 mg/kg	no impact

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Antimony	4.3 ug/l	no impact
Barium	3.9 ug/l	no impact
Beryllium	0.56 ug/l	all soil samples below 0.56 mg/kg
Calcium	14.3 ug/l	no impact
Chromium	3.8 ug/l	no impact
Cobalt	1.9 ug/l	all soil samples below 1.9 mg/kg
Copper	39.8 ug/l	all soil samples below 39.8 mg/kg
Nickel	1.8 ug/l	no impact
Selenium	3.2 ug/l	all soil samples below 3.2 mg/kg
Silver	3.4 ug/l	all soil samples below 3.4 mg/kg
Sodium	6880 ug/l	all soil samples below 6880 mg/kg
Thallium	9.8 ug/l	all soil samples below 9.8 mg/kg
Tin	6.1 ug/l	no impact
Thallium	0.66 ug/l	no impact
Zinc	20.2 ug/l	all soil samples below 20.2 mg/kg

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Thallium	-0.61 mg/kg	all soil samples below 6.1 mg/kg

The USEPA requires that the reviewer review and qualify data bias on negative bias. This reviewer qualifies all non-detect and positive results below ten times the absolute value as estimated, "J" or "UJ".

Field and Laboratory Duplicate Results

Specific Finding

The RPDs for field duplicate samples (609SB00201 and 609CB00201) for Aluminum (58%), Arsenic (81%), Copper (70%), Magnesium (82%), Nickel (70%), Potassium (63%), Tin (66%) and Zinc (56%) were greater than 50%. All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All soil samples below 7.3 mg/kg	Sn.	+	U
All soil samples below 0.56 mg/kg	Be.		
All soil samples below 1.9 mg/kg	Co.		
All soil samples below 39.8 mg/kg	Cu.		
All soil samples below 3.2 mg/kg	Se.		
All soil samples below 3.4 mg/kg	Ag.		
All soil samples below 6880 mg/kg	Na.		
All soil samples below 9.8 mg/kg	Tl.		
All soil samples below 20.2 mg/kg	Zn.		
All soil samples below 6.1 mg/kg	Tl.	+/U	J/UJ
609SB00201 and 609CB00201.	Al, As, Cu, Mg, Ni, K, Sn and Zn.	+	J
All "B" results	all analytes	B	J

DATA ASSESSMENT AND NARRATIVE

Dioxin/Furans

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, matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard recoveries. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. EPA SW846, Method 8290; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27133

A validation was performed on the Dioxin/Furans Data from SDG 27133. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Mass Resolution Checks
*	•	Column Performance
*	•	Calibrations
*	•	Internal Standard Performance
	•	Blanks
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Congener Identification /Quantitation

* - All criteria were met for this parameter

Method Blanks

The method blank exhibited contamination that resulted in qualifications.

Method Blanks - continued

Sample ID	Congener ID	Blank Conc. ng/Kg	Sample Conc. ng/Kg	Quals
609-C-B001-01	OCDD	2.57	220	NA
	1,2,3,4,6,7,8-HpCDF	0.765	1.94	U
	OCDF	2.02	2.21	U
609-C-B002-01	OCDD	2.57	173	NA
	1,2,3,4,6,7,8-HpCDF	0.765	2.97	U
	OCDF	2.02	7.86	U
609-C-B003-01	OCDD	2.57	4.06	U
	1,2,3,4,6,7,8-HpCDF	0.765	0.252	U
	OCDF	2.02	0.241	U
613-N-0001-01	OCDD	2.57	269	NA
	1,2,3,4,6,7,8-HpCDF	0.765	6.5	NA
	OCDF	2.02	14.1	NA

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems.

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 the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
609-C-B001-01	OCDD	+B	NA
	1,2,3,4,6,7,8-HpCDF	+B	U
	OCDF	+B	U
609-C-B002-01	OCDD	+B	NA
	1,2,3,4,6,7,8-HpCDF	+B	U
	OCDF	+B	U
609-C-B003-01	OCDD	+B	U
	1,2,3,4,6,7,8-HpCDF	+B	U
	OCDF	+B	U
613-N-0001-01	OCDD	+B	NA
	1,2,3,4,6,7,8-HpCDF	+B	NA
	OCDF	+B	NA

* 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#:	27133B
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	September 27-30, 1996
Number of Samples:	1 Aqueous Sample(s) with 0 MS/MSD(s) 16 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Metals

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 in 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. Searson

Paul B. Humburg, President

11/25/96

Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27133B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
609SB00101	SOIL		X		X				X		
609SB00102	SOIL		X		X				X		
609SB00201	SOIL		X		X				X		
609SB00202	SOIL		X		X				X		
609SB00301	SOIL		X		X				X		
609SB00302	SOIL		X		X				X		
609SB00401	SOIL		X		X				X		
609TB00401	WATER	X									
609SB00501	SOIL		X		X				X		
609SB00502	SOIL		X		X				X		
609SB00601	SOIL		X		X				X		
609TB00601	SOIL		X								
613M000101	SOIL		X		X				X		X
613M000201	SOIL		X		X				X		X
613TB00201	SOIL		X								
619M000101	SOIL		X		X		X		X		X
643M000101	SOIL		X		X		X				
Total Billable Samples (Water/Soil)		1	16	0	14	0	2	0	13	0	3

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
TAL= SW846 Metals

DATA ASSESSMENT NARRATIVES

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 U.S. EPA 8240; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 27133B

A validation was performed on the Volatile Data from SDG 27133B. 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
	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were within calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, I21522.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).

609SB00102	2-chloroethyl vinyl ether (0.023)
609SB00101	
609SB00202	
609SB00301	

The continuing calibration, I21566.D, contained compounds with %Ds greater than 25% and less than 50%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J).

609SB301DL	acetone (26.0%)

The continuing calibration, I21566.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).

609SB00201	2-chloroethyl vinyl ether (64.5%)
609SB00302	
613MO00201	
619MO00101	
643MO00101	

Internal Standards

All internal standard EICP areas did not meet the internal standard EICP area QA/QC criteria. Qualifications are required.

Internal Standards (continued)

Specific Finding:

The Samples listed below, exhibited low internal standard areas. Qualify all associated positive results as estimated (J) and all non detects as estimated(UJ).

609SB00101	bromochloromethane 1,4-difluorobenzene chlorobenzene-d_5
609SB00301	1,4-difluorobenzene chlorobenzene-d_5

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
VBLK2	methylene chloride	2J ug/kg	20 ug/kg
	acetone	5J ug/kg	50 ug/kg
VBLK3	acetone	3J ug/kg	30 ug/kg

Samples	Compound	Qualification
609SB00102 609SB00202	methylene chloride	CRQL
609SB00101 609SB00301	methylene chloride	U

Method Blank (continued)

Samples	Compound	Qualification
613MO00101 619MO00101 613MO00201	acetone	CRQL
609SB00102 609SB00202 609SB00201 609SB00302 643MO00101	acetone	U

Trip Blank

Associated blank	Compound	Concentration	Action Level
613TB00201	methylene chloride	2J ug/L	20 ug/L

Samples	Compound	Qualification
609SB00101DL 609SB00201 609SB00301DL 609SB00302 619MO00101	methylene chloride	CRQL

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
609EB00401	chloroform	16 ug/L	16 ug/L

Samples	Compound	Qualification
609SB00301	chloroform	CRQL

Field Duplicates

Sample 609SB00101 and duplicate sample 609CB00101 exhibited positive results for acetone and 2-butanone. When sample results were compared the %RPD was greater than the 50% criteria for acetone; therefore, qualify positive results for acetone in both samples as estimated (J).

Sample 609SB00301 and duplicate sample 609CB00301 exhibited positive results for acetone and 2-butanone. When sample results were compared the %RPD was greater than the 50% criteria for 2-butanone; therefore, qualify positive results for 2-butanone in both samples as estimated (J).

Compound Identification /Quantitation

Reject all E-flagged compounds in samples 609SB00101 and 609SB00301, in favor of the D-flagged compound in the diluted samples.

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 10% of the data is qualified.

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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
609SB00102 609SB00101 609SB00202 609SB00301	2-chloroethyl vinyl ether	+/-	J/UR
609SB301DL	acetone	+	J
609SB00201 609SB00302 613MO00201 619MO00101 643MO00101	2-chloroethyl vinyl ether	+/-	J/UJ
609SB00101	All associated compounds bromochloromethane 1,4-difluorobenzene chlorobenzene-d_5	+/-	J/UJ
609SB00301	1,4-difluorobenzene chlorobenzene-d_5		
609SB00102 609SB00202	methylene chloride	+	CRQL
609SB00101 609SB00301	methylene chloride	+	U
613MO00101 619MO00101 613MO00201	acetone	+	CRQL
609SB00102 609SB00202 609SB00201 609SB00302 643MO00101	acetone	+	U

* 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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
609SB00101DL 609SB00201 609SB00301DL 609SB00302 619MO00101	methylene chloride	+	CRQL
609SB00301	chloroform	+	CRQL
609SB00101	acetone	+	J
609SB00301	2-butanone	+	J
609SB00101 609SB00301	All E-flagged compounds	+	UR
609SB00101DL 609SB00301DL	All compounds except D-flagged compounds	+/-	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 U.S. EPA SW846, Method 8270 with CLP deliverables; 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 (Form I's).

SDG # 27133B

A validation was performed on the Semivolatile Data from SDG 27133B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibrations
*	•	Internal Standard Performance
	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within %D continuing calibration criteria. All RRFs were not within calibration criteria.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, S6802, contained compounds with %Ds greater than 25% D but less than 50% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J).

619MO00101 benzo(b)fluoranthene (-30.1)

Method Blanks

Associated blank	Compound	Conc.	Action level
SBLK1	butylbenzylphthalate	39J ug/Kg	390 ug/Kg

Samples	Compound	Qualification
613MO00101	butylbenzylphthalate	CRQL
619MO00101		
643MO00101		
643MO00101DL		

Field Duplicates

The field duplicates exhibited a high RPD for fluoranthene. For sample 609SB00101, qualify positive results as estimated (J).

Compound Identification/Quantitation

Specific Finding:

For sample 643MO00101, replace the "E" flagged results with the corresponding "D" flagged results from the diluted sample. For the diluted sample 643MO00101DL reject all results except the "D" flagged results.

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
619MO00101	benzo(b)fluoranthene (-30.1)	+	J
613MO00101 619MO00101 643MO00101 643MO00101DL	butylbenzylphthalate	+	CRQL
609SB00101	fluoranthene	+	J
643MO00101	"E" flagged results	+	D
643MO00101DL	All results except "D" flagged results.	+/-	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27133B

A validation was performed on the Pesticide/Aroclor Data from SDG 27133B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve or a single point curve (in one (1) sequence) for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration or with no calibration, therefore the data did not require qualification. The continuing calibration standards were not always run with the frequency required by the SW-846 method. The method requires that a CCV be analyzed every 10 sample injections. However, periods of time ranging from 12 to 24 hours passed before a CCV was analyzed on one (1) of the analytical sequences. It is not clear how many injections were run during this time as the Form 8s only listed those samples related to this SDG. No qualifications were required.

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion). One (1) sample required dilution to accurately quantitate target compounds.

Specific Findings

For the following sample, the results for the E flagged compounds are rejected and replaced with the results reported from the DL analysis. All other results from the dilution are rejected, UR.

643MO00101

The positive results reported in all samples which exhibited column quantitation differences greater than 40% but less than 70% are qualified as presumptively present at an estimated concentration, NJ.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and less than 10X the CRQL are reported as undetected, U.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and one of the following: results greater than 10X the CRQL, outside the calibration range, or the result of a dilution, are qualified as presumptively present at an estimated concentration, NJ.

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates less than 10% of 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 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
643MO00101	All E Flagged	+E	D
643MO00101DL	All except corresponding D flagged results	+/-	UR
ALL	All P >40% But ≤ 70%	+	NJ
ALL	All P > 70% And < 10X CRQL, > cal. range, or due to dilution.	+	U
ALL	All P > 70% And > 10X CRQL	+	NJ

* 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
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level IV 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 # 27133A

A validation was performed on the Metals and Cyanide Data from SDG 27133A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
	•	Matrix Spike Recovery
	•	Matrix Duplicates
	•	Field Duplicates
*	•	Laboratory Control Samples
	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Aluminum	2.97 mg/kg	no impact
Beryllium	0.05 mg/kg	no impact
Chromium	0.13 mg/kg	no impact
Iron	3.55 mg/kg	no impact
Lead	0.26 mg/kg	no impact

Manganese	0.10 mg/kg	no impact
Nickel	0.36 mg/kg	all soil samples below 1.8 mg/kg
Tin	1.86 mg/kg	all soil samples below 9.3 mg/kg

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Antimony	4.3 ug/l	all soil samples below 4.3 mg/kg
Barium	3.9 ug/l	no impact
Beryllium	0.56 ug/l	all soil samples below 0.56 mg/kg
Calcium	14.3 ug/l	no impact
Chromium	3.8 ug/l	no impact
Cobalt	1.9 ug/l	all soil samples below 1.9 mg/kg
Copper	39.8 ug/l	all soil samples below 39.8 mg/kg
Nickel	1.8 ug/l	no impact
Selenium	3.2 ug/l	all soil samples below 3.2 mg/kg
Silver	3.4 ug/l	all soil samples below 3.4 mg/kg
Sodium	6880 ug/l	all soil samples below 6880 mg/kg
Thallium	9.8 ug/l	all soil samples below 9.8 mg/kg
Tin	6.1 ug/l	no impact
Thallium	0.66 ug/l	no impact
Zinc	20.2 ug/l	all soil samples below 20.2 mg/kg

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Thallium	-0.61 mg/kg	all soil samples below 6.1 mg/kg

The USEPA requires that the reviewer review and qualify data bias on negative bias. This reviewer qualifies all non-detect and positive results below ten times the absolute value as estimated, "J" or "UJ".

Matrix Spike recovery

Specific Finding

The Matrix Spike recoveries for soils for Antimony (53%), Cadmium (69%), Lead (70%), Manganese (69%) and Thallium (65%) were below the lower control limits (>30% but <75%). All positive and non-detect results are qualified as estimated, "J" or "UJ".

The Matrix Spike recoveries for soils for Arsenic (155%), Chromium (141%) and Zinc (190%) were above the upper control limits (>125%). All positive results are qualified as estimated, "J".

Field and Duplicate Analysis

Specific Finding

The RPDs for field duplicate samples (609SB00201 and 609CB00201) for Aluminum (58%), Arsenic (81%), Copper (70%), Magnesium (82%), Nickel (70%), Potassium (63%), Tin (66%) and Zinc (56%) were greater than 50%. All positive results are qualified as estimated, "J".

Serial Dilution

Specific Finding

The RPD for soils for Nickel was greater than 10%. All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All soil samples below 1.8 mg/kg	Ni.	+	U
All soil samples below 9.3 mg/kg	Sn.		
All soil samples below 4.3 mg/kg	Sb.		
All soil samples below 0.56 mg/kg	Be.		
All soil samples below 1.9 mg/kg	Co.		
All soil samples below 39.8 mg/kg	Cu.		
All soil samples below 3.2 mg/kg	Se.		
All soil samples below 3.4 mg/kg	Ag.		
All soil samples below 6880 mg/kg	Na.		
All soil samples below 9.8 mg/kg	Tl.		
All soil samples below 20.2 mg/kg	Zn.		
All soil samples below 6.1 mg/kg	Tl.	+/U	J/UJ
All soil samples	Sb, Cd, Cu, Pb, Mn and Zn.	+/U	J/UJ
All soil samples	As, Cr and Zn.	+	J
All soil samples	Al, Cu and Pb.	+	J
609SB00201 and 609CB00201.	Al, As, Cu, Mg, Ni, K, Sn and Zn.	+	J
All soil samples	Ni.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27159A
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 1, 1996
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, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Metals, Cyanide

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 in 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

Paul B. Humburg, President

11/15/96

Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27159A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
628EB00101	WATER	X		X		X		X		X	
628DB00101	WATER	X		X		X		X		X	
Total Billable Samples	(Water/Soil)	2	0	2	0	2	0	2	0	2	0

VOA= SW846 Volatiles
SV= SW846 Semivolatiles
P/P= SW846 Pesticide/PCBs
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA 8240 Appendix IX; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level IV. All comments made within this report should be considered when examining the analytical results.

SDG # 27159A

A validation was performed on the Volatile Data from SDG 27159A. 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
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data package required no qualifications since all samples submitted were quality control samples.

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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL

No qualifications 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

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 U.S. EPA SW846, Method 8270 with CLP deliverables; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27159A

A validation was performed on the Semivolatile Data from SDG 27159A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not include the following compounds in there calibration curve or continuing calibration, compounds carbazole, 3-methyl-cholanthrene and 1,2-dibromo-3-chloropropane. No qualification are required because, only QC blanks were submitted in this data package.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL

No qualifications are 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

DATA ASSESSMENT NARRATIVE

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27159A

A validation was performed on the Pesticide/Aroclor Data from SDG 27159A. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the aroclors, therefore the data did not require qualification. No qualifications were required.

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 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.

DATA ASSESSMENT NARRATIVE

PESTICIDE/AROCLOR ANALYSIS
PAGE - 2

System Performance and Overall Assessment

Overall performance was acceptable. The data did not require qualification. This SDG consisted of two (2) field QC blanks only.

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

DATA ASSESSMENT NARRATIVE
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level IV 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 # 27159B

A validation was performed on the Metals and Cyanide Data from SDG 27159B. The data was evaluated based on the following parameters for field QC samples only.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
*	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL

Data stands as reported without qualification.

ANNOTATED FORM Is

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27159B
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 1, 1996
Number of Samples:	1 Aqueous Sample(s) with 0 MS/MSD(s) 11 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Metals

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 in 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 H. Searson

Paul B. Humburg, President

11/15/96

Date

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(314) 936-1332 · Fax (314) 936-1335

SDG# 27159B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL	
120M000101	SOIL		X		X		X		X
628SB00101	SOIL		X		X				X
628TB00101	WATER	X							
628SB00102	SOIL		X		X				X
628SB00201	SOIL		X		X				X
628TB00201	SOIL		X						
628SB00202	SOIL		X		X				X
628SB00301	SOIL		X		X				X
628SB00302	SOIL		X		X				X
628SB00401	SOIL		X		X				X
628SB00501	SOIL		X		X				X
628SB00502	SOIL		X		X				X
Total Billable Samples (Water/Soil)		1	11	0	10	0	1	0	10

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
TAL= SW846 Metals

DATA ASSESSMENT NARRATIVES

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 U.S. EPA 8240; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 27159B

A validation was performed on the Volatile Data from SDG 27159B. 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
*	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were within calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, I21596.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).

628SB00101	2-chloroethyl vinyl ether (0.038)
628SB00201	
628SB00301	
628SB00302	
628SB00401	
120MO00101	

The continuing calibration, I21596.D, contained compounds with %Ds greater than 25% and less than 50%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J).

120MO00101	acetone (25.2%)
628SB00302	

The continuing calibration, I21669.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).

628SB00202	2-chloroethyl vinyl ether (61.3%)
120MO00101RE	

The continuing calibration, I21708.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).

628SB00502	2-chloroethyl vinyl ether (0.015)

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, I21708.D, contained compounds with %Ds greater than 25% and less than 50%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J).

628SB00502	2-butanone (32.4%)

Internal Standards

All internal standard EICP areas did not meet the internal standard EICP area QA/QC criteria. Qualifications are required.

Specific Finding:

The Samples listed below, exhibited low internal standard areas. Qualify all associated positive results as estimated (J) and all non detects as estimated (UJ).

120MO00101	bromochloromethane
628SB00202	1,4-difluorobenzene
628SB00301RE	chlorobenzene-d_5
628SB00302RE	
120MO00101RE	
628SB00202RE	

628SB00301	1,4-difluorobenzene
628SB00401	chlorobenzene-d_5
628SB00401RE	

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
VBLK3	methylene chloride	14 ug/kg	140 ug/kg
	acetone	5J ug/kg	50 ug/kg
VBLK5	methylene chloride	5 ug/kg	50 ug/kg
	acetone	6J ug/kg	60 ug/kg

Samples	Compound	Qualification
62SB00202 628SB00202RE	methylene chloride	U
628SB00301RE 628SB00302RE 628SB00401RE 120MO00101RE 628SB00502	methylene chloride	CRQL
628SB00301RE 628SB00302RE 628SB00401RE 628SB00202RE	acetone	U

Trip Blank

Associated blank	Compound	Concentration	Action Level
628TB00201	acetone	10 ug/L	100 ug/L

Samples	Compound	Qualification
628SB00101 628SB00401	acetone	U
628SB00201 628SB00301	acetone	CRQL

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
628EB00101	chloroform	16 ug/L	16 ug/L

Samples	Compound	Qualification
628SB00301RE	chloroform	CRQL

Surrogates

All of the surrogate recoveries for these samples were not within QA/QC limits. Qualifications are required.

Specific Finding:

Sample listed below exhibited high recoveries for toluene-d_8 and 1,2-dichloroethane-d_4. Qualify all positive results as estimated (J).

120MO00101 (118% and 124%)

Compound Identification /Quantitation

Reject sample 120MO00101, in favor of the reanalysis, due to non compliant surrogate recoveries.

Reject samples 628SB00301RE, 628SB00202RE, 628SB00302RE, and 628SB00401RE, in favor of the initial analysis, due to non compliant internal standard area recoveries.

Sample 628SB00202 and reanalysis sample 628SB00202 exhibited inconsistent results for acetone, qualify positive results for acetone as estimated (J).

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 10% of the data is qualified.

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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
628SB00101 628SB00201 628SB00301 628SB00302 628SB00401 120MO00101	2-chloroethyl vinyl ether	+/-	J/UR
120MO00101 628SB00302	acetone	+	J
628SB00202 120MO00101RE	2-chloroethyl vinyl ether	+/-	J/UJ
628SB00502	2-chloroethyl vinyl ether	+/-	J/UR
628SB00502	2-butanone	+	J
120MO00101 628SB00202 628SB00301RE 628SB00302RE 120MO00101RE 628SB00202RE	All associated compounds bromochloromethane 1,4-difluorobenzene chlorobenzene-d_5	+/-	J/UJ
628SB00301 628SB00401 628SB00401RE	1,4-difluorobenzene chlorobenzene-d_5		
62SB00202 628SB00202RE	methylene chloride	+	U

* DL denotes the Form 1 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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
628SB00301RE 628SB00302RE 628SB00401RE 120MO00101RE 628SB00502	methylene chloride	+	CRQL
628SB00301RE 628SB00302RE 628SB00401RE 628SB00202RE	acetone	+	U
628SB00101 628SB00401	acetone	+	U
628SB00201 628SB00301	acetone	+	CRQL
62SB00301RE	chloroform	+	CRQL
120MO00101	all compounds	+	J
120MO00101	all results	+/-	UR
628SB00301RE 628SB00202RE 628SB00302RE 628SB00401RE	all results	+/-	UR
628SB00202 628SB00202RE	acetone	+	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 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 U.S. EPA SW846, Method 8270 with CLP deliverables; 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 (Form I's).

SDG # 27159B

A validation was performed on the Semivolatile Data from SDG 27159B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibrations
*	•	Internal Standard Performance
	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within %D continuing calibration criteria. All RRFs were not within calibration criteria.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, S6802, contained compounds with %Ds greater than 25% D but less than 50% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J).

628SB00101	benzo(b)fluoranthene (-30.1)
628SB00102	
628SB00201	
628SB00301	
628SB00501	

Field Blanks

Associated blank	Compound	Conc.	Action level
628DB00101	bis(2-ethylhexyl) phthalate	130D ug/L	43300 ug/Kg

Samples	Compound	Qualification
120MO00101 628SB00202	bis(2-ethylhexyl) phthalate	U
628SB00101 628SB00302 628SB00501	bis(2-ethylhexyl) phthalate	CRQL

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
628SB00101 628SB00102 628SB00201 628SB00301 628SB00501	benzo(b)fluoranthene (-30.1)	+	J
120MO00101 628SB00202	bis(2-ethylhexyl) phthalate	+	U
628SB00101 628SB00302 628SB00501	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27159B

A validation was performed on the Pesticide/Aroclor Data from SDG 27159B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the aroclors, therefore the data did not require qualification. No qualifications were required.

Compound Identification/Quantitation

The sample exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. For the sample, 120M000101, the laboratory reported the compound endrin aldehyde from the DB17 column because the continuing calibration %D from the DB1701 column was slightly greater than 15%D. The result from the DB17 column was 3200E µg/Kg and the result from the DB1701 column was 9.8 µg/Kg. In the professional judgement of the reviewer, 9.8 µg/Kg should be the reported result for endrin aldehyde in the sample. The compound quantitation %D for this compound in the sample was 999%. This indicates likely interferences on the DB17 column which inflated the result. Therefore, the result is amended and qualified based on EnSafe guidelines for column quantitation %Ds.

Specific Findings

For the following sample the reported result for endrin aldehyde is amended to the lower of the quantitated values based on the circumstances noted above.

120MO00101

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and less than 10X the CRQL are reported as undetected, U.

System Performance and Overall Assessment

Overall performance was acceptable. The reviewer estimates that less than 10% of 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 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
120MO00101	endrin aldehyde	+3200E	+9.8J
ALL	All P > 70% And < 10X CRQL	+	U

* 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
METALS

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 27159A

A validation was performed on the Metals Data from SDG 27159A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Beryllium	0.04 mg/kg	all soil samples below 0.2 mg/kg
Iron	6.37 mg/kg	no impact
Nickel	0.12 mg/kg	no impact
Tin	1.59 mg/kg	all soil samples below 7.95 mg/kg
Zinc	3.83 mg/kg	no impact

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Barium	0.46 ug/l	no impact
Beryllium	0.41 ug/l	all soil samples below 0.41 mg/kg
Calcium	22.9 ug/l	no impact
Chromium	1.8 ug/l	no impact
Copper	91.1 ug/l	all soil samples below 91.1 mg/kg
Iron	45.5 ug/l	no impact
Silver	1.4 ug/l	no impact
Sodium	7350 ug/l	all soil samples below 7350 mg/kg
Vanadium	0.8 ug/l	no impact
Zinc	16.8 ug/l	no impact

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Thallium	-0.37 mg/kg	all soil samples below 3.7 mg/kg

The USEPA requires that the reviewer review and qualify data bias on negative bias. This reviewer qualifies all non-detect and positive results below ten times the absolute value as estimated, "J" or "UJ".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All soil samples below 0.2 mg/kg	Be.	+	U
All soil samples below 7.95 mg/kg	Sn.		
All soil samples below 0.41 mg/kg	Be.		
All soil samples below 91.1 mg/kg	Cu.		
All soil samples below 7350 mg/kg	Na.		
All soil samples below 3.7 mg/kg	Tl.	+/U	J/UJ
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27166A
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 1, 1996
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, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Gasoline Range Organics, Diesel Range Organics

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 in 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
for Paul B. Humburg, President

11/14/96
Date

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SDG# 27166A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	DRO		GRO	
FDSCC07701	SOIL		X		X
FDSCC08001	SOIL		X		X
Total Billable Samples (Water/Soil)		0	2	0	2

DRO= Diesel Range Organics
GRO= Gasoline Range Organics

DATA ASSESSMENT NARRATIVES

DATA ASSESSMENT NARRATIVE

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level IV requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27166A

A validation was performed on the TPH (DRO) data from SDG 27166A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. The data did not require qualification. A miscellaneous fuel was reported in samples FDSCC07701 and FDSCC08001. These results were not present on the spreadsheet results but were present on the Form I equivalent submitted by the laboratory.

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

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

DATA ASSESSMENT NARRATIVE

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level IV requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27166A

A validation was performed on the TPH (GRO) data from SDG 27166A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. 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

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

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#:	26166B
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	September 30-October 1, 1996
Number of Samples:	13 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Diesel Range Organics, Gasoline Range Organics

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 in 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 B. Seaman
for Paul B. Humburg, President

11/14/96
Date

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SDG# 27166B

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	DRO		GRO	
FDSSC06801	SOIL		X		X
FDSSC06901	SOIL		X		X
FDSSC07001	SOIL		X		X
FDSSC07101	SOIL		X		X
FDSSC07201	SOIL		X		X
FDSSC07301	SOIL		X		X
FDSSC07401	SOIL		X		X
FDSSC07501	SOIL		X		X
FDSSC07601	SOIL		X		X
FDSSC07701	SOIL		X		X
FDSSC07801	SOIL		X		X
FDSSC07901	SOIL		X		X
FDSSC08001	SOIL		X		X
Total Billable Samples (Water/Soil)		0	13	0	13

DRO= Diesel Range Organics
GRO= Gasoline Range Organics

DATA ASSESSMENT NARRATIVES

DATA ASSESSMENT NARRATIVE

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27166B

A validation was performed on the TPH (DRO) data from SDG 27166B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. The data did not require qualification. A miscellaneous fuel was reported in sample FDSSC08001. This result was not present on the spreadsheet results but was present on the Form I equivalent submitted by the laboratory.

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

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

DATA ASSESSMENT NARRATIVE

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27166B

A validation was performed on the TPH (GRO) data from SDG 27166B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. 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

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

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#:	27178A
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 2, 1996
Number of Samples:	1 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Gasoline Range Organics, Diesel Range Organics

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 in 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 H. Searfoss

Paul B. Humburg, President

11/25/96

Date

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SDG# 27178A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	DRO		GRO	
FDSCC08601	SOIL		X		X
Total Billable Samples (Water/Soil)		0	1	0	1

DRO= Diesel Range Organics
GRO= Gasoline Range Organics

DATA ASSESSMENT NARRATIVES

DATA ASSESSMENT NARRATIVE

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level IV requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27178A

A validation was performed on the TPH (DRO) data from SDG 27178A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. The data did not require qualification.

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

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

DATA ASSESSMENT NARRATIVE

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level IV requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27178A

A validation was performed on the TPH (GRO) data from SDG 27178A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. 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

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

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#:	27178B
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 2, 1996
Number of Samples:	25 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Gasoline Range Organics, Diesel Range Organics, Metals, Cyanide

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 in 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. Seaman

Paul B. Humburg, President

11/25/96

Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27178B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		DRO		GRO		TAL		CN	
633SB00101	SOIL						X								
633SB00102	SOIL						X								
633SB00201	SOIL						X								
633SB00202	SOIL						X								
633SB00301	SOIL						X								
633SB00302	SOIL						X								
633SB00401	SOIL						X								
633SB00402	SOIL						X								
633SB00501	SOIL						X								
633SB00601	SOIL						X								
633SB00701	SOIL						X								
633SB00702	SOIL						X								
643SB00301	SOIL		X		X		X								
643SB00302	SOIL		X		X		X								
643TB00301	SOIL		X												
FDSTC08401	SOIL		X												
FDSSC08401	SOIL		X		X		X		X		X		X		X
FDSSC08101	SOIL								X		X				
FDSSC08201	SOIL								X		X				
FDSSC08301	SOIL								X		X				
FDSSC08501	SOIL								X		X				
FDSSC08601	SOIL								X		X				
FDSSC08701	SOIL								X		X				
FDSSC08801	SOIL								X		X				
FDSSC08901	SOIL								X		X				
Total Billable Samples (Water/Soil)		0	5	0	3	0	15	0	9	0	9	0	1	0	1

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
GRO= Gasoline Range Organics
DRO= Diesel Range Organics
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA SW846, Method 8240 with CLP deliverables; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level III. 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 Qualifications table.

SDG # 27178B

A validation was performed on the Volatile Data from SDG 27178B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibrations
*	•	Internal Standard Performance
	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within %D continuing calibration criteria. All RRFs were within calibration criteria.

Continuing Calibrations (continued)

Specific Finding:

The continuing calibration, I21669, contained compounds with %Ds greater than 50% D but less than 90% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and all non detects as estimated (UJ).

FDSSC08401 2-chloroethyl vinyl ether (61.3)

Method Blanks

Associated blank	Compound	Conc	Action level
VBLK2	methylene chloride	14 ug/Kg	140 ug/Kg
	acetone	5J ug/Kg	50 ug/Kg

Samples	Compound	Qualification
FDSSC08401	methylene chloride	CRQL

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

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

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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
FDSSC08401	2-chloroethyl vinyl ether (61.3)	+/-	J/UJ
FDSSC08401	methylene chloride	+	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 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 U.S. EPA SW846, Method 8270 with CLP deliverables; 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 (Form I's).

SDG # 27178B

A validation was performed on the Semivolatile Data from SDG 27178B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

DI Blanks

Associated blank	Compound	Conc	Action level
628DB00101	bis(2-ethylhexyl) phthalate	130D ug/L	43300 ug/Kg

Samples	Compound	Qualification
643SB00302	bis(2-ethylhexyl) phthalate	CRQL

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
643SB00302	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27178B

A validation was performed on the Pesticide/Aroclor Data from SDG 27178B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the aroclors which did not have a five (5) point curve , therefore the data did not require qualification. No qualifications were required.

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion). One (1) sample required dilution to accurately quantitate target compounds. Sample 633SB00702 exhibited E flagged results for 4,4'-DDT and AR1260. However, in the dilution analysis 4,4'-DDT was non-detect. Therefore, 4,4'-DDT will be reported from the undiluted sample and qualified as estimated because it exceeds the calibration range. It is the professional opinion of the data validator that single component pesticides reported in the samples with high concentrations of aroclors should be considered suspect.

Specific Findings

For the following sample, the results for the E flagged compounds are rejected and replaced with the results reported from the DL analysis for which results are present. All other results from the dilution are rejected, UR.

633SB00702

For the following sample, the result for 4,4'-DDT is qualified as estimated, J, because it is above the calibration range of the instrument.

633SB00702

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and less than 10X the CRQL are reported as undetected, U.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and one of the following: results greater than 10X the CRQL, outside the calibration range, or the result of a dilution, are qualified as presumptively present at an estimated concentration, NJ.

System Performance and Overall Assessment

Overall performance was acceptable. The reviewer estimates that less than 10% of 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 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
633SB00702	All E Flagged	+E	D
633SB00702DL	All except corresponding D flagged results	+/-	UR
633SB00702	4,4'-DDT	+	J
ALL	All P > 70% And < 10X CRQL	+	U
ALL	All P > 70% And > 10X CRQL, above the calibration, or due to dilution.	+	NJ

* 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

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27178B

A validation was performed on the TPH (DRO) data from SDG 27178B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. The data did not require qualification. Miscellaneous fuels were reported in samples FDSSC08101 and FDSSC08401. These results were not present on the spreadsheet results but were present on the Form I equivalent submitted by the laboratory.

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

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

DATA ASSESSMENT NARRATIVE

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27178B

A validation was performed on the TPH (GRO) data from SDG 27178B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. 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

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

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

DATA ASSESSMENT NARRATIVE
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 27178

A validation was performed on the Metals and Cyanide Data from SDG 27178. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Beryllium	0.04 mg/kg	no impact
Iron	6.37 mg/kg	no impact
Nickel	0.12 mg/kg	no impact
Tin	1.59 mg/kg	no impact

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Copper	4.2 ug/l	all soil samples below 4.2 mg/kg
Sodium	5560 ug/l	all soil samples 5560 mg/kg
Zinc	7.3 ug/l	no impact

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Thallium	-1.37 mg/kg	all soil samples below 13.7 mg/kg

The USEPA requires that the reviewer review and qualify data bias on negative bias. This reviewer qualifies all non-detect and positive results below ten times the absolute value as estimated, "J" or "UJ".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All soil samples below 4.2 mg/kg	Cu.	+	U
All soil samples below 5560 mg/kg	Na.		
All soil samples below 13.7 mg/kg	Tl.	+/U	J/UJ
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27202B
Date:	November 22, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 3-4, 1996
Number of Samples:	12 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Metals, Cyanide

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 in 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 Kimberly S. Gropp
Paul B. Humburg, President

26 November 1996
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27202B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
634SB00101	SOIL		X						X		
634SB00201	SOIL		X						X		
634SB00202	SOIL		X						X		
634SB00301	SOIL		X						X		
634SB00302	SOIL		X						X		
007SB00101	SOIL		X		X		X		X		
635SB00101	SOIL		X		X		X		X		
634SB00102	SOIL		X						X		
634TB00101	SOIL		X								
GDGSB00601	SOIL		X		X		X		X		X
GDGSB00602	SOIL		X		X		X		X		X
GDGTB00601	SOIL		X								
Total Billable Samples (Water/Soil)		0	12	0	4	0	4	0	10	0	2

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
TAL= SW846 Metals
CN= SW846 Cyanide

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 8240; the National Functional Guidelines for Organic Data Validation, June 1991, 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 # 27202B

A validation was performed on the Volatile Data from SDG 27202B. The data was evaluated based on the following parameters:

- * Data Completeness
- * Holding Times
- * GC/MS Tuning
- Calibration
- Blanks
- * Surrogate Recoveries
- * Matrix Spike/Matrix Spike Duplicates
- Field Duplicates
- Internal Standard Performance
- * Compound Identification
- Compound Quantitation

* - All criteria were met for this parameter.

Continuing Calibrations

The continuings calibrations were not acceptable for all compound %RSDs. The average RRF requirements were not met for all initial calibration compounds. Qualifications were required. Original samples or RE samples that are rejected for other QC reasons in the Compound Quantitation section of this narrative are not mentioned in these specific findings.

Continuing Calibrations, continued

Specific Findings

The continuing calibration standard I21669.D contained a compound with a %D greater than 50% but less than 90%. For the samples and non-compliant compound listed below, the positive and non-detect results are qualified as estimated, J/UJ.

GDGSB00602	2-chloroethyl_vinyl-ether (61.3%)

The continuing calibration standard I21708.D contained a compound with a RRF less than 0.05. For the samples and non-compliant compound listed below, positive results are qualified as estimated, J, and non-detect results are rejected, UR.

GDGSB00601	2-chloroethyl_vinyl_ether (0.015)
634SB00101	
634SB00302	
007SB00101	

The continuing calibration standard I21708.D contained a compound with a %D greater than 25% but less than 50% for which qualifications were required. For the samples and non-compliant compound listed below, the positive results are qualified as estimated, J.

007SB00101	2-butanone (32.4%)
634SB00101	
634SB00302	

The continuing calibration standard I21732.D contained a compound with a %D greater than 50% but less than 90%. For the samples and non-compliant compound listed below, the positive and non-detect results are qualified as estimated, J/UJ.

634SB00102	2-chloroethyl_vinyl-ether (74.2%)

The continuing calibration standard I21732.D contained compounds with %Ds greater than 25% but less than 50% for which qualifications were required. For the samples and non-compliant compounds listed below, the positive results are qualified as estimated, J.

634SB00302DL	acetone (29.1%)
634SB00102	2-butanone (41.0%)

Internal Standards

All samples did not exhibit acceptable EICP area recoveries.

Specific Finding

The following samples exhibited EICP area recoveries below the lower QC limit. All positive results and non detect results for compounds associated with the noted internal standard are qualified as estimated, J/UJ.

634sb00302 chlorobenzene-d_5

Method Blanks

The method blanks exhibited contamination. The samples required qualification. 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 consideration when applying the 5X or 10X criteria to field samples.

	VBLK1	VBLK2	VBLK3	VBLK4
acetone	4 µg/Kg	5 µg/Kg	6 µg/Kg	6 µg/Kg
methylene chloride	--------	14 µg/Kg	5 µg/Kg	6 µg/Kg
chloroform	1 µg/Kg	--------	--------	--------

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
VBLK1	634SB00201 634SB00202 635SB00101	acetone	40 µg/Kg	NA
	634SB00301	acetone	40 µg/Kg	U
	634SB00201 634SB00202 634SB00301 635SB00101	chloroform	5 µg/Kg	CRQL

Method Blanks, continued
Specific Findings, continued

Blank	Samples	Compound	Action Level	Qualification
VBLK2	GDGSB00602	acetone	50 µg/Kg	NA
	GDGSB00602	methylene chloride	140 µg/Kg	CRQL
VBLK3	GDGSB00601	acetone	60 µg/Kg	CRQL
	634SB00101 634SB00302 007SB00101	acetone	60 µg/Kg	NA
	GDGSB00601 634SB00101 007SB00101	methylene chloride	50 µg/Kg	CRQL
	634SB00302	methylene chloride	50 µg/Kg	U
VBLK4	634SB00302DL	acetone	60 µg/Kg	NA
	634SB00102	acetone	60 µg/Kg	U
	634SB00102	methylene chloride	60 µg/Kg	U

Field QC Blanks

The trip blanks, the rinseate blanks, and the DI blanks associated with these samples exhibited contamination. The samples required qualification. Contamination was attributed to the trip blanks. 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 consideration when applying the 5X or 10X criteria to field samples.

	GDGTB00601	634TB00101
acetone	10 µg/L	18 µg/L
methylene chloride	2 µg/L	2 µg/L
chloroform	--------	1 µg/L

Field QC Blanks, continued

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
GDGTB00601	GDGSB00602	acetone	100 μg/Kg	U
634TB00101	007SB00101 634SB00101 634SB00201 634SB00202 635SB00101	acetone	180 μg/Kg	U
	634SB00302DL	acetone	180 μg/Kg	NA
	634SB00201 634SB00202	methylene chloride	20 μg/Kg	U
	634SB00301	methylene chloride	20 μg/Kg	CRQL

Field Duplicates

One (1) of the field duplicate pairs required qualifications for non-compliant precision.

Specific Findings

The field duplicate pair of samples 007SB00101/007CB00101 exhibited non-compliant precision for the compounds chlorobenzene and 2-butanone. The reported positive and non-detect results are qualified as estimated, J/UJ.

Compound Quantitation

Specific Finding

For the following sample, the E flagged results are replaced by the corresponding D flagged result in the dilution analysis. All other results reported from the dilution analysis are rejected in favor of the results reported from the undiluted analysis.

634SB00302

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates that less than 15% of the data required qualifications/rejections.

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
GDGSB00602	2-chloroethyl_vinyl-ether	+/-	J/UJ
GDGSB00601 634SB00101 634SB00302 007SB00101	2-chloroethyl_vinyl_ether	+/-	J/UR
007SB00101 634SB00101 634SB00302	2-butanone	+	J
634SB00102	2-chloroethyl_vinyl-ether	+/-	J/UJ
634SB00302DL	acetone	+/-	J
634SB00102	2-butanone	+	J
634SB00302	All associated with chlorobenzene-d_5	+/-	J/UJ
634SB00201 634SB00202 635SB00101 GDGSB00602 634SB00101 634SB00302 007SB00101 634SB00302DL	acetone	+B	NA
634SB00301 634SB00102	acetone	+B	U

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
GDGSB00601	acetone	+B	CRQL
634SB00201 634SB00202 634SB00301 635SB00101	chloroform	+B	CRQL
GDGSB00602 GDGSB00601 634SB00101 007SB00101	methylene chloride	+B	CRQL
634SB00302 634SB00102	methylene chloride	+B	U
GDGSB00602	acetone	+	U
007SB00101 634SB00101 634SB00201 634SB00202 635SB00101	acetone	+	U
634SB00302DL	acetone	+	NA
634SB00201 634SB00202	methylene chloride	+	U
634SB00301	methylene chloride	+	CRQL

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
007SB00101	chlorobenzene 2-butanone.	+/-	J/UJ
634SB00302	All E flagged compounds	+E	D
634SB00302DL	All except corresponding D flagged compounds	+/-	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 U.S. EPA SW846, Method 8270 with CLP deliverables; 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 (Form I's).

SDG # 27202B

A validation was performed on the Semivolatile Data from SDG 27202B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Initial calibrations

The initial calibrations that were analyzed with this data package exhibited %RSDs that were not within calibration criteria. All RRFs were within calibration criteria.

Initial calibrations (continued)

Specific Finding:

The initial calibration analyzed on, 10/24/96, contained compounds with %RSDs greater than 30% RSD. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J).

007SB00101 chrysene (30.8)

Field Duplicates

Specific Finding:

For samples 007SB00101 and 007CB00101, qualify positive results for phenanthrene and fluoranthene as estimated (J), due to high RPD in duplicate comparison.

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings wili be noted in numerical form on the Form is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
007SB00101	chrysene (30.8)	+	J
007SB00101	phenanthrene fluoranthene	+	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27202B

A validation was performed on the Pesticide/Aroclor Data from SDG 27202B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Surrogate Recoveries

One (1) field sample exhibited non-compliant TCX and DCB recoveries.

Specific Finding

The sample listed below exhibited low TCX and DCB recoveries. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ.

Sample ID	Surrogate	% Recovery
GDGSB00601	TCX-1/TCX-2	20%/18%
	DCB-1/DCB-2	23%/20%

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates less than 10% of 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 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
GDGSB00601	ALL	+/-	J/UJ

* 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
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 27202A

A validation was performed on the Metals and Cyanide Data from SDG 27202A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
	•	Matrix Spike Recovery
*	•	Matrix Duplicates
	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Aluminum	6.9 mg/kg	no impact
Barium	0.08 mg/kg	no impact
Beryllium	0.03 mg/kg	no impact
Calcium	36.5 mg/kg	no impact
Iron	2.3 mg/kg	no impact

Lead	0.22 mg/kg	no impact
Tin	1.28 mg/kg	all soil samples below 6.4 mg/kg
Zinc	2.79 mg/kg	all soil samples below 13.95 mg/kg

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Chromium	0.84 ug/l	no impact
Copper	4.7 ug/l	all soil samples below 4.7 mg/kg
Iron	42.1 ug/l	no impact
Nickel	3.5 ug/l	all soil samples below 3.5 mg/kg
Sodium	551 ug/l	all soil samples below 551 mg/kg
Zinc	11.3 ug/l	no impact

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Matrix Spike recovery

Specific Finding

The Matrix Spike recovery for soils for Lead (0%) was below 30%. All positive and results are qualified as estimated, "J". All non-detect results are rejected.

Field and Duplicate Analysis

Specific Finding

The RPD for field duplicate samples (GDGSB0601 and GDGCB0601) for Barium (107%) was greater than 50%. All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All soil samples below 6.4 mg/kg	Sn.	+	U
All soil samples below 13.95 mg/kg	Zn.		
All soil samples below 4.7 mg/kg	Cu.		
All soil samples below 3.5 mg/kg	Ni.		
All soil samples below 551 mg/kg	Na.		
All soil samples	Pb.	+	J
		U	R
GDGSB0601 and GDGCB0601.	Ba.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27202A
Date:	November 22, 1996
Client Name:	Ensafe/.Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 3-4, 1996
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, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Organophosphorus Pesticides, Herbicides, Dioxin/Furans, Hexavalent Chromium, Metals, Cyanide

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 in 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
for Paul B. Humburg, President

11/26/96
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27202A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
007CB00101	SOIL		X		X		X		X		X		X		X		X		
GDGCB00601	SOIL		X		X		X		X		X		X		X		X		X
Total Billable Samples (Water/Soil)		0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	1

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
OPP= SW846 Organophosphorus Pesticides
HERB= SW846 Herbicides
D/F= SW846 Dioxin/Furans
HCR= SW846 Hexavalent Chromium
TAL= SW846 Metals
CN= SW846 Cyanide

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 8240; the National Functional Guidelines for Organic Data Validation, June 1991, and DQO Level IV 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 # 27202A

A validation was performed on the Volatile Data from SDG 27202A. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
	•	Field Duplicates
*	•	Internal Standard Performance
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Continuing Calibrations

The continuings calibrations were not acceptable for all compound %RSDs. The average RRF requirements were not met for all initial calibration compounds. Qualifications were required.

Continuing Calibrations, continued

Specific Findings

The continuing calibration standard I21669.D contained two (2) compounds with %Ds greater than 50% but less than 90%. For the samples and non-compliant compounds listed below, the positive and non-detect results are qualified as estimated, J/UJ.

GDGCB00601	2-chloroethyl_vinyl-ether (61.3%)
	Trichlorofluoromethane (63.1%)

The continuing calibration standard I21699.D contained four (4) compounds with RRFs less than 0.05. For the samples and non-compliant compound listed below, positive results are qualified as estimated, J, and non-detect results are rejected, UR.

GDGCB00601	acetonitrile (0.018)
	isobutyl alcohol (0.009)
	1,4-dioxane (0.002)
	Acrolein (0.028)

The continuing calibration standard I21699.D contained one (1) compound with a %D greater than 90%. For the samples and non-compliant compound listed below, positive results are qualified as estimated, J, and non-detect results are rejected, UR.

GDGCB00601	dichlorodifluoromethane (98.5%)

The continuing calibration standard K16187.D contained four (4) compounds with RRFs less than 0.05. For the samples and non-compliant compound listed below, positive results are qualified as estimated, J, and non-detect results are rejected, UR.

007CB00101	acetonitrile (0.022)
	isobutyl alcohol (0.005)
	1,4-dioxane (0.002)
	Acrolein (0.028)

Method Blanks

The method blanks exhibited contamination. The samples required qualification. 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 consideration when applying the 5X or 10X criteria to field samples.

	VBLK1	VBLK2
acetone	4 µg/Kg	5 µg/Kg
methylene chloride	2 µg/Kg	14 µg/Kg
chloroform	1 µg/Kg	--------

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
VBLK1	007CB00101	acetone	40 µg/Kg	U
	007CB00101	chloroform	5 µg/Kg	CRQL
	007CB00101	methylene chloride	20 µg/Kg	U
VBLK2	GDGCB00601	acetone	50 µg/Kg	CRQL

Field Duplicates

One (1) of the field duplicate pairs required qualifications for non-compliant precision.

Specific Findings

The field duplicate pair of samples 007SB00101/007CB00101 exhibited non-compliant precision for the compounds chlorobenzene and 2-butanone. The reported positive and non-detect results are qualified as estimated, J/UJ.

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates that less than 15% of the data required qualifications/rejections.

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
GDGCB00601	2-chloroethyl_vinyl-ether Trichlorofluoromethane	+/-	J/UJ
GDGCB00601	acetonitrile isobutyl alcohol 1,4-dioxane acrolein	+/-	J/UR
GDGCB00601	dichlorodifluoromethane	+/-	J/UR
007CB00101	acetonitrile isobutyl alcohol 1,4-dioxane acrolein	+/-	J/UR
007CB00101	acetone	+B	U
GDGCB00601	acetone	+B	CRQL
007CB00101	chloroform	+B	CRQL
007CB00101	methylene chloride	+B	U
007CB00101	chlorobenzene 2-butanone.	+/-	J/UJ

* 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 U.S. EPA SW846, Method 8270 with CLP deliverables; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27202A

A validation was performed on the Semivolatile Data from SDG 27202A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within %D continuing calibration criteria. All RRFs were not within calibration criteria.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A6436,-37,-38,-40, contained compounds with %Ds greater than 50% D but less than 90% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and all non detects as estimated (UJ).

GDGCB00601	n-nitrosomethylethylamine (57.6)
007CB00101	n-nitrosodiethylamine (53.2)
	acetophenone (50.7)
	o-toluidine (53.3)
	1-nitroso-piperidine (65.0)
	o,o,o-triethyl phosphorothio (53.9)
	n-nitrosodi-n-butylamine (67.1)
	safrole (66.5)
	isosafrole (68.6)
	2-naphthylamine (57.5)
	thionazin (83.9)
	5-nitro-o-toluidine (75.8)
	phorate (72.0)
	dimethoate (89.8)
	4-aminobiphenyl (78.4)
	pronamide (72.6)
	pentachloronitrobenzene (65.3)
	disulfoton (68.2)
	methyl parathion (89.8)
	parathion (72.7)
	isodrin (67.6)
	3,3-dimethylbenzidine (71.1)
	famphur (58.1)
	2-acetylaminofluorene (86.5)
	m-cresol (54.5)
	diphenylamine (64.7)
	7,12-dimethylbenz(a)anthracene (89.0)

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A6436,-37,-38,-40, contained compounds with %Ds greater than 90% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and reject all non detects (UR).

GDGCB00601	1,4-naphthoquinone (112.9)
007CB00101	1,3-dinitrobenzene (95.4)
	phenacetin (94.5)
	diallate (103.4)
	kepone (105.2)

The continuing calibration, A6436,-37,-38,-40, contained compounds with RRFs less than 0.05. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and reject all non detects (UR).

GDGCB00601	hexachlorophene (81.6)
007CB00101	

Field Duplicates

Specific Finding:

For samples 007SB00101 and 007CB00101, qualify positive results for phenanthrene and fluoranthene as estimated (J), due to high RPD in duplicate comparison.

Compound Identification/Quantitation

Specific Finding:

The laboratory did not include the following compounds in there calibration curve or continuing calibration, compounds carbazole, 3-methyl-cholanthrene and 1,2-dibromo-3-chloropropane. For all samples, qualify all positive results estimated (J) and reject all non detects (UR).

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
GDGCB00601	n-nitrosomethylethylamine (57.6)	+/-	J/UJ
007CB00101	n-nitrosodiethylamine (53.2)		
	acetophenone (50.7)		
	o-toluidine (53.3)		
	1-nitroso-piperidine (65.0)		
	o,o,o-triethyl phosphorothio (53.9)		
	n-nitrosodi-n-butylamine (67.1)		
	safrole (66.5)		
	isosafrole (68.6)		
	2-naphthylamine (57.5)		
	thionazin (83.9)		
	5-nitro-o-toluidine (75.8)		
	phorate (72.0)		
	dimethoate (89.8)		
	4-aminobiphenyl (78.4)		
	pronamide (72.6)		
	pentachloronitrobenzene (65.3)		
	disulfoton (68.2)		
	methyl parathion (89.8)		
	parathion (72.7)		
	isodrin (67.6)		
	3,3-dimethylbenzidine (71.1)		
	famphur (58.1)		
	2-acetylaminofluorene (86.5)		
	m-cresol (54.5)		
	diphenylamine (64.7)		
	7,12-dimethylbenz(a)anthracene (89.0)		
GDGCB00601	1,4-naphthoquinone (112.9)	+/-	J/UR
007CB00101	1,3-dinitrobenzene (95.4)		
	phenacetin (94.5)		
	diallate (103.4)		
	kepone (105.2)		

* 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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
GDGCB00601 007CB00101	hexachlorophene (81.6)	+/-	J/UR
007CB00101	phenanthrene fluoranthene	+	J
All samples	carbazole 3-methyl-cholanthrene 1,2-dibromo-3-chloropropane	+/-	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27202A

A validation was performed on the Pesticide/Aroclor Data from SDG 27202A. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion).

Specific Findings

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results less than 10X the CRQL are reported as undetected, U.

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates less than 10% of 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 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
ALL	All P > 70% And < 10X CRQL	+	U

* 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

ORGANOPHOSPHORUS PESTICIDES

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 SW846 Method 8140; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27202A

A validation was performed on the Organophosphorus Pesticide Data from SDG 27202A. 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

Overall performance was acceptable. 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

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

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

DATA ASSESSMENT NARRATIVE

CHLORINATED HERBICIDES

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 SW846 Method 8150; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27202A

A validation was performed on the Herbicide Data from SDG 27202A. 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

Overall performance was acceptable. 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

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

NO QUALIFICATIONS ARE 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

DATA ASSESSMENT NARRATIVE
METALS, HEXAVALENT CHROMIUM AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level IV 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 # 27202B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 27202B. The data was evaluated based on the following parameters for field duplicate samples.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Aluminum	6.9 mg/kg	no impact
Barium	0.08 mg/kg	no impact
Beryllium	0.03 mg/kg	no impact
Calcium	36.5 mg/kg	no impact

Iron	2.3 mg/kg	no impact
Lead	0.22 mg/kg	no impact
Tin	1.28 mg/kg	all soil samples below 6.4 mg/kg
Zinc	2.79 mg/kg	all soil samples below 13.95 mg/kg

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Chromium	0.84 ug/l	no impact
Copper	4.7 ug/l	all soil samples below 4.7 mg/kg
Iron	42.1 ug/l	no impact
Nickel	3.5 ug/l	all soil samples below 3.5 mg/kg
Sodium	551 ug/l	all soil samples below 551 mg/kg
Zinc	11.3 ug/l	no impact

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Field and Duplicate Analysis

Specific Finding

The RPD for field duplicate samples (GDGSB0601 and GDGCB0601) for Barium (107%) was greater than 50%. All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All soil samples below 6.4 mg/kg	Sn.	+	U
All soil samples below 13.95 mg/kg	Zn.		
All soil samples below 4.7 mg/kg	Cu.		
All soil samples below 3.5 mg/kg	Ni.		
All soil samples below 551 mg/kg	Na.		
GDGSB0601 and GDGCB0601.	Ba.	+	J
All "B" results	all analytes	B	J

DATA ASSESSMENT AND NARRATIVE

Dioxin/Furans

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, matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard recoveries. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. EPA SW846, Method 8290; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27202

A validation was performed on the Dioxin/Furans Data from SDG 27202. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Mass Resolution Checks
*	•	Column Performance
*	•	Calibrations
*	•	Internal Standard Performance
	•	Blanks
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Congener Identification /Quantitation

* - All criteria were met for this parameter

Method Blanks

The method blank exhibited contamination that resulted in qualifications.

Method Blanks - continued

Sample ID	Congener ID	Blank Conc. ng/Kg	Sample Conc. ng/Kg	Quals
007-C-B001-01	1,2,3,4,6,7,8-HpCDD	0.724	1.74	U
	OCDD	4.627	138	NA
	1,2,3,4,6,7,8-HpCDF	1.067	0.432	U
	OCDF	1.192	0.362	U
GDG-C-B006-01	1,2,3,4,6,7,8-HpCDD	0.724	8.99	NA
	OCDD	4.627	81.6	NA
	1,2,3,4,6,7,8-HpCDF	1.067	1.58	U
	OCDF	1.192	3.13	U

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems.

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 the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	CONGENER ID	DL	QL
007-C-B001-01	1,2,3,4,6,7,8-HpCDD	+B	U
	OCDD	+B	NA
	1,2,3,4,6,7,8-HpCDF	+B	U
	OCDF	+B	U
GDG-C-B006-01	1,2,3,4,6,7,8-HpCDD	+B	NA
	OCDD	+B	NA
	1,2,3,4,6,7,8-HpCDF	+B	U
	OCDF	+B	U

* 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#:	27212A
Date:	November 22, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 3-4, 1996
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, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Gasoline Range Organics, Diesel Range Organics

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 in 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 Kimberly S. Shapp
Paul B. Humburg, President

26 November 1996
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27212A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	GRO		DRO	
FDSCC09101	SOIL		X		X
FDSCC09501	SOIL		X		X
FDSCC10001	SOIL		X		X
Total Billable Samples (Water/Soil)		0	3	0	3

DRO= Gasoline Range Organics
GRO= Diesel Range Organics

DATA ASSESSMENT NARRATIVES

DATA ASSESSMENT NARRATIVE

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level IV requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27212A

A validation was performed on the TPH (GRO) data from SDG 27212A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Field Duplicates

The field duplicate pair of samples FDSSC09501/FDSCC09501 exhibited non-compliant precision for the gasoline results. The result in the field sample was 57 μg/Kg and in the field duplicate was 66100 μg/Kg. The RPD for the sample pair was 199.6%.

Specific Finding

The field duplicate pair of samples FDSSC09501/FDSCC09501 exhibited non-compliant precision for the gasoline results. The reported positive result in the following sample is qualified as estimated, J.

FDSCC09501

Overall Performance

Overall performance was acceptable. The reviewer estimates that less than 10% of the data required qualification.

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
FDSCC09501	gasoline	+	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

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level IV requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27212A

A validation was performed on the TPH (DRO) data from SDG 27212A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. The data did not require qualification. Miscellaneous fuels were reported in sample FDSSC09501. These results were not present on the spreadsheet results but were present on the Form I equivalent submitted by the laboratory.

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

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#:	27212B
Date:	November 22, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 3-4, 1996
Number of Samples:	3 Aqueous Sample(s) with 0 MS/MSD(s) 17 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Gasoline Range Organics, Diesel Range Organics, Metals, Cyanide

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 in 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:

Kimberly S. Hopp — 26 November, 1996

for Paul B. Humburg, President — Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27212B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		DRO		GRO		TAL		CN	
FDSE009401	WATER	X		X		X		X		X		X		X	
FDSD009401	WATER	X		X		X		X		X		X		X	
FDSSC09001	SOIL								X		X				
FDSSC09101	SOIL								X		X				
FDSSC09201	SOIL								X		X				
FDSSC09301	SOIL								X		X				
FDSSC09401	SOIL		X		X		X		X		X		X		X
FDSSC09501	SOIL								X		X				
FDSSC09601	SOIL								X		X				
FDSSC09701	SOIL								X		X				
FDSSC09702	SOIL								X		X				
FDSSC09801	SOIL								X		X				
FDSSC09901	SOIL								X		X				
FDSSC10001	SOIL								X		X				
FDSSC10101	SOIL								X		X				
FDSSC10201	SOIL								X		X				
FDSSC10301	SOIL								X		X				
FDSSC10401	SOIL								X		X				
FDSSC10402	SOIL								X		X				
FDSTC09401	WATER	X													
Total Billable Samples (Water/Soil)		3	1	2	1	2	1	2	17	2	17	2	1	2	1

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
GRO= Gasoline Range Organics
DRO= Diesel Range Organics
TAL= SW846 Metals
CN= SW846 Cyanide

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 8240; the National Functional Guidelines for Organic Data Validation, June 1991, 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 # 27212B

A validation was performed on the Volatile Data from SDG 27212B. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibration
	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Internal Standard Performance
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Method Blanks

The method blanks exhibited contamination. The samples required qualification. 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 consideration when applying the 5X or 10X criteria to field samples.

Method Blanks, continued

	VBLK2
acetone	4 μg/Kg
methylene chloride	2 μg/Kg
chloroform	1 μg/Kg

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
VBLK2	FDSSC09401	methylene chloride	20 μg/Kg	U
	FDSSC09401	acetone	40 μg/Kg	U
	FDSSC09401	chloroform	5 μg/Kg	CRQL

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates that less than 15% of the data required qualifications/rejections.

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
FDSSC09401	methylene chloride	+B	U
	acetone		U
	chloroform		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 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 U.S. EPA SW846, Method 8270 with CLP deliverables; 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 (Form I's).

SDG # 27212B

A validation was performed on the Semivolatile Data from SDG 27212B. The data was evaluated based on the following parameters.

* • Data Completeness
* • Holding Times
* • GC/MS Tuning
* • Calibrations
* • Internal Standard Performance
* • Blanks
* • Surrogate Recoveries
* • Matrix Spike/Matrix Spike Duplicate
* • Field Duplicates
* • Compound Identification /Quantitation

* - All criteria were met for this parameter

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data as presented did not require qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL

No qualifications are 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

DATA ASSESSMENT NARRATIVE

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27212B

A validation was performed on the Pesticide/Aroclor Data from SDG 27212B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

System Performance and Overall Assessment

Overall performance was acceptable. 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 iess 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

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

DATA ASSESSMENT NARRATIVE

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27212B

A validation was performed on the TPH (GRO) data from SDG 27212B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Surrogate Recoveries

One (1) sample exhibited a surrogate recovery greater than the QC limits.

Specific Finding

The reported positive result reported in the following sample for gasoline is qualified as estimated, J, due to a surrogate recovery above the QC limit.

Sample	Surrogate	% Recovery
FDSSC09501	naphthalene	535%

Field Duplicates

The field duplicate pair of samples FDSSC09501/FDSCC09501 exhibited non-compliant precision for the gasoline results. The result in the field sample was 57 μg/Kg and in the field duplicate was 66100 μg/Kg. The RPD for the sample pair was 199.6%.

Specific Finding

The field duplicate pair of samples FDSSC09501/FDSCC09501 exhibited non-compliant precision for the gasoline results. The reported positive result in the following sample is qualified as estimated, J.

FDSSC09501

Overall Performance

Overall performance was acceptable. The reviewer estimates that less than 10% of the data required qualification.

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
FDSSC09501	gasoline	+	J
FDSSC09501	gasoline	+	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

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27212B

A validation was performed on the TPH (DRO) data from SDG 27212B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. The data did not require qualification. Miscellaneous fuels were reported in samples FDSSC04001, FDSSC09501, FDSSC09701, and FDSSC10402. These results were not present on the spreadsheet results but were present on the Form I equivalent submitted by the laboratory.

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

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

DATA ASSESSMENT NARRATIVE
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 27212

A validation was performed on the Metals and Cyanide Data from SDG 27212. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Aluminum	6.9 mg/kg	no impact
Barium	0.08 mg/kg	no impact
Beryllium	0.03 mg/kg	no impact
Calcium	36.5 mg/kg	no impact
Chromium	0.1 mg/kg	no impact

Iron	2.3 mg/kg	no impact
Lead	0.22 mg/kg	no impact
Tin	1.28 mg/kg	all soil samples below 6.4 mg/kg
Beryllium	0.35 ug/l	no impact
Silver	1.25 ug/l	no impact
Thallium	2.72 ug/l	no impact

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Barium	0.64 ug/l	no impact
Beryllium	0.41 ug/l	all soil samples below 0.41 mg/kg
Calcium	158 ug/l	no impact
Cobalt	1.3 ug/l	no impact
Copper	7.3 ug/l	all soil samples below 7.3 mg/kg
Iron	108 ug/l	no impact
Manganese	4.9 ug/l	no impact
Potassium	332 ug/l	all soil samples below 322 mg/kg
Sodium	7320 ug/l	all soil samples below 7320 mg/kg
Thallium	4.6 ug/l	all soil samples below 4.6 mg/kg
Zinc	97.3 ug/l	no impact

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All soil samples below 6.4 mg/kg	Sn.	+	U
All soil samples below 0.41 mg/kg	Be.		
All soil samples below 7.3 mg/kg	Cu.		
All soil samples below 322 mg/kg	K.		
All soil samples below 7320 mg/kg	Na.		
All soil samples below 4.6 mg/kg	Tl.		
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27232A
Date:	November 25, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 4-8, 1996
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, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Organophosphorus Pesticides, Herbicides, Gasoline Range Organics, Diesel Range Organics, Dioxin/Furans, Hexavalent Chromium, Metals, Cyanide

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 in 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. Searson
Paul B. Humburg, President

11/27/96
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27232A

Samples and Fractions Reviewed

ample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		GRO		DRO		D/F		HCR		TAL		CN	
003CB00701	SOIL		X		X		X		X		X						X		X		X		X
FDSCC10701	SOIL												X		X								
FDSCC11401	SOIL												X		X								
Total Billable Samples (Water/Soi		0	1	0	1	0	1	0	1	0	1	0	2	0	2	0	1	0	1	0	1	0	1

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
OPP= SW846 Organophosphorus Pesticides
HERB= SW846 Herbicides
GRO= Gasoline Range Organics
DRO= Diesel Range Organics
D/F= SW846 Dioxin/Furans
HCR= SW846 Hexavalent Chromium
TAL= SW846 Metals
CN= SW846 Cyanide

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 8240; the National Functional Guidelines for Organic Data Validation, June 1991, and DQO Level IV 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 # 27232A

A validation was performed on the Volatile Data from SDG 27232A. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Internal Standard Performance
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Continuing Calibrations

The continuing calibration %Ds were not acceptable for all standards. All RRF criteria was not met. Qualifications were required.

Continuing Calibrations

Specific Findings

The continuing calibration standard K16234.D contained four (4) compounds with RRFs less than 0.05. For the samples and non-compliant compound listed below, positive results are qualified as estimated, J, and non-detect results are rejected, UR.

003CB00701	acrolein (0.029)
	acetonitrile (0.026)
	Isobutyl alcohol (0.006)
	1,4-dioxane (0.002)

Method Blanks

The method blanks exhibited contamination. The samples required qualification. 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 consideration when applying the 5X or 10X criteria to field samples.

	VBLK1
acetone	6 μg/Kg
chloroform	1 μg/Kg

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
VBLK1	003CB00701	chloroform	5 μg/Kg	CRQL
	003CB00701	acetone	60 μg/Kg	U

Field QC Blanks

The trip blanks, the rinseate blanks, and the DI blanks associated with these samples exhibited contamination. The samples required qualification. Contamination was attributed to the trip 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 consideration when applying the 5X or 10X criteria to field samples.

Field Blanks, continued

	003TB00701
acetone	4 μg/Kg
methylene chloride	2 μg/Kg
chloroform	2 μg/Kg

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
003TB00701	003CB00701	methylene chloride	20 μg/Kg	CRQL

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates that less than 15% of the data required qualifications/rejections.

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
003CB00701	acrolein acetonitrile Isobutyl alcohol 1,4-dioxane	+/-	J/UR
003CB00701	chloroform	+B	CRQL
003CB00701	acetone	+B	U
003CB00701	methylene chloride	+	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 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 U.S. EPA SW846, Method 8270 with CLP deliverables; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27232A

A validation was performed on the Semivolatile Data from SDG 27232A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within %D continuing calibration criteria. All RRFs were not within calibration criteria.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A6436,-37,-38,-40, contained compounds with %Ds greater than 50% D but less than 90% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and all non detects as estimated (UJ).

003CB00701	n-nitrosomethylethylamine (57.6)
	n-nitrosodiethylamine (53.2)
	acetophenone (50.7)
	o-toluidine (53.3)
	1-nitroso-piperidine (65.0)
	o,o,o-triethyl phosphorothio (53.9)
	n-nitrosodi-n-butylamine (67.1)
	safroie (66.5)
	isosafrole (68.6)
	2-naphthylamine (57.5)
	thionazin (83.9)
	5-nitro-o-toluidine (75.8)
	phorate (72.0)
	dimethoate (89.8)
	4-aminobiphenyl (78.4)
	pronamide (72.6)
	pentachloronitrobenzene (65.3)
	disulfoton (68.2)
	methyl parathion (89.8)
	parathion (72.7)
	isodrin (67.6)
	3,3-dimethylbenzidine (71.1)
	famphur (58.1)
	2-acetylaminofluorene (86.5)
	m-cresol (54.5)
	diphenylamine (64.7)
	7,12-dimethylbenz(a)anthracene (89.0)

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A6436,-37,-38,-40, contained compounds with %Ds greater than 90% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and reject all non detects (UR).

003CB00701	1,4-naphthoquinone (112.9)
	1,3-dinitrobenzene (95.4)
	phenacetin (94.5)
	diallate (103.4)
	kepone (105.2)

The continuing calibration, A6436,-37,-38,-40, contained compounds with RRFs less than 0.05. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and reject all non detects (UR).

003CB00701	hexachlorophene (81.6)

Compound Identification/Quantitation

Specific Finding:

The laboratory did not include the following compounds in there calibration curve or continuing calibration, compounds carbazole, 3-methyl-cholanthrene and 1,2-dibromo-3-chloropropane. For all samples, qualify all positive results estimated (J) and reject all non detects (UR).

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
003CB00701	n-nitrosomethylethylamine (57.6)	+/-	J/UJ
	n-nitrosodiethylamine (53.2)		
	acetophenone (50.7)		
	o-toluidine (53.3)		
	1-nitroso-piperidine (65.0)		
	o,o,o-triethyl phosphorothio (53.9)		
	n-nitrosodi-n-butylamine (67.1)		
	safrole (66.5)		
	isosafrole (68.6)		
	2-naphthylamine (57.5)		
	thionazin (83.9)		
	5-nitro-o-toluidine (75.8)		
	phorate (72.0)		
	dimethoate (89.8)		
	4-aminobiphenyl (78.4)		
	pronamide (72.6)		
	pentachloronitrobenzene (65.3)		
	disulfoton (68.2)		
	methyl parathion (89.8)		
	parathion (72.7)		
	isodrin (67.6)		
	3,3-dimethylbenzidine (71.1)		
	famphur (58.1)		
	2-acetylaminofluorene (86.5)		
	m-cresol (54.5)		
	diphenylamine (64.7)		
	7,12-dimethylbenz(a)anthracene (89.0)		
003CB00701	1,4-naphthoquinone (112.9)	+/-	J/UR
	1,3-dinitrobenzene (95.4)		
	phenacetin (94.5)		
	diallate (103.4)		
	kepone (105.2)		

* 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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
003CB00701	hexachlorophene (81.6)	+/-	J/UR
All samples	carbazole 3-methyl-cholanthrene 1,2-dibromo-3-chloropropane	+/-	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27232A

A validation was performed on the Pesticide/Aroclor Data from SDG 27232A. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Field Duplicates

The field duplicate pair of samples 003SB00701/DL and 003CB00701/DL exhibited positive results in the field sample and the field duplicate. Qualifications were required.

Specific Finding

The field duplicate pair of samples 003SB00701/DL and 003CB00701/DL exhibited a positive results above the CRQL for Heptachlor and Alpha-Chlordane in the field sample. These compounds were not detected in the field duplicate. 4,4'-DDD was detected in the field duplicate, but not detected in the field sample. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ, due to poor duplicate precision.

003CB00701	Heptachlor
	Alpha-Chlordane
	4,4'-DDD

Compound Identification/Quantitation

One (1) sample was diluted to accurately quantitate target compounds.

Specific Findings

For the following sample, the result for the E flagged compound is rejected and replaced with the corresponding result from the dilution analysis. All other results from the dilution are rejected, UR, in favor of the results reported from the undiluted analysis.

003CB00701

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates less than 10% of 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 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
003CB00701	Heptachlor Alpha-Chlordane 4,4'-DDD	+/-	J/UJ
003CB00701	All E flagged results	+E	D
003CB00701DL	All except corresponding D flagged results	+/-	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

ORGANOPHOSPHORUS PESTICIDES

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 SW846 Method 8140; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27232A

A validation was performed on the Organophosphorus Pesticide Data from SDG 27232A. 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

Overall performance was acceptable. 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

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

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

DATA ASSESSMENT NARRATIVE

CHLORINATED HERBICIDES

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 SW846 Method 8150; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27232A

A validation was performed on the Herbicide Data from SDG 27232A. 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

Overall performance was acceptable. 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

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

NO QUALIFICATIONS ARE 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

DATA ASSESSMENT NARRATIVE

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level IV requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27232A

A validation was performed on the TPH (GRO) data from SDG 27232A. The data was evaluated based on the following parameters.

* • Data Completeness
* • Holding Times
* • GC/MS Tuning
* • Calibrations
* • Internal Standard Performance
* • Blanks
* • Surrogate Recoveries
* • Matrix Spike/Matrix Spike Duplicate
* • Field Duplicates
* • Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. 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

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

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

DATA ASSESSMENT NARRATIVE

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level IV requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27232A

A validation was performed on the TPH (DRO) data from SDG 27232A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Field Duplicates

The field duplicate pair of samples FDSSC11401/FDSCC11401 exhibited non-compliant precision for the diesel results. The result in the field sample was 336 μg/Kg and in the field duplicate was non-detect.

Specific Finding

The reported non-detect result in the field duplicate sample of the pair of samples FDSSC11401/FDSCC11401 is qualified as estimated, UJ.

Overall Performance

Overall performance was acceptable. The reviewer estimates that less than 10% of the data required qualification.

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
FDSCC11401	diesel	_	UJ

* 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
METALS, HEXAVALENT CHROMIUM AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level IV 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 # 27232B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 27232B. The data was evaluated based on the following parameters for field duplicate samples only.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Antimony	0.33 mg/kg	all soil samples below 1.65 mg/kg
Beryllium	0.05 mg/kg	all soil samples below 0.25 mg/kg
Chromium	0.11 mg/kg	no impact
Tin	1.17 mg/kg	all soil samples below 5.85 mg/kg

Vanadium	0.10 mg/kg	no impact
Cyanide	0.11 mg/kg	all soil samples below 0.55 mg/kg

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Barium	0.46 ug/l	no impact
Beryllium	0.41 ug/l	no impact
Calcium	22.9 ug/l	no impact
Chromium	1.8 ug/l	no impact
Copper	91.1 ug/l	all soil samples below 91.1 mg/kg
Iron	45.5 ug/l	no impact
Silver	1.4 ug/l	all soil samples below 1.4 mg/kg
Sodium	7350 ug/l	all soil samples below 7350 mg/kg
Vanadium	0.8 ug/l	no impact
Zinc	16.8 ug/l	all soil samples below 16.8 mg/kg

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Field and Duplicate Analysis

Specific Finding

The RPDs for field duplicate samples (003SB00701 and 003CB00701) for Cobalt (165%), Manganese (62%) and Zinc (146%) were greater than 50%. All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
all soil samples below 1.65 mg/kg	Sb.	+	U
all soil samples below 0.25 mg/kg	Be.		
all soil samples below 5.85 mg/kg	Sn.		
all soil samples below 0.55 mg/kg	Cn.		
All soil samples below 1.4 mg/kg	Ag.		
All soil samples below 91.1 mg/kg	Cu.		
All soil samples below 7350 mg/kg	Na.		
All soil samples below 16.8 mg/kg	Zn.		
003SB00701 and 003CB00701.	Co, Mn and Zn.	+	J
All "B" results	all analytes	B	J

DATA ASSESSMENT AND NARRATIVE

Dioxin/Furans

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, matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard recoveries. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. EPA SW846, Method 8290; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27232

A validation was performed on the Dioxin/Furans Data from SDG 27232. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Mass Resolution Checks
*	•	Column Performance
*	•	Calibrations
*	•	Internal Standard Performance
	•	Blanks
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Congener Identification /Quantitation

* - All criteria were met for this parameter

Method Blanks

The method blank exhibited contamination that resulted in qualifications.

Method Blanks - continued

Sample ID	Congener ID	Blank Conc. ng/Kg	Sample Conc. ng/Kg	Quals
003-C-B007-01	1,2,3,4,6,7,8-HpCDD	0.704	3.81	NA
	OCDD	4.675	126	NA
	1,2,3,4,6,7,8-HpCDF	0.941	0.587	U
	OCDF	1.048	0.594	U

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems.

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 the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	CONGENER ID	DL	QL
003-C-B007-01	1,2,3,4,6,7,8-HpCDD	+B	NA
	OCDD	+B	NA
	1,2,3,4,6,7,8-HpCDF	+B	U
	OCDF	+B	U

* 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#:	27232B
Date:	November 25, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 4-8, 1996
Number of Samples:	15 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Gasoline Range Organics, Diesel Range Organics, Metals, Cyanide

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 in 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

Paul B. Humburg, President

11/27/96

Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27232B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		GRO		DRO		TAL		CN	
FDSSC10501	SOIL								X		X				
FDSSC10601	SOIL								X		X				
FDSSC10701	SOIL								X		X				
FDSSC10801	SOIL								X		X				
FDSSC10901	SOIL								X		X				
FDSSC11001	SOIL								X		X				
FDSSC11101	SOIL								X		X				
FDSSC11201	SOIL								X		X				
FDSSC11301	SOIL								X		X				
FDSSC11401	SOIL								X		X				
FDSSC11501	SOIL								X		X				
003SB00701	SOIL						X						X		
GDGSB00401	SOIL		X		X		X						X		X
GDGSB00402	SOIL		X		X		X						X		X
003TB00701	SOIL		X												
Total Billable Samples (Water/Soil)		0	3	0	2	0	3	0	11	0	11	0	3	0	2

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
GRO= Gasoline Range Organics
DRO= Diesel Range Organics
TAL= SW846 Metals
CN= SW846 Cyanide

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 8240; the National Functional Guidelines for Organic Data Validation, June 1991, 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 # 27232B

A validation was performed on the Volatile Data from SDG 27232B. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibration
	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Internal Standard Performance
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Method Blanks

The method blanks exhibited contamination. The samples required qualification. 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 consideration when applying the 5X or 10X criteria to field samples.

Method Blanks, continued

	VBLK1
acetone	6 µg/Kg
chloroform	1 µg/Kg

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
VBLK1	GDGSB00401 GDGSB00402	chloroform	5 µg/Kg	CRQL
	GDGSB00401 GDGSB00402	acetone	60 µg/Kg	U

Field QC Blanks

The trip blanks, the rinseate blanks, and the DI blanks associated with these samples exhibited contamination. The samples required qualification. Contamination was attributed to the trip 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 consideration when applying the 5X or 10X criteria to field samples.

	003TB00701
acetone	4 µg/Kg
methylene chloride	2 µg/Kg
chloroform	2 µg/Kg

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
003TB00701	GDGSB00401	methylene chloride	20 µg/Kg	U
	GDGSB00402			CRQL

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates that less than 15% of the data required qualifications/rejections.

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
GDGSB00401 GDGSB00402	chloroform	+B	CRQL
GDGSB00401 GDGSB00402	acetone	+B	U
GDGSB00401	methylene chloride	+	U
GDGSB00402	methylene chloride	+	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 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 U.S. EPA SW846, Method 8270 with CLP deliverables; 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 (Form I's).

SDG # 27232B

A validation was performed on the Semivolatile Data from SDG 27232B. The data was evaluated based on the following parameters.

* • Data Completeness
* • Holding Times
* • GC/MS Tuning
* • Calibrations
* • Internal Standard Performance
* • Blanks
* • Surrogate Recoveries
* • Matrix Spike/Matrix Spike Duplicate
* • Field Duplicates
* • Compound Identification /Quantitation

* - All criteria were met for this parameter

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data as submitted does not require qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL

No qualifications are 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

DATA ASSESSMENT NARRATIVE

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27232B

A validation was performed on the Pesticide/Aroclor Data from SDG 27232B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Field Duplicates

The field duplicate pair of samples 003SB00701/DL and 003CB00701/DL exhibited positive results in the field sample and the field duplicate. Qualifications were required.

Specific Finding

The field duplicate pair of samples 003SB00701/DL and 003CB00701/DL exhibited a positive results above the CRQL for Heptachlor and Alpha-Chlordane in the field sample. These compounds were not detected in the field duplicate. 4,4'-DDD was detected in the field duplicate, but not detected in the field sample. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ, due to poor duplicate precision.

003SB00701	Heptachlor
	Alpha-Chlordane
	4,4'-DDD

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion). One (1) sample was diluted to accurately quantitate target compounds.

Specific Findings

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results less than 10X the CRQL are reported as undetected, U.

For the following sample, the result for the E flagged compound is rejected and replaced with the corresponding result from the dilution analysis. All other results from the dilution are rejected, UR, in favor of the results reported from the undiluted analysis.

003SB00701

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates less than 10% of 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 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
003SB00701	Heptachlor Alpha-Chlordane 4,4'-DDD	+/-	J/UJ
ALL	All P > 70% And < 10X CRQL	+	U
003SB00701	All E flagged results	+E	D
003SB00701DL	All except corresponding D flagged results	+/-	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

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27232B

A validation was performed on the TPH (GRO) data from SDG 27232B. The data was evaluated based on the following parameters.

- * Data Completeness
- * Holding Times
- * GC/MS Tuning
- * Calibrations
- * Internal Standard Performance
- * Blanks
- Surrogate Recoveries
- * Matrix Spike/Matrix Spike Duplicate
- * Field Duplicates
- * Identification/Quantitation

* - All criteria were met for this parameter.

Surrogate Recoveries

One (1) sample exhibited a non-compliant surrogate recovery.

Specific Finding

One (1) sample exhibited a high Naphthalene recovery. For the following sample, the positive results are qualified as estimated, J.

Sample	Surrogate	% Recovery
FDSSC10601	Naphthalene	345 %

Overall Performance

Overall performance was acceptable. The reviewer estimates that less than 10% of the data required 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
FDSSC10601	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

DATA ASSESSMENT NARRATIVE

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27232B

A validation was performed on the TPH (DRO) data from SDG 27232B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Field Duplicates

The field duplicate pair of samples FDSSC11401/FDSCC11401 exhibited non-compliant precision for the diesel results. The result in the field sample was 336 μg/Kg and in the field duplicate was non-detect.

Specific Finding

The reported positive result in the field sample of the pair of samples FDSSC11401/FDSCC11401 is qualified as estimated, J.

Overall Performance

Overall performance was acceptable. The reviewer estimates that less than 10% of the data required qualification. Miscellaneous fuels were reported in samples FDSSC10501 and FDSSC10601. These results were not present on the spreadsheet results but were present on the Form I equivalent submitted by the laboratory.

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
FDSSC11401	diesel	+	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
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 27232A

A validation was performed on the Metals and Cyanide Data from SDG 27232A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
	•	Matrix Spike Recovery
*	•	Matrix Duplicates
	•	Field Duplicates
*	•	Laboratory Control Samples
	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Antimony	0.33 mg/kg	all soil samples below 1.65 mg/kg
Beryllium	0.05 mg/kg	all soil samples below 0.25 mg/kg
Chromium	0.11 mg/kg	no impact
Tin	1.17 mg/kg	all soil samples below 5.85 mg/kg
Vanadium	0.10 mg/kg	no impact

Cyanide	0.11 mg/kg	all soil samples below 0.55 mg/kg

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Barium	0.46 ug/l	no impact
Beryllium	0.41 ug/l	all soil samples below 0.41 mg/kg
Calcium	22.9 ug/l	no impact
Chromium	1.8 ug/l	no impact
Copper	91.1 ug/l	all soil samples below 91.1 mg/kg
Iron	45.5 ug/l	no impact
Silver	1.4 ug/l	no impact
Sodium	7350 ug/l	all soil samples below 7350 mg/kg
Vanadium	0.8 ug/l	no impact
Zinc	16.8 ug/l	all soil samples below 16.8 mg/kg

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Matrix Spike recovery

Specific Finding

The Matrix Spike recoveries for soils for Antimony (74%) and Lead (64%) were below the lower control limits (>30% but <75%). All positive and non-detect results are qualified as estimated, "J" or "UJ".

Field and Duplicate Analysis

Specific Finding

The RPDs for Aluminum (24%) and Lead (30%) were not greater than 35% and will not be qualified.

The RPDs for field duplicate samples (003SB00701 and 003CB00701) for Cobalt (165%), Manganese (62%) and Zinc (146%) were greater than 50%. All positive results are qualified as estimated, "J".

Serial Dilution

Specific Finding

The serial dilution for Calcium (11%) was greater than 10%. All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
all soil samples below 1.65 mg/kg	Sb.	+	U
all soil samples below 0.25 mg/kg	Be.		
all soil samples below 5.85 mg/kg	Sn.		
all soil samples below 0.55 mg/kg	Cn.		
All soil samples below 0.41 mg/kg	Be.		
All soil samples below 91.1 mg/kg	Cu.		
All soil samples below 7350 mg/kg	Na.		
All soil samples below 16.8 mg/kg	Zn.		
All soil samples	Sb and Pb.	+/U	J/UJ
003SB00701 and 003CB00701.	Co, Mn and Zn.	+	J
All soil samples	Ca.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27232B
Date:	November 25, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 4-8, 1996
Number of Samples:	15 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Gasoline Range Organics, Diesel Range Organics, Metals, Cyanide

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 in 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
Paul B. Humburg, President

11/27/96
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27232B

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		GRO		DRO		TAL		CN	
FDSSC10501	SOIL								X		X				
FDSSC10601	SOIL								X		X				
FDSSC10701	SOIL								X		X				
FDSSC10801	SOIL								X		X				
FDSSC10901	SOIL								X		X				
FDSSC11001	SOIL								X		X				
FDSSC11101	SOIL								X		X				
FDSSC11201	SOIL								X		X				
FDSSC11301	SOIL								X		X				
FDSSC11401	SOIL								X		X				
FDSSC11501	SOIL								X		X				
003SB00701	SOIL						X						X		
GDGSB00401	SOIL		X		X		X						X		X
GDGSB00402	SOIL		X		X		X						X		X
003TB00701	SOIL		X												
Total Billable Samples (Water/Soil)		0	3	0	2	0	3	0	11	0	11	0	3	0	2

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
GRO= Gasoline Range Organics
DRO= Diesel Range Organics
TAL= SW846 Metals
CN= SW846 Cyanide

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 8240; the National Functional Guidelines for Organic Data Validation, June 1991, 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 # 27232B

A validation was performed on the Volatile Data from SDG 27232B. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibration
	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Internal Standard Performance
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Method Blanks

The method blanks exhibited contamination. The samples required qualification. 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 consideration when applying the 5X or 10X criteria to field samples.

Method Blanks, continued

	VBLK1
acetone	6 µg/Kg
chloroform	1 µg/Kg

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
VBLK1	GDGSB00401 GDGSB00402	chloroform	5 µg/Kg	CRQL
	GDGSB00401 GDGSB00402	acetone	60 µg/Kg	U

Field QC Blanks

The trip blanks, the rinseate blanks, and the DI blanks associated with these samples exhibited contamination. The samples required qualification. Contamination was attributed to the trip 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 consideration when applying the 5X or 10X criteria to field samples.

	003TB00701
acetone	4 µg/Kg
methylene chloride	2 µg/Kg
chloroform	2 µg/Kg

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
003TB00701	GDGSB00401	methylene chloride	20 µg/Kg	U
	GDGSB00402			CRQL

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates that less than 15% of the data required qualifications/rejections.

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
GDGSB00401 GDGSB00402	chloroform	+B	CRQL
GDGSB00401 GDGSB00402	acetone	+B	U
GDGSB00401	methylene chloride	+	U
GDGSB00402	methylene chloride	+	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 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 U.S. EPA SW846, Method 8270 with CLP deliverables; 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 (Form I's).

SDG # 27232B

A validation was performed on the Semivolatile Data from SDG 27232B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data as submitted does not require qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL

No qualifications are 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

DATA ASSESSMENT NARRATIVE

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27232B

A validation was performed on the Pesticide/Aroclor Data from SDG 27232B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Field Duplicates

The field duplicate pair of samples 003SB00701/DL and 003CB00701/DL exhibited positive results in the field sample and the field duplicate. Qualifications were required.

Specific Finding

The field duplicate pair of samples 003SB00701/DL and 003CB00701/DL exhibited a positive results above the CRQL for Heptachlor and Alpha-Chlordane in the field sample. These compounds were not detected in the field duplicate. 4,4'-DDD was detected in the field duplicate, but not detected in the field sample. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ, due to poor duplicate precision.

003SB00701	Heptachlor Alpha-Chlordane 4,4'-DDD

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion). One (1) sample was diluted to accurately quantitate target compounds.

Specific Findings

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results less than 10X the CRQL are reported as undetected, U.

For the following sample, the result for the E flagged compound is rejected and replaced with the corresponding result from the dilution analysis. All other results from the dilution are rejected, UR, in favor of the results reported from the undiluted analysis.

003SB00701

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates less than 10% of 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 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
003SB00701	Heptachlor Alpha-Chlordane 4,4'-DDD	+/-	J/UJ
ALL	All P > 70% And < 10X CRQL	+	U
003SB00701	All E flagged results	+E	D
003SB00701DL	All except corresponding D flagged results	+/-	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

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27232B

A validation was performed on the TPH (GRO) data from SDG 27232B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Surrogate Recoveries

One (1) sample exhibited a non-compliant surrogate recovery.

Specific Finding

One (1) sample exhibited a high Naphthalene recovery. For the following sample, the positive results are qualified as estimated, J.

Sample	Surrogate	% Recovery
FDSSC10601	Naphthalene	345 %

Overall Performance

Overall performance was acceptable. The reviewer estimates that less than 10% of the data required 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
FDSSC10601	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

DATA ASSESSMENT NARRATIVE

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27232B

A validation was performed on the TPH (DRO) data from SDG 27232B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Field Duplicates

The field duplicate pair of samples FDSSC11401/FDSCC11401 exhibited non-compliant precision for the diesel results. The result in the field sample was 336 μg/Kg and in the field duplicate was non-detect.

Specific Finding

The reported positive result in the field sample of the pair of samples FDSSC11401/FDSCC11401 is qualified as estimated, J.

Overall Performance

Overall performance was acceptable. The reviewer estimates that less than 10% of the data required qualification. Miscellaneous fuels were reported in samples FDSSC10501 and FDSSC10601. These results were not present on the spreadsheet results but were present on the Form I equivalent submitted by the laboratory.

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
FDSSC11401	diesel	+	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
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 27232A

A validation was performed on the Metals and Cyanide Data from SDG 27232A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
	•	Matrix Spike Recovery
*	•	Matrix Duplicates
	•	Field Duplicates
*	•	Laboratory Control Samples
	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Antimony	0.33 mg/kg	all soil samples below 1.65 mg/kg
Beryllium	0.05 mg/kg	all soil samples below 0.25 mg/kg
Chromium	0.11 mg/kg	no impact
Tin	1.17 mg/kg	all soil samples below 5.85 mg/kg
Vanadium	0.10 mg/kg	no impact

Cyanide	0.11 mg/kg	all soil samples below 0.55 mg/kg

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Barium	0.46 ug/l	no impact
Beryllium	0.41 ug/l	all soil samples below 0.41 mg/kg
Calcium	22.9 ug/l	no impact
Chromium	1.8 ug/l	no impact
Copper	91.1 ug/l	all soil samples below 91.1 mg/kg
Iron	45.5 ug/l	no impact
Silver	1.4 ug/l	no impact
Sodium	7350 ug/l	all soil samples below 7350 mg/kg
Vanadium	0.8 ug/l	no impact
Zinc	16.8 ug/l	all soil samples below 16.8 mg/kg

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Matrix Spike recovery

Specific Finding

The Matrix Spike recoveries for soils for Antimony (74%) and Lead (64%) were below the lower control limits (>30% but <75%). All positive and non-detect results are qualified as estimated, "J" or "UJ".

Field and Duplicate Analysis

Specific Finding

The RPDs for Aluminum (24%) and Lead (30%) were not greater than 35% and will not be qualified.

The RPDs for field duplicate samples (003SB00701 and 003CB00701) for Cobalt (165%), Manganese (62%) and Zinc (146%) were greater than 50%. All positive results are qualified as estimated, "J".

Serial Dilution

Specific Finding

The serial dilution for Calcium (11%) was greater than 10%. All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
all soil samples below 1.65 mg/kg	Sb.	+	U
all soil samples below 0.25 mg/kg	Be.		
all soil samples below 5.85 mg/kg	Sn.		
all soil samples below 0.55 mg/kg	Cn.		
All soil samples below 0.41 mg/kg	Be.		
All soil samples below 91.1 mg/kg	Cu.		
All soil samples below 7350 mg/kg	Na.		
All soil samples below 16.8 mg/kg	Zn.		
All soil samples	Sb and Pb.	+/U	J/UJ
003SB00701 and 003CB00701.	Co, Mn and Zn.	+	J
All soil samples	Ca.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27280A
Date:	November 22, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 10-15, 1996
Number of Samples:	7 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Organophosphorus Pesticides, Herbicides, Dioxin/Furans, Hexavalent Chromium, Metals, Cyanide

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 in 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 H. Scarpa
Paul B. Humburg, President

11/26/96
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27280A

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
646CB00401	SOIL		X		X		X		X		X		X		X		X		X
646CB00402	SOIL		X		X		X		X		X		X		X		X		X
646CB00101	SOIL		X		X		X		X		X		X		X		X		X
646CB00102	SOIL		X		X		X		X		X		X		X		X		X
646CB00201	SOIL		X		X		X		X		X		X		X		X		X
646CB00301	SOIL		X		X		X		X		X		X		X		X		X
646CB00302	SOIL		X		X		X		X		X		X		X		X		X
Total Billable Samples (Water/Soil)		0	7	0	7	0	7	0	7	0	7	0	7	0	7	0	7	0	7

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
OPP= SW846 Organophosphorus Pesticides
HERB= SW846 Herbicides
D/F= SW846 Dioxin/Furans
HCR= SW846 Hexavalent Chromium
TAL= SW846 Metals
CN= SW846 Cyanide

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 8240; the National Functional Guidelines for Organic Data Validation, June 1991, and DQO Level IV 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 # 27280A

A validation was performed on the Volatile Data from SDG 27280A. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
	•	Internal Standard Performance
*	•	Compound Identification
	•	Compound Quantitation

* - All criteria were met for this parameter.

Continuing Calibrations

The continuings calibrations were not acceptable for all compound %RSDs. The average RRF requirements were not met for all initial calibration compounds. Qualifications were required. Original samples or RE samples that are rejected for other QC reasons in the Compound Quantitation section of this narrative are not mentioned in these specific findings.

Continuing Calibrations, continued

Specific Findings

The continuing calibration standard I21834.D contained a compound with a %D greater than 50% but less than 90%. For the samples and non-compliant compound listed below, the positive and non-detect results are qualified as estimated, J/UJ.

646CB00401	trichlorofluoromethane (63.5%)
646CB00402	
646CB00101	
646CB00201	
646CB00302	

The continuing calibration standard I21834.D contained five (5) compounds with RRFs less than 0.05. For the samples and non-compliant compound listed below, positive results are qualified as estimated, J, and non-detect results are rejected, UR.

646CB00401	2-chloroethyl_vinyl_ether (0.034)
646CB00402	propionitrile (0.037)
646CB00101	acetonitrile (0.012)
646CB00201	isobutyl alcohol (0.004)
646CB00302	1,4-dioxane (0.001)
	acrolein (0.012)

The continuing calibration standard I21834.D contained a compound with a %D greater than 25% but less than 50% for which qualifications were required. For the samples and non-compliant compound listed below, the positive results are qualified as estimated, J.

646SB00302	2-butanone (42.6%)

The continuing calibration standard I21862.D contained six (6) compounds with RRFs less than 0.05. For the samples and non-compliant compounds listed below positive results are qualified as estimated, J, and non-detect results are rejected, UR.

646CB00102	2-chloroethyl_vinyl_ether (0.025)
646CB00301RE	acrolein (0.014)
	acetonitrile (0.013)
	propionitrile (0.040)
	isobutyl alcohol (0.006)
	1,4-dioxane (0.002)

Internal Standards

All samples did not exhibit acceptable EICP area recoveries. Original samples or RE samples that are rejected for other QC reasons in the Compound Quantitation section of this narrative are not mentioned in these specific findings.

Specific Finding

The following samples exhibited EICP area recoveries below the lower QC limit. All positive results and non detect results for compounds associated with the noted internal standard are qualified as estimated, J/UJ.

646CB00201	1,4-difluorobenzene
	chlorobenzene-d_5
646CB00301RE	chlorobenzene-d_5

Method Blanks

The method blanks exhibited contamination. The samples required qualification. 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 consideration when applying the 5X or 10X criteria to field samples.

	VBLK1	VBLK2
acetone	5 µg/Kg	4 µg/Kg

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
VBLK1	646CB00401	acetone	50 µg/Kg	CRQL
	646CB00402			CRQL
	646CB00201			
	646CB00101	acetone	50 µg/Kg	U
	646CB00302			
VBLK2	646CB00301RE	acetone	40 µg/Kg	CRQL
	646CB00102	acetone	40 µg/Kg	U

Field QC Blanks

The trip blanks, the rinseate blanks, and the DI blanks associated with these samples exhibited contamination. The samples required qualification. Contamination was attributed to the trip blanks. 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 consideration when applying the 5X or 10X criteria to field samples.

	638TB00201	638TB00202	646TB00301
acetone	12 µg/L	16 µg/L	30 µg/L
methylene chloride	9 µg/L	18 µg/L	--------

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
638TB00201	646CB00201 646CB00302	methylene chloride	90 µg/Kg	CRQL

Compound Quantitation

Specific Finding

The following sample is rejected, UR, in favor of the original analysis for the noted reason.

Sample	Compounds	Reason
646CB00301	All compounds	Improved internal standard area recoveries in RE sample.
646CB00201RE	All compounds	Similar internal standard area recoveries in both samples

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates that less than 15% of the data required qualifications/rejections.

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
646CB00401	trichlorofluoromethane	+/-	J/UJ
646CB00402			
646CB00101			
646CB00201			
646CB00302			
646CB00401	2-chloroethyl_vinyl_ether	+/-	J/UR
646CB00402	propionitrile		
646CB00101	acetonitrile		
646CB00201	isobutyl alcohol		
646CB00302	1,4-dioxane		
	acrolein		
646CB00302	2-butanone	+	J
646CB00102	2-chloroethyl_vinyl_ether	+/-	J/UR
646CB00301RE	acrolein		
	acetonitrile		
	propionitrile		
	isobutyl alcohol		
	1,4-dioxane		
646CB00201	All associated with 1,4-difluorobenzene chlorobenzene-d_5	+/-	J/UJ
646CB00301RE	All associated with chlorobenzene-d_5	+/-	J/UJ
646CB00401	acetone	+B	CRQL
646CB00402			
646CB00201			
646CB00101	acetone	+B	U
646CB00302			
646CB00102			

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
646CB00301RE	acetone	+B	CRQL
646CB00201 646CB00302	methylene chloride	+	CRQL
646CB00301 646CB00201RE	All compounds	+/-	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 U.S. EPA SW846, Method 8270 with CLP deliverables; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27280A

A validation was performed on the Semivolatile Data from SDG 27280A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within %D continuing calibration criteria. All RRFs were not within calibration criteria.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A6641,-42,-43, contained compounds with %Ds greater than 50% D but less than 90% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and all non detects as estimated (UJ).

646CB00401	safrole (56.4)
646CB00402	dimethoate (58.3)
646CB00101	disulfoton (54.0)
646CB00102	methapyriline (78.9)
646CB00201	3,3'-dimethylbenzidine (56.8)
646CB00301	sulfotepp (51.7)
646CB00302	7,12-dimethylbenz(a)anthracene (81.2)
	a,a-dimethylphenethylamine (70.3)
	p-phenylenediamine (78.8)

The continuing calibration, A6641,-42,-43, contained compounds with %Ds greater than 90% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and reject all non detects (UR).

646CB00401	1,4-naphthoquinone (113.7)
646CB00402	1,3-dinitrobenzene (100.5)
646CB00101	kepone (206.3)
646CB00102	
646CB00201	
646CB00301	
646CB00302	

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A6641,-42,-43, contained compounds with RRFs less than 0.05. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and reject all non detects (UR).

646CB00401	hexachlorophene (76.7)
646CB00402	
646CB00101	
646CB00102	
646CB00201	
646CB00301	
646CB00302	

Compound Identification/Quantitation

Specific Finding:

The laboratory did not include the following compounds in there calibration curve or continuing calibration, compounds carbazole, 3-methyl-cholanthrene and 1,2-dibromo-3-chloropropane. For all samples, qualify all positive results estimated (J) and reject all non detects (UR).

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
646CB00401	safrole (56.4)	+/-	J/UJ
646CB00402	dimethoate (58.3)		
646CB00101	disulfoton (54.0)		
646CB00102	methapyriline (78.9)		
646CB00201	3,3'-dimethylbenzidine (56.8)		
646CB00301	sulfotepp (51.7)		
646CB00302	7,12-dimethylbenz(a)anthracene (81.2)		
	a,a-dimethylphenethylamine (70.3)		
	p-phenylenediamine (78.8)		
646CB00401	1,4-naphthoquinone (113.7)	+/-	J/UR
646CB00402	1,3-dinitrobenzene (100.5)		
646CB00101	kepone (206.3)		
646CB00102			
646CB00201			
646CB00301			
646CB00302			
646CB00401	hexachlorophene (76.7)	+/-	J/UR
646CB00402			
646CB00101			
646CB00102			
646CB00201			
646CB00301			
646CB00302			
All samples	carbazole	+/-	J/UR
	3-methyl-cholanthrene		
	1,2-dibromo-3-chloropropane		

* 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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27280A

A validation was performed on the Pesticide/Aroclor Data from SDG 27280A. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Field Duplicates

The field duplicate pair of samples 646SB00201 and 646CB00201 exhibited a positive result for Endrin Aldehyde in the field sample. The field duplicate pair of samples 646SB00301 and 646CB00301 exhibited positive results for Aldrin and Dieldrin in the field duplicate. The field duplicate pair of samples 646SB00401 and 646CB00401 exhibited a positive result for Beta-BHC in the field sample. Qualifications were required.

Specific Finding

The field duplicate pair of samples 646SB00201 and 646CB00201 exhibited a positive result above the CRQL for Endrin Aldehyde in the field sample. This compound was not detected in the field duplicate. The positive result is qualified as estimated, J, and the non-detect result is qualified as estimated, UJ, due to poor duplicate precision.

646CB00201	Endrin Aldehyde (200%)

The field duplicate pair of samples 646SB00301 and 646CB00301 exhibited positive results above the CRQL for Aldrin and Dieldrin in the field duplicate. These compounds were not detected in the field sample. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ, due to poor duplicate precision.

646CB00301	Aldrin (200%)
	Dieldrin (200%)

The field duplicate pair of samples 646SB00401 and 646CB00401 exhibited a positive result above the CRQL for Beta-BHC in the field sample. This compound was not detected in the field duplicate. The positive result is qualified as estimated, J, and the non-detect result is qualified as estimated, UJ, due to poor duplicate precision.

646CB00401	Beta-BHC (200%)

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion). In addition several results with high %Ds were not flagged with a P on the Form 1 or sample spreadsheet. The data validator qualified the data based on the %Ds on the sample Form 10s.

Specific Findings

The positive results reported in all samples which exhibited column quantitation differences greater than 40% but less than 70% are qualified as presumptively present at an estimated concentration, NJ.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results less than 10X the CRQL are reported as undetected, U.

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates less than 10% of 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 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
646CB00201	Endrin Aldehyde	+/-	J/UJ
646CB00301	Aldrin Dieldrin	+/-	J/UJ
646CB00401	Beta-BHC	+/-	J/UJ
ALL	All P >40% But ≤ 70%	+	NJ
ALL	All P > 70% And < 10X CRQL	+	U

* DL denotes the Form 1 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

ORGANOPHOSPHORUS PESTICIDES

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 SW846 Method 8140; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27280A

A validation was performed on the Organophosphorus Pesticide Data from SDG 27280A. 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

Overall performance was acceptable. 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

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

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

DATA ASSESSMENT NARRATIVE

CHLORINATED HERBICIDES

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 SW846 Method 8150; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27280A

A validation was performed on the Herbicide Data from SDG 27280A. 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

One (1) field sample exhibited a non-compliant surrogate recovery.

Specific Finding

The sample listed below exhibited a 2,4-Dichlorophenylacetic acid recovery below 10%. The positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

Sample ID	Surrogate	% Recovery
646CB00301	2,4-Dichlorophenylacetic acid	5%

Compound Identification/Quantitation

One (1) sample was re-extracted due to non-compliant surrogate recoveries in the original analysis.

Specific Findings

The following sample is rejected, UR, in favor of the results reported from the re-extracted analysis for the noted reason.

Sample	Compounds	Reason
646CB00301	ALL	low surrogate recoveries

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates less than 10% of the data required 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
646CB00301	ALL	+/-	J/UR
646CB00301	ALL	+/-	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
METALS, HEXAVALENT CHROMIUM AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level IV 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 # 27280A

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 27280A. The data was evaluated based on the following parameters for field duplicate samples.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
	•	Matrix Spike Recovery
*	•	Matrix Duplicates
	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Aluminum	1.29 mg/kg	no impact
Beryllium	0.04 mg/kg	all soil samples below 0.2 mg/kg
Iron	6.22 mg/kg	no impact
Lead	0.32 mg/kg	no impact

Tin	1.73 mg/kg	all soil samples below 8.65 mg/kg

The equipment and Rinsate blanks exhibited extreme contamination for several elements. The reviewer does not believe that this contamination has impact on the data.

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Matrix Spike recovery

Specific Finding

The Matrix Spike recovery for soils for Hexavalent Chromium (63%) was below the lower control limits (>30% but <75%). All positive and non-detect results are qualified as estimated, "J" or "UJ".

Field and Duplicate Analysis

Specific Finding

The RPD for field duplicate samples (646SB00301 and 646CB00301) for Calcium (63%) was greater than 50%. All positive results are qualified as estimated, "J".

The RPDs for field duplicate samples (646SB00401 and 646CB00401) for Aluminum (73%), Calcium (64%), Chromium (79%), Iron (92%), Lead (98%), Manganese (88%), Vanadium (88%) and Zinc (61%) were greater than 50%. All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All soil samples below 8.65 mg/kg	Sn.	+	U
all soil samples below 0.2 mg/kg	Be.		
All soil samples	Hex Cr.	+/U	J/UJ
646SB00301 and 646CB00301	Ca.	+	J
646SB00401 and 646CB00401	Al, Ca, Cr, Fe, Pb, Mn, V and Zn.		
All "B" results	all analytes	B	J

DATA ASSESSMENT AND NARRATIVE

Dioxin/Furans

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, matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard recoveries. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. EPA SW846, Method 8290; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27280

A validation was performed on the Dioxin/Furans Data from SDG 27280. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Mass Resolution Checks
*	•	Column Performance
*	•	Calibrations
*	•	Internal Standard Performance
	•	Blanks
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Congener Identification /Quantitation

* - All criteria were met for this parameter

Method Blanks

The method blank exhibited contamination that resulted in qualifications.

Method Blanks - continued

Sample ID	Congener ID	Blank Conc. ng/Kg	Sample Conc. ng/Kg	Quals
646-C-B001-01	OCDD	2.062	68.7	NA
646-C-B001-02	OCDD	2.062	51.2	NA
646-C-B002-01	OCDD	2.062	56.2	NA
646-C-B003-01	OCDD	2.062	55.4	NA
646-C-B003-02	OCDD	2.062	6.62	U
646-C-B004-01	OCDD	2.062	17.5	NA
646-C-B004-02	OCDD	2.062	34.8	NA

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems.

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 the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	CONGENER ID	DL	QL
646-C-B001-01	OCDD	+B	NA
646-C-B001-02	OCDD	+B	NA
646-C-B002-01	OCDD	+B	NA
646-C-B003-01	OCDD	+B	NA
646-C-B003-02	OCDD	+B	U
646-C-B004-01	OCDD	+B	NA
646-C-B004-02	OCDD	+B	NA

* 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#:	27280B
Date:	November 22, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 10-15, 1996
Number of Samples:	3 Aqueous Sample(s) with 0 MS/MSD(s) 11 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA Level III
Method(s) Utilized:	SW846 [illegible] Edition
Analytical Fractions:	Volatiles, Pesticide/PCB's, Metals, Cyanide

Analytical data in this report were screened to determine usability of results and also [illegible] contractual compliance relative to these requirements and deliverables. The screen [illegible] analytical results are correct as reported and may provide an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user in 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 B. Scarborough
Paul B. Humburg, President

11/26/96
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 Fax (314) 936-1335

SDG# 27280B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
638SB00201	SOIL		X		X		X		X		
638EB00201	WATER	X		X		X		X		X	
638DB00201	WATER	X		X		X		X		X	
638TB00201	SOIL		X								
638TB00202	WATER	X									
646SB00401	SOIL		X		X		X		X		
646SB00402	SOIL		X		X		X		X		
646SB00101	SOIL		X		X		X		X		
646SB00102	SOIL		X		X		X		X		
646SB00201	SOIL		X		X		X		X		
646SB00202	SOIL		X		X		X		X		
646SB00301	SOIL		X		X		X		X		
646SB00302	SOIL		X		X		X		X		
646TB00301	SOIL		X								
Total Billable Samples (Water/Soil)		[illegible]	11	2	9	2	9	2	9	[illegible]	

VOA= [illegible] Volatiles
SVOA= [illegible] Semivolatiles
P/P= [illegible] Pesticide/PCB's
TAL= SW[illegible]46 Metals
CN= SW[illegible]46 Cyanide

DATA ASSESSMENT NARRATIVES

DATA ASSESSMENT NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical resu[illegible] correct as reported and is based upon the examination of the reported holding times analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning [illegible] calibration results and internal standard areas. This report was prepared in compliar[illegible] to the analytical and deliverable requirements specified in the SW-846 Method 8240; the National Functional Guidelines for Organic Data Validation, June 1991, 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 t[illegible] of Data Qualification table.

S[illegible]G # 27280B

A validation was performed on the Volatile Data from SDG 27280B. The data wa[illegible] b[illegible]d on th[illegible] following parameters:

*		Data Completeness
*		Holding Ti[illegible]
*		GC/MS Tu[illegible]
	•	Calibration
	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Internal Standard Performance
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Continuing Calibrations

The continuings calibrations were not acceptable for all compound %RSDs. The averag[illegible] RRF requirements were not met for all initial calibration compounds. Qualifications were re[illegible]ed.

Continuing Calibrations, continued

Specific Findings

The continuing calibration standard I21732.D contained a compound with a %D greater than 50% but less than 90%. For the samples and non-compliant compound listed below, the positive and non-detect results are qualified as estimated, J/UJ.

638SB00201 2-chloroethyl_vinyl_ether (74.2%)

The continuing calibration standard I21834.D contained a compound with a RRF less than 0.05. For the samples and non-compliant compound listed below, positive results are qualified as estimated, J, and non-detect results are rejected, UR.

646SB00401 2-chloroethyl_vinyl_ether (0.034)
646SB00402
646SB00101
646SB00102
646SB00202
646SB00302

The continuing calibration standard I21862.D contained a compound with a RRF less than 0.05. For the samples and non-compliant compound listed below positive results are qualified as estimated, J, and non-detect results are rejected, UR.

646SB00201 2-chloroethyl_vinyl_ether (0.025)
646SB00301

Method Blanks

The method blanks exhibited contamination. The samples required qualification. 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 consideration when applying the 5X or 10X criteria to field samples.

	VBLK2	VBLK3	VBLK6
acetone	6 µg/Kg	5 µg/Kg	4 µg/Kg
methylene chloride	6 µg/Kg	---------	--------

Method Blanks, continued

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
VBLK2	638SB00201	acetone	60 µg/Kg	U
	638SB00201	methylene chloride	60 µg/Kg	U
VBLK3	646SB00402 646SB00302	acetone	50 µg/Kg	CRQL
	646SB00101 646SB00102 646SB00202	acetone	50 µg/Kg	U
VBLK4	646SB00301 646SB00201	acetone	40 µg/Kg	CRQL

Field QC Blanks

The trip blanks, the rinseate blanks, and the DI blanks associated with these samples exhibited contamination. The samples required qualification. Contamination was attributed to the trip blanks. 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 consideration when applying the 5X or 10X criteria to field samples.

	638TB00201	**638TB00202**	**646TB00301**
acetone	12 µg/L	18 µg/L	30 µg/L
methylene chloride	9 µg/L	16 µg/L	--------

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
638TB00201	646SB00101 646SB00202 646SB00302	methylene chloride	90 µg/Kg	CRQL

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates that less than 10% of the data required qualifications/rejections.

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
638SB00201	2-chloroethyl_vinyl_ether	+/-	J/UJ
646SB00401 646SB00402 646SB00101 646SB00102 646SB00202 646SB00302	2-chloroethyl_vinyl_ether	+/-	J/UR
646SB00201 646SB00301	2-chloroethyl_vinyl_ether	+/-	J/UR
638SB00201 646SB00101 646SB00102 646SB00202	acetone	+B	U
646SB00402 646SB00302 646SB00301 646SB00201	acetone	+B	CRQL
638SB00201	methylene chloride	+B	U
646SB00101 646SB00202 646SB00302	methylene chloride	+	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 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 U.S. EPA SW846, Method 8270 with CLP deliverables; 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 (Form I's).

SDG # 27280B

A validation was performed on the Semivolatile Data from SDG 27280B. The data was evaluated based on the following parameters.

- * Data Completeness
- * Holding Times
- * GC/MS Tuning
- * Calibrations
- * Internal Standard Performance
- Blanks
- * Surrogate Recoveries
- * Matrix Spike/Matrix Spike Duplicate
- * Field Duplicates
- * Compound Identification /Quantitation

* - All criteria were met for this parameter

Rinseate Blanks

Associated blank	Compound	Conc.	Action level
638EB00201	bis(2-ethylhexyl) phthalate	2J ug/L	660 ug/Kg

Samples	Compound	Qualification
646SB00401	bis(2-ethylhexyl) phthalate	CRQL

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
646SB00401	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27280B

A validation was performed on the Pesticide/Aroclor Data from SDG 27280B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Field Duplicates

The field duplicate pair of samples 646SB00201 and 646CB00201 exhibited a positive result for Endrin Aldehyde in the field sample. The field duplicate pair of samples 646SB00301 and 646CB00301 exhibited positive results for Aldrin and Dieldrin in the field duplicate. The field duplicate pair of samples 646SB00401 and 646CB00401 exhibited a positive result for Beta-BHC in the field sample. Qualifications were required.

Specific Finding

The field duplicate pair of samples 646SB00201 and 646CB00201 exhibited a positive result above the CRQL for Endrin Aldehyde in the field sample. This compound was not detected in the field duplicate. The positive result is qualified as estimated, J, and the non-detect result is qualified as estimated, UJ, due to poor duplicate precision.

646SB00201	Endrin Aldehyde (200%)

The field duplicate pair of samples 646SB00301 and 646CB00301 exhibited positive results above the CRQL for Aldrin and Dieldrin in the field duplicate. These compounds were not detected in the field sample. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ, due to poor duplicate precision.

646SB00301	Aldrin (200%)
	Dieldrin (200%)

The field duplicate pair of samples 646SB00401 and 646CB00401 exhibited a positive result above the CRQL for Beta-BHC in the field sample. This compound was not detected in the field duplicate. The positive result is qualified as estimated, J, and the non-detect result is qualified as estimated, UJ, due to poor duplicate precision.

646SB00401	Beta-BHC (200%)

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion). In addition several results with high %Ds were not flagged with a P on the Form 1 or sample spreadsheet. The data validator qualified the data based on the %Ds on the sample Form 10s.

Specific Findings

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results less than 10X the CRQL are reported as undetected, U.

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates less than 10% of 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 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
646SB00201	Endrin Aldehyde	+/-	J/UJ
646SB00301	Aldrin Dieldrin	+/-	J/UJ
646SB00401	Beta-BHC	+/-	J/UJ
ALL	All P > 70% And < 10X CRQL	+	U

* 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
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 27280B

A validation was performed on the Metals and Cyanide Data from SDG 27280B. The data was evaluated based on the following parameters.

- * Data Completeness
- * Holding Times
- * Calibrations
- Blanks
- * Interferences
- Matrix Spike Recovery
- Matrix Duplicates
- Field Duplicates
- * Laboratory Control Samples
- * Serial Dilutions
- * Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Aluminum	1.29 mg/kg	no impact
Beryllium	0.04 mg/kg	all soil samples below 0.2 mg/kg
Iron	6.22 mg/kg	no impact
Lead	0.32 mg/kg	no impact
Tin	1.73 mg/kg	all soil samples below 8.65 mg/kg

Vanadium	0.07 mg/kg	no impact

The equipment and Rinsate blanks exhibited extreme contamination for several elements. The reviewer does not believe that this contamination has impact on the data.

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Matrix Spike recovery

Specific Finding

The Matrix Spike recoveries for soils for Antimony (54%), Arsenic (60%), Mercury (72%) and Lead (55%) were below the lower control limits (>30% but <75%). All positive and non-detect results are qualified as estimated, "J" or "UJ".

Field and Duplicate Analysis

Specific Finding

The RPDs for the laboratory duplicate samples for soils for Calcium (54%) and Iron (59%) were greater than 35%. All positive results are qualified as estimated, "J". The RPDs for Antimony (31%), Arsenic (28%), Lead (30%) and Vanadium (20%) were not greater than 35% and will not be qualified.

The RPD for field duplicate samples (646SB00301 and 646CB00301) for Calcium (63%) was greater than 50%. All positive results are qualified as estimated, "J".

The RPDs for field duplicate samples (646SB00401 and 646CB00401) for Aluminum (73%), Calcium (64%), Chromium (79%), Iron (92%), Lead (98%), Manganese (88%), Vanadium (88%) and Zinc (61%) were greater than 50%. All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All soil samples below 8.65 mg/kg	Sn.	+	U
all soil samples below 0.2 mg/kg	Be.		
All soil samples	Sb, As, Pb and Hg.	+/U	J/UJ
All soil samples	Ca and Fe.	+	J
646SB00301 and 646CB00301	Ca.	+	J
646SB00401 and 646CB00401	Al, Ca, Cr, Fe, Pb, Mn, V and Zn.		
All "B" results	all analytes	B	J

ANNOTATED FORM Is

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27339A
Date:	November 22, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 16, 1996
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, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Metals, Cyanide

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 in 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 B. Searfoss

Paul B. Humburg, President

12/6/96

Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27339A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
GDGEB00301	WATER	X		X		X		X		X	
GDGDB00301	WATER	X		X		X		X		X	
Total Billable Samples (Water/Soil)		2	0	2	0	2	0	2	0	2	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA 8240, Appendix IX; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level IV. All comments made within this report should be considered when examining the analytical results.

SDG # 27339A

A validation was performed on the Volatile Data from SDG 27339A. 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
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data package contained only quality control samples; therefore, no qualifications are required.

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

No qualifications 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

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 U.S. EPA 8270, Appendix IX; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27339A

A validation was performed on the Semivolatile Data from SDG # 27339A. 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 Sample
*	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Compound Identification /Quantitation

The laboratory did not include the following compounds in the calibration curve or continuing calibration, compounds carbazole, 3-methyl-cholanthrene, and 1,2-dibromo-3-chloropropane. Only quality control samples were submitted in this SDG; therefore, no qualifications are required.

System Performance and Overall Assessment

The overall system performance was fair. The laboratory did not encounter any large problems. This data package contained only quality control samples; therefore, no qualifications are required.

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

No qualifications 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

DATA ASSESSMENT NARRATIVE

PESTICIDE/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 SW846 Method 8080; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27339A

A validation was performed on the Pesticide/Aroclor Data from SDG 27339A. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory analyzed a single point curve for the Aroclors and Toxaphene. The data did not require qualification because no positive results were reported for the compounds analyzed with a single point calibration.

System Performance and Overall Assessment

Overall performance was acceptable. Only QC blanks were included in this data package. 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 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

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

DATA ASSESSMENT NARRATIVE
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level IV 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 # 27339B

A validation was performed on the Metals and Cyanide Data from SDG 27339B. The data was evaluated based on the following parameters for QC samples only.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
*	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL

Data stands as reported without qualification.

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27339B
Date:	November 22, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 16-17, 1996
Number of Samples:	1 Aqueous Sample(s) with 0 MS/MSD(s) 15 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Gasoline Range Organics, Diesel Range Organics, Metals, Cyanide

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 in 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
Paul B. Humburg, President

12-6-96
Date

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(314) 936-1332 · Fax (314) 936-1335

SDG# 27339B

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		GRO		DRO		TAL		CN	
GDGSB00501	SOIL		X		X		X						X		X
GDGSB00502	SOIL		X		X		X						X		X
GDGSB00301	SOIL		X		X		X						X		X
GDGTB00301	WATER	X													
GDGTB00501	SOIL	X													
FDSSH00201	SOIL								X		X				
FDSSH00301	SOIL								X		X				
FDSSH00401	SOIL								X		X				
FDSSH00501	SOIL								X		X				
FDSSH00701	SOIL								X		X				
FDSSH01101	SOIL								X		X				
FDSSH01301	SOIL								X		X				
FDSSH01401	SOIL								X		X				
FDSSH01501	SOIL								X		X				
FDSSH02301	SOIL		X		X		X		X		X		X		X
FDSTH02301	SOIL		X												
Total Billable Samples (Water/Soil)		2	5	0	4	0	4	0	10	0	10	0	4	0	4

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
GRO= Gasoline Range Organics
DRO= Diesel Range Organics
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA 8240; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 27339B

A validation was performed on the Volatile Data from SDG 27339B. 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
*	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, I21834.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).

GDGSB00502	2-chloroethyl vinyl ether (0.034, 66.7%)
GDGSB00301	

The continuing calibration, I21862.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).

GDGSB00501	2-chloroethyl vinyl ether (0.025, 75.5%)
GDGSB00301RE	
FDSSH02301	
GDGSB00502RE	

Internal Standards

All internal standard EICP areas did not meet the internal standard EICP area QA/QC criteria. Qualifications are required.

Specific Finding:

The Samples listed below, exhibited low internal standard areas. Qualify all associated positive results as estimated (J) and all non detects as estimated(UJ).

GDGSB00502RE	chlorobenzene-d_5
FDSSH02301	
GDDSB00502	1,4-difluorobenzene
	chlorobenzene-d_5
GDGSB00301	bromochloromethane
GDGSB00301RE	1,4-difluorobenzene
	chlorobenzene-d_5

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
VBLK1	Acetone	5J ug/kg	50 ug/kg
VBLK3	acetone	4J ug/kg	40 ug/kg

Samples	Compound	Qualification
GDGSB00301 GDGSB00502	acetone	U
GDGSB00501 GDGSB00502RE GDGSB00301RE FDSSH02301 FDSSH02301RE	acetone	CRQL

Surrogates

All of the surrogate recoveries for these samples were not within QA/QC limits. Qualifications are required.

Specific Finding:

Sample listed below exhibited high recoveries for the surrogate listed. Qualify all positive results as estimated (J).

GDGSB00301	toluene-d_8 (123%) 1,2-dichloroethane-d_4 (122%)
FDSSH02301	toluene-d_8 (121%)

Surrogates (continued)

Specific Finding:

Sample listed below exhibited low recoveries for the surrogate listed. Qualify all positive results as estimated (J) and non detects as estimated (UJ).

FDSSH02301RE	bromofluorobenzene (70%)

Compound Identification /Quantitation

Reject sample FDSSH02301RE, in favor of the initial analysis, due to non compliant surrogate recoveries.

Reject sample GDGSB00301, in favor of the re-analysis, due to non compliant surrogate and internal standard area recoveries.

Reject sample GDGSB00502, in favor of the re- analysis, due to non compliant internal standard area recoveries.

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 10% of the data is qualified.

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
GDGSB00502 GDGSB00301	2-chloroethyl vinyl ether	+/-	J/UR
GDGSB00501 GDGSB00301RE FDSSH02301 GDGSB00502RE	2-chloroethyl vinyl ether	+/-	J/UR
GDGSB00502RE FDSSH02301	All associated compounds chlorobenzene-d_5	+/-	J/UJ
GDDSB00502	1,4-difluorobenzene chlorobenzene-d_5		
GDGSB00301 GDGSB00301RE	bromochloromethane 1,4-difluorobenzene chlorobenzene-d_5		
GDGSB00301 GDGSB00502	acetone	+	U
GDGSB00501 GDGSB00502RE GDGSB00301RE FDSSH02301 FDSSH02301RE	acetone	+	CRQL
GDGSB00301 FDSSH02301	all results	+	J
FDSSH02301RE	all results	+/-	J/UJ
FDSSH02301RE GDGSB00301 GDGSB00502	all results	+/-	UR

* DL denotes the Form 1 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 U.S. EPA 8270; 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 (Form I's).

SDG # 27339B

A validation was performed on the Semivolatile Data from SDG # 27339B. 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 Sample
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Blanks

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 consideration when applying the 5X and 10X criteria to field samples.

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
GDGEB00301	bis(2ethylhexyl)phthalate	7J ug/L	2300 ug/kg

Samples	Compound	Qualification
GDGSB00301 FDSH02301	bis(2-ethylhexyl)phthalate	CRQL

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data requires qualification.

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
GDGSB00301 FDSH02301	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27339B

A validation was performed on the Pesticide/Aroclor Data from SDG 27339B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Surrogate Recoveries

One (1) field sample exhibited non-compliant DCB recoveries.

Specific Finding

The sample listed below exhibited high DCB recoveries. The positive results are qualified as estimated, J.

Sample ID	Surrogate	% Recovery
GDGSB00301	DCB-1/DCB-2	304%/341%

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion). One (1) sample required dilution to accurately quantitate target compounds.

Specific Findings

For the following sample, the results for the E flagged compound are rejected and replaced with the results reported from the dilution analysis. All other results from the dilution are rejected, UR.

GDGSB00301

The positive results reported in all samples which exhibited column quantitation differences greater than 40% but less than 70% are qualified as presumptively present at an estimated concentration, NJ.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results less than 10X the CRQL are reported as undetected, U.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and one (1) or more of the following: results greater than 10X the CRQL, outside the calibration range, or the result of a dilution, are qualified as presumptively present at an estimated concentration, NJ.

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates less than 10% of 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 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
GDGSB00301	ALL	+	J
GDGSB00301	All E Flagged	+E	D
GDGSB00301DL	All except corresponding D flagged results	+/-	UR
ALL	All P >40% But ≤ 70%	+	NJ
ALL	All P > 70% And < 10X CRQL	+	U
ALL	All P > 70% And > 10X CRQL, > cal. range, or due to DL	+	NJ

* 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

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27339B

A validation was performed on the TPH (GRO) data from SDG 27339B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Surrogate Recoveries

Specific Finding

The following sample exhibited a surrogate recovery above the QC limit. All reported positive results in the sample are qualified as estimated, J.

FDSSH02301

Overall Performance

Overall performance was acceptable. The reviewer estimates that less than 5% of the data required 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
FDSSH02301	All Compounds	+	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

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27339B

A validation was performed on the TPH (DRO) data from SDG 27339B. The data was evaluated based on the following parameters.

* • Data Completeness
* • Holding Times
* • GC/MS Tuning
* • Calibrations
* • Internal Standard Performance
* • Blanks
* • Surrogate Recoveries
* • Matrix Spike/Matrix Spike Duplicate
* • Field Duplicates
* • Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. The data did not require qualification. Miscellaneous fuels were reported in samples FDSSH00301, FDSSH00501, FDSSH00701, FDSSH01101, FDSSH01301, FDSSH01401, FDSSH01501, and FDSSH02301. These results were not present on the spreadsheet results but were present on the Form I equivalent submitted by the laboratory.

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

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

DATA ASSESSMENT NARRATIVE
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 27339A

A validation was performed on the Metals and Cyanide Data from SDG 27339A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Aluminum	1.29 mg/kg	no impact
Beryllium	0.03 mg/kg	no impact
Iron	6.22 mg/kg	no impact
Lead	0.32 mg/kg	no impact
Tin	1.73 mg/kg	all soil samples below 8.65 mg/kg

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Beryllium	0.41 ug/l	all soil samples below 0.41 mg/kg
Calcium	37.7 ug/l	no impact
Chromium	1.0 ug/l	no impact
Copper	43.0 ug/l	all soil samples below 43.0 mg/kg
Sodium	8530 ug/l	all soil samples below 8530 mg/kg
Zinc	6.5 ug/l	no impact
Cyanide	2.7 ug/l	all soil samples below 2.7 mg/kg

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
all soil samples below 8.65 mg/kg	Sn.	+	U
all soil samples below 0.41 mg/kg	Be.		
all soil samples below 43.0 mg/kg	Cu.		
all soil samples below 8530 mg/kg	Na.		
all soil samples below 2.7 mg/kg	Cn.		
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27341A
Date:	November 22, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 17, 1996
Number of Samples:	1 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Metals, pH

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 in 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 B. Searfoss
Paul B. Humburg, President

11/25/96
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27341A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	TAL		pH	
011CP00501	SOIL		X		X
Total Billable Samples	(Water/Soil)	0	1	0	1

TAL= SW846 Metals
pH= pH

DATA ASSESSMENT NARRATIVE
METALS AND pH

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level IV 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 # 27341B

A validation was performed on the Metals and pH Data from SDG 27341B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Tin	2.37 mg/kg	all soil samples below 11.9 mg/kg
Vanadium	0.05 mg/kg	no impact

The equipment and Rinsate blanks exhibited contamination. The reviewer did not qualify the data based on this contamination. It appears that the DI columns are not working properly. The contamination was unnecessarily high.

The USEPA requires that all sample values below five times the preparation or calibration blank contamination be qualified as non-detect, "U".

Field and Duplicate Analysis

Specific Finding

The RPDs for field duplicate samples (011SP00501 and 011CP00501) for Lead (73%), Chromium (52%), Copper (62%) and Zinc (51%) were greater than 50%. All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All soil samples below 11.9 mg/kg (011SP00501 and 011CP00501).	Sn.	+	U
	Pb, Cr, Cu and Zn.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27341B
Date:	November 22, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 16-17, 1996
Number of Samples:	16 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Metals, pH

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 in 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. Seaman
for Paul B. Humburg, President

11/25/96.
Date

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SDG# 27341B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	pH		TAL	
011SP00101	SOIL		X		X
011SP00102	SOIL		X		X
011SP00103	SOIL		X		X
011SP00201	SOIL		X		X
011SP00202	SOIL		X		X
011SP00301	SOIL		X		X
011SP00302	SOIL		X		X
011SP00401	SOIL		X		X
011SP00501	SOIL		X		X
011SP00502	SOIL		X		X
011SP00601	SOIL		X		X
011SP00602	SOIL		X		X
011SP00603	SOIL		X		X
011SP00701	SOIL		X		X
011SP00702	SOIL		X		X
011SP00801	SOIL		X		X
Total Billable Samples (Water/Soil)		0	16	0	16

pH= pH
TAL= SW846 Metals

DATA ASSESSMENT NARRATIVE
METALS AND pH

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 27341A

A validation was performed on the Metals and pH Data from SDG 27341A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
	•	Field Duplicates
*	•	Laboratory Control Samples
	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Aluminum	4.96 mg/kg	no impact
Beryllium	0.36 mg/kg	no impact
Cobalt	0.18 mg/kg	all soil samples below 0.9 mg/kg
Lead	0.21 mg/kg	no impact
Tin	0.78 mg/kg	all soil samples below 3.9 mg/kg

The equipment and Rinsate blanks exhibited contamination. The reviewer did not qualify the data based on this contamination. It appears that the DI columns are not working properly. The contamination was unnecessarily high.

The USEPA requires that all sample values below five times the preparation or calibration blank contamination be qualified as non-detect, "U".

Field and Duplicate Analysis

Specific Finding

The RPDs for field duplicate samples (011SP00501 and 011CP00501) for Lead (73%), Chromium (52%), Copper (62%) and Zinc (51%) were greater than 50%. All positive results are qualified as estimated, "J".

Serial Dilution

Specific Finding

The serial dilution RPDs for soils for Barium, Chromium, Lead and Manganese were greater than 10%. All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All soil samples below 0.9 mg/kg	Co.	+	U
All soil samples below 3.9 mg/kg	Sn.		
(011SP00501 and 011CP00501).	Pb, Cr, Cu and Zn.	+	J
All soil samples	Ba, Cr, Pb and Mn.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27367B
Date:	November 22, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 18, 1996
Number of Samples:	9 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Diesel Range Organics, Gasoline Range Organics

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 in 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 Kimberly S. Shopp — 6 December 1996

for Paul B. Humburg, President — Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27367B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	DRO		GRO	
FDSSH00101	SOIL		X		X
FDSSH02001	SOIL		X		X
FDSSH01201	SOIL		X		X
FDSSH01601	SOIL		X		X
FDSSH01701	SOIL		X		X
FDSSH01801	SOIL		X		X
FDSSH01901	SOIL		X		X
FDSSH02101	SOIL		X		X
FDSSH02201	SOIL		X		X
Total Billable Samples (Water/Soil)		0	9	0	9

DRO= Diesel Range Organics
GRO= Gasoline Range Organics

DATA ASSESSMENT NARRATIVES

DATA ASSESSMENT NARRATIVE

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27367B

A validation was performed on the TPH (GRO) data from SDG 27367B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. 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

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

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

DATA ASSESSMENT NARRATIVE

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27367B

A validation was performed on the TPH (DRO) data from SDG 27367B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

Overall performance was acceptable. The data did not require qualification. Miscellaneous fuels were reported in samples FDSSH00101, FDSSH01901 and FDSSH02101. These results were not present on the spreadsheet results but were present on the Form I equivalent submitted by the laboratory.

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

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#:	27377A
Date:	November 22, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 21, 1996
Number of Samples:	1 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Diesel Range Organics, Gasoline Range Organics

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 in 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 — 12/10/96

Paul B. Humburg, President — Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27377A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	DRO		GRO	
FDSCH02401	SOIL		X		X
Total Billable Samples (Water/Soil)		0	I	0	I

DRO= Diesel Range Organics
GRO= Gasoline Range Organics

DATA ASSESSMENT NARRATIVES

DATA ASSESSMENT NARRATIVE

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level IV requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27377A

A validation was performed on the TPH (DRO) data from SDG 27377A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

The data did not require qualification.

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

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

DATA ASSESSMENT NARRATIVE

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level IV requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27377A

A validation was performed on the TPH (GRO) data from SDG 27377A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

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

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

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#:	27377B
Date:	November 22, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	October 21, 1996
Number of Samples:	3 Aqueous Sample(s) with 0 MS/MSD(s) 9 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Gasoline Range Organics, Diesel Range Organics, Metals, Cyanide

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 in 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

12/10/96
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27377B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		GRO		DRO		TAL		CN	
FDSSH00601	SOIL								X		X				
FDSSH00801	SOIL								X		X				
FDSSH00901	SOIL								X		X				
FDSSH01001	SOIL								X		X				
FDSSH02701	SOIL								X		X				
FDSSH02601	SOIL		X		X		X		X		X		X		X
FDSTB02601	SOIL		X												
FDSSH02501	SOIL								X		X				
FDSSH02401	SOIL		X		X		X		X		X		X		X
FDSESH2401	WATER	X		X		X		X		X		X		X	
FDSDSH2401	WATER	X		X		X		X		X		X		X	
FDSTSH2401	WATER	X													
Total Billable Samples (Water/Soil)		3	3	2	2	2	2	2	8	2	8	2	2	2	2

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
GRO= Gasoline Range Organics
DRO= Diesel Range Organics
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA SW846, Method 8240 with CLP deliverables; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level III. 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 Qualifications table.

SDG # 27377B

A validation was performed on the Volatile Data from SDG 27377B. The data was evaluated based on the following parameters.

- * Data Completeness
- * Holding Times
- * GC/MS Tuning
- * Calibrations
- * Internal Standard Performance
- Blanks
- * Surrogate Recoveries
- * Matrix Spike/Matrix Spike Duplicate
- * Field Duplicates
- * Compound Identification /Quantitation

* - All criteria were met for this parameter

Trip Blanks

Associated blank	Compound	Conc.	Action level
FDSTB02601	acetone	8J ug/L	80 ug/Kg

Samples	Compound	Qualification
FDSSH02401	acetone	U
FDSSH02601		

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data as presented required 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

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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
FDSSH02401	acetone	+	U
FDSSH02601			

* 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 U.S. EPA SW846, Method 8270 with CLP deliverables; 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 (Form I's).

SDG # 27377B

A validation was performed on the Semivolatile Data from SDG 27377B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
	•	Internal Standard Performance
	•	Blanks
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Internal Standards

Specific Finding:

The Samples listed below, exhibited low internal standard areas. Qualify all associated positive results as estimated (J) and all non detects as estimated (UJ).

FDSSH02601RE	phenanthrene-d_{10}
FDSSH02601	chrysene-d_{12}
	perylene-d_{12}
FDSSH02401	perylene-d_{12}
FDSSH02401RE	chrysene-d_{12}
	perylene-d_{12}

Method Blanks

Associated blank	Compound	Conc.	Action level
SBLK2	butylbenzylphthalate	36J ug/Kg	360 ug/Kg

Samples	Compound	Qualification
FDSSH02401	butylbenzylphthalate	CRQL

Surrogates

Surrogate recoveries for all samples and blanks did not meet QA/QC criteria. The SOW and the National Functional Guidelines allow one surrogate for each fraction to fall out side the QA/QC criteria as long as the recovery is greater than 10%.

Specific Finding:

Sample FDSSH02601, exhibited high surrogate recoveries for two base/neutral surrogates. Qualify all positive results for the base/neutral fraction as estimated (J).

2-fluorobiphenyl	136%
terphenyl-d_{14}	187%

Compound Identification/Quantitation

Specific Finding:

Reject all results for the samples listed below, due to non compliant internal standard areas and /or non compliant surrogate recoveries.

FDSSH02401RE
FDSSH02601RE

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data as presented required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
	All associated compounds	+/-	J/UJ
FDSSH02601RE FDSSH02601	phenanthrene-d_{10} chrysene-d_{12} perylene-d_{12}		
FDSSH02401	perylene-d_{12}		
FDSSH02401RE	chrysene-d_{12} perylene-d_{12}		
FDSSH02401	butylbenzylphthalate	+	CRQL
FDSSH02601	base/neutral fraction	+	J
FDSSH02401RE FDSSH02601RE	All results	+/-	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27377B

A validation was performed on the Pesticide/Aroclor Data from SDG 27377B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the aroclors which did not have a five (5) point curve , therefore the data did not require qualification.

0

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 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

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

DATA ASSESSMENT NARRATIVE

TPH - PURGEABLES (GRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for purgeable TPH (GRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27377B

A validation was performed on the TPH (GRO) data from SDG 27377B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

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

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

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

DATA ASSESSMENT NARRATIVE

TPH - EXTRACTABLES (DRO)

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, calibration results, surrogate and matrix spike recoveries, and GC performance. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. SW-846 Method 8015, modified for extractable TPH (DRO); the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27377B

A validation was performed on the TPH (DRO) data from SDG 27377B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

The data did not require qualification. Miscellaneous fuels were reported in samples FDSSH02701, FDSSH02601 and FDSSH02501. These results were not present on the spreadsheet results but were present on the Form I equivalent submitted by the laboratory. The data contained two initial calibrations, analyzed on different dates, which contained the same calibration factors, but different RSDs. This appears to be caused by rounding differences.

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

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

DATA ASSESSMENT NARRATIVE
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 27377A

A validation was performed on the Metals and Cyanide Data from SDG 27377A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Chromium	0.09 mg/kg	no impact
Lead	0.26 mg/kg	no impact
Tin	1.64 mg/kg	all soil samples below 8.2 mg/kg
Cyanide	0.19 mg/kg	all soil samples below 0.95 mg/kg

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Cyanide	3.8 ug/l	no impact
Arsenic	2.7 ug/l	all soil samples below 2.7 mg/kg
Calcium	110 ug/l	no impact
Chromium	1.7 ug/l	no impact
Cobalt	0.92 ug/l	no impact
Copper	50.3 ug/l	all soil samples below 50.3 mg/kg
Manganese	0.99 ug/l	no impact
Nickel	6.3 ug/l	all soil samples below 6.3 mg/kg
Sodium	9930 ug/l	all soil samples below 9930 mg/kg
Thallium	3.1 ug/l	no impact
Tin	3.3 ug/l	no impact
Zinc	15.0 ug/l	no impact

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
all soil samples below 8.2 mg/kg	Sn.	+	U
all soil samples below 0.95 mg/kg	Cn.		
all soil samples below 2.7 mg/kg	As.		
all soil samples below 50.3 mg/kg	Cu.		
all soil samples below 6.3 mg/kg	Ni.		
all soil samples below 9930 mg/kg	Na.		
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27581B
Date:	January 6, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	November 11-14, 1996
Number of Samples:	15 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Metals, Cyanide, pH

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 in 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 B. Scanlon — 1/9/97

Paul B. Hamburg, President — Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27581B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN		PH	
003TB01001	WATER	X											
003EB01001	WATER	X		X		X		X		X			
003DB01001	WATER	X		X		X		X		X			
006GW00101	WATER	X		X		X		X					
006GW00201	WATER	X		X		X		X					
006GW00301	WATER	X		X		X		X					
006GW00401	WATER	X		X		X		X					
006GW00501	WATER	X		X		X		X					
006GW00601	WATER	X		X		X		X					
006GW00701	WATER	X		X		X		X					
006TW00701	WATER	X											
011TW00101	WATER	X											
011GW00201	WATER							X				X	
011GW00301	WATER							X				X	
011GW00101	WATER							X				X	
Total Billable Samples (Water/Soil)		12	0	9	0	9	0	12	0	2	0	3	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
TAL= SW846 Metals
CN= SW846 Cyanide
PH= SW846 pH

DATA ASSESSMENT NARRATIVES

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 U.S. EPA 8240; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 27581B

A validation was performed on the Volatile Data from SDG 27581B. 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
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were within continuing calibration criteria. All average RRFs were not within the calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, K16601.D, contained compounds with average 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).

006GW00701	2-chloroethyl vinyl ether (0.021, 70.0%D)
006GW00401	
006GW00501	
006GW00601	

The continuing calibration, K16663.D, contained compounds with average 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).

006GW00101	2-chloroethyl vinyl ether (0.021, 70.0%D)
006GW00201	
006GW00301	

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
006TW00701	methylene chloride	3 ug/L	30 ug/L
	acetone	6 ug/L	60 ug/L

Samples	Compound	Qualification
006GW00201	acetone	CRQL
006GW00301		
006GW00401		
006GW00501		
006GW00601		
006GW00701		
006GW00401	methylene chloride	CRQL
006GW00501		
006GW00601		
006GW00701		

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
003EB01001	acetone	10 ug/L	100 ug/L

Samples	Compound	Qualification
006GW00101	acetone	U

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

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
006GW00701	2-chloroethyl vinyl ether	+/-	J/UR
006GW00401			
006GW00501			
006GW00601			
006GW00101	2-chloroethyl vinyl ether	+/-	J/UR
006GW00201			
006GW00301			
006GW00201	acetone	+	CRQL
006GW00301			
006GW00401			
006GW00501			
006GW00601			
006GW00701			
006GW00401	methylene chloride	+	CRQL
006GW00501			
006GW00601			
006GW00701			
006GW00101	acetone	+	U

* 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 U.S. EPA 8270; 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 (Form I's).

SDG # 27581B

A validation was performed on the Semivolatile Data from SDG 27581B. 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 Sample
*	•	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	1 ug/L	10 ug/L

Samples	Compound	Qualification
006GW00101	bis(2-ethylhexyl)phthalate	CRQL
006GW00201		
006GW00301		
006GW00501		
006GW00601		

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

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
006GW00101	bis(2-ethylhexyl)phthalate	+	CRQL
006GW00201			
006GW00301			
006GW00501			
006GW00601			

* 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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27581B

A validation was performed on the Pesticide/Aroclor Data from SDG 27581B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the aroclors which did not have a five (5) point curve , therefore the data did not require qualification. No qualifications were required.

Surrogate Recoveries

Two (2) samples required qualification due to non-compliant surrogate recoveries.

Specific Finding

The positive and non-detect results in the following samples are qualified as estimated, J/UJ, due to non-compliant TCMX and DCB recoveries below the QC limits.

Sample	Surrogate	%R
006GW00501	TCMX1/TCMX2	35%/34%
	DCB2	24%
006GW00601	TCMX1/TCMX2	27%/25%
	DCB1/DCB2	23%/21%

System Performance and Overall Assessment

The reviewer estimates that less than 30% of 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 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
006GW00501 006GW00601	All Compounds	+/-	J/UJ

* 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
METALS, pH AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 27581A

A validation was performed on the Metals, pH and Cyanide Data from SDG 27581A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
	•	Field Duplicates
*	•	Laboratory Control Samples
	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Copper	10.4 ug/l	all water samples below 52.0 ug/l
Thallium	3.63 ug/l	all water samples below 18.2 ug/l
Cyanide	2.03 ug/l	all water samples below 10.2 ug/l

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Antimony	3.5 ug/l	all water samples below 17.5 ug/l
Aluminum	19.4 ug/l	no impact
Chromium	0.87 ug/l	all water samples below 4.35 ug/l
Manganese	0.74 ug/l	no impact
Nickel	1.5 ug/l	all water samples below 7.5 ug/l
Tin	3.8 ug/l	all water samples below 19.0 ug/l

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Field and Duplicate Analysis

Specific Finding

The RPDs for field duplicate samples (006GW00401 and 006HW00401) for Magnesium (102%) and Sodium (94%) were greater than 35%. All positive results are qualified as estimated, "J".

Serial Dilutions

Specific Finding

The Serial dilution for waters for Barium was greater than 10%. All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All water samples below 52.0 ug/l	Cu.	+	U
All water samples below 18.2 ug/l	Tl.		
All water samples below 10.2 ug/l	Cn.		
All water samples below 17.5 ug/l	Sb.		
All water samples below 4.35 ug/l	Cr.		
All water samples below 7.5 ug/l	Ni.		
All water samples below 19.0 ug/l	Sn.		
006GW/HW00401.	Mg and Na.	+	J
All water samples	Ba.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27581A
Date:	January 6, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	November 11-14, 1996
Number of Samples:	4 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Organophosphorus Pesticides, Herbicides, Dioxin/Furans, Hexavalent Chromium, Metals, Cyanide, pH

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 in 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 B. Searson

Paul B. Humburg, President

1/9/97

Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27581A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN		PH	
011FW00101	WATER	X		X		X		X		X		X		X		X		X		X	
011EW00101	WATER	X		X		X		X		X		X		X		X		X		X	
011DW00101	WATER	X		X		X		X		X		X		X		X		X		X	
006HW00401	WATER	X		X		X		X		X		X		X		X		X			
Total Billable Samples (Water/Soil)		4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	3	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
OPP= SW846 Organophosphorus Pesticides
HERB= SW846 Herbicides
D/F= SW846 Dioxin/Furans
HCR= SW846 Hexavalent Chromium
TAL= SW846 Metals
CN= SW846 Cyanide
PH= SW846 pH

DATA ASSESSMENT NARRATIVES

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 U.S. EPA 8240, Appendix IX; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level IV. All comments made within this report should be considered when examining the analytical results.

SDG # 27581A

A validation was performed on the Volatile Data from SDG 27581A. 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
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, K16632.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).

006HW00401	2-chloroethyl vinyl ether (0.024, 65.7%D) acrolein (0.024) propionitrile (0.042) isobutyl alcohol (0.004) 1,4-dioxane (0.002)

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
006TW00701	methylene chloride	3 ug/L	30 ug/L
	acetone	6 ug/L	60 ug/L

Samples	Compound	Qualification
006HW00401	acetone	CRQL
	methylene chloride	CRQL

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

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
006HW00401	2-chloroethyl vinyl ether	+/-	J/UR
	acrolein		
	propionitrile		
	isobutyl alcohol		
	1,4-dioxane		
006HW00401	acetone	+	CRQL
	methylene chloride	+	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 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 U.S. EPA 8270, Appendix IX; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27581A

A validation was performed on the Semivolatile Data from SDG # 27581A. 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 Sample
*	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A6966, -67, -68, -69, 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 all non detects as estimated (UJ).

006HW00401	2,6-dichlorophenol (55.4%)
	hexachloropropane (71.8%)
	1,2,4,5-tetrachlorobenzene (62.1%)
	pentachlorobenzene (64.7%)
	methyl methanesulfonate (55.7%)
	ethyl methanesulfonate (53.4%)
	n-nitrosopyrrolidine (73.6%)
	isosafrole (72.0%)
	1,3-dinitrobenzene (75.9%)
	phorate (72.8%)
	pentachloronitrobenzene (76.1%)
	methyl parathion (52.5%)
	diphenylamine (70.5%)
	p-Phenylenediamine (79.3%)

The continuing calibration,A6966, -67, -68, -69, contained compounds with %Ds greater than 90%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and all non detects as rejected (UR).

006HW00401	famphur (114.7%)
	sulfotepp (98.9%)

The continuing calibration,A6966, -67, -68, -69, contained compounds RRFs less than 0.050. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and all non detects as rejected (UR).

006HW00401	aramite (0.041)
	hexachlorophene (0.031)

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.

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
003EB01001	bis(2-ethylhexyl)phthalate	1 ug/L	10 ug/L

Samples	Compound	Qualification
006HW00401	bis(2-ethylhexyl)phthalate	CRQL

Compound Identification /Quantitation

Specific Finding:

The laboratory did not include the following compounds in the calibration curve or continuing calibration, compounds carbazole, 3-methyl-cholanthrene, and 1,2-dibromo-3-chloropropane. For all samples, qualify all positive results estimated (J) and reject all non detects (UR).

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data reviewer estimates that less than 10% of the data is qualified.

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
006HW00401	2,6-dichlorophenol hexachloropropane 1,2,4,5-tetrachlorobenzene pentachlorobenzene methyl methanesulfonate ethyl methanesulfonate n-nitrosopyrrolidine isosafrole 1,3-dinitrobenzene phorate pentachloronitrobenzene methyl parathion diphenylamine p-Phenylenediamine	+/-	J/UJ
006HW00401	famphur sulfotepp	+/-	J/UR
006HW00401	aramite hexachlorophene	+/-	J/UR
006HW00401	bis(2-ethylhexyl)phthalate	+	CRQL
All samples	carbazole 3-methyl-cholanthrene 1,2-dibromo-3-chloropropane	+/-	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27581A

A validation was performed on the Pesticide/PCB Data from SDG 27581A. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the aroclors, therefore the data did not require qualification. No qualifications were required.

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 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

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

DATA ASSESSMENT NARRATIVE

ORGANOPHOSPHORUS PESTICIDES

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 SW846 Method 8140; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27581A

A validation was performed on the Organophosphorus Pesticide Data from SDG 27581A. 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

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

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

DATA ASSESSMENT NARRATIVE

CHLORINATED HERBICIDES

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 SW846 Method 8150; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27581A

A validation was performed on the Herbicide Data from SDG 27581A. 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

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

NO QUALIFICATIONS WERE REQUIRED.

* DL denotes the Form 1 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
METALS, pH, HEXAVALENT CHROMIUM AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level IV 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 # 27581B

A validation was performed on the Metals, pH, Hexavalent Chromium and Cyanide Data from SDG 27581B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Copper	10.4 ug/l	no impact
Thallium	3.63 ug/l	all water samples below 18.2 ug/l
Cyanide	2.03 ug/l	all water samples below 10.2 ug/l

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Antimony	3.5 ug/l	No impact
Aluminum	19.4 ug/l	no impact
Chromium	0.87 ug/l	all water samples below 4.35 ug/l
Manganese	0.74 ug/l	no impact
Nickel	1.5 ug/l	all water samples below 7.5 ug/l
Tin	3.8 ug/l	all water samples below 19.0 ug/l

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Field and Duplicate Analysis

Specific Finding

The RPDs for field duplicate samples (006GW00401 and 006HW00401) for Magnesium (102%) and Sodium (94%) were greater than 35%. All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All water samples below 18.2 ug/l	Tl.	+	U
All water samples below 10.2 ug/l	Cn.		
All water samples below 4.35 ug/l	Cr.		
All water samples below 7.5 ug/l	Ni.		
All water samples below 19.0 ug/l	Sn.		
006GW/HW00401.	Mg and Na.	+	J
All "B" results	all analytes	B	J

DATA ASSESSMENT AND NARRATIVE

Dioxin/Furans

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, matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard recoveries. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. EPA SW846, Method 8290; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27581

A validation was performed on the Dioxin/Furans Data from SDG 27581. The data was evaluated based on the following parameters.

- * Data Completeness
- * Holding Times
- * Mass Resolution Checks
- * Column Performance
- * Calibrations
- * Internal Standard Performance
- Blanks
- * Matrix Spike/Matrix Spike Duplicate
- * Field Duplicates
- * Congener Identification /Quantitation

* - All criteria were met for this parameter

Blanks

The method blank exhibited contamination that resulted in qualifications.

Sample ID	Congener ID	Blank Conc. pg/L	Sample Conc. pg/L	Quals
006-H-W004-01	OCDD	22.231	37.2	U
	2,3,4,6,7,8-HxCDF	2.629	2.67	U
	OCDF	14.384	1.15	U

System Performance and Overall Assessment

The overall system performance was acceptable. The laboratory did not encounter any large problems.

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 the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	CONGENER ID	DL	QL
006-H-W004-01	OCDD	+B	U
	2,3,4,6,7,8-HxCDF	+B	U
	OCDF	+B	U

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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#:	27595
Date:	December 17, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	November 12, 1996
Number of Samples:	18 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Pesticide/PCB's, Organophosphorus Pesticides

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 in 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 B. Scopes — 1/17/97

Paul B. Humburg, President — Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

DATA ASSESSMENT NARRATIVE

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27595B

A validation was performed on the Pesticide/Aroclor Data from SDG 27595B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. The laboratory did analyze a five (5) point curve for the aroclor AR1248 which was reported in one (1) sample. No qualifications were required.

Continuing Calibrations

Specific Finding

The continuing calibration standard INDAL33Q, 11/21/96, 1415, exhibited a compound with a %D greater than 15% but less than 50% for which qualifications were required. For the following sample and compounds, the reported positive results are qualified as estimated, J.

003SB00201 Endrin (16.4%)

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion). Two (2) samples required dilution to accurately quantitate target compounds. It is the professional opinion of the data validator that single component pesticides reported in the samples with high concentrations of aroclors should be considered suspect.

Specific Findings

For the following samples, the results for the E flagged compounds are rejected and replaced with the results reported from the DL analyses. All other results from the dilution are rejected, UR.

003SB00201
003SB00301

The positive results reported in all samples which exhibited column quantitation differences greater than 40% but less than 70% are qualified as presumptively present at an estimated concentration, NJ.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and less than 10X the CRQL are reported as undetected, U.

Compound Identification/Quantitation, continued

Specific Findings, continued

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and one of the following: results greater than 10X the CRQL, outside the calibration range, or the result of a dilution, are qualified as presumptively present at an estimated concentration, NJ.

System Performance and Overall Assessment

Overall performance was acceptable. The reviewer estimates that less than 10% of 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 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
003SB00201	Endrin	+	J
003SB00201 003SB00301	All E Flagged	+E	D
003SB00201DL 003SB00301DL	All other compounds	+/-	UR
ALL	All P > 40% & ≤ 70%	+P	NJ
ALL	All P > 70% And < 10X CRQL	+P	U
ALL	All P > 70% And > 10X CRQL, above the calibration, or due to dilution.	+P	NJ

* 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

ORGANOPHOSPHORUS PESTICIDES

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 SW846 Method 8140; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27595B

A validation was performed on the Organophosphorus Pesticide Data from SDG 27595B. 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

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

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#:	27651B
Date:	January 16, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	November 15-18, 1996
Number of Samples:	18 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Explosives, Hydrazine, Total Dissolved Solids, Chloride, Sulfate, Metals, Cyanide

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 in 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 Kimberly S. Shopp
for Paul B. Humburg, President

16 January 1997
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27651B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		EXP		HYD		TDS		CHL		SUL		TAL		CN	
008GW00101	WATER	X		X		X												X			
008TW00101	WATER	X																			
008GW00201	WATER	X		X		X												X			
008GW00301	WATER	X		X		X												X			
008GW00401	WATER	X		X		X												X			
008GW00501	WATER	X		X		X												X			
008GW00601	WATER	X		X		X												X			
120GW00101	WATER	X		X		X												X			
120FW00101	WATER	X		X		X												X		X	
120GW00201	WATER	X		X		X												X			
120GW00301	WATER	X		X		X												X			
120TW00301	WATER	X																			
636GW00101	WATER	X		X		X		X		X								X			
637GW00101	WATER	X		X		X												X			
GDGGW00101	WATER	X		X		X						X		X		X		X		X	
GDGGW00201	WATER	X		X		X						X		X		X		X		X	
GDGGW01D01	WATER	X		X		X						X		X		X		X		X	
GDGGW02D01	WATER	X		X		X						X		X		X		X		X	
Total Billable Samples (Water/Soil)		18	0	16	0	16	0	1	0	1	0	4	0	4	0	4	0	16	0	5	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
EXP= SW846 Explosives
HYD= Hydrazine
TDS= Total Dissolved Solids
CHL= Chloride
SUL= Sulfate
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA 8240; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 27651B

A validation was performed on the Volatile Data from SDG 27651B. 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
	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, K16663.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).

008GW00201	2-chloroethyl vinyl ether (0.021, 70.0%D)
008GW00301	
008GW00401	
008GW00501	
008GW00601	
636GW00101	

The continuing calibration, K16690.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).

008GW00101	2-chloroethyl vinyl ether (0.018, 74.3%D)
637GW00101	

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
120TW00301	methylene chloride	8 ug/L	80 ug/L
008TW00101	acetone	7 ug/L	70 ug/L

Trip Blank (continued)

Samples	Compound	Qualification
120GW00101	methylene chloride	U
120GW00201		
120GW00301		
GDGGW00101		
GDGGW00201		
GDGGW01D01		
GDGGW02D01		
008GW00101	acetone	CRQL
008GW00201		
637GW00101		
008GW00301	acetone	U
008GW00401		
008GW00501		
008GW00601		
636GW00101		

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
011EW00101	acetone	8 ug/L	80 ug/L
	carbon disulfide	1 ug/L	5 ug/L
	xylene (total)	11	55 ug/L
003EB01001	methylene chloride	2 ug/L	20 ug/L

Samples	Compound	Qualification
120GW00101	acetone	U
120GW00201		
120GW00301		
GDGGW01D01		

Rinseate Blank (continued)

Samples	Compound	Qualification
008GW00401 008GW00601	carbon disulfide	CRQL
008GW00201 008GW00301 008GW00601	xylene (total)	U
008GW00401	xylene (total)	CRQL
008GW00101 636GW00101 637GW00101	methylene chloride	U

Compound Identification /Quantitation

Sample 637GW00101 exhibited positive results for xylene (total) that exceeded the calibration range. For reason stated in the laboratory case narrative, no dilution was analyzed on this sample. Qualify the positive result for xylene (total), in sample 637GW00101, as estimated (J).

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

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
008GW00201	2-chloroethyl vinyl ether	+/-	J/UR
008GW00301			
008GW00401			
008GW00501			
008GW00601			
636GW00101			
008GW00101	2-chloroethyl vinyl ether	+/-	J/UR
637GW00101			
120GW00101	methylene chloride	+	U
120GW00201			
120GW00301			
GDGGW00101			
GDGGW00201			
GDGGW01D01			
GDGGW02D01			
008GW00101	acetone	+	CRQL
008GW00201			
637GW00101			
008GW00301	acetone	+	U
008GW00401			
008GW00501			
008GW00601			
636GW00101			
120GW00101	acetone	+	U
120GW00201			
120GW00301			
GDGGW01D01			
008GW00401	carbon disulfide	+	CRQL
008GW00601			

* 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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
008GW00201 008GW00301 008GW00601	xylene (total)	+	U
008GW00401	xylene (total)	+	CRQL
008GW00101 636GW00101 637GW00101	methylene chloride	+	U
637GW00101	xylene (total)	+	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 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 U.S. EPA 8270; 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 (Form I's).

SDG # 27651B

A validation was performed on the Semivolatile Data from SDG 27651B. 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 Sample
*	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Holding Times

Sample GDGGW02D01RE exceeded the extraction holding time criteria of seven (7) days by eleven (11) days. Qualify all positive results as estimated (J) and non detects as estimated (UJ).

Initial calibrations

The initial calibrations that were analyzed with this data package exhibited %RSDs that were not within initial calibration criteria. All RRFs were within calibration criteria. Qualifications are required.

Initial calibrations (continued)

Specific Finding:

The initial calibration analyzed on 12-04-96, contained compounds with %RSDs greater than 30%, but less than 90%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J).

008GW00201	naphthalene (32.0%)

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within continuing calibration criteria. All RRFs were within calibration criteria. Qualifications are required.

Specific Finding:

The continuing calibration, A7132.D, contained compounds with %Ds greater than 50%, but less than 90%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects es estimated (UJ).

GDGGW00101	2,4-dinitrophenol (52.4%)
GDGGW01D01	
GDGGW00201	
GDGGW02D01	

The continuing calibration, V16110.D, contained compounds with %Ds greater than 50%, but less than 90%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects es estimated (UJ).

636GW00101	2,4-dinitrophenol (64.8%)

Internal Standards

All internal standard EICP areas did not meet the internal standard EICP area QA/QC criteria. Qualifications are required.

Internal Standards (continued)

Specific Finding:

The Samples listed below, exhibited high internal standard areas. Qualify all associated positive results as estimated (J).

120GW00201	chrysene-d_{12}
120GW00201RE	naphthalene-d_8

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.

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
003EB01001	bis(2-ethylhexyl)phthalate	1 ug/L	10 ug/L

Samples	Compound	Qualification
008GW00301	bis(2-ethylhexyl)phthalate	CRQL
008GW00601		
120GW00201		
120GW00201RE		
120GW00301		
636GW00101		
637GW00101		
GDGGW00101		
GDGGW00201		
GDGGW01D01		
GDGGW02D01		

Field Blank

Associated blank	Compound	Concentration	Action Level
120FW01001	bis(2-ethylhexyl)phthalate	2 ug/L	20 ug/L

Samples	Compound	Qualification
008GW00201 008GW00501	bis(2-ethylhexyl)phthalate	U

Surrogates

Surrogate recoveries for all samples did not meet QA/QC criteria. The SOW and the National Functional Guidelines allow one surrogate for each fraction to fall out side the QA/QC criteria as long as the recovery is greater than 10%. Qualifications are required.

Specific Finding:

Sample listed below exhibited low recoveries for the surrogates listed. Qualify all positive results, in the associated fraction, as estimated (J) and non detects as rejected (UR).

GDGGW02D01	phenol-d_5 (5%) 2-fluorophenol (1%) 2,4,6-tribromophenol (3%)
GDGGW02D01RE	phenol-d_5 (0%) 2-fluorophenol (1%) 2,4,6-tribromophenol (2%)

Compound Identification /Quantitation

Reject sample 120GW00201RE, in favor of the initial analysis, due to non compliant internal standard area recoveries.

Reject sample GDGGW02D01RE, in favor of the initial analysis, due to exceeded extraction holding time and non compliant surrogate recoveries.

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

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
GDGGW02D01RE	all results	+/-	J/UJ
008GW00201	naphthalene	+	J
GDGGW00101 GDGGW01D01 GDGGW00201 GDGGW02D01	2,4-dinitrophenol	+/-	J/UJ
636GW00101	2,4-dinitrophenol	+/-	J/UJ
120GW00201	All associated compounds chrysene-d_{12}	+	J
120GW00201RE	naphthalene-d_8		
008GW00301 008GW00601 120GW00201 120GW00201RE 120GW00301 636GW00101 637GW00101 GDGGW00101 GDGGW00201 GDGGW01D01 GDGGW02D01	bis(2-ethylhexyl)phthalate	+	CRQL
008GW00201 008GW00501	bis(2-ethylhexyl)phthalate	+	U

* DL denotes the Form 1 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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
GDGGW02D01 GDGGW02D01RE	all acid compounds	+/-	J/UR
120GW00201RE	all results	+/-	UR
GDGGW02D01RE	all results	+/-	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27651B

A validation was performed on the Pesticide/Aroclor Data from SDG 27651B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory analyzed a single point curve for the aroclors and toxaphene. No positive results were reported for the aroclors or toxaphene, therefore the data did not require qualification.

Surrogate Recoveries

Two (2) field samples exhibited non-compliant TCX recoveries.

Specific Finding

The samples listed below exhibited low TCX recoveries. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ.

Sample ID	Surrogate	% Recovery
637GW00101	TCX-1	38%
GDGGW00201	TCX-1	42%

System Performance and Overall Assessment

The data reviewer estimates less than 10% of 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 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
637GW00101 GDGGW00201	ALL	+/-	J/UJ

* 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

EXPLOSIVES

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, calibration data, blank analysis results, and LCS recoveries. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8330; the National Functional Guidelines for Organic Data Review, where applicable; and EPA DQO Level III requirements. Please refer the specific findings found in each category to the Summary of Data Qualifications table.

SDG# 27651B

A validation was performed on the Explosives data from SDG 27651B. The data was evaluated based on the following parameters.

* • Data Completeness
* • Holding Times
* • HPLC Performance
* • Calibrations
* • Blanks
* • LCS Recoveries
* • Field Duplicates
* • Identification/Quantitation

* - All criteria were met for this parameter.

Overall Performance

The form II for surrogate recoveries was not present. According to the laboratory, surrogates are not ran on the explosive analysis. 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

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

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

DATA ASSESSMENT NARRATIVE
METALS, WET CHEMISTRY AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 27651A

A validation was performed on the Metals, wet chemistry and Cyanide Data from SDG 27651A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Beryllium	0.33 ug/l	all water samples below 1.65 ug/l
Calcium	40.5 ug/l	no impact
Chromium	0.84 ug/l	all water samples below 4.2 ug/l
Zinc	10.8 ug/l	all water samples below 54.0 ug/l
Cyanide	2.5 ug/l	all water samples below 12.5 ug/l

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Mercury	0.13 ug/l	all water samples below 0.65 ug/l

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Lead	-2.6 ug/l	all water samples below 26.0 ug/l
Nickel	-0.97 ug/l	all water samples below 9.7 ug/l

The USEPA requires that the reviewer review and qualify data bias on negative bias. This reviewer qualifies all non-detect and positive results below ten times the absolute value as estimated, "J" or "UJ".

Matrix Spike recovery

Specific Finding

The Matrix Spike recoveries for waters for Aluminum (133%) was above the upper control limits (> 125%). All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All water samples below 1.65 ug/l	Be.	+	U
All water samples below 4.2 ug/l	Cr.		
All water samples below 54.0 ug/l	Zn.		
All water samples below 12.5 ug/l	Cn.		
All water samples below 0.65 ug/l	Hg.		
All water samples below 26.0 ug/l	Pb.	+/U	J/UJ
All water samples below 9.7 ug/l	Ni.		
All water samples	Al.	+	J
All "B" results	all analytes	B	J

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 U.S. EPA 8240, Appendix IX; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level IV. All comments made within this report should be considered when examining the analytical results.

SDG # 27651A

A validation was performed on the Volatile Data from SDG 27651A. 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
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, K16690.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).

120HW00301	2-chloroethyl vinyl ether (0.018, 74.3%D) acrolein (0.023) propionitrile (0.045) isobutyl alcohol (0.004) 1,4-dioxane (0.002)

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
120TW00301	methylene chloride	8 ug/L	80 ug/L

Samples	Compound	Qualification
120HW00301	methylene chloride	U

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
111EW00101	acetone	8 ug/L	80 ug/L
	xylene (total)	11	55

Rinseate Blank (continued)

Samples	Compound	Qualification
120HW00301	acetone	U
120HW00301	xylene (total)	CRQL

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

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
120HW00301	2-chloroethyl vinyl ether acrolein propionitrile isobutyl alcohol 1,4-dioxane	+/-	J/UR
120HW00301	methylene chloride	U	
120HW00301	acetone	U	
120HW00301	xylene (total)	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 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 U.S. EPA 8270, Appendix IX; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27651A

A validation was performed on the Semivolatile Data from SDG # 27651A. 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 Sample
*	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A7197, -98, -99, 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 all non detects as estimated (UJ).

120HW00301	ethyl methanesulfonate (56.4%)
	acetophenone (60.0%)
	o-toluidine (61.9%)
	thionazin (52.7%)
	phorate (87.0%)
	diallate (63.1%)
	dimethoate (61.7%)
	disulfoton (60.8%)
	methyl parathion (57.3%)
	isodrin (60.5%)
	famphur (63.4%)
	diphenylamine (70.1%)
	p-phenylenediamine (64.7%)

The continuing calibration, A7197, -98, -99, contained compounds RRFs less than 0.050. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and all non detects as rejected (UR).

120HW00301	aramite (0.044)
	hexachlorophene (0.031)

Compound Identification /Quantitation

Specific Finding:

The laboratory did not include the following compounds in the calibration curve or continuing calibration, compounds carbazole, 3-methyl-cholanthrene, and 1,2-dibromo-3-chloropropane. For all samples, qualify all positive results estimated (J) and reject all non detects (UR).

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

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
120HW00301	ethyl methanesulfonate	+/-	J/UJ
	acetophenone		
	o-toluidine		
	thionazin		
	phorate		
	diallate		
	dimethoate		
	disulfoton		
	methyl parathion		
	isodrin		
	famphur		
	diphenylamine		
	p-phenylenediamine		
120HW00301	aramite	+/-	J/UR
	hexachlorophene		
All samples	carbazole	+/-	J/UR
	3-methyl-cholanthrene		
	1,2-dibromo-3-chloropropane		

* 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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27651A

A validation was performed on the Pesticide/Aroclor Data from SDG 27651A. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory analyzed a single point curve for the aroclors and toxaphene. No positive results were reported for the aroclors or toxaphene, therefore the data did not require qualification.

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 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

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

DATA ASSESSMENT NARRATIVE

ORGANOPHOSPHORUS PESTICIDES

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 SW846 Method 8140; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27651A

A validation was performed on the Organophosphorus Pesticide Data from SDG 27651A. 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

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

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

DATA ASSESSMENT NARRATIVE

CHLORINATED HERBICIDES

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 SW846 Method 8150; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27651A

A validation was performed on the Herbicide Data from SDG 27651A. 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

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

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

DATA ASSESSMENT NARRATIVE
METALS, HEXAVALENT CHROMIUM AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level IV 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 # 27651B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 27651B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Beryllium	0.33 ug/l	all water samples below 1.65 ug/l
Calcium	40.5 ug/l	no impact
Chromium	0.84 ug/l	no impact
Zinc	10.8 ug/l	no impact
Cyanide	2.5 ug/l	all water samples below 12.5 ug/l

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Mercury	0.13 ug/l	all water samples below 0.65 ug/l

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Lead	-2.6 ug/l	all water samples below 26.0 ug/l
Nickel	-0.97 ug/l	all water samples below 9.7 ug/l

The USEPA requires that the reviewer review and qualify data bias on negative bias. This reviewer qualifies all non-detect and positive results below ten times the absolute value as estimated, "J" or "UJ".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All water samples below 1.65 ug/l	Be.	+	U
All water samples below 12.5 ug/l	Cn.		
All water samples below 0.65 ug/l	Hg.		
All water samples below 26.0 ug/l	Pb.	+/U	J/UJ
All water samples below 9.7 ug/l	Ni.		
All "B" results	all analytes	B	J

DATA ASSESSMENT AND NARRATIVE

Dioxin/Furans

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, matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard recoveries. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. EPA SW846, Method 8290; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27651

A validation was performed on the Dioxin/Furans Data from SDG 27651. The data was evaluated based on the following parameters.

- * Data Completeness
- * Holding Times
- * Mass Resolution Checks
- * Column Performance
- * Calibrations
- * Internal Standard Performance
- Blanks
- * Matrix Spike/Matrix Spike Duplicate
- * Field Duplicates
- * Congener Identification /Quantitation

* - All criteria were met for this parameter

Blanks

The method blank exhibited contamination that resulted in qualifications.

Sample ID	Congener ID	Blank Conc. pg/L	Sample Conc. pg/L	Quals
120-H-W003-01	OCDD	7.35	4.25	U
	2,3,4,6,7,8-HxCDF	6.45	2.69	U
	1,2,3,4,6,7,8-HpCDF	15.6	2.57	U
	OCDF	5.66	4.66	U

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 the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	CONGENER ID	DL	QL
120-H-W003-01	OCDD	+B	U
	2,3,4,6,7,8-HxCDF	+B	U
	1,2,3,4,6,7,8,-HpCDF	+B	U
	OCDF	+B	U

* 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#:	27715B
Date:	January 16, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	November 20-22, 1996
Number of Samples:	6 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Herbicides, Organophosphorus Pesticides, Metals, Cyanide

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 in 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 Kimberly S. Shopp
Paul B. Humburg, President

16 January 1997
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

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 U.S. EPA 8240; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 27715B

A validation was performed on the Volatile Data from SDG 27715B. 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
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, R25084.D, contained compounds with average 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).

638GW00101 2-chloroethyl vinyl ether (0.049, 46.2%D)

The continuing calibration, R25084.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).

638GW00101 acetone (66.0%)

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
VBLK2	methylene chloride	2 ug/L	20 ug/L

Samples	Compound	Qualification
638GW00101	methylene chloride	U

Trip Blank

Associated blank	Compound	Concentration	Action Level
638TW00101	acetone	3 ug/L	30 ug/L

Samples	Compound	Qualification
638GW00101	acetone	CRQL

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

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
638GW00101	2-chloroethyl vinyl ether	+/-	J/UR
638GW00101	acetone	+/-	J/UJ
638GW00101	methylene chloride	+	U
638GW00101	acetone	+	CRQL

* DL denotes the Form I qualifier supplied by the laboratory
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- 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 U.S. EPA 8270; 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 (Form I's).

SDG # 27715B

A validation was performed on the Semivolatile Data from SDG 27715B. 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 Sample
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data required no 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

No qualifications 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

DATA ASSESSMENT NARRATIVE

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27715B

A validation was performed on the Pesticide/Aroclor Data from SDG 27715B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory analyzed a single point curve for the aroclors and toxaphene. No positive results were reported for the aroclors or toxaphene, therefore the data did not require qualification.

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 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

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

DATA ASSESSMENT NARRATIVE

ORGANOPHOSPHORUS PESTICIDES

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 SW846 Method 8140; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27715

A validation was performed on the Organophosphorus Pesticide Data from SDG 27715. 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

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

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

DATA ASSESSMENT NARRATIVE

CHLORINATED HERBICIDES

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 SW846 Method 8150; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27715B

A validation was performed on the Herbicide Data from SDG 27715B. 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

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

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

DATA ASSESSMENT NARRATIVE
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 27715A

A validation was performed on the Metals and Cyanide Data from SDG 27715A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Antimony	2.23 ug/l	all water samples below 11.15 ug/l
Calcium	19.8 ug/l	no impact
Copper	0.78 ug/l	all water samples below 3.9 ug/l
Vanadium	3.01 ug/l	all water samples below 15.1 ug/l
Tin	3.28 ug/l	all water samples below 16.4 ug/l

Zinc	18.5 ug/l	all water samples below 92.5 ug/l

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Lead	-2.22 ug/l	all water samples below 22.2 ug/l
Selenium	-4.65 ug/l	all water samples below 46.5 ug/l

This reviewer qualifies all positive and non-detect results below ten times the absolute value of the negative bias, "J" or "UJ".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All water samples below 11.2 ug/l	Sb.	+	U
All water samples below 3.9 ug/l	Cu.		
All water samples below 15.1 ug/l	V.		
All water samples below 16.4 ug/l	Sn.		
All water samples below 92.5 ug/l	Zn.		
All water samples below 22.2 ug/l	Pb.	+/U	J/UJ
All water samples below 46.5 ug/l	Se.		
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27715A
Date:	January 16, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	November 21, 1996
Number of Samples:	1 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Herbicides, Organophosphorus Pesticides, Dioxin/Furans, Metals, Cyanide, Hexavalent Chromium

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 in 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. Sharpe

Paul B. Humburg, President

1/16/97

Date

4127 Plaza 94 South St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27715A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
003HW00201	WATER	X		X		X		X		X		X		X		X		X	
Total Billable Samples (Water/Soil)		1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
OPP= SW846 Organophosphorus Pesticides
HERB= SW846 Herbicides
D/F= SW846 Dioxin/Furans
HCR= SW846 Hexavalent Chromium
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA 8240, Appendix IX; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level IV. All comments made within this report should be considered when examining the analytical results.

SDG # 27715A

A validation was performed on the Volatile Data from SDG 27715A. 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
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, R25063.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).

003HW00201	acrolein (0.040) acetonitrile (0.023) isobutyl alcohol (0.004, 33.3%D) 1,4-dioxane (0.002)

The continuing calibration, R25063.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).

003HW00201	acetone (53.6%) vinyl acetate (63.6%) dichlorodifluoromethane (50.9%)

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
003TW00201	1,2-dichloroethene (total)	2 ug/L	20 ug/L

Samples	Compound	Qualification
003HW00201	1,2-dichloroethene (total)	U

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

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
003HW00201	acrolein acetonitrile isobutyl alcohol 1,4-dioxane	+/-	J/UR
003HW00201	acetone vinyl acetate dichlorodifluoromethane	+/-	J/UJ
003HW00201	1,2-dichloroethene (total)	+	U

* 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 U.S. EPA 8270, Appendix IX; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27715A

A validation was performed on the Semivolatile Data from SDG # 27715A. 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 Sample
*	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A7241, -42, -43, 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 all non detects as estimated (UJ).

003HW00201	methyl methanesulfonate (66.6%)
	ethyl methanesulfonate (62.5%)
	2-picoline (59.1%)
	o-toluidine (52.5%)
	phorate (61.6%)
	diphenylamine (63.6%)

The continuing calibration,A7241, -42, -43, contained compounds RRFs less than 0.050. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and all non detects as rejected (UR).

003HW00201	aramite (0.044)
	hexachlorophene (0.028, 31.9%D)

Compound Identification /Quantitation

Specific Finding:

The laboratory did not include the following compounds in the calibration curve or continuing calibration, compounds carbazole, 3-methyl-cholanthrene, and 1,2-dibromo-3-chloropropane. For all samples, qualify all positive results estimated (J) and reject all non detects (UR).

System Performance and Overall Assessment

The data reviewer estimates that less than 5% of the data is qualified.

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
003HW00201	methyl methanesulfonate ethyl methanesulfonate 2-picoline o-toluidine phorate diphenylamine	+/-	J/UJ
003HW00201	aramite hexachlorophene	+/-	J/UR
All samples	carbazole 3-methyl-cholanthrene 1,2-dibromo-3-chloropropane	+/-	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27715A

A validation was performed on the Pesticide/Aroclor Data from SDG 27715A. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory analyzed a single point curve for the aroclors and toxaphene. No positive results were reported for the aroclors or toxaphene, therefore the data did not require qualification.

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 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

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

DATA ASSESSMENT NARRATIVE

ORGANOPHOSPHORUS PESTICIDES

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 SW846 Method 8140; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27715A

A validation was performed on the Organophosphorus Pesticide Data from SDG 27715A. 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

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

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

DATA ASSESSMENT NARRATIVE

CHLORINATED HERBICIDES

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 SW846 Method 8150; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27715A

A validation was performed on the Herbicide Data from SDG 27715A. 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

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

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

DATA ASSESSMENT NARRATIVE
METALS, HEXAVALENT CHROMIUM AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level IV 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 # 27715B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 27715B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Antimony	2.23 ug/l	all water samples below 11.15 ug/l
Calcium	19.8 ug/l	no impact
Sodium	258.0 ug/l	no impact
Tin	3.28 ug/l	all water samples below 16.4 ug/l
Zinc	18.5 ug/l	all water samples below 92.5 ug/l

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Copper	-0.85 ug/l	all water samples below 8.5 ug/l
Potassium	-72.0 ug/l	all water samples below 720 ug/l
Vanadium	-0.53 ug/l	no impact

This reviewer qualifies all positive and non-detect results below ten times the absolute value of the negative bias, "J" or "UJ".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All water samples below 11.2 ug/l	Sb.	+	U
All water samples below 16.4 ug/l	Sn.		
All water samples below 92.5 ug/l	Zn.		
All water samples below 8.5 ug/l	Cu.	+/U	J/UJ
All water samples below 720 ug/l	K.		
All "B" results	all analytes	B	J

DATA ASSESSMENT AND NARRATIVE

Dioxin/Furans

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, matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard recoveries. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. EPA SW846, Method 8290; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27715

A validation was performed on the Dioxin/Furans Data from SDG 27715. The data was evaluated based on the following parameters.

- * Data Completeness
- * Holding Times
- * Mass Resolution Checks
- * Column Performance
- * Calibrations
- * Internal Standard Performance
- Blanks
- * Matrix Spike/Matrix Spike Duplicate
- * Field Duplicates
- * Congener Identification /Quantitation

* - All criteria were met for this parameter

Blanks

The method blank exhibited contamination that resulted in qualifications.

Sample ID	Congener ID	Blank Conc. pg/L	Sample Conc. pg/L	Quals
003-H-W002-01	OCDD	11	22.2	U

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 the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	CONGENER ID	DL	QL
003-H-W002-01	OCDD	+B	U

* 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#:	27869A
Date:	January 30, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	December 4-5, 1996
Number of Samples:	2 Aqueous Sample(s) with 0 MS/MSD(s) 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, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Organophosphorus pesticides, Herbicides, Dioxin/Furans, Hexavalent Chromium, Metals, Cyanide

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 in 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 H. Searson
Paul B. Humburg, President

1/31/97
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 27869A

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
FDSE011401	WATER	X		X		X		X		X		X		X		X		X	
FDSD011401	WATER	X		X		X		X		X		X		X		X		X	
FDSCC06701	SOIL		X		X		X		X		X		X		X		X		X
FDSCC09701	SOIL		X		X		X		X		X		X		X		X		X
Total Billable Samples (Water/Soil)		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
OPP= SW846 Organophosphorus Pesticides
HERB= SW846 Herbicides
D/F= SW846 Dioxin/Furans
HCR= SW846 Hexavalent Chromium
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA SW846, Method 8240, Appendix IX with CLP deliverables; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level IV. 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 Qualifications table.

SDG # 27869A

A validation was performed on the Volatile Data from SDG 27869A. The data was evaluated based on the following parameters.

- * Data Completeness
- * Holding Times
- * GC/MS Tuning
- Calibrations
- Internal Standard Performance
- Blanks
- * Surrogate Recoveries
- * Matrix Spike/Matrix Spike Duplicate
- Field Duplicates
- Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within %D continuing calibration criteria. All RRFs were within calibration criteria.

Continuing Calibrations (continued)

Specific Finding:

The continuing calibration, I22576, contained compounds with %Ds greater than 25% D but less than 50% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J).

FDSCC09701 FDSCC06701RE	2-butanone (37.5)

The continuing calibration, I22576, contained compounds with %Ds greater than 50% D but less than 90% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and all non detects as estimated (UJ).

FDSCC09701 FDSCC06701RE	trichlorofluoromethane (67.6)

The continuing calibration, I22576, contained compounds with RRFs less than 0.05. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and reject all non detects (R).

FDSCC09701 FDSCC06701RE	acrolein (0.034) acetonitrile (0.027) isobutyl alcohol (0.009)(50.0) 1,4-dioxane (0.002)(33.3)

Internal Standards

Specific Finding:

The Samples listed below, exhibited low internal standard areas. Qualify all associated positive results as estimated (J) and all non detects as estimated (UJ).

FDSCC06701RE	1,4-difluorobenzene chlorobenzene-d_5

QC Blanks

Associated blank	Compound	Conc.	Action level
FDSE011401	acetone	35 ug/L	350 ug/Kg
	chloroform	2J ug/L	10 ug/Kg

Samples	Compound	Qualification
FDSCC09701	acetone	U
FDSCC06701RE		

Field Duplicates

Specific Finding:

The field duplicate samples FDSSC06701/FDSCC06701, exhibited a non complaint RPD for toluene (200%). Qualify positive results for toluene as estimated (J) and all non detects as estimated (UJ), for sample FDSCC06701RE.

The field duplicate samples FDSSC09701/FDSCC09701, exhibited a non complaint RPD for xylene(total) (188%). Qualify positive results for xylene (total) as estimated (J) for sample FDSCC09701.

Compound Identification/Quantitation

Specific Finding:

Reject all results for sample FDSCC06701, in favor of the re-analyzed sample analysis due to non compliant internal standard areas and non compliant surrogate recoveries.

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data as presented required 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

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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
FDSCC09701 FDSCC06701RE	2-butanone (37.5)	+	J
FDSCC09701 FDSCC06701RE	trichlorofluoromethane (67.6)	+/-	J/UJ
FDSCC09701 FDSCC06701RE	acrolein (0.034) acetonitrile (0.027) isobutyl alcohol (0.009)(50.0) 1,4-dioxane (0.002)(33.3)	+/-	J/UR
FDSCC06701RE	All associated compounds 1,4-difluorobenzene chlorobenzene-d_5	+/-	J/UJ
FDSCC09701 FDSCC06701RE	acetone	+	U
FDSCC06701RE.	toluene	+/-	J/UJ
FDSCC09701	xylene (total)	+	J
FDSCC06701	All results	+/-	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 U.S. EPA SW846, Method 8270 with CLP deliverables; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27869A

A validation was performed on the Semivolatile Data from SDG 27869A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within %D continuing calibration criteria. All RRFs were not within calibration criteria.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A7403,-04,-05, contained compounds with %Ds greater than 50% D but less than 90% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and all non detects as estimated (UJ).

FDSCC06701	o-toluidine (51.0)
	pentachloronitrobenzene (65.1)
	3,3'-dichlorobenzidine (60.3)
	m-cresol (60.7)
	diphenylamine (63.8)
	phenylenediamine (59.8)

The continuing calibration, A7403,-04,-05, contained compounds with %Ds greater than 90% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and reject all non detects (UR).

FDSCC06701	famphur (122.4)
	sulfotepp (132.4)
	a,a-dimethylphenethylamine (95.3)

The continuing calibration, A7403,-04,-05, contained compounds with RRFs less than 0.05. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and reject all non detects (UR).

FDSCC06701	hexachlorophene (0.028)

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A7431,-32,-33, -34, contained compounds with %Ds greater than 50% D but less than 90% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and all non detects as estimated (UJ).

FDSCC09701	2,6-dichlorophenol (84.1)
	hexachloropropene (68.1)
	1,2,4,5-tetrachlorobenzene (52.0)
	2-sec-butyl-4,6-dinitrophenol (61.9)
	ethyl methanesulfonate (52.3)
	2-picoline (58.4)
	o-toluidine (51.8)
	4-aminobiphenyl (54.1)
	3,3'-dimethylbenzidine (52.7)
	diphenylamine (69.9)
	7,12-dimethylbenz(a)anthrace (80.9)
	p-phenylenediamine (71.1)

The continuing calibration, A7431,-32,-33, -34, contained compounds with %Ds greater than 90% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and reject all non detects (R).

FDSCC09701	pentachlorobenzene (99.5)
	famphur (131.8)
	sulfotepp (188.4)

The continuing calibration, A7431,-32,-33, -34, contained compounds with RRFs less than 0.05. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and reject all non detects (UR).

FDSCC09701	hexachlorophene (0.019) (53.2)

Field Duplicates

Specific Finding:

The field duplicate samples FDSSC06701/FDSCC06701, exhibited a non complaint RPD's. Qualify positive results for the compounds listed below as estimated (J), for sample FDSSC06701.

FDSCC06701	fluoranthene (111%)
	benzo(a)anthracene (110%)
	chrysene (105%)
	benzo(b)fluoranthene (125%)
	benzo(k)fluoranthene (158%)
	benzo(a)pyrene (121%)
	indeno(1,2,3-cd)perylene (143%)
	dibenz(a,h)anthracene (71%)
	benzo(g,h,i)perylene (63%)

The field duplicate samples FDSSC09701/FDSCC09701, exhibited a non complaint RPD. Qualify positive results for the compounds listed below as estimated (J) for sample FDSSC09701.

FDSCC09701	2-methyl naphthalene (86%)
	phenanthrene (81%)

Compound Identification/Quantitation

Specific Finding:

The laboratory did not include the following compounds in there calibration curve or continuing calibration, compounds carbazole, 3-methyl-cholanthrene and 1,2-dibromo-3-chloropropane. For all samples, qualify all positive results estimated (J) and reject all non detects (UR).

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data as present required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
FDSCC06701	o-toluidine (51.0) pentachloronitrobenzene (65.1) 3,3'-dichlorobenzidine (60.3) m-cresol (60.7) diphenylamine (63.8) phenylenediamine (59.8)	+/-	J/UJ
FDSCC06701	famphur (122.4) sulfotepp (132.4) a,a-dimethylphenethylamine (95.3)	+/-	J/UR
FDSCC06701	hexachlorophene (0.028)	+/-	J/UR
FDSCC09701	2,6-dichlorophenol (84.1) hexachloropropene (68.1) 1,2,4,5-tetrachlorobenzene (52.0) 2-sec-butyl-4,6-dinitrophenol (61.9) ethyl methanesulfonate (52.3) 2-picoline (58.4) o-toluidine (51.8) 4-aminobiphenyl (54.1) 3,3'-dimethylbenzidine (52.7) diphenylamine (69.9) 7,12-dimethylbenz(a)anthrace (80.9) p-phenylenediamine (71.1)	+/-	J/UJ
FDSCC09701	pentachlorobenzene (99.5) famphur (131.8) sulfotepp (188.4)	+/-	J/UR
FDSCC09701	hexachlorophene (0.019) (53.2)	+/-	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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
FDSCC06701	fluoranthene (111%) benzo(a)anthracene (110%) chrysene (105%) benzo(b)fluoranthene (125%) benzo(k)fluoranthene (158%) benzo(a)pyrene (121%) indeno(1,2,3-cd)perylene (143%) dibenz(a,h)anthracene (71%) benzo(g,h,i)perylene (63%)	+	J
FDSCC09701	2-methyl naphthalene (86%) phenanthrene (81%)	+	J
All samples	carbazole 3-methyl-cholanthrene 1,2-dibromo-3-chloropropane	+/-	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27869A

A validation was performed on the Pesticide/Aroclor Data from SDG 27869A. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Continuing Calibrations

One (1) continuing calibration standard associated with the reported samples exhibited %Ds above the QC limits and required qualifications of the data.

Specific Findings

The continuing calibration of INDAL34U (12/16/96 16:40) contained a compound with a %D greater than 50% but less than 90% that required qualifications. For the samples and the non-compliant compound listed below, the positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ.

FDSCC06701	4,4'-DDT (-63.4%)
FDSCC09701	

Surrogate Recoveries

One (1) field sample exhibited a non-compliant DCB recovery.

Specific Finding

The sample listed below exhibited a low DCB recovery. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ.

Sample ID	Surrogate	% Recovery
FDSCC06701	DCB-1	37%

Field Duplicates

The field duplicate pair of samples FDSSC06701 and FDSCC06701 exhibited positive results for 4,4'-DDE and 4,4'-DDD in the field sample and Gamma-BHC in the field duplicate. Qualifications were required.

Field Duplicates, Continued

Specific Finding

The field duplicate pair of samples FDSSC06701 and FDSCC06701 exhibited positive results above the CRQL for 4,4'-DDE and 4,4'-DDD in the field sample and Gamma-BHC in the field duplicate. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ, due to poor duplicate precision.

FDSCC06701	Gamma-BHC (200%)
	4,4'-DDE (200%)
	4,4'-DDD (200%)

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion). In addition several results with high %Ds were not flagged with a P on the Form 1 or sample spreadsheet. The data validator qualified the data based on the %Ds on the sample Form 10s.

Specific Findings

The positive results reported in all samples which exhibited column quantitation differences greater than 40% but less than 70% are qualified as presumptively present at an estimated concentration, NJ.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results less than 10X the CRQL are reported as undetected, U.

System Performance and Overall Assessment

The data reviewer estimates less than 10% of 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
FDSCC06701 FDSCC09701	4,4'-DDT	+/-	J/UJ
FDSCC06701	ALL	+/-	J/UJ
FDSCC06701	Gamma-BHC 4,4'-DDE 4,4'-DDD	+/-	J/UJ
ALL	All P >40% But ≤ 70%	+	NJ
ALL	All P > 70% And < 10X CRQL	+	U

* 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

ORGANOPHOSPHORUS PESTICIDES

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 SW846 Method 8140A; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27869A

A validation was performed on the Organophosphorus Pesticide Data from SDG 27869A. 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

One (1) field sample exhibited a non-compliant surrogate recovery.

Specific Finding

The sample listed below exhibited a low Ethion recovery. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ.

Sample ID	Surrogate	% Recovery
FDSCC06701	Ethion	48%

System Performance and Overall Assessment

The data reviewer estimates less than 10% of the data required 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
FDSCC06701	ALL	+/-	J/UJ

* 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

CHLORINATED HERBICIDES

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 SW846 Method 8150; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 27869A

A validation was performed on the Herbicide Data from SDG 27869A. 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

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

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

DATA ASSESSMENT NARRATIVE
METALS, HEXAVALENT CHROMIUM AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level IV 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 # 27869B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 27869B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions

* - All criteria were met for this parameter.

Preparation Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Nickel	0.11 mg/kg	no impact
Tin	1.51 mg/kg	all soil samples below 7.55 mg/kg
Cyanide	0.18 mg/kg	all soil samples below 0.9 mg/kg

The USEPA requires that all sample values below five times the preparation or calibration blank contamination be qualified as non-detect, "U".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Magnesium	-8.87 mg/kg	no impact
Vanadium	-0.07 mg/kg	no impact

This reviewer qualifies all samples results below ten times the negative bias as estimated, "J" or "UJ".

Field and Laboratory Duplicate Analysis

Specific Finding

The field duplicate RPDs for soils for samples (FDSSC06701 and FDSCC06701) for Manganese (53%), Lead (75%), Calcium (65%), Zinc (66%), Copper (62%) and Iron (85%) and for samples (FDSSC09701 and FDSCC09701) for Lead (53%), Copper (74%), Iron (77%_), Manganese (91%) and Zinc (73%) were greater than 50%. All positive and non-detect results are qualified as estimated, "J" or "UJ".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All soil samples below 7.55 mg/kg	Sn.	+	U
All soil samples below 0.9 mg/kg	Hg.		
FDSSC06701 and FDSCC06701.	Mn, Pb, Ca, Zn, Cu and Fe.	+/U	J/UJ
FDSSC09701 and FDSCC09701.	Pb, Cu, Fe, Mn and Zn.		
All "B" results	all analytes	B	J

DATA ASSESSMENT AND NARRATIVE

Dioxin/Furans

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, matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard recoveries. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. EPA SW846, Method 8290; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27869

A validation was performed on the Dioxin/Furans Data from SDG 27869. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Mass Resolution Checks
*	•	Column Performance
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
*	•	Congener Identification /Quantitation

* - All criteria were met for this parameter

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 the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	CONGENER ID	DL	QL

No qualifications are 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#:	27869B
Date:	January 30, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	December 4-5, 1996
Number of Samples:	1 Aqueous Sample(s) with 0 MS/MSD(s) 13 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Metals, Cyanide

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 in 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 B. Scarfoss
for Paul B. Humburg, President

1/31/97
Date

SDG# 27869B

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
FDST011401	WATER	X									
FDSSC00201	SOIL		X		X		X		X		X
FDSSC01101	SOIL		X		X		X		X		X
FDSSC01201	SOIL		X		X		X		X		X
FDSSC01301	SOIL		X		X		X		X		X
FDSSC01401	SOIL		X		X		X		X		X
FDSSC01601	SOIL		X		X		X		X		X
FDSSC03001	SOIL		X		X		X		X		X
FDSSC05501	SOIL		X		X		X		X		X
FDSSC06601	SOIL		X		X		X		X		X
FDSSC06701	SOIL		X		X		X		X		X
FDSSC09501	SOIL		X		X		X		X		X
FDSSC09701	SOIL		X		X		X		X		X
FDSSC11401	SOIL		X		X		X		X		X
Total Billable Samples (Water/Soil)		1	13	0	13	0	13	0	13	0	13

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA SW846, Method 8240 with CLP deliverables; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level III. 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 Qualifications table.

SDG # 27869B

A validation was performed on the Volatile Data from SDG 27869B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibrations
	•	Internal Standard Performance
	•	Blanks
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within %D continuing calibration criteria. All RRFs were within calibration criteria.

Continuing Calibrations (continued)

Specific Finding:

The continuing calibration, I22597, contained compounds with %Ds greater than 25% D but less than 50% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J).

FDSSC01301	2-butanone (40.9)
FDSSC01401	

The continuing calibration, I22622, contained compounds with %Ds greater than 25% D but less than 50% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J).

FDSSC11401	2-butanone (27.4)
FDSSC09701	
FDSSC0160RE	
FDSSC03001	

The continuing calibration, I22622, contained compounds with %Ds greater than 50% D but less than 90% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and all non detects as estimated (UJ).

FDSCC01101	2-chloroethyl vinyl ether (-84.5)
FDSSC11401	
FDSSC09701	
FDSSC09501	
FDSSC06601	
FDSSC06701	
FDSSC01201	
FDSSC00201	
FDSSC0160RE	
FDSSC03001	

Continuing Calibrations (continued)

Specific Finding:

The continuing calibration, I22644, contained compounds with %Ds greater than 25% D but less than 50% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J).

FDSSC03001DL	acetone (38.2)
FDSSC09501DL	

Internal Standards

Specific Finding:

The Samples listed below, exhibited low internal standard areas. Qualify all associated positive results as estimated (J) and all non detects as estimated (UJ).

FDSSC01301	bromochloromethane
FDSSC01401	1,4-difluorobenzene
FDSSC01601	chlorobenzene-d_5
FDSSC01601RE	chlorobenzene-d_5

Method Blanks

Associated blank	Compound	Conc.	Action level
VBLK2	methylene chloride	5J ug/Kg	50 ug/Kg
	acetone	5J ug/Kg	50 ug/Kg

Samples	Compound	Qualification
FDSSC01101	methylene chloride	U
FDSSC11401		
FDSSC09701		
FDSSC09501		
FDSSC06601		
FDSSC00201		

Method Blanks (continued)

Samples	Compound	Qualification
FDSSC01201	methylene chloride	CRQL
FDSSC06701		
FDSSC03001		
FDSSC01601RE		
FDSSC01101	acetone	U
FDSSC00201		
FDSSC06601	acetone	CRQL
FDSSC01201		

QC Blanks

Associated blank	Compound	Conc.	Action level
FDSE011401	acetone	35 ug/L	350 ug/Kg
	chloroform	2J ug/L	10 ug/Kg

Samples	Compound	Qualification
FDSSC01601	acetone	U
FDSSC05501		
FDSSC09701		
FDSSC09501		

Surrogates

Specific Finding:

The samples listed below, exhibited surrogate recoveries that exceeded the QA/QC limits. Qualify all positive results as estimated (J).

FDSSC01301	toluene-d_8 (118%)
FDSSC01401	toluene-d_8 (123%)

Field Duplicates

Specific Finding:

The field duplicate samples FDSSC06701/FDSCC06701, exhibited a non complaint RPD for toluene (200%). Qualify positive results for toluene as estimated (J) and all non detects as estimated (UJ), for sample FDSSC06701.

The field duplicate samples FDSSC09701/FDSCC09701, exhibited a non complaint RPD for xylene(total) (188%). Qualify positive results for xylene (total) as estimated (J) for sample FDSSC09701.

Compound Identification/Quantitation

Specific Finding:

Reject all results for sample FDSSC01601, in favor of the re-analyzed sample analysis due to non compliant internal standard areas.

For samples FDSSC01301, FDSSC01401, FDSSC09501, FDSSC03001 and FDSSC11401, replace the "E" flagged results with the corresponding "D"flagged results found in the diluted samples, FDSSC01301DL, FDSSC01401DL, FDSSC09501DL, FDSSC03001DL and FDSSC11401DL, and reject all other results for the diluted sample.

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data as presented required 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

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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form 1s in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
FDSSC01301 FDSSC01401	2-butanone (40.9)	+	J
FDSSC11401 FDSSC09701 FDSSC0160RE FDSSC03001	2-butanone (27.4)	+	J
FDSCC01101 FDSSC11401 FDSSC09701 FDSSC09501 FDSSC06601 FDSSC06701 FDSSC01201 FDSSC00201 FDSSC0160RE FDSSC03001	2-chloroethyl vinyl ether (-84.5)	+/-	J/UJ
FDSSC03001DL FDSSC09501DL	acetone (38.2)	+	J
	All associated compounds	+/-	J/UJ
FDSSC01301	bromochloromethane		
FDSSC01401	1,4-difluorobenzene		
FDSSC01601	chlorobenzene-d_5		
FDSSC01601RE	chlorobenzene-d_5		
FDSSC01101 FDSSC11401 FDSSC09701 FDSSC09501 FDSSC06601 FDSSC00201	methylene chloride	+	U

* 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 U.S. EPA SW846, Method 8270 with CLP deliverables; 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 (Form I's).

SDG # 27869B

A validation was performed on the Semivolatile Data from SDG 27869B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibrations
	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within %D continuing calibration criteria. All RRFs were within calibration criteria.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, V16277, contained compounds with %Ds greater than 25% D but less than 50% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J).

FDSSC00201	naphthalene (-33.1)

The continuing calibration, V16277, contained compounds with %Ds greater than 50% D but less than 90% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and all non detects as estimated (UJ).

FDSSC00201 FDSSC01101	2,4-dinitrophenol (57.1)

Internal Standards

Specific Finding:

The Samples listed below, exhibited low internal standard areas. Qualify all associated positive results as estimated (J) and all non detects as estimated (UJ).

FDSSC01301 FDSSC01601 FDSSC09501DL	chrysene-d_{12} perylene-d_{12}
FDSSC01401	1,4-dichlorobenzene-d_4 naphthalene-d_8 acenaphthene-d_{10} phenanthrene-d_{10} chrysene-d_{12} perylene-d_{12}
FDSSC03001	1,4-dichlorobenzene-d_4 naphthalene-d_8 acenaphthene-d_{10} phenanthrene-d_{10} chrysene-d_{12}

Internal Standards (continued)

FDSSC05501	acenaphthene-d_{10} phenanthrene-d_{10} chrysene-d_{12}
FDSSC06701	acenaphthene-d_{10} phenanthrene-d_{10}
FDSSC06601DL	phenanthrene-d_{10} chrysene-d_{12} perylene-d_{12}
FDSC09501	naphthalene-d_8 acenaphthene-d_{10} phenanthrene-d_{10} chrysene-d_{12} perylene-d_{12}
FDSSC11401 FDSSC09701	acenaphthene-d_{10} phenanthrene-d_{10} chrysene-d_{12} perylene-d_{12}

Field Duplicates

Specific Finding:

The field duplicate samples FDSSC06701/FDSCC06701, exhibited a non complaint RPD's. Qualify positive results for the compounds listed below as estimated (J), for sample FDSSC06701.

FDSSC06701	fluoranthene (111%) benzo(a)anthracene (110%) chrysene (105%) benzo(b)fluoranthene (125%) benzo(k)fluoranthene (158%) benzo(a)pyrene (121%) indeno(1,2,3-cd)perylene (143%) dibenz(a,h)anthracene (71%) benzo(g,h,i)perylene (63%)

Field Duplicates (continued)

The field duplicate samples FDSSC09701/FDSCC09701, exhibited a non complaint RPD. Qualify positive results for the compounds listed below as estimated (J) for sample FDSSC09701.

FDSSC09701	2-methyl naphthalene (86%) phenanthrene (81%)

Compound Identification/Quantitation

Specific Finding:

Reject all results for samples listed below, in favor of the original sample analysis due to non compliant internal standard areas.

FDSSC01301RE
FDSSC01401RE
FDSSC01601RE
FDSSC03001RE
FDSSC05501RE
FDSSC06701RE
FDSSC11401RE
FDSSC09701RE

For samples FDSSC06601 and FDSSC09501, replace the "E" flagged results with the corresponding "D"flagged results found in the diluted samples, FDSSC06601DL and FDSSC09501DL, and reject all other results for the diluted sample.

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data as presented required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
FDSSC00201	naphthalene (-33.1)	+	J
FDSSC00201 FDSSC01101	2,4-dinitrophenol (57.1)	+/-	J/UJ
	All associated compounds	+/-	J/UJ
FDSSC01301 FDSSC01601 FDSSC09501DL	chrysene-d_{12} perylene-d_{12}		
FDSSC01401	1,4-dichlorobenzene-d_4 naphthalene-d_8 acenaphthene-d_{10} phenanthrene-d_{10} chrysene-d_{12} perylene-d_{12}		
FDSSC03001	1,4-dichlorobenzene-d_4 naphthalene-d_8 acenaphthene-d_{10} phenanthrene-d_{10} chrysene-d_{12}		
FDSSC05501	acenaphthene-d_{10} phenanthrene-d_{10} chrysene-d_{12}		
FDSSC06701	acenaphthene-d_{10} phenanthrene-d_{10}		
FDSSC06601DL	phenanthrene-d_{10} chrysene-d_{12} perylene-d_{12}		

* 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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
	All associated compounds	+/-	J/UJ
FDSC09501	naphthalene-d_8 acenaphthene-d_{10} phenanthrene-d_{10} chrysene-d_{12} perylene-d_{12}		
FDSSC11401 FDSSC09701	acenaphthene-d_{10} phenanthrene-d_{10} chrysene-d_{12} perylene-d_{12}		
FDSSC06701	fluoranthene (111%) benzo(a)anthracene (110%) chrysene (105%) benzo(b)fluoranthene (125%) benzo(k)fluoranthene (158%) benzo(a)pyrene (121%) indeno(1,2,3-cd)perylene (143%) dibenz(a,h)anthracene (71%) benzo(g,h,i)perylene (63%)	+	J
FDSSC09701	2-methyl naphthalene (86%) phenanthrene (81%)	+	J
FDSSC01301RE FDSSC01401RE FDSSC01601RE FDSSC03001RE FDSSC05501RE FDSSC06701RE FDSSC11401RE FDSSC09701RE	All results	+/-	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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
FDSSC06601 FDSSC09501	"E" flagged results	+	D
FDSSC06601DL FDSSC09501DL	All results	+	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27869B

A validation was performed on the Pesticide/Aroclor Data from SDG 27869B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Surrogate Recoveries

One (1) field sample exhibited non-compliant TCX recoveries.

Specific Finding

The sample listed below exhibited low TCX recoveries. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ.

Sample ID	Surrogate	% Recovery
FDSSC01201	TCX-1/TCX-2	11%/14%

Field Duplicates

The field duplicate pair of samples FDSSC06701 and FDSCC06701 exhibited positive results for 4,4-DDE and 4,4'-DDD in the field sample and Gamma-BHC in the field duplicate. Qualifications were required.

Specific Finding

The field duplicate pair of samples FDSSC06701 and FDSCC06701 exhibited positive results above the CRQL for 4,4'-DDE and 4,4'-DDD in the field sample and Gamma-BHC in the field duplicate. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ, due to poor duplicate precision.

FDSSC06701	Gamma-BHC (200%)
	4,4'-DDE (200%)
	4,4'-DDD (200%)

Compound Identification/Quantitation

One (1) sample was diluted to accurately quantitate target compounds. Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion). In addition several results with high %Ds were not flagged with a P on the Form 1 or sample spreadsheet. The data validator qualified the data based on the %Ds on the sample Form 10s.

Compound Identification/Quantitation, Continued

Specific Findings

For the following sample, the result for the E flagged compound is rejected, UR, in favor of the result reported from the DL analysis. All other results from the dilution are rejected, UR.

FDSSC06601

The positive results reported in all samples which exhibited column quantitation differences greater than 40% but less than 70% are qualified as presumptively present at an estimated concentration, NJ.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results less than 10X the CRQL are reported as undetected, U.

System Performance and Overall Assessment

The data reviewer estimates less than 10% of 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
FDSSC01201	ALL	+/-	J/UJ
FDSSC06701	Gamma-BHC 4,4'-DDE 4,4'-DDD	+/-	J/UJ
FDSSC06601	All E Flagged	+E	D
FDSSC06601DL	All except corresponding D flagged results	+/-	UR
ALL	All P >40% But ≤ 70%	+	NJ
ALL	All P > 70% And < 10X CRQL	+	U

* 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
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 27869A

A validation was performed on the Metals and Cyanide Data from SDG 27869A. The data was evaluated based on the following parameters.

- * Data Completeness
- * Holding Times
- * Calibrations
- Blanks
- * Interferences
- Matrix Spike Recovery
- Matrix Duplicates
- Field Duplicates
- * Laboratory Control Samples
- Serial Dilutions

* - All criteria were met for this parameter.

Preparation Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Nickel	0.11 mg/kg	no impact
Tin	1.51 mg/kg	all soil samples below 7.55 mg/kg
Cyanide	0.18 mg/kg	all soil samples below 0.9 mg/kg

The USEPA requires that all sample values below five times the preparation or calibration blank contamination be qualified as non-detect, "U".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Magnesium	-8.87 mg/kg	no impact
Vanadium	-0.07 mg/kg	no impact

This reviewer qualifies all samples results below ten times the negative bias as estimated, "J" or "UJ".

Matrix Spike Recovery

Specific Finding

The Matrix Spike recoveries for soils for Antimony (59%) and Lead (63%) were below the lower control limits (>30% but <75%). All positive and non-detect results are qualified as estimated, "J" or "UJ".

The Matrix Spike recoveries for soils for Chromium (126%), Magnesium (135%), Manganese (141%) and Mercury (166%) were above the upper control limits (>125%). All positive results are qualified as estimated, "J".

Field and Laboratory Duplicate Analysis

Specific Finding

The field duplicate RPDs for soils for samples (FDSSC06701 and FDSCC06701) for Manganese (53%), Lead (75%), Calcium (65%), Zinc (66%), Copper (62%) and Iron (85%) and for samples (FDSSC09701 and FDSCC09701) for Lead (53%), Copper (74%), Iron (77%_), Manganese (91%) and Zinc (73%) were greater than 50%. All positive and non-detect results are qualified as estimated, "J" or "UJ".

The difference for the laboratory duplicate analysis for soils for Mercury was greater than two times the CRDL limit. All positive results are qualified as estimated, "J".

Serial Dilution

Specific Finding

The Serial Dilutions for soils for Calcium (11%), Chromium (22%), Manganese (49%), Nickel (34%) and Zinc (22%) were greater than 10%. All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All soil samples below 7.55 mg/kg	Sn.	+	U
All soil samples below 0.9 mg/kg	Hg.		
All soil samples	Sb and Pb.	+/U	J/UJ
All soil samples	Cr, Mg, Mn and Hg.	+	J
All soil samples	Hgt.	+	J
FDSSC06701 and FDSCC06701.	Mn, Pb, Ca, Zn, Cu and Fe.	+/U	J/UJ
FDSSC09701 and FDSCC09701.	Pb, Cu, Fe, Mn and Zn.		
All soil samples	Ca, Cr, Pb, Mn, Ni and Zn.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27934B
Date:	January 30, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	December 10, 1996
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, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Metals, Cyanide

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 in 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. Snyder
Paul B. Humburg, President

2/7/97
Date

4127 Plaza 94 South · St. Charles, MO 63304

SDG# 27934B

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
FDSSC06201	WATER	X									
FDSTC06201	WATER	X		X		X		X		X	
Total Billable Samples (Water/Soil)		2	0	1	0	1	0	1	0	1	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
TAL= SW846 Metals
CN= SW846 Cyanide

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 8240; the National Functional Guidelines for Organic Data Validation, June 1991, 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 # 27934B

A validation was performed on the Volatile Data from SDG 27934B. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Internal Standard Performance
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Continuing Calibrations

Specific Findings

The continuing calibration standard I22668.D contained one (1) compound with a %D greater than 25% but less than 50% for which qualifications were required. For the samples and non-compliant compound listed below, positive results are qualified as estimated, J.

FDSSC06201 acetone (45.7%)

DATA ASSESSMENT NARRATIVE
VOLATILE ANALYSIS

System Performance and Overall Assessment

The data reviewer estimates that less than 5% of the data required qualifications/rejections.

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
FDSSC06201	acetone	+	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 8270; the National Functional Guidelines for Organic Data Validation, June 1991, 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 # 27934B

A validation was performed on the Semivolatile Data from SDG 27934B. The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • GC/MS Tuning
* • Calibration
* • Blanks
* • Surrogate Recoveries
* • Matrix Spike/Matrix Spike Duplicates
* • Field Duplicates
* • Internal Standard Performance
* • Compound Identification
* • Compound Quantitation

* - All criteria were met for this parameter.

System Performance and Overall Assessment

The data as reported did not require qualifications/rejections.

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

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

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DATA ASSESSMENT NARRATIVE

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 27934B

A validation was performed on the Pesticide/Aroclor Data from SDG 27934B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Compound Identification/Quantitation

The field sample exhibited a column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion).

Specific Findings

The positive results reported in all samples which exhibited column quantitation differences greater than 40% but less than 70% are qualified as presumptively present at an estimated concentration, NJ.

System Performance and Overall Assessment

The data reviewer estimates less than 10% of 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
ALL	All P >40% But ≤ 70%	+	NJ

* 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
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 27934

A validation was performed on the Metals and Cyanide Data from SDG 27934. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions

* - All criteria were met for this parameter.

Preparation Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Nickel	0.11 mg/kg	no impact
Tin	1.51 mg/kg	all soil samples below 7.55 mg/kg
Cyanide	0.18 mg/kg	all soil samples below 0.9 mg/kg

The USEPA requires that all sample values below five times the preparation or calibration blank contamination be qualified as non-detect, "U".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Magnesium	-8.87 mg/kg	no impact
Vanadium	-0.07 mg/kg	no impact

This reviewer qualifies all samples results below ten times the negative bias as estimated, "J" or "UJ".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All soil samples below 7.55 mg/kg	Sn.	+	U
All soil samples below 0.9 mg/kg	Hg.		
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	28103A
Date:	February 12, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	January 7, 1997
Number of Samples:	2 Aqueous Sample(s) with 0 MS/MSD(s) 1 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Organophosphorus Pesticides, Herbicides, Dioxin/Furans, Hexavalent Chromium, Metals, Cyanide

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 in 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. Searpos
Paul B. Humburg, President

2/14/97
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 28103A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
633EB00801	WATER	X		X		X		X		X		X		X		X		X	
633DB00801	WATER	X		X		X		X		X		X		X		X		X	
637CB00701	SOIL		X		X		X		X		X		X		X		X		X
Total Billable Samples (Water/Soil)		2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
OPP= SW846 Organophosphorus Pesticides
HERB= SW846 Herbicides
D/F= SW846 Dioxin/Furans
HCR= SW846 Hexavalent Chromium
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA SW846 8240, Appendix IX; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level IV. All comments made within this report should be considered when examining the analytical results.

SDG # 28103A

A validation was performed on the Volatile Data from SDG 28103A. 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
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, C23337.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).

637CB00701	acrolein (0.012, 68.4%D) isobutyl alcohol (0.005) 1,4-dioxane (0.002)

The continuing calibration, C23337.D, contained compounds with %Ds greater than 50% and less than 90%D. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects as estimated (UJ).

637CB00701	methyl iodide (83.2%) acetonitrile (52.6%)

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
637TB00701	acetone	9 ug/Kg	90 ug/Kg

Samples	Compound	Qualification
637CB00701	acetone	U

System Performance and Overall Assessment

The laboratory did not encounter any large problems. 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
637CB00701	acrolein isobutyl alcohol 1,4-dioxane	+/-	J/UR
637CB00701	methyl iodide acetonitrile	+/-	J/UJ
637CB00701	acetone	+	U

* 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 U.S. EPA SW846, Method 8270 with CLP deliverables; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 28103A

A validation was performed on the Semivolatile Data from SDG 28103A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within %D continuing calibration criteria. All RRFs were not within calibration criteria.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A7677,-78,-79,-80, contained compounds with %Ds greater than 50% D but less than 90% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and all non detects as estimated (UJ).

637CB007001	1,2,4,5-tetrachlorobenzene (80.0)
	pentachlorobenzene (65.0)
	safrole (58.8)
	isosafrole (54.8)
	1-naphthylamine (55.7)
	5-nitro-o-toluene (53.4)
	pronamide (56.7)
	pentachloronitrobenzene (68.6)
	diphenylamine (72.0)
	kepone (66.1)

The continuing calibration, A7677,-78,-79,-80, contained compounds with RRFs less than 0.05. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and reject all non detects (UR).

637CB00701	aramite (0.047)
	hexachlorophene (0.028) (47.3)

Field Duplicates

Specific Finding:

The field duplicate samples 637SB00701/637CB00701, exhibited a non complaint RPD's. Qualify positive results for the compounds listed below as estimated (J).

637CB00701	phenanthrene (133%)
	fluoranthene (140%)
	pyrene (135%)
	benzo(a)anthracene (138%)
	chrysene (142%)
	benzo(k)fluoranthene (138%)
	benzo(a)pyrene (128%)

Compound Identification/Quantitation

Specific Finding:

The laboratory did not include the following compounds in there calibration curve or continuing calibration, compounds carbazole, 3-methyl-cholanthrene and 1,2-dibromo-3-chloropropane. For all samples, qualify all positive results estimated (J) and reject all non detects (UR).

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data as present required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
637CB007001	1,2,4,5-tetrachlorobenzene (80.0) pentachlorobenzene (65.0) safrole (58.8) isosafrole (54.8) 1-naphthylamine (55.7) 5-nitro-o-toluene (53.4) pronamide (56.7) pentachloronitrobenzene (68.6) diphenylamine (72.0) kepone (66.1)	+/-	J/UJ
637CB00701	aramite (0.047) hexachlorophene (0.028) (47.3)	+/-	J/UR
637CB00701	phenanthrene (133%) fluoranthene (140%) pyrene (135%) benzo(a)anthracene (138%) chrysene (142%) benzo(k)fluoranthene (138%) benzo(a)pyrene (128%)	+	J
All samples	carbazole 3-methyl-cholanthrene 1,2-dibromo-3-chloropropane	+/-	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 28103A

A validation was performed on the Pesticide/PCB Data from SDG 28103A. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the aroclors which did not have a five (5) point curve, therefore the data did not require qualification. No qualifications were required.

Surrogate Recoveries

Specific Finding

The following sample exhibited non-compliant recoveries for the noted surrogates. All positive and non-detect result are qualified as estimated, J/UJ.

Sample	Surrogate	Recovery
637CB00701	DCB2	38%

System Performance and Overall Assessment

The reviewer estimates that less than 5% of 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 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
637CB00701	All Compounds	+/-	J/UJ

* 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

ORGANOPHOSPHOROUS PESTICIDES

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 SW846 Method 8140; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 28103A

A validation was performed on the Organophosphorous Pesticides Data from SDG 28103A. 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

Specific Finding

The following sample exhibited non-compliant recoveries for the noted surrogate. All positive and non-detect result are qualified as estimated, J/UJ.

Sample	Surrogate	Recovery
637CB00701	ETHION	47%

System Performance and Overall Assessment

The reviewer estimates that less than 5% of 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 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
637CB00701	All Compounds	+/-	J/UJ

* 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

CHLORINATED HERBICIDES

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 Method 8150; the National Functional Guidelines for Organic Data Validation, June 1991, and DQO Level IV 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 # 28103A

A validation was performed on the Chlorinated Herbicides from SDG 28103A. The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • 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 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

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

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

DATA ASSESSMENT NARRATIVE
METALS, HEXAVALENT CHROMIUM AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level IV 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 # 28103B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 28103B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
	•	Field Duplicates
*	•	Laboratory Control Samples
	•	Serial Dilutions

* - All criteria were met for this parameter.

Preparation Blanks

Specific Finding

The field blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Calcium	33.6 ug/l	no impact
Copper	1.1 ug/l	no impact
Lead	2.3 ug/l	no impact
Sodium	108 ug/l	no impact
Zinc	6.6 ug/l	no impact

The USEPA requires that all sample values below five times the preparation or calibration blank contamination be qualified as non-detect, "U".

Field and Laboratory Duplicate Analysis

Specific Finding

The field duplicate RPDs for soils for samples (637SB00701 and 637CB00701) for Arsenic (57%), Lead (60%) and Manganese (66%) were greater than 50%. All positive and non-detect results are qualified as estimated, "J" or "UJ".

Serial Dilution

Specific Finding

The serial dilution RPDs for soils for Cobalt, Lead, Magnesium and Nickel were greater than 10%. All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
637SB00701 and 637CB00701.	As, Pb and Mn.	+/U	J/UJ
All field soil QC samples	Co, Pb, Mg and Ni.	+	J
All "B" results	all analytes	B	J

DATA ASSESSMENT AND NARRATIVE

Dioxin/Furans

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, matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard recoveries. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. EPA SW846, Method 8290; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 28103A

A validation was performed on the Dioxin/Furans Data from SDG 28103A. The data was evaluated based on the following parameters.

- * Data Completeness
- * Holding Times
- * Mass Resolution Checks
- * Column Performance
- * Calibrations
- * Internal Standard Performance
- Blanks
- * Matrix Spike/Matrix Spike Duplicate
- * Field Duplicates
- * Congener Identification /Quantitation

* - All criteria were met for this parameter

Blanks

The method blank and associated rinseate blank exhibited contamination that resulted in qualifications.

Sample ID	Congener ID	Blank Conc. ng/Kg	Sample Conc. ng/Kg	Quals
637-C-B007-01	OCDD	0.249	183	NA

Blanks - continued

Equipment Blanks

Sample ID	Congener ID	Blank Conc. pg/L	Sample Conc. ng/Kg	Quals
637-C-B007-01	1234678-HpCDF	1.87	2.66	U

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 the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	CONGENER ID	DL	QL
637-C-B007-01	OCDD	+B	NA
637-C-B007-01	1234678-HpCDF	+	U

* 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#:	28103B
Date:	February 12, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	January 7, 1997
Number of Samples:	1 Aqueous Sample(s) with 0 MS/MSD(s) 13 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Metals

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 in 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 H. Simpson

Paul B. Humburg, President

2/14/97

Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 28103B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL	
633TB00801	WATER	X							
637TB00701	SOIL		X						
633SB00801	SOIL						X		
633SB00802	SOIL						X		
633SB00901	SOIL						X		
633SB00902	SOIL						X		
633SB01001	SOIL						X		
633SB01002	SOIL						X		
636SB01001	SOIL				X		X		X
636SB01101	SOIL				X		X		X
636SB01201	SOIL				X		X		X
637SB00601	SOIL				X		X		X
637SB00602	SOIL				X		X		X
637SB00701	SOIL				X		X		X
Total Billable Samples (Water/Soil)		1	1	0	6	0	12	0	6

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
TAL= SW846 Metals

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 U.S. EPA SW846 8240; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 28103B

A validation was performed on the Volatile Data from SDG 28103B. 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
* • Field Duplicates
* • Compound Identification /Quantitation

* - All criteria were met for this parameter

System Performance and Overall Assessment

The laboratory did not encounter any large problems. Only quality control samples were submitted in this SDG; therefore, no qualifications are required.

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

No qualifications are 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

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 U.S. EPA SW846, Method 8270 with CLP deliverables; 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 (Form I's).

SDG # 28103B

A validation was performed on the Semivolatile Data from SDG 28103B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Field Duplicates

Specific Finding:

The field duplicate samples 637SB00701/637CB00701, exhibited a non complaint RPD's. Qualify positive results for the compounds listed below as estimated (J).

637SB00701	phenanthrene (133%)
	fluoranthene (140%)
	pyrene (135%)
	benzo(a)anthracene (138%)
	chrysene (142%)
	benzo(k)fluoranthene (138%)
	benzo(a)pyrene (128%)

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data as presented required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form 1s in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
637SB00701	phenanthrene (133%)	+	J
	fluoranthene (140%)		
	pyrene (135%)		
	benzo(a)anthracene (138%)		
	chrysene (142%)		
	benzo(k)fluoranthene (138%)		
	benzo(a)pyrene (128%)		

* 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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 28103B

A validation was performed on the Pesticide/Aroclor Data from SDG 28103B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. There were no positive results reported for those aroclors for which a five (5) point curve was not analyzed. No qualifications were required.

Surrogate Recoveries

Two (2) samples exhibited 0% TCMX recoveries on one (1) column. The laboratory noted a retention time shift in the case narrative.

Specific Finding

The following samples exhibited non-compliant surrogate recoveries. All positive results are qualified as estimated, J, and all non-detect results are rejected, UR.

Sample	Surrogate	%R
633SB00901	TCMX1/DCB2	0%/33%
633SB01001	TCMX1	0%

Field Duplicates

The field duplicate pair of samples 637SB00701/637CB00701 exhibited non-compliant precision for endosulfan II. The compound was reported in the field sample but not in the field duplicate.

Specific Finding

For the following sample, the positive result for endosulfan II is qualified as estimated, J, due to non-compliant field duplicate precision.

637SB00701	endosulfan II

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion). One (1) sample required dilution to accurately quantitate target compounds. Two (2) compounds in the undiluted sample are above the calibration range, but were below the adjusted CRQL in the dilution. It is the professional opinion of the data validator that single component pesticides reported in the samples with high concentrations of aroclors should be considered suspect.

Compound Identification/Quantitation, continued

Specific Findings

For the following sample, the results for the E flagged compounds are rejected and replaced with the results reported from the DL analyses (if corresponding D flagged results are reported). All other results from the dilution are rejected, UR.

633SB01001

The compounds in the following sample that are outside the calibration range are qualified as estimated, J.

633SB01001

The positive results reported in all samples which exhibited column quantitation differences greater than 40% but less than 70% are qualified as presumptively present at an estimated concentration, NJ.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and less than 10X the CRQL are reported as undetected, U.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and one of the following: results greater than 10X the CRQL, outside the calibration range, or the result of a dilution, are qualified as presumptively present at an estimated concentration, NJ.

System Performance and Overall Assessment

The reviewer estimates that less than 10% of 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 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
633SB00901 633SB01001	All Compounds	+/-	J/UR
637SB00701	endosulfan II	+	J
633SB01001	All E Flagged	+E	D
633SB01001DL	All other compounds	+/-	UR
633SB01001	All above cal. range	+E	J
ALL	All P > 40% & ≤ 70%	+P	NJ
ALL	All P > 70% And < 10X CRQL	+P	U
ALL	All P > 70% And > 10X CRQL, above the calibration, or due to dilution.	+P	NJ

* 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
METALS

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 28103A

A validation was performed on the Metals Data from SDG 28103A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions

* - All criteria were met for this parameter.

Preparation Blanks

Specific Finding

The field blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Calcium	33.6 ug/l	no impact
Copper	1.1 ug/l	no impact
Lead	2.3 ug/l	no impact
Sodium	108 ug/l	no impact
Zinc	6.6 ug/l	no impact

The USEPA requires that all sample values below five times the preparation or calibration blank contamination be qualified as non-detect, "U".

Field and Laboratory Duplicate Analysis

Specific Finding

The field duplicate RPDs for soils for samples (637SB00701 and 637CB00701) for Arsenic (57%), Lead (60%) and Manganese (66%) were greater than 50%. All positive and non-detect results are qualified as estimated, "J" or "UJ".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
637SB00701 and 637CB00701.	As, Pb and Mn.	+/U	J/UJ
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	28114B
Date:	February 12, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	January 8, 1997
Number of Samples:	13 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data; June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Metals, Cyanide

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 in 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 B. Simpson

Paul B. Humburg, President

2/14/97

Date

4127 Plaza 94 South · St. Charles, MO 63304
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SDG# 28114B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
GDGTB00701	SOIL		X								
643SB00901	SOIL				X		X				
643SB00902	SOIL				X		X				
643SB01001	SOIL				X		X				
643SB01002	SOIL				X		X				
643SB01201	SOIL				X		X				
643SB01202	SOIL				X		X				
GDGSB00701	SOIL		X		X		X		X		X
GDGSB00702	SOIL		X		X		X		X		X
GDGSB00801	SOIL		X		X		X		X		X
GDGSB00802	SOIL		X		X		X		X		X
GDGSB00901	SOIL		X		X		X		X		X
GDGSB00902	SOIL		X		X		X		X		X
Total Billable Samples (Water/Soil)		0	7	0	12	0	12	0	6	0	6

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA SW846 8240; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 28114B

A validation was performed on the Volatile Data from SDG 28114B. 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
*	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within continuing calibration criteria. All average RRFs were within calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, C23337.D, contained compounds with %Ds greater than 25% and less than 50%D. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J).

GDGSB00701	acetone (42.6%)
GDGSB00702	
GDGSB00802	
GDGSB00901	
GDGSB00902	

The continuing calibration, C23362.D, contained compounds with %Ds greater than 25% and less than 50%D. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J).

GDGSB00801	acetone (46.4%)

Internal Standard Performance

Specific Finding:

The following samples exhibited low internal standard area recoveries. Qualify all associated compound positive results as estimated (J) and non detects as estimated (UJ).

GDGSB00701	chlorobenzene-d_5
GDGSB00701RE	

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.

Blank (continued)

Trip Blank

Associated blank	Compound	Concentration	Action Level
GDGTB00701	methylene chloride	1 ug/Kg	10 ug/Kg

Samples	Compound	Qualification
GDGSB00701 GDGSB00802 GDGSB00901	methylene chloride	U
GDGSB00702 GDGSB00801 GDGSB00902	methylene chloride	CRQL

Surrogate Recoveries

Specific Finding:

The following samples exhibited low surrogate recoveries for bromofluorobenzene. Qualify all positive results as estimated (J) and non detects as estimated (UJ).

GDGSB00701 (72%)
GDGSB00701RE (70%)

Compound Identification /Quantitation

Reject sample GDGSB00701RE, in favor of the initial analysis, due to non compliant surrogate and internal standard area recoveries.

System Performance and Overall Assessment

The laboratory did not encounter any large problems. 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
GDGSB00701 GDGSB00702 GDGSB00802 GDGSB00901 GDGSB00902	acetone	+	J
GDGSB00801	acetone	+	J
GDGSB00701 GDGSB00701RE	All associated compounds chlorobenzene-d_5	+/-	J/UJ
GDGSB00701 GDGSB00802 GDGSB00901	methylene chloride	+	U
GDGSB00702 GDGSB00801 GDGSB00902	methylene chloride	+	CRQL
GDGSB00701	all results	+/-	J/UJ
GDGSB00701RE	all results	+/-	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 U.S. EPA 8270; 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 (Form I's).

SDG # 28114B

A validation was performed on the Semivolatile Data from SDG 28114B. 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 Sample
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within continuing calibration criteria. All RRFs were within calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A7596.D, contained compounds with %Ds greater than 25%, but less than 50%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J).

643SB01001	butylbenzylphthalate (27.5%)
643SB01201	bis(2-ethylhexyl)phthalate (27.1%)

System Performance and Overall Assessment

The laboratory did not encounter any large problems. 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
643SB01001	butylbenzylphthalate	+	J
643SB01201	bis(2-ethylhexyl)phthalate		

* 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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 28114B

A validation was performed on the Pesticide/Aroclor Data from SDG 28114B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. There were no positive results reported for those aroclors for which a five (5) point curve was not analyzed. No qualifications were required.

Field Duplicates

The field duplicate pair of samples 643SB01001/643CB01001 exhibited non-compliant precision for several reported compounds.

Specific Finding

For the following sample, the positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ, due to non-compliant field duplicate precision.

643SB01001	4,4'-DDD
	4,4'-DDT
	Endrin aldehyde
	α-chlordane
	γ-chlordane
	AR1260

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion). Four (4) samples required dilution to accurately quantitate target compounds. One (1) compound in the diluted run of sample 643SB01001 is above the calibration range. One (1) sample was re-extracted and analyzed due to surrogate recoveries less than 10%. The reviewer chose the analysis exhibiting the best overall QC responses to report. It is the professional opinion of the data validator that single component pesticides reported in the samples with high concentrations of aroclors should be considered suspect.

Specific Findings

For the following samples, the results for the E flagged compounds are rejected and replaced with the results reported from the DL analyses (if corresponding D flagged results are reported). All other results from the dilution are rejected, UR.

643SB00901
643SB01001
GDGSB00701
GDGSB00801

Compound Identification/Quantitation, continued

Specific Findings, continued

The compounds in the following sample that are outside the calibration range are qualified as estimated, J.

643SB01001DL

The following sample is rejected, UR, in favor of the results reported from the RE analysis for the noted reason.

643SB01002	Improved surrogate recoveries in the RE sample

The positive results reported in all samples which exhibited column quantitation differences greater than 40% but less than 70% are qualified as presumptively present at an estimated concentration, NJ.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and less than 10X the CRQL are reported as undetected, U.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and one of the following: results greater than 10X the CRQL, outside the calibration range, or the result of a dilution, are qualified as presumptively present at an estimated concentration, NJ.

System Performance and Overall Assessment

The reviewer estimates that less than 10% of 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 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
643SB01001	4,4'-DDD 4,4'-DDT Endrin aldehyde α-chlordane γ-chlordane AR1260	+/-	J/UJ
643SB00901 643SB01001 GDGSB00701 GDGSB00801	All E Flagged	+E	D
643SB00901DL 643SB01001DL GDGSB00701DL GDGSB00801DL	All other compounds	+/-	UR
643SB01001DL	All above cal. range	+E	J
643SB01002	All Compounds	+/-	UR
ALL	All P > 40% & ≤ 70%	+P	NJ
ALL	All P > 70% And < 10X CRQL	+P	U
ALL	All P > 70% And > 10X CRQL, above the calibration, or due to dilution.	+P	NJ

* 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
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 28114A

A validation was performed on the Metals and Cyanide Data from SDG 28114A. The data was evaluated based on the following parameters.

*	●	Data Completeness
*	●	Holding Times
*	●	Calibrations
	●	Blanks
*	●	Interferences
*	●	Matrix Spike Recovery
*	●	Matrix Duplicates
*	●	Field Duplicates
*	●	Laboratory Control Samples
*	●	Serial Dilutions
*	●	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Cobalt	0.08 mg/kg	no impact
Thallium	0.44 mg/kg	all soil samples below 2.2 mg/kg

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
all soil samples below 2.2 mg/kg	Tl.	+	U
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	28114A
Date:	February 12, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	January 8, 1997
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, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Organophosphorus Pesticides, Herbicides, Dioxin/Furans, Hexavalent Chromium, Metals, Cyanide

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 in 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 H. Searles — 2/14/97

Paul B. Humburg, President — Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 28114A

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
643CB00901	SOIL		X		X		X		X		X		X		X		X		X
643CB01001	SOIL		X		X		X		X		X		X		X		X		X
Total Billable Samples (Water/Soil)		0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
OPP= SW846 Organophosphorus Pesticides
HERB= SW846 Herbicides
D/F= SW846 Dioxin/Furans
HCR= SW846 Hexavalent Chromium
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA SW846 8240, Appendix IX; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level IV. All comments made within this report should be considered when examining the analytical results.

SDG # 28114A

A validation was performed on the Volatile Data from SDG 28114A. 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
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, C23337.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).

643CB01001	acrolein (0.012, 68.4%D) isobutyl alcohol (0.005) 1,4-dioxane (0.002)

The continuing calibration, C23337.D, contained compounds with %Ds greater than 50% and less than 90%D. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects as estimated (UJ).

643CB01001	methyl iodide (83.2%) acetonitrile (52.6%)

The continuing calibration, C23337.D, contained compounds with %Ds greater than 25% and less than 50%D. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J).

643CB01001	acetone (42.6%)

The continuing calibration, C23362.D, contained compounds with %Ds greater than 50% and less than 90%D. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects as estimated (UJ).

643CB00901	acrolein (63.2%) dichlorodifluoromethane (55.2%)

The continuing calibration, C23362.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).

643CB00901	isobutyl alcohol (0.005) 1,4-dioxane (0.002)

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
GDGTB00701	methylene chloride	1 ug/Kg	10 ug/Kg

Samples	Compound	Qualification
643CB01001	methylene chloride	CRQL

System Performance and Overall Assessment

The laboratory did not encounter any large problems. 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
643CB01001	acrolein isobutyl alcohol 1,4-dioxane	+/-	J/UR
643CB01001	methyl iodide acetonitrile	+/-	J/UJ
643CB01001	acetone	+	J
643CB00901	acrolein dichlorodifluoromethane	+/-	J/UJ
643CB00901	isobutyl alcohol 1,4-dioxane	+/-	J/UR
643CB01001	methylene chloride	+	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 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 U.S. EPA 8270, Appendix IX; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 28114A

A validation was performed on the Semivolatile Data from SDG # 28114A. 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 Sample
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A7677, -78, -79,-80, 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 all non detects as estimated (UJ).

643CB00901	1,2,4,5-tetrachlorobenzene (80.0%)
643CB01001	pentachlorobenzene (65.0%)
	diphenylamine (72.0%)
	kepone (66.1%)
	safrole (58.8%)
	isosafrole (54.8%)
	1-naphthylamine (55.7%)
	2-methyl-5-nitroaniline (53.4%)
	4-aminobiphenyl (50.6%)
	pronamide (56.7%)
	pentachloronitrobenzene (68.6%)

The continuing calibration, A7677, -78, -79,-80, 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 all non detects as rejected (UR).

643CB00901	hexachloraphene (0.028, 47.3%D)
643CB01001	aramite (0.047)

System Performance and Overall Assessment

The laboratory did not include the following compounds in the calibration curve or continuing calibration, compounds carbazole, 3-methyl-cholanthrene, and 1,2-dibromo-3-chloropropane. For all samples, qualify all positive results as estimated (J) and reject all non detects (UR).

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
643CB00901 643CB01001	1,2,4,5-tetrachlorobenzene pentachlorobenzene diphenylamine kepone safrole isosafrole 1-naphthylamine 2-methyl-5-nitroaniline 4-aminobiphenyl pronamide pentachloronitrobenzene	+/-	J/UJ
643CB00901 643CB01001	hexachloraphene aramite	+/-	J/UR
All samples	carbazole 3-methyl-cholanthrene 1,2-dibromo-3-chloropropane	+/-	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 28114A

A validation was performed on the Pesticide/Aroclor Data from SDG 28114A. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. There were no positive results reported for those aroclors for which a five (5) point curve was not analyzed. No qualifications were required.

Field Duplicates

The field duplicate pair of samples 643SB01001/643CB01001 exhibited non-compliant precision for several reported compounds.

Specific Finding

For the following sample, the positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ, due to non-compliant field duplicate precision.

643CB01001	4,4'-DDD
	4,4'-DDT
	Endrin aldehyde
	α-chlordane
	γ-chlordane
	AR1260

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion). Two (2) samples required dilution to accurately quantitate target compounds. It is the professional opinion of the data validator that single component pesticides reported in the samples with high concentrations of aroclors should be considered suspect.

Specific Findings

For the following samples, the results for the E flagged compounds are rejected and replaced with the results reported from the DL analyses. All other results from the dilution are rejected, UR.

643CB00901
643CB01001

Compound Identification/Quantitation, continued

Specific Findings, continued

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and less than 10X the CRQL are reported as undetected, U.

System Performance and Overall Assessment

The reviewer estimates that less than 10% of 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 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
643CB01001	4,4'-DDD 4,4'-DDT Endrin aldehyde α-chlordane γ-chlordane AR1260	+/-	J/UJ
643CB00901 643CB01001	All E Flagged	+E	D
643CB00901DL 643CB01001DL	All other compounds	+/-	UR
ALL	All P > 70% And < 10X CRQL	+P	U

* DL denotes the Form 1 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

ORGANOPHOSPHOROUS PESTICIDES

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 SW846 Method 8140; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 28114A

A validation was performed on the Organophosphorous Pesticides Data from SDG 28114A. 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 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

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 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

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

DATA ASSESSMENT NARRATIVE

CHLORINATED HERBICIDES

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 Method 8150; the National Functional Guidelines for Organic Data Validation, June 1991, and DQO Level IV 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 # 28114A

A validation was performed on the Chlorinated Herbicides from SDG 28114A. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	Calibration
*	•	Blanks
	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Surrogate Recoveries

Specific Finding

The following samples exhibited non-compliant recoveries for the noted surrogate. All positive and non-detect result are qualified as estimated, J/UJ.

Sample	Surrogate	Recovery
643CB00901	2,4-dichlorophenylacetic acid	28%
643CB01001		27%

System Performance and Overall Assessment

The data as reported did require 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
643CB00901 643CB01001	All compounds	+/-	J/UJ

* 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
METALS, HEXAVALENT CHROMIUM AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level IV 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 # 28114B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 28114B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Cobalt	0.08 mg/kg	no impact
Thallium	0.44 mg/kg	no impact

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All "B" results	all analytes	B	J

DATA ASSESSMENT AND NARRATIVE

Dioxin/Furans

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, matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard recoveries. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. EPA SW846, Method 8290; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 28114

A validation was performed on the Dioxin/Furans Data from SDG 28114. The data was evaluated based on the following parameters.

- * Data Completeness
- * Holding Times
- * Mass Resolution Checks
- * Column Performance
- * Calibrations
- * Internal Standard Performance
- Blanks
- * Matrix Spike/Matrix Spike Duplicate
- * Field Duplicates
- * Congener Identification /Quantitation

* - All criteria were met for this parameter

Blanks

The associated rinseate and field blanks exhibited contamination that resulted in qualifications.

Sample ID	Congener ID	Blank Conc. pg/L	Sample Conc. ng/Kg	Quals
643-C-B009-01	OCDD	2.45	69.5	NA
643-C-B010-01	OCDD	2.45	1300	NA

Blanks - continued

Sample ID	Congener ID	Blank Conc. pg/L	Sample Conc. ng/Kg	Quals
643-C-B009-01	1234678-HpCDF	1.87	3.17	U
643-C-B-01001	1234678-HpCDF	1.87	14	U

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 the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	CONGENER ID	DL	QL
643-C-B009-01 643-C-B010-01	OCDD	+	NA
643-C-B009-01 643-C-B010-01	1234678-HpCDF	+	U

* 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#:	28134B
Date:	February 12, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G]
Date Sampled:	January 9-14, 1997
Number of Samples:	8 Aqueous Sample(s) with 0 MS/MSD(s) 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, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Metals, Cyanide

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 in 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. Searson

Paul B. Humburg, President

2/14/97

Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 28134B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
FDS5001A01	SOIL		X		X		X		X		X
FDS6001A01	SOIL		X		X		X		X		X
FDST001A01	WATER	X									
FDSP001A01	WATER	X		X		X		X		X	
FDS7001A01	WATER	X		X		X		X		X	
FDST00A201	WATER	X									
FDSGW01A01	WATER	X		X		X		X		X	
FDSGW01B01	WATER	X		X		X		X		X	
FDSGW01C01	WATER			X		X		X		X	
FDSSC05101	SOIL		X		X		X		X		X
FDSTS06201	WATER	X									
Total Billable Samples (Water/Soil)		7	3	5	3	5	3	5	3	5	3

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA SW846 8240; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 28134B

A validation was performed on the Volatile Data from SDG 28134B. 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
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within continuing calibration criteria. All average RRFs were within calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, C23374.D, contained compounds with %Ds greater than 50% and less than 90%D. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects as estimated (UJ).

FDSSC05101 acetone (50.2%)

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.

Bentonite Blank

Associated blank	Compound	Concentration	Action Level
FDS5001A01	acetone	140 ug/Kg	1400 ug/Kg
	methylene chloride	11	110
	2-butanone	35	350
	xylene	3	15

Samples	Compound	Qualification
FDSSC05101	acetone	U
FDSSC05101	methylene chloride	CRQL

System Performance and Overall Assessment

The laboratory did not encounter any large problems. 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
FDSSC05101	acetone	+/-	J/UJ
FDSSC05101	acetone	+	U
FDSSC05101	methylene chloride	+	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 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 U.S. EPA SW846, Method 8270 with CLP deliverables; 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 (Form I's).

SDG # 28134B

A validation was performed on the Semivolatile Data from SDG 28134B. The data was evaluated based on the following parameters.

* • Data Completeness
* • Holding Times
* • GC/MS Tuning
* • Calibrations
* • Internal Standard Performance
* • Blanks
* • Surrogate Recoveries
* • Matrix Spike/Matrix Spike Duplicate
* • Field Duplicates
* • Compound Identification /Quantitation

* - All criteria were met for this parameter

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data as presented did not require qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL

No qualifications are 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

DATA ASSESSMENT NARRATIVE

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 28134B

A validation was performed on the Pesticide/PCB Data from SDG 28134B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the aroclors which did not have a five (5) point curve, therefore the data did not require qualification. No qualifications were required.

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

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 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

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

DATA ASSESSMENT NARRATIVE
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 28134A/B

A validation was performed on the Metals and Cyanide Data from SDG 28134A/B. The data was evaluated based on the following parameters.

*	●	Data Completeness
*	●	Holding Times
*	●	Calibrations
	●	Blanks
*	●	Interferences
	●	Matrix Spike Recovery
*	●	Matrix Duplicates
*	●	Field Duplicates
*	●	Laboratory Control Samples
*	●	Serial Dilutions
*	●	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Aluminum	1.11 mg/kg	no impact
Tin	1.65 mg/kg	all soil samples below 8.25 mg/kg
Antimony	2.56 ug/l	no impact
Calcium	264 ug/l	all water samples below 1320 ug/l
Zinc	47.3 ug/l	all water samples below 237 ug/l

The equipment and Rinsate blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Arsenic	2.7 ug/l	all soil samples below 2.7 mg/kg
Barium	0.40 ug/l	all water samples below 2.0 ug/l
Calcium	40.5 ug/l	no impact
Copper	1.3 ug/l	all water samples below 6.5 ug/l
Selenium	4.3 ug/l	all water samples below 21.5 ug/l
Cyanide	7.7 ug/l	all soil samples below 7.7 mg/kg and all water samples below 38.5 ug/l

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Iron	-2.0 mg/kg	all soil samples below 20.0 mg/kg
Vanadium	-0.09 mg/kg	all soil samples below 0.9 mg/kg
Iron	-32.2 ug/l	all water samples below 322 ug/l
Magnesium	-91.6 ug/l	no impact

The USEPA requires that the reviewer review and qualify data bias on negative bias. This reviewer qualifies all non-detect and positive results below ten times the absolute value as estimated, "J" or "UJ".

Matrix Spike recovery

Specific Finding

The Matrix Spike recovery for waters for Cyanide (69%) was below the lower control limits (>30% but <75%). All positive and non-detect results are qualified as estimated, "J" or "UJ".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All soil samples below 8.25 mg/kg	Sn.	+	U
All water samples below 1320 ug/l	Ca.		
All water samples below 237 ug/l	Zn.		
All soil samples below 2.7 mg/kg	As.		
All water samples below 2.0 ug/l	Ba.		
All water samples below 6.5 ug/l	Cu.		
All water samples below 21.5 ug/l	Se.		
All water samples below 38. 5u ug/l	Cn.		
All soil samples below 7.7 mg/kg	Cn.		
All soil samples	Cn.	+/U	J/UJ
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	28134A
Date:	February 12, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	January 9, 1997
Number of Samples:	3 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Organophosphorus Pesticides, Herbicides, Dioxin/Furans, Hexavalent Chromium, Metals, Cyanide

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 in 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 H. Hearden
Paul B. Humburg, President

2/14/97
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 28134A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
FDSE001A01	WATER	X		X		X		X		X		X		X		X		X	
FDSD001A01	WATER	X		X		X		X		X		X		X		X		X	
FDSFW01B01	WATER	X		X		X		X		X		X		X		X		X	
Total Billable Samples (Water/Soil)		3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
OPP= SW846 Organophosphorus Pesticides
HERB= SW846 Herbicides
D/F= SW846 Dioxin/Furans
HCR= SW846 Hexavalent Chromium
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA SW846 8240, Appendix IX; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level IV. All comments made within this report should be considered when examining the analytical results.

SDG # 28134A

A validation was performed on the Volatile Data from SDG 28134A. 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
* • Field Duplicates
* • Compound Identification /Quantitation

* - All criteria were met for this parameter

System Performance and Overall Assessment

The laboratory did not encounter any large problems. Only quality control samples were submitted in this SDG; therefore, no qualifications are required.

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

No qualifications are 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

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 U.S. EPA SW846, Method 8270 with CLP deliverables; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 28134A

A validation was performed on the Semivolatile Data from SDG 28134A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibrations
*	•	Internal Standard Performance
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Field Duplicates
	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Compound Identification/Quantitation

Specific Finding:

The laboratory did not include the following compounds in there calibration curve or continuing calibration, compounds carbazole, 3-methyl-cholanthrene and 1,2-dibromo-3-chloropropane. No qualifications are required because, only QC field samples were analyzed.

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data as presented did not require qualifications because, only field QC samples were included in this SDG.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL

No qualifications are 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

DATA ASSESSMENT NARRATIVE

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 28134A

A validation was performed on the Pesticide/PCB Data from SDG 28134A. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the aroclors which did not have a five (5) point curve, therefore the data did not require qualification. No qualifications were required.

System Performance and Overall Assessment

This SDG consisted of field QC blanks only. 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

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 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

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

DATA ASSESSMENT NARRATIVE

ORGANOPHOSPHOROUS PESTICIDES

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 Method 8140; the National Functional Guidelines for Organic Data Validation, June 1991, and DQO Level IV 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 # 28134A

A validation was performed on the Organophosphorous Pesticides from SDG 28134A. The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • 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 as reported did not require qualifications. The SDG consisted of field QC blanks only.

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

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

DATA ASSESSMENT NARRATIVE

CHLORINATED HERBICIDES

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 Method 8150; the National Functional Guidelines for Organic Data Validation, June 1991, and DQO Level IV 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 # 28134A

A validation was performed on the Chlorinated Herbicides from SDG 28134A. The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • 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 as reported did not require qualifications. The SDG consisted of field QC blanks only.

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

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

DATA ASSESSMENT NARRATIVE
METALS, HEXAVALENT CHROMIUM AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level IV 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 # 28134C

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 28134C. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
*	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL

Data stands as reported without qualification.

DATA ASSESSMENT AND NARRATIVE

Dioxin/Furans

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, matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard recoveries. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. EPA SW846, Method 8290; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 28134

A validation was performed on the Dioxin/Furans Data from SDG 28134. The data was evaluated based on the following parameters.

* • Data Completeness
* • Holding Times
* • Mass Resolution Checks
* • Column Performance
* • Calibrations
* • Internal Standard Performance
* • Blanks
* • Matrix Spike/Matrix Spike Duplicate
* • Field Duplicates
* • Congener Identification /Quantitation

* - All criteria were met for this parameter

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 the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	CONGENER ID	DL	QL

No qualifications are required - all field QC.

* 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

ANNOTATED FORM Is

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	28146
Date:	February 18, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	January 10, 1997
Number of Samples:	8 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Semivolatiles, Pesticide/PCB's, Metals

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 in 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 Kimberly S. Shapp — 21 February 1997

Paul B. Humburg, President — Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 28146

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	SVOA		P/P		TAL	
636SB01301	SOIL		X		X		X
636SB01302	SOIL		X		X		X
636SB01401	SOIL		X		X		X
636SB01402	SOIL		X		X		X
643SB00801	SOIL		X		X		
643SB00802	SOIL		X		X		
643SB01101	SOIL		X		X		
643SB01102	SOIL		X		X		
Total Billable Samples (Water/Soil)		0	8	0	8	0	4

SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
TAL= SW846 Metals

DATA ASSESSMENT NARRATIVES

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 8270; the National Functional Guidelines for Organic Data Validation, June 1991, 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 # 28146B

A validation was performed on the Semivolatile Data from SDG 28146B. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Internal Standard Performance
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Continuing Calibrations

The continuing calibrations that were analyzed by the laboratory for these samples were not acceptable for all compound %Ds. The continuing calibration standards that were analyzed did meet all the minimum RRF criteria.

Continuing Calibrations, continued

Specific Findings

The continuing calibration standard P11038.D contained a compounds with %Ds greater than 50% but less than 90%. For the samples and non-compliant compound listed below, all positive and non-detect results are qualified as estimated, J/UJ.

636SB01402	hexachlorocyclopentadiene (62.1)
643SB01101	

The continuing calibration standard P11039.D contained a compounds with %Ds greater than 50% but less than 90%. For the samples and non-compliant compound listed below, all positive and non-detect results are qualified as estimated, J/UJ.

636SB01301	benzoic acid (72.4)
643SB00802	
643SB01102	

The continuing calibration standard P11160.D contained a compounds with %Ds greater than 50% but less than 90%. For the samples and non-compliant compound listed below, all positive and non-detect results are qualified as estimated, J/UJ.

643SB00801	benzoic acid (85.0)

System Performance and Overall Assessment

The data reviewer estimates less than 5% of data required 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
636SB01402 643SB01101	hexachlorocyclopentadiene (62.1)	+/-	J/UJ
636SB01301 643SB00802 643SB01102	benzoic acid (72.4)	+/-	J/UJ
643SB00801	benzoic acid (85.0)	+/-	J/UJ

* 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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 28146B

A validation was performed on the Pesticide/Aroclor Data from SDG 28146B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Compound Identification/Quantitation

One (1) sample was diluted to accurately quantitate target compounds. Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion).

Specific Findings

For the following sample, the result for the E flagged compound is rejected and replaced with the corresponding result from the DL analysis. All other results from the dilution are rejected, UR, in favor of the results reported in the original analysis.

643SB00801

The positive results reported in all samples which exhibited column quantitation differences greater than 40% but less than 70% are qualified as presumptively present at an estimated concentration, NJ.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results less than 10X the CRQL are reported as undetected, U.

System Performance and Overall Assessment

The data reviewer estimates less than 10% of 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
643SB00801	All E Flagged	+E	D
643SB00801DL	All except corresponding D flagged results	+/-	UR
ALL	All P >40% But ≤ 70%	+	NJ
ALL	All P > 70% And < 10X CRQL	+	U

* 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
METALS

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 28146

A validation was performed on the Metals Data from SDG 28146. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions

* - All criteria were met for this parameter.

Preparation Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Tin	1.65 mg/kg	all soil samples below 8.25 mg/kg

The USEPA requires that all sample values below five times the preparation or calibration blank contamination be qualified as non-detect, "U".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Aluminum	-3.58 mg/kg	no impact
Iron	-2.00 mg/kg	no impact
Vanadium	-0.09 mg/kg	no impact

This reviewer qualifies all samples results below ten times the negative bias as estimated, "J" or "UJ".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All soil samples below 8.25 mg/kg	Sn.	+	U
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	28185A
Date:	February 12, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	January 14-16, 1997
Number of Samples:	3 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Organophosphorus Pesticides, Herbicides, Dioxin/Furans, Hexavalent Chromium, Metals, Cyanide

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 in 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 Kimberly L. Shopp — Paul B. Humburg, President

14 February 1997 — Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 28185A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
FDSHW01D01	WATER	X		X		X		X		X		X		X		X		X	
FDSEW01B01	WATER	X		X		X		X		X		X		X		X		X	
FDSHW02A01	WATER	X		X		X		X		X		X		X		X		X	
Total Billable Samples (Water/Soil)		3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
OPP= SW846 Organophosphorus Pesticides
HERB= SW846 Herbicides
D/F= SW846 Dioxin/Furans
HCR= SW846 Hexavalent Chromium
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA SW846 8240, Appendix IX; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level IV. All comments made within this report should be considered when examining the analytical results.

SDG # 28185A

A validation was performed on the Volatile Data from SDG 28185A. 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
	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration,N24728.D, contained compounds with %Ds greater than 25% and less than 50%D. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J).

FDSHW01D01	acetone (40.9%)
FDSHW02A01	

The continuing calibration,N24728.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).

FDSHW01D01	acetonitrile (0.035)
FDSHW02A01	isobutyl alcohol (0.009, 28.6%D)
	1,4-dioxane (0.003, 50.0%D)

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.

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
FDSEW01D01	chloroform	3 ug/L	30 ug/L

Samples	Compound	Qualification
FDSHW01D01	chloroform	CRQL

Field Duplicates

Sample FDSGW02A01 and duplicate sample FDSHW02A01 exhibited %RPDs greater than 30% for acetone. Qualify positive results for acetone as estimated.

System Performance and Overall Assessment

The laboratory did not encounter any large problems. 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
FDSHW01D01 FDSHW02A01	acetone	+	J
FDSHW01D01 FDSHW02A01	acetonitrile isobutyl alcohol 1,4-dioxane	+/-	J/UR
FDSHW01D01	chloroform	+	CRQL
FDSHW02A01	acetone	+	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 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 U.S. EPA 8270, Appendix IX; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 28185A

A validation was performed on the Semivolatile Data from SDG # 28185A. 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 Sample
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A7705, -06, -07,-11, 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 all non detects as estimated (UJ).

FDSHW01D01	hexachloropropene (55.0%)
FDSHW02A01	1,2,4,5-tetrachlorobenzene (66.5%)
	pentachlorobenzene (53.7%)
	2-picoline (62.5%)
	o,o,o-triethyl phosphorothioate (53.6%)
	safrole (59.4%)
	isosafrole (65.7%)
	1,3-dinitrobenzene (62.2%)
	1-naphthylamine (62.3%)
	2-naphthylamine (51.5%)
	thionazin (54.1%)
	2-methyl-5-nitroaniline (70.9%)
	phorate (54.7%)
	phenacetin (58.9%)
	dimethoate (55.7%)
	4-aminobiphenyl (58.5%)
	pronamide (72.1%)
	methyl parathion (59.1%)
	parathion (68.9%)
	chlorobenzilate (55.1%)
	3,3'-dimethylbenzidine (59.0%)
	2-acetylaminofluorene (71.4%)
	diphenylamine (55.1%)
	7,12-dimethylbenz(a)anthracene (84.5%)

The continuing calibration, A7705, -06, -07,-11, contained compounds with %Ds greater than 90%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and all non detects as rejected (UR).

FDSHW01D01	pentachloronitrobenzene (90.2%)
FDSHW02A01	famphur (122.8%)
	sulfotepp (93.6%)

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A7705, -06, -07,-11, 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 all non detects as rejected (UR).

FDSHW01D01	aramite (0.047)
FDSHW02A01	

System Performance and Overall Assessment

The laboratory did not include the following compounds in the calibration curve or continuing calibration, compounds carbazole, 3-methyl-cholanthrene, and 1,2-dibromo-3-chloropropane. For all samples, qualify all positive results as estimated (J) and reject all non detects (UR).

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
FDSHW01D01	hexachloropropene	+/-	J/UJ
FDSHW02A01	1,2,4,5-tetrachlorobenzene		
	pentachlorobenzene		
	2-picoline		
	o,o,o-triethyl phosphorothioate		
	safrole		
	isosafrole		
	1,3-dinitrobenzene		
	1-naphthylamine		
	2-naphthylamine		
	thionazin		
	2-methyl-5-nitroaniline		
	phorate		
	phenacetin		
	dimethoate		
	4-aminobiphenyl		
	pronamide		
	methyl parathion		
	parathion		
	chlorobenzilate		
	3,3'-dimethylbenzidine		
	2-acetylaminofluorene		
	diphenylamine		
	7,12-dimethylbenz(a)anthracene		
FDSHW01D01	pentachloronitrobenzene	+/-	J/UR
FDSHW02A01	famphur		
	sulfotepp		
FDSHW01D01	aramite	+/-	J/UR
FDSHW02A01			
All samples	carbazole	+/-	J/UR
	3-methyl-cholanthrene		
	1,2-dibromo-3-chloropropane		

* 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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 28185A

A validation was performed on the Pesticide/PCB Data from SDG 28185A. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the aroclors which did not have a five (5) point curve, therefore the data did not require qualification. No qualifications were required.

Surrogate Recoveries

Specific Finding

The following sample exhibited non-compliant recoveries for the noted surrogates. All positive and non-detect result are qualified as estimated, J/UJ.

Sample	Surrogate	Recovery
FDSHW02A01	TCMX1/TCMX2	31%/30%
	DCB1	24%

System Performance and Overall Assessment

The reviewer estimates that less than 5% of 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 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
FDSHW02A01	All Compounds	+/-	J/UJ

* 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

CHLORINATED HERBICIDES

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 Method 8150; the National Functional Guidelines for Organic Data Validation, June 1991, and DQO Level IV 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 # 28185A

A validation was performed on the Chlorinated Herbicides from SDG 28185A. The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • 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 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

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

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

DATA ASSESSMENT NARRATIVE

ORGANOPHOSPHOROUS PESTICIDES

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 SW846 Method 8140; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 28185A

A validation was performed on the Organophosphorous Pesticides Data from SDG 28185A. 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 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

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 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

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

DATA ASSESSMENT NARRATIVE
METALS, HEXAVALENT CHROMIUM AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level IV 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 # 28185B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 28185B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Calcium	24.5 ug/l	no impact
Cobalt	1.0 ug/l	all water samples below 5.0 ug/l
Zinc	5.63 ug/l	all water samples below 28.2 ug/l

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Field and Duplicate Analysis

Specific Finding

The RPDs for field duplicate samples (FDSGW02A01 and FDSHW02A01) for Aluminum (110%), Barium (115%), Calcium (55%), Magnesium (99%), Manganese (61%), Potassium (87%) and Sodium (140%) were greater than 30%. All positive and non-detect results are qualified as estimated, "J" or "UJ".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All water samples below 5.0 ug/l	Co.	+	U
All water samples below 28.2 ug/l	Zn.		
FDSGW02A01 and HW02A01.	Al, Ba, Mg, Mn, Ca, K and Na.	+/U	J/UJ
All "B" results	all analytes	B	J

DATA ASSESSMENT AND NARRATIVE

Dioxin/Furans

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, matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard recoveries. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. EPA SW846, Method 8290; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 28185

A validation was performed on the Dioxin/Furans Data from SDG 28185. The data was evaluated based on the following parameters.

- * Data Completeness
- * Holding Times
- * Mass Resolution Checks
- * Column Performance
- * Calibrations
- * Internal Standard Performance
- Blanks
- * Matrix Spike/Matrix Spike Duplicate
- * Field Duplicates
- * Congener Identification /Quantitation

* - All criteria were met for this parameter

Blanks

Sample ID	Congener ID	Blank Conc. pg/L	Sample Conc. pg/L	Quals
FDS-H-W01D-01	OCDD	9.66	50.7	U

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 the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	CONGENER ID	DL	QL
FDS-H-W01D-01	OCDD	+B	U

* 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#:	28185B
Date:	February 12, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	January 14-17, 1997
Number of Samples:	12 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Metals, Cyanide

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 in 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 Kimberly S. Shopp — 14 February 1997

Paul B. Humburg, President — Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 28185B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
FDSGW01C01	WATER	X									
FDSGW01D01	WATER	X		X		X		X		X	
FDSTW01D01	WATER	X									
FDSGW02A01	WATER	X		X		X		X		X	
FDSTW02A01	WATER	X									
FDSGW02C01	WATER	X		X		X		X		X	
FDSGW03B01	WATER	X		X		X		X		X	
FDSGW03C01	WATER	X		X		X		X		X	
FDSGW05B01	WATER	X		X		X		X		X	
FDSGW07B01	WATER	X		X		X		X		X	
FDSGW07C01	WATER	X		X		X		X		X	
FDSTW07C01	WATER	X									
Total Billable Samples (Water/Soil)		12	0	8	0	8	0	8	0	8	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA SW846 8240; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 28185B

A validation was performed on the Volatile Data from SDG 28185B. 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
	•	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.

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
FDSEW01B01	chloroform	3 ug/Kg	30 ug/Kg

Samples	Compound	Qualification
FDSGW01D01	chloroform	CRQL

Field Duplicates

Specific Finding:

Water sample FDSGW02A01 and duplicate FDSHW02A01 exhibited positive results for acetone that exhibited %RPD above the 30% criteria. Qualify positive results for acetone as estimated (J).

System Performance and Overall Assessment

The laboratory did not encounter any large problems. 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
FDSGW01D01	chloroform	+	CRQL
FDSGW02A01	acetone	+	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 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 U.S. EPA 8270; 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 (Form I's).

SDG # 28185B

A validation was performed on the Semivolatile Data from SDG 28185B. 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 Sample
* • Field Duplicates
* • Compound Identification /Quantitation

* - All criteria were met for this parameter

System Performance and Overall Assessment

The laboratory did not encounter any large problems. The data as presented does not require qualification.

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

No qualifications are 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

DATA ASSESSMENT NARRATIVE

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 28185B

A validation was performed on the Pesticide/PCB Data from SDG 28185B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the aroclors which did not have a five (5) point curve, therefore the data did not require qualification. No qualifications were required.

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

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 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

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

DATA ASSESSMENT NARRATIVE
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 28185A

A validation was performed on the Metals and Cyanide Data from SDG 28185A. The data was evaluated based on the following parameters.

*	●	Data Completeness
*	●	Holding Times
*	●	Calibrations
	●	Blanks
*	●	Interferences
*	●	Matrix Spike Recovery
*	●	Matrix Duplicates
	●	Field Duplicates
*	●	Laboratory Control Samples
	●	Serial Dilutions
*	●	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Calcium	24.5 ug/l	no impact
Cobalt	1.0 ug/l	all water samples below 5.0 ug/l
Zinc	5.63 ug/l	all water samples below 28.2 ug/l

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Field and Duplicate Analysis

Specific Finding

The RPDs for field duplicate samples (FDSGW02A01 and FDSHW02A01) for Aluminum (110%), Barium (115%), Calcium (55%), Magnesium (99%), Manganese (61%), Potassium (87%) and Sodium (140%) were greater than 30%. All positive and non-detect results are qualified as estimated, "J" or "UJ".

Serial Dilutions

Specific Findings

The Serial dilutions for waters for Barium, Calcium and Iron were outside the control limits (> 10%). All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All water samples below 5.0 ug/l	Co.	+	U
All water samples below 28.2 ug/l	Zn.		
FDSGW02A01 and HW02A01.	Al, Ba, Mg, Mn, Ca, K and Na.	+/U	J/UJ
All water samples	Ba, Ca and Fe.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	28217B
Date:	February 12, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	January 18-21, 1997
Number of Samples:	17 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Metals, Cyanide

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 in 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. Searson

Paul B. Humburg, President

2/14/97

Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 28217B

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
FDSGW03A01	WATER	X		X		X		X		X	
FDSGW06A01	WATER	X		X		X		X		X	
FDSGW05A01	WATER	X		X		X		X		X	
FDSTW06A01	WATER	X									
FDSGW06B01	WATER	X		X		X		X		X	
FDSGW06C01	WATER	X		X		X		X		X	
FDSGW04A01	WATER	X		X		X		X		X	
FDSGW04B01	WATER	X		X		X		X		X	
FDSGW04C01	WATER	X		X		X		X		X	
FDSGW02B01	WATER	X		X		X		X		X	
FDSGW10A01	WATER	X		X		X		X		X	
FDSGW10B01	WATER	X		X		X		X		X	
FDSGW10C01	WATER	X		X		X		X		X	
FDSGW09A01	WATER	X		X		X		X		X	
FDSGW09C01	WATER	X		X		X		X		X	
FDSGW09B01	WATER	X		X		X		X		X	
FDSTW09D01	WATER	X									
Total Billable Samples (Water/Soil)		17	0	15	0	15	0	15	0	15	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA SW846 8240; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # 28217B

A validation was performed on the Volatile Data from SDG 28217B. 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
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within continuing calibration criteria. All RRFs were within calibration criertia. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, N24743.D, contained compounds with %Ds greater than 25% and less than 50%D. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J).

FDSGW10A01	acetone (36.7%)
FDSGW10B01	
FDSGW09C01	
FDSGW06B01	
FDSGW06C01	

System Performance and Overall Assessment

The laboratory did not encounter any large problems. 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
FDSGW10A01	acetone	+	J
FDSGW10B01			
FDSGW09C01			
FDSGW06B01			
FDSGW06C01			

* 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 U.S. EPA 8270; 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 (Form I's).

SDG # 28217B

A validation was performed on the Semivolatile Data from SDG 28217B. 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 Sample
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds that were not within continuing calibration criteria. All RRFs were within calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, V16771.D, contained compounds with %Ds greater than 50%, but less than 90%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects es estimated (UJ).

FDSGW09B01	benzoic acid (50.2%)

System Performance and Overall Assessment

The laboratory did not encounter any large problems. 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
FDSGW09B01	benzoic acid	+/-	J/UJ

* 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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 28217B

A validation was performed on the Pesticide/PCB Data from SDG 28217B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the aroclors which did not have a five (5) point curve, therefore the data did not require qualification. No qualifications were required.

Surrogate Recoveries

Specific Finding

The following samples exhibited non-compliant recoveries for the noted surrogates. All positive and non-detect result are qualified as estimated, J/UJ.

Sample	Surrogate	Recovery
FDSGW10A01	TCMX2	40%
FDSGW10C01		42%

System Performance and Overall Assessment

The reviewer estimates that less than 5% of 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 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
FDSGW10A01 FDSGW10C01	All Compounds	+/-	J/UJ

* 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
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 28217A

A validation was performed on the Metals and Cyanide Data from SDG 28217A. The data was evaluated based on the following parameters.

*	●	Data Completeness
*	●	Holding Times
*	●	Calibrations
	●	Blanks
*	●	Interferences
*	●	Matrix Spike Recovery
*	●	Matrix Duplicates
*	●	Field Duplicates
*	●	Laboratory Control Samples
	●	Serial Dilutions
*	●	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Calcium	17.3 ug/l	no impact
Chromium	1.17 ug/l	all water samples below 5.85 ug/l
Copper	0.72 ug/l	all water samples below 3.6 ug/l
Thallium	3.14 ug/l	all water samples below 15.7 ug/l
Tin	7.30 ug/l	all water samples below 36.5 ug/l

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Serial Dilutions

Specific Findings

The Serial dilutions for waters for Barium and Calcium were outside the control limits (>10%). All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All water samples below 5.85 ug/l	Cr.	+	U
All water samples below 3.6 ug/l	Cu.		
All water samples below 15.7 ug/l	Tl.		
All water samples below 36.5 ug/l	Sn.		
All water samples	Ba and Ca.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	28217A
Date:	February 12, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	January 20-21, 1997
Number of Samples:	3 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Organophosphorus Pesticides, Herbicides, Dioxin/Furans, Hexavalent Chromium, Metals, Cyanide

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 in 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

Paul B. Humburg, President

2/14/97

Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 28217A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
FDSFW04A01	WATER	X		X		X		X		X		X		X		X		X	
FDSEW10C01	WATER	X		X		X		X		X		X		X		X		X	
FDSHW09B01	WATER	X		X		X		X		X		X		X		X		X	
Total Billable Samples (Water/Soil)		3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
OPP= SW846 Organophosphorus Pesticides
HERB= SW846 Herbicides
D/F= SW846 Dioxin/Furans
HCR= SW846 Hexavalent Chromium
TAL= SW846 Metals
CN= SW846 Cyanide

DATA ASSESSMENT NARRATIVES

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 U.S. EPA SW846 8240, Appendix IX; the National Functional Guidelines for Organic Data Review, June 1991, and DQO Level IV. All comments made within this report should be considered when examining the analytical results.

SDG # 28217A

A validation was performed on the Volatile Data from SDG 28217A. 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
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, N24772.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).

FDSHW09B01	acetonitrile (0.034) isobutyl alcohol (0.008) 1,4-dioxane (0.002)

The continuing calibration,N24772.D, contained compounds with %Ds greater than 50% and less than 90%D. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects as estimated (UJ).

FDSHW09B01	trans-1,4-dichloro-2-butene (56.5%)

System Performance and Overall Assessment

The laboratory did not encounter any large problems. 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
FDSHW09B01	acetonitrile isobutyl alcohol 1,4-dioxane	+/-	J/UR
FDSHW09B01	trans-1,4-dichloro-2-butene	+/-	J/UJ

* 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 U.S. EPA 8270, Appendix IX; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 28217A

A validation was performed on the Semivolatile Data from SDG # 28217A. 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 Sample
*	•	Field Duplicates
*	•	Compound Identification /Quantitation

* - All criteria were met for this parameter

Continuing calibrations

The continuing calibrations that were analyzed with this data package exhibited %Ds and average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A7786, -87, -88,-89, 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 all non detects as estimated (UJ).

FDSHW09B01	hexachloropropene (61.3%)
	1,2,4,5-tetrachlorobenzene (89.5%)
	pentachlorobenzene (75.9%)
	2-picoline (59.4%)
	safrole (54.1%)
	isosafrole (51.9%)
	1-naphthylamine (58.5%)
	2-naphthylamine (52.5%)
	2-methyl-5-nitroaniline (58.9%)
	phenacetin (51.1%)
	4-aminobiphenyl (51.9%)
	pronamide (53.0%)
	pentachloronitrobenzene (53.4%)
	3,3'-dimethylbenzidine (63.0%)
	2-acetylaminofluorene (54.0%)
	diphenylamine (52.0%)
	7,12-dimethylbenz(a)anthracene (54.9%)

The continuing calibration, A7786, -87, -88,-89, 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 all non detects as rejected (UR).

FDSHW09B01	hexachloraphene (0.029, 44.9%D)
	aramite (0.044)

The continuing calibration, A7786, -87, -88,-89, contained compounds with %Ds greater than 90%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and all non detects as rejected (UR).

FDSHW09B01	famphur (95.1%)

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
SBLK2	bis(2-ethylhexyl)phthalate	2 ug/L	20 ug/L

Samples	Compound	Qualification
FDSHW09B01	bis(2-ethylhexyl)phthalate	CRQL

System Performance and Overall Assessment

The laboratory did not include the following compounds in the calibration curve or continuing calibration, compounds carbazole, 3-methyl-cholanthrene, and 1,2-dibromo-3-chloropropane. For all samples, qualify all positive results as estimated (J) and reject all non detects (UR).

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
FDSHW09B01	hexachloropropene	+/-	J/UJ
	1,2,4,5-tetrachlorobenzene		
	pentachlorobenzene		
	2-picoline		
	safrole		
	isosafrole		
	1-naphthylamine		
	2-naphthylamine		
	2-methyl-5-nitroaniline		
	phenacetin		
	4-aminobiphenyl		
	pronamide		
	pentachloronitrobenzene		
	3,3'-dimethylbenzidine		
	2-acetylaminofluorene		
	diphenylamine		
	7,12-dimethylbenz(a)anthracene		
FDSHW09B01	hexachloraphene	+/-	J/UR
	aramite		
FDSHW09B01	famphur	+/-	J/UR
FDSHW09B01	bis(2-ethylhexyl)phthalate	+	CRQL
All samples	carbazole	+/-	J/UR
	3-methyl-cholanthrene		
	1,2-dibromo-3-chloropropane		

* 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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 28217A

A validation was performed on the Pesticide/PCB Data from SDG 28217A. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the aroclors which did not have a five (5) point curve, therefore the data did not require qualification. No qualifications were required.

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

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 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

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

DATA ASSESSMENT NARRATIVE

ORGANOPHOSPHOROUS PESTICIDES

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 SW846 Method 8140; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 28217A

A validation was performed on the Organophosphorous Pesticides Data from SDG 28217A. 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 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

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 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

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

DATA ASSESSMENT NARRATIVE

CHLORINATED HERBICIDES

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 Method 8150; the National Functional Guidelines for Organic Data Validation, June 1991, and DQO Level IV 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 # 28217A

A validation was performed on the Chlorinated Herbicides from SDG 28217A. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	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 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

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

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

DATA ASSESSMENT NARRATIVE
METALS, HEXAVALENT CHROMIUM AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level IV 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 # 28217B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 28217B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Calcium	17.3 ug/l	no impact
Chromium	1.17 ug/l	all water samples below 5.85 ug/l
Copper	0.72 ug/l	no impact
Thallium	3.14 ug/l	no impact
Tin	7.30 ug/l	all water samples below 36.5 ug/l

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All water samples below 5.85 ug/l	Cr.	+	U
All water samples below 36.5 ug/l	Sn.		
All "B" results	all analytes	B	J

DATA ASSESSMENT AND NARRATIVE

Dioxin/Furans

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, matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard recoveries. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. EPA SW846, Method 8290; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 28217

A validation was performed on the Dioxin/Furans Data from SDG 28217. The data was evaluated based on the following parameters.

* • Data Completeness
* • Holding Times
* • Mass Resolution Checks
* • Column Performance
* • Calibrations
* • Internal Standard Performance
* • Blanks
* • Matrix Spike/Matrix Spike Duplicate
* • Field Duplicates
* • Congener Identification /Quantitation

* - All criteria were met for this parameter

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 the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	CONGENER ID	DL	QL

No qualifications are 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#:	28249A
Date:	February 18, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	January 24-27, 1997
Number of Samples:	3 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data; June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Herbicides, Organophosphorus Pesticides, Dioxin/Furans, Metals, Cyanide, Hexavalent Chromium

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 in 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

2/24/97
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 28249A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
FDSHW08C01	WATER	X		X		X		X		X		X		X		X		X	
FDSFW13A01	WATER	X		X		X		X		X		X		X		X		X	
FDSHW12A01	WATER	X		X		X		X		X		X		X		X		X	
Total Billable Samples (Water/Soil)		3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
OPP= SW846 Organophosphorus Pesticides
HERB= SW846 Herbicides
D/F= SW846 Dioxin/Furans
HCR= SW846 Hexavalent Chromium
TAL= SW846 Metals
CN= SW846 Cyanide

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 8240; the National Functional Guidelines for Organic Data Validation, June 1991, and DQO Level IV 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 # 28249A

A validation was performed on the Volatile Data from SDG 28249A. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
	•	Field Duplicates
*	•	Internal Standard Performance
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Continuing Calibrations

The continuing calibration standard associated with the samples exhibited non-compliant %Ds and RRFs. Qualifications were required.

Continuing Calibrations, continued

Specific Findings

The continuing calibration standard N24833.D contained four (4) compounds with RRFs less than 0.05. For the samples and non-compliant compound listed below, positive results are qualified as estimated, J, and non-detect results are rejected, UR.

FDSHW08C01	acrolein (0.035) acetonitrile (0.031) Isobutyl alcohol (0.007) 1,4-dioxane (0.002)

The continuing calibration standard N24868.D contained one (1) compound with a %D greater than 90%. For the samples and non-compliant compound listed below, positive results are qualified as estimated, J, and non-detect results are rejected, UR.

FDSHW12A01	trans-1,4-dichloro-2-butene (95.7)

The continuing calibration standard N24868.D contained three (3) compounds with RRFs less than 0.05. For the samples and non-compliant compound listed below, positive results are qualified as estimated, J, and non-detect results are rejected, UR.

FDSHW12A01	acetonitrile (0.036) Isobutyl alcohol (0.009) 1,4-dioxane (0.002)

Field Duplicates

The field duplicate pairs of samples FDSGW08C01/FDSHW08C01 and FDSGW12A01/FDSHW12A01 exhibited non-compliant precision for acetone.

Specific Finding

The positive results reported for acetone in the field duplicate samples FDSHW08C01 and FDSHW12A01 are qualified as estimated, J, due to non-compliant field duplicate precision.

System Performance and Overall Assessment

The data reviewer estimates that less than 10% of the data required qualifications/rejections.

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
FDSHW08C01	acrolein (0.035) acetonitrile (0.031) Isobutyl alcohol (0.007) 1,4-dioxane (0.002)	+/-	J/UR
FDSHW12A01	trans-1,4-dichloro-2-butene	+/-	J/UR
FDSHW12A01	acetonitrile (0.036) Isobutyl alcohol (0.009) 1,4-dioxane (0.002)	+/-	J/UR
FDSHW08C01 FDSHW12A01	acetone	+	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 8270 for the Appendix IX List; the National Functional Guidelines for Organic Data Validation, June 1991, and DQO Level IV 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 # 28249A

A validation was performed on the Semivolatile Data from SDG 28249A. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Internal Standard Performance
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Initial Calibrations

The laboratory did not calibrate the instrument for three (3) compounds which were reported as target compounds. Therefore, the results for these compounds required rejection.

Initial Calibrations, continued

Specific Finding

The results for the following compounds are rejected, UR, in all samples, because there was no calibration analyzed for them.

Carbazole
1,2-Dibromo-3-chloropropane
3-Methyl cholanthrene

Continuing Calibrations

The continuing calibrations that were analyzed by the laboratory for these samples were not acceptable for all compound %Ds. The continuing calibration standards that were analyzed did not all meet the minimum RRF criteria.

Specific Findings

The continuing calibrations on analyzed on 01/28/97 on instrument A.I contained compounds with average RRFs less than 0.05. For the samples and non-compliant compounds listed below, the positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

FDSHW08C01	aramite (0.047)
	hexachlorophene (0.041)

The continuing calibration on 01/28/97 on instrument A.I contained compounds with %Ds greater than 50% but less than 90%. For the samples and non-compliant compounds listed below, all positive and non-detect results are qualified as estimated, J/UJ.

FDSHW08C01	2,6-dichlorophenol (50.7)
	Hexachloropropene (57.7)
	1,2,4,5-tetrachlorobenzene (74.3)
	Pentachlorobenzene (69.1)
	N-nitrosodiethylamine (58.9)
	Ethyl methanesulfonate (53.1)
	2-picoline (68.2)
	1-nitroso-piperidine (51.4)
	o,o,o-triethylphosphorothio (50.8)

Continuing Calibrations, continued

Specific Finding

The continuing calibration on 01/28/97 on instrument A.I contained compounds with %Ds greater than 50% but less than 90%. For the samples and non-compliant compounds listed below, all positive and non-detect results are qualified as estimated, J/UJ.

FDSHW08C01	Safrole (61.4)
	Isosafrole (57.3)
	1-naphthylamine (52.7)
	2-naphthylamine (50.3)
	Thionazin (53.3)
	2-methyl-5-nitroaniline (57.5)
	Phorate (52.4)
	Dimethoate (51.1)
	4-aminobiphenyl (53.3)
	Pronamide (62.1)
	Pentachloronitrobenzene (73.9)
	Methyl parathion (51.7)
	Parathion (51.8)
	Isodrin (52.1)
	Famphur (63.2)
	4-nitroquinoline-1-oxide (55.7)
	Diphenylamine (62.4)
	Sulfotepp (54.6)
	Kepone (63.8)

The continuing calibration on 02/04/97 on instrument A.I contained compounds with %Ds greater than 50% but less than 90%. For the samples and non-compliant compounds listed below, all positive and non-detect results are qualified as estimated, J/UJ.

FDSHW12A01	N-nitrosodiethylamine (57.4)
	2-picoline (50.8)
	1-nitroso-piperidine (62.1)
	N-nitrosodi-n-butylamine (56.8)
	Safrole (63.7)
	1,3-dinitrobenzene (89.9)
	1-naphthylamine (65.1)

Continuing Calibrations, continued

Specific Finding

The continuing calibration on 02/04/97 on instrument A.I contained compounds with %Ds greater than 50% but less than 90%. For the samples and non-compliant compounds listed below, all positive and non-detect results are qualified as estimated, J/UJ.

FDSHW12A01	2-naphthylamine (58.8)
	2-methyl-5-nitroaniline (75.4)
	Phenacetin (55.3)
	Diallate (80.1)
	Dimethoate (55.7)
	4-aminobiphenyl (59.8)
	Pronamide (60.3)
	Pentachloronitrobenzene (57.4)
	Methyl parathion (63.9)
	Parathion (77.9)
	Famphur (58.7)
	Diphenylamine (59.9)
	Sulfotepp (82.8)

The continuing calibrations on analyzed on 02/04/97 on instrument A.I contained compounds with average RRFs less than 0.05. For the samples and non-compliant compounds listed below, the positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

FDSHW12A01	aramite (0.039)
	hexachlorophene (0.041)

The continuing calibrations on analyzed on 02/04/97 on instrument A.I contained compounds with %Ds greater than 90%. For the samples and non-compliant compounds listed below, the positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

FDSHW12A01	4-nitroquinoline-1-oxide (111.7)

Field QC Blanks

One (1) field blank exhibited contamination which resulted in the qualification of field samples.

	FDSFW13A01
bis(2-ethylhexyl)phthalate	2 μg/L

Specific Findings

Blank	Samples	Compound	Action Level	Qualification
FDSFW13A01	FDSHW12A01	bis(2-ethylhexyl)phthalate	20 μg/L	CRQL

System Performance and Overall Assessment

The data reviewer estimates less than 15% of data required qualifications/rejections.

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
All Samples	Carbazole	+/-	UR
	1,2-Dibromo-3-chloropropane		
	3-Methyl cholanthrene		
FDSHW08C01	aramite (0.047)	+/-	J/UR
	hexachlorophene (0.041)		
FDSHW08C01	2,6-dichlorophenol (50.7)	+/-	J/UJ
	Hexachloropropene (57.7)		
	1,2,4,5-tetrachlorobenzene (74.3)		
	Pentachlorobenzene (69.1)		
	N-nitrosodiethylamine (58.9)		
	Ethyl methanesulfonate (53.1)		
	2-picoline (68.2)		
	1-nitroso-piperidine (51.4)		
	o,o,o-triethylphosphorothio (50.8)		
	Safrole (61.4)		
	Isosafrole (57.3)		
	1-naphthylamine (52.7)		
	2-naphthylamine (50.3)		
	Thionazin (53.3)		
	2-methyl-5-nitroaniline (57.5)		
	Phorate (52.4)		
	Dimethoate (51.1)		
	4-aminobiphenyl (53.3)		
	Pronamide (62.1)		
	Pentachloronitrobenzene (73.9)		
	Methyl parathion (51.7)		
	Parathion (51.8)		
	Isodrin (52.1)		
	Famphur (63.2)		
	4-nitroquinoline-1-oxide (55.7)		
	Diphenylamine (62.4)		
	Sulfotepp (54.6)		
	Kepone (63.8)		

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
FDSHW12A01	N-nitrosodiethylamine (57.4)	+/-	J/UJ
	2-picoline (50.8)		
	1-nitroso-piperidine (62.1)		
	N-nitrosodi-n-butylamine (56.8)		
	Safrole (63.7)		
	1,3-dinitrobenzene (89.9)		
	1-naphthylamine (65.1)		
	2-naphthylamine (58.8)		
	2-methyl-5-nitroaniline (75.4)		
	Phenacetin (55.3)		
	Diallate (80.1)		
	Dimethoate (55.7)		
	4-aminobiphenyl (59.8)		
	Pronamide (60.3)		
	Pentachloronitrobenzene (57.4)		
	Methyl parathion (63.9)		
	Parathion (77.9)		
	Famphur (58.7)		
	Diphenylamine (59.9)		
	Sulfotepp (82.8)		
FDSHW12A01	aramite (0.039)	+/-	J/UR
	hexachlorophene (0.041)		
FDSHW12A01	4-nitroquinoline-1-oxide (111.7)	+/-	J/UR
FDSHW12A01	bis(2-ethylhexyl)phthalate	+	CRQL

* DL denotes the Form 1 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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 28249A

A validation was performed on the Pesticide/Aroclor Data from SDG 28249A. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Surrogate Recoveries

One (1) field sample exhibited non-compliant TCX recoveries.

Specific Finding

The sample listed below exhibited low TCX recoveries. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ.

Sample ID	Surrogate	% Recovery
FDSHW08C01	TCX-1/TCX-2	35%/30%

System Performance and Overall Assessment

The data reviewer estimates less than 10% of 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
FDSHW08C01	ALL	+/-	J/UJ

* 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

ORGANOPHOSPHORUS PESTICIDES

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 SW846 Method 8140; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 28249A

A validation was performed on the Organophosphorus Pesticide Data from SDG 28249A. 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

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

DATA ASSESSMENT NARRATIVE

CHLORINATED HERBICIDES

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 SW846 Method 8150; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 28249A

A validation was performed on the Herbicide Data from SDG 28249A. 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

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

DATA ASSESSMENT NARRATIVE
METALS, HEXAVALENT CHROMIUM AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level IV 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 # 28249B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 28249B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Aluminum	37.6 ug/l	all water samples below 188 ug/l
Antimony	2.42 ug/l	all water samples below 12.1 ug/l
Calcium	1385 ug/l	no impact
Manganese	0.77 ug/l	no impact
Tin	2.70 ug/l	no impact

The field blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Barium	0.44 ug/l	no impact
Copper	0.6 ug/l	all water samples below 3.0 ug/l
Nickel	0.86 ug/l	no impact
Sodium	1040 ug/l	no impact
Zinc	6.0 ug/l	all water samples below 30.0 ug/l

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Field and Laboratory duplicate results

Samples FDSGW12A01 and FDSHW12A01

The field duplicate analysis for Aluminum (74%) was greater than 35%. All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All water samples below 188 ug/l	Al.	+	U
All water samples below 12.1 ug/l	Sb.		
All water samples below 3.0 ug/l	Cu.		
All water samples below 4.3 ug/l	Ni.		
All water samples below 30.0 ug/l	Zn.		
FDSHW12A01.	Al.	+	J
All "B" results	all analytes	B	J

DATA ASSESSMENT AND NARRATIVE

Dioxin/Furans

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 U.S. EPA SW846, Method 8290; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 28249

A validation was performed on the Dioxin/Furans Data from SDG 28249. The data was evaluated based on the following parameters.

* • Data Completeness
* • Holding Times
* • Mass Resolution Checks
* • Column Performance
* • Calibrations
* • Internal Standard Performance
* • Blanks
* • Matrix Spike/Matrix Spike Duplicate
* • Field Duplicates
* • Congener Identification /Quantitation

* - All criteria were met for this parameter

System Performance and Overall Assessment

The laboratory did not encounter any large problems. 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

UR = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	CONGENER	DL	QL

No qualifications are required.

* DL denotes the Form 1 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#:	28249B
Date:	February 18, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	January 22-27, 1997
Number of Samples:	16 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Metals, Cyanide

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 in 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 B. Scarson

Paul B. Hamburg, President

2/24/97

Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 28249B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
FDSGW14C01	WATER	X		X		X		X		X	
FDSTW14C01	WATER	X									
FDSGW07D01	WATER	X		X		X		X		X	
FDSGW08A01	WATER	X		X		X		X		X	
FDSGW08C01	WATER	X		X		X		X		X	
FDSTW08C01	WATER	X									
FDSGW13C01	WATER	X		X		X		X		X	
FDSGW14A01	WATER	X		X		X		X		X	
FDSGW13B01	WATER	X		X		X		X		X	
FDSGW13A01	WATER	X		X		X		X		X	
FDSGW12A01	WATER	X		X		X		X		X	
FDSGW14B01	WATER	X		X		X		X		X	
FDSGW12B01	WATER	X		X		X		X		X	
FDSGW13D01	WATER	X		X		X		X		X	
FDSTW13C01	WATER	X									
FDSGW08B01	WATER	X		X		X		X		X	
Total Billable Samples (Water/Soil)		16	0	13	0	13	0	13	0	13	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
TAL= SW846 Metals
CN= SW846 Cyanide

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 8240; the National Functional Guidelines for Organic Data Validation, June 1991, 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 # 28249B

A validation was performed on the Volatile Data from SDG 28249B. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibration
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
	•	Field Duplicates
*	•	Internal Standard Performance
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Field Duplicates

The field duplicate pairs of samples FDSGW08C01/FDSHW08C01 and FDSGW12A01/FDSHW12A01 exhibited non-compliant precision for acetone. Qualifications were required.

Field Duplicates, continued

Specific Finding

The positive and non-detect results reported for acetone in the field duplicate samples FDGW08C01 and FDSGW12A01 are qualified as estimated, J, due to non-compliant field duplicate precision.

System Performance and Overall Assessment

The data reviewer estimates that less than 5% of the data required qualifications/rejections.

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
FDSGW08C01	acetone	+/-	J/UJ
FDSGW12A01			

* 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 assume that all analytical results are correct as reported and are 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 8270; the National Functional Guidelines for Organic Data Validation, June 1991, 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 # 28249B

A validation was performed on the Semivolatile Data from SDG 28249B. The data was evaluated based on the following parameters:

- * Data Completeness
- * Holding Times
- * GC/MS Tuning
- * Calibration
- Blanks
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicates
- * Field Duplicates
- * Internal Standard Performance
- * Compound Identification
- Compound Quantitation

* - All criteria were met for this parameter.

Field QC Blanks

One (1) field blank exhibited contamination which resulted in the qualification of field samples.

	FDSFW13A01
bis(2-ethylhexyl)phthalate	2 μg/L

Field QC Blanks, continued

Specific Findings

Blank	Samples	Compound	Action Level	Qualification
FDSFW13A01	FDSGW07D01 FDSGW13A01	bis(2-ethylhexyl)phthalate	20 µg/L	CRQL
	FDSGW13B01	bis(2-ethylhexyl)phthalate	20 µg/L	U

Surrogate Recoveries

Specific Finding

The following sample exhibited recoveries less than 10% for the acid surrogate compounds. All positive acid results are qualified as estimated, J, and all non-detect acid results are rejected, UR.

Sample	Surrogate Compound	%R
FDSGW12B01	phenol-d5	5%
	2-fluorophenol	2%
	2,4,6-tribromophenol	2%

Matrix Spike/Matrix Spike Duplicates

Specific Finding

The MS/MSD pair of sample GDSGW13C01 exhibited recoveries less than 10% for the following compounds. For the noted sample and compounds, the positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

Sample	Spike Compounds	%R
FDSGW13C01	2,4-dinitrotoluene	3%/3%
	4-nitrophenol	0%/0%

Compound Quantitation

Specific Finding

The following sample is rejected, UR, in favor of the results reported from the original analysis. Both samples exhibited similar surrogate recoveries for the acid fraction.

FDSGW12B01RE

System Performance and Overall Assessment

The data reviewer estimates less than 20% of data required 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
FDSGW07D01 FDSGW13A01	bis(2-ethylhexyl)phthalate	+	CRQL
FDSGW13B01	bis(2-ethylhexyl)phthalate	+	U
FDSGW12B01	All Acid Compounds	+/-	J/UR
FDSGW13C01	2,4-dinitrotoluene 4-nitrophenol	+/-	J/UR
FDSGW12B01RE	All Compounds	+/-	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 28249B

A validation was performed on the Pesticide/Aroclor Data from SDG 28249B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Surrogate Recoveries

Five (5) field samples exhibited non-compliant TCX recoveries.

Specific Finding

The samples listed below exhibited low TCX recoveries. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ.

Sample ID	Surrogate	% Recovery
FDSGW14C01	TCX-2	39%
FDSGW07D01	TCX-2	42%
FDSGW08A01	TCX-2	42%
FDSGW08C01	TCX-2	39%
FDSGW08B01	TCX-1/TCX-2	29%/26%

System Performance and Overall Assessment

The data reviewer estimates less than 10% of 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
FDSGW14C01	ALL	+/-	J/UJ
FDSGW07D01			
FDSGW08A01			
FDSGW08C01			
FDSGW08B01			

* 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
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 28249A

A validation was performed on the Metals and Cyanide Data from SDG 28249A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
	•	Matrix Spike Recovery
*	•	Matrix Duplicates
	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Aluminum	37.6 ug/l	all water samples below 188 ug/l
Antimony	2.42 ug/l	all water samples below 12.1 ug/l
Calcium	1385 ug/l	no impact
Manganese	0.77 ug/l	no impact
Tin	2.70 ug/l	all water samples below 13.5 ug/l

The field blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Barium	0.44 ug/l	no impact
Copper	0.6 ug/l	all water samples below 3.0 ug/l
Nickel	0.86 ug/l	all water samples below 4.3 ug/l
Sodium	1040 ug/l	no impact
Zinc	6.0 ug/l	all water samples below 30.0 ug/l

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Matrix Spike Recovery

The matrix spike recovery for water for Iron (24%) was below 30%. All positive results are qualified as estimated, "J" and all non-detect results are rejected.

The matrix spike recoveries for waters for Potassium (37%) and Thallium (74%) were below the lower control limits (>30% but <75%). All positive and non-detect results are qualified as estimated, "J" or "UJ".

Field and Laboratory duplicate results

The laboratory duplicate analysis for Iron (29%) was greater than 20%. All positive results are qualified as estimated, "J".

Samples FDSGW12A01 and FDSHW12A01

The field duplicate analysis for Aluminum (74%) was greater than 35%. All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All water samples below 188 ug/l	Al.	+	U
All water samples below 12.1 ug/l	Sb.		
All water samples below 3.0 ug/l	Cu.		
All water samples below 4.3 ug/l	Ni.		
All water samples below 30.0 ug/l	Zn.		
All water samples below 13.5 ug/l	Sn.		
All water samples	Fe.	+	J
		U	R
All water samples	K and Tl.	+/U	J/UJ
All water samples	Fe.	+	J
FDSGW12A01.	Al.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	28308B
Date:	February 18, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	January 28-29, 1997
Number of Samples:	19 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticide/PCB's, Metals, Cyanide

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 in 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 Kimberly S. Shopp — 21 February 1997

for Paul B. Humburg, President — Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 28308B

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
FDSGW01E01	WATER	X		X		X		X		X	
FDSGW07A01	WATER	X		X		X		X		X	
FDSTW07A01	WATER	X									
FDSGW11A01	WATER	X		X		X		X		X	
FDSGW11B01	WATER	X		X		X		X		X	
FDSGW11C01	WATER	X		X		X		X		X	
FDSTW11C01	WATER	X									
FDSGW13E01	WATER	X		X		X		X		X	
FDSGW15A01	WATER	X		X		X		X		X	
FDSGW15B01	WATER	X		X		X		X		X	
FDSGW15C01	WATER	X		X		X		X		X	
FDSGW16A01	WATER	X		X		X		X		X	
FDSGW16B01	WATER	X		X		X		X		X	
FDSGW16C01	WATER	X		X		X		X		X	
FDSGW17A01	WATER	X		X		X		X		X	
FDSGW17B01	WATER	X		X		X		X		X	
FDSGW18A01	WATER	X		X		X		X		X	
FDSTW18A01	WATER	X									
GDGGW002A1	WATER							X			
Total Billable Samples (Water/Soil)		18	0	15	0	15	0	16	0	15	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
TAL= SW846 Metals
CN= SW846 Cyanide

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 8240; the National Functional Guidelines for Organic Data Validation, June 1991, 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 # 28308B

A validation was performed on the Volatile Data from SDG 28308B. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
*	•	Calibration
	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
	•	Field Duplicates
*	•	Internal Standard Performance
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Field QC Blanks

The rinseate blank associated with these samples exhibited contamination. One (1) sample required qualification. 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 consideration when applying the 5X or 10X criteria to field samples.

Field Blanks, continued

	FDSEW11A01
chloroform	1 μg/L

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
FDSEW11A01	FDSGW18A01	chloroform	5 μg/L	CRQL

Field Duplicates

The field duplicate pair of samples FDSGW11C01/FDSHW11C01 exhibited non-compliant precision for acetone (RPD 31%).

Specific Finding

The positive result reported for acetone in the field duplicate sample FDSGW11C01 is qualified as estimated, J, due to non-compliant field duplicate precision.

System Performance and Overall Assessment

The data reviewer estimates that less than 10% of the data required qualifications/rejections.

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
FDSGW18A01	chloroform	+	CRQL
FDSGW11C01	acetone	+	J

* DL denotes the Form 1 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 assume that all analytical results are correct as reported and are 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 8270; the National Functional Guidelines for Organic Data Validation, June 1991, 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 # 28308B

A validation was performed on the Semivolatile Data from SDG 28308B. The data was evaluated based on the following parameters:

- * Data Completeness
- * Holding Times
- * GC/MS Tuning
- * Calibration
- Blanks
- * Surrogate Recoveries
- * Matrix Spike/Matrix Spike Duplicates
- * Field Duplicates
- * Internal Standard Performance
- * Compound Identification
- * Compound Quantitation

* - All criteria were met for this parameter.

Field QC Blanks

One (1) rinseate blank and one (1) field blank exhibited contamination which resulted in the qualification of field samples.

	FDSFW13A01	FDSEW11A01
nitrobenzene	-------	1 μg/L
bis(2-ethylhexyl)phthalate	2 μg/L	-------

Field QC Blanks, continued

Specific Findings

Blank	Samples	Compound	Action Level	Qualification
FDSEW11A01	FDSGW17A01	nitrobenzene	5 μg/L	CRQL
FDSFW13A01	FDSGW11C01	bis(2-ethylhexyl)phthalate	20 μg/L	CRQL

System Performance and Overall Assessment

The data reviewer estimates less than 5% of data required 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 diiution 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
FDSGW17A01	nitrobenzene	+	CRQL
FDSGW11C01	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 28308B

A validation was performed on the Pesticide/Aroclor Data from SDG 28308B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Surrogate Recoveries

Two (2) field samples exhibited non-compliant TCX recoveries.

Specific Finding

The samples listed below exhibited low TCX recoveries. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ.

Sample ID	Surrogate	% Recovery
FDSGW15A01	TCX-2	40%

Compound Identification/Quantitation

One (1) sample was re-extracted. It is the professional opinion of the data validator that the results from the original analysis be rejected in favor of the RE analysis due to improved surrogate recoveries. One (1) sample exhibited a column quantitation %D greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion).

Specific Findings

For the following sample, the results from the original analysis are rejected, UR, in favor of the results from the RE analysis due to improved surrogate recoveries.

FDSGW16B01

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results less than 10X the CRQL are reported as undetected, U.

System Performance and Overall Assessment

The data reviewer estimates less than 10% of 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
FDSGW15A01	ALL	+/-	J/UJ
FDSGW16B01	ALL	+/-	UR
ALL	All P > 70% And < 10X CRQL	+	U

* 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
METALS AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 28308A

A validation was performed on the Metals and Cyanide Data from SDG 28308A. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Calcium	29.5 ug/l	no impact
Zinc	5.97 ug/l	all water samples below 29.9 ug/l
Tin	3.31 ug/l	all water samples below 16.6 ug/l

The equipment blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Barium	0.37 ug/l	no impact
Beryllium	0.44 ug/l	all water samples below 2.2 ug/l
Copper	0.6 ug/l	all water samples below 3.0 ug/l
Zinc	7.8 ug/l	all water samples below 39.0 ug/l

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Serial Dilutions

Specific Findings

The Serial dilutions for waters for Barium, Calcium, Iron, Magnesium and Manganese were outside the control limits (>10%). All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All water samples below 39.0 ug/l	Zn.	+	U
All water samples below 16.6 ug/l	Sn.		
All water samples below 2.2 ug/l	Be.		
All water samples below 3.0 ug/l	Cu.		
All water samples	Ba, Ca, Fe, Mg and Mn.	+	J
All "B" results	all analytes	B	J

ANNOTATED FORM Is

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 8240; the National Functional Guidelines for Organic Data Validation, June 1991, and DQO Level IV 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 # 28308A

A validation was performed on the Volatile Data from SDG 28308A. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
	•	Field Duplicates
*	•	Internal Standard Performance
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Continuing Calibrations

The continuing calibration standard associated with the samples exhibited non-compliant %Ds and RRFs. Qualifications were required.

Continuing Calibrations, continued

Specific Findings

The continuing calibration standard N24894.D contained three (3) compounds with RRFs less than 0.05. For the samples and non-compliant compound listed below, positive results are qualified as estimated, J, and non-detect results are rejected, UR.

FDSHW11C01	acetonitrile (0.032)
	Isobutyl alcohol (0.008)
	1,4-dioxane (0.002)

The continuing calibration standard N24894.D contained one (1) compound with a %D greater than 50% but less than 90%. For the samples and non-compliant compound listed below, positive results are qualified as estimated, J, and non-detect results are qualified as estimated, UJ.

FDSHW11C01	acrolein (55.3%)

Field Duplicates

The field duplicate pair of samples FDSGW11C01/FDSHW11C01 exhibited non-compliant precision for acetone (RPD 31%).

Specific Finding

The positive result reported for acetone in the field duplicate sample FDSHW11C01 is qualified as estimated, J, due to non-compliant field duplicate precision.

System Performance and Overall Assessment

The data reviewer estimates that less than 10% of the data required qualifications/rejections.

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
FDSHW11C01	acetonitrile (0.032) Isobutyl alcohol (0.008) 1,4-dioxane (0.002)	+/-	J/UR
FDSHW11C01	acrolein (55.3%)	+/-	J/UJ
FDSHW11C01	acetone	+	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 8270 for the Appendix IX List; the National Functional Guidelines for Organic Data Validation, June 1991, and DQO Level IV 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 # 28308A

A validation was performed on the Semivolatile Data from SDG 28308A. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Internal Standard Performance
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Initial Calibrations

The laboratory did not calibrate the instrument for three (3) compounds which were reported as target compounds. Therefore, the results for these compounds required rejection.

Initial Calibrations, continued

Specific Finding

The results for the following compounds are rejected, UR, in all samples, because there was no calibration analyzed for them.

Carbazole
1,2-Dibromo-3-chloropropane
3-Methyl cholanthrene

Continuing Calibrations

The continuing calibrations that were analyzed by the laboratory for these samples were not acceptable for all compound %Ds. The continuing calibration standards that were analyzed did not all meet the minimum RRF criteria.

Specific Findings

The continuing calibrations on analyzed on 01/30/97 on instrument A.I contained compounds with average RRFs less than 0.05. For the samples and non-compliant compounds listed below, the positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

FDSHW11C01	aramite (0.045)
	hexachlorophene (0.034)

The continuing calibration on 01/30/97 on instrument A.I contained compounds with %Ds greater than 50% but less than 90%. For the samples and non-compliant compounds listed below, all positive and non-detect results are qualified as estimated, J/UJ.

FDSHW11C01	2,6-dichlorophenol (52.7)
	1,2,4,5-tetrachlorobenzene (78.2)
	Pentachlorobenzene (69.6)
	N-nitrosomethylethylamine (51.5)
	N-nitrosodiethylamine (63.2)
	1-nitroso-piperidine (57.0)
	o,o,o-triethylphosphorothio (55.6)
	N-nitrosodi-n-butylamine (52.3)

Continuing Calibrations, continued

Specific Finding

The continuing calibration on 01/30/97 on instrument A.I contained compounds with %Ds greater than 50% but less than 90%. For the samples and non-compliant compounds listed below, all positive and non-detect results are qualified as estimated, J/UJ.

FDSHW11C01	Safrole (57.3) Isosafrole (64.1) 1,4-naphthoquinone (52.7) 1-naphthylamine (61.6) 2-naphthylamine (55.2) 2-methyl-5-nitroaniline (63.4) 4-aminobiphenyl (58.8) Pronamide (66.4) Pentachloronitrobenzene (68.0) Parathion (53.4) Isodrin (53.1) Diphenylamine (54.6) Kepone (70.9)

Field QC Blanks

One (1) field blank exhibited contamination which resulted in the qualification of field samples.

	FDSFW13A01
bis(2-ethylhexyl)phthalate	2 μg/L

Specific Findings

Blank	Samples	Compound	Action Level	Qualification
FDSFW13A01	FDSHW11C01	bis(2-ethylhexyl)phthalate	20 μg/L	CRQL

System Performance and Overall Assessment

The data reviewer estimates less than 15% of data required qualifications/rejections.

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
FDSHW11C01	Carbazole	+/-	UR
	1,2-Dibromo-3-chloropropane		
	3-Methyl cholanthrene		
FDSHW11C01	aramite (0.045)	+/-	J/UR
	hexachlorophene (0.034)		
FDSHW11C01	2,6-dichlorophenol (52.7)	+/-	J/UJ
	1,2,4,5-tetrachlorobenzene (78.2)		
	Pentachlorobenzene (69.6)		
	N-nitrosomethylethylamine (51.5)		
	N-nitrosodiethylamine (63.2)		
	1-nitroso-piperidine (57.0)		
	o,o,o-triethylphosphorothio (55.6)		
	N-nitrosodi-n-butylamine (52.3)		
	Safrole (57.3)		
	Isosafrole (64.1)		
	1,4-naphthoquinone (52.7)		
	1-naphthylamine (61.6)		
	2-naphthylamine (55.2)		
	2-methyl-5-nitroaniline (63.4)		
	4-aminobiphenyl (58.8)		
	Pronamide (66.4)		
	Pentachloronitrobenzene (68.0)		
	Parathion (53.4)		
	Isodrin (53.1)		
	Diphenylamine (54.6)		
	Kepone (70.9)		
FDSHW11C01	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

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 28308A

A validation was performed on the Pesticide/Aroclor Data from SDG 28308A. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory analyzed a single point curve for the aroclors and toxaphene. No positive results were reported for the aroclors or toxaphene, therefore the data did not require qualification.

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

DATA ASSESSMENT NARRATIVE

ORGANOPHOSPHORUS PESTICIDES

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 SW846 Method 8140; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 28308A

A validation was performed on the Organophosphorus Pesticide Data from SDG 28308A. 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

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

DATA ASSESSMENT NARRATIVE

CHLORINATED HERBICIDES

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 SW846 Method 8150; the National Functional Guidelines for Organic Data Validation, June 1991; and DQO Level IV 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 # 28308A

A validation was performed on the Herbicide Data from SDG 28308A. 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

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

DATA ASSESSMENT NARRATIVE
METALS, HEXAVALENT CHROMIUM AND CYANIDE

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic Data Validation, February 1994, and DQO Level IV 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 # 28308B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 28308B. The data was evaluated based on the following parameters.

*	•	Data Completeness
*	•	Holding Times
*	•	Calibrations
	•	Blanks
*	•	Interferences
*	•	Matrix Spike Recovery
*	•	Matrix Duplicates
*	•	Field Duplicates
*	•	Laboratory Control Samples
*	•	Serial Dilutions
*	•	Post Digestion Spiking

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Calcium	29.5 ug/l	no impact
Zinc	5.97 ug/l	all water samples below 29.9 ug/l

The equipment blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Barium	0.37 ug/l	no impact
Beryllium	0.44 ug/l	all water samples below 2.2 ug/l
Copper	0.6 ug/l	all water samples below 3.0 ug/l
Zinc	7.8 ug/l	all water samples below 39.0 ug/l

The USEPA requires that all sample values below five times the preparation, field, DI or calibration blank contamination be qualified as non-detect, "U".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All water samples below 39.0 ug/l	Zn.	+	U
All water samples below 16.6 ug/l	Sn.		
All water samples below 2.2 ug/l	Be.		
All water samples below 3.0 ug/l	Cu.		
All "B" results	all analytes	B	J

DATA ASSESSMENT AND NARRATIVE

Dioxin/Furans

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 U.S. EPA SW846, Method 8290; National Functional Guidelines for Organic Data Review, and DQO Level IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 28308

A validation was performed on the Dioxin/Furans Data from SDG 28308. The data was evaluated based on the following parameters.

* • Data Completeness
* • Holding Times
* • Mass Resolution Checks
* • Column Performance
* • Calibrations
* • Internal Standard Performance
* • Blanks
* • Matrix Spike/Matrix Spike Duplicate
* • Field Duplicates
* • Congener Identification /Quantitation

* - All criteria were met for this parameter

System Performance and Overall Assessment

The laboratory did not encounter any large problems. 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

UR = Result is rejected and unusable

D= Result value is based on the 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 analyte 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 analyte 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.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	CONGENER	DL	QL

No qualifications are 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#:	28896
Date:	April 21, 1997
Client Name:	Ensafe/Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	March 19, 1997
Number of Samples:	2 Aqueous Sample(s) with 0 MS/MSD(s) 1 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, June 1991 and February, 1994, respectively
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, Pesticides/PCBs, Organophosphorous Pesticides, TAL Metals

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 in 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:

Kimberly S. Gropp
for Paul B. Humburg, President

25 April 1997
Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1335

SDG# 28896

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		TAL	
637M000101	SOIL		X		X		X		X		X
637W000101	WATER	X		X		X		X		X	
637T000201	WATER	X									
Total Billable Samples (Water/Soil)		2	1	1	1	1	1	1	1	1	1

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
OPP= SW846 Organophosphorous Pesticides
TAL= SW846 Metals

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 8260 for Volatile Organics; the National Functional Guidelines for Organic Data Validation, June 1991, 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 # 28896

A validation was performed on the Volatile Data from SDG 28896. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC/MS Tuning
	•	Calibration
	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Field Duplicates
*	•	Internal Standard Performance
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

Initial Calibration

The initial calibration analyzed 03/87/97on instrument I exhibited compounds with %RSDs greater than 50%. For the following compounds and samples, the positive and non-detect results are qualified as estimated, J/UJ.

637M000101 chloroethane (58.3%)

Method Blanks

Specific Finding

Associated Blank	Compound	Conc.	Action Level
VBLK01	methylene chloride	4 μg/Kg	40 μg/Kg

Samples	Compound	Qualification
637M000101	methylene chloride	U

System Performance and Overall Assessment

The data reviewer estimates that less than 5% of the data required 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 5X (10X for common contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that concentration is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound concentration reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common 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
637M000101	chloroethane	+/-	J/UJ
637M000101	methylene chloride	+B	U

* 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 8270; the National Functional Guidelines for Organic Data Validation, June 1991, 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 # 28896

A validation was performed on the Semivolatile Data from SDG 28896. The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • GC/MS Tuning
* • Calibration
* • Blanks
* • Surrogate Recoveries
* • Matrix Spike/Matrix Spike Duplicates
* • Field Duplicates
* • Internal Standard Performance
* • Compound Identification
* • Compound Quantitation

* - All criteria were met for this parameter.

System Performance and Overall Assessment

No qualification of the data was required.

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 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

DATA ASSESSMENT NARRATIVE

PESTICIDE/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 SW846 Method 8080A; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 28896B

A validation was performed on the Pesticide/Aroclor Data from SDG 28896B. 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.

Contractual Non-Compliance

The method requires that all target compounds, including the multi-component compounds, be analyzed with a five (5) point calibration curve. The laboratory did not analyze a five (5) point curve for all aroclors and toxaphene in each sequence included in this SDG. No positive results were reported for the compounds analyzed with a single point calibration, therefore the data did not require qualification.

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results were qualified as presumptively present at an estimated concentration (NJ) if they exhibited %Ds greater than 70% and one (1) or more of the following: were outside the calibration range, the result of a dilution, or above 10X the CRQL (professional opinion). For sample 637M000101 the Aroclor 1016 result exhibited a %D greater than 70% and was less than 10X the CRQL. However, based on the professional opinion of the data validator, the result was qualified as presumptively present at an estimated concentration (NJ) instead of non-detect (U) because of the magnitude of the result and the identification criteria for aroclors. It is the professional opinion of the data validator that single component pesticides reported in the samples with high concentrations of aroclors should be considered suspect.

Specific Findings

For sample 637M000101, the result for Aroclor 1016 is qualified as presumptively present at an estimated concentration, NJ, as noted above.

637M000101 Aroclor 1016

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and results less than 10X the CRQL are reported as undetected, U.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and one of the following: results greater than 10X the CRQL, outside the calibration range, or the result of a dilution, are qualified as presumptively present at an estimated concentration, NJ.

System Performance and Overall Assessment

The data reviewer estimates less than 10% of 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
637M000101	Aroclor 1016	+	NJ
ALL	All P > 70% And < 10X CRQL	+	U
ALL	All P > 70% And > 10X CRQL, > cal. range, or DL result	+	NJ

* 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

ORGANOPHOSPHORUS PESTICIDES

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 SW846 Method 8140; the National Functional Guidelines for Organic Data Validation, June 1991; 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 # 28896B

A validation was performed on the Organophosphorus Pesticide Data from SDG 28896B. 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

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

DATA ASSESSMENT NARRATIVE
METALS

General

The inorganic 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, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 Methods; the Functional Guidelines for Inorganic 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 # 28896

A validation was performed on the Metals Data from SDG 28896. The data was evaluated based on the following parameters.

- * Data Completeness
- * Holding Times
- * Calibrations
- Blanks
- * Interferences
- * Matrix Spike Recovery
- * Matrix Duplicates
- * Field Duplicates
- * Laboratory Control Samples
- Serial Dilutions

* - All criteria were met for this parameter.

Preparation and Field Blanks

Specific Finding

The preparation blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Aluminum	10.9 ug/l	no impact
Antimony	1.65 ug/l	no impact
Iron	42.2 ug/l	no impact
Lead	1.54 ug/l	no impact
Aluminum	2.16 mg/kg	no impact

Calcium	6.38 mg/kg	no impact
Chromium	0.08 mg/kg	no impact
Tin	0.64 mg/kg	no impact

The USEPA requires that all sample values below five times the preparation, field, or DI or calibration blank contamination be qualified as non-detect, "U".

Serial Dilution

Specific Findings

The serial dilution for soils for Zinc was greater than 10%. All positive results are qualified as estimated, "J".

Specific Finding

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B" per Ensafe's request.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All soil samples	Zn.	+	J
All "B" results	all analytes	B	J