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INVESTIGATION REPORT ADDENDUM ZONE F RESOURCE CONSERVATION AND RECOVERY ACT FACILITY VOLUME V OF V APPENDIX E CNC CHARLESTON SC
3/31/1999
ENSAFE

ZONE F
RCRA FACILITY
INVESTIGATION REPORT - ADDENDUM
CHARLESTON NAVAL COMPLEX

VOLUME V of V
APPENDIX E

CONTRACT N62467-89-D-0318
CTO-029

Prepared for:

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

Prepared by:

EnSafe Inc.
5724 Summer Trees Drive
Memphis, Tennessee 38134
(901)372-7962

March 31, 1999
Revision: 0

Appendix E
Zone F
Data Validation Reports

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	26739A
Date:	October 23, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	August 30, 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 B. Simpson
Paul B. Humburg, President

10/30/96
Date

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

SDG# 26739A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
617CB00202	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 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 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 # 26739A

A validation was performed on the Volatile Data from SDG 26739A. 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 average RRF requirements were not met for all continuing calibration compounds.

Continuing Calibrations, continued

Specific Findings

The continuing calibration standard I20945.D contained compounds with average 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.

617CB00202	Isobutyl alcohol (0.008) Acetonitrile (0.019) 1,4-dioxane (0.002) Acrolein (0.015)

The continuing calibration standard I20945.D contained a compound with a %D greater than 50% but less than 90%. For the samples and non-compliant compounds listed below, the positive results and non-detect results are qualified as estimated, J/UJ.

617CB00202	2-chloroethyl_vinyl_ether (57.6%)

Method Blanks

The method blank associated with this sample exhibited contamination. The 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.

	VBLK1
acetone	4 µg/Kg
methylene chloride	3 µg/Kg

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
VBLK1	617CB00202	acetone	40 µg/Kg	NA
	617CB00202	methylene chloride	30 µg/Kg	U

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
617CB00202	Isobutyl alcohol Acetonitrile 1,4-dioxane Acrolein	+/-	J/UR
617CB00202	2-chloroethyl_vinyl_ether	+/-	J/UJ
617CB00202	acetone	+B	NA
617CB00202	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 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 # 26739A

A validation was performed on the Semivolatile Data from SDG 26739A. 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, A5676,-77,-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).

617CB00202	hexachloropropene (66.5) pentachlorobenzene (59.7) pyridine (52.9) safrole (60.7) 1,4-naphthoquinone (62.0) methyl parathion (54.3) parathion (71.9) famphur (74.0) m-cresol (77.4) diphenylamine (83.5) sulfotepp (52.8) 4-methylphenol (63.5) p-phenylenediamine (51.3) 1,3,5-trinitrobenzene (79.5)

The continuing calibration, A5676,-77,-78,-79,-80, 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).

617CB00202	1,3-dinitrobenzene (93.5) pentachloronitrobenzene (93.3) 4-nitroquinoline-1-oxide (259.0) kepone (266.7) 7,12-dimethylbenz(a)anthrace (94.6)

The continuing calibration, A5676,-77,-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 (R).

617CB00202	aramite (0.039) hexachlorophene (0.021)

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
617CB00202	hexachloropropene (66.5) pentachlorobenzene (59.7) pyridine (52.9) safrole (60.7) 1,4-naphthoquinone (62.0) methyl parathion (54.3) parathion (71.9) famphur (74.0) m-cresol (77.4) diphenylamine (83.5) sulfotepp (52.8) 4-methylphenol (63.5) p-phenylenediamine (51.3) 1,3,5-trinitrobenzene (79.5)	+/-	J/UJ
617CB00202	1,3-dinitrobenzene (93.5) pentachloronitrobenzene (93.3) 4-nitroquinoline-1-oxide (259.0) kepone (266.7) 7,12-dimethylbenz(a)anthrace (94.6)	+/-	J/UR
617CB00202	aramite (0.039) hexachlorophene (0.021)	+/-	J/UR
617CB00202	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 # 26739A

A validation was performed on the Pesticide/Aroclor Data from SDG 26739A. 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 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 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 # 26739A

A validation was performed on the Organophosphorous Pesticide Data from SDG 26739A. 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 # 26739A

A validation was performed on the Chlorinated Herbicides from SDG 26739A. 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 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 # 26739

A validation was performed on the Dioxin/Furans Data from SDG 26739. 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

One (1) of the two (2) method blanks exhibited contamination for octa-dioxin.

Sample ID	Congener ID	Blank Conc. ng/Kg	Sample Conc. ng/Kg	Qualification
617-C-B002-02	OCDD	0.386	94.2	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
617-C-B002-02	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

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 # 26739B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 26739B. 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
Chromium	0.15 mg/kg	no impact
Nickel	0.15 mg/kg	no impact
Vanadium	1.42 mg/kg	no impact
Cyanide	0.24 mg/kg	all soil samples below 1.2 mg/kg

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

Elements	Conc.	Samples affected
Barium	0.5 ug/l	no impact
Copper	2.7 ug/l	no impact
Lead	2.9 ug/l	no impact
Silver	2.0 ug/l	no impact
Vanadium	0.54 ug/l	no impact
Zinc	6.0 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".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Cobalt	-0.06 mg/kg	no impact
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".

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 1.2 mg/kg	Cn.	+	U
all soil samples below 4.3 mg/kg	Tl.	+/U	J/UJ
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	26739B
Date:	October 23, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	August 26-30, 1996
Number of Samples:	4 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, pH, 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. Searjeant
Paul B. Humburg, President

10/30/96
Date

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

SDG# 26739B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		pH		TAL		CN	
109TB00101	WATER	X											
109SB00101	SOIL				X		X				X		
109SB00102	SOIL				X		X				X		
617SB00101	SOIL		X		X				X		X		
617TB00101	WATER	X											
617SB00102	SOIL		X		X				X		X		
617SB00201	SOIL		X		X		X		X		X		X
617SB00202	SOIL		X		X		X		X		X		X
617SB00301	SOIL		X		X		X		X		X		X
617SB00302	SOIL		X		X		X		X		X		X
617SB00401	SOIL		X		X		X		X		X		X
617TB00401	WATER	X											
617SB00402	SOIL		X		X		X		X		X		X
619SB00101	SOIL		X		X		X				X		
619TB00101	WATER	X											
619SB00102	SOIL		X		X		X				X		
619SB00201	SOIL		X		X		X				X		
620SB00201	SOIL		X		X		X				X		
GDFSB00101	SOIL		X		X		X				X		X
GDFSB00102	SOIL		X		X		X				X		X
Total Billable Samples (Water/Soil)		4	14	0	16	0	14	0	8	0	16	0	8

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
pH= pH
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 # 26739B

A validation was performed on the Volatile Data from SDG 26739B. 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 average RRF requirements were not met for all continuing calibration compounds. The RE sample was not noted in these specific findings because it was rejected in favor of the original sample in the Compound Quantitation section of this narrative.

Continuing Calibrations, continued

Specific Findings

The continuing calibration standard I20899.D contained a compound with an average RRF less than 0.05. For the samples and non-compliant compound listed below, the positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

620SB00201	2-chloroethyl_vinyl_ether (0.010)
619SB00102	

The continuing calibration standard I20919.D contained a compound with an average RRF less than 0.05. For the samples and non-compliant compound listed below, the positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

619SB00101	2-chloroethyl_vinyl_ether (0.043)
619SB00201	
GDFSB00101	
GDFSB00102	
617SB00101	
617SB00102	

The continuing calibration standard I20945.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.

617SB00201	2-chloroethyl_vinyl_ether (57.6%)
617SB00202	
617SB00301	
617SB00302	
617SB00401	
617SB00402	

Internal Standards

All samples did not exhibit acceptable EICP area recoveries. The RE sample was not noted in these specific findings because it was rejected in favor of the original sample in the Compound Quantitation section of this narrative.

Specific Finding

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

617SB00102 chlorobenzene-d5

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

	VBLK3	VBLK4	VBLK7
acetone	3 µg/Kg	4 µg/Kg	3 µg/Kg
methylene chloride	-------	-------	4 µg/Kg

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
VBLK3	619SB00102 620SB00201	acetone	30 µg/Kg	NA
VBLK4	619SB00101 GDFSB00101	acetone	40 µg/Kg	U
	619SB00201	acetone	40 µg/Kg	CRQL
	GDFSB00102 617SB00101 617SB00102	acetone	40 µg/Kg	NA

Method Blanks, continued

Specific Finding, continued

Blank	Samples	Compound	Action Level	Qualification
VBLK7	617SB00201 617SB00301 617SB00401	acetone	30 μg/Kg	U
	617SB00202 617SB00302 617SB00402	acetone	30 μg/Kg	NA
	617SB00201 617SB00202 617SB00301 617SB00302 617SB00401 617SB00402	methylene chloride	40 μg/Kg	U

Field QC Blanks

One (1) of the trip blanks, the rinseate blank, and the DI blank associated with these samples 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.

	617TB00101	**619EB00701**	**619DB00701**
methylene chloride	2 μg/L	-------	-------
chloroform	-------	14 μg/L	17 μg/L

Blank	Samples	Compound	Action Level	Qualification
617TB00101	617SB00101 617SB00102	methylene chloride	20 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
617SB00102RE	All compounds	Better EICP area recoveries in original analysis.

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
620SB00201 619SB00102	2-chloroethyl_vinyl_ether	+/-	J/UR
619SB00101 619SB00201 GDFSB00101 GDFSB00102 617SB00101 617SB00102	2-chloroethyl_vinyl_ether	+/-	J/UR
617SB00201 617SB00202 617SB00301 617SB00302 617SB00401 617SB00402	2-chloroethyl_vinyl_ether	+/-	J/UJ
617SB00102	All associated with chlorobenzene-d5	+/-	J/UJ
619SB00102 GDFSB00102 617SB00101 620SB00201 617SB00202 617SB00302 617SB00402	acetone	+B	NA
619SB00201	acetone	+B	CRQL
619SB00101 GDFSB00101 617SB00201 617SB00301 617SB00401	acetone	+B	U

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
617SB00102	methylene chloride	+B	CRQL
617SB00201 617SB00202 617SB00301 617SB00302 617SB00401 617SB00402	methylene chloride	+B	U
617SB00101 617SB00102	methylene chloride	+	CRQL
617SB00102RE	All compounds	+/-	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 # 26739

A validation was performed on the Semivolatile Data from SDG 26739. 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, V14622, 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).

619SB00101	bis(2-ethylhexyl)phthalate (-27.9)

Internal Standards

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

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).

619SB00101RE	chrysene-d_{12} perylene-d_{12}
619SB00101	perylene-d_{12}

Method Blanks

Associated blank	Compound	Conc.	Action level
SBLK2	bis(2-ethylhexyl) phthalate	34J ug/Kg	340 ug/Kg

Samples	Compound	Qualification
620SB00201	bis(2-ethylhexyl) phthalate	CRQL

Compound Identification/Quantitation

Specific Finding:

Reject all results for sample 619SB00101RE, in favor of the original sample analysis due to non compliant internal standard areas.

For samples 617SB00302 and 617SB00402, replace the "E" flagged results with the corresponding "D"flagged results found in the diluted samples 617SB00302DL and 617SB00402DL, and reject all other results for the diluted sample.

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
619SB00101	bis(2-ethylhexyl) phthalate (-27.9)	+	J
619SB00101RE	All associated compounds chrysene-d_{12} perylene-d_{12}	+/-	J/UJ
619SB00101	perylene-d_{12}		
620SB00201	bis(2-ethylhexyl) phthalate	+	CRQL
619SB00101RE	All results	+/-	UR
617SB00302 617SB00402	"E" flagged results	+	UR
617SB00302DL 617SB00402DL	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 # 26739B

A validation was performed on the Pesticide/Aroclor Data from SDG 26739B. 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 the 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

Three (3) field samples exhibited non-compliant DCB recoveries.

Specific Finding

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

Sample ID	Surrogate	% Recovery
617SB00202	DCB-1	35%
617SB00301	DCB-1	31%

The sample listed below exhibited a 0% DCB recovery. The positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

Sample ID	Surrogate	% Recovery
617SB00402	DCB-1/DCB-2	220%/0%

Compound Identification/Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines. Results that exhibited %Ds greater than 70%, were outside the calibration range, were the result of a dilution, or were above 10X the CRQL (professional opinion) were qualified as presumptively present at an estimated concentration. Sample 617SB00302 was diluted to accurately quantitate 4,4'-DDT. Sample 617SB00402 exhibited a result for 4,4'-DDE that was above the calibration range of the instrument. However, this sample was not diluted per the method; therefore, this result is qualified as estimated, J. 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 compound are rejected, UR, in favor of the results reported for the DL analysis. All other results from the dilution are rejected, UR.

617SB00302

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

617SB00402 4,4'-DDE

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
617SB00202 617SB00301	ALL	+/-	J/UJ
617SB00402	ALL	+/-	J/UR
617SB00302	All E Flagged	+E	D
617SB00302DL	All except corresponding D Flagged	+/-	UR
617SB00402	4,4'-DDE	+	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
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 # 26739A

A validation was performed on the Metals, pH and Cyanide Data from SDG 26739A. 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	3.41 mg/kg	no impact
Antimony	0.32 mg/kg	all soil samples below 1.6 mg/kg
Chromium	0.12 mg/kg	no impact
Iron	2.50 mg/kg	no impact
Tin	1.68 mg/kg	all soil samples below 8.4 mg/kg

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

Elements	Conc.	Samples affected
Barium	0.5 ug/l	no impact
Copper	2.7 ug/l	all soil samples below 2.7 mg/kg
Lead	2.9 ug/l	all soil samples below 2.9 mg/kg
Silver	2.0 ug/l	all soil samples below 2.0 mg/kg
Vanadium	0.54 ug/l	no impact
Zinc	6.0 ug/l	all soil samples below 6.0 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 1.6 mg/kg	Sb.	+	U
all soil samples below 8.4 mg/kg	Sn.		
all soil samples below 2.7 mg/kg	Cu.		
all soil samples below 2.9 mg/kg	Pb.		
all soil samples below 2.0 mg/kg	Ag.		
all soil samples below 6.0 mg/kg	Zn.		
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	26756
Date:	October 9, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston Zone F
Date Sampled:	August 27-29, 1996
Number of Samples:	11 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, 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

10-15-96
Date

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

SDG# 26756

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		TAL	
613SP00301	SOIL		X		X		X
613GP00301	WATER	X		X		X	
613TP00301	WATER	X					
613SP00901	SOIL		X		X		X
613GP00901	WATER	X					
613SP02101	SOIL		X		X		X
613GP02101	WATER	X		X		X	
613SP02501	SOIL		X		X		X
613GP02501	WATER	X		X			
613SP02901	SOIL		X		X		X
613GP02901	WATER	X		X		X	
613TP02901	WATER	X					
613SP03301	SOIL		X		X		X
613GP03301	WATER	X		X		X	
613SP03801	SOIL		X		X		X
613SP04401	SOIL		X		X		X
613GP04401	WATER	X		X		X	
613TP04401	WATER	X					
613SP05101	SOIL		X		X		X
613GP05101	WATER	X		X		X	
Total Billable Samples	(Water/Soil)	11	9	7	9	6	9

VOA = SW846 Volatiles
SV = SW846 Semivolatiles
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 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 # 26756

A validation was performed on the Volatile Data from SDG 26756. 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

One of the initial calibrations that were analyzed by the laboratory for these samples was not acceptable for all compound %RSDs. The average RRFs for all of the compounds met the initial calibration criteria.

Initial Calibrations (continued)

Specific Finding:

The initial calibration analyzed on, 09/05/96, contained compounds with %RSDs greater than 30%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J).

613GP00301	acetone (54.6)
613GP00901	methylene chloride (35.5)
613GP02101	
613GP02501	

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.

Specific Finding:

The continuing calibration, I20871, 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).

613SP04401	2-chloroethyl vinyl ether (0.032)
613SP05101	
613SP03301	

The continuing calibration, I20899, 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).

613SP03801	2-chloroethyl vinyl ether (0.010)
613SP02901	
613SP02501	

Continuing Calibrations (continued)

Specific Finding:

The continuing calibration,I20919, 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).

613SP02101	2-chloroethyl vinyl ether (0.043)
613SP00901	
613SP00301	

Internal Standards

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

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).

613SP04401	1,4-difluorobenzene
613SP04401RE	chlorobenzene-d_5

Method Blanks

Associated blank	Compound	Conc	Action level
VBLK4	acetone	3.0 ug/Kg	30 ug/Kg

Samples	Compound	Qualification
613SP03801	acetone	U

Trip Blanks

Associated blank	Compound	Conc	Action level
613TP00301	methylene chloride	2J ug/L	20 ug/L

Samples	Compound	Qualification
613GP02501	methylene chloride	CRQL
613SP02101		U
613GP02101		CRQL
613SP00901		U
613SP00301		U
613GP00901		CRQL
613GP00301		CRQL

Compound Identification/Quantitation

Specific Finding:

Reject all results for the sample 613SP04401RE, 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

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
613GP00301	acetone (54.6)	+	J
613GP00901	methylene chloride (35.5)		
613GP02101			
613GP02501			
613SP04401	2-chloroethyl-vinyl ether (0.032)	+/-	J/UR
613SP05101			
613SP03301			
613SP03801	2-chloroethyl-vinyl ether (0.010)	+/-	J/UR
613SP02901			
613SP02501			
613SP02101	2-chloroethyl-vinyl ether (0.043)	+/-	J/UR
613SP00901			
613SP00301			
	All associated compounds	+/-	J/UJ
613SP04401	1,4-difluorobenzene		
613SP04401RE	chlorobenzene-d_5		
613SP03801	acetone	+	U
613GP02501	methylene chloride	+	CRQL
613SP02101			U
613GP02101			CRQL
613SP00901			U
613SP00301			U
613GP00901			CRQL
613GP00301			CRQL
613SP04401RE	All analytes	+/-	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 # 26756

A validation was performed on the Semivolatile Data from SDG 26756. 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, JJS298, 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).

613SP02901	indeno(1,2,3-cd)pyrene (-30.9)
613SP02101	dibenz(a,h)anthracene (-30.3)
613SP00901	benzo(g,h,i)perylene (-43.4)

The continuing calibration, V14573, 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).

613GP05101	bis(2-ethylhexyl)phthalate (-26.6)
613GP03301	

Internal Standards

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

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).

613SP05101	perylene-d_{12}
613SP05101DL	

Method Blanks

Associated blank	Compound	Conc.	Action level
SBLK2	bis(2-ethylhexyl) phthalate	34J ug/Kg	340 ug/Kg

Samples	Compound	Qualification
613SP05101	bis(2-ethylhexyl) phthalate	CRQL

Compound Identification/Quantitation

Specific Finding:

Reject all results for samples 613GP02101 and 613GP00301, in favor of the re-analyzed sample analysis due to non compliant surrogate recoveries.

For sample 613SP05101, replace the "E" flagged results with the corresponding "D" flagged results found in the diluted sample 613SP05101DL, and reject all other results for the diluted sample.

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
613SP02901 613SP02101 613SP00901	indeno(1,2,3-cd)pyrene (-30.9) dibenz(a,h)anthracene (-30.3) benzo(g,h,i)perylene (-43.4)	+	J
613GP05101 613GP03301	bis(2-ethylhexyl)phthalate (-26.6)	+	J
613SP05101 613SP05101DL	All associated compounds perylene-d_{12}	+/-	J/UJ
613SP05101	bis(2-ethylhexyl) phthalate	+	CRQL
613GP02101 613GP00301	All results	+/-	UR
613GP05101	"E" flagged results	+-	UR
613GP05101DL	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
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 # 26756

A validation was performed on the Metals Data from SDG 26756. 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	1.43 mg/kg	no impact
Iron	2.73 mg/kg	no impact
Tin	1.91 mg/kg	all soil samples below 9.55 mg/kg
Vanadium	0.062 mg/kg	no impact
Zinc	1.00 mg/kg	all soil samples below 5.0 mg/kg

Copper	1.32 ug/l	no impact
Lead	1.86 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
Silver	-1.33 ug/l	all water samples below 13.3 ug/l
Vanadium	-0.62 ug/l	no impact

This reviewer qualifies all samples results below ten times the negative bias as estimated, "J" or "UJ".

Serial Dilution

Specific Finding

The serial dilutions for soils for Chromium and for waters for Aluminum, Barium, Calcium, Chromium, Lead, Magnesium, Manganese, Nickel and vanadium were outside the control limits of 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 9.55 mg/kg	Sn.	+	U
All soil samples below 5.0 mg/kg	Zn.		
All water samples below 13.3 ug/l	Ag.	+/U	J/UJ
All soil samples	Cr.	+	J
All water samples	Al, Ba, Ca, Cr, Pb, Mg, Mn, Ni and V.		
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	26797A
Date:	October 23, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	September 4, 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, 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 B. Seaton
Paul B. Humburg, President

10/30/96
Date

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

SDG# 26797A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
613HP05001	WATER	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 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 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 # 26797A

A validation was performed on the Volatile Data from SDG 26797A. 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 average RRF requirements were not met for all continuing calibration compounds.

Continuing Calibrations, continued

Specific Findings

The continuing calibration standard R24157.D contained compounds with average 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.

613HP05001

2-chloroethyl_vinyl_ether (0.017)
Isobutyl alcohol (0.007)
Acetonitrile (0.024)
1,4-dioxane (0.002)
Acrolein (0.017)
Dichlorodifluoromethane (0.024)

Field QC Blanks

The trip blank, the rinseate blank, and the DI blank associated with these samples 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.

	613TP05001	619DB00701	619EB00701
acetone	14 μg/L	------	------
methylene chloride	1 μg/L	------	------
carbon disulfide	3 μg/L	------	------
chloroform	------	17 μg/L	14 μg/L

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
613TP005001	613HP05001	acetone	140 μg/L	U

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
613HP05001	2-chloroethyl_vinyl_ether	+/-	J/UR
	Isobutyl alcohol		
	Acetonitrile		
	1,4-dioxane		
	Acrolein		
	Dichlorodifluoromethane		
613HP05001	acetone	+	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

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 # 26797A

A validation was performed on the Semivolatile Data from SDG 26797A. 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, A5676,-77,-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).

613HP05001	hexachloropropene (66.5)
	pentachlorobenzene (59.7)
	pyridine (52.9)
	safrole (60.7)
	1,4-naphthoquinone (62.0)
	methyl parathion (54.3)
	parathion (71.9)
	famphur (74.0)
	m-cresol (77.4)
	diphenylamine (83.5)
	sulfotepp (52.8)
	4-methylphenol (63.5)
	p-phenylenediamine (51.3)
	1,3,5-trinitrobenzene (79.5)
	1,2,4,5-tetrachlorobenzene (52.2)

The continuing calibration, A5676,-77,-78,-79,-80, 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).

613HP05001	1,3-dinitrobenzene (93.5)
	pentachloronitrobenzene (93.3)
	4-nitroquinoline-1-oxide (259.0)
	kepone (266.7)
	7,12-dimethylbenz(a)anthrace (94.6)

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A5676,-77,-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 (R).

613HP05001	aramite (0.039) hexachlorophene (0.021)

Method Blanks

Associated blank	Compound	Conc.	Action level
SBLK1	bis(2-ethylhexyl) phthalate	1J ug/Kg	10 ug/Kg

Samples	Compound	Qualification
613HP05001	bis(2-ethylhexyl) phthalate	CRQL

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-dibrbromo-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
613HP05001	hexachloropropene (66.5) pentachlorobenzene (59.7) pyridine (52.9) safrole (60.7) 1,4-naphthoquinone (62.0) methyl parathion (54.3) parathion (71.9) famphur (74.0) m-cresol (77.4) diphenylamine (83.5) sulfotepp (52.8) 4-methylphenol (63.5) p-phenylenediamine (51.3) 1,3,5-trinitrobenzene (79.5) 1,2,4,5-tetrachlorobenzene (52.2)	+/-	J/UJ
613HP05001	1,3-dinitrobenzene (93.5) pentachloronitrobenzene (93.3) 4-nitroquinoline-1-oxide (259.0) kepone (266.7) 7,12-dimethylbenz(a)anthrace (94.6)	+/-	J/UR
613HP05001	aramite (0.039) hexachlorophene (0.021)	+/-	J/UR
613HP05001	bis(2-ethylhexyl) phthalate	+	CRQL
613HP05001	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 # 26797A

A validation was performed on the Pesticide/Aroclor Data from SDG 26797A. 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 compounds analyzed with a single point calibration, therefore the data did not require qualification.

Surrogate Recoveries

One (1) sample exhibited a non-compliant TCX recovery.

Specific Finding

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

Sample ID	Surrogate	% Recovery
613HP05001	TCX-2	39%

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
613HP05001	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

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 # 26797A

A validation was performed on the Organophosphorous Pesticide Data from SDG 26797A. 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 # 26797A

A validation was performed on the Chlorinated Herbicides from SDG 26797A. 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 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 # 26797

A validation was performed on the Dioxin/Furans Data from SDG 26797. 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 for a octa-dioxin.

Sample ID	Congener ID	Blank Conc. pg/L	Sample Conc. pg/L	Qualification
613-H-P050-01	OCDD	5.73	204	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
613-H-P050-01	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

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 # 26797B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 26797B. 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
Arsenic	2.9 ug/l	no impact
Copper	1.19 ug/l	no impact
Selenium	3.72 ug/l	all water samples below 18.6 ug/l
Cyanide	3.52 ug/l	all water samples below 17.6 ug/l

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

Elements	Conc.	Samples affected
Barium	0.5 ug/l	no impact
Copper	2.7 ug/l	all water samples below 13.5 ug/l
Lead	2.9 ug/l	no impact
Silver	2.0 ug/l	no impact
Vanadium	0.54 ug/l	no impact
Zinc	6.0 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 water samples below 18.6 ug/l	Se.	+	U
all water samples below 17.6 ug/l	Cn.		
all water samples below 13.5 ug/l	Cu.		
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	26797B
Date:	October 23, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	August 30-September 4, 1996
Number of Samples:	11 Aqueous Sample(s) with 0 MS/MSD(s) 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:	Volatiles, Semivolatiles, 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 S. Simpson
Paul B. Humburg, President

10/30/96
Date

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

SDG# 26797B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		TAL	
613SP03701	SOIL		X		X		X
613GP03701	WATER	X		X		X	
613SP04201	SOIL		X		X		X
613GP04201	WATER	X		X		X	
613SP05001	SOIL		X		X		X
613GP05001	WATER	X		X		X	
613TP05001	WATER	X					
613SP05601	SOIL		X		X		X
613GP05601	WATER	X					
613TP05601	WATER	X					
613SP05701	SOIL		X		X		X
613GP05701	WATER	X		X		X	
613TP05701	WATER	X					
613SP05801	SOIL		X		X		X
613GP05801	WATER	X		X		X	
613SP05901	SOIL		X		X		X
613GP05901	WATER	X		X		X	
613SP06001	SOIL		X		X		X
613GP06001	WATER	X		X		X	
Total Billable Samples (Water/Soil)		11	8	7	8	7	8

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
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 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 # 26797B

A validation was performed on the Volatile Data from SDG 26797B. 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 average RRF requirements were not met for all continuing calibration compounds.

Continuing Calibrations, continued

Specific Findings

The continuing calibration standard I20919.D contained a compound with an average 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.

613SP05701	2-chloroethyl_vinyl_ether (0.043)
613SP05801	
613SP03701	

The continuing calibration standard I20970.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.

613SP05901	2-chloroethyl_vinyl_ether (78.8%)
613SP04201	
613SP06001	

The continuing calibration standard I20992.D contained a compound with an average 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.

613SP05601	2-chloroethyl_vinyl_ether (0.037)

The continuing calibration standard I21007.D contained a compound with an average 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.

613SP05001	2-chloroethyl_vinyl_ether (0.031)

The continuing calibration standard R24138.D contained a compound with an average 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.

613GP05601	2-chloroethyl_vinyl_ether (0.017)

Continuing Calibrations, continued

Specific Findings, continued

The continuing calibration standard R24157.D contained a compound with an average 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.

613GP06001 2-chloroethyl_vinyl_ether (0.017)
613GP05001

The continuing calibration standard N23543.D contained a compound with a %D greater than 25% but less than 50%. For the samples and non-compliant compound listed below, the positive results are qualified as estimated, J.

613GP05901 acetone (32%)

Method Blanks

One of 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	VBLK4	VBLK5	VBLK8
acetone	4 μg/Kg	------	3μg/Kg	2 μg/Kg
methylene chloride	------	7 μg/L	6 μg/Kg	1 μg/Kg

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
VBLK1	613SP05701	acetone	40 μg/Kg	NA
	613SP05801 613SP03701	acetone	40 μg/Kg	U
VBLK4	613GP05601	methylene chloride	70 μg/L	CRQL

Method Blanks, continued

Specific Findings, continued

Blank	Samples	Compound	Action Level	Qualification
VBLK5	613SP05901 613SP04201 613SP06001	methylene chloride	60 µg/Kg	CRQL
	613SP05901 613SP04201 613SP06001	acetone	30 µg/Kg	NA
VBLK8	613SP05001	methylene chloride	10 µg/Kg	CRQL
	613SP05001	acetone	20 µg/Kg	NA

Field QC Blanks

Two (2) of the trip blanks, the rinseate blank, and the DI blank associated with these samples 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.

	613TP05001	**613TB05601**	**619DB00701**	**619EB00701**
acetone	14 µg/L	-------	-------	-------
methylene chloride	1 µg/L	-------	-------	-------
carbon disulfide	3 µg/L	-------	-------	-------
chloroform	-------	2 µg/L	17 µg/L	14 µg/L

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
613TP005001	613GP06001	acetone	140 µg/L,140 µg/Kg	U
	613SP05001			U
	613GP06001	carbon disulfide	15 µg/L, 15 µg/Kg	CRQL
	613GP05001			CRQL

System Performance and Overall Assessment

Overall performance was acceptable. The data reviewer estimates that less than 10% of the data required qualifications/rejections. It should be noted that the client sample ID on the VOA data for sample 613SP06001 is incorrect by one (1) digit. The ID as presented on the data is 613SP06101. The ID on the spreadsheet is correct according to the sample chain of custody. This ID (613SP06001) has been used throughout this narrative.

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
613SP05701 613SP05801 613SP03701	2-chloroethyl_vinyl_ether	+/-	J/UR
613SP05901 613SP04201 613SP06001	2-chloroethyl_vinyl_ether	+/-	J/UJ
613SP05601	2-chloroethyl_vinyl_ether	+/-	J/UR
613SP05001	2-chloroethyl_vinyl_ether	+/-	J/UR
613GP05601	2-chloroethyl_vinyl_ether	+/-	J/UR
613GP06001 613GP05001	2-chloroethyl_vinyl_ether	+/-	J/UR
613GP05901	acetone	+	J
613SP05801 613SP03701	acetone	+B	U
613GP05601 613SP05901 613SP04201 613SP06001 613SP05001	methylene chloride	+B	CRQL
613SP05901 613SP04201 613SP06001 613SP05001 613SP05701	acetone	+B	NA

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
613GP06001	acetone	+	U
613SP05001			U
613GP06001	carbon disulfide	+	CRQL
613GP05001			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 # 26797

A validation was performed on the Semivolatile Data from SDG 26797. 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, P9191, 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).

613GP05001	benzoic acid (0.003) (98.8)
613GP06001	

The continuing calibration, V14597, 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).

613GP05701	bis(2-ethylhexyl)phthalate (-28.0)
613GP05801	
613GP03701	

The continuing calibration, JJS369, 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).

613SP05701RE	indeno(1,2,3-cd)pyrene (-54.0)
613SP05801	benzo(g,h,i)perylene (-62.0)

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).

613SP05701	acenaphthene-d_{10}
	phenanthrene-d_{10}
	chrysene-d_{12}
	perylene-d_{12}
613SP05701RE	chrysene-d_{12}
	perylene-d_{12}

Compound Identification/Quantitation

Specific Finding:

Reject all results for sample 613SP05701, in favor of the reanalyzed sample analysis 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
613GP05001 613GP06001	benzoic acid (0.003) (98.8)	+/-	J/UR
613GP05701 613GP05801 613GP03701	bis(2-ethylhexyl)phthalate (-28.0)	+	J
613SP05701RE 613SP05801	indeno(1,2,3-cd)pyrene (-54.0) benzo(g,h,i)perylene (-62.0)	+/-	J/UJ
613SP05701	All associated compounds acenaphthene-d_{10} phenanthrene-d_{10} chrysene-d_{12} perylene-d_{12}	+/-	J/UJ
613SP05701RE	chrysene-d_{12} perylene-d_{12}		
613SP05701	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
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 # 26797A

A validation was performed on the Metals Data from SDG 26797A. 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	1.15 mg/kg	no impact
Chromium	0.18 mg/kg	no impact
Iron	2.73 mg/kg	no impact
Manganese	0.15 mg/kg	no impact
Nickel	0.16 mg/kg	no impact

Tin	1.77 mg/kg	all soil samples 8.85 mg/kg
Vanadium	0.08 mg/kg	no impact
Arsenic	2.9 ug/l	no impact
Copper	1.19 ug/l	no impact
Selenium	3.72 ug/l	all water samples below 18.6 ug/l
Calcium	14.6 ug/l	no impact
Mercury	0.11 ug/l	0.55 ug/l
Sodium	694 ug/l	no impact

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

Elements	Conc.	Samples affected
Barium	0.5 ug/l	no impact
Copper	2.7 ug/l	all soil samples below 2.7 mg/kg all water samples below 13.5 ug/l
Lead	2.9 ug/l	no impact
Silver	2.0 ug/l	all soil samples below 2.0 mg/kg
Vanadium	0.54 ug/l	no impact
Zinc	6.0 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".

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".

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#:	26816A
Date:	October 23, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	September 9, 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 B. Sempson
for Paul B. Humburg, President

10/30/96
Date

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

SDG# 26816A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
619CB00501	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 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 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 # 26816A

A validation was performed on the Volatile Data from SDG 26816A. 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 initial calibration that was analyzed by the laboratory for this sample was not acceptable for all compound %Ds. The average RRF requirements were not met for all initial calibration compounds.

Initial Calibrations, continued

Specific Findings

The initial calibration on 09/16/96 on instrument I, contained compounds with average 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.

619CB00501	2-chloroethyl_vinyl_ether (0.031) Isobutyl alcohol (0.009) Acetonitrile (0.020) 1,4-dioxane (0.002) Acrolein (0.040)

The initial calibration on 09/16/96 on instrument I, 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.

619CB00501	acetone (37%)

The initial calibration on 09/16/96 on instrument I, contained a compound with a %D greater than 50% but less than 100%. For the sample and non-compliant compound listed below, all positive and non-detect results are qualified as estimated, J/UJ.

619CB00501	trichlorofluoromethane (58%)

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
619CB00501	2-chloroethyl_vinyl_ether Isobutyl alcohol Acetonitrile 1,4-dioxane Acrolein	+/-	J/UR
619CB00501	acetone	+	J
619CB00501	trichlorofluoromethane	+/-	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 # 26816A

A validation was performed on the Semivolatile Data from SDG 26816A. 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, A5746,-47,-48,-49,-50, 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).

619CB00501	pronamide (52.5)
	pentachloronitrobenzene (54.4)
	parathion (56.6)
	methapyrilene (52.4)
	famphur (78.1)
	m-cresol (84.7)
	diphenylamine (78.3)
	2,6-dichlorophenol (70.9)
	hexachloropropene (62.1)
	dinoseb (85.4)

The continuing calibration, A5746,-47,-48,-49,-50, 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).

619CB00501	4-nitroquinoline-1-oxide (454.1)
	sulfotepp (194.6)
	kepone (232.0)
	1,3,5-trinitrobenzene (137.7)

The continuing calibration, A5746,-47,-48,-49,-50, 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).

619CB00501	aramite (0.029)
	hexachlorophene (0.039)

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
619CB00501	pronamide (52.5) pentachloronitrobenzene (54.4) parathion (56.6) methapyrilene (52.4) famphur (78.1) m-cresol (84.7) diphenylamine (78.3) 2,6-dichlorophenol (70.9) hexachloropropene (62.1) dinoseb (85.4)	+/-	J/UJ
619CB00501	4-nitroquinoline-1-oxide (454.1) sulfotepp (194.6) kepone (232.0) 1,3,5-trinitrobenzene (137.7)	+/-	J/UR
619CB00501	aramite (0.029) hexachlorophene (0.039)	+/-	J/UR
619CB00501	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 # 26816A

A validation was performed on the Pesticide/Aroclor Data from SDG 26816A. 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 compounds analyzed with a single point calibration, therefore the data did not require qualification.

Field Duplicate

The field duplicate pair of samples 619SB00501/DL and 619CB00501/DL exhibited positive results 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, Alpha-Chlordane, and Gamma Chlordane. Precision results were outside criteria for 4,4'-DDT.

Specific Finding

The field duplicate pair of samples 619SB00501/DL and 619CB00501/DL exhibited a non-compliant RPD for one (1) compound. For the following sample and compound, the positive results are qualified as estimated, J, due to poor duplicate precision.

619CB00501/DL	4,4'-DDT (119%)

Compound Identification/Quantitation

One (1) sample required dilution to accurately quantitate target compounds. Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines.

Specific Findings

For the following sample, the result for the E flagged compound are 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.

619CB00501

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

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
619CB00501/DL	4,4'-DDT	+	J
619CB00501	All E Flagged	+E	D
619CB00501DL	All others	+/-	UR
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

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 # 26816A

A validation was performed on the Organophosphorous Pesticide Data from SDG 26816A. 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 # 26816A

A validation was performed on the Chlorinated Herbicides from SDG 26816A. 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 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 # 26816

A validation was performed on the Dioxin/Furans Data from SDG 26816. 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

One (1) of the two (2) method blanks exhibited contamination for octa-dioxin and octa-furan.

Sample ID	Congener ID	Blank Conc. ng/Kg	Sample Conc. ng/Kg	Qualification
619-C-B005-01	OCDD	0.812	149	NA
	OCDF	0.826	18.3	NA

Field Blanks

The associated equipment blank, 619-E-B007-01 and field blank, 619-D-B007-01, exhibited several positive results which impacted the sample. All qualifications were performed per the field blank.

Sample ID	Congener ID	Blank Conc. ng/Kg	Sample Conc. ng/Kg	Qualification
619-C-B005-01	1,2,3,4,7,8-HxCDF	1.26	1.55	U
	1,2,3,4,6,7,8-HpCDF	24.2	6.6	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	ANALYTE ID	DL	QL
619-C-B005-01	OCDD	+B	NA
	OCDF	+B	NA
	1,2,3,4,7,8-HpCDF	+	U
	1,2,3,4,6,7,8-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

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 # 26816B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 26816B. 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
Tin	1.52 mg/kg	all soil samples below 7.6 mg/kg
Cyanide	0.18 mg/kg	all soil samples below 0.9 mg/kg

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

Elements	Conc.	Samples affected
Barium	0.5 ug/l	no impact
Copper	2.7 ug/l	no impact
Lead	2.9 ug/l	no impact
Silver	2.0 ug/l	no impact
Vanadium	0.54 ug/l	no impact
Zinc	6.0 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".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Aluminum	-1.55 mg/kg	no impact
Cobalt	-0.07 mg/kg	no impact
Thallium	-0.39 mg/kg	all soil samples below 3.9 mg/kg
Vanadium	-0.04 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 7.6 mg/kg	Sn.	+	U
all soil samples below 0.9 mg/kg	Cn.		
all soil samples below 3.9 mg/kg	Tl.	+/U	J/UJ
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	26816B
Date:	October 23, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	September 3-9, 1996
Number of Samples:	3 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 G. Seafoss
for Paul B. Hamburg, President

10/29/96
Date

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

SDG# 26816B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
616SB00101	SOIL		X		X				X		
616SB00102	SOIL		X		X				X		
616SB00201	SOIL		X		X				X		
616SB00202	SOIL		X		X				X		
616SB00301	SOIL		X		X				X		
616TB00301	WATER	X									
616SB00302	SOIL		X		X				X		
616SB00401	SOIL		X		X				X		
616TB00401	WATER	X									
616SB00402	SOIL		X		X				X		
619SB00401	SOIL		X		X		X		X		X
619SB00402	SOIL		X		X		X		X		X
619SB00501	SOIL		X		X		X		X		X
619SB00901	SOIL		X		X		X		X		X
619TB00901	WATER	X									
619SB00902	SOIL		X		X		X		X		X
Total Billable Samples (Water/Soil)		3	13	0	13	0	5	0	13	0	5

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 # 26816B

A validation was performed on the Volatile Data from SDG 26816B. 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 average RRF requirements were not met for all continuing calibration compounds.

Continuing Calibrations, continued
Specific Findings

The continuing calibration standard I20992.D contained a compound with an average 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.

616SB00402	2-chloroethyl_vinyl_ether (0.037)
616SB00401	

The continuing calibration standard I20970.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.

616SB00301	2-chloroethyl_vinyl_ether (78.8%)
616SB00302	
616SB00101	
616SB00102	
616SB00201	
616SB00202	

The continuing calibration standard I21095.D contained a compound with an average 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.

619SB00901	2-chloroethyl_vinyl_ether (0.032)
619SB00501	

The continuing calibration standard I21095.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.

619SB00901	bromomethane (57.5%)
619SB00501	

The continuing calibration standard I21120.D contained a compound with an average 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.

619SB00401	2-chloroethyl_vinyl_ether (0.033)
619SB00902	

Continuing Calibrations, continued

Specific Findings, continued

The continuing calibration standard I21149.D contained a compound with an average 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.

619SB00402	2-chloroethyl_vinyl_ether (0.048)

The continuing calibration standards I21095.D and I21149.D each contained a compound with %Ds greater than 25% but less than 50%. For the samples and non-compliant compounds listed below, positive results are qualified as estimated, J.

619SB00901	2-butanone (37.5%)
619SB00501	
619SB00402	acetone (27.3%)

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	VBLK7	VBLK8	VBLK9
acetone	3 µg/Kg	3 µg/Kg	4µg/Kg	3 µg/Kg
methylene chloride	6 µg/Kg	--------	4µg/Kg	4 µg/Kg

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
VBLK2	616SB00301 616SB00302 616SB00101 616SB00202	acetone	30 µg/Kg	U
	616SB00102 616SB00201	acetone	30 µg/Kg	NA

Method Blanks, continued
Specific Findings, continued

Blank	Samples	Compound	Action Level	Qualification
VBLK2	616SB00301 616SB00302 616SB00101 616SB00102 616SB00201 616SB00202	methylene chloride	60 µg/Kg	CRQL
VBLK7	619SB00901 619SB00501	acetone	30 µg/Kg	NA
VBLK8	619SB00401 619SB00902	acetone	40 µg/Kg	NA
	619SB00401 619SB00902	methylene chloride	40 µg/Kg	CRQL
VBLK9	619SB00402	acetone	30 µg/Kg	NA
	619SB00402	methylene chloride	40 µg/Kg	NA

Field QC Blanks

Two (2) of the trip blanks, the rinseate blank, and the DI blank associated with these samples 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.

	616TB00301	619TB00901	619DB00701	619EB00701
acetone	11 µg/L	--------	--------	--------
methylene chloride	3 µg/L	-------	--------	-------
carbon disulfide	--------	2 µg/L	--------	--------
chloroform	--------	2 µg/L	17 µg/L	14 µg/L

Field QC Blanks, continued

Specific Findings, continued

Blank	Samples	Compound	Action Level	Qualification
616TB00301	616SB00102 616SB00201	acetone	110 μg/Kg	U
619TP00901	619SB00401 619SB00402 619SB00501 619SB00901 619SB00902	chloroform	10 μg/Kg	NA
	619SB00401 619SB00402 619SB00501 619SB00901 619SB00902	carbon disulfide	10 μg/Kg	NA

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
616SB00402 616SB00401	2-chloroethyl_vinyl_ether	+/-	J/UR
616SB00301 616SB00302 616SB00101 616SB00102 616SB00201 616SB00202	2-chloroethyl_vinyl_ether	+/-	J/UJ
619SB00901 619SB00501	2-chloroethyl_vinyl_ether	+/-	J/UR
619SB00901 619SB00501	bromomethane	+/-	J/UJ
619SB00401 619SB00902	2-chloroethyl_vinyl_ether	+/-	J/UR
619SB00402	2-chloroethyl_vinyl_ether	+/-	J/UR
619SB00501 619SB00901	2-butanone	+	J
619SB00402	acetone	+	J
616SB00301 616SB00302 616SB00101 616SB00202	acetone	+B	U

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
616SB00301	methylene chloride	+B	CRQL
616SB00302			
616SB00101			
616SB00102			
616SB00201			
616SB00202			
619SB00401			
619SB00902			
619SB00901	acetone	+B	NA
619SB00501			
619SB00402			
616SB00102			
616SB00201			
619SB00401			
619SB00902			
619SB00402	methylene chloride	+B	NA
616SB00102	acetone	+	U
616SB00201			
619SB00401	chloroform	+	NA
619SB00402	carbon disulfide		
619SB00501			
619SB00901			
619SB00902			

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the 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 # 26816

A validation was performed on the Semivolatile Data from SDG 26816. 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, P9211, 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).

619SB00901	3,3'-dichlorobenzidine (54.7)
619SB00902	
619SB00401	
619SB00402	
619SB00501	

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
619SB00901	3,3'-dichlorobenzidine (54.7)	+/-	J/UJ
619SB00902			
619SB00401			
619SB00402			
619SB00501			

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the 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 # 26816B

A validation was performed on the Pesticide/Aroclor Data from SDG 26816B. 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 compounds analyzed with a single point calibration, therefore the data did not require qualification.

Field Duplicate

The field duplicate pair of samples 619SB00501/DL and 619CB00501/DL exhibited positive results 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, Alpha-Chlordane, and Gamma Chlordane. Precision results were outside criteria for 4,4'-DDT.

Specific Finding

The field duplicate pair of samples 619SB00501/DL and 619CB00501/DL exhibited a non-compliant RPD for one (1) compound. For the following sample and compound, the positive results are qualified as estimated, J, due to poor duplicate precision.

619SB00501/DL	4,4'-DDT (119%)

Compound Identification/Quantitation

One (1) sample required dilution to accurately quantitate target compounds. Several samples exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines.

Specific Findings

For the following sample, the result for the E flagged compound are 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.

619SB00501

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

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
619SB00501/DL	4,4'-DDT	+	J
619SB00501	All E Flagged	+E	D
619SB00501DL	All others	+/-	UR
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 an 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 # 26816A

A validation was performed on the Metals and Cyanide Data from SDG 26816A. 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	1.67 mg/kg	all soil samples below 8.35 mg/kg
Cyanide	0.18 mg/kg	all soil samples below 0.9 mg/kg

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

Elements	Conc.	Samples affected
Barium	0.5 ug/l	no impact
Copper	2.7 ug/l	all soil samples below 2.7 mg/kg
Lead	2.9 ug/l	all soil samples below 2.9 mg/kg
Silver	2.0 ug/l	all soil samples below 2.0 mg/kg
Vanadium	0.54 ug/l	no impact
Zinc	6.0 ug/l	all soil samples below 6.0 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	-1.55 mg/kg	no impact
Cobalt	-0.07 mg/kg	all soil samples below 0.7 mg/kg
Thallium	-0.39 mg/kg	all soil samples below 3.9 mg/kg
Vanadium	-0.04 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 recovery for Zinc (0%) was below 30%. All non-detect results are rejected and all positive results are qualified as estimated, "J".

The Matrix Spike recoveries for Arsenic (74%), Antimony (65%), Lead (54%), Manganese (72%), Selenium (69%) and Thallium (72%) were below the lower control limits (>30 but <75%). All positive and non-detect results are qualified as estimated, "J" or "UJ".

Duplicate Analysis

Specific Finding

The Duplicate analysis for Calcium was outside the control limits of 35%. All positive results are qualified as estimated, "J". The RPD for Aluminum was not greater than 35%.

Serial Dilutions

Specific Finding

The serial dilutions for Chromium and Vanadium were outside the control limits. 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

[illegible]le ID	Analyte	DL	QL
All soil samples below 8.35 mg/kg	Sn.	+	U
[illegible] samples below 0.9 mg/kg	Cn.		
[illegible] samples below 2.7 mg/kg	Cu.		
[illegible] soil samples below 2.9 mg/kg	Pb.		
[illegible] samples below 2.0 mg/kg	Ag.		
[illegible] samples below 6.0 mg/kg	Zn.		
All soil samples	Zn.	+	J
		U	R
All soil samples	As, Sb, Pb, Mn, Se and Tl.	+/U	J/UJ
All soil samples	Ca.	+	J
All soil samples	Cr and V.	+	J
[illegible] result	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	26864A
Date:	October 23, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	September 10, 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, 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 Craig G. Sempson
Paul B. Humburg, President

10/30/96
Date

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

SDG# 26864A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
613HP04101	WATER	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 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 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 # 26864A

A validation was performed on the Volatile Data from SDG 26864A. 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 that was analyzed by the laboratory for this sample was not acceptable for all compound %Ds. The average RRF requirements were not met for all continuing calibration compounds.

Continuing Calibrations, continued

Specific Findings

The continuing calibration standard R24279.D contained compounds with average 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.

613HP04101	2-chloroethyl_vinyl_ether (0.026)
	Isobutyl alcohol (0.008)
	Acetonitrile (0.024)
	1,4-dioxane (0.002)
	Acrolein (0.048)

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
613HP04101	2-chloroethyl_vinyl_ether	+/-	J/UR
	Isobutyl alcohol		
	Acetonitrile		
	1,4-dioxane		
	Acrolein		

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the 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 # 26864A

A validation was performed on the Semivolatile Data from SDG 26864A. 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, A5771,-72,-73,-74,-75, 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).

613HP04101	2,6-dichlorophenol (59.6)
	1,2,4,5-tetrachlorobenzene (54.0)
	n-nitrosodiethylamine (83.0)
	acetophenone (66.3)
	n-nitrosomorpholine (57.0)
	o,o,o-triethyl phosphorothio (79.1)
	isosafrole (74.1)
	2,4-dinitrotoluene (71.9)
	1-naphthylamine (58.2)
	2-naphthylamine (58.7)
	phenacetin (56.8)
	4-aminobiphenyl (70.1)
	methapyrilene (63.3)
	isodrin (71.4)
	3,3'-dimethylbenzidine (53.2)
	famphur (79.2)

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A5771,-72,-73,-74,-75, 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).

613HP04101	n-nitrosopyrrolidine (97.3)
	1-nitroso-piperidine (96.6)
	n-nitrosodi-n-butylamine (93.0)
	safrole (112.1)
	1,4-naphthoquinone (97.6)
	1,3-dinitrobenzene (160.0)
	2-methyl-5-nitroaniline (114.8)
	diallate (112.7)
	pentachloronitrobenzene (122.0)
	methyl parathion (111.6)
	parathion (140.7)
	4-nitroquinoline-1-oxide (218.5)
	kepone (122.0)
	7,12-dimethylbenz(a)anthrace (102.4)
	1,3,5-trinitrobenzene (149.3)
	5-nitro-o-toluidine (114.5)

The continuing calibration, A5771,-72,-73,-74,-75, 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).

613HP04101	aramite (0.044)
	hexachlorophene (0.017)

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
613HP04101	2,6-dichlorophenol (59.6)	+/-	J/UJ
	1,2,4,5-tetrachlorobenzene (54.0)		
	n-nitrosodiethylamine (83.0)		
	acetophenone (66.3)		
	n-nitrosomorpholine (57.0)		
	o,o,o-triethyl phosphorothio (79.1)		
	isosafrole (74.1)		
	2,4-dinitrotoluene (71.9)		
	1-naphthylamine (58.2)		
	2-naphthylamine (58.7)		
	phenacetin (56.8)		
	4-aminobiphenyl (70.1)		
	methapyrilene (63.3)		
	isodrin (71.4)		
	3,3'-dimethylbenzidine (53.2)		
	famphur (79.2)		
613HP04101	n-nitrosopyrrolidine (97.3)	+/-	J/UR
	1-nitroso-piperidine (96.6)		
	n-nitrosodi-n-butylamine (93.0)		
	safrole (112.1)		
	1,4-naphthoquinone (97.6)		
	1,3-dinitrobenzene (160.0)		
	2-methyl-5-nitroaniline (114.8)		
	diallate (112.7)		
	pentachloronitrobenzene (122.0)		
	methyl parathion (111.6)		
	parathion (140.7)		
	4-nitroquinoline-1-oxide (218.5)		
	kepone (122.0)		
	7,12-dimethylbenz(a)anthrace (102.4)		
	1,3,5-trinitrobenzene (149.3)		
	5-nitro-o-toluidine (114.5)		

* 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	ANALYTE ID	DL	QL
613HP04101	aramite (0.044) hexachlorophene (0.017)	+/-	J/UR
613HP04101	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 # 26864A

A validation was performed on the Pesticide/Aroclor Data from SDG 26864A. 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 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 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 # 26864A

A validation was performed on the Organophosphorous Pesticide Data from SDG 26864A. 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

SAMPLE CALCULATION
GC METHODS

EPA SAMPLE ID: LD0912WC

COMPOUND: phorate

CONCENTRATION: 6.6 μg/L

	Water (μg/L)	Soil (μg/Kg)
Area of Compound	221880	
Mid Level Calibration Factor	334443	
Final Volume	10000	10000
Dilution Factor	1	1
GPC Factor	NA	1
Injection Volume	1	1
Weight of Sample	NA	30
Volume of Sample	1000	NA
% Moisture	NA	1.0
Concentration	6.63431436747	??

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 # 26864A

A validation was performed on the Chlorinated Herbicides from SDG 26864A. 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. The summary page for the opening continuing calibration standard was not present in the data package. However, the raw data was present. The reviewer calculated %Ds for the TCL. No action 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 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 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 # 26864

A validation was performed on the Dioxin/Furans Data from SDG 26864. 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 for a octa-dioxin.

Sample ID	Congener ID	Blank Conc. pg/L	Sample Conc. pg/L	Qualification
613-H-P041-01	OCDD	15.4	66.7	NA

Field Blanks

The associated equipment blank, 619-E-B007-01, did not exhibit results that impacted the sample. The field blank, 619-D-B007-01, exhibited several positive results, none of which impacted the sample.

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
613-H-P041-01	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

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 # 26864C

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 26864C. 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
Antimony	2.88 ug/l	no impact
Iron	35.7 ug/l	no impact

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

Elements	Conc.	Samples affected
Beryllium	0.45 ug/l	all water samples below 2.25 ug/l
Calcium	23.1 ug/l	no impact
Zinc	5.8 ug/l	all water samples below 29.0 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".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Aluminum	-33.1 ug/l	no impact
Chromium	-1.02 ug/l	no impact
Copper	-1.15 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".

Field Duplicate Analysis

Specific Finding

The RPDs for waters for the field duplicate results are above the upper control limits (>35%). All positive results are qualified as estimated, "J", for the following elements.

Aluminum, Barium, Arsenic, Calcium, Chromium, Iron, Lead, Magnesium, Manganese, Nickel, Potassium , Vanadium and Zinc.

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 2.25 ug/l	Be.	+	U
all water samples below 29.0 ug/l	Zn.		
all water samples	Al, As, Ba, Ca, Cr, Fe, Pb, Mg, Mn, Ni, K, V and Zn.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	26864B
Date:	October 23, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	September 9-11, 1996
Number of Samples:	11 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, 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. Searfoss
for Paul B. Humburg, President

10/30/96
Date

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

SDG# 26864B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		TAL	
613SP02001	SOIL		X		X		X
613SP02401	SOIL		X		X		X
613GP02401	WATER	X				X	
613TP02401	WATER	X					
613SP02801	SOIL		X		X		X
613GP02801	WATER	X		X		X	
613SP03201	SOIL		X		X		X
613GP03201	WATER	X		X		X	
613SP03601	SOIL		X		X		X
613GP03601	WATER	X		X		X	
613SP04101	SOIL		X		X		X
613GP04101	WATER	X		X		X	
613TP04101	WATER	X					
613SP04301	SOIL		X		X		X
613GP04301	WATER	X		X		X	
613TP04301	WATER	X					
613SP04801	SOIL		X		X		X
613GP04801	WATER	X		X		X	
613SP04901	SOIL		X		X		X
613GP04901	WATER	X		X		X	
Total Billable Samples (Water/Soil)		11	9	7	9	8	9

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
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 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 # 26864

A validation was performed on the Volatile Data from SDG 26864. 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 initial calibrations were not acceptable for all compound %RSDs. The average RRF requirements were not met for all initial calibration compounds. Qualifications were required.

Initial Calibrations, continued

Specific Findings

The initial calibration dated 09/16/96 on instrument I contained a compound with an average RRF less than 0.05. For the sample and non-compliant compound listed below, the positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

613SP04301	2-chloroethyl_vinyl_ether (0.031)

The initial calibration dated 09/16/96 on instrument I contained a compound with a %D greater than 25% but less than 50%. For the sample and non-compliant compound listed below, the positive results are qualified as estimated, J.

613SP04301	acetone (37.0%)

Continuing Calibrations

The continuing calibrations that were analyzed by the laboratory for these samples were not acceptable for all compound %Ds. The average RRF requirements were not met for all continuing calibration compounds. The DL of sample 613SP04301 was not noted in these specific findings because the DL was rejected as not required.

Specific Findings

The continuing calibration standard I21048.D contained a compound with an average RRF less than 0.05. For the samples and non-compliant compound listed below, the positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

613SP04901	2-chloroethyl_vinyl_ether (0.037)
613SP03601	
613SP04801	
613SP04101	
613SP03201	
613SP02001DL	

Continuing Calibrations, continued
Specific Findings, continued

The continuing calibration standard I21095.D contained a compound with an average RRF less than 0.05. For the samples and non-compliant compound listed below, the positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

613SP02801	2-chloroethyl_vinyl_ether (0.032)
613SP02401	
613SP02001	

The continuing calibration standard I21095.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.

613SP02801	bromomethane (57.5%)
613SP02401	
613SP02001	

The continuing calibration standard N23682.D contained a compound with an average RRF less than 0.05. For the samples and non-compliant compound listed below, the positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

613GP04801	2-chloroethyl_vinyl_ether (0.024)
613GP04101	
613GP03201	

The continuing calibration standard N23725.D contained a compound with an average RRF less than 0.05. For the samples and non-compliant compound listed below, the positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

613GP02801	2-chloroethyl_vinyl_ether (0.022)
613GP02401	

The continuing calibration standard N24203.D contained a compound with an average RRF less than 0.05. For the samples and non-compliant compound listed below, the positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

613GP04901	2-chloroethyl_vinyl_ether (0.024)
613GP04301	
613GP03601	

Continuing Calibrations, continued
Specific Findings, continued

The continuing calibration I21048.D contained two (2) compounds with %Ds greater than 25% but less than 50%. For the samples and non-compliant compounds listed below, the positive results are qualified as estimated, J.

613SP04901	acetone (38.4%)
613SP03601	
613SP04801	
613SP04101	
613SP03201	
613SP02001DL	

613SP04901	2-butanone (32.4%)
613SP03601	
613SP04101	
613SP03201	

The continuing calibration I21095.D contained a compound with a %D greater than 25% but less than 50%. For the samples and non-compliant compound listed below, the positive results are qualified as estimated, J.

613SP02001	2-butanone (37.5%)
613SP02401	
613SP02801	

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. The DL of sample 613SP04301 was not noted in these specific findings because the DL was rejected as not required.

	VBLK1	VBLK2	VBLK7
acetone	--------	1 μg/Kg	3 μg/Kg
methylene chloride	2μg/L	--------	--------

Method Blanks, continued
Specific Finding

Blank	Samples	Compound	Action Level	Qualification
VBLK1	613GP04901 613GP04301	methylene chloride	20 μg/L	CRQL
VBLK2	613SP04901 613SP03601 613SP04801 613SP04101 613SP03201 613SP02001DL	acetone	10 μg/Kg	NA
VBLK7	613SP02801 613SP02401 613SP02001	acetone	30 μg/Kg	NA

Field QC Blanks

One (1) of the trip blanks, the rinseate blank, and the DI blank associated with these samples 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. The DL sample of 613SP04301 was not noted in these specific findings because the DL was rejected as not required.

	613TP04301	**619EB00701**	**619DB00701**
methylene chloride	2 μg/L	-------	------
chloroform	2 μg/L	14 μg/L	17 μg/L
carbon disulfide	1 μg/L		

Blank	Samples	Compound	Action Level	Qualification
613TP04301	613SP04301 613GP04301 613SP04901	methylene chloride	20 μg/L, 20 μg/Kg	CRQL
	613GP04301	carbon disulfide	5 μg/L	CRQL

Compound Quantitation

Specific Finding

The following sample is rejected, UR, in favor of the original analysis for the noted reason.

Sample	Compounds	Reason
613SP04301DL	All compounds	Dilution analysis was not required.

For the following samples, the E flagged results are rejected, UR, and 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.

613SP02001

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
613SP04301	2-chloroethyl_vinyl_ether	+/-	J/UR
613SP04301	acetone	+	J
613SP04901 613SP03601 613SP04801 613SP04101 613SP03201 613SP02001DL	2-chloroethyl_vinyl_ether	+/-	J/UR
613SP02801 613SP02401 613SP02001	2-chloroethyl_vinyl_ether	+/-	J/UR
613SP02801 613SP02401 613SP02001	bromomethane	+/-	J/UJ
613GP04801 613GP04101 613GP03201	2-chloroethyl_vinyl_ether	+/-	J/UR
613GP02801 613GP02401	2-chloroethyl_vinyl_ether	+/-	J/UR
613GP04901 613GP04301 613GP03601	2-chloroethyl_vinyl_ether	+/-	J/UR

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
613SP04901 613SP03601 613SP04801 613SP04101 613SP03201 613SP02001DL	acetone	+	J
613SP04901 613SP03601 613SP04101 613SP03201	2-butanone	+	J
613SP02001 613SP02401 613SP02801	2-butanone	+	J
613GP04901 613GP04301	methylene chloride	+B	CRQL
613SP04901 613SP03601 613SP04801 613SP04101 613SP03201 613SP02001DL	acetone	+B	NA
613SP02801 613SP02401 613SP02001	acetone	+B	NA
613SP04301 613GP04301 613SP04901	methylene chloride	+	CRQL

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
613GP04301	carbon disulfide	+	CRQL
613SP04301DL	All compounds	+/-	UR
613SP02001	All E flagged compounds	+E	UR
613SP02001DL	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 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 # 26864

A validation was performed on the Semivolatile Data from SDG 26864. 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, P9191, 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).

613SP04901	benzoic acid (0.003) (98.8)
613SP04301	
613SP03601	
613GP04901	
613GP04301	
613GP03601	

Method Blanks

Associated blank	Compound	Conc.	Action level
SBLK1	bis(2-ethylhexyl) phthalate	36J ug/Kg	360 ug/Kg
SBLK6	bis(2-ethylhexyl) phthalate	1J ug/L	10 ug/L

Samples	Compound	Qualification
613SP04901	bis(2-ethylhexyl) phthalate	CRQL
613SP04301		
613SP03601		
613GP04801		
613GP04101		
613GP03201		

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
613SP04901 613SP04301 613SP03601 613GP04901 613GP04301 613GP03601	benzoic acid (0.003) (98.8)	+/-	J/UR
613SP04901 613SP04301 613SP03601 613GP04801 613GP04101 613GP03201	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
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 # 26864A

A validation was performed on the Metals Data from SDG 26864A. 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	2.30 mg/kg	all soil samples below 11.5 mg/kg
Antimony	2.88 ug/l	all water samples below 14.4 ug/l
Mercury	0.11 ug/l	all water samples below 0.55 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
Silver	-0.25 mg/kg	all soil samples below 2.5 mg/kg
Cobalt	-1.02 ug/l	all water samples below 10.2 ug/l
Copper	-1.15 ug/l	all water samples below 11.5 ug/l

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 11.5 mg/kg	Sn.	+	U
all water samples below 14.4 ug/l	Sb.		
all water samples below 0.55 ug/l	Hg.		
all soil samples below 2.5 mg/kg	Ag.	+/U	J/UJ
all water samples below 10.2 ug/l	Co.		
all water samples below 11.5 ug/l	Cu.		
All "B" results	all analytes	B	J

ANNOTATED FORM Is

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	26883A
Date:	November 7, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	September 10-16, 1996
Number of Samples:	4 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, 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
Paul B. Humburg, President

11/12/96
Date

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

SDG# 26883A

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		HERB		OPP		D/F		TAL		CN		HCR	
619EB00701	WATER	X		X		X		X		X		X		X		X		X	
619DB00701	WATER	X		X		X		X		X		X		X		X		X	
620CB00101	SOIL		X		X		X		X		X		X		X		X		X
620CB00401	SOIL		X		X		X		X		X		X		X		X		X
620EB00501	WATER	X		X		X		X		X		X		X		X		X	
620DB00501	WATER	X		X		X		X		X		X		X		X		X	
Total Billable Samples (Water/Soil)		4	2	4	2	4	2	4	2	4	2	4	2	4	2	4	2	4	2

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

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 # 26883A

A validation was performed on the Volatile Data from SDG 26883A. 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, I21149, 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).

620CB00401	2-chloroethyl vinyl ether (-54.8) acrolein acetonitrile isobutyl alcohol 1,4-dioxane

The continuing calibration, I21263, 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).

620CB00101	2-chloroethyl vinyl ether (-83.9)

The continuing calibration, I21263, 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).

620CB00101	acrolein acetonitrile isobutyl alcohol 1,4-dioxane (50.0)

Method Blanks

Associated blank	Compound	Conc	Action level
VBLK2	methylene chloride	4J ug/Kg	40 ug/Kg
	acetone	3.0 ug/Kg	30 ug/Kg
VBLK4	methylene chloride	8 ug/Kg	80 ug/Kg
	acetone	4J ug/Kg	40 ug/Kg

Method Blanks (continued)

Samples	Compound	Qualification
620CB00401 620CB00101	methylene chloride	U
620CB00401	acetone	CRQL
620CB00101	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

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
620CB00401	2-chloroethyl- vinyl ether (-54.8) acrolein acetonitrile isobutyl alcohol 1,4-dioxane	+/-	J/UR
620CB00101	2-chloroethyl- vinyl ether (-83.9)	+/-	J/UJ
620CB00101	acrolein acetonitrile isobutyl alcohol 1,4-dioxane (50.0)	+/-	J/UR
620CB00401 620CB00101	methylene chloride	+	U
620CB00401	acetone	+	CRQL
620CB00101	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 # 26883A

A validation was performed on the Semivolatile Data from SDG 26883A. 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, A5836,-38,-39,-40,-41, 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).

620CB00401	2,6-dichlorophenol (64.6)
	1,2,4,5-tetrachlorobenzene (59.5)
	4-nitroquinoline-1-oxide (67.7)
	1,3,5-trinitrobenzene (54.9)
	safrole (65.4)
	1,4-naphthoquinone (54.2)
	1,3-dinitrobenzene (86.4)
	5-nitro-o-toluidine (69.1)
	daillate (60.7)
	methyl parathion (74.8)
	parathion (88.4)
	famphur (62.4)

The continuing calibration, A5836,-38,-39,-40,-41, 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).

620CB00401	kepone (115.0)
	7,12-dimethylbenz(a)anthracene (100.3)
	pentachloronitrobenzene (97.8)

The continuing calibration, A5836,-38,-39,-40,-41, 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).

620CB00401	aramite (0.041)
	hexachlorophene (0.017)

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).

620CB00101	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)
	famphur (55.0)
	2-acetylaminofluorene (73.8)
	diphenylamine (74.6)
	sulfotepp (73.6)
	kepone (83.6)
	7,12-dimethylbenz(a)anthracene (58.5)
	dimethylbenzidine (76.0)

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).

620SB00101	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).

620SB00101	hexachlorophene (0.017)(70.2) aramite (0.047)

Rinseate Blanks

Associated blank	Compound	Conc.	Action level
620EB00501	bis(2-ethylhexyl) phthalate	21B ug/L	210 ug/L

Samples	Compound	Qualification
620CB00101	bis(2-ethylhexyl) phthalate	CRQL

Compound Identification/Quantitation

Specific Finding:

The laboratory did not include the following compounds in their 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
620CB00401	2,6-dichlorophenol (64.6)	+/-	J/UJ
	1,2,4,5-tetrachlorobenzene (59.5)		
	4-nitroquinoline-1-oxide (67.7)		
	1,3,5-trinitrobenzene (54.9)		
	safrole (65.4)		
	1,4-naphthoquinone (54.2)		
	1,3-dinitrobenzene (86.4)		
	5-nitro-o-toluidine (69.1)		
	daillate (60.7)		
	methyl parathion (74.8)		
	parathion (88.4)		
	famphur (62.4)		
620CB00401	kepone (115.0)	+/-	J/UR
	7,12-dimethylbenz(a)anthracene (100.3)		
	pentachloronitrobenzene (97.8)		
620CB00401	aramite (0.041)	+/-	J/UR
	hexachlorophene (0.017)		

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the 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
620CB00101	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)		
	famphur (55.0)		
	2-acetylaminofluorene (73.8)		
	diphenylamine (74.6)		
	sulfotepp (73.6)		
	kepone (83.6)		
	7,12-dimethylbenz(a)anthracene (58.5)		
	3,3'-dimethylbenzidine (76.0)		
620SB00101	1,4-naphthoquinone (91.5)	+/-	J/UR
620SB00101	hexachlorophene (0.017)(70.2)	+/-	J/UR
	aramite (0.047)		
620CB00101	bis(2-ethylhexyl) phthalate	+	CRQL
620CB00401	carbazole	+/-	J/UR
620CB00101	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 # 26883A

A validation was performed on the Pesticide/Aroclor Data from SDG 26883A. 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 620SB00101 and 620CB00101 exhibited positive results for three (3) compounds in the field duplicate. The field duplicate pair of samples 620SB00401/DL and 620CB00401 exhibited positive results for five (5) compounds in the field sample and three (3) compounds in the field duplicate. Qualifications were required for both field duplicate pairs as several calculated RPDs were above the QC limit of 50%.

Specific Finding

The field duplicate pair of samples 620SB00101 and 620CB00101 exhibited positive results above the CRQL for 4,4'-DDE, 4,4'-DDD, and Aroclor 1260 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.

620CB00101	4,4'-DDE (200%)
	4,4'-DDD (200%)
	Aroclor 1260 (200%)

The field duplicate pair of samples 620SB00401/DL and 620CB00401 exhibited positive results above the CRQL for 4,4'-DDT and Gamma-Chlordane 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.

620CB00401	4,4'-DDT (200%)
	Gamma-Chlordane (200%)

The field duplicate pair of samples 620SB00401/DL and 620CB00401 exhibited positive results above the CRQL for 4,4'-DDE in the field sample and field duplicate. The positive results are qualified as estimated, J, due to poor duplicate precision.

620CB00401	4,4'-DDE (61%)

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). 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

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
620CB00101	4,4'-DDE 4,4'-DDD Aroclor 1260	+/-	J/UJ
620CB00401	4,4'-DDT Gamma-Chlordane	+/-	J/UJ
620CB00401	4,4'-DDE	+	J
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

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 # 26883A

A validation was performed on the Herbicide Data from SDG 26883A. 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

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 # 26883A

A validation was performed on the Organophosphorus Pesticide Data from SDG 26883A. 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
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 # 26883B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 26883B. 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
Chromium	0.12 mg/kg	no impact
Tin	1.72 mg/kg	all soil samples below 8.6 mg/kg
Cyanide	0.18 mg/kg	all soil samples below 0.9 mg/kg

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

Elements	Conc.	Samples affected
Barium	0.5 ug/l	no impact
Beryllium	0.35 ug/l	no impact
Copper	7.3 ug/l	no impact
Lead	2.9 ug/l	no impact
Silver	2.0 ug/l	no impact
Vanadium	0.54 ug/l	no impact
Tin	3.0 ug/l	no impact
Zinc	6.1 ug/l	no impact
Cyanide	4.1 ug/l	all soil samples below 4.1 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	-1.55 mg/kg	no impact
Cobalt	-0.07 mg/kg	no impact
Thallium	-0.39 mg/kg	all soil samples below 3.9 mg/kg
Vanadium	-0.04 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".

Field Duplicate Analysis

Specific Finding

The RPD for Lead (sample 620CB00401) 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 8.6 mg/kg	Sn.	+	U
all soil samples below 0.9 mg/kg	Cn.		
all soil samples below 4.1 mg/kg	Cn.		
all soil samples below 3.9 mg/kg	Tl.	+/U	J/UJ
620-CB00401 only	Pb.	+	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 # 26883

A validation was performed on the Dioxin/Furans Data from SDG 26883. 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 blanks exhibited contamination that resulted in qualifications.

Method Blanks - continued

Sample ID	Congener ID	Blank Conc. ng/Kg	Sample Conc. ng/Kg	Qualification
620-C-B004-01	OCDD	0.812	258	NA
	OCDF	0.826	13.4	NA
620-C-B001-01	OCDD	2.57	252	NA
	1,2,3,4,6,7,8-HpCDF	0.765	6	NA
	OCDF	2.02	10.9	NA

Field Blanks

The DI blank exhibited contamination for four 2,3,7,-substituted dioxin furans. It is the professional opinion of the data validator that the contamination is due to the laboratory, not the source water. Therefore, all positive 1,2,3,4,7,8-HxCDF and 1,2,3,4,6,7,8-HpCDF results are considered to be suspect and will be qualified as non detect, U.

Sample ID	Congener ID	DI Blank Conc. pg/L	Sample Conc. ng/Kg	Qualification
620-C-B004-01	1,2,3,4,6,7,8-HpCDF	24.2	7.65	U
	1,2,3,4,7,8-HxCDF	1.26	2.22	U
620-C-B001-01	1,2,3,4,6,7,8-HxCDF	24.2	6	U
	1,2,3,4,7,8-HxCDF	1.26	1.77	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
620-C-B004-01	OCDD	+B	NA
	OCDF	+B	NA
620-C-B001-01	OCDD	+B	NA
	1,2,3,4,6,7,8-HpCDF	+B	NA
	OCDF	+B	NA
620-C-B004-01	1,2,3,4,6,7,8-HpCDF	+	U
	1,2,3,4,7,8-HxCDF	+	U
620-C-B001-01	1,2,3,4,6,7,8-HxCDF	+	U
	1,2,3,4,7,8-HxCDF	+	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#:	26883B
Date:	November 7, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	September 10-16, 1996
Number of Samples:	3 Aqueous Sample(s) with 0 MS/MSD(s) 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:	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. Scarfaro
Paul B. Humburg, President

11/12/96
Date

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

SDG# 26883B

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
619SB00701	SOIL		X		X		X		X		
619SB00801	SOIL		X		X		X		X		X
619SB01101	SOIL		X		X		X		X		X
619TB01101	WATER	X									
620SB00101	SOIL		X		X		X		X		
620SB00301	SOIL		X		X		X		X		
620SB00401	SOIL		X		X		X		X		X
620TB00401	WATER	X									
620SB00501	SOIL		X		X		X		X		
620TB00501	WATER	X									
620SB00502	SOIL		X		X		X		X		
Total Billable Samples (Water/Soil)		3	8	0	8	0	8	0	8	0	3

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
TAL= SW846 Metals
CN= 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 # 26883B

A validation was performed on the Volatile Data from SDG 26883B. 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, I21120, 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).

620SB00401	2-chloroethyl vinyl ether
619SB01101	

The continuing calibration, I21149, 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).

619SB00801	2-chloroethyl vinyl ether

The continuing calibration, I21204, 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).

619SB00701	2-butanone (26.2)

The continuing calibration, I21204, 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).

619SB00701	2-chloroethyl vinyl ether

The continuing calibration, I21263, 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).

620SB00501	2-chloroethyl vinyl ether (-83.9)
620SB00101	
620SB00301	

Continuing Calibrations (continued)

Specific Finding:

The continuing calibration, I21291, 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).

620SB00502	2-chloroethyl vinyl ether

Internal Standards

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

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).

620SB00401	1,4-difluorobenzene
619SB01101	chlorobenzene-d_5
620SB00401RE	
619SB00701	
619SB01101RE	bromochloromethane
	1,4-difluorobenzene
	chlorobenzene-d_5

Method Blanks

Associated blank	Compound	Conc	Action level
VBLK2	methylene chloride	4J ug/Kg	40 ug/Kg
	acetone	4J ug/Kg	40 ug/Kg
VBLK3	methylene chloride	4J ug/Kg	40 ug/Kg
	acetone	3J ug/Kg	30 ug/Kg

Method Blanks (continued)

Associated blank	Compound	Conc	Action level
VBLK6	methylene chloride	8 ug/Kg	80 ug/Kg
	acetone	4J ug/Kg	40 ug/Kg
VBLK7	acetone	5J ug/Kg	50 ug/Kg

Samples	Compound	Qualification
619SB01101	methylene chloride	CRQL
620SB00401 619SB00801 620SB00501 620SB00101 620SB00301	methylene chloride	U
620SB00401 619SB00801	acetone	CRQL
619SB01101 620SB00301 620SB00502	acetone	U

Compound Identification/Quantitation

Specific Finding:

Reject all results for the samples 619SB01101RE and 620SB00401RE, 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

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
620SB00401 619SB01101	2-chloroethyl vinyl ether	+/-	J/UR
619SB00801	2-chloroethyl vinyl ether	+/-	J/UR
619SB00701	2-butanone (26.2)	+	J
619SB00701	2-chloroethyl vinyl ether	+/-	J/UR
620SB00501 620SB00101 620SB00301	2-chloroethyl- vinyl ether (-83.9)	+/-	J/UJ
620SB00502	2-chloroethyl vinyl ether	+/-	J/UR
620SB00401 619SB01101 620SB00401RE 619SB00701	All associated compounds 1,4-difluorobenzene chlorobenzene-d_5	+/-	J/UJ
619SB01101RE	bromochloromethane 1,4-difluorobenzene chlorobenzene-d_5		
619SB01101	methylene chloride	+	CRQL
620SB00401 619SB00801 620SB00501 620SB00101 620SB00301	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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
620SB00401 619SB00801	acetone	+	CRQL
619SB01101 620SB00301 620SB00502	acetone	+	U
619SB01101RE 620SB00401RE	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 # 26883B

A validation was performed on the Semivolatile Data from SDG 26883B. 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, V14813, 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).

620SB00501	indeno(1,2,3-cd)pyrene (-59.0)
620SB00502	dibenzo(a,h)anthracene (-67.1)
620SB00101	benzo(g,h,i)perylene (-69.8)
620SB00301	

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).

620SB00501	chrysene-d_{12}
620SB00502	perylene-d_{12}
620SB00101	
620SB00301	
620SB00101RE	
620SB00301RE	
620SB00501RE	perylene-d_{12}
620SB00502RE	

Rinseate Blanks

Associated blank	Compound	Conc.	Action level
620EB00501	bis(2-ethylhexyl) phthalate	21J ug/L	210 ug/L

Rinseate Blanks (continued)

Samples	Compound	Qualification
620SB00101	bis(2-ethylhexyl) phthalate	CRQL
620SB00301		
620SB00301RE		
620SB00401		

Compound Identification/Quantitation

Specific Finding:

Reject all results for samples 620SB00501, 620SB00502, 620SB00101RE and 620SB00301RE, 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
620SB00501 620SB00502 620SB00101 620SB00301	indeno(1,2,3-cd)pyrene (-59.0) dibenzo(a,h)anthracene (-67.1) benzo(g,h,i)perylene (-69.8)	+/-	J/UJ
620SB00501 620SB00502 620SB00101 620SB00301 620SB00101RE 620SB00301RE	All associated compounds chrysene-d_{12} perylene-d_{12}	+/-	J/UJ
620SB00501RE 620SB00502RE	perylene-d_{12}		
620SB00101 620SB00301 620SB00301RE 620SB00401	bis(2-ethylhexyl) phthalate	+	CRQL
620SB00501 620SB00502 620SB00101RE 620SB00301RE	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 # 26883B

A validation was performed on the Pesticide/Aroclor Data from SDG 26883B. 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

Two (2) continuing calibration standards associated with the reported samples exhibited %Ds above the QC limits and required qualifications of the data.

Specific Findings

The continuing calibration of INDBL36N (9/25/96 06:41) contained two (2) compounds with %Ds greater than 15% but less than 50% that required qualifications. For the samples and the non-compliant compounds listed below, the positive results are qualified as estimated, J.

619SB01101	Alpha Chlordane (16.3%)
619SB00801	Gamma Chlordane (15.7%)

The continuing calibration of INDAL36W (9/28/96 04:51) contained one (1) compound with a %D greater than 15% but less than 50% that required qualification. For the sample and the non-compliant compound listed below, the positive results are qualified as estimated, J.

619SB01101DL	4,4'-DDD (-16.3%)

Matrix Spike/Matrix Spike Duplicate

The MS/MSD pair of sample 620SB00301 exhibited non-compliant recoveries for several compounds.

Specific Finding

The MS/MSD pair of sample 620SB00301 exhibited 0% recoveries for several compounds. For the following sample and compounds, the positive results are qualified as estimated, J.

	Compound	MS	MSD
620SB00301	4,4'-DDE	0%	0%
	4,4'-DDD	0%	21%
	4,4'-DDT	0%	0%

Field Duplicates

The field duplicate pair of samples 620SB00101 and 620CB00101 exhibited positive results for three (3) compounds in the field duplicate. The field duplicate pair of samples 620SB00401/DL and 620CB00401 exhibited positive results for five (5) compounds in the field sample and three (3) compounds in the field duplicate. Qualifications were required for both field duplicate pairs as several calculated RPDs were above the QC limit of 50%.

Specific Finding

The field duplicate pair of samples 620SB00101 and 620CB00101 exhibited positive results above the CRQL for 4,4'-DDE, 4,4'-DDD, and Aroclor 1260 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.

620SB00101	4,4'-DDE (200%)
	4,4'-DDD (200%)
	Aroclor 1260 (200%)

The field duplicate pair of samples 620SB00401/DL and 620CB00401 exhibited positive results above the CRQL for 4,4'-DDT and Gamma-Chlordane 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.

620SB00401	4,4'-DDT (200%)
	Gamma-Chlordane (200%)

The field duplicate pair of samples 620SB00401/DL and 620CB00401 exhibited positive results above the CRQL for 4,4'-DDE in the field sample and field duplicate. The positive results are qualified as estimated, J, due to poor duplicate precision.

620SB00401	4,4'-DDE (61%)

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 620SB00301 the Aroclor 1260 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. 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. Two (2) samples were diluted to accurately quantitate target compounds. Sample 620SB00401DL exhibited a result for 4,4'-DDT that was above the calibration range of the instrument. However, this DL sample was not further diluted per the method; 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.

Specific Findings

For sample 620SB00301, the result for Aroclor 1260 is qualified as presumptively present at an estimated concentration, NJ, as noted above.

620SB00301 Aroclor 1260

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

619SB01101
620SB00401

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

620SB00401DL 4,4'-DDT

Compound Identification/Quantitation, Continued

Specific Findings, Continued

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
619SB01101	Alpha Chlordane	+	J
619SB00801	Gamma Chlordane	+	J
619SB01101DL	4,4'-DDD	+	J
620SB00301	4,4'-DDE 4,4'-DDD 4,4'-DDT	+	J
620SB00101	4,4'-DDE 4,4'-DDD Aroclor 1260	+/-	J/UJ
620SB00401	4,4'-DDT Gamma-Chlordane	+/-	J/UJ
620SB00401	4,4'-DDE	+	J
620SB00301	Aroclor 1260	+	NJ
619SB01101 620SB00401	All E Flagged	+E	D
619SB01101DL 620SB00401DL	All except corresponding D flagged results	+/-	UR
620SB00401DL	4,4'-DDT	+	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
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 # 26883A

A validation was performed on the Metals and Cyanide Data from SDG 26883A. 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	0.12 mg/kg	no impact
Lead	0.25 mg/kg	no impact
Tin	1.90 mg/kg	all soil samples below 9.5 mg/kg
Zinc	0.83 mg/kg	no impact
Cyanide	0.18 mg/kg	all soil samples below 0.9 mg/kg

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

Elements	Conc.	Samples affected
Barium	0.5 ug/l	no impact
Beryllium	0.35 ug/l	all soil samples below 0.35 mg/kg
Copper	7.3 ug/l	no impact
Lead	2.9 ug/l	no impact
Silver	2.0 ug/l	no impact
Vanadium	0.54 ug/l	no impact
Tin	3.0 ug/l	no impact
Zinc	6.1 ug/l	no impact
Cyanide	4.1 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
Aluminum	-1.55 mg/kg	no impact
Antimony	-0.57 mg/kg	all soil samples below 5.7 mg/kg
Cobalt	-0.07 mg/kg	no impact
Silver	-0.28 mg/kg	all soil samples below 2.8 mg/kg
Thallium	-0.38 mg/kg	all soil samples below 3.8 mg/kg
Vanadium	-0.08 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 recovery for Manganese (3%) was below 30%. All non-detect results are rejected and all positive results are qualified as estimated, "J".

The Matrix Spike recoveries for Antimony (41%) and Arsenic (71%) 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 Zinc (150%) 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 soil samples below 9.5 mg/kg	Sn.	+	U
all soil samples below 0.35 mg/kg	Be.		
aa soil samples below 0.9 mg/kg	Cn.		
all soil samples below 5.7 mg/kg	Sb.	+/U	J/UJ
all soil samples below 2.8 mg/kg	Ag.		
all soil samples below 3.8 mg/kg	Tl.		
all soil samples	Mn.	+	J
		U	R
all soil samples	Sb and As.	+/U	J/UJ
all soil samples	Zn.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	26913A
Date:	October 23, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	September 12, 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. Scarfoss
for Paul B. Humburg, President

10/30/96
Date

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

SDG# 26913

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
613CP00101	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 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 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 # 26913A

A validation was performed on the Volatile Data from SDG 26913A. 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 average RRF requirements were not met for all continuing calibration compounds.

Continuing Calibrations, continued

Specific Findings

The continuing calibration standard I21120.D contained compounds with average 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.

613CP00101	2-chloroethyl_vinyl_ether (0.033) Isobutyl alcohol (0.007) Acetonitrile (0.020) 1,4-dioxane (0.002) Acrolein (0.034)

Method Blanks

The method blank associated with this sample exhibited contamination. The 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.

	VBLK1
acetone	4 μg/Kg
methylene chloride	4 μg/Kg

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
VBLK1	613CP00101	acetone	40 μg/Kg	NA
	613CP00101	methylene chloride	40 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
613CP00101	2-chloroethyl_vinyl_ether Isobutyl alcohol Acetonitrile 1,4-dioxane Acrolein	+/-	J/UR
613CP00101	acetone	+B	NA
613CP00101	methylene chloride	+B	CRQL

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non detect result

DATA ASSESSMENT 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 # 26913A

A validation was performed on the Semivolatile Data from SDG 26913A. 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, A5771,-72,-73,-74,-75, 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).

613CP00101	2,6-dichlorophenol (59.6)
	1,2,4,5-tetrachlorobenzene (54.0)
	n-nitrosodiethylamine (83.0)
	acetophenone (66.3)
	n-nitrosomorpholine (57.0)
	o,o,o-triethyl phosphorothio (79.1)
	isosafrole (74.1)
	2,4-dinitrotoluene (71.9)
	1-naphthylamine (58.2)
	2-naphthylamine (58.7)
	phenacetin (56.8)
	4-aminobiphenyl (70.1)
	methapyrilene (63.3)
	isodrin (71.4)
	3,3'-dimethylbenzidine (53.2)
	famphur (79.2)

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A5771,-72,-73,-74,-75, 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).

613CP00101	n-nitrosopyrrolidine (97.3)
	1-nitroso-piperidine (96.6)
	n-nitrosodi-n-butylamine (93.0)
	safrole (112.1)
	1,4-naphthoquinone (97.6)
	1,3-dinitrobenzene (160.0)
	2-methyl-5-nitroaniline (114.8)
	diallate (112.7)
	pentachloronitrobenzene (122.0)
	methyl parathion (111.6)
	parathion (140.7)
	4-nitroquinoline-1-oxide (218.5)
	kepone (122.0)
	7,12-dimethylbenz(a)anthrace (102.4)
	1,3,5-trinitrobenzene (149.3)

The continuing calibration, A5771,-72,-73,-74,-75, 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).

613CP00101	aramite (0.044)
	hexachlorophene (0.017)

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
613CP00101	2,6-dichlorophenol (59.6)	+/-	J/UJ
	1,2,4,5-tetrachlorobenzene (54.0)		
	n-nitrosodiethylamine (83.0)		
	acetophenone (66.3)		
	n-nitrosomorpholine (57.0)		
	o,o,o-triethyl phosphorothio (79.1)		
	isosafrole (74.1)		
	2,4-dinitrotoluene (71.9)		
	1-naphthylamine (58.2)		
	2-naphthylamine (58.7)		
	phenacetin (56.8)		
	4-aminobiphenyl (70.1)		
	methapyrilene (63.3)		
	isodrin (71.4)		
	3,3'-dimethylbenzidine (53.2)		
	famphur (79.2)		
613CP00101	n-nitrosopyrrolidine (97.3)	+/-	J/UR
	1-nitroso-piperidine (96.6)		
	n-nitrosodi-n-butylamine (93.0)		
	safrole (112.1)		
	1,4-naphthoquinone (97.6)		
	1,3-dinitrobenzene (160.0)		
	2-methyl-5-nitroaniline (114.8)		
	diallate (112.7)		
	pentachloronitrobenzene (122.0)		
	methyl parathion (111.6)		
	parathion (140.7)		
	4-nitroquinoline-1-oxide (218.5)		
	kepone (122.0)		
	7,12-dimethylbenz(a)anthrace (102.4)		
	1,3,5-trinitrobenzene (149.3)		
613CP00101	aramite (0.044)	+/-	J/UR
	hexachlorophene (0.017)		

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the 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
613CP00101	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 # 26913A

A validation was performed on the Pesticide/Aroclor Data from SDG 26913A. 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 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 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 # 26913A

A validation was performed on the Organophosphorous Pesticide Data from SDG 26913A. 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 # 26913A

A validation was performed on the Chlorinated Herbicides from SDG 26913A. 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 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 # 26913

A validation was performed on the Dioxin/Furans Data from SDG 26913. 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

Field Blanks

The associated equipment blank, 619-E-B007-01, did not exhibit results that impacted the sample. The field blank, 619-D-B007-01, exhibited several positive results, none of which impacted the sample.

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

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 # 26913C

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 26913C. 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
Chromium	0.09 mg/kg	no impact
Lead	0.73 mg/kg	no impact
Tin	1.81 mg/kg	all soil samples below 9.05 mg/kg
Cyanide	0.18 mg/kg	all soil samples below 0.9 mg/kg

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

Elements	Conc.	Samples affected
Barium	0.5 ug/l	no impact
Copper	2.7 ug/l	all soil samples below 2.7 mg/kg
Lead	2.9 ug/l	no impact
Silver	2.0 ug/l	no impact
Vanadium	0.54 ug/l	no impact
Zinc	6.0 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 9.05 mg/kg	Sn.	+	U
all soil samples below 0.9 mg/kg	Cn.		
all soil samples below 2.7 mg/kg	Cu.		
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	26913B
Date:	October 23, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	September 14-16, 1996
Number of Samples:	8 Aqueous Sample(s) with 0 MS/MSD(s) 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 III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, 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. Simpson
Paul B. Hamburg, President

10/30/96
Date

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

SDG# 26913B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		TAL	
613SP00101	SOIL		X		X		X
613GP00101	WATER	X		X		X	
613SP00201	SOIL		X		X		X
613GP00201	WATER	X		X			
613SP00701	SOIL		X		X		X
613GP00701	WATER	X		X		X	
613SP00801	SOIL		X		X		X
613GP00801	WATER	X					
613SP01401	SOIL		X		X		X
613GP02001	WATER	X					
613TP02001	WATER	X					
613SP04001	SOIL		X		X		X
613GP04001	WATER	X		X		X	
613TP04001	WATER	X					
613SP05501	SOIL		X		X		X
Total Billable Samples (Water/Soil)		8	7	4	7	3	7

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
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 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 # 26913

A validation was performed on the Volatile Data from SDG 26913. 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 average RRF requirements were not met for all continuing calibration compounds. The DL of sample 613SP01401 was not noted in these specific findings because the DL was rejected in the Compound Quantitation section of this narrative.

Continuing Calibrations, continued

Specific Findings

The continuing calibration standard I21095.D contained a compound with an average RRF less than 0.05. For the samples and non-compliant compound listed below, the positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

613SP01401	2-chloroethyl_vinyl_ether (0.032)
613SP00101	
613SP00201	
613SP05501	
613SP04001	

The continuing calibration standard I21095.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.

613SP01401	bromomethane (57.5%)
613SP00101	
613SP00201	
613SP05501	
613SP04001	

The continuing calibration standard I21119.D contained a compound with an average RRF less than 0.05. For the samples and non-compliant compound listed below, the positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

613SP00701	2-chloroethyl_vinyl_ether (0.033)
613SP00801	

The continuing calibration standard N23757.D contained a compound with an average RRF less than 0.05. For the samples and non-compliant compound listed below, the positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

613GP02001	2-chloroethyl_vinyl_ether (0.016)
613GP00701	
613GP00101	
613GP00801	
613GP00201	
613GP04001	

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. The DL of sample 613SP01401 was not noted in these specific findings because the DL was rejected in the Compound Quantitation section of this narrative.

	VBLK2	VBLK3
acetone	3 μg/Kg	4 μg/Kg
methylene chloride	--------	4 μg/Kg

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
VBLK2	613SP01401 613SP00101 613SP05501	acetone	30 μg/L	NA
	613SP00201 613SP04001	acetone	30 μg/L	U
VBLK3	613SP00701 613SP00801	acetone	40 μg/Kg	NA
	613SP00701 613SP00801	methylene chloride	40 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
613SP01401DL	All compounds	Dilution analysis results conflict with original analysis.

Compound Quantitation, continued

Specific Findings, continued

All results reported above the calibration range in the following sample are qualified as estimated, J.

613SP01401

For the following samples, the E flagged results are rejected, UR, and 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.

613GP02001

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
613SP01401 613SP00101 613SP00201 613SP05501 613SP04001	2-chloroethyl_vinyl_ether	+/-	J/UR
613SP01401 613SP00101 613SP00201 613SP05501 613SP04001	bromomethane	+/-	J/UJ
613SP00701 613SP00801	2-chloroethyl_vinyl_ether	+/-	J/UR
613GP02001 613GP00701 613GP00101 613GP00801 613GP00201 613GP04001	2-chloroethyl_vinyl_ether	+/-	J/UR
613SP01401 613SP00101 613SP05501	acetone	+B	NA
613SP00201 613SP04001	acetone	+B	U
613SP00701 613SP00801	acetone	+B	NA
613SP00701 613SP00801	methylene chloride	+B	CRQL
613SP01401DL	All compounds	+/-	UR

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
613SP01401	All compounds	+	J
613GP02001	All E flagged compounds	+E	UR
613GP02001DL	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 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 # 26913

A validation was performed on the Semivolatile Data from SDG 26913. 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

Method Blanks

Associated blank	Compound	Conc.	Action level
SBLK2	bis(2-ethylhexyl) phthalate	4J ug/L	40 ug/L

Samples	Compound	Qualification
613GP00101	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 required qualifications for method blank contamination.

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
613GP00101	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
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 # 26913A

A validation was performed on the Metals Data from SDG 26913A. 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	0.73 mg/kg	no impact
Tin	1.81 mg/kg	all soil samples below 9.05 mg/kg

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

Elements	Conc.	Samples affected
Barium	0.5 ug/l	no impact
Copper	2.7 ug/l	all soil samples below 2.7 mg/kg
Lead	2.9 ug/l	no impact
Silver	2.0 ug/l	no impact
Vanadium	0.54 ug/l	no impact
Zinc	6.0 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 9.05 mg/kg	Sn.	+	U
all soil samples below 2.7 mg/kg	Cu.		
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	26964
Date:	October 23, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	September 14-16, 1996
Number of Samples:	11 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, 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. Seafoss
for Paul B. Humburg, President

10/30/96
Date

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

SDG# 26964

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
613SP02201	SOIL		X		X				X		
613GP02201	WATER	X									
613SP02202	SOIL		X		X				X		
613SP02301	SOIL		X		X				X		
613SP02601	SOIL		X		X				X		
613GP02601	WATER	X									
613TP02601	WATER	X									
613SP02701	SOIL		X		X				X		
613GP02701	WATER	X									
613SP03101	SOIL		X		X				X		
613GP03101	WATER	X						X			
613TP03101	WATER	X									
613SP03501	SOIL		X		X				X		
613GP03501	WATER	X		X				X			
613GP03801	WATER	X		X				X			
613TP03801	WATER	X									
613EP03801	WATER	X		X		X		X		X	
613DP03801	WATER	X		X		X		X		X	
613SP06101	SOIL		X		X				X		
613SP06201	SOIL		X		X				X		
Total Billable Samples (Water/Soil)		11	9	4	9	2	0	5	9	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 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 # 26964

A validation was performed on the Volatile Data from SDG 26964. 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 average RRF requirements were not met for all continuing calibration compounds. The DL of sample 613SP02201 was not noted in these specific findings because the DL was rejected in the Compound Quantitation section of this narrative.

Continuing Calibrations, continued

Specific Findings

The continuing calibration standard I21204.D contained a compound with an average RRF less than 0.05. For the samples and non-compliant compound listed below, the positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

613SP06101	2-chloroethyl_vinyl_ether (0.048)
613SP02601	
613SP02201	
613SP02202	
613SP02301	
613SP02701	

The continuing calibration standard I21236.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.

613SP06201	2-chloroethyl_vinyl_ether (87.1%)
613SP03501	
613SP03101	

Internal Standards

All samples did not exhibit acceptable EICP area recoveries. The DL of sample 613SP02201 was not noted in these specific findings because the DL was rejected in the Compound Quantitation section of this narrative.

Specific Finding

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

613SP02202	chlorobenzene-d5

Continuing Calibrations, continued

Specific Findings

The continuing calibration standard I21204.D contained a compound with an average RRF less than 0.05. For the samples and non-compliant compound listed below, the positive results are qualified as estimated, J, and the non-detect results are rejected, UR.

613SP06101	2-chloroethyl_vinyl_ether (0.048)
613SP02601	
613SP02201	
613SP02202	
613SP02301	
613SP02701	

The continuing calibration standard I21236.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.

613SP06201	2-chloroethyl_vinyl_ether (87.1%)
613SP03501	
613SP03101	

The continuing calibration standard I21204.D contained a compound with a %D greater than 25% but less than 50%. For the samples and non-compliant compound listed below, the positive results are qualified as estimated, J.

613SP06101	2-butanone (26.2%)
613SP02601	
613SP02201	
613SP02301	
613SP02701	

Internal Standards

All samples did not exhibit acceptable EICP area recoveries. The DL of sample 613SP02201 was not noted in these specific findings because the DL was rejected in the Compound Quantitation section of this narrative.

Internal Standards, continued

Specific Finding

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

613SP02202 chlorobenzene-d5

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. The DL of sample 613SP02201 was not noted in these specific findings because the DL was rejected in the Compound Quantitation section of this narrative.

	VBLK3	VBLK4
acetone	4 μg/Kg	4 μg/Kg
methylene chloride	--------	2 μg/Kg

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
VBLK3	613SP06101	acetone	40 μg/Kg	NA
	613SP02601			
	613SP02201			
	613SP02202			
	613SP02301			
	613SP02701			
VBLK4	613SP06201	acetone	40 μg/Kg	NA
	613SP03501			
	613SP03101			
	613SP03501	methylene chloride	20 μg/Kg	CRQL
	613SP03101			
	613SP06201	methylene chloride	20 μg/Kg	U

Surrogate Recoveries

Specific Finding

The following sample exhibited two (2) surrogates with recoveries above the upper control limits. All reported positive results are qualified as estimated, J.

Sample ID	Surrogate	%R
613SP02202	toluene-d8	172%
	Bromofluorobenzene	126%

Compound Quantitation

Specific Finding

The following sample is rejected, UR, in favor of the original analysis for the noted reason.

Sample	Compounds	Reason
613SP02202DL	All compounds	Dilution analysis results conflict with original analysis.

All results reported above the calibration range in the following sample are qualified as estimated, J.

613SP02202

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
613SP06101 613SP02601 613SP02201 613SP02202 613SP02301 613SP02701	2-chloroethyl_vinyl_ether	+/-	J/UR
613SP06201 613SP03501 613SP03101	2-chloroethyl_vinyl_ether	+/-	J/UJ
613SP02202	All associated with chlorobenzene-d5	+/-	J/UJ
613SP06101 613SP02601 613SP02201 613SP02202 613SP02301 613SP02701 613SP06201 613SP03501 613SP03101	acetone	+B	NA
613SP03501 613SP03101	methylene chloride	+B	CRQL
613SP06201	methylene chloride	+B	U
613SP02202	All compounds	+	J

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
613SP02202DL	All compounds	+/-	UR
613SP02201 2	All above cal. range	+	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
613SP06101 613SP02601 613SP02201 613SP02202 613SP02301 613SP02701	2-chloroethyl_vinyl_ether	+/-	J/UR
613SP06201 613SP03501 613SP03101	2-chloroethyl_vinyl_ether	+/-	J/UJ
613SP06101 613SP02601 613SP02201 613SP02301 613SP02701	2-butanone	+	J
613SP02202	All associated with chlorobenzene-d5	+/-	J/UJ
613SP06101 613SP02601 613SP02201 613SP02202 613SP02301 613SP02701 613SP06201 613SP03501 613SP03101	acetone	+B	NA
613SP03501 613SP03101	methylene chloride	+B	CRQL
613SP06201	methylene chloride	+B	U

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
613SP02202	All compounds	+	J
613SP02202DL	All compounds	+/-	UR
613SP02202	All above cal. range	+	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 # 26964

A validation was performed on the Semivolatile Data from SDG 26964. 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 Calibration

Specific Finding:

The initial calibration analyzed on, 09/26/96, contained compounds with %RSDs greater than 30% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J).

613GP03501RE fluorene (34.7)

Internal Standards

Specific Finding:

The samples listed below, exhibited high internal standard areas. Qualify all associated positive results as estimated (J).

613SP02202	naphthalene-d_8 acenaphthene-d_8 perylene-d_{12}
613SP02202DL	perylene-d_{12}

Surrogates

Specific Finding:

Sample 613GP03501, exhibited low surrogate recoveries for the two base/neutral surrogates. Qualify all positive results associated with the base/neutral fraction as estimated (J) and all non detects as estimated (UJ).

Compound Identification/Quantitation

Specific Finding:

Reject all results for sample 613GP03501, in favor of the reanalyzed sample analysis due to non compliant surrogate recoveries.

For samples 613SP02202, replace the "E" flagged results with the corresponding "D"flagged results found in the diluted sample 613SP02202DL, and reject all other results for the diluted sample.

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
613GP03501RE	fluorene (34.7)	+	J
613SP02202	All associated compounds naphthalene-d_8 acenaphthene-d_8 perylene-d_{12}	+/-	J
613SP02202DL	perylene-d_{12}		
613GP03501	All results	+/-	UR
613SP02202	"E" flagged results	+	UR
613SP02202DL	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 # 26964B

A validation was performed on the Pesticide/Aroclor Data from SDG 26964B. 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 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 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 # 26964

A validation was performed on the Metals and Cyanide Data from SDG 26964. 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	1.37 mg/kg	no impact
Chromium	0.15 mg/kg	no impact
Silver	0.21 mg/kg	all soil samples below 1.05 mg/kg
Tin	1.89 mg/kg	all soil samples below 9.45 mg/kg
Vanadium	0.14 mg/kg	no impact

Aluminum	27.4 ug/l	no impact
Antimony	5.84 ug/l	all water samples below 29.2 ug/l
Barium	0.58 ug/l	no impact
Calcium	72.3 ug/l	no impact
Silver	2.26 ug/l	all water samples below 11.3 ug/l
Vanadium	1.26 ug/l	no impact
Cyanide	6.46 ug/l	no impact

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

Elements	Conc.	Samples affected
Antimony	4.9 ug/l	no impact
Barium	0.7 ug/l	no impact
Beryllium	0.34 ug/l	all soil samples below 0.34 mg/kg
Calcium	63.2 ug/l	no impact
Copper	5.9 ug/l	all soil samples below 5.9 mg/kg
Iron	73.8 ug/l	no impact
Manganese	1.3 ug/l	no impact
Sodium	3.0 ug/l	no impact
Vanadium	1.60 ug/l	no impact
Zinc	13.0 ug/l	all soil samples below 13.0 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
Arsenic	-2.75 ug/l	all water samples below 27.5 ug/l
Chromium	-1.10 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".

Serial Dilutions

Specific Finding

The Serial Dilution for waters for Aluminum was outside the control limits. 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 9.45 mg/kg	Sn.	+	U
all soil samples below 1.05 mg/kg	Ag.		
all soil samples below 0.34 mg/kg	Be.		
all soil samples below 5.9 mg/kg	Cu.		
all soil samples below 13.0 mg/kg	Zn.		
All water samples below 29.2 ug/l	Sb.		
all water samples below 11.3 ug/l	Ag.		
All water samples below 27.5 ug/l	As.	+/U	J/UJ
all water samples	Al.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	26979A
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	September 18, 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 B. Scarfoss
Paul B. Humburg, President

11/14/96
Date

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

SDG# 26979A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
619CB00601	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 # 26979A

A validation was performed on the Volatile Data from SDG 26979A. 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. Average RRFs were exhibited that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, I21219.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 (UUR).

619CB00601	2-chloroethyl vinyl ether (0.042) Acrolein (0.027) Acetonitrile (0.019) Isobutyl alcohol (0.006) 1,4-dioxane (0.002)

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 bromofluorobenzene. Qualify all positive results as estimated (J).

619CB00601 (140%)
619CB00601RE (123%)

Field Duplicates

Duplicate sample 619CB00601 exhibited positive results for 2-butanone that were not exhibited in the sample 619SB00601. The compound RPD percentage was above the 50% criteria for soils. Acetone was exhibited in the duplicate and initial sample, but RPD percentage for this compound was above the 50% criteria. Qualify sample 619CB00601 results for 2-butanone and acetone as estimated (J). (Non detected compounds will be qualified as estimated in the initial sample SDG.)

Compound Identification /Quantitation

Reject sample 619CB00601RE, in favor of the initial analysis, due 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

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 compounde 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
619CB00601	2-chloroethyl vinyl ether Acrolein Acetonitrile Isobutyl alcohol 1,4-dioxane	+/-	J/UR
619CB00601 619CB00601RE	all compounds	+	J
619CB00601	2-butanone Acetone	+	J
619CB00601RE	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 IV. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 26979A

A validation was performed on the Semivolatile Data from SDG 26979A. 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, A6117,-18,-19,-20, 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).

619CB00601	ethyl methanesulfonate (54.9)
	acetophenone (51.7)
	o-toluidine (60.5)
	o,o,o-triethyl phosphorothio (56.0)
	1-naphthylamine (67.5)
	2-naphthylamine (63.1)
	thionazin (61.5)
	5-nitro-o-toluidine (58.8)
	phorate (56.0)
	dimethoate (69.3)
	4-aminobiphenyl (60.7)
	pronamide (51.9)
	disulfoton (62.0)
	chlorobenzilate (57.2)
	3,3'-dimethylbenzidine (76.0)
	famphur (78.2)
	m-cresol (54.3)
	diphenylamine (60.5)
	7,12-dimethylbenz(a)anthracene (64.9)

The continuing calibration, A6117,-18,-19,-20, 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).

619cb00601	safrole (137.3)

The continuing calibration, A6117,-18,-19,-20, 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).

619CB00601	aramite
	hexachlorophene (74.2)

Field Duplicates

Specific Finding:

For the field dup pair 619SB00601 and 619CB00601, qualify positive results for pyrene and chrysene 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
619CB00601	ethyl methanesulfonate (54.9)	+/-	J/UJ
	acetophenone (51.7)		
	o-toluidine (60.5)		
	o,o,o-triethyl phosphorothio (56.0)		
	1-naphthylamine (67.5)		
	2-naphthylamine (63.1)		
	thionazin (61.5)		
	5-nitro-o-toluidine (58.8)		
	phorate (56.0)		
	dimethoate (69.3)		
	4-aminobiphenyl (60.7)		
	pronamide (51.9)		
	disulfoton (62.0)		
	chlorobenzilate (57.2)		
	3,3'-dimethylbenzidine (76.0)		
	famphur (78.2)		
	m-cresol (54.3)		
	diphenylamine (60.5)		
	7,12-dimethylbenz(a)anthracene (64.9)		
619CB00601	isosafrole (137.3)	+/-	J/UR
619CB00601	aramite	+/-	J/UR
	hexachlorophene (74.2)		
619CB00601	pyrene	+	J
	chrysene		
619CB00601	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 # 26979A

A validation was performed on the Pesticide/Aroclor Data from SDG 26979A. 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 sample 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

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 # 26979A

A validation was performed on the Organophosphorous Pesticide Data from SDG 26979A. 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.

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 # 26979A

A validation was performed on the Chlorinated Herbicides from SDG 26979A. 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 # 26979B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 26979B. 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
Aluminum	1.11 mg/kg	no impact
Chromium	0.11 mg/kg	no impact
Selenium	0.36 mg/kg	all soil samples below 1.8 mg/kg
Tin	1.70 mg/kg	all soil samples below 8.5 mg/kg

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".

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	Se.	+	U
all soil samples below 8.5 mg/kg	Sn..		
all soil samples below 4.8 mg/kg	Sb.		
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 # 26979

A validation was performed on the Dioxin/Furans Data from SDG 26979. 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

Internal Standard Performance

The sample, 619-C-B006-01, was extracted and analyzed twice due to low or missing internal standards. The re-extracted sample will be reported in favor of the original analysis.

Specific findings:

Sample 619-C-B006-01RE exhibited a low internal standard recovery for $^{13}C_{12}$-1,2,3,7,8-PeCDD. The non detect result for penta-dioxin should be considered as estimated non detect, UJ.

Method Blanks

The method blanks exhibited contamination that resulted in qualifications.

Sample ID	Congener ID	Blank Conc. ng/Kg	Sample Conc. ng/Kg	Qual.
619-C-B006-01RE	1,2,3,4,6,7,8-HpCDD	0.724	102	NA
	OCDD	4.63	703	NA
	1,2,3,4,6,7,8-HpCDF	1.07	25.8	NA
	OCDF	1.19	118	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
619-C-B006-01	all congeners	+/-	UR
619-C-B006-01RE	1,2,3,7,8-PeCDD	-	UJ
619-C-B006-01RE	1,2,3,4,6,7,8-HpCDD	+B	NA
	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#:	26979B
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	September 17-18, 1996
Number of Samples:	2 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, 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. Sufan
Paul B. Humburg, President

11/15/96
Date

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

SDG# 26979B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
004SB00101	SOIL		X		X		X		X		
004SB00102	SOIL		X		X		X		X		
004SB00201	SOIL		X		X		X		X		
004SB00202	SOIL		X		X		X		X		
004SB00301	SOIL		X		X		X		X		
004SB00302	SOIL		X		X		X		X		
004SB00401	SOIL		X		X		X		X		
004SB00402	SOIL		X		X		X		X		
619SB00601	SOIL		X		X		X		X		X
619TB00601	WATER	X									
619SB01001	SOIL		X		X		X		X		
619SB01002	SOIL		X		X		X		X		
619SB01201	SOIL		X		X		X		X		
619SB01202	SOIL		X		X		X		X		
619SB01301	SOIL		X		X		X		X		
619SB01302	SOIL		X		X		X		X		
619SB01501	SOIL		X		X		X		X		
619TB01501	WATER	X									
619SB01502	SOIL		X		X		X		X		
Total Billable Samples (Water/Soil)		2	17	0	17	0	17	0	17	0	1

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 # 26979B

A validation was performed on the Volatile Data from SDG 26979B. 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. Average RRFs were exhibited that were not within continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

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).

619SB00601	2-chloroethyl vinyl ether (0.038)
619SB01001	
004SB00302	
004SB00402	
619SB01301	
619SB01501	
619SB01502	

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).

619SB01002	2-chloroethyl vinyl ether (0.023)
004SB00301	
004SB00302DL	
004SB00401	
004SB00402DL	
004SB00202	
004SB00102	
619SB01201	
619SB01202	
619SB01302	
619SB01501RE	
619SB01502DL	
004SB00201	

Continuing calibrations (continued)

Specific Finding:

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).

619SB01301DL	2-chloroethyl vinyl ether (0.030)
004SB00101	

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).

004SB00302	bromochloromethane
004SB00402	1,4-difluorobenzene
619SB01301	chlorobenzene-d_5
619SB01501	
619SB01502	
619SB01502DL	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	12 ug/kg	120 ug/kg
	2-butanone	3J ug/kg	30 ug/kg
VBLK3	acetone	2J ug/kg	20 ug/kg
VBLK4	acetone	1J ug/kg	10 ug/kg

Samples	Compound	Qualification
619SB00601	methylene chloride	CRQL
619SB01001 004SB00302 619SB01502	methylene chloride	U
619SB01201 619SB01501RE 004SB00201 004SB00101	acetone	CRQL
619SB00601 619SB01001 619SB01202 619SB01501	acetone	U
619SB00601	2-butanone	CRQL

Surrogates

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

Surrogates (continued)

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).

004SB00302 (147% and 128%)
619SB01501 (148% and 126%)
619SB01502 (145% and 129%)

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

004SB00402 (149%)
619SB01301 (126%)

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

619SB01501RE (120% and 70%)

Field Duplicates

Duplicate sample 619CB00601 exhibited positive results for 2-butanone that were not exhibited in the sample 619SB00601. The compound RPD percentage was above the 50% criteria for soils. Acetone was exhibited in the duplicate and initial sample, but RPD percentage for this compound was above the 50% criteria. Qualify sample 619SB00601 results for 2-butanone and acetone as estimated (UJ). (Detected compounds will be qualified as estimated in the duplicate sample SDG.)

Compound Identification /Quantitation

Reject sample 619SB01501, in favor of the reanalysis, due surrogate and internal standard areas.

Reject all E-flagged compounds in samples 004SB00302, 004SB00402, 619SB01301, and 619SB01502, in favor of the D-flagged compounds in the diluted 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
619SB00601	2-chloroethyl vinyl ether	+/-	J/UR
619SB01001			
004SB00302			
004SB00402			
619SB01301			
619SB01501			
619SB01502			
619SB01002	2-chloroethyl vinyl ether	+/-	J/UR
004SB00301			
004SB00302DL			
004SB00401			
004SB00402DL			
004SB00202			
004SB00102			
619SB01201			
619SB01202			
619SB01302			
619SB01501RE			
619SB01502DL			
004SB00201			
619SB01301DL	2-chloroethyl vinyl ether	+/-	J/UR
004SB00101			
	All associated compounds	+/-	J/UJ
004SB00302	bromochloromethane		
004SB00402	1,4-difluorobenzene		
619SB01301	chlorobenzene-d_5		
619SB01501			
619SB01502			
619SB01502DL	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
619SB00601	methylene chloride	+	CRQL
619SB01001 004SB00302 619SB01502	methylene chloride	+	U
619SB01201 619SB01501RE 004SB00201 004SB00101	acetone	+	CRQL
619SB00601 619SB01001 619SB01202	acetone	+	U
619SB00601	2-butanone	+	CRQL
004SB00302 619SB01501 619SB01502 004SB00402 619SB01301	all results	+	J
619SB01501RE		+/-	J/UJ
619SB00601	2-butanone acetone	-	UJ
619SB01501	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	COMPOUND ID	DL	QL
004SB00302 004SB00402 619SB01301 619SB01502	all E-flagged results	+	UR
004SB00302DL 004SB00402DL 619SB01301DL 619SB01502DL	All results 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 # 26979B

A validation was performed on the Semivolatile Data from SDG 26979B. 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:

For the field dup pair 619SB00601 and 619CB00601, qualify positive results for pyrene and chrysene 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 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
619SB00601	pyrene chrysene	+	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 # 26979B

A validation was performed on the Pesticide/Aroclor Data from SDG 26979B. 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). 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. Two (2) samples were diluted to accurately quantitate target compounds. Sample 619SB01301 exhibited a result for Gamma-Chlordane that was above the calibration range of the instrument. However, Gamma-Chlordane was not detected in the dilution 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.

Specific Findings

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

619SB01301
619SB01501

For the following sample, the result for Gamma-Chlordane is qualified as estimated, J, as it is above the calibration range of the instrument.

619SB01301 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
619SB01301 619SB01501	All E Flagged	+E	D
619SB01301DL 619SB01501DL	All except corresponding D flagged results	+/-	UR
619SB01301	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
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 # 26979A

A validation was performed on the Metals and Cyanide Data from SDG 26979A. 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
Chromium	0.11 mg/kg	no impact
Selenium	0.36 mg/kg	all soil samples below 1.8 mg/kg
Tin	1.70 mg/kg	all soil samples below 8.5 mg/kg

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".

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	Se.	+	U
all soil samples below 8.5 mg/kg	Sn..		
all soil samples below 4.8 mg/kg	Sb.		
all soil samples below 532 mg/kg	Na.		
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	26977B
Date:	October 23, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	September 17, 1996
Number of Samples:	3 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 III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, 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. Simpson
Paul B. Humburg, President

10/30/96
Date

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

SDG# 26977B

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		TAL	
613SP05301	SOIL		X		X		X
613GP05301	WATER	X					
613SP05401	SOIL		X		X		X
613GP05401	WATER	X					
613TP05401	WATER	X					
Total Billable Samples (Water/Soil)		3	2	0	2	0	2

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
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 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 # 26977B

A validation was performed on the Volatile Data from SDG 26977B. 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 average RRF requirements were met for all continuing calibration target compounds.

Continuing Calibrations, continued

Specific Findings

The continuing calibration standard I21263.D contained a compound with a %D greater than 50% but less than 90%. For the samples and non-compliant compounds listed below, the positive results and non-detect results are qualified as estimated, J/UJ.

613SP05401 2-chloroethyl_vinyl_ether (83.9%)
613SP05301

Method Blanks

The method blanks associated with these samples 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
acetone	------	4 µg/Kg
methylene chloride	------	8 µg/Kg
1,2-dichloroethene (total)	1 µg/L	-------

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
VBLK3	613SP05401 613SP05301	acetone	40 µg/Kg	NA
	613SP05401 613SP05301	methylene chloride	80 µg/Kg	U

Field QC Blanks

The trip blank, the rinseate blank, and the DI blank associated with these samples 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.

	613TP05401	613DP03801	613EP03801
1,2-dichloroethene (total)	1 μg/L	-------	-------
chloroform	2 μg/L	18 μg/L	17 μg/L
dibromochloromethane	--------	1 μg/L	1 μg/L

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
613TP05401	613GP05401	1,2-dichloroethene (total)	5 μg/L	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
613SP05401 613SP05301	2-chloroethyl_vinyl_ether	+/-	J/UJ
613SP05401 613SP05301	acetone	+B	NA
613SP05401 613SP05301	methylene chloride	+B	U
613GP05401	1,2-dichloroethene (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 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 # 26977

A validation was performed on the Semivolatile Data from SDG 26977. 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
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 # 26977

A validation was performed on the Metals Data from SDG 26977. 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	1.85 mg/kg	all soil samples below 9.25 mg/kg
Lead	0.14 mg/kg	no impact

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

Elements	Conc.	Samples affected
Barium	0.5 ug/l	no impact
Copper	2.7 ug/l	no impact
Lead	2.9 ug/l	no impact
Silver	2.0 ug/l	no impact
Vanadium	0.54 ug/l	no impact
Zinc	6.0 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".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Aluminum	-1.33 mg/kg	no impact
Vanadium	-0.07 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 9.25 mg/kg	Sn.	+	U
All "B" results	all analytes	B	J

ANNOTATED FORM Is

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27042A
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	September 23, 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, Herbicides, Organophosphorus pesticides, 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

11/15/96
Date

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

SDG# 27042A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
109CB00301	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 # 27042A

A validation was performed on the Volatile Data from SDG 27042A. 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).

109CB00301	2-chloroethyl vinyl ether (0.028) Acrolein (0.019) Propionitrile (0.048) Isobutyl alcohol (0.005) 1,4-dioxane (0.001)

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).

109CB00301	vinyl acetate (60.9%) Trichlorofluoromethane (67.4%)

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
VBLK1	acetone	6J ug/kg	60 ug/kg

Samples	Compound	Qualification
109CB00301	acetone	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

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
109CB00301	2-chloroethyl vinyl ether Acrolein Propionitrile Isobutyl alcohol 1,4-dioxane	+/-	J/UR
109CB00301	vinyl acetate Trichlorofluoromethane	+/-	J/UJ
109CB00301	acetone	+	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 # 27042A

A validation was performed on the Semivolatile Data from SDG 27042A. 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, A6186,-87,-88,-89, 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).

109CB00301	hexachloropropene (51.5)
	1,2,4,5-tetrachlorobenzene (63.5)
	pentachlorobenzene (54.6)
	safrole (59.4)
	isosafrole (58.6)
	1,4-naphthoquinone (78.3)
	1,3-dinitrobenzene (56.5)
	2-naphthylamine (58.4)
	5-nitro-o-toluidine (62.2)
	4-aminobiphenyl (57.0)
	diphenylamine (58.7)
	kepone (61.8)

The continuing calibration, A6186,-87,-88,-89, 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).

109CB00301	aramite
	hexachlorophene (82.1)

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
109CB00301	hexachloropropene (51.5) 1,2,4,5-tetrachlorobenzene (63.5) pentachlorobenzene (54.6) safrole (59.4) isosafrole (58.6) 1,4-naphthoquinone (78.3) 1,3-dinitrobenzene (56.5) 2-naphthylamine (58.4) 5-nitro-o-toluidine (62.2) 4-aminobiphenyl (57.0) diphenylamine (58.7) kepone (61.8)	+/-	J/UJ
109CB00301	aramite hexachlorophene (82.1)	+/-	J/UR
109CB00301	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 # 27042A

A validation was performed on the Pesticide/Aroclor Data from SDG 27042A. 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
109CB00301	TCX-1/TCX-2	26%/28%
	DCB-1/DCB-2	38%/29%

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
109CB00301	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 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 # 27042A

A validation was performed on the Organophosphorus Pesticides from SDG 27042A. 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 # 27042A

A validation was performed on the Chlorinated Herbicides from SDG 27042A. 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 # 27042B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 27042B. 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	0.03 mg/kg	no impact
Chromium	0.09 mg/kg	no impact
Iron	2.46 mg/kg	no impact
Tin	1.71 mg/kg	all soil samples below 8.55 mg/kg
Vanadium	0.06 mg/kg	no impact

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
Chromium	0.84 ug/l	no impact
Copper	4.7 ug/l	no impact
Iron	42.1 ug/l	no impact
Nickel	3.5 ug/l	no impact
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".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Aluminum	-2.01 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".

Field and Duplicate Analysis

Specific Finding

The RPDs for field duplicate samples (109SB00301 and 109CB00301) for Calcium (132%) and Cobalt (139%) 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 8.55 mg/kg	Sn.	+	U
All soil samples below 0.7 mg/kg	Cn.		
All soil samples below 551 mg/kg	Na.		
109SB00301 and 109CB00301.	Ca.	+	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 # 27042

A validation was performed on the Dioxin/Furans Data from SDG 27042. 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

SDG# 27042B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
109SB00201	SOIL				X		X		X		X
109SB00202	SOIL				X		X		X		X
109SB00301	SOIL				X		X		X		X
109SB00302	SOIL				X		X		X		X
109SB00401	SOIL				X		X		X		X
109EB00401	WATER	X		X		X		X		X	
109DB00401	WATER	X		X		X		X		X	
109SB00402	SOIL				X		X		X		X
109SB00501	SOIL				X				X		
109SB00502	SOIL				X				X		
109SB00601	SOIL				X				X		
109SB00602	SOIL				X				X		
109TB00201	WATER	X									
Total Billable Samples (Water/Soil)		3	0	2	10	2	6	2	10	2	6

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
TAL= SW846 Metals
CN= 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 # 27042B

A validation was performed on the Volatile Data from SDG 27042B. 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 reviewer estimates that none 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.

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 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 # 27042B

A validation was performed on the Semivolatile Data from SDG 27042B. 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
109EB00401	bis(2-ethylhexyl) phthalate	1J ug/L	330 ug/Kg
109DB00401	bis(2-ethylhexyl) phthalate	3J ug/L	1000 ug/Kg

Samples	Compound	Qualification
109SB00401	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
109SB00401	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 # 27042B

A validation was performed on the Pesticide/Aroclor Data from SDG 27042B. 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). 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. 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 Finding

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
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 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 # 27042A

A validation was performed on the Metals and Cyanide Data from SDG 27042A. 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	0.03 mg/kg	no impact
Chromium	0.09 mg/kg	no impact
Iron	2.46 mg/kg	no impact
Tin	1.71 mg/kg	all soil samples below 8.55 mg/kg
Vanadium	0.06 mg/kg	no impact

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	all soil samples below 11.3 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
Aluminum	-2.01 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 (72%) and Lead (62%) 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 Manganese (157%) and Copper (138%) were above the upper control limits (>125%). All positive results are qualified as estimated, "J".

Field and Duplicate Analysis

Specific Finding

The RPDs for the laboratory duplicate samples for soils for Aluminum (71%), Calcium (50%) and Iron (37%) were greater than 35%. All positive results are qualified as estimated, "J". The RPDs for Copper (32%) and Manganese (28%) were not greater than 35% and will not be qualified.

The RPDs for field duplicate samples (109SB00301 and 109CB00301) for Calcium (132%) and Cobalt (139%) were greater than 50%. All positive results are qualified as estimated, "J".

Serial Dilutions

Specific Finding

The Serial dilution for soils for Vanadium 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 8.55 mg/kg	Sn.	+	U
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 below 11.3 mg/kg	Zn.		
All soil samples	Sb and Pb.	+/U	J/UJ
All soil samples	Mn and Cu.	+	J
All soil samples	Al, Ca and Fe.	+	J
All soil samples	V.	+	J
109SB00301 and 109CB00301.	Ca.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27064B
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	September 24, 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:	Volatiles, Semivolatiles, 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. Seaton

Paul B. Humburg, President

11/15/96

Date

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

SDG# 27064B

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		TAL		pH	
607SB00101	SOIL		X		X		X		
607TB00101	SOIL		X						
607SB00102	SOIL		X		X		X		
607SB00201	SOIL		X		X		X		
607SB00202	SOIL		X		X		X		
607SB00301	SOIL		X		X		X		
607SB00302	SOIL		X		X		X		
607SB00401	SOIL		X		X		X		
607SB00402	SOIL		X		X		X		
611SB00101	SOIL		X		X		X		X
611SB00102	SOIL		X		X		X		X
611SB00201	SOIL		X		X		X		X
611TB00201	SOIL		X						
611SB00202	SOIL		X		X		X		X
611SB00301	SOIL		X		X		X		X
611SB00302	SOIL		X		X		X		X
611SB00401	SOIL		X		X		X		X
611SB00402	SOIL		X		X		X		X
Total Billable Samples (Water/Soil)		0	18	0	16	0	16	0	8

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
TAL= SW846 Metals
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 # 27064B

A validation was performed on the Volatile Data from SDG 27064B. 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).

607SB00402 607SB00202DL	2-chloroethyl vinyl ether (0.031)

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).

607SB00202DL	acetone (46.7%)

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.

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).

611SB00101 611SB00102	2-chloroethyl vinyl ether (0.024)

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).

611SB00101 611SB00102	vinyl acetate (56.0%)

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).

611SB00402	2-chloroethyl vinyl ether (0.028)

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).

611SB00402	vinyl acetate (60.9%)

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).

611SB00301	2-chloroethyl vinyl ether (0.037)
611SB00302	
611SB00401	
607SB00101	
607SB00102	
607SB00201	
607SB00202	
607SB00301	
607SB00302	
607SB00401	

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).

611SB00301	vinyl acetate (63.4%)
611SB00302	
611SB00401	
607SB00101	
607SB00102	
607SB00201	
607SB00202	
607SB00301	
607SB00302	
607SB00401	

The continuing calibration, I21465.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).

607SB00201	acetone
607SB00202	2-butanone
611SB00301	2-butanone
607SB00301	

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).

611SB00201	2-chloroethyl vinyl ether (0.023)
611SB00202	
611SB00202DL	

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	methylene chloride	5J ug/kg	50 ug/kg
	Acetone	4J ug/kg	40 ug/kg
VBLK2	acetone	6J ug/kg	60 ug/kg
VBLK3	acetone	12 ug/kg	120 ug/kg
VBLK5	acetone	5J ug/kg	50 ug/kg
	Methylene chloride	2J ug/kg	20 ug/kg

Samples	Compound	Qualification
611SB00101 611SB00102 611SB00201	methylene chloride	CRQL
607SB00101 607SB00302 611SB00201	acetone	CRQL
611SB00101 611SB00102 611SB00402 611SB00301 611SB00302 611SB00401 607SB00102 607SB00301 607SB00401 611SB00202DL	acetone	U

Trip Blank

Associated blank	Compound	Concentration	Action Level
611TB00201	acetone	33 ug/L	330 ug/L
607TB00101	acetone	4J ug/L	40 ug/L

Samples	Compound	Qualification
611SB00202 607SB00402	acetone	U
607SB00402DL	acetone	CRQL

Compound Identification /Quantitation

Reject E-flagged results in samples 607SB00402, and 611SB00202, in favor of the D-flagged value in the diluted samples.

Reject sample 611SB00202DL as unuseable data due to inconsistent acetone 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 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
607SB00402 607SB00202DL	2-chloroethyl vinyl ether	+/-	J/UR
607SB00202DL	acetone	+	J
611SB00101 611SB00102	2-chloroethyl vinyl ether	+/-	J/UR
611SB00101 611SB00102	vinyl acetate	+/-	J/UJ
611SB00402	2-chloroethyl vinyl ether	+/-	J/UR
611SB00402	vinyl acetate	+/-	J/UJ
611SB00301 611SB00302 611SB00401 607SB00101 607SB00102 607SB00201 607SB00202 607SB00301 607SB00302 607SB00401	2-chloroethyl vinyl ether	+/-	J/UR
611SB00301 611SB00302 611SB00401 607SB00101 607SB00102 607SB00201 607SB00202 607SB00301 607SB00302 607SB00401	vinyl acetate	+/-	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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
607SB00201 607SB00202	acetone 2-butanone	+	J
611SB00301 607SB00301	2-butanone	+	J
611SB00201 611SB00202 611SB00202DL	2-chloroethyl vinyl ether	+/-	J/UR
611SB00101 611SB00102 611SB00201	methylene chloride	+	CRQL
607SB00101 607SB00302 611SB00201	acetone	+	CRQL
611SB00101 611SB00102 611SB00402 611SB00301 611SB00302 611SB00401 607SB00102 607SB00301 607SB00401 611SB00202DL	acetone	+	U
611SB00202 607SB00402	acetone	+	U
607SB00402DL	acetone	+	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
607SB00202 607SB00402	All E-flagged compounds	+	UR
607SB00202DL 607SB00402DL	All compounds except D-flagged compounds	+/-	UR
611SB00202DL	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 III. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27064B

A validation was performed on the Semivolatile Data from SDG 27064B. 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

Method Blanks

Associated blank	Compound	Conc.	Action level
SBLK1	butylbenzylphthalate	94J ug/Kg	940 ug/Kg
	bis(2-ethylhexyl) phthalate	45J ug/Kg	450 ug/Kg
SBLK2	bis(2-ethylhexyl) phthalate	53J ug/Kg	530 ug/Kg

Method Blanks (continued)

Samples	Compound	Qualification
611SB00102 611SB00301 607SB00101 607SB00102 607SB00201 607SB00202 607SB00301 607SB00302 607SB00401 607SB00402	bis(2-ethylhexyl) phthalate	CRQL
611SB00202	butylbenzylphthalate	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
611SB00102	bis(2-ethylhexyl)	+	CRQL
611SB00301	phthalate		
607SB00101			
607SB00102			
607SB00201			
607SB00202			
607SB00301			
607SB00302			
607SB00401			
607SB00402			
611SB00202	butylbenzylphthalate	+	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
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 # 27064

A validation was performed on the Metals Data from SDG 27064. 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 0.20 mg/kg
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 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
Thallium	-0.43 mg/kg	all soil samples below 4.3 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".

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 7.6 mg/kg	Sn.		
All soil samples below 4.8 mg/kg	Sb.		
All soil samples below 532 mg/kg	Na.		
All soil samples below 4.3 mg/kg	Tl.	+/U	J/UJ
All "B" results	all analytes	B	J

ANNOTATED FORM Is

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27133A
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	September 27-30, 1996
Number of Samples:	2 Aqueous Sample(s) with 0 MS/MSD(s) 4 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, 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
for Paul B. Humburg, President

11/25/96
Date

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

SDG# 27133A

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
609CB00101	SOIL		X		X		X		X		X		X		X		X		X
609CB00201	SOIL		X		X		X		X		X		X		X		X		X
609CB00301	SOIL		X		X		X		X		X		X		X		X		X
613N000101	SOIL		X		X		X		X		X		X		X		X		X
609EB00401	WATER	X		X		X										X		X	
609DB00401	WATER	X		X		X										X		X	
Total Billable Samples (Water/Soil)		2	4	2	4	2	4	0	4	0	4	0	4	0	4	2	4	2	4

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 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

Page 2

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 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
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. 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# 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#:	27146A
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	September 28, 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, Pesticides/PCB's, Herbicides, Organophosphorus Pesticides, 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. Senfan — 11/15/96

Paul B. Humburg, President — Date

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

SDG# 27146A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
613HP03001	WATER	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 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 # 27146A

A validation was performed on the Volatile Data from SDG 27146A. 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 continuing calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, R24634.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).

613HP03001	Acrolein (0.033)
	Acetonitrile (0.025)
	Isobutyl alcohol (0.007)
	1,4-dioxane (0.002)
	Dichlorodifluoromethane (0.038)

The continuing calibration, R24634.D, contained compounds with %Ds greater than 90%. For the samples and non-compliant compounds listed below, qualify all positive results as estimated (J) and non detects as rejected (UR).

613HP03001	2-chloroethyl vinyl ether (91.8%)

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.

Trip Blank

Associated blank	Compound	Concentration	Action Level
613TP04501	acetone	24 ug/kg	240 ug/kg

Samples	Compound	Qualification
613HP03001	acetone	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

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 compounde 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
613HP03001	Acrolein Acetonitrile Isobutyl alcohol 1,4-dioxane Dichlorodifluoromethane	+/-	J/UR
613HP03001	2-chloroethyl vinyl ether	+/-	J/UR
613HP03001	acetone	+	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 # 27146A

A validation was performed on the Semivolatile Data from SDG 27146A. 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, A6117,-18,-19,-20, 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).

613HP03001	ethyl methanesulfonate (54.9)
	acetophenone (51.7)
	o-toluidine (60.5)
	o,o,o-triethyl phosphorothio (56.0)
	1-naphthylamine (67.5)
	2-naphthylamine (63.1)
	thionazin (61.5)
	5-nitro-o-toluidine (58.8)
	phorate (56.0)
	dimethoate (69.3)
	4-aminobiphenyl (60.7)
	pronamide (51.9)
	disulfoton (62.0)
	chlorobenzilate (57.2)
	3,3'-dimethylbenzidine (76.0)
	famphur (78.2)
	m-cresol (54.3)
	diphenylamine (60.5)
	7,12-dimethylbenz(a)anthracene (64.9)

The continuing calibration, A6117,-18,-19,-20, 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).

613HP03001	isosafrole (137.3)

The continuing calibration, A6117,-18,-19,-20, 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).

613HP03001	aramite
	hexachlorophene (74.2)

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
613HP03001	ethyl methanesulfonate (54.9)	+/-	J/UJ
	acetophenone (51.7)		
	o-toluidine (60.5)		
	o,o,o-triethyl phosphorothio (56.0)		
	1-naphthylamine (67.5)		
	2-naphthylamine (63.1)		
	thionazin (61.5)		
	5-nitro-o-toluidine (58.8)		
	phorate (56.0)		
	dimethoate (69.3)		
	4-aminobiphenyl (60.7)		
	pronamide (51.9)		
	disulfoton (62.0)		
	chlorobenzilate (57.2)		
	3,3'-dimethylbenzidine (76.0)		
	famphur (78.2)		
	m-cresol (54.3)		
	diphenylamine (60.5)		
	7,12-dimethylbenz(a)anthracene (64.9)		
613HP03001	isosafrole (137.3)	+/-	J/UR
613HP03001	aramite	+/-	J/UR
	hexachlorophene (74.2)		
613HP03001	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 # 27146A

A validation was performed on the Pesticide/Aroclor Data from SDG 27146A. 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 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

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 # 27146A

A validation was performed on the Organophosphorous Pesticide Data from SDG 27146A. 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 # 27146A

A validation was performed on the Chlorinated Herbicides from SDG 27146A. 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, CYANIDE AND HEXAVALENT CHROMIUM

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 # 27146B

A validation was performed on the Metals, Cyanide and Hexavalent Chromium Data from SDG 27146B. 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	2.57 ug/l	no impact
Cadmium	2.57 ug/l	all water samples below 5.2 ug/l
Iron	64.8 ug/l	no impact
Manganese	0.86 ug/l	no impact
Zinc	11.4 ug/l	no impact

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	no impact
Sodium	3560 ug/l	no impact
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
Arsenic	-0.36 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".

Serial Dilution

Specific Finding

The serial dilution RPDs for waters for Cobalt 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 5.2 ug/l	Cd.	+	U
All water samples	Co.	+	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 # 27146

A validation was performed on the Dioxin/Furans Data from SDG 27146. 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.

Sample ID	Congener ID	Blank Conc. pg/L	Sample Conc. pg/L	Quals
613-H-P030-01	1,2,3,4,6,7,-HpCDD	3.39	9.73	U
	OCDD	8.74	217	NA
	2,3,4,6,7,-HxCDF	2.24	3.45	U
	1,2,3,4,6,7,8-HpCDF	3.04	3.88	U
	OCDF	3.18	4.12	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	ANALYTE ID	DL	QL
613-H-P030-01	1,2,3,4,6,7,8-HpCDD	+B	U
	OCDD	+B	NA
	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

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 # 27146A/C

A validation was performed on the Metals Data from SDG 27146A/C. 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
Lead	0.27 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
Antimony	2.57 ug/l	no impact

Cadmium	2.57 ug/l	all water samples below 5.2 ug/l
Iron	64.8 ug/l	no impact
Manganese	0.86 ug/l	no impact
Zinc	11.4 ug/l	no impact

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
Cobalt	-0.07 mg/kg	all soil samples below 0.7 mg/kg
Arsenic	-0.36 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".

Serial Dilution

Specific Finding

The serial dilution RPDs for soils for Cobalt and for waters for Beryllium, Chromium, Cobalt, Iron, Lead, Manganese, Nickel, Sodium and Zinc 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 water samples below 5.2 ug/l	Cd.	+	U
All soil samples below 1.8 mg/kg	Ni.		
All soil samples below 9.3 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 0.7 mg/kg	Co.	+/U	J/UJ
All soil samples	Co.	+	J
All water samples	Be, Cr, Co, Fe, Pb, Mn, Ni, Na and Zn.		
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27146B
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	September 28-October 3, 1996
Number of Samples:	10 Aqueous Sample(s) with 0 MS/MSD(s) 11 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwestern 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, 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. Seaton

Paul B. Humburg, President

11/15/96

Date

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

SDG# 27146B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		TAL	
613SP00401	SOIL		X		X		X
613TP00401	SOIL		X				
613GP00401	WATER	X		X		X	
613SP00501	SOIL		X		X		X
613TP00501	SOIL		X				
613GP00501	WATER	X					
613SP01001	SOIL		X		X		X
613GP01001	WATER	X		X		X	
613TP01001	WATER	X					
613SP01701	SOIL		X		X		X
613GP01701	WATER	X					
613TP01701	WATER	X					
613SP03001	SOIL		X		X		X
613GP03001	WATER	X		X		X	
613SP03401	SOIL		X		X		X
613GP03401	WATER	X		X		X	
613TP03401	SOIL		X				
613SP03901	SOIL		X		X		X
613GP03901	WATER	X				X	
613SP04501	SOIL		X		X		X
613TP04501	WATER	X					
Total Billable Samples (Water/Soil)		10	11	4	8	5	8

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
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 # 27146B

A validation was performed on the Volatile Data from SDG 27146B. 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 %Ds. 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).

613SP03001DL	2-chloroethyl vinyl ether (0.031)

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

613SP03001DL	acetone (46.7%)

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.

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).

613SP03001	2-chloroethyl vinyl ether (0.028)
613SP03401	
613SP03901	
613SP04501	

The continuing calibration, I21435.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).

613SP03001	2-butanone (31.1%)

Continuing calibrations (continued)

Specific Finding:

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).

613SP03001	vinyl acetate (60.9%)
613SP03401	
613SP03901	
613SP04501	

The continuing calibration, I21465.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).

613SP04501DL	acetone (39.3%)

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).

613SP00401	2-chloroethyl vinyl ether (0.023)

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).

613SP00501	2-chloroethyl vinyl ether (64.5%)
613SP01001	

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).

613SP01701	2-chloroethyl vinyl ether (0.038)

The continuing calibration, N24018.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).

613GP00401	acetone (29.6%)
613GP01001	

The continuing calibration, N24068.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).

613GP00501	2-butanone (28.1%)

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).

613SP03001	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	6J ug/kg	60 ug/kg
VBLK7	Methylene chloride	2J ug/kg	20 ug/kg
VBLK10	acetone	3J ug/kg	30 ug/kg

Samples	Compound	Qualification
613SP03901 613SP00501	acetone	U
613SP03401DL	methylene chloride	CRQL

Trip Blank

Associated blank	Compound	Concentration	Action Level
613TB00501	acetone	5J ug/L	50 ug/L
613TP03401	tetrachloroethene	1J ug/L	10 ug/L
613TP04501	acetone	24 ug/L	240 ug/L

Samples	Compound	Qualification
613SP01701 613GP00501 613GP01701 613SP03901	acetone	U

Trip Blank (continued)

Associated blank	Compound	Concentration	Action Level
613TB00501	acetone	5J ug/L	50 ug/L
613TP03401	tetrachloroethene	1J ug/L	10 ug/L
613TP04501	acetone	24 ug/L	240 ug/L

Samples	Compound	Qualification
613SP04501	tetrachloroethene	CRQL
613GP03401	acetone	CRQL

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
609EB00401	chloroform	16 ug/L	160 ug/L
	tetrachloroethene	6 ug/L	60 ug/L

Samples	Compound	Qualification
613SP01001	chloroform	CRQL
613SP03901	tetrachloroethene	U

Surrogates

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

Surrogates (continued)

Specific Finding:

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

613SP03001 (120%)

Compound Identification /Quantitation

Reject E-flagged results in samples 613SP03001, 613SP03401, 613GP03901, and 613SP04501, in favor of the D-flagged value 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
613SP03001DL	2-chloroethyl vinyl ether	+/-	J/UR
613SP03001DL	acetone	+	J
613SP03001 613SP03401 613SP03901 613SP04501	2-chloroethyl vinyl ether	+/-	J/UR
613SP03001	2-butanone	+	J
613SP03001 613SP03401 613SP03901 613SP04501	vinyl acetate	+/-	J/UJ
613SP04501DL	acetone	+	J
613SP00401	2-chloroethyl vinyl ether	+/-	J/UR
613SP00501 613SP01001	2-chloroethyl vinyl ether	+/-	J/UJ
613SP01701	2-chloroethyl vinyl ether	+/-	J/UR
613GP00401 613GP01001	acetone	+	J
613GP00501	2-butanone	+	J
613SP03001	All associated compounds chlorobenzene-d_5	+/-	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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
613SP03901 613SP00501	acetone	+	U
613SP03401DL	methylene chloride	+	CRQL
613SP01701 613GP00501 613GP01701 613GP03901	acetone	+	U
613SP04501	tetrachloroethene	+	CRQL
613GP03401	acetone	+	CRQL
613SP01001	chloroform	+	CRQL
613SP03901	tetrachloroethene	+	U
613SP03001	all compounds	+	J
613SP03001 613SP03401 613GP03901 613SP04501	all E-flagged compounds	+	UR
613SP03001DL 613SP03401DL 613GP03901DL 613SP04501DL	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 # 27146B

A validation was performed on the Semivolatile Data from SDG 27146B. 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, M2312, 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).

613GP00401	pyrene (-31.5)

Internal Standards

Specific Finding:

The Samples listed below, exhibited internal standard areas that exceeded the QA/QC limit. Qualify all associated positive results as estimated (J).

613GP00401	1,4-dichlorobenzene-d_4
613GP01001	naphthalene-d_8

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

613GP03001	1,4-dichlorobenzene-d_4
613GP03401	acenaphthene-d_{10}
	phenanthrene-d_{10}
	perylene-d_{12}
613GP03001RE	1,4-dichlorobenzene-d_4
	naphthalene-d_8
	acenaphthene-d_{10}
	phenanthrene-d_{10}
	chrysene-d_{12}
	perylene-d_{12}

Surrogates

Specific Finding:

Sample 613GP00401, exhibited surrogate recoveries that were less than 10% for all of the acid surrogates. Qualify all positive results as estimated (J) and reject all non detects (UR).

phenol-d_5	8%
2-fluorophenol	5%
tribromophenol	5%

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.

613GP00401
613GP01001
613GP03001RE

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
613GP00401	pyrene (-31.5)	+	J
613GP00401 613GP01001	All associated compounds 1,4-dichlorobenzene-d_4 naphthalene-d_8	+	J
613GP03001 613GP03401	All associated compounds 1,4-dichlorobenzene-d_4 acenaphthene-d_{10} phenanthrene-d_{10} perylene-d_{12}	+/-	J/UJ
613GP03001RE	1,4-dichlorobenzene-d_4 naphthalene-d_8 acenaphthene-d_{10} phenanthrene-d_{10} chrysene-d_{12} perylene-d_{12}		
613GP00401	All results acid fraction	+/-	J/UR
613GP00401 613GP01001 613GP03001RE	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

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27162B
Date:	November 25, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	October 1-4, 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, 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. Scopa

Paul B. Humburg, President

12/4/96

Date

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

SDG# 27162B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
109MO00301	SOIL				X				X		X
109MO00101	SOIL				X				X		X
607MO00401	SOIL		X		X				X		X
607MO00301	SOIL		X		X				X		X
607MO00201	SOIL		X		X				X		X
607TB00401	SOIL		X								
GDFSB00401	SOIL		X		X		X		X		X
GDFSB00402	SOIL		X		X		X		X		X
GDFSB00501	SOIL		X		X		X		X		X
GDFSB00502	SOIL		X		X		X		X		X
GDFSB00201	SOIL		X		X		X		X		X
GDFSB00202	SOIL		X		X		X		X		X
620SB00601	SOIL		X		X				X		
620SB00602	SOIL		X		X				X		
GDFTB00401	SOIL		X								
Total Billable Samples (Water/Soil)		0	13	0	13	0	6	0	13	0	11

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 # 27162B

A validation was performed on the Volatile Data from SDG 27162B. 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. 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

Specific Findings

The continuing calibration standard I21708.D contained one (1) 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.

607MO00201 2-chloroethyl_vinyl_ether (0.015)

The continuing calibration standard I21708.D contained one (1) compound with %Ds 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.

607MO00201 2-butanone (32.4%)

The continuing calibration standard I21669.D contained one (1) compound with %Ds greater than 50% but less than 90%. For the samples and non-compliant compound listed below, positive and non-detect results are qualified as estimated, J/UJ.

607MO00301 2-chloroethyl_vinyl_ether (61.3%)
607MO00401

Internal Standards

All of the EICP area recoveries were not acceptable. 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 Findings

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.

607MO00301 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.

	VBLK2	VBLK3	VBLK4	VBLK5
acetone	4 µg/Kg	5 µg/Kg	6 µg/Kg	6 µg/Kg
methylene chloride	2 µg/Kg	14 µg/Kg	5 µg/Kg	-------
chloroform	1 µg/Kg	--------	--------	1 µg/Kg

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
VBLK2	GDFSB00401 GDFSB00402 GDFSB00201	methylene chloride	20 µg/Kg	U
	GDFSB00501 GDFSB00202 620SB00601 620SB00602	methylene chloride	20 µg/Kg	CRQL
	GDFSB00401 GDFSB00402 GDFSB00202 620SB00601	acetone	40 µg/Kg	U
	GDFSB00501 GDFSB00201	acetone	40 µg/Kg	CRQL
	GDFSB00402 GDFSB00501 GDFSB00201 GDFSB00202 620SB00601 620SB00602	chloroform	5 µg/Kg	CRQL

Method Blanks, continued

Specific Findings, continued

Blank	Samples	Compound	Action Level	Qualification
VBLK3	607MO00301	methylene chloride	140 µg/Kg	CRQL
	607MO00301	acetone	50 µg/Kg	CRQL
VBLK4	607MO00201	methylene chloride	50 µg/Kg	CRQL
	607MO00201	acetone	60 µg/Kg	U
VBLK5	GDFSB00502	acetone	60 µg/Kg	U
	GDFSB00502	chloroform	5 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.

	GDFTB00401	607TB00401
acetone	5 µg/Kg	4 µg/Kg
methylene chloride	2 µg/Kg	1 µg/Kg
chloroform	1 µg/Kg	

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
GDFTB00401	GDFSB00502	methylene chloride	20 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
607MO00301RE	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
607MO00201	2-chloroethyl_vinyl_ether	+/-	J/UR
607MO00201	2-butanone	+	J
607MO00301 607MO00401	2-chloroethyl_vinyl_ether	+/-	J/UJ
607MO00301	All Associated with chlorobenzene-d_5	+/-	J/UJ
GDFSB00401 GDFSB00402 GDFSB00201	methylene chloride	+B	U
GDFSB00501 GDFSB00202 620SB00601 620SB00602	methylene chloride	+B	CRQL
GDFSB00401 GDFSB00402 GDFSB00202 620SB00601	acetone	+B	U
GDFSB00501 GDFSB00201	acetone	+B	CRQL
GDFSB00402 GDFSB00501 GDFSB00201 GDFSB00202 620SB00601 620SB00602	chloroform	+B	CRQL

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
607MO00301	methylene chloride	+B	CRQL
607MO00301	acetone	+B	CRQL
607MO00201	methylene chloride	+B	CRQL
607MO00201	acetone	+B	U
GDFSB00502	acetone	+B	U
GDFSB00502	chloroform	+B	CRQL
GDFSB00502	methylene chloride	+	CRQL
607MO00301RE	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 III. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 27162B

A validation was performed on the Semivolatile Data from SDG 27162B. 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).

GDFSB00401	chrysene (30.8)
GDFSB00201	

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).

607M000401	chrysene-d_{12}
607M000201	perylene-d_{12}
607M000201RE	
607M000301	phenanthrene-d_{10}
	chrysene-d_{12}
	perylene-d_{12}
GDFSB00201	perylene-d_{12}
GDFSB00201RE	

Field Duplicates

Specific Finding:

For samples 607M000401 and 607N00401, qualify positive results for naphthalene, acenaphthene, fluorene, phenanthrene, anthracene, pyrene, benzo(a)anthracene, bis(2-ethylhexyl)phthalate, chrysene, di-n-octylphthalate, benzo(a)pyrene, indeno (1,2,3-cd)pyrene, dibenzo(a,h)anthracene and benzo(g,h,i)perylene as estimated (J), due to high RPD in duplicate comparison.

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.

607M000201RE
GDFSB00201RE

For samples 607M000301 and 607M000401, replace the "E" flagged results with the corresponding "D" flagged results found in the diluted samples. For the diluted samples 607M000301DL and 607M000401DL reject all results except for "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
GDFSB00401 GDFSB00201	chrysene (30.8)	+	J
	All associated compounds	+/-	J/UJ
607M000401 607M000201 607M000201RE	chrysene-d_{12} perylene-d_{12}		
607M000301	phenanthrene-d_{10} chrysene-d_{12} perylene-d_{12}		
GDFSB00201 GDFSB00201RE	perylene-d_{12}		
607M000401	naphthalene acenaphthene fluorene phenanthrene anthracene pyrene benzo(a)anthracene bis(2-ethylhexyl)phthalate chrysene di-n-octylphthalate benzo(a)pyrene indeno (1,2,3-cd)pyrene dibenzo(a,h)anthracene benzo(g,h,i)perylene	+	J
607M000201RE GDFSB00201RE	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
607M000301 607M000401	"E" flagged results	+	D
607M000301DL 607M000401DL	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 # 27162B

A validation was performed on the Pesticide/Aroclor Data from SDG 27162B. 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.

GC Performance

PEM1P (10/25/96 10:28) exhibited high 4,4'-DDT and Endrin breakdowns and high combined breakdown.

Specific Finding

PEM1P (10/25/96 10:28) exhibited high % breakdowns. The positive results for 4,4'-DDT are qualified as estimated, J. If 4,4'-DDT was not detected, but 4,4'-DDD or 4,4'-DDE were detected, the result for 4,4'-DDT is rejected, R. The positive results for 4,4'-DDD and 4,4'-DDE are qualified as presumptively present at an estimated concentration, NJ.

Sample	Compound	Qualification
GDFSB00201 GDFSB00401	4,4'-DDT	J
GDFSB00402 GDFSB00501	4,4'-DDT	R
GDFSB00201 GDFSB00401 GDFSB00402 GDFSB00501	4,4'-DDE	NJ

Surrogate Recoveries

One (1) field sample exhibited a non-compliant DCB recovery.

Specific Finding

The sample listed below exhibited a high DCB recovery and required qualifications. The positive results are qualified as estimated, J.

Sample ID	Surrogate	% Recovery
GDFSB00401	DCB-1	189%

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). The result for 4,4'-DDE in sample GDFSB00401 was flagged E indicating the result was outside the calibration range of the instrument. However, the result was at the upper limit of the calibration range and the sample was not diluted. The E flag was removed from the spreadsheet and no qualifications were required.

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

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
GDFSB00201 GDFSB00401	4,4'-DDT	+	J
GDFSB00402 GDFSB00501	4,4'-DDT	-	R
GDFSB00201 GDFSB00401 GDFSB00402 GDFSB00501	4,4'-DDE	+	NJ
GDFSB00401	ALL	+	J
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 # 27162A

A validation was performed on the Metals and Cyanide Data from SDG 27162A. 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	0.03 mg/kg	all soil samples below 0.15 mg/kg
Tin	1.37 mg/kg	all soil samples below 6.85 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	all soil samples below 11.3 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".

Matrix Spike recovery

Specific Finding

The Matrix Spike recovery for soils for Copper (27%) was below 30%. All positive results are qualified as estimated, "J". All non-detect results are rejected.

The Matrix Spike recoveries for soils for Antimony (56%), Chromium (72%) and Manganese (40%) 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 Copper (156%), Iron (71%), Lead (123%), Manganese (57%) and Zinc (128%) were greater than 35%. All positive results are qualified as estimated, "J". The RPDs for Calcium (29%), Aluminum (21%), Chromium (32%) and Nickel (23%) were not greater than 35% and will not be qualified.

The RPDs for field duplicate samples (109M000301 and 109N000301) for Arsenic (131%), Barium (61%), Chromium (71%), Iron (171%), Manganese (135%) and Vanadium (169%) were greater than 50%. All positive results are qualified as estimated, "J".

The RPD for field duplicate samples (607M000401 and 607N000401) for Barium (70%) was greater than 50%. All positive results are qualified as estimated, "J".

Serial Dilutions

Specific Finding

The Serial dilution for soils for Copper 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 6.85 mg/kg	Sn.	+	U
all soil samples below 0.15 mg/kg	Be.		
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 below 11.3 mg/kg	Zn.		
All soil samples	Cu.	+	J
		U	R
All soil samples	Cr, Mn and Sb.	+/U	J/UJ
All soil samples	Cu, Fe, Pb, Mn and Zn.	+	J
All soil samples	Cu.	+	J
109M000301and109N000301	As, Ba, Cr, Fe, Mn and V.	+	J
607M000401 and 607N000401	Ba.		
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27162A
Date:	November 25, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
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:	Volatiles, Semivolatiles, Pesticide/PCB's, Organophosphorus Pesticides, Herbicides, Dioxin/Furans, Hexavalent Chromium, Metals, 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:

for Kimberly S. Shopp
Paul B. Humburg, President

4 December 1996
Date

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

SDG# 27162A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
109NO00301	SOIL		X		X		X		X		X		X		X		X		X
607NO00401	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 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 # 27162A

A validation was performed on the Volatile Data from SDG 27162A. 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 I21596.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.

109NO00301	acrolein (0.034)
607NO00401	2-chloroethyl_vinyl_ether (0.038)
	Isobutyl alcohol (0.008)
	1,4-dioxane (0.002)

The continuing calibration standard I21596.D contained one (1) compound with %Ds greater than 50% but less than 90%. For the samples and non-compliant compound listed below, positive and non-detect results are qualified as estimated, J/UJ.

109NO00301	trichlorofluoromethane (52.8%)
607NO00401	

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.

	607TB00401
acetone	4 μg/Kg
methylene chloride	1 μg/Kg

Specific Finding

Blank	Samples	Compound	Action Level		Qualification
607TB00401	109NO00301 607NO00401	methylene chloride	10 μg/Kg	CRQL	
	109NO00301 607NO00401	acetone	40 μg/Kg	U	

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
109NO00301 607NO00401	acrolein 2-chloroethyl_vinyl_ether Isobutyl alcohol 1,4-dioxane	+/-	J/UR
109NO00301 607NO00401	trichlorofluoromethane	+/-	J/UJ
109NO00301 607NO00401	methylene chloride	+	CRQL
109NO00301 607NO00401	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, Appendix IX 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 # 27162A

A validation was performed on the Semivolatile Data from SDG 27162A. 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, A6411,-12,-13,-14, 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).

109N000301	2,6-dichlorophenol (62.6)
607N000401	1-nitrosopiperdine (50.8)
	safrole (70.4)
	isosafrole (56.7)
	1,4-naphthoquinone (82.4)
	1,3-dinitrobenzene (54.9)
	1-naphthylamine (55.2)
	2-naphthylamine (67.7)
	5-nitro-o-toluidine (61.6)
	phenacetin (56.4)
	diallate (64.4)
	4-aminobiphenyl (62.3)
	pronamide (58.6)
	methyl parathion (51.3)
	chlorobenzilate (58.0)
	famphur (78.6)
	2-acetylaminofluorene (77.5)
	diphenylamine (64.4)
	7,12-dimethylbenz(a)anthracene (86.5)

The continuing calibration, A6411,-12,-13,-14, 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).

109N000301	3,3'-dimethylbenzidine (109.7)
607N000401	kepone (93.4)

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A6411,-12,-13,-14, 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).

109N000301	hexachlorophene (82.7)
607N000401	

Field Duplicates

Specific Finding:

For samples 607M000401 and 607N00401, qualify positive results for naphthalene, acenaphthene, fluorene, phenanthrene, anthracene, pyrene, benzo(a)anthracene, bis(2-ethylhexyl)phthalate, chrysene, di-n-octylphthalate, benzo(a)pyrene, indeno (1,2,3-cd)pyrene, dibenzo(a,h)anthracene and benzo(g,h,i)perylene 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
109N000301 607N000401	2,6-dichlorophenol (62.6)	+/-	J/UJ
	1-nitrosopiperdine (50.8)		
	safrole (70.4)		
	isosafrole (56.7)		
	1,4-naphthoquinone (82.4)		
	1,3-dinitrobenzene (54.9)		
	1-naphthylamine (55.2)		
	2-naphthylamine (67.7)		
	5-nitro-o-toluidine (61.6)		
	phenacetin (56.4)		
	diallate (64.4)		
	4-aminobiphenyl (62.3)		
	pronamide (58.6)		
	methyl parathion (51.3)		
	chlorobenzilate (58.0)		
	famphur (78.6)		
	2-acetylaminofluorene (77.5)		
	diphenylamine (64.4)		
	7,12-dimethylbenz(a)anthracene (86.5)		
109N000301 607N000401	3,3'-dimethylbenzidine (109.7)	+/-	J/UR
	kepone (93.4)		
109N000301 607N000401	hexachlorophene (82.7)	+/-	J/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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
607N000401	naphthalene	+	J
	acenaphthene		
	fluorene		
	phenanthrene		
	anthracene		
	pyrene		
	benzo(a)anthracene		
	bis(2-ethylhexyl)phthalate		
	chrysene		
	di-n-octylphthalate		
	benzo(a)pyrene		
	indeno (1,2,3-cd)pyrene		
	dibenzo(a,h)anthracene		
	benzo(g,h,i)perylene		
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 # 27162A

A validation was performed on the Pesticide/Aroclor Data from SDG 27162A. 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 # 27162A

A validation was performed on the Organophosphorus Pesticide Data from SDG 27162A. 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 # 27162A

A validation was performed on the Herbicide Data from SDG 27162A. 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
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 # 27162B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 27162B. 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	0.03 mg/kg	no impact
Tin	1.37 mg/kg	all soil samples below 6.85 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	no impact
Iron	42.1 ug/l	no impact
Nickel	3.5 ug/l	no impact
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 RPDs for field duplicate samples (109M000301 and 109N000301) for Arsenic (131%), Barium (61%), Chromium (71%), Iron (171%), Manganese (135%) and Vanadium (169%) were greater than 50%. All positive results are qualified as estimated, "J".

The RPD for field duplicate samples (607M000401 and 607N000401) for Barium (70%) 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 6.85 mg/kg	Sn.	+	U
All soil samples below 551 mg/kg	Na.		
109M000301and109N000301	As, Ba, Cr, Fe, Mn and V.	+	J
607M000401 and 607N000401	Ba.		
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 # 27162

A validation was performed on the Dioxin/Furans Data from SDG 27162. 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#:	27211
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	October 4-8, 1996
Number of Samples:	8 Aqueous Sample(s) with 0 MS/MSD(s) 8 Non-aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwestern 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, 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. 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# 27211B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		TAL	
613T004701	WATER	X					
613E004701	WATER	X		X		X	
613D004701	WATER	X		X		X	
613T0A4701	SOIL		X				
613SP00601	SOIL		X		X		X
613GP00601	WATER			X		X	
613TP00601	WATER	X					
613SP01301	SOIL		X		X		X
613GP01301	WATER	X		X		X	
613TP01301	WATER	X					
613SP01801	SOIL		X		X		X
613TP01801	SOIL		X				
613SP01901	SOIL		X		X		X
613TP01901	SOIL		X				
613GP01901	WATER	X		X		X	
613SP04701	SOIL		X		X		X
613GP04701	WATER	X		X		X	
Total Billable Samples (Water/Soil)		8	8	6	5	6	5

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
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 # 27211B

A validation was performed on the Volatile Data from SDG 27211B. 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, 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).

613SP01801	2-chloroethyl vinyl ether (64.5%)

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).

613SP00601	acetone (25.2%)
613SP04701	

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).

613SP00601	2-chloroethyl vinyl ether (0.038)
613SP01901	
613SP04701	

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).

613SP01301	2-chloroethyl vinyl ether (61.3%)

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	3J ug/kg	30 ug/kg
VBLK7	methylene chloride Acetone	14 ug/kg 5J ug/kg	140 ug/kg 50 ug/kg

Samples	Compound	Qualification
613SP01801 613SP01301	acetone	U
613SP01301	methylene chloride	CRQL

Trip Blank

Associated blank	Compound	Concentration	Action Level
613TB01301	xylene Chloroform	2 ug/L 100 ug/L	20 ug/L 1000 ug/L
613TP01901	acetone	8J ug/kg	80 ug/kg

Samples	Compound	Qualification
613GP01301	xylene	CRQL
613SP01901	chloroform	CRQL
613SP01901	acetone	U

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
613E004701	Methylene chloride	11 ug/L	110 ug/L
	Carbon disulfide	2J ug/L	20 ug/L

Samples	Compound	Qualification
613SP00601 613GP01301	carbon disulfide	CRQL
613SP01801	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

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
613SP01801	2-chloroethyl vinyl ether	+/-	J/UJ
613SP00601 613SP04701	acetone	+	J
613SP00601 613SP01901 613SP04701	2-chloroethyl vinyl ether	+	J/UR
613SP01301	2-chloroethyl vinyl ether	+/-	J/UJ
613SP01801 613SP01301	acetone	+	U
613SP01301	methylene chloride	+	CRQL
613GP01301	xylene	+	CRQL
613SP01901	chloroform	+	CRQL
613SP01901	acetone	+	U
613SP00601 613GP01301	carbon disulfide	+	CRQL
613SP01801	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 # 27211B

A validation was performed on the Semivolatile Data from SDG 27211B. 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).

613SP04701	chrysene-d_{12} perylene-d_{12}
613SP04701RE	perylene-d_{12}

Compound Identification/Quantitation

Specific Finding:

Reject all results for the sample 613SP04701, 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
613SP04701	chrysene-d_{12} perylene-d_{12}		
613SP04701RE	perylene-d_{12}		
613SP04701	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
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 # 27211A

A validation was performed on the Metals Data from SDG 27211A. 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
Chromium	0.11 mg/kg	no impact
Lead	0.27 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

Copper	0.71 ug/l	no impact

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

Elements	Conc.	Samples affected
Antimony	2.2 ug/l	no impact
Beryllium	0.35 ug/l	all soil samples below 0.35 mg/kg
Calcium	88.4 ug/l	no impact
Copper	16.8 ug/l	all soil samples below 16.8 mg/kg
Manganese	5.2 ug/l	no impact
Sodium	7910 ug/l	all soil samples below 7910 mg/kg
Zinc	8.7 ug/l	all soil samples below 8.7 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 Barium, Beryllium, Calcium, Chromium, Cobalt 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
All soil samples below 1.8 mg/kg	Ni.	+	U
All soil samples below 9.3 mg/kg	Sn.		
All soil samples below 0.35 mg/kg	Be.		
All soil samples below 16.8 mg/kg	Cu.		
All soil samples below 7910 mg/kg	Na.		
All soil samples below 8.7 mg/kg	Zn.		
All soil samples below 4.3 mg/kg	Tl.	+/U	J/UJ
All water samples	Ba, Be, Ca, Cr, Co and Ni.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27242A
Date:	November 25, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	October 9, 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, 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 S. Stopp — 5 December 1996

Paul B. Humburg, President — Date

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

SDG# 27242A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
036EB00301	WATER	X		X		X		X		X		X		X		X		X	
036DB00301	WATER	X		X		X		X		X		X		X		X		X	
Total Billable Samples (Water/Soil)		2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	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 # 27242A

A validation was performed on the Volatile Data from SDG 27242A. 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 # 27242A

A validation was performed on the Semivolatile Data from SDG # 27242A. 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 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 # 27242A

A validation was performed on the Pesticide/Aroclor Data from SDG 27242A. 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 compounds analyzed with a single point calibration, therefore the data did not require qualification.

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

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 # 27242A

A validation was performed on the Herbicide Data from SDG 27242A. 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. 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

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

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 # 27242A

A validation was performed on the Organophosphorus Pesticide Data from SDG 27242A. 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. 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

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 # 27242B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 27242B. 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.

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 # 27242

A validation was performed on the Dioxin/Furans Data from SDG 27242. 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#:	27242B
Date:	November 25, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	October 8-10, 1996
Number of Samples:	1 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, 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

5 December 1996
Date

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

SDG# 27242B

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
036SB00201	SOIL		X		X				X		
036TB00201	SOIL		X								
036SB00301	SOIL		X		X				X		
036TB00301	SOIL		X								
036TB00302	WATER	X									
036SB00101	SOIL		X		X				X		
036SB00102	SOIL		X		X				X		
GDFSB00301	SOIL		X		X		X		X		X
GDFSB00302	SOIL		X		X		X		X		X
GDFTB00301	SOIL		X								
Total Billable Samples (Water/Soil)		1	9	0	6	0	2	0	6	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 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 # 27242B

A validation was performed on the Volatile Data from SDG 27242B. 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 the calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, K16260.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).

GDFSB00301	acetone (81.7%)
GDFSB00302	

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
	Chloroform	1J	10
VBLK3	methylene chloride	2J ug/kg	20 ug/kg
	Acetone	2J	20
	Chloroform	2J	20
VBLK4	methylene chloride	13 ug/kg	130
	Acetone	3J	30
	Chloroform	2J	20

Samples	Compound	Qualification
036SB00301	acetone	U
036SB00101		
036SB00102		
GDFSB00302		

Method Blank (continued)

Samples	Compound	Qualification
036SB00201	acetone	U
036SB00301 036SB00101 GDFSB00301 GDFSB00302 036SB00201	chloroform	CRQL
GDFSB00301 GDFSB00302 036SB00201	methylene chloride	U

Trip Blank

Associated blank	Compound	Concentration	Action Level
036TB00301	methylene chloride	13 ug/kg	130 ug/kg

Samples	Compound	Qualification
036SB00301	methylene chloride	U
036SB00101 036SB00102	methylene chloride	CRQL

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
613E004701	carbon disulfide	2J ug/kg	10 ug/kg

Samples	Compound	Qualification
036SB00102 GDFSB00301	carbon disulfide	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

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
GDFSB00301 GDFSB00302	acetone	+/-	J/UJ
036SB00301 036SB00101 036SB00102 GDFSB00302 036SB00201	acetone	+	U
036SB00301 036SB00101 GDFSB00301 GDFSB00302 036SB00201	chloroform	+	CRQL
GDFSB00301 GDFSB00302 036SB00201 036SB00301	methylene chloride	+	U
036SB00101 036SB00102	methylene chloride	+	CRQL
036SB00102 GDFSB00301	carbon disulfide	+	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; 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 # 27242B

A validation was performed on the Semivolatile Data from SDG # 27242B. 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 Blanks

Associated blank	Compound	Concentration	Action Level
036EB00301	bis(2-ethylhexyl)phthalate	3 ug/L	1000 ug/Kg

Samples	Compound	Qualification
036SB00101 036SB00102	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
036SB00101	bis(2-ethylhexyl)phthalate	+	CRQL
036SB00102			

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the 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 # 27242B

A validation was performed on the Pesticide/Aroclor Data from SDG 27242B. 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 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

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
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 # 27242A

A validation was performed on the Metals and Cyanide Data from SDG 27242A. 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
Tin	1.47 mg/kg	all soil samples below 7.35 mg/kg
Vanadium	0.07 mg/kg	no impact

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

Elements	Conc.	Samples affected
Aluminum	20.7 ug/l	no impact
Barium	0.58 ug/l	no impact
Beryllium	0.43 ug/l	all soil samples 0.43 mg/kg
Calcium	18.3 ug/l	no impact
Copper	23.8 ug/l	all soil samples below 23.8 mg/kg
Silver	1.3 ug/l	no impact
Tin	2.7 ug/l	no impact
Sodium	7840 ug/l	all soil samples below 7840 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 (39%), Copper (73%), Mercury (50%), Silver (46%) and Zinc (34%) 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 Arsenic (380%) was above the upper control limits (>125%). All positive results are qualified as estimated, "J".

Field and Duplicate Analysis

Specific Finding

The RPDs for the laboratory duplicate samples for soils for Arsenic (42%) and Manganese (89%) were greater than 35%. All positive results are qualified as estimated, "J". The RPDs for Calcium (31%) and Lead (24%) were not greater than 35% and will not be qualified.

Serial Dilution

Specific Finding

The serial dilution 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 0.2 mg/kg	Be.	+	U
all soil samples below 7.35 mg/kg	Sn.		
all soil samples below 0.43 mg/kg	Be.		
all soil samples below 23.8 mg/kg	Cu.		
all soil samples below 7840 mg/kg	Na.		
all soil samples	Sb, Cu, Hg, Ag and Zn.	+/U	J/UJ
all soil samples	As.	+	J
all soil samples	As and Mn.	+	J
all soil samples	Ni.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27258A
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	October 10-11, 1996
Number of Samples:	1 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 IV
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, 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. Jackson
Paul B. Humburg, President

11/21/96
Date

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

SDG# 27258A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		TAL	
613CP01201	SOIL		X		X		X
613CP06701	SOIL		X		X		X
613CP06801	SOIL		X		X		X
613HP06801	WATER	X					
Total Billable Samples	(Water/Soil)	1	3	0	3	0	3

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
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 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 # 27258A

A validation was performed on the Volatile Data from SDG 27258A. 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, I21708, 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).

613CP01201	2-chloroethyl vinyl ether (-51.6) acrolein (56.5) acetonitrile isobutyl alcohol (45.5) 1,4-dioxane (50.0)

The continuing calibration, I21708, 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).

613CP01201	2-butanone (32.4)

The continuing calibration, I21708, 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).

613CP01201	dichlorodifluoromethane (-51.3)

The continuing calibration, I21708, 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).

613CP01201	trichlorofluoromethane (-91.6)

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, I21732, 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).

613CP06701	acrolein (67.4) acetonitrile (42.9) propionitrile (48.7) isobutyl alcohol (63.6) 1,4-dioxane (50.0)

The continuing calibration, I21732, 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).

613CP06701	2-chloroethylvinyl ether (-74.2)

The continuing calibration, I21777, 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).

613CP06801	acrolein (26.3) acetonitrile propionitrile (39.7) isobutyl alcohol (44.4) 1,4-dioxane (50.0)

The continuing calibration, I21777, 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).

613CP06801	2-butanone (37.7)

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, R24827, 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).

613HP06801	acetonitrile
	isobutyl alcohol (-36.4)
	1,4-dioxane (-33.3)
	dichlorofluoromethane

Method Blanks

Associated blank	Compound	Conc	Action level
VBLK1	methylene chloride	5 ug/Kg	50 ug/Kg
	acetone	6J ug/Kg	60 ug/Kg
VBLK2	methylene chloride	2J ug/Kg	20 ug/Kg
	acetone	4J ug/Kg	40 ug/Kg
VBLK3	methylene chloride	6 ug/Kg	60 ug/Kg
	acetone	6J ug/Kg	60 ug/Kg
VBLK4	methylene chloride	4J ug/Kg	40 ug/Kg
	acetone	6J ug/Kg	60 ug/Kg

Samples	Compound	Qualification
613CP01201 613CP06801	methylene chloride	CRQL
613HP06801 613CP06701	methylene chloride	U
613HP06801	acetone	U

Trip Blanks

Associated blank	Compound	Conc	Action level
613TP06701	acetone	44B ug/Kg	440 ug/Kg
	chloroform	2J ug/Kg	10 ug/Kg
	2-butanone	4J ug/Kg	40 ug/Kg
613TP06801	acetone	12B ug/L	120 ug/L

Samples	Compound	Qualification
613CP06701 613CP06801	acetone	U
613CP06701	chloroform	CRQL
613CP06701	2-butanone	CRQL

Field Duplicates

Specific Finding:

For sample 613CP01201, qualify positive results for carbon disulfide and 2-butanone as estimated (J), due to high RPDs.

For sample 613CP06801, qualify positive results for 2-butanone as estimated (J), due to high RPDs.

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
613CP01201	2-chloroethyl vinyl ether (-51.6) acrolein (56.5) acetonitrile isobutyl alcohol (45.5) 1,4-dioxane (50.0)	+/-	J/UR
613CP01201	2-butanone (32.4)	+	J
613CP01201	dichlorodifluoromethane (-51.3)	+/-	J/UJ
613CP01201	trichlorofluoromethane (-91.6)	+/-	J/UR
613CP06701	acrolein (64.7) acetonitrile (42.9) propionitrile (48.7) isobutyl alcohol (63.6) 1,4-dioxane (50.0)	+/-	J/UR
613CP06701	2-chloroethylvinyl ether (-74.2)	+/-	J/UJ
613CP06801	acrolein (26.3) acetonitrile propionitrile (39.7) isobutyl alcohol (44.4) 1,4-dioxane (50.0)	+/-	J/UR
613CP06801	2-butanone (37.7)	+	J
613HP06801	acetonitrile isobutyl alcohol (-36.4) 1,4-dioxane (-33.3) dichlorofluoromethane	+/-	J/UR
613CP01201 613CP06801	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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
613HP06801 613CP06701	methylene chloride	+	U
613HP06801	acetone	+	U
613CP06701 613CP06801	acetone	+	U
613CP06701	chloroform	+	CRQL
613CP06701	2-butanone	+	CRQL
613CP01201	carbon disulfide 2-butanone	+	J
613CP06801	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

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, Appendix IX 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 # 27258A

A validation was performed on the Semivolatile Data from SDG 27258A. 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, A6271,-72,-73, 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).

613CP01201	p-phenylenediamine (60.8)
613CP06701	1,3,5-trinitrobenzene (80.4)
613CP06801	safrole (56.2)
	1,4-naphthoquinone (85.7)
	1,3-dinitrobenzene (56.7)
	4-aminobiphenyl (53.9)
	methapyrilene (70.4)
	7,12-dimethylbenz(a)anthracene (89.6)

The continuing calibration, A6271,-72,-73,, 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).

613CP01201	a,a-dimethylphenethylamine (98.7)
613CP06701	kepone (134.6)
613CP06801	

The continuing calibration, A6271,-72,-73, 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).

613CP01201	hexachlorophene (79.0)
613CP06701	aramite (29.9)
613CP06801	

Rinseate Blanks

Associated blank	Compound	Conc	Action level
036EB00101	bis(2-ethylhexyl) phthalate	3J ug/L	990 ug/Kg

Samples	Compound	Qualification
613CP01201	bis(2-ethylhexyl) phthalate	CRQL
613CP06701		

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
613CP01201	p-phenylenediamine (60.8)	+/-	J/UJ
613CP06701	1,3,5-trinitrobenzene (80.4)		
613CP06801	safrole (56.2)		
	1,4-naphthoquinone (85.7)		
	1,3-dinitrobenzene (56.7)		
	4-aminobiphenyl (53.9)		
	methapyrilene (70.4)		
	7,12-dimethylbenz(a)anthracene (89.6)		
613CP01201	a,a-dimethylphenethylamine (98.7)	+/-	J/UR
613CP06701	kepone (134.6)		
613CP06801			
613CP01201	hexachlorophene (79.0)	+/-	J/UR
613CP06701	aramite (29.9)		
613CP06801			
613CP01201	bis(2-ethylhexyl)	+	CRQL
613CP06701	phthalate		
613CP01201	carbazole	+/-	J/UR
613CP06701	3-methyl-cholanthrene		
613CP06801	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
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 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 # 27258B

A validation was performed on the Metals Data from SDG 27258B. 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	1.87 mg/kg	all soil samples below 9.35 mg/kg
Zinc	1.29 mg/kg	no impact

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	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
Cobalt	-0.13 mg/kg	no impact
Vanadium	-0.15 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".

Field and Duplicate Analysis

Specific Finding

The RPD for field duplicate samples (613SP01201 and 613CP01201) for Arsenic (53%) 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 field dup samples below 9.35 mg/kg	Sn.	+	U
613SP01201 and 613CP01201.	As.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27258B
Date:	November 8, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	October 9-11, 1996
Number of Samples:	7 Aqueous Sample(s) with 0 MS/MSD(s) 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:	Volatiles, Semivolatiles, 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. Scarfone

Paul B. Hamburg, President

11/21/96

Date

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

SDG# 27258B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		TAL	
613SP01201	SOIL		X		X		X
613GP01201	WATER	X					
613TP01201	WATER	X					
613SP04601	SOIL		X		X		X
613TP04601	SOIL		X				
613GP04601	WATER	X		X		X	
613SP05201	SOIL		X		X		X
613GP05201	WATER	X		X		X	
613TP05201	WATER	X					
613SP06701	SOIL		X		X		X
613TP06701	SOIL		X				
613SP06801	SOIL		X		X		X
613GP06801	WATER	X		X		X	
613TP06801	WATER	X					
613TP06802	SOIL		X				
Total Billable Samples	(Water/Soil)	7	8	3	5	3	5

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
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 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 # 27258B

A validation was performed on the Volatile Data from SDG 27258B. 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, I21708, 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).

613SP06801	2-chloroethylvinyl ether (51.6)

The continuing calibration, I21732, 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).

613SP01201	acetone (29.1)
613SP04601	
613SP05201	

The continuing calibration, I21732, 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).

613SP01201	2-chloroethyl vinyl ether (-74.2)
613SP04601	
613SP05201	
613SP06701	

Method Blanks

Associated blank	Compound	Conc	Action level
VBLK2	methylene chloride	3J ug/L	140 ug/L
	acetone	2J ug/L	50 ug/L
	chloroform	1J ug/L	5 ug/L
VBLK3	methylene chloride	5 ug/Kg	50 ug/Kg
	acetone	6J ug/Kg	60 ug/Kg
VBLK4	methylene chloride	2J ug/L	20 ug/L
	acetone	4J ug/L	40 ug/L
	chloroform	1J ug/L	5 ug/L
VBLK5	methylene chloride	6 ug/Kg	60 ug/Kg
	acetone	6J ug/Kg	60 ug/Kg

Samples	Compound	Qualification
613SP06801	methylene chloride	CRQL
613GP06801 613GP01201 613SP01201 613SP04601 613SP05201 613SP06701	methylene chloride	U
613GP06801 613GP01201 613SP06701	acetone	U

Trip Blanks

Associated blank	Compound	Conc	Action level
613TP01201	chloroform	2JB ug/Kg	10 ug/Kg
613TP06701	chloroform	2J ug/Kg	10 ug/Kg
	2-butanone	4J ug/Kg	40 ug/Kg
613TP06801	chloroform	2JB ug/L	10 ug/Kg
613TP04601	methylene chloride	2JB ug/L	20 ug/Kg
	acetone	8JB ug/L	80 ug/Kg
	chloroform	1J ug/L	5 ug/L
613TP05201	methylene chloride	5 ug/L	50 ug/Kg

Samples	Compound	Qualification
613GP04601 613GP05201	methylene chloride	U
613GP04601	acetone	U
613SP01201 613SP06701 613SP06801 613SP04601	chloroform	CRQL
613SP06701	2-butanone	CRQL

Rinseate Blanks

Associated blank	Compound	Conc	Action level
036EB00301	chloroform	12 ug/L	60 ug/Kg

Samples	Compound	Qualification
613SP05201 613SP06801	chloroform	CRQL

Field Duplicates

Specific Finding:

For sample 613SP01201, qualify positive results for carbon disulfide and 2-butanone as estimated (J), due to high RPDs.

For sample 613SP06801, qualify positive results for 2-butanone as estimated (J), due to high RPDs.

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
613SP06801	2-chloroethylvinyl ether (51.6)	+/-	J/UR
613SP01201 613SP04601 613SP05201	acetone (29.1)	+	J
613SP01201 613SP04601 613SP05201 613SP06701	2-chloroethyl vinyl ether (-74.2)	+/-	J/UJ
613SP06801	methylene chloride	+	CRQL
613GP06801 613GP01201 613SP01201 613SP04601 613SP05201 613SP06701	methylene chloride	+	U
613GP06801 613GP01201 613SP06701	acetone	+	U
613GP04601 613GP05201	methylene chloride	+	U
613GP04601	acetone	+	U
613SP01201 613SP06701 613SP06801 613SP04601	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	ANALYTE ID	DL	QL
613SP06701	2-butanone	+	CRQL
613SP05201 613SP06801	chloroform	+	CRQL
613SP01201	carbon disulfide 2-butanone .	+	J
613SP06801	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

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 # 27258B

A validation was performed on the Semivolatile Data from SDG 27258B. 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
036EB00101	bis(2-ethylhexyl) phthalate	3J ug/L	990 ug/Kg

Samples	Compound	Qualification
613SP04601 613GP04601 613SP06701 613SP06801	bis(2-ethylhexyl) phthalate	CRQL
613GP06801	bis(2-ethylhexyl) phthalate	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

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
613SP04601 613GP04601 613SP06701 613SP06801	bis(2-ethylhexyl) phthalate	+	CRQL
613GP06801	bis(2-ethylhexyl) phthalate	+	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 # 27258A

A validation was performed on the Metals Data from SDG 27258A. 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
Magnesium	6.88 mg/kg	no impact
Tin	1.87 mg/kg	all soil samples below 9.35 mg/kg
Vanadium	0.04 mg/kg	no impact
Zinc	1.29 mg/kg	no impact

Antimony	3.0 ug/l	no impact
Beryllium	0.31 ug/l	no impact

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
Cobalt	-0.13 mg/kg	no impact
Copper	-1.23 ug/l	no impact
Lead	-1.91 ug/l	all water samples below 19.1 ug/l
Thallium	-5.41 ug/l	all water samples below 54.1 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 soils for Antimony (37%), Mercury (49%) and Arsenic (49%) 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 Chromium (139%) was above the upper control limits (>125%). All positive results are qualified as estimated, "J".

Field and Duplicate Analysis

Specific Finding

The RPDs for Iron (21%) and Lead (28%) were not greater than 35% and will not be qualified.

The RPD for field duplicate samples (613SP01201 and 613CP01201) for Arsenic (53%) was greater than 50%. All positive results are qualified as estimated, "J".

Serial Dilutions

Specific Findings

The Serial dilutions for soils for Cobalt and for waters for Aluminum, Arsenic, Barium, Beryllium, Cobalt, Chromium, Calcium, Copper, Iron, Lead, Manganese, Nickel, Tin, Vanadium and Zinc 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 soil samples below 9.35 mg/kg	Sn.	+	U
All water samples below 19.1 ug/l	Pb.		
All water samples below 54.1 ug/l	Tl.		
All soil samples	Sb, Hg and As.	+/U	J/UJ
All soil samples	Cr.	+	J
613SP01201 and 613CP01201.	As.	+	J
All soil samples	Co.	+	J
All water samples	Al, As, Ba, Be, Ca, Cr, Co, Cu, Fe, Pb, Mn, Ni, Sn, V and Zn.		
All "B" results	all analytes	B	J

ANNOTATED FORM Is

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27307A
Date:	November 22, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	October 12-15, 1996
Number of Samples:	1 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, 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. Gropp — 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# 27307A

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		TAL	
613CP06601	SOIL		X		X		X
613CP06501	SOIL		X		X		X
613HP06501	WATER	X		X		X	
Total Billable Samples (Water/Soil)		1	2	1	2	1	2

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
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 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 # 27307A

A validation was performed on the Volatile Data from SDG 27307A. 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 initial calibrations were not acceptable for all compound %RSDs. The average RRF requirements were not met for all initial calibration compounds. Qualifications were required.

Initial Calibrations, continued

Specific Findings

The initial calibration analyzed 10/16/96 contained four (4) compounds with average 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.

613CP06601	acetonitrile (0.016)
613CP06501	isobutyl alcohol (0.009)
	1,4-dioxane (0.002)
	acrolein (0.019)

The initial calibration analyzed 10/16/96 contained a compound with a %RSD greater than 30% but less than 90%. For the samples and non-compliant compound listed below, the positive results are qualified as estimated, J.

613CP06601	Trichlorofluoromethane (58.4%)
613CP06501	

Continuing Calibrations

Specific Findings

The continuing calibration standard 24843.D contained six (6) 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.

613HP06501	2-chloroethyl_vinyl_ether (0.031)
	acrolein (0.033)
	acetonitrile (0.026)
	Isobutyl alcohol (0.007)
	1,4-dioxane (0.002)
	dichlorodifluoromethane (0.011)

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	-------	6 μg/Kg
methylene chloride	11 μg/L	5 μg/Kg
chloroform	2 μg/L	-------

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
VBLK1	613HP06501	methylene chloride	110 μg/L	U
VBLK2	613CP06601	acetone	60 μg/Kg	U
	613CP06501	acetone	60 μg/Kg	NA
	613CP06601 613CP06501	methylene chloride	50 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.

Field Blanks, continued

	613TP06401	613TPA6401	613TP06601	613TP06702
acetone	6 μg/L	7 μg/L	15 μg/L	7 μg/L
methylene chloride	--------	--------	7 μg/L	--------
chloroform	2 μg/L	--------	--------	2 μg/L
2-butanone	--------	--------	2 μg/L	--------
trichloroethene	--------	2 μg/L	--------	--------

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
613TP06401	613HP06501	acetone	60 μg/L	U
613TP06601	613CP06501	acetone	150 μg/Kg	U
613TP06702	613CP06601	chloroform	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
613CP06601 613CP06501	acetonitrile isobutyl alcohol 1,4-dioxane acrolein	+/-	J/UR
613CP06601 613CP06501	Trichlorofluoromethane	+	J
613HP06501	2-chloroethyl_vinyl_ether acrolein acetonitrile Isobutyl alcohol 1,4-dioxane dichlorodifluoromethane	+/-	J/UR
613HP06501 613CP06601 613CP06501	methylene chloride	+B	U
613CP06601	acetone	+B	U
613CP06501	acetone	+B	NA
613HP06501 613CP06501	acetone	+	U
613CP06601	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, Appendix IX 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 # 27307A

A validation was performed on the Semivolatile Data from SDG 27307A. 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, A6386,-87,-88, 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).

613CP06601	n-nitrosomethylethylamine (53.6)
613CP06501	n-nitrosodiethylamine (52.0)
	1-nitroso-piperidine (52.5)
	safrole (68.0)
	isosafrole (61.3)
	1,4-naphthoquinone (87.7)
	1,3-dinitrobenzene (66.2)
	1-naphthylamine (64.4)
	2-naphthylamine (75.8)
	5-nitro-o-toluidine (78.6)
	4-aminobiphenyl (75.6)
	pronamide (59.2)
	pentachloronitrobenzene (71.0)
	3,3'-dimethylbenzidine (64.7)
	diphenylamine (54.0)
	7,12-dimethylbenz(a)anthracene (83.5)

The continuing calibration, A6386,-87,-88, 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).

613CP06601	kepone (111.7)
613CP06501	

The continuing calibration, A6386,-87,-88, 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).

613CP06601	aramite
613CP06501	hexachlorophene (64.0)

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A6301,-02,-03,-04, 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).

613HP06501	2,6-dichlorophenol (53.0)
	2-picoline (53.4)
	safrole (59.4)
	isosafrole (59.7)
	1,3-dinitrobenzene (68.9)
	5-nitro-o-toluidine (58.3)
	4-aminobiphenyl (64.0)
	pronamide (54.4)
	diphenylamine (52.9)

The continuing calibration, A6301,-02,-03,-04, 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).

613HP06501	1,4-naphthoquinone (93.5)
	kepone (119.1)

The continuing calibration, A6301,-02,-03,-04, 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).

613HP06501	aramite
	7,12-dimethylbenz(a)anthracene (95.7)
	hexachlorophene (71.7)

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
613CP06601 613CP06501	n-nitrosomethylethylamine (53.6) n-nitrosodiethylamine (52.0) 1-nitroso-piperidine (52.5) safrole (68.0) isosafrole (61.3) 1,4-naphthoquinone (87.7) 1,3-dinitrobenzene (66.2) 1-naphthylamine (64.4) 2-naphthylamine (75.8) 5-nitro-o-toluidine (78.6) 4-aminobiphenyl (75.6) pronamide (59.2) pentachloronitrobenzene (71.0) 3,3'-dimethylbenzidine (64.7) diphenylamine (54.0) 7,12-dimethylbenz(a)anthracene (83.5)	+/-	J/UJ
613CP06601 613CP06501	kepone (111.7)	+/-	J/UR
613CP06601 613CP06501	aramite hexachlorophene (64.0)	+/-	J/UR
613HP06501	2,6-dichlorophenol (53.0) 2-picoline (53.4) safrole (59.4) isosafrole (59.7) 1,3-dinitrobenzene (68.9) 5-nitro-o-toluidine (58.3) 4-aminobiphenyl (64.0) pronamide (54.4) diphenylamine (52.9)	+/-	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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	ANALYTE ID	DL	QL
613HP06501	1,4-naphthoquinone (93.5) kepone (119.1)	+/-	J/UR
613HP06501	aramite 7,12-dimethylbenz(a)anthracene (95.7) hexachlorophene (71.7)	+/-	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
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 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 # 27307C/D

A validation was performed on the Metals Data from SDG 27307C/D. 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
Barium	0.04 mg/kg	no impact
Beryllium	0.04 mg/kg	no impact
Lead	0.32 mg/kg	no impact
Nickel	0.16 mg/kg	no impact
Tin	5.3 mg/kg	all soil samples below 26.5 mg/kg

Barium	0.35 ug/l	no impact
Antimony	3.31 ug/l	no impact
Thallium	5.87 ug/l	no impact
Tin	19.8 ug/l	all water samples below 99.0 ug/l

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".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Aluminum	-2.20 mg/kg	no impact
Cobalt	-0.17 mg/kg	no impact
Vanadium	-0.10 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".

Field and Duplicate Analysis

Specific Finding

The RPDs for field duplicate samples (613SP06501 and 613CP06501) for Chromium (52%) and Potassium (54%) were greater than 50%. All positive results are qualified as estimated, "J".

The RPD for field duplicate samples (613SP06601 and 613CP06601) for Zinc (51%) was greater than 50%. All positive results are qualified as estimated, "J".

The RPDs for field duplicate samples (613HP06501 and 613GP06501) for Arsenic (67%), Barium (87%), Beryllium (78%), Zinc (58%), Vanadium (63%), Sodium (180%), Selenium (85%), Potassium (165%), Nickel (85%), Manganese (81%), Magnesium (180%), Lead (54%), Iron (56%), Copper (71%), Mercury (200%), Chromium (79%) and Cobalt (59%) were greater than 50%. All positive results are qualified as estimated, "J".

Serial Dilution

Specific Finding

The RPDs for waters for Barium, Calcium, Chromium, Iron, Nickel and Zinc 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 26.5 mg/kg	Sn.	+	U
All water samples below 99.0 ug/l	Sn.		
All water samples	Ba, Ca, Cr, Fe, NI and Zn.	+	J
613CP06501 and 613SP06501.	Cr and K.	+	J
613HP06501 and 613GP06501.	As, Ba, Be, Zn, V, Na, Se, K, Ni, Mn, Mg, Pb, Fe, Cu, Hg Cr and Co.		
613SP06601 and 613CP06601.	Zn.		
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27307B
Date:	November 22, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	October 12-15, 1996
Number of Samples:	8 Aqueous Sample(s) with 0 MS/MSD(s) 5 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, 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
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# 27307B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		TAL	
613GP06701	WATER	X		X		X	
613SP06601	SOIL		X		X		X
613GP06601	WATER	X		X		X	
613SP06501	SOIL		X		X		X
613D006501	WATER	X		X		X	
613E006501	WATER	X		X		X	
613TP06601	SOIL		X				
613TP06702	WATER	X					
613GP06501	WATER	X		X		X	
613SP06401	SOIL		X		X		X
613GP06401	WATER	X		X		X	
613TP06401	WATER	X					
613TPA6401	SOIL		X				
Total Billable Samples (Water/Soil)		8	5	6	3	6	3

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
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 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 # 27307B

A validation was performed on the Volatile Data from SDG 27307B. 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 I21777.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.

613SP06401 2-butanone (37.7%)

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	6 μg/Kg	6 μg/Kg
methylene chloride	5 μg/Kg	4 μg/Kg

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
VBLK1	613SP06601	methylene chloride	50 μg/Kg	U
	613SP06601	acetone	60 μg/Kg	U
VBLK2	613SP06501 613SP06401	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 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.

	613TP06401	613TPA6401	613TP06601	613TP06702
acetone	6 μg/L	7 μg/L	15 μg/L	7 μg/L
methylene chloride	-------	-------	7 μg/L	-------
chloroform	2 μg/L	-------	-------	2 μg/L
2-butanone	-------	-------	2 μg/L	-------
trichloroethene	-------	2 μg/L	-------	-------

Field QC Blanks, continued

Specific Finding

Blank	Samples	Compound	Action Level	Qualification
613TP06401	613GP06401	acetone	60 μg/L	CRQL
613TP06601	613GP06701 613GP06501	acetone	150 μg/L	U
	613GP06601	acetone	150 μg/L	CRQL
	613SP06601 613SP06501	2-butanone	10 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
613SP06401	2-butanone	+	J
613SP06601	methylene chloride	+B	U
613SP06601 613SP06501 613SP06401	acetone	+B	U
613GP06401	acetone	+	CRQL
613GP06701 613GP06501	acetone	+	U
613GP06601	acetone	+	CRQL
613SP06601 613SP06501	2-butanone	+	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 # 27307B

A validation was performed on the Semivolatile Data from SDG 27307B. 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, 10/21/96, contained compounds with %RSDs greater than 30% RSD. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J).

613SP06501	chrysene (39.7) benzo(k)fluoranthene (33.7)

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).

613GP06501 613GP06501RE	perylene-d_{12}

Method Blanks

Associated blank	Compound	Conc.	Action level
SBLK1	bis(2-ethylhexyl) phthalate	2J ug/L	20 ug/L

Samples	Compound	Qualification
613GP06701 613GP06501 613GP06501RE	bis(2-ethylhexyl) phthalate	U
613GP06601	bis(2-ethylhexyl) phthalate	CRQL

Surrogates

Specific Finding:

Sample 613GP06501RE, exhibited two base/neutral surrogates with surrogate recoveries that exceeded the QA/QC limits. Qualify all positive results as estimated (J).

Sample 613GP06401, exhibited acid surrogates with recoveries less than 10%. Qualify all positive results as estimated (J) and reject all non detects (UR).

Compound Identification/Quantitation

Specific Finding:

Reject all results for sample 613GP06501RE, due to non compliant internal standard areas and surrogate recoveries.

Reject all results for sample 613GP06401, due to 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
613SP06501	chrysene (39.7) benzo(k)fluoranthene (33.7)	+	J
613GP06501 613GP06501RE	All associated analytes perylene-d_{12}	+/-	J/UJ
613GP06701 613GP06501 613GP06501RE	bis(2-ethylhexyl) phthalate	+	U
613GP06601	bis(2-ethylhexyl) phthalate	+	CRQL
613GP06501RE	All results base/neutral fraction	+	J
613GP06401	All results acid fraction	+/-	J/UR
613GP06501RE	All results	+/-	UR
613GP06401	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
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 # 27307A/B

A validation was performed on the Metals Data from SDG 27307A/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
Beryllium	0.04 mg/kg	no impact
Lead	0.32 mg/kg	no impact
Nickel	0.14 mg/kg	no impact
Tin	5.3 mg/kg	all soil samples below 26.5 mg/kg
Barium	0.35 ug/l	no impact

Beryllium	0.48 ug/l	no impact
Thallium	5.87 ug/l	all water samples below 29.4 ug/l
Tin	19.8 ug/l	all water samples below 99.0 ug/l

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".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Aluminum	-2.20 mg/kg	no impact
Cobalt	-0.17 mg/kg	no impact
Silver	-0.14 mg/kg	all soil samples below 1.4 mg/kg
Vanadium	-0.10 mg/kg	no impact
Aluminum	-20.4 ug/l	no impact
Iron	-43.1 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 recoveries for soils for Manganese (26%) and Lead (13%) were below 30%. All non-detect results are rejected and all positive results are qualified as estimated, "J".

The Matrix Spike recoveries for soils for Antimony (51%), Arsenic (66%), Mercury (70%) and Zinc (66%) 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 Aluminum (35%), Arsenic (42%), Calcium (76%), Iron (52%) and Lead (44%) were greater than 35%. All positive results are qualified as estimated, "J". The RPDs for Manganese (29%), Vanadium (22%) and Zinc (22%) were not greater than 35% and will not be qualified.

The RPDs for field duplicate samples (613SP06501 and 613CP06501) for Chromium (52%) and Potassium (54%) were greater than 50%. All positive results are qualified as estimated, "J".

The RPD for field duplicate samples (613SP06601 and 613CP06601) for Zinc (51%) was greater than 50%. All positive results are qualified as estimated, "J".

The RPDs for field duplicate samples (613HP06501 and 613GP06501) for Arsenic (67%), Barium (87%), Beryllium (78%), Zinc (58%), Vanadium (63%), Sodium (180%), Selenium (85%), Potassium (165%), Nickel (85%), Manganese (81%), Magnesium (180%), Lead (54%), Iron (56%), Copper (71%), Mercury (200%), Chromium (79%) and Cobalt (59%) were greater than 50%. All positive results are qualified as estimated, "J".

Serial Dilution

Specific Finding

The RPDs for soils for Copper, Lead, Nickel and Zinc and for waters for Barium, Calcium, Chromium, Iron, Nickel and Zinc 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 26.5 mg/kg	Sn.	+	U
All water samples below 29.4 ug/l	Tl.		
All water samples below 99.0 ug/l	Sn.		
All soil samples below 1.4 mg/kg	Ag.	+/U	J/UJ
All soil samples	Mn and Pb.	+	J
		U	R
All soil samples	Sb, As, Hg and Zn.	+/U	J/UJ
All soil samples	Al, As, Ca, Fe and Pb.	+	J
All soil samples	Cu, Pb, Ni and Zn.	+	J
All water samples	Ba, Ca, Cr, Fe, NI and Zn.		
613CP06501 and 613SP06501.	Cr and K.	+	J
613HP06501 and 613GP06501.	As, Ba, Be, Zn, V, Na, Se, K, Ni, Mn, Mg, Pb, Fe, Cu, Hg Cr and Co.		
613SP06601 and 613CP06601.	Zn.		
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27338B
Date:	November 25, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	October 16, 1996
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, 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. Hopp 5 December 1996

for Paul B. Humburg, President Date

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

SDG# 27338B

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		TAL	
613SP06301	SOIL		X		X		X
613GP06301	WATER	X		X		X	
613TP06301	WATER	X					
Total Billable Samples (Water/Soil)		2	1	1	1	1	1

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
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 # 27338B

A validation was performed on the Volatile Data from SDG 27338B. 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 %Ds greater than 50% and less than 90% and 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).

613SP06301 2-chloroethyl vinyl ether (66.7%, 0.034)

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

Samples	Compound	Qualification
613SP06301	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
613SP06301	2-chloroethyl vinyl ether	+/-	J/UR
613SP06301	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 # 27338B

A validation was performed on the Semivolatile Data from SDG # 27338B. 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 overall system performance was acceptable. The laboratory did not encounter any large problems. The data reviewer estimates that none 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

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

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 # 27338A

A validation was performed on the Metals Data from SDG 27338. 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	2.92 ug/l	all water samples below 14.6 ug/l
Cobalt	1.07 ug/l	no impact
Copper	1.44 ug/l	no impact
Tin	3.36 ug/l	all water samples below 16.8 ug/l
Aluminum	4.96 mg/kg	no impact

Beryllium	0.04 mg/kg	no impact
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 extreme contamination for several elements. The reviewer does not believe that this contamination has impact on the data.

Matrix Spike recovery

Specific Finding

The Matrix Spike recoveries for waters for Arsenic (62%), Chromium (74%), Lead (48%) and Manganese (66%) 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 waters for Mercury (30%) was greater than 20%. All positive results are qualified as estimated, "J".

[illegible] Dilution

Specific Finding

The RPDs for waters for Calcium, 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.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
All water samples below 14.6 ug/l	Sb.	+	U
All water samples below 16.8 ug/l	Sn.		
All soil samples below 3.9 mg/kg	Sn.		
All water samples	As, Cr, Pb and Mn.	+/U	J/UJ
All water samples	Hg.	+	J
All water samples	Ca, Cr and Ni.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27389B
Date:	December 4, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	October 22, 1996
Number of Samples:	1 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, 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. Seaton
Paul B. Humburg, President

12/10/96
Date

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SDG# 27389B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL	
619SB01401	SOIL		X		X		X		X
619SB01402	SOIL		X		X		X		X
619TB01401	SOIL		X						
607SB00501	SOIL		X		X				X
607SB00502	SOIL		X		X				X
607SB00601	SOIL		X		X				X
607SB00801	SOIL		X		X				X
607SB00802	SOIL		X		X				X
607SB00901	SOIL		X		X				X
607SB00902	SOIL		X		X				X
607SB01001	SOIL		X		X				X
607SB01002	SOIL		X		X				X
607SB00701	SOIL		X		X				X
607SB00702	SOIL		X		X				X
607TB00701	WATER	X							
Total Billable Samples (Water/Soil)		1	14	0	13	0	2	0	13

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 # 27389B

A validation was performed on the Volatile Data from SDG 27389B. 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 the calibration criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, C22657.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).

607SB00702	carbon disulfide (35.4%)

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).

607SB01002	1,4-difluorobenzene chlorobenzene-d_5
607SB01002RE	bromochloromethane 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.

DATA ASSESSMENT AND NARRATIVE

VOLATILE ANALYSIS

Trip Blank

Associated blank	Compound	Concentration	Action Level
619TB01401	acetone	8J ug/kg	80 ug/kg
607TB00701	methylene chloride	11 ug/L	3600 ug/kg

Samples	Compound	Qualification
607SB00501 607SB01002 619SB01401	acetone	CRQL
607SB00502 607SB00601 607SB00701 607SB00702 607SB00801 607SB00802 607SB00901 607SB00902 607SB01001	acetone	U
607SB00502 607SB00601 607SB00801 607SB00802 607SB00901 607SB00902 619SB01402	methylene chloride	CRQL

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
607EB00701	acetone	26J ug/L	260 ug/L

Samples	Compound	Qualification
619SB01402	acetone	U

Field Blank

Associated blank	Compound	Concentration	Action Level
607DB00701	2-butanone	23J ug/L	230 ug/L

Samples	Compound	Qualification
607SB00801	2-butanone	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 low recoveries for toluene-d_8. Qualify all positive results as estimated (J) and non detects as estimated (UJ).

607SB01002 (78%)
607SB01002RE (75%)

Compound Identification /Quantitation

Specific Finding:

Reject sample 607SB01002RE, in favor of the initial analysis, due to non compliant surrogates and internal standards.

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
607SB00702	carbon disulfide	+	J
607SB01002	All associated compounds 1,4-difluorobenzene chlorobenzene-d_5	+/-	J/UJ
607SB01002RE	bromochloromethane 1,4-difluorobenzene chlorobenzene-d_5		
607SB00501 607SB01002 619SB01401	acetone	+	CRQL
607SB00502 607SB00601 607SB00701 607SB00702 607SB00801 607SB00802 607SB00901 607SB00902 607SB01001	acetone	+	U
607SB00502 607SB00601 607SB00801 607SB00802 607SB00901 607SB00902 619SB01402	methylene chloride	+	CRQL
619SB01402	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
Page 2

SAMPLE ID	COMPOUND ID	DL	QL
607SB00801	2-butanone	+	CRQL
607SB01002 607SB01002RE	all results	+/-	J/UJ
607SB01002RE	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 # 27389B

A validation was performed on the Semivolatile Data from SDG 27389B. 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, V15709.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 all non detects as estimated (UJ).

607SB00501RE	indeno(1,2,3-cd)pyrene (64.6%) dibenz(a,h)anthracene (65.7%) benzo(g,h,i) perylene (78.1%)

Internal Standards

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

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).

607SB00502	perylene-d_{12}
607SB00501	phenanthrene-d_{10} chrysene-d_{12} perylene-d_{12}
607SB00502RE	chrysene-d_{12}
607SB00501RE	perylene-d_{12}

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%.

Surrogates (continued)

Specific Finding:

Sample listed below exhibited high recoveries for the surrogates listed Qualify all positive results as estimated (J).

607SB00501	2-fluorobiphenyl (123%)
	terphenyl-d_{14} (195%)

Compound Identification /Quantitation

Reject sample 607SB00502RE, in favor of the initial analysis, due to non compliant internal standard area recoveries.

Reject sample 607SB00501, in favor of the re-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 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
607SB00501RE	indeno(1,2,3-cd)pyrene dibenz(a,h)anthracene benzo(g,h,i) perylene	+/-	J/UJ
	All associated compounds	+/-	J/UJ
607SB00502	perylene-d_{12}		
607SB00501	phenanthrene-d_{10} chrysene-d_{12} perylene-d_{12}		
607SB00502RE 607SB00501RE	chrysene-d_{12} perylene-d_{12}		
607SB00501	all results	+	J
607SB00502RE 607SB00501	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 # 27389B

A validation was performed on the Pesticide/Aroclor Data from SDG 27389B. 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

One (1) sample required qualification due to a non-compliant surrogate recovery.

Specific Finding

The positive results in the following sample are qualified as estimated, J/UJ, due to a non-compliant TCMX recovery below the QC limits.

Sample	Surrogate	%R
619SB01402	TCMX	28%

Compound Identification/Quantitation

One (1) sample exhibited column quantitation %Ds greater than 40%. Qualifications were required per the EnSafe guidelines.

Specific Findings

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
619SB01402	All Compounds	+/-	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

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 # 27389A

A validation was performed on the Metals Data from SDG 27389A. 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	2.27 mg/kg	no impact
Beryllium	0.04 mg/kg	no impact
Lead	0.30 mg/kg	no impact
Tin	2.03 mg/kg	all soil samples below 10.15 mg/kg
Zinc	0.85 mg/kg	no impact

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

Elements	Conc.	Samples affected
Beryllium	0.31 ug/l	all soil samples below 0.31 mg/kg
Calcium	18.7 ug/l	no impact
Chromium	1.0 ug/l	no impact
Copper	0.75 ug/l	no impact
Thallium	6.8 ug/l	no impact
Vanadium	2.8 ug/l	no impact
Zinc	7.6 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 10.15 mg/kg	Sn.	+	U
all soil samples below 0.31 mg/kg	Be.		
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27389A
Date:	December 4, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	October 22, 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, 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

12/10/96
Date

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

SDG# 27389A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
607EB00701	WATER	X		X		X		X		X		X		X		X		X	
607DB00701	WATER	X		X		X		X		X		X		X		X		X	
Total Billable Samples (Water/Soil)		2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	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 # 27389A

A validation was performed on the Volatile Data from SDG 27389A. 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 # 27389A

A validation was performed on the Semivolatile Data from SDG # 27389A. 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 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 # 27389A

A validation was performed on the Pesticide/Aroclor Data from SDG 27389A. 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 did not require qualifications. Only Field QC blanks 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

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 # 27389A

A validation was performed on the Organophosphorous Pesticide Data from SDG 27389A. 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 did not require qualifications. Only field QC blanks 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

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 # 26389A

A validation was performed on the Chlorinated Herbicides from SDG 26389A. 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 did not require qualifications. Only Field QC blanks 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

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 # 27389B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 27389B. 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.

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 # 27389

A validation was performed on the Dioxin/Furans Data from SDG 27389. 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.

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 - field QC only.

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the 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#:	27426B
Date:	December 4, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	October 25, 1996
Number of Samples:	1 Aqueous Sample(s) with 0 MS/MSD(s) 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:	Volatiles, Organophosphorus Pesticides, Herbicides

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

12/12/96

Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1222 · Fax (314) 936-1225

SDG# 27426B

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		OPP		HERB	
004SB00301	SOIL				X		X
004SB00302	SOIL				X		X
004SB00401	SOIL				X		X
004SB00402	SOIL				X		X
004SB00101	SOIL				X		X
004SB00102	SOIL				X		X
004SB00201	SOIL				X		X
004SB00202	SOIL				X		X
004TB00201	WATER	X					
Total Billable Samples (Water/Soil)		1	0	0	8	0	8

VOA= SW846 Volatiles
OPP= SW846 Organophosphorus Pesticides
HERB= SW846 Herbicides

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 CLP 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 # 27426B

A validation was performed on the Volatile Data from SDG 27426B. 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. 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 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; 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 # 27426B

A validation was performed on the Organophosphorous Pesticide Data from SDG 27426B. 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 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 # 27426B

A validation was performed on the Chlorinated Herbicide Data from SDG 27426B. 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.

Continuing Calibrations

Specific Finding

The continuing calibration standard, 7_002382D, exhibited non-compliant %Ds greater than 50% but less than 90% for four (4) compounds. For the following samples and compounds, all reported positive and non-detect results are qualified as estimated, J/UJ.

All samples	Silvex (52%)
	2,4,5-T (51%)
	Dinoseb (52%)
	2,4-DB (51%)

System Performance and Overall Assessment

The reviewer estimates that less than 40% 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
All Samples	Silvex	+/-	J/UJ
	2,4,5-T		
	Dinoseb		
	2,4-DB		

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the 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#:	27426A
Date:	December 4, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	October 25, 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, Herbicides, Organophosphorus Pesticides, 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 B. Jenkins

Paul B. Humburg, President

12/12/96
Date

4127 Plaza 94 South · St. Charles, MO 63304

SDG# 27426A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
004CB00201	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, 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 # 27426A

A validation was performed on the Volatile Data from SDG 27426A. 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 average RRFs that were not within continuing calibration criteria. Qualifications are required.

Continuing Calibration (continued)

Specific Finding:

the continuing calibration, UL217, 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).

004CB00201	isobutyl alcohol (0.017) 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
004TB00201	methylene chloride	4J ug/kg	40 ug/kg

Samples	Compound	Qualification
004CB00201	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
004CB00201	isobutyl alcohol 1,4-dioxane	+/-	J/UR
004CB00201	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 # 27426A

A validation was performed on the Semivolatile Data from SDG # 27426A. 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, A6831, -32, -34, -35, 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).

004CB00201	2,6-dichlorophenol (57.8%)
	hexachloropropene (62.8%)
	1,2,4,5-tetrachlorobenzene (58.1%)
	pentachlorobenzene (56.5%)
	methyl methanesulfonate (50.9%)
	n-nitrosomethylethylamine (57.8%)
	n-nitrosodiethylamine (52.0%)
	ethyl methanesulfonate (52.5%)
	acetophenone (50.6%)
	o-toludine (55.7%)
	o,o,o-triethyl phosphorothioate (51.5%)
	isosafrole (53.8%)
	1,4-naphthoquinone (51.9%)
	2-naphthylamine (54.1%)
	thionazin (63.2%)
	2-methyl-5-nitroaniline (78.8%)
	diallate (57.4%)
	dimethoate (72.4%)
	4-aminobiphenyl (53.5%)
	pronamide (53.4%)
	pentachloronitrobenzene (65.9%)
	disulfoton (64.9%)
	methyl parathion (72.8%)
	chlorobenzilate (75.0%)
	3,3'-dimethylbenzidine (81.3%)
	2-acetylaminofluorene (60.8%)
	4-nitroquinoline-1-oxide (53.7%)
	diphenylamine (77.96%)
	7,12-dimethylbenz(a)anthracene (89.5%)

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, A6831, -32, -34, -35, 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).

004CB00201	1,3-dinitrobenzene (94.2%)
	phorate (98.8%)
	famphur (123.2%)
	sulfotepp (123.4%)
	p-phenylenediamine (103.6%)

The continuing calibration, A6831, -32, -34, -35, 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).

004CB00201	hexachloropene (0.022)

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
004CB00201	2,6-dichlorophenol	+/-	J/UJ
	hexachloropropene		
	1,2,4,5-tetrachlorobenzene		
	pentachlorobenzene		
	methyl methanesulfonate		
	n-nitrosomethylethylamine		
	n-nitrosodiethylamine		
	ethyl methanesulfonate		
	acetophenone		
	o-toludine		
	o,o,o-triethyl phosphorothioate		
	isosafrole		
	1,4-naphthoquinone		
	2-naphthylamine		
	thionazin		
	2-methyl-5-nitroaniline		
	diallate		
	dimethoate		
	4-aminobiphenyl		
	pronamide		
	pentachloronitrobenzene		
	disulfoton		
	methyl parathion		
	chlorobenzilate		
	3,3'-dimethylbenzidine		
	2-acetylaminofluorene		
	4-nitroquinoline-1-oxide		
	diphenylamine		
	7,12-dimethylbenz(a)anthracene		

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the 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
004CB00201	1,3-dinitrobenzene phorate famphur sulfotepp p-phenylenediamine	+/-	J/UR
004CB00201	hexachloropene	+/-	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 # 27426A

A validation was performed on the Pesticide/PCB Data from SDG 27426A. 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.

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 the 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. 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 replaced with the results reported from the DL analysis for which results are present. All other results from the dilution are rejected, UR.

004CB00201

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

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and are 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) 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 less than 20% of the data required qualifications. The raw data for the CCV INDAL38V was not present in data package.

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
004CB00201	All E Flagged	+E	D
004CB00201DL	All except corresponding D flagged results	+/-	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

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 # 27426A

A validation was performed on the Organophosphorous Pesticide Data from SDG 27426A. 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 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 # 27426A

A validation was performed on the Chlorinated Herbicides from SDG 27426A. 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 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 # 27426

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 27426. The data was evaluated based on the following parameters for field duplicate sample.

*	•	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	0.03 mg/kg	no impact
Lead	0.22 mg/kg	no impact
Nickel	0.23 mg/kg	no impact
Tin	1.75 mg/kg	all soil samples below 8.75 mg/kg

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

Elements	Conc.	Samples affected
Beryllium	0.31 ug/l	all soil samples below 0.31 mg/kg
Calcium	18.7 ug/l	no impact
Chromium	1.0 ug/l	no impact
Copper	0.75 ug/l	no impact
Thallium	6.8 ug/l	no impact
Vanadium	2.8 ug/l	no impact
Zinc	7.6 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 8.75 mg/kg	Sn.	+	U
all soil samples below 0.31 mg/kg	Be.		
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 # 27426

A validation was performed on the Dioxin/Furans Data from SDG 27426. 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

Field Blanks

Sample ID	Congener ID	Blank Conc. pg/L	Sample Conc. ng/Kg	Quals
004-C-B002-01	1,2,3,6,7,8-HxCDD	7.37	1.52	U
	1,2,3,4,6,7,8-HpCDD	131	58.5	U
	OCDD	744	468	U
	1,2,3,4,7,8-HxCDF	2.29	2.9	U

System Performance and Overall Assessment

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
004-C-B002-01	1,2,3,6,7,8-HxCDD	+	U
	1,2,3,4,6,7,8-HpCDD	+	U
	OCDD	+	U
	1,2,3,4,7,8-HxCDF	+	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#:	27502B
Date:	January 6, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	November 4-11, 1996
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, Organophosphorus Pesticides, Total Dissolved Solids, Chloride, Sulfate, Metals, Chloride

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. Seaton

Paul B. Humburg, President

1/15/97

Date

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

SDG# 27502B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		TDS		CHL		SUL		TAL		CN	
109GW00101	WATER			X												X			
620GW00201	WATER	X		X												X			
620DW00201	WATER	X		X		X										X		X	
620EW00201	WATER	X		X		X										X		X	
620TW00201	WATER	X																	
GDFGW00101	WATER	X		X		X				X		X		X		X		X	
GDFGW01D01	WATER	X		X		X				X		X		X		X		X	
GDFTW01D01	WATER	X																	
620GW00101	WATER	X		X												X			
620TW00101	WATER	X																	
619GW00301	WATER	X		X		X		X								X			
619GW00201	WATER	X		X		X		X								X			
619GW00101	WATER	X		X		X		X								X			
GELGW00701	WATER	X		X												X			
GELGW00801	WATER	X		X												X			
GELGW00501	WATER	X		X												X			
GELTW00501	WATER	X																	
Total Billable Samples	(Water/Soil)	16	0	13	0	7	0	3	0	2	0	2	0	2	0	13	0	4	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
OPP= SW846 Organophosphorus Pesticides
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 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 # 27502B

A validation was performed on the Volatile Data from SDG 27502B. 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, K16493, 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).

GDFGW00101	2-chloroethyl vinyl ether (71.4)
GDFGW01D01	

The continuing calibration, K16543, 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).

619GW00301	2-chloroethyl vinyl ether (67.1)
619GW00201	
619GW00101	
GELGW00701	
GELGW00801	
GELGW00501	

The continuing calibration, R24801, 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).

620GW00201	2-chloroethyl vinyl ether (-81.3)

The continuing calibration, R24845, 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).

620GW00101	vinyl acetate (-55.5)

Method Blanks

Associated blank	Compound	Conc	Action level
VBLK3	acetone	8J ug/L	80 ug/L
VBLK4	acetone	13J ug/L	130 ug/L

Samples	Compound	Qualification
GDFGW00101 GDFGW01D01	acetone	CRQL
620GW00101	acetone	U

Trip Blanks

Associated blank	Compound	Conc	Action level
GELTW00501	methylene chloride	1J ug/L	10 ug/L

Samples	Compound	Qualification
GELGW00501	methylene chloride	CRQL

DI Blanks

Associated blank	Compound	Conc	Action level
620DW00201	acetone	7J ug/L	70 ug/L

Samples	Compound	Qualification
619GW00101 619GW00201	acetone	CRQL
619GW00301	acetone	U

Field Blanks

Associated blank	Compound	Conc	Action level
GELFW00501	methylene chloride	2J ug/L	20 ug/L
	acetone	9J ug/L	90 ug/L

Samples	Compound	Qualification
GELGW00501	methylene chloride	CRQL
GELGW00501 GELGW00701 GELGW00801	acetone	CRQL

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
GDFGW00101 GDFGW01D01	2-chloroethyl vinyl ether (71.4)	+/-	J/UR
619GW00301 619GW00201 619GW00101 GELGW00701 GELGW00801 GELGW00501	2-chloroethyl vinyl ether (67.1)	+/-	J/UR
620GW00201	2-chloroethyl vinyl ether (-81.3)	+/-	J/UJ
620GW00101	vinyl acetate (-55.5)	+/-	J/UJ
GDFGW00101 GDFGW01D01	acetone	+	CRQL
620GW00101	acetone	+	U
GELGW00501	methylene chloride	+	CRQL
619GW00101 619GW00201	acetone	+	CRQL
619GW00301	acetone	+	U
GELGW00501	methylene chloride	+	CRQL
GELGW00501 GELGW00701 GELGW00801	acetone	+	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 # 27502B

A validation was performed on the Semivolatile Data from SDG 27502B. 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, 11/18/96, contained compounds with %RSDs greater than 30% RSD. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J).

620GW00201 di-n-butylphthalate (32.0)

Method Blanks

Associated blank	Compound	Conc.	Action level
SBLK1	bis(2-ethylhexyl) phthalate	7J ug/L	70 ug/L

Samples	Compound	Qualification
620GW00201	bis(2-ethylhexyl) phthalate	CRQL

Rinseate Blanks

Associated blank	Compound	Conc.	Action level
607EW05D01	bis(2-ethylhexyl) phthalate	1J ug/L	10 ug/L

Samples	Compound	Qualification
620GW00101 GDFGW01D01	bis(2-ethylhexyl) phthalate	CRQL

Surrogates

Specific Finding:

Samples GDFGW01D01 and GDFGW01D01RE, exhibited acid surrogates with recoveries less than 10%. Qualify all positive results as estimated (J) and reject all non detects (UR).

Compound Identification/Quantitation

Specific Finding:

Reject all results for sample GDFGW01D01RE, due to 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

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
620GW00201	di-n-butylphthalate (32.0)	+	J
620GW00201	bis(2-ethylhexyl) phthalate	+	CRQL
620GW00101 GDFGW01D01	bis(2-ethylhexyl) phthalate	+	CRQL
GDFGW01D01 GDFGW01D01RE	All results acid fraction	+/-	J/UR
GDFGW01D01RE	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 # 27502B

A validation was performed on the Pesticide/Aroclor Data from SDG 27502B. 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 # 27502B

A validation was performed on the Organophosphorus Pesticide Data from SDG 27502B. 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, 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 # 27502A

A validation was performed on the Metals, Wet Chenmistry and Cyanide Data from SDG 27502A. 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	2.96 ug/l	all water samples below 14.8 ug/l
Calcium	33.6 ug/l	no impact
Cobalt	1.07 ug/l	all water samples below 5.35 ug/l
Copper	1.18 ug/l	all water samples below 5.9 ug/l
Selenium	3.78 ug/l	all water samples below 18.9 ug/l

Silver	5.28 ug/l	all water samples below 26.4 ug/l

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

Elements	Conc.	Samples affected
Barium	0.3 ug/l	no impact
Beryllium	0.31 ug/l	all water samples below 1.55 ug/l
Nickel	1.3 ug/l	all water samples below 6.5 ug/l
Zinc	9.1 ug/l	all water samples below 45.5 ug/l
Tin	13.5 ug/l	all water samples below 67.5 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 14.8 ug/l	Sb.	+	U
All water samples below 5.35 ug/l	Co.		
All water samples below 5.9 ug/l	Cu.		
All water samples below 18.9 ug/l	Se.		
All water samples below 26.4 ug/l	Ag.		
All water samples below 1.55 ug/l	Be.		
All water samples below 6.5 ug/l	Ni.		
All water samples below 45.5 ug/l	Zn.		
All water samples below 67.5 ug/l	Sn.		
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27502A
Date:	January 6, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	November 4-11, 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, Herbicdes, Dioxin/Furans, Organotins, Total Dissolved Solids, Chloride, Sulfate, 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

1/15/97
Date

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

SDG# 27502A

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		ORG		TDS		CHL		SUL		HCR		TAL		CN	
607EW05D01	WATER	X		X		X		X		X		X		X		X		X		X		X		X		X	
GELDW00501	WATER	X		X		X		X		X		X										X		X		X	
GELEW00501	WATER	X		X		X		X		X		X										X		X		X	
GELFW00501	WATER	X		X		X		X		X		X										X		X		X	
Total Billable Samples	(Water/Soi	4	0	4	0	4	0	4	0	4	0	4	0	1	0	1	0	1	0	1	0	4	0	4	0	4	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
ORG= SW846 Organotins
TDS= Total Dissolved Solids
CHL= Chloride
SUL= Sulfate
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 # 27502A

A validation was performed on the Volatile Data from SDG 27502A. 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. No qualification were required because, only field QC samples were analyzed in this SDG.

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

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, Appendix IX 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 # 27502A

A validation was performed on the Semivolatile Data from SDG 27502A. 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 include the following compounds in there calibration curve or continuing calibration, compounds carbazole, 3-methyl-cholanthrene and 1,2-dibromo-3-chloropropane. No qualification were required because, only field QC samples were analyzed 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 # 27502A

A validation was performed on the Pesticide/Aroclor Data from SDG 27502A. 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

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

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 # 27502A

A validation was performed on the Organophosphorus Pesticide Data from SDG 27502A. 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

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

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 # 27502A

A validation was performed on the Herbicide Data from SDG 27502A. 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

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

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 AND NARRATIVE

ORGANOTIN

General

The organic findings offered in this screening 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 for Organotin reported as components; 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 # 27502F

A validation was performed on the Organotin data from SDG 27502F. 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

This SDG contained field QC blanks only. No qualifications were required. The calibration calculations could not be verified based on the data as presented.

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, 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 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 # 27502B

A validation was performed on the Metals, Hexavalent Chromium, Wet chemistry and Cyanide Data from SDG 27502B. 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 # 27502

A validation was performed on the Dioxin/Furans Data from SDG 27502. 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. This SDG contained only field QC.

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#:	27594
Date:	December 17, 1996
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	November 12, 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 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:

for Kimberly S. Shapp — 20 December 1996

Paul B. Humburg, President — Date

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

SDG# 27594

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	P/P		OPP	
619SB00301	SOIL		X		X
619SB00302	SOIL		X		X
Total Billable Samples (Water/Soil)		0	2	0	2

P/P= SW846 Pesticide/PCB's
OPP= SW846 Organophosphorus Pesticides

DATA ASSESSMENT NARRATIVES

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 # 27594B

A validation was performed on the Pesticide/Aroclor Data from SDG 27594B. 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). 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.

The positive results reported in all samples which exhibited column quantitation differences greater than 70% and one (1) 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
ALL	All P > 70% And < 10X CRQL	+	U
ALL	All P > 70% And > 10X CRQL, > cal. range, or result of a 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

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 # 27594B

A validation was performed on the Organophosphorus Pesticide Data from SDG 27594B. 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#:	27598B
Date:	January 6, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	November 12-14, 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, 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. Scarpa
for Paul B. Humburg, President

1/17/97
Date

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

SDG# 27598B

Samples and Fractions Reviewed

Sample Identifications Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		GRO		DRO		TAL		CN		PH	
GELGW01101	WATER	X		X								X					
GELGW00601	WATER	X		X								X					
613GW00401	WATER	X		X								X					
GELGW01201	WATER	X		X								X					
GELGW01301	WATER	X		X								X					
GELGW01401	WATER	X		X				X		X		X					
GELTW01401	WATER	X															
GELTW01301	WATER	X															
SMEGW00301	WATER	X		X		X						X		X			
SMEGW00701	WATER	X		X		X						X		X			
SMEGW00501	WATER	X		X		X						X		X			
SMEGW00601	WATER	X		X		X						X		X			
SMETW00701	WATER	X															
617GW00101	WATER	X		X								X				X	
617TW00101	WATER	X															
Total Billable Samples (Water/Soil)		15	0	11	0	4	0	1	0	1	0	11	0	4	0	1	0

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

DATA ASSESSMENT NARRATIVES

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 # 27598B

A validation was performed on the Volatile Data from SDG 27598B. 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 criteria. Qualifications are required.

Continuing calibrations (continued)

Specific Finding:

The continuing calibration, K16543.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).

613GW00401	2-chloroethyl vinyl ether (0.023, 67.1%D)
GELGW01101	
GELGW00601	
GELGW01201	
GELGW01301	

The continuing calibration, K16573.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).

SMEGW00301	2-chloroethyl vinyl ether (0.024, 65.7%D)
SMEGW00701	
SMEGW00601	

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).

SMEGW00501	2-chloroethyl vinyl ether (0.021, 70.0%D)
GELGW01401	

The continuing calibration, K16632.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).

GELGW01401RE	2-chloroethyl vinyl ether (0.024, 65.7%D)
617GW00101	

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	methylene chloride	1500 ug/L	15000 ug/L
	acetone	1500 ug/L	15000 ug/L
VBLK6	methylene chloride	160 ug/L	1600 ug/L

Samples	Compound	Qualification
GELGW01401 GELGW01401RE	methylene chloride	CRQL
GELGW01401	acetone	U

Trip Blank

Associated blank	Compound	Concentration	Action Level
GELTW01401	acetone	7 ug/L	70 ug/L
617TW00101	methylene chloride	3 ug/L	30 ug/L
	acetone	8 ug/L	80 ug/L

Samples	Compound	Qualification
GELGW00601 GELGW01101 617GW00101	acetone	CRQL
GELGW01301 GELGW01401RE	acetone	U
617GW00101	acetone	CRQL

Trip Blank (continued)

Associated blank	Compound	Concentration	Action Level
SMETW00701	methylene chloride	2 ug/L	20 ug/L

Samples	Compound	Qualification
SMEGW00301 SMEGW00601 SMEGW00701	methylene chloride	CRQL
SMEGW00501	methylene chloride	U

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
GELEW00501	acetone	5 ug/L	50 ug/L

Samples	Compound	Qualification
SMEGW00301 SMEGW00601 SMEGW00701	acetone	CRQL
SMEGW00501	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 the surrogates listed. Qualify all positive results as estimated (J).

GELGW01401 (toluene-d_8 168%)

GELGW01401RE (toluene-d_8 144%, bromofluorobenzene 134%)

Compound Identification /Quantitation

Reject sample GELGW01401RE, in favor of the initial analysis, due to 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
613GW00401 GELGW01101 GELGW00601 GELGW01201 GELGW01301	2-chloroethyl vinyl ether	+/-	J/UR
SMEGW00301 SMEGW00701 SMEGW00601	2-chloroethyl vinyl ether	+/-	J/UR
SMEGW00501 GELGW01401	2-chloroethyl vinyl ether	+/-	J/UR
GELGW01401RE 617GW00101	2-chloroethyl vinyl ether	+/-	J/UR
GELGW01401 GELGW01401RE	methylene chloride	+	CRQL
GELGW01401	acetone	+	U
GELGW00601 GELGW01101 617GW00101	acetone	+	CRQL
GELGW01301 GELGW01401RE	acetone	+	U
617GW00101	acetone	+	CRQL
SMEGW00301 SMEGW00601 SMEGW00701	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

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
SMEGW00501	methylene chloride	+	U
SMEGW00301 SMEGW00601 SMEGW00701	acetone	+	CRQL
SMEGW00501	acetone	+	U
GELGW01401 GELGW01401RE	all results	+	J
GELGW01401RE	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 # 27598B

A validation was performed on the Semivolatile Data from SDG 27598B. 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
SBLK3	bis(2-ethylhexyl)phthalate	2 ug/L	20 ug/L

Samples	Compound	Qualification
617GW00101	bis(2-ethylhexyl)phthalate	CRQL

Compound Identification /Quantitation

Reject all E-flagged compounds in sample SMEGW00501, in favor of the D-flagged compounds in the diluted sample.

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
617GW00101	bis(2-ethylhexyl)phthalate	+	CRQL
SMEGW00501	all E-flagged compounds	+	UR
SMEGW00501DL	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 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 # 27598B

A validation was performed on the Pesticide/PCB Data from SDG 27598B. 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.

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# 27598

A validation was performed on the TPH (GRO) data from SDG 27598. 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 of 240%, which is above the QC limit. All reported positive results in the sample are qualified as estimated, J.

GELGW01401

DATA ASSESSMENT NARRATIVE
TPH - PURGEABLES (GRO)

Overall Performance

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
GELGW01401	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# 27598

A validation was performed on the TPH (DRO) data from SDG 27598. 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 sample GELGW01401. These results were not present on the spreadsheet results but were present on the Form I equivalent submitted by the laboratory. 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, 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 # 27598A/B

A validation was performed on the Metals, pH and Cyanide Data from SDG 27598A/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
Cadmium	0.18 mg/kg	no impact
Tin	1.89 mg/kg	all soil samples below 9.45 mg/kg
Beryllium	0.39 ug/l	all water samples below 1.95 ug/l
Chromium	1.12 ug/l	no impact
Copper	2.04 ug/l	all water samples below 10.2 ug/l

Silver	1.44 ug/l	all water samples below 7.2 ug/l
Thallium	3.82 ug/l	all water samples below 19.1 ug/l
Tin	5.97 ug/l	all water samples below 29.9 ug/l

The equipment and Rinsate blanks exhibited contamination for the following elements but had no 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".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Cobalt	-0.09 mg/kg	all soil samples below 0.9 mg/kg
Arsenic	-2.82 ug/l	all water samples below 28.2 ug/l
Cobalt	-1.66 ug/l	all water samples below 16.6 ug/l
Manganese	-1.39 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 Calcium (29%) 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 Mercury (71%), Cyanide (74%) and Sodium (72%) 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 waters for Aluminum (1045%), Arsenic (126%) and Lead (130%) were 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 waters for Iron (23%) was greater than 20%. All positive results are qualified as estimated, "J".

The RPDs for field duplicate samples (GELGW01201 and GELHW01201) for Aluminum (130%) and samples (SMEGW00701 and SMEHW00701) for Aluminum (54%), Calcium (83%), Manganese (86%) and Sodium (76%) were greater than 35%. All positive results are qualified as estimated, "J".

Serial Dilutions

Specific Finding

The Serial dilution for waters for Manganese 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 9.45 mg/kg	Sn.	+	U
All water samples below 1.95 ug/l	Be.		
All water samples below 10.2 ug/l	Cu.		
All water samples below 7.2 ug/l	Ag.		
All water samples below 19.1 ug/l	Tl.		
All water samples below 29.9 ug/l	Sn.		
All soil samples below 0.9 mg/kg	Co.		
All water samples below 28.2 ug/l	As.		
All water samples below 16.6 ug/l	Co.		
All water samples	Ca.	+	J
		U	R
All water samples	Hg, Cn and Na.	+/U	J/UJ
All water samples	Al, As and Pb.	+	J
All water samples	Fe.	+	J
All water samples	Mn.	+	J
GELGW/HW01201.	Al.	+	J
SMEGW/HW00701.	Al, Ca, Na and Mn.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27598A
Date:	January 6, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	November 12-13, 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, 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. Scarpos
for Paul B. Humburg, President

1/17/97
Date

4127 Plaza 94 South · St. Charles, MO 63304

SDG# 27598A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
GELHW01201	WATER	X		X		X		X		X		X		X		X		X	
SMEHW00701	WATER	X		X		X		X		X		X		X		X		X	
Total Billable Samples (Water/Soil)		2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	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 # 27598A

A validation was performed on the Volatile Data from SDG 27598A. 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, K16573.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).

GELHW01201	2-chloroethyl vinyl ether (0.024, 65.7%D)
SMEHW00701	acrolein (0.022)
	trans-1,4-dichloro-2-butene (0.048, 39.2%D)
	propionitrile (0.036, 29.4%D)
	isobutyl alcohol (0.001, 50.0%D)

The continuing calibration, K16573.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).

GELHW01201	dichlorodifluoromethane (81.3)
SMEHW00701	

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
GELTW01301	acetone	6 ug/L	60 ug/L
SMETW00701	methylene chloride	2 ug/L	20 ug/L

Samples	Compound	Qualification
GELHW01201	acetone	CRQL

Trip Blank (continued)

Associated blank	Compound	Concentration	Action Level
GELTW01301	acetone	6 ug/L	60 ug/L
SMETW00701	methylene chloride	2 ug/L	20 ug/L

Samples	Compound	Qualification
SMETW00701	methylene chloride	CRQL

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
GELFW00501	methylene chloride	2 ug/L	20 ug/L

Samples	Compound	Qualification
GELHW01201	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
GELHW01201 SMEHW00701	2-chloroethyl vinyl ether acrolein trans-1,4-dichloro-2-butene propionitrile isobutyl alcohol	+/-	J/UR
GELHW01201 SMEHW00701	dichlorodifluoromethane	+/-	J/UJ
GELHW01201	acetone	+	CRQL
SMETW00701	methylene chloride	+	CRQL
GELHW01201	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 # 27598A

A validation was performed on the Semivolatile Data from SDG # 27598A. 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, A7022, -23, -24, 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).

SMEHW00701	2-picoline (50.8%)
	1,3-dinitrobenzene (53.7%)
	2-methyl-5-nitroaniline (58.5%)
	methyl parathion (56.5%)
	famphur (73.8%)
	p-Phenylenediamine (50.2%)
	diphenylamine (62.8%)

The continuing calibration,A7022, -23, -24, 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).

SMEHW00701	sulfotepp (94.6%)
	n-nitrosodimethylamine (90.2%)
	pentachloronitrobenzene (93.2%)

The continuing calibration,A7022, -23, -24, 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).

SMEHW00701	aramite (0.043)
	hexachlorophene (0.025, 39.2%D)

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).

GELHW01201	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).

GELHW01201	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).

GELHW01201	aramite (0.041)
	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 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
SMEHW00701	2-picoline 1,3-dinitrobenzene 2-methyl-5-nitroaniline methyl parathion famphur p-Phenylenediamine diphenylamine	+/-	J/UJ
SMEHW00701	sulfotepp n-nitrosodimethylamine	+/-	J/UR
SMEHW00701	aramite hexachlorophene pentachloronitrobenzene	+/-	J/UR
GELHW01201	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
GELHW01201	famphur sulfotepp	+/-	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	COMPOUND ID	DL	QL
GELHW01201	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 # 27598A

A validation was performed on the Pesticide/PCB Data from SDG 27598A. 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.

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 # 27598A

A validation was performed on the Organophosphorus Pesticide Data from SDG 27598A. 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 # 27598A

A validation was performed on the Herbicide Data from SDG 27598A. 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 # 27598C

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 27598C. 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	0.39 ug/l	all water samples below 1.95 ug/l
Chromium	1.12 ug/l	all water samples below 5.6 ug/l
Copper	2.04 ug/l	all water samples below 10.2 ug/l
Silver	1.44 ug/l	all water samples below 7.2 ug/l
Thallium	3.82 ug/l	all water samples below 19.1 ug/l

Tin	5.97 ug/l	all water samples below 29.9 ug/l

The equipment and Rinsate blanks exhibited contamination for the following elements but had no 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".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Arsenic	-2.82 ug/l	all water samples below 28.2 ug/l
Cobalt	-1.66 ug/l	all water samples below 16.6 ug/l
Manganese	-1.39 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".

Field and Duplicate Analysis

Specific Finding

The RPDs for field duplicate samples (GELGW01201 and GELHW01201) for Aluminum (130%) and samples (SMEGW00701 and SMEHW00701) for Aluminum (54%), Calcium (83%), Manganese (86%) and Sodium (76%) 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 1.95 ug/l	Be.	+	U
All water samples below 10.2 ug/l	Cu.		
All water samples below 5.6 ug/l	Cr.		
All water samples below 7.2 ug/l	Ag.		
All water samples below 19.1 ug/l	Tl.		
All water samples below 29.9 ug/l	Sn.		
All water samples below 28.2 ug/l	As.		
All water samples below 16.6 ug/l	Co.		
GELGW/HW01201.	Al.	+	J
SMEGW/HW00701.	Al, Ca, Na and Mn.	+	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 # 27598

A validation was performed on the Dioxin/Furans Data from SDG 27598. 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.

Blanks - continued

Sample ID	Congener ID	Blank Conc. pg/L	Sample Conc. pg/L	Quals
GEL-H-W012-01	OCDD	22.621	306	NA
	2,3,4,6,7,8-HxCDF	2.834	2.75	U
	OCDF	11.602	3.45	U
SME-H-W007-01	OCDD	22.621	48.1	U
	2,3,4,6,7,8-HxCDF	2.834	2.46	U
	OCDF	11.602	2.09	U

Equipment Blanks

Sample ID	Congener ID	Blank Conc. pg/L	Sample Conc. pg/L	Quals
GEL-H-W012-01	1,2,3,4,6,7,8-HpCDD	3.67	7.13	U
	1,2,3,4,6,7,8-HpCDF	1.72	1.87	U
SME-H-W007-01	1,2,3,4,6,7,8-HpCDD	3.67	4.49	U

System Performance and Overall Assessment

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
GEL-H-W012-01	OCDD	+B	NA
	2,3,4,6,7,8-HxCDF	+B	U
	OCDF	+B	U
SME-H-W007-01	OCDD	+B	U
	2,3,4,6,7,8-HxCDF	+B	U
	OCDF	+B	U
GEL-H-W012-01	1,2,3,4,6,7,8-HpCDD	+	U
	1,2,3,4,6,7,8-HpCDF	+	U
SME-H-W007-01	1,2,3,4,6,7,8-HpCDD	+	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#:	27677B
Date:	January 16, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	November 18-19, 1996
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. Grayson

Paul B. Humburg, President

1/16/97

Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 935-1335

SDG# 27677B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
240GW00301	WATER	X		X				X			
240EW00301	WATER	X		X		X		X		X	
240DW00301	WATER	X		X		X		X		X	
613FW00301	WATER	X		X		X		X		X	
613GW00301	WATER	X		X				X			
613TW00301	WATER	X									
607GW00201	WATER	X		X				X			
607GW02I01	WATER	X		X				X			
607GW00601	WATER	X		X				X			
607GW00101	WATER	X		X				X			
607GW01I01	WATER	X		X				X			
607TW00201	WATER	X									
607GW00401	WATER	X		X				X			
607GW004I01	WATER	X		X				X			
607GW00301	WATER	X		X				X			
607GW03I01	WATER	X		X				X			
Total Billable Samples (Water/Soil)		16	0	14	0	3	0	14	0	3	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; 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 # 27677B

A validation was performed on the Volatile Data from SDG 27677B. 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, R25007.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).

607GW00201	vinyl acetate (76.3%)
607GW02I01	
607GW00601	
607GW01I01	

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
613TW00301	methylene chloride	7 ug/L	70 ug/L
607TW00201	tetrachloroethene	1 ug/L	10 ug/L

Samples	Compound	Qualification
240GW00301 613GW00301	methylene chloride	U
607GW00401 607GW01I01 607GW02I01	tetrachloroethene	CRQL
607GW00301	tetrachloroethene	U

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
240EW00301	methylene chloride	7 ug/L	70 ug/L

Samples	Compound	Qualification
607GW00101 607GW00301 607GW00401 607GW00601DL 607GW03I01 607GW04I01	methylene chloride	U

Field Duplicates

The sample 607GW00201 and duplicate sample 607HW00201, both exhibited positive results for acetone. When these results were compared the percent RPD exceeded the criteria of 30% for waters; therefore, qualify acetone results in 607GW00201 as estimated (J).

Compound Identification /Quantitation

Replace all E-flagged results in sample 607GW00601 with D-flagged results in sample 607GW00601DL.

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
607GW00201 607GW02I01 607GW00601 607GW01I01	vinyl acetate	+/-	J/UJ
240GW00301 613GW00301	methylene chloride	+	U
607GW00401 607GW01I01 607GW02I01	tetrachloroethene	+	CRQL
607GW00301	tetrachloroethene	+	U
607GW00101 607GW00301 607GW00401 607GW00601DL 607GW03I01 607GW04I01	methylene chloride	+	U
607GW00201	acetone	+	J
607GW00601	All E-flagged compounds	+	UR
607GW00601DL	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 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 # 27677B

A validation was performed on the Semivolatile Data from SDG 27677B. 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 607GW00601RE exceeded the extraction holding time criteria of seven (7) days by ten (10) days. Qualify all positive results as estimated (J) and non detects as estimated (UJ).

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, 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 all non detects as estimated (UJ).

240GW00301	2,4-dinitrophenol (52.4%)
613GW00301	

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%.

Specific Finding:

Sample listed below exhibited low recoveries for the surrogate listed Qualify all positive results, for that fraction, as estimated (J) and non detects as rejected (UR).

607GW0601	2-fluorophenol (5%)

Compound Identification /Quantitation

Reject sample 607GW00601, in favor of the reanalysis, due to 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
607GW00601RE	all results	+/-	J/UJ
240GW00301 613GW00301	2,4-dinitrophenol	+/-	J/UJ
607GW0601	all acid compounds	+/-	J/UR
607GW00601	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 # 27677B

A validation was performed on the Pesticide/Aroclor Data from SDG 27677B. 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

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 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 # 27677A

A validation was performed on the Metals and Cyanide Data from SDG 27677A. 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	23.8 ug/l	all water samples below 119 ug/l
Antimony	6.22 ug/l	all water samples below 31.1 ug/l
Cobalt	1.24 ug/l	all water samples below 6.2 ug/l
Silver	1.91 ug/l	all water samples below 9.55 ug/l
Thallium	3.4 ug/l	all water samples below 17.0 ug/l

Vanadium	0.81 ug/l	all water samples below 4.05 ug/l
Zinc	7.61 ug/l	all water samples below 38.1 ug/l
Cyanide	2.5 ug/l	no impact

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
Copper	-1.37 ug/l	all water samples below 13.7 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 31.1 ug/l	Sb.	+	U
All water samples below 119 ug/l	Al.		
All water samples below 6.2 ug/l	Co.		
All water samples below 9.55 ug/l	Ag.		
All water samples below 17.0 ug/l	Tl.		
All water samples below 4.05 ug/l	V.		
All water samples below 38.1 ug/l	Zn.		
All water samples below 0.65 ug/l	Hg.		
All water samples below 13.7 ug/l	Cu.	+/U	J/UJ
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27677A
Date:	January 16, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	November 19, 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. Searfoss

Paul B. Humburg, President

1/16/97

Date

4127 Plaza 94 South · St. Charles, MO 63304
(314) 936-1332 · Fax (314) 936-1325

SDG# 27677A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
607HW00201	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 # 27677A

A validation was performed on the Volatile Data from SDG 27677A. 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).

607HW00201	2-chloroethyl vinyl ether (0.018, 74.3%D) acrolein (0.023) propionitrile (0.045) isobutyl alcohol (0.004) 1,4-dioxane (0.002)

The continuing calibration, K16690.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).

607HW00201	acetone (26.4%)

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.

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
240EW00301	methylene chloride	7 ug/L	70 ug/L

Samples	Compound	Qualification
607HW00201	methylene chloride	U

Field Duplicates

The sample 607GW00201 and duplicate sample 607HW00201, both exhibited positive results for acetone. When these results were compared the percent RPD exceeded the criteria of 30% for waters; therefore, qualify acetone results in 607HW00201 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
607HW00201	2-chloroethyl vinyl ether acrolein propionitrile isobutyl alcohol 1,4-dioxane	+/-	J/UR
607HW00201	acetone	+	J
607HW00201	methylene chloride	+	U
607HW00201	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 # 27677A

A validation was performed on the Semivolatile Data from SDG # 27677A. 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, A7216, -17, -18, 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).

607HW00201	methyl methanesulfonate (65.6%)
	ethyl methanesulfonate (73.0%)
	2-picoline (54.7%)
	acetophenone (51.8%)
	o-toluidine (58.8%)
	safrole (56.7%)
	1,3-dinitrobenzene (73.9%)
	2-methyl-5-nitroaniline (67.3%)
	phorate (69.7%)
	dimethoate (54.1%)
	pentachloronitrobenzene (55.0%)
	disulfoton (51.0%)
	methyl parathion (66.7%)
	famphur (66.0%)
	diphenylamine (60.2%)
	sulfotep (54.7%)

The continuing calibration,A7216, -17, -18, 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).

607HW00201	hexachlorophene (0.035)

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
607HW00201	methyl methanesulfonate	+/-	J/UJ
	ethyl methanesulfonate		
	2-picoline		
	acetophenone		
	o-toluidine		
	safrole		
	1,3-dinitrobenzene		
	2-methyl-5-nitroaniline		
	phorate		
	dimethoate		
	pentachloronitrobenzene		
	disulfoton		
	methyl parathion		
	famphur		
	diphenylamine		
	sulfotep		
607HW00201	hexachlorophene	+/-	J/UR
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 # 27677A

A validation was performed on the Pesticide/Aroclor Data from SDG 27677A. 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 # 27677A

A validation was performed on the Organophosphorus Pesticide Data from SDG 27677A. 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 # 27677A

A validation was performed on the Herbicide Data from SDG 27677A. 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 # 27677B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 27677B. 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	23.8 ug/l	no impact
Antimony	6.22 ug/l	all water samples below 31.1 ug/l
Cobalt	1.24 ug/l	all water samples below 6.2 ug/l
Silver	1.91 ug/l	no impact
Thallium	3.4 ug/l	no impact

Vanadium	0.81 ug/l	all water samples below 4.05 ug/l
Zinc	7.61 ug/l	all water samples below 38.1 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
Copper	-1.37 ug/l	all water samples below 13.7 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 31.1 ug/l	Sb.	+	U
All water samples below 6.2 ug/l	Co.		
All water samples below 4.05 ug/l	V.		
All water samples below 38.1 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 13.7 ug/l	Cu.	+/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 # 27677

A validation was performed on the Dioxin/Furans Data from SDG 27677. 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
607-H-W002-01	OCDD	7.35	4.39	U
	2,3,4,6,7,8-HxCDF	6.45	3.07	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
617-H-W002-01	OCDD	+B	U
	2,3,4,6,7,8-HxCDF	+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

ANNOTATED FORM Is

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	28136B
Date:	February 17, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	January 9-10, 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:

for Kimberly S. Stopp
Paul B. Humburg, President

17 February 1997
Date

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

SDG# 28136B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL	
611TB00701	SOIL		X						
620TB00901	WATER	X							
611SB00501	SOIL				X				X
611SB00502	SOIL				X				X
611SB00601	SOIL				X				X
611SB00602	SOIL				X				X
611SB00701	SOIL				X				X
611SB00702	SOIL				X				X
620SB00701	SOIL				X		X		X
620SB00702	SOIL				X		X		X
620SB00801	SOIL				X		X		X
620SB00802	SOIL				X		X		X
620SB00901	SOIL				X		X		X
620SB00902	SOIL				X		X		X
Total Billable Samples (Water/Soil)		1	1	0	12	0	6	0	12

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 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 # 28136B

A validation was performed on the Volatile Data from SDG 28136B. 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 # 28136B

A validation was performed on the Semivolatile Data from SDG 28136B. 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, P11084, 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).

620SB00901	benzo(k)fluoranthene (35.5)

The continuing calibration, P11139, 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).

620SB00902	benzoic acid (-74.4)

Internal Standards

Specific Finding:

The Samples listed below, exhibited internal standard areas that exceeded the QA/QC limit. Qualify all associated positive results as estimated (J) and all non detects as estimated (UJ).

611SB00602	phenanthrene-d_{10} chrysene-d_{12} perylene-d_{12}
611SB00602RE 611SB00502DL	phenanthrene-d_{10}

Compound Identification/Quantitation

Specific Finding:

Reject all results for the sample 611SB00602, due to non compliant internal standard areas.

For sample 611SB00502, replace all E-flagged results with the D-flagged results from the diluted sample. For the diluted sample 611SB00502DL, reject all results except for the D-flagged results with corresponding E-flagged results in the original sample analysis.

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
620SB00901	benzo(k)fluoranthene (35.5)	+	J
620SB00902	benzoic acid (-74.4)	+/-	J/UJ
611SB00602	All associated compounds phenanthrene-d_{10} chrysene-d_{12} perylene-d_{12}	+/-	J/UJ
611SB00602RE 611SB00502DL	phenanthrene-d_{10}		
611SB00602	All results	+/-	UR
611SB00502	E-flagged results	+	D
611SB00502DL	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 # 28136B

A validation was performed on the Pesticide/Aroclor Data from SDG 28136B. 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 a non-compliant DCB recovery.

Specific Finding

The sample listed below exhibited a low DCB recovery and required qualifications. The positive results are qualified as estimated, J, and the non-detect results are qualified as estimated, UJ.

Sample ID	Surrogate	% Recovery
620SB00901	DCB-2	34%

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). 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. Two (2) samples were diluted to accurately quantitate target compounds.

Specific Findings

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

620SB00701
620SB00802

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.

Compound Identification/Quantitation, Continued

Specific Findings, Continued

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) 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
620SB00901	ALL	+/-	J/UJ
620SB00701 620SB00802	All E flagged	+	D
620SB00701DL 620SB00802DL	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 result of a 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
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 # 28136A

A validation was performed on the Metals Data from SDG 28136A. 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	1.65 mg/kg	all soil samples below 8.25 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	-3.58 mg/kg	no impact
Iron	-2.00 mg/kg	no impact
Vanadium	-0.09 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 Copper (0%) and Zinc (0%) were below 30%. All positive results are qualified as estimated, "J" and all non-detect results are rejected.

The Matrix Spike recovery for soils for Antimony (61%) was 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 Chromium (131%) was above the upper control limits (>125%). All positive results are qualified as estimated, "J".

Field and Duplicate Analysis

Specific Finding

The RPDs for laboratory duplicate results for soils for Arsenic (35%), Copper (52%) and Zinc (49%) were greater than 35%. All positive results are qualified as estimated, "J".

The RPD for field duplicate samples (611SB00701 and 611CB00701) for Nickel (190) was 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 8.25 mg/kg	Sn.	+	U
All soil samples	Cu and Zn.	+	J
		U	R
All soil samples	Sb.	+/U	J/UJ
All soil samples	Cr.	+	J
All soil samples	As, Cu and Zn.	+	J
611SB00701 and CB00701.	Ni.	+/U	J/UJ
All soil samples	Ni.	+	J
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	28136A
Date:	February 12, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	January 9-10, 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:

Kimberly S. Hopp
for Paul B. Humburg, President

17 February 1997
Date

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

SDG# 28136A

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
620EB00901	WATER	X		X		X		X		X		X		X		X		X	
620DB00901	WATER	X		X		X		X		X		X		X		X		X	
611CB00701	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 # 28136A

A validation was performed on the Volatile Data from SDG 28136A. 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, I2282.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).

611CB00701	isobutyl alcohol (0.006) 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.

Method Blank

Associated blank	Compound	Concentration	Action Level
VBLK2	methylene chloride	3 ug/Kg	30 ug/Kg

Samples	Compound	Qualification
611CB00701	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
611CB00701	isobutyl alcohol 1,4-dioxane	+/-	J/UR
611CB00701	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 # 28136A

A validation was performed on the Semivolatile Data from SDG 28136A. 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, A7705,-06,-07,-11, 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).

611CB00701	hexachloropropene (55.0)
	1,2,4,5-tetrachlorobenzene (66.5)
	pentachlorobenzene (53.7)
	2-picoline (62.5)
	o,o,o-triethyl phosphorothio (53.6)
	safrole (59.4)
	isosafrole (65.7)
	1,3-dinitrobenzene (62.2)
	1-naphthylamine (62.3)
	2-naphthylamine (51.5)
	thionazin (54.1)
	5-nitro-o-toluene (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% D. For the samples and non compliant compounds listed below, qualify all positive results as estimated (J) and reject all non detects (R).

611CB00701	pentachloronitrobenzene (90.2)
	famphur (122.8)
	sulfotepp (93.6)

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 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
611CB00701	hexachloropropene (55.0)	+/-	J/UJ
	1,2,4,5-tetrachlorobenzene (66.5)		
	pentachlorobenzene (53.7)		
	2-picoline (62.5)		
	o,o,o-triethyl phosphorothio (53.6)		
	safrole (59.4)		
	isosafrole (65.7)		
	1,3-dinitrobenzene (62.2)		
	1-naphthylamine (62.3)		
	2-naphthylamine (51.5)		
	thionazin (54.1)		
	5-nitro-o-toluene (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)		
611CB00701	pentachloronitrobenzene (90.2)	+/-	J/UR
	famphur (122.8)		
	sulfotepp (93.6)		
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 # 28136A

A validation was performed on the Pesticide/Aroclor Data from SDG 28136A. 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). 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

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
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 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 # 28136A

A validation was performed on the Organophosphorus Pesticide Data from SDG 28136A. 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 # 28136A

A validation was performed on the Herbicide Data from SDG 28136A. 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.

Initial Calibration

Initial calibration summaries for the sequence analyzed on 1/15/97 were not included in this data package. Only QC samples were associated with this sequence. These summary pages should be submitted for data completeness. 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

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 # 28136B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 28136B. 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	1.65 mg/kg	all soil samples below 8.25 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	-3.58 mg/kg	no impact
Iron	-2.00 mg/kg	no impact
Vanadium	-0.09 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".

Field and Duplicate Analysis

Specific Finding

The RPD for field duplicate samples (611SB00701 and 611CB00701) for Nickel (190) 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 8.25 mg/kg	Sn.	+	U
611SB00701 and CB00701.	Ni.	+/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 # 28136

A validation was performed on the Dioxin/Furans Data from SDG 28136. 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#:	28894
Date:	April 21, 1997
Client Name:	Ensafe/Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	March 19, 1997
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 III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Arsenic

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. Hoppe — Paul B. Humburg, President

25 April 1997
Date

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

SDG# 28894

Samples and Fractions Reviewed

Sample Identifications Analytical Fractions

ENSAFE ID	MATRIX	AS	
109SB00701	SOIL		X
109SB00801	SOIL		X
109SB00901	SOIL		X
Total Billable Samples (Water/Soil)		0	3

AS= SW846 Arsenic

DATA ASSESSMENT NARRATIVE
ARSENIC ONLY

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 # 28894

A validation was performed on the Arsenic Data from SDG 28894. 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.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL

Data stands as reported without qualification.

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:

for Kimberly S. Hoppe — 25 April 1997

Paul B. Humburg, President — 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

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	27713A
Date:	January 16, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	November 20, 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, Herbicides, Organophosphorus Pesticides, 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 S. Hopp
Paul B. Humburg, President

21 January 1997
Date

4127 Plaza 94 South · St. Charles, MO 63304

SDG# 27713A

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		OPP		HERB		D/F		HCR		TAL		CN	
607HW02D01	WATER	X		X		X		X		X		X		X		X		X	
613HW00101	WATER	X		X		X		X		X		X		X		X		X	
Total Billable Samples (Water/Soil)		2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	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 # 27713A

A validation was performed on the Volatile Data from SDG 27713A. 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).

613HW00101	2-chloroethyl vinyl ether (0.018, 74.3%D)
607HW02D01	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
613TW00501	methylene chloride	7 ug/L	70 ug/L

Samples	Compound	Qualification
607HW02D01	methylene chloride	U
613HW00101		

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
613HW00101 607HW02D01	2-chloroethyl vinyl ether acrolein propionitrile isobutyl alcohol 1,4-dioxane	+/-	J/UR
607HW02D01 613HW00101	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 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 # 27713A

A validation was performed on the Semivolatile Data from SDG # 27713A. 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 613HW00101RE exceeded the seven (7) day extraction holding time by fourteen (14) days. Qualify all positive results as estimated (J) and non detects as estimated (UJ).

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).

613HW00101	methyl methanesulfonate (66.6%)
607HW02D01	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).

613HW00101	aramite (0.044)
607HW02D01	hexachlorophene (0.028, 31.9%D)

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).

613HW00101	phenol-d_5 (0%)
	2-fluorophenol (0%)
	2,4,6-tribromophenol (1%)
613HW00101RE	phenol-d_5 (0%)
	2-fluorophenol (2%)
	2,4,6-tribromophenol (8%)

Compound Identification /Quantitation

Reject sample 613HW00101RE, in favor of the initial analysis, due to non compliant extraction holding time and non compliant surrogate recoveries.

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. 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

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 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 # 27713A

A validation was performed on the Pesticide/Aroclor Data from SDG 27713A. 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 calibration 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
613HW00101RE	all results	+/-	J/UJ
613HW00101 607HW02D01	methyl methanesulfonate ethyl methanesulfonate 2-picoline o-toluidine phorate diphenylamine	+/-	J/UJ
613HW00101 607HW02D01	aramite hexachlorophene	+/-	J/UR
613HW00101 613HW00101RE	all acid fraction compounds	+/-	J/UR
613HW00101RE	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

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 # 27713A

A validation was performed on the Herbicide Data from SDG 27713A. 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

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 # 27713A

A validation was performed on the Organophosphorus Pesticide Data from SDG 27713A. 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 # 27713A

A validation was performed on the Metals and Cyanide Data from SDG 27713A. 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
Antimony	4.43 ug/l	all water samples below 22.2 ug/l
Thallium	3.75 ug/l	all water samples below 18.8 ug/l
Zinc	8.36 ug/l	all water samples below 41.8 ug/l

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
Copper	-1.14 ug/l	all water samples below 11.4 ug/l

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 RPD for waters for samples (607GW02D01 and 607HW02D01) for Lead (200%) was greater than 30%. All positive and non-detect results are qualified as estimated, "J" or "UJ".

Serial Dilution

Specific Finding

The Serial Dilutions for waters for Barium (15%), Calcium (16%) and Iron (11%) 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 water samples below 22.2 ug/l	Sb.	+	U
All water samples below 18.8 ug/l	Tl.		
All water samples below 41.8 ug/l	Zn.		
All water samples below 11.4 ug/l	Cu.	+/U	J/UJ
(607GW02D01 and HW02D01)	Pb.	+/U	J/UJ
All water samples	Ba, Ca and Fe.	+	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 # 27713

A validation was performed on the Dioxin/Furans Data from SDG 27713. 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.

Sample ID	Congener ID	Blank Conc. pg/L	Sample Conc. pg/L	Quals
607-H-W02D-01	OCDD	11	19.9	U
613-H-W001-01	OCDD	11	49.8	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
607-H-W02D-01	OCDD	+B	U
613-H-W001-01	OCDD	+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#:	27713B
Date:	January 16, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	November 20-21, 1996
Number of Samples:	14 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
Paul B. Humburg, President

21 January 1997
Date

SDG# 27713B

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
613GW00501	WATER	X		X				X			
613GW00101	WATER	X		X				X			
607GW02D01	WATER	X		X				X			
607GW05D01	WATER	X		X				X			
613TW00501	WATER	X									
613GW02D01	WATER	X		X				X			
607GW00701	WATER	X		X				X			
607GW01D01	WATER	X		X				X			
607GW03D01	WATER	X		X				X			
607GW04D01	WATER	X		X				X			
SMEGW00101	WATER	X		X		X		X		X	
SMEGW00401	WATER	X		X		X		X		X	
SMEGW00801	WATER	X		X		X		X		X	
SMETW00801	WATER	X									
Total Billable Samples (Water/Soil)		14	0	12	0	3	0	12	0	3	0

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

DATA ASSESSMENT NARRATIVES

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

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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
613GW00501	2-chloroethyl vinyl ether	+/-	J/UR
613GW00101			
607GW02D01			
607GW05D01			
613GW02D01	2-chloroethyl vinyl ether	+/-	J/UR
607GW00701			
607GW01D01			
607GW03D01			
607GW04D01			
SMEGW00101			
SMEGW00401			
SMEGW00801			
607GW01D01	chloromethane	+	J
613GW00101	methylene chloride	+	U
613GW00501			
607GW02D01			
607GW05D01			
613GW00501	acetone	+	CRQL
607GW02D01			
607GW05D01			
607GW03D01			
607GW04D01			
613GW02D01			
SMEGW00101			
607GW00701	acetone	+	U
607GW01D01			
613GW02D01	methylene chloride	+	CRQL
607GW01D01	chloroform	+	CRQL
613GW02D01			

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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

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 # 27713B

A validation was performed on the Volatile Data from SDG 27713B. 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 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).

613GW00501	2-chloroethyl vinyl ether (0.018, 74.3%D)
613GW00101	
607GW02D01	
607GW05D01	

The continuing calibration, K16728.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).

613GW02D01	2-chloroethyl vinyl ether (0.018, 74.3%D)
607GW00701	
607GW01D01	
607GW03D01	
607GW04D01	
SMEGW00101	
SMEGW00401	
SMEGW00801	

The continuing calibration, K16728.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).

607GW01D01	chloromethane (30.5%)

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.

DATA ASSESSMENT AND NARRATIVE

VOLATILE ANALYSIS

Trip Blank

Associated blank	Compound	Concentration	Action Level
613TW00501	methylene chloride	7 ug/L	70 ug/L
	acetone	12 ug/L	120 ug/L
SMETW00801	acetone	4 ug/L	40 ug/L

Samples	Compound	Qualification
613GW00101 613GW00501 607GW02D01 607GW05D01	methylene chloride	U
613GW00501 607GW02D01 607GW05D01 607GW03D01 607GW04D01 613GW02D01 SMEGW00101	acetone	CRQL
607GW00701 607GW01D01	acetone	U

Rinseate Blank

Associated blank	Compound	Concentration	Action Level
240EW00301	methylene chloride	7 ug/L	70 ug/L
	chloroform	3 ug/L	30 ug/L

Samples	Compound	Qualification
613GW02D01	methylene chloride	CRQL
607GW01D01 613GW02D01	chloroform	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.

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 # 27713B

A validation was performed on the Semivolatile Data from SDG 27713B. 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 613GW00101RE exceeded the extraction holding time criteria of seven (7) days by nine (9) days. Qualify all positive results as estimated (J) and non detects as estimated (UJ).

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, M3501.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).

613GW02D01	2,4-dinitrophenol (50.1%)
607GW00701	
607GW01D01	
607GW03D01	
607GW04D01	
SMEGW00101	
SMEGW00401	

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).

613GW00101	phenol-d_5 (2%) 2-fluorophenol (1%) 2,4,6-tribromophenol (1%)
613GW00101RE	phenol-d_5 (1%) 2-fluorophenol (2%)

Compound Identification /Quantitation

Reject sample 613GW00101RE, in favor of the initial analysis, due to non compliant extraction holding times 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
613GW00101RE	all results	+/-	J/UJ
613GW02D01 607GW00701 607GW01D01 607GW03D01 607GW04D01 SMEGW00101 SMEGW00401	2,4-dinitrophenol	+/-	J/UJ
613GW00101 613GW00101RE	all acid fraction compounds	+/-	J/UR
613GW00101RE	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 # 27713B

A validation was performed on the Pesticide/Aroclor Data from SDG 27713B. 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 calibration 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
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 # 27713B

A validation was performed on the Metals, Hexavalent Chromium and Cyanide Data from SDG 27713B. 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
Antimony	4.43 ug/l	all water samples below 22.2 ug/l
Thallium	3.75 ug/l	all water samples below 18.8 ug/l
Zinc	8.36 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".

The preparation blank exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Copper	-1.14 ug/l	all water samples below 11.4 ug/l

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 RPD for waters for samples (607GW02D01 and 607HW02D01) for Lead (200%) was 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 22.2 ug/l	Sb.	+	U
All water samples below 18.8 ug/l	Tl.		
All water samples below 11.4 ug/l	Cu.	+/U	J/UJ
(607GW02D01 and HW02D01)	Pb.	+/U	J/UJ
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	29122
Date:	May 14, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone F
Date Sampled:	April 16, 1997
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:

for Kimberly S. Shopp
Paul B. Humburg, President

20 May 1997
Date

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

SDG# 29122

Samples and Fractions Reviewed

Sample Identifications | Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN	
6073006I01	WATER	X		X		X		X		X	
607T006I01	WATER	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 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 8260 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 # 29122B

A validation was performed on the Volatile Data from SDG 29122B. 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

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

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 # 29122B

A validation was performed on the Semivolatile Data from SDG 29122B. 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

Method Blanks

Associated blank	Compound	Conc.	Action level
SBLK1	bis(2-ethylhexyl) phthalate	2J ug/L	20 ug/L

Samples	Compound	Qualification
6073006101	bis(2-ethylhexyl) phthalate	CRQL

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
6073006101	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 # 29122B

A validation was performed on the Pesticide/Aroclor Data from SDG 29122B. 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 the aroclors or toxaphene. 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

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
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 # 29122

A validation was performed on the Metals and Cyanide Data from SDG 29122. 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.

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

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	ECZG02
Date:	June 9, 1998
Client Name:	EnSafe
Project/Site Name:	Charleston - Zone F & G
Date Sampled:	April 20-22, 1998
Number of Samples:	16 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Savannah Laboratories
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	EPA DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Volatiles, Semivolatiles, 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 is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Searles
for Paul B. Humburg, President

6-15-98.
Date

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

SDG# ECZG02

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		TAL	
FDSGW16A03	WATER	X		X		X	
FDSTW16A03	WATER	X					
FDSGW16B03	WATER	X		X		X	
FDSGW16C03	WATER	X		X		X	
003GW00105	WATER	X		X		X	
003TW00105	WATER	X					
003GW00205	WATER	X		X		X	
003HW00205	WATER	X		X		X	
003GW00305	WATER	X		X		X	
024GW00101	WATER	X		X		X	
024GW00201	WATER	X		X		X	
024TW00201	WATER	X					
024EW00201	WATER	X		X		X	
024DW00201	WATER	X		X		X	
024GW00301	WATER	X		X		X	
GELGW01405	WATER	X		X		X	
Total Billable Samples (Water/Soil)		16	0	13	0	13	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
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 8260; the National Functional Guidelines for Organic Data Review, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # ECZG02

A validation was performed on the Volatile Data from SDG ECZG02. 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 Calibration

The continuing calibration, BQ230, 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).

FDS-G-W16C-03	bromomethane (50.4%)
FDS-G-W16B-03	
024-G-W003-01	
024-G-W002-01	
003-G-W001-05	
003-G-W003-05	

The continuing calibration, BQ245, 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).

024-G-W001-01	tetrachloroethene (33.2%)

The continuing calibration, BQ245, 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).

GEL-G-W014-05	carbon disulfide (85.9%)
003-G-W002-05	
003-H-W002-05	
024-G-W001-01	
FDS-G-W16A-03	

System Performance and Overall Assessment

The data as presented requires qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 10X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
FDS-G-W16C-03	bromomethane	+/-	J/UJ
FDS-G-W16B-03			
024-G-W003-01			
024-G-W002-01			
003-G-W001-05			
003-G-W003-05			
024-G-W001-01	tetrachloroethene	+	J
GEL-G-W014-05	carbon disulfide	+/-	J/UJ
003-G-W002-05			
003-H-W002-05			
024-G-W001-01			
FDS-G-W16A-03			

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the 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 8270; the National Functional Guidelines for Organic Data Review, and DQO Level III. All comments made within this report should be considered when examining the analytical results.

SDG # ECZG02

A validation was performed on the Semivolatile Data from SDG ECZG02. 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 calibration, KQ090, 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).

FDS-G-W16C-03	2,4-dinitrophenol (52.3%)
FDS-G-W16B-03	4,6-dinito-2-methylphenol (85.1%)
024-G-W003-01	
024-G-W002-01	
003-G-W001-05	
003-G-W003-05	
GEL-G-W014-05	
003-G-W002-05	
003-H-W002-05	
024-G-W001-01	

The continuing calibration, KQ095, 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).

FDS-G-W16A-03	4,6-dinito-2-methylphenol (66.0%)

System Performance and Overall Assessment

The data as presented requires qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

METHOD BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.
U =	The sample result for the blank contaminant is greater than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.
No Action =	The sample result for the blank contaminant is greater than the sample CRQL and is greater than 10X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID	COMPOUND ID	DL	QL
FDS-G-W16C-03	2,4-dinitrophenol	+/-	J/UJ
FDS-G-W16B-03	4,6-dinito-2-methylphenol		
024-G-W003-01			
024-G-W002-01			
003-G-W001-05			
003-G-W003-05			
GEL-G-W014-05			
003-G-W002-05			
003-H-W002-05			
024-G-W001-01			
FDS-G-W16A-03	4,6-dinito-2-methylphenol	+/-	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

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 SW846 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.

SDGs # ECZG02

A validation was performed on the Metals Data from SDG ECZG02. 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

The preparation blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Beryllium	0.21 ug/l	all water samples below 1.05 ug/l
Iron	16.2 ug/l	no impact
Magnesium	10.5 ug/l	no impact
Potassium	17.9 ug/l	no impact
Selenium	5.29 ug/l	no impact
Zinc	2.05 ug/l	all water samples below 10.1 ug/l

The calibration blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Barium	1.4 ug/l	no impact
Calcium	15.2 ug/l	no impact
Chromium	0.9 ug/l	all water samples below 4.5 ug/l
Copper	1.8 ug/l	all water samples below 9.0 ug/l
Iron	30.8 ug/l	no impact
Magnesium	22.4 ug/l	no impact
Manganese	1.3 ug/l	no impact
Thallium	6.2 ug/l	no impact
Vanadium	1.6 ug/l	all water samples below 8.0 ug/l

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

The preparation and calibration blanks exhibited negative bias for the following elements.

Elements	Conc.	Samples affected
Aluminum	-15.6 ug/l	all water samples below 156 ug/l
Silver	-1.51 ug/l	all water samples below 15.1 ug/l
Sodium	-6.08 ug/l	no impact

This reviewer qualifies all samples results below ten times the negative bias as estimated, "J" or "UJ".

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B". Value is below the CRDL but greater than the IDL.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
all water samples below 1.05 ug/l	Be.	+	U
all water samples below 4.5 ug/l	Cr.		
all water samples below 8.0 ug/l	V.		
all water samples below 10.1 ug/l	Zn.		
all water samples below 156 ug/l	Al.	+/U	J/UJ
all water samples below 15.1 ug/l	Ag.		
all "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	36147
Date:	December 16, 1998
Client Name:	Ensafe
Project/Site Name:	Charleston Zone F
Date Sampled:	October 27 & 28, 1998
Number of Samples:	5 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data, February, 1994
QA/QC Level:	DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	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 is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Searson
for Paul B. Humburg, President

12-17-98.
Date

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

SDG# 36147

Samples and Fractions Reviewed

Sample Identifications Analytical Fraction

ENSAFE ID	MATRIX	MET	
FDSGW16A04	WATER	X	
FDSEW16A04	WATER	X	
FDSDW16A04	WATER	X	
FDSGW16B04	WATER	X	
FDSGW16C04	WATER	X	
Total Billable Samples (Water/Soil)		5	0

MET= SW846 Metals

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.

SDGs # 36147

A validation was performed on the Metals Data from SDG 36147. 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

The preparation blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Antimony	3.21 ug/l	no impact
Calcium	117 ug/l	no impact
Mercury	0.14 ug/l	all water samples below 0.7 ug/l
Thallium	3.61 ug/l	all water samples below 18.0 ug/l
Zinc	8.0 ug/l	all water samples below 40.0 ug/l
Tin	16.8 ug/l	all water samples below 84.0 ug/l

The field blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Calcium	95.2 ug/l	no impact
Chromium	0.81 ug/l	all water samples below 4.1 ug/l
Magnesium	51.5 ug/l	no impact
Mercury	0.19 ug/l	no impact
Sodium	85.2 ug/l	no impact
Tin	6.1 ug/l	no impact
Zinc	6.7 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".

All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B". Value is below the CRDL but greater than the IDL.

SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
all water samples below 4.1 ug/l	Cr.	+	U
all water samples below 0.7 ug/l	Hg.		
all water samples below 18.0 ug/l	Tl.		
all water samples below 40.0 ug/l	Zn.		
all water samples below 84.0 ug/l	Sn.		
all "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	29707
Date:	July 18, 1997
Client Name:	Ensafe/Allen & Hoshall
Project/Site Name:	Charleston Zone G
Date Sampled:	June 13, 16, 17, 1997
Number of Samples:	17 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	Southwest Laboratory of Oklahoma, Inc.
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, Chloride, Total Dissolved Solids, Sulfate

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. Seerfoss
for Paul B. Humburg, President

7-18-97
Date

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

SDG# 29707

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN		CL		TDS		SUL	
FDSGW07D02	WATER	X		X		X		X									
FDSGW13B02	WATER	X		X		X		X									
FDSGW13E02	WATER	X		X		X		X									
FDSGW14C02	WATER	X		X		X		X									
FDSGW15A02	WATER	X		X		X		X									
FDSTW15A02	WATER	X															
FDSGW15B02	WATER	X		X		X		X									
FDSGW15C02	WATER	X		X		X		X									
FDSTW15C02	WATER	X															
FDSGW16B02	WATER	X		X		X		X									
FDSEW16B02	WATER	X		X		X		X		X		X		X		X	
FDSFW16B02	WATER	X		X		X		X		X		X		X		X	
FDSDW16B02	WATER	X		X		X		X		X		X		X		X	
FDSGW16C02	WATER	X		X		X		X									
FDSGW17A02	WATER	X		X		X		X									
FDSGW17B02	WATER	X		X		X		X									
FDSTW17B02	WATER	X															
Total Billable Samples (Water/Soil)		17	0	14	0	14	0	14	0	3	0	3	0	3	0	3	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
TAL= SW846 Metals
CN= SW846 Cyanide
CL= Chloride
TDS= Total Dissolved Solids
SUL= Sulfate

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 8260A; the National Functional Guidelines for Organic Data Validation, February 1994, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 29707B

A validation was performed on the Volatile Data from SDG 29707B. 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 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 (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

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, 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 # 29707B

A validation was performed on the Semivolatile Data from SDG 29707B. 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

Three (3) of the method blanks associated with samples in this SDG exhibited contamination. Several 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

Associated Blank	Compound	Conc.	Action Level
SBLK1	bis(2-ethylhexyl)phthalate	2J μg/L	20 μg/L
SBLK2	bis(2-ethylhexyl)phthalate	1J μg/L	10 μg/L
SBLK3	bis(2-ethylhexyl)phthalate	5J μg/L	50 μg/L

Samples	Compound	Qualification
FDSGW13E02	bis(2-ethylhexyl)phthalate	CRQL
FDSGW14C02		
FDSGW17A02		
FDSGW17B02		
FDSGW16B02		
FDSGW16C02		
FDSGW15B02		

System Performance and Overall Assessment

The data required qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

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
FDSGW13E02	bis(2-ethylhexyl)phthalate	+B	CRQL
FDSGW14C02			
FDSGW17A02			
FDSGW17B02			
FDSGW16B02			
FDSGW16C02			
FDSGW15B02			

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the 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, 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 # 29707B

A validation was performed on the Pesticide/Aroclor Data from SDG 29707B. 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
METALS, CYANIDE AND WET CHEMISTRY

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 Appendix IX 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 # 29707

A validation was performed on the Metals, Cyanide and Wet Chemistry Data from SDG 29707. 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

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Sodium	30.9 ug/l	no impact
Thallium	5.87 ug/l	all water samples below 29.4 ug/l
Zinc	6.29 ug/l	all water samples below 31.5 ug/l

The calibration blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Aluminum	11.6 ug/l	all water samples below 58.0 ug/l

The field QC blanks exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Antimony	2.0 ug/l	all water samples below 10.0 ug/l
Barium	0.79 ug/l	no impact
Beryllium	0.24 ug/l	all water samples below 1.2 ug/l
Calcium	1380 ug/l	no impact
Iron	47.0 ug/l	no impact
Magnesium	733 ug/l	no impact
Manganese	3.2 ug/l	no impact
Sodium	96.3 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".

"B" Qualifier

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 58.0 ug/l	Al.	+	U
All water samples below 10.0 ug/l	Sb.		
All water samples below 1.2 ug/l	Be.		
All water samples below 29.4 ug/l	Tl.		
All "B" results	all analytes	B	J

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	29767
Date:	July 22, 1997
Client Name:	Ensafe/ Allen & Hoshall
Project/Site Name:	Charleston - Zone G
Date Sampled:	June 18, 1997
Number of Samples:	8 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, Total Dissolved Solids, Chlorides, Sulfates

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. Scarfoss
for Paul B. Humburg, President

7-22-97
Date

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

SDG# 29767

Samples and Fractions Reviewed

Sample Identifications — Analytical Fractions

ENSAFE ID	MATRIX	VOA		SVOA		P/P		TAL		CN		TDS		CHL		SUL	
FDSGW16A02	WATER	X		X		X		X									
FDSGW18A02	WATER	X		X		X		X									
GDGGW00102	WATER	X		X		X		X		X		X		X		X	
GDGGW00202	WATER	X		X		X		X		X		X		X		X	
GDGGW01D02	WATER	X		X		X		X		X		X		X		X	
GDGGW02D02	WATER	X		X		X		X		X		X		X		X	
003GW00302	WATER					X		X									
GDGTW02D02	WATER	X															
Total Billable Samples (Water/Soil)		7	0	6	0	7	0	7	0	4	0	4	0	4	0	4	0

VOA= SW846 Volatiles
SVOA= SW846 Semivolatiles
P/P= SW846 Pesticide/PCB's
TAL= SW846 Metals
CN= SW846 Cyanide
TDS= SW846 Total Dissolved Solids
CHL= SW846 Chlorides
SUL= SW846 Sulfates

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 8260A; the National Functional Guidelines for Organic Data Validation, February 1994, and DQO Level III requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

SDG # 29767B

A validation was performed on the Volatile Data from SDG 29767B. 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 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 (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

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, 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 # 29767B

A validation was performed on the Semivolatile Data from SDG 29767B. 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.

Holding Times

The following samples were re-extracted six (6) days outside the extraction holding time for water samples. All positive and non-detect results are qualified as estimated, J/UJ.

FDSGW16A02RE
GDGGW00202RE

Method Blanks

One (1) of the method blanks associated with samples in this SDG exhibited contamination. Several 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.

Associated Blank	Compound	Conc.	Action Level
SBLK1	bis(2-ethylhexyl)phthalate	2J μg/L	20 μg/L

Samples	Compound	Qualification
GDGGW00102 GDGGW00202 GDGGW02D02 FDSGW18A02 FDSGW16A02	bis(2-ethylhexyl)phthalate	CRQL
GDGGW01D02	bis(2-ethylhexyl)phthalate	U

Surrogate Recoveries

The following sample exhibited acid fraction surrogate recoveries which were below 10%. All reported positive results are qualified as estimated, J, and the non-detect results are rejected, UR, for the acid fraction compounds.

Sample	Surrogate	%R
GDGGW02D02	phenol-d5	1%
	2-fluorophenol	1%
	2,4,6-tribromophenol	2%

Compound Quantitation

For the following samples and compounds, the noted analysis is not used in favor of the results reported from the RE or original analysis due to improved or similar surrogate recoveries:

FDSGW16A02 FDSGW00202	Acid Fraction Compounds
FDSGW16A02RE FDSGW00202RE	Base/Neutral Fraction Compounds
FDSGW18A02RE FDSGW00102RE FDSGW02D02RE	All Compounds

System Performance and Overall Assessment

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 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
FDSGW16A02RE GDGGW00202RE	All Compounds	+/-	J/UJ
GDGGW00102 GDGGW00202 GDGGW02D02 FDSGW18A02 FDSGW16A02	bis(2-ethylhexyl)phthalate	+B	CRQL
GDGGW01D02	bis(2-ethylhexyl)phthalate	+B	U
GDGGW02D02	Acid Fraction Compounds	+/-	J/UR
FDSGW16A02 GDGGW00202	Acid Fraction Compounds	+/-	Not Used
FDSGW16A02RE GDGGW00202RE	Base/Neutral Compounds	+/-	Not Used
FDSGW18A02RE GDGGW00102RE GDGGW02D02RE	All Compounds	+/-	Not Used

* DL denotes the Form I qualifier supplied by the laboratory
QL denotes the qualifier used by the data validation firm
\+ in the DL column denotes a positive result
\- in the DL column denotes a non detect result

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, 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 # 29767B

A validation was performed on the Pesticide/Aroclor Data from SDG 29767B. 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
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 Appendix IX 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 # 29767

A validation was performed on the Metals, wet chemistry and Cyanide Data from SDG 29767. 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

The preparation blank exhibited contamination for the following elements.

Elements	Conc.	Samples affected
Beryllium	0.32 ug/l	all water samples below 1.6 ug/l
Iron	21.2 ug/l	no impact
Manganese	0.41 ug/l	no impact
Thallium	7.82 ug/l	all water samples below 39.1 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
Aluminum	-14.0 ug/l	all water samples below 140 ug/l
Nickel	-0.79 ug/l	all water samples below 7.9 ug/l

This reviewer qualifies all samples results below ten times the negative bias as estimated, "J" or "UJ".

Serial Dilution Results

The serial dilutions for waters for Aluminum and Sodium were greater than 10%. All positive results are qualified as estimated, "J".

"B" Qualifier

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 1.6 ug/l	Be.	+	U
All water samples below 39.1 ug/l	Tl.		
All water samples below 140 ug/l	Al.	+/U	J/UJ
All water samples below 7.9 ug/l	Ni.		
All water samples	Al and Na.	+	J
All "B" results	all analytes	B	J