N00639.AR.000954
NSA MID SOUTH
5090.3a

PRELIMINARY RISK EVALUATION FOR YOUTH SPORTS FIELD MILLINGTON SUPPACT TN

12/3/2001

ENSAFE

Preliminary Risk Evaluation

NSA Mid-South — Millington, Tennessee
Youth Sports Field

Revision: 0

Prepared for:

NSA Mid-South
Millington, Tennessee

Prepared by:

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

December 3, 2001

Preliminary Risk Evaluation

NSA Mid-South — Millington, Tennessee
Youth Sports Field

Revision: 0

Prepared for:

NSA Mid-South
Millington, Tennessee

Prepared by:

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

December 3, 2001

Table of Contents

List of Figures

List of Tables

List of Appendices

1.0 INTRODUCTION

This preliminary risk evaluation (PRE) has been conducted to determine whether soil at the site of 12 former housing units at the southwest corner of Mears Street and Hutchins Road would pose an unacceptable risk to future site workers or recreational users. The site workers will construct a baseball field on the property for the children who will use the youth sports field. A vicinity map for the proposed youth sports field is shown in Figure 1. Additionally, this investigation sought to confirm the presence of seven underground heating-oil tanks between several former housing units and a potential petroleum release from the tanks. EnSafe visited the site from October 30 to November 1, 2001, to collect soil samples as outlined in the *Sampling Work Plan — Proposed Youth Sports Field, Naval Support Activity (NSA) Mid-South, Millington, Tennessee* (EnSafe, 2001). The contaminants of interest are pesticides, specifically chlorinated and organophosphorus pesticides, which may have been routinely used for pest control, and extractable petroleum hydrocarbons (EPHs) from any petroleum release(s). The former housing units, which were on the eastern portion of the NSA Mid-South Southside (Figure 1), were constructed on four or five concrete footing piers and demolished prior to 1996. The 12 units, 1003 to 1009 and 1029 to 1033, and the seven suspected UST locations are shown on Figure 2.

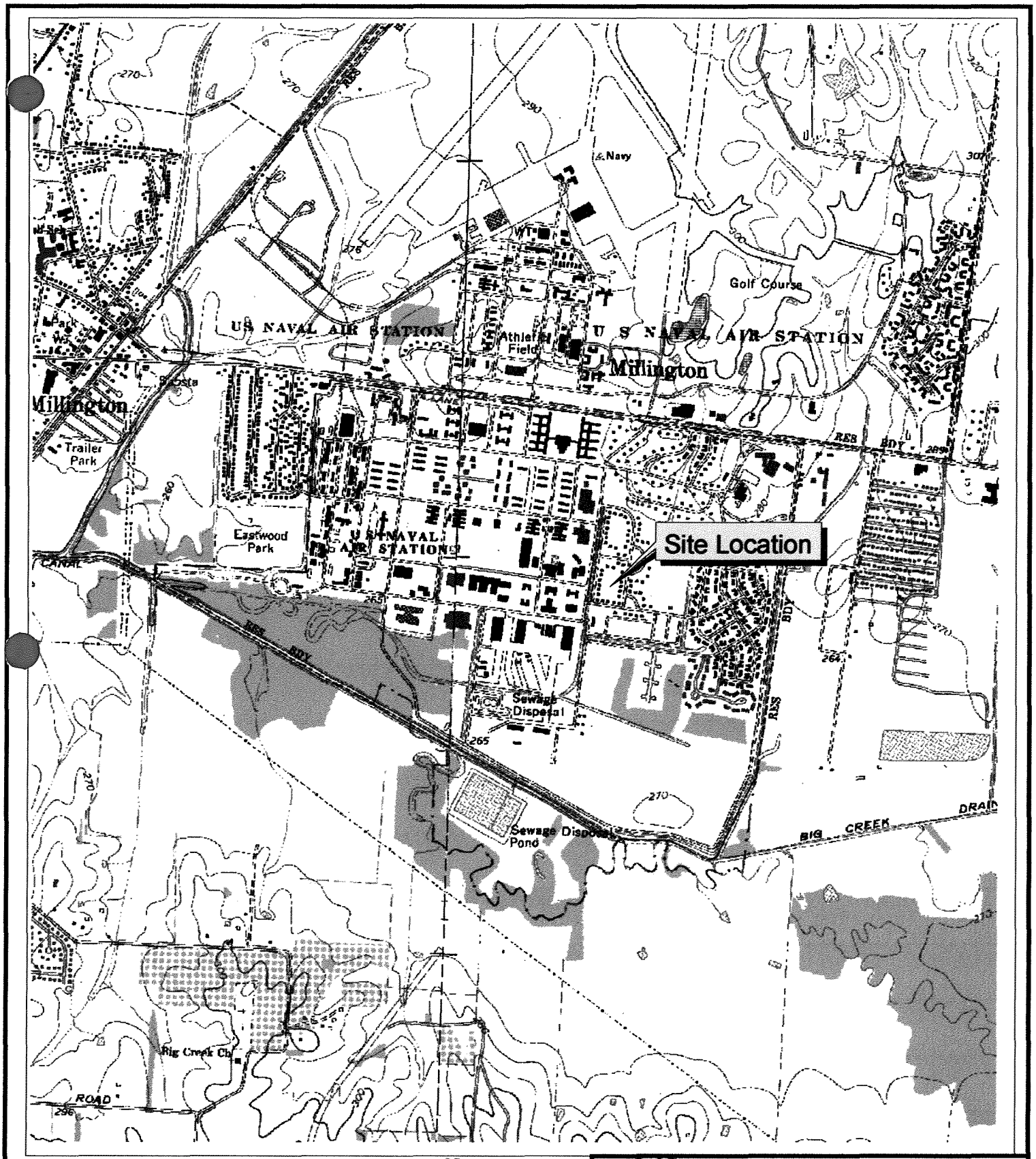
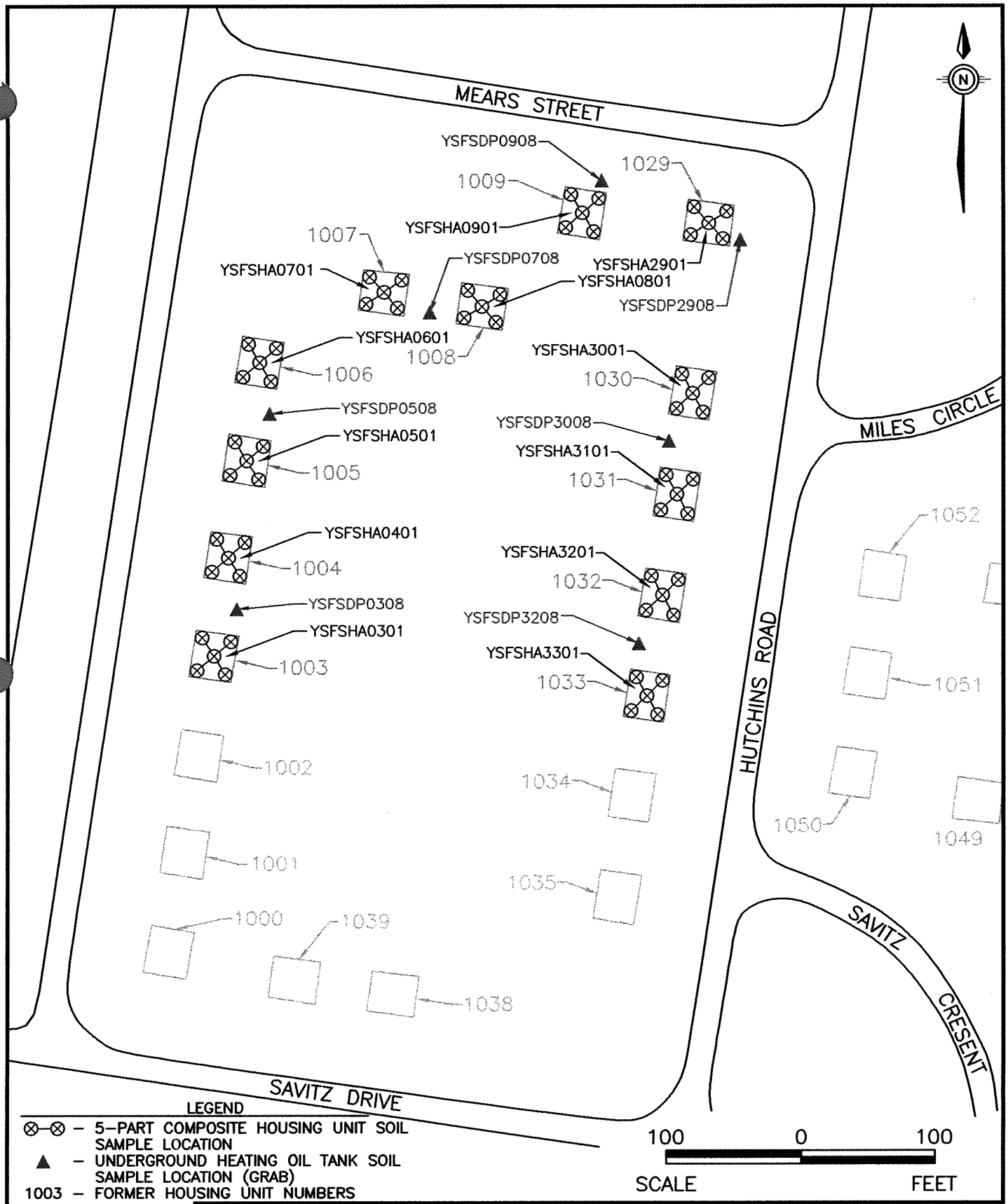


FIGURE 1
VICINITY MAP
PROPOSED YOUTH FIELD
NSA MID-SOUTH
MILLINGTON, TN

GISSAFE/PROJECTS/NSA_MEM/WHERRY HOUSE/INGT/YOUTH-FIELD.APR



ENSAFE
(800) 588–7962
MEMPHIS, TENNESSEE
ARKANSAS FLORIDA KENTUCKY MICHIGAN MISSISSIPPI
OHIO TENNESSEE TEXAS SOUTH CAROLINA
VIRGINIA SLOVAKIA

FIGURE 2
FORMER HOUSING UNIT AND POTENTIAL HEATING–OIL TANK SAMPLE LOCATION MAP
PROPOSED YOUTH SPORTS FIELD
NSA MID–SOUTH
MILLINGTON, TENNESSEE

DWG DATE: 12/03/01 | NAME: 3134011W002

2.0 SOIL SAMPLING

The former housing unit soil sampling and the heating-oil tank sampling activities are described below.

Former Housing Units Soil Sampling

The housing units may have been treated for termites by spraying the ground beneath the former houses and/or shallow injections into the ground around them. Soil samples were collected from within the former houses' perimeters from 0 to 6 inches below ground surface (bgs) with a stainless-steel hand auger. Termite treatments would probably have been applied in the 0- to 6-inch interval. Any potential future exposure to pesticides in soil by a construction worker or child using the sports field would likely occur in this interval. Therefore, the 0- to 6-inch interval was sampled since it poses the greatest risk to potential future uses.

All former housing unit soil samples were five-point composite samples. Each former housing unit's sample locations and IDs are shown on Figure 2. Planimetric maps, provided by NSA Mid-South, were used to locate the center of the housing units that made up the first composite sampling location. Field personnel measured 20 feet from the center location toward each corner of each former housing unit for the second to fifth sampling location. Equal amounts of material from each composite sampling location were placed into a clean stainless-steel bowl. The material was mixed using a clean stainless-steel spoon and immediately placed into glass sample containers provided by the laboratory. The samples were then placed on ice, logged on the chain of custody, and shipped to the Severn Trent Laboratories in Savannah, Georgia, via an overnight courier. Samples were analyzed for chlorinated pesticides using USEPA Method 8081 and organophosphorus pesticides using USEPA Method 8141. Quality control/quality assurance (QA/QC) samples collected to ensure the validity of the sampling

results included two duplicates, one field blank, one matrix spike/matrix spike duplicate, and one equipment rinsate blank sample.

Heating-Oil Tank Soil Sampling

NSA Mid-South building plans indicate that seven heating-oil tanks may have been installed as a heating source for the former housing units (two had 1,000-gallon capacity; five had 2,000-gallon capacity). However, NSA Mid-South personnel had no documentation to either confirm or deny that the heating-oil tanks were removed during housing unit demolition or if they were even installed. Therefore, NSA Mid-South requested an investigation to confirm the presence of the heating-oil tanks and determine if a petroleum release has occurred.

A direct-push technology (DPT) rig advanced one soil borings to 8 feet bgs at each suspected heating-oil tank location. Soil samples were collected from each 2-foot interval and field-screened using an flame ionization detector. In samples from all depth intervals at each sampling location, petroleum hydrocarbons were present at background concentrations (less than 1 part per million). The material encountered during sampling generally consisted of brown and gray stiff silty clay.

One grab soil sample was collected for laboratory analysis from each suspected heating-oil tank location. Sample locations and sample IDs for each heating-oil tank location are shown on Figure 2. Because all field screen analyses indicated background concentrations in soil samples, soil was collected for laboratory analysis from the 6 to 8-foot interval (a potential release from the suspected tanks most likely would have impacted this depth interval). The soil was placed into glass sample containers provided by the laboratory. The samples were then placed on ice, logged on the chain of custody, and shipped to the Severn Trent Laboratories in Savannah, Georgia, via an overnight courier. Samples were analyzed for extractable petroleum hydrocarbons (EPHs) using the TN-EPH method. QA/QC samples collected to ensure the validity of the

sampling results included one duplicate, one field blank, one matrix spike/matrix spike duplicate, and one equipment rinsate blank sample.

No evidence of an underground heating-oil tank or a petroleum release was noted during the DPT investigation. The soil recovered during the boring installation did not appear to be stained and no petroleum odors were observed. EPH concentrations in all samples were below the laboratory method detection limit of 0.76 parts per million.

3.0 ANALYTICAL RESULTS

Samples were analyzed and reported as definitive data, and QC forms were submitted for validation. Two types of definitive data packages were submitted for review: a summary QC package were provided for 90 percent of the samples and a full QC package were provided for 10 percent of the samples. The summary QC package was formerly USEPA level III deliverables without raw data. The full QC package was Level IV deliverable with raw data. Analytical data and the data validation reports are presented in Appendix A.

4.0 PRELIMINARY RISK EVALUATION

4.1 Contaminant of Potential Concern (COPC) Selection

In accordance with *Supplemental Guidance to RAGS Bulletin 1, Data Collection and Evaluation* (USEPA, November 1995), COPCs were identified by comparing the maximum concentration of each detected chemical with its corresponding residential and industrial soil preliminary remediation goal (PRG) values. The PRGs are based on a target incidental lifetime cancer risk (ILCR) of 1E-06 and a target hazard quotient (HQ) of 1. Noncarcinogenic-based PRGs were adjusted from a target HQ of 1 to 0.1 in accordance with the Supplemental Guidance to RAGS. The cumulative ILCR threshold is 1E-04 and the cumulative hazard threshold is 1, in accordance with *Guidance on Preliminary Risk Evaluations (PREs) for the Purpose of Reaching a Finding of Suitability to Lease* (USEPA 1994).[1]

Table 1, which summarizes the soil data, presents detection ranges and frequencies, average detected concentrations, and industrial and residential soil Region 9 PRGs for residential and industrial soil (USEPA, 2000). Alpha-chlordane, dieldrin, gamma-chlordane, heptachlor, and heptachlor epoxide were identified as COPCs.

Because the industrial receptor identified for this site is a construction worker, the exposure assumptions used to calculate the Region 9 industrial PRGs are not appropriate for this scenario. Region 9 industrial soil PRGs are based on a default scenario for a site worker who is expected to be present on the site 250 days per year for a total duration of 25 years and who is assumed to ingest 50 milligrams of soil per day. Because construction activities are much briefer,

[1]Carcinogens eliminated based on the 1E-06 target risk are not expected to contribute greatly to the cumulative ILCR because this threshold is 1E-04. Noncarcinogens are not expected to greatly contribute to the hazard index (HI) because the target HQ (0.1) is less than the cumulative threshold of 1. Screening determines which contaminants pose the greatest threat to human receptors, identifies hot spots, and eliminates chemicals that would not significantly affect the PRE conclusions.

exposure parameter assumptions used for other sites at NSA Mid-South were used to calculate site-specific construction worker soil PRGs (SSPRGs) (EnSafe, 1999). The exposure assumptions used for the construction worker are listed below.

Construction Worker Exposure Assumptions

Exposure Frequency (EF)	120 days per year
Exposure Duration (ED)	1 year
Soil Ingestion Rate (IR)	200 milligrams per day

These exposure assumptions account for the shorter exposure periods and increased soil ingestion rates for construction workers. While these values are not presented in any guidance, they were agreed to by the Tennessee Department of Environment and Conservation and USEPA Region IV for use during the NSA Mid-South RCRA Facility Investigations. All other exposure parameters, chemical/physical values, toxicity values, and route-to-route extrapolation assumptions are the same as those used in the Region 9 PRG calculations. SSPRGs were calculated only for chemicals that exceeded the Region 9 industrial soil PRGs. Tables 2 to 6 present the calculations used to develop the SSPRGs for the construction worker scenario. Table 7 shows that heptachlor epoxide's maximum detection does not exceed its SSPRG.

4.2 PRE Methodology

Risk ratios for each chemical were summed separately for the residential and industrial scenarios to determine cumulative site risk. Cumulative risk (for carcinogens) and cumulative HI (for noncarcinogens) are calculated separately, and then compared with the corresponding cumulative USEPA Region IV thresholds. Cumulative risk ratios were calculated for the residential and industrial land-use scenarios.

Equations 1 and 2 were used to estimate risk and hazard ratios.

$$\text{Risk Ratio}_{CA} = \frac{C_{max} \times TR}{SL} \qquad \text{Equation 1}$$

$$\textit{Hazard Ratio}_{NC} = \frac{C_{max} \times HQ}{\textit{Screening Level}} \qquad \text{Equation 2}$$

where:

	C_{max}	=	maximum detected concentration (mg/kg)
	TR	=	target risk level (1E-06; unitless)
	SL	=	Region 9 PRG or SSPRG (mg/kg)
	HQ	=	target hazard quotient (1; unitless)

An ILCR greater than 1E-04 (the USEPA cumulative upper-bound acceptable risk threshold) or an HI greater than 1 (the USEPA cumulative HI threshold) indicates the site may require additional investigation for the corresponding land-use scenario (USEPA, 1994). In accordance with this USEPA memorandum, the property is considered suitable for lease for the specified land-use scenario if the threshold is not exceeded.

4.3 Results

As shown in Table 8 no contaminants of concern were identified for any land-use scenario evaluated for the youth sports field; therefore, based on the data collected during the October 2001 sampling event, the site is acceptable for recreational land use.

4.4 Uncertainty

The uncertainty section presents information with a direct influence on the level of confidence in this risk assessment. These issues are discussed to put the results of the risk estimates in proper perspective.

Because the PRE for the youth sports field is based on the maximum detected concentrations, it assumes that the soil concentrations are uniform throughout the site and receptors would be exposed to the maximum concentrations as they traverse the site. This assumption is not likely because the sample results indicate a range of detected concentrations for some pesticides that spans at least 1 order of magnitude. Additionally, the average detected concentration for heptachlor epoxide is an order of magnitude less than the maximum detected concentration. Therefore, risk ratios are overestimated.

The PRE was completed using PRGs that are based on exposure parameter assumptions that may be inappropriate for the specified future land use. PRGs are calculated using standard default exposure assumptions for the residential land-use scenarios. Because the future site use is recreational, the residential exposure frequency (350 days per year) and exposure duration (30 years) are greater than that of a recreational land-use scenario because the recreational receptor would not be present on the site 350 days per year for 30 years. Therefore, the residential land-use scenario is more conservative and protective of human health exposures.

5.0 ECOLOGICAL RISK EVALUATION

No complete exposure pathways are present because of the lack of ecological receptors. This site consists of concrete sidewalks and piers and abandoned utility manways. No quality ecological habitat is available; thus, no ecological evaluation was performed.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Five compounds were identified as COPCs using USEPA Region 9 residential and industrial PRGs: alpha-chlordane, dieldrin, gamma-chlordane, heptachlor, and heptachlor epoxide. Using an SSPRG, heptachlor epoxide was the only compound identified as a COPC under a construction worker scenario. No contaminants of concern were identified for the construction worker, commercial/industrial, or residential land use scenarios. Based on these results and the guidelines presented in USEPA's *Guidance on Preliminary Risk Evaluations (PREs) for the Purpose of Reaching a Finding of Suitability to Lease* (1994), this site is acceptable for recreational land use.

Table 1
Frequency and Occurrence of Pesticides in Soil
Youth Sports Field, Millington, Tennessee

Chemical	Units	Detection Range	Detection Frequency	Average Detected Concentration	Residential Soil PRG	Industrial Soil PRG	Exceeds Residential Soil PRG?	Exceeds Industrial Soil PRG?
4,4'-DDE	mg/kg	8.40E-03 – 1.20E-01	5 / 14	5.97E-02	1.72E+00	1.21E+01	No	No
4,4'-DDT	mg/kg	1.40E-02 – 2.60E-01	11 / 14	8.44E-02	1.72E+00	1.21E+01	No	No
alpha-Chlordane	mg/kg	5.80E-02 – 3.60E+00	14 / 14	1.52E+00	1.62E+00	1.07E+01	**Yes**	No
Dieldrin	mg/kg	1.20E-02 – 6.70E-02	3 / 14	3.07E-02	3.04E-02	1.54E-01	**Yes**	No
Endrin	mg/kg	9.10E-02 – 9.60E-02	2 / 14	9.35E-02	1.83E+00	2.64E+01	No	No
gamma-Chlordane	mg/kg	3.40E-02 – 3.60E+00	14 / 14	1.34E+00	1.62E+00	1.07E+01	**Yes**	No
Heptachlor	mg/kg	6.10E-02 – 4.20E-01	2 / 14	2.41E-01	1.08E-01	5.48E-01	**Yes**	No
Heptachlor Epoxide	mg/kg	4.00E-03 – 5.40E-01	10 / 14	9.92E-02	5.34E-02	2.71E-01	**Yes**	**Yes**

Notes:
PRG = preliminary remediation goal (USEPA Region 9, 2000)
mg/kg = milligrams per kilogram

[a] Site-specific PRGs were calculated for chemicals that exceeded the Region 9 industrial soil PRGs.

Table 2
Calculation of Site-specific Preliminary Remediation Goals: Oral Pathway
Construction Worker Scenario
Youth Sports Field, Millington, Tennessee

Noncarcinogenic

Equation	Oral $SSPRG_N$	= [(	THI	×	BW	×	AT	×	RfDo	×	365	)÷(	IR	×	ED	×	EF	×	1E-06	)]
Units	mg/kg		unitless		kg		years		mg/kg-day		days/year		mg/day		years		days/year		kg/mg	
Heptachlor Epoxide	1.38E+01	= [(	1	×	70	×	1	×	1.3E-05	×	365	)÷(	200	×	1	×	120	×	1E-06	)]

Carcinogenic

Equation	Oral $SSPRG_C$	= [(	TR	×	BW	×	AT	×	365	÷	SFo	×	IR	×	ED	×	EF	×	1E-06	)]
Units	mg/kg		unitless		kg		years		days/year		$(mg/kg\text{-}day)^{-1}$		mg/day		years		days/year		kg/mg	
Heptachlor Epoxide	8.19E+00	= [(	1E-06	×	70	×	70	×	365	÷	9.1E+00	×	200	×	1	×	120	×	1E-06	)]

Notes:

$SSPRG_N$ = noncancer site-specific preliminary remediation goal
THI = target hazard index
BW = body weight
AT = averaging time
RfDo = reference dose
IR = ingestion rate
ED = exposure duration
EF = exposure frequency
$SSPRG_C$ = cancer site-specific preliminary remediation goal
TR = target risk level
SFo = oral slope factor

Table 3
Calculation of Site-specific Preliminary Remediation Goals: Dermal Pathway
Construction Worker Scenario
Youth Sports Field, Millington, Tennessee

Noncarcinogenic

Equation	Dermal $SSPRG_N$	=	[(	THI	×	BW	×	AT	×	RfDo	×	365	)÷(	SA	×	AF	×	ABS	×	EF	×	ED	×	1E-06	)]
Units	mg/kg			unitless		kg		years		mg/kg-day		days/year		cm^2/event		mg/cm^2		unitless		events/year		years		kg/mg	
Heptachlor Epoxide	4.19E+01	=	[(	1	×	70	×	1	×	1.30E-05	×	365	)÷(	3300	×	0.2	×	0.1	×	120	×	1	×	1E-06	)]

Carcinogenic

Equation	Dermal $SSPRG_C$	=	[(	TR	×	BW	×	AT	×	365	)÷	SFo	×	SA	×	AF	×	ABS	×	EF	×	ED	×	1E-06	)]
Units	mg/kg			unitless		kg		years		days/year		$(mg/kg\text{-}day)^{-1}$		cm^2/event		mg/cm^2		unitless		events/year		years		kg/mg	
Heptachlor Epoxide	2.48E+01	=	[(	1E-06	×	70	×	70	×	365	)÷	9.1E+00	×	3300	×	0.2	×	0.1	×	120	×	1	×	1E-06	)]

Notes:

$SSPRG_N$ = noncancer site-specific preliminary remediation goal
THI = target hazard index
BW = body weight
AT = averaging time
RfDo = oral reference dose; USEPA Region 9 uses the oral reference dose for the dermal contact pathway
SA = surface area
AF = adherence factor
ABS = absorption factor
EF = exposure frequency
ED = exposure duration
$SSPRG_C$ = cancer site-specific preliminary remediation goal
TR = target risk level
SFo = oral slope factor; USEPA Region 9 uses the oral slope factor for the dermal contact pathway

Table 4
Calculation of Site-specific Preliminary Remediation Goals: Inhalation Pathway
Construction Worker Scenario
Youth Sports Field, Millington, Tennessee

Noncarcinogenic

Equation	Inhalation $SSPRG_N$	= [(	THI	×	BW	×	AT	×	365	)÷(	IR	×	EF	×	ED	)]×[(	1	÷	RfDi	)×(	1	÷	PEF	)]
Units	mg/kg		unitless		kg		years		days/year		m^3/day		days/year		years				mg/kg-day				m^3/kg	
Heptachlor Epoxide	1.83E+05	= [(	1	×	70	×	1	×	365	)÷(	20	×	120	×	1	)]×[(	1	÷	1.30E-05	)×(	1	÷	1.32E+09	)]

Carcinogenic

Equation	Inhalation $SSPRG_C$	= [(	TR	×	BW	×	AT	×	365	)÷(	IR	×	EF	×	ED	×	SFi	)×(	1	÷	PEF	)]
Units	mg/kg		unitless		kg		years		days/year		m^3/day		days/year		years		$(mg/kg-day)^{-1}$				m^3/kg	
Heptachlor Epoxide	1.08E+05	= [(	1.00E-06	×	70	×	70	×	365	)÷(	20	×	120	×	1	×	9.1E+00	)×(	1	÷	1.32E+09	)]

Notes:

$SSPRG_N$ = noncancer site-specific preliminary remediation goal
THI = target hazard index
BW = body weight
AT = averaging time
IR = inhalation rate
EF = exposure frequency
ED = exposure duration
RfDi = inhalation reference dose
PEF = particulate emission factor
$SSPRG_C$ = cancer site-specific preliminary remediation goal
TR = target risk level
SFi = inhalation slope factor

Table 5
Summary of Site-specific Preliminary Remediation Goals
Construction Worker Scenario
Youth Sports Field, Millington, Tennessee

Noncarcinogenic

Equation	$SSPRG_N$	= 1 ÷ [(1 ÷	Oral $SSPRG_N$	)+(1 ÷	Dermal $SSPRG_N$	)+(1 ÷	Inhalation $SSPRG_N$	)]
Units	mg/kg		mg/kg		mg/kg		mg/kg	
Heptachlor Epoxide	1.04E+01	= 1 ÷ [(1 ÷	1.38E+01	)+(1 ÷	4.19E+01	)+(1 ÷	1.83E+05	)]

Carcinogenic

Equation	$SSPRG_C$	= 1 ÷ [(1 ÷	Oral $SSPRG_C$	)+(1 ÷	Dermal $SSPRG_C$	)+(1 ÷	Inhalation $SSPRG_C$	)]
Units	mg/kg		mg/kg		mg/kg		mg/kg	
Heptachlor Epoxide	6.16E+00	= 1 ÷ [(1 ÷	8.19E+00	)+(1 ÷	2.48E+01	)+(1 ÷	1.08E+05	)]

Notes:

$SSPRG_N$ = noncancer site-specific preliminary remediation goal

mg/kg = milligrams per kilogram

$SSPRG_C$ = cancer site-specific preliminary remediation goal

Table 6
Selected Site-specific Preliminary Remediation Goals
Construction Worker Scenario
Youth Sports Field, Millington, Tennessee

Chemical	Site-specific Preliminary Remediation Goal Noncarcinogenic mg/kg	Carcinogenic mg/kg	Value Used For Screening mg/kg
Heptachlor Epoxide	1.04E+01	6.16E+00	6.16E+00

Table 7
Comparison of Maximum Detected Concentrations to Site-specific Construction Worker PRGs
Youth Sports Field, Millington, Tennessee

Chemical	Units	Detection Range	Detection Frequency	Average Detected Concentration	Exceeds Residential Soil PRG?	Industrial Soil PRG	Site-specific Construction Worker PRG[a]	Exceeds Site-specific Construction Worker PRG?
Heptachlor Epoxide	mg/kg	4.00E-03 – 5.40E-01	10 / 14	9.92E-02	5.34E-02	2.71E-01	6.16E+00	No

Notes:

PRG = preliminary remediation goal (USEPA Region 9, 2000)

[a] Site-specific PRGs were calculated for those chemicals that exceeded the Region 9 industrial soil PRGs.

Table 8
Preliminary Risk Evaluation
Residential and Construction Worker Land-Use Scenarios
Youth Sports Field, Millington, Tennessee

						Residential		Industrial	
Chemical	Maximum Concentration (mg/kg)	Region 9 Residential Soil PRG (mg/kg)	Region 9 Industrial Soil PRG (mg/kg)	Site-specific Construction Worker Soil PRG (mg/kg)	Basis	Risk Ratio (unitless)	Hazard Ratio (unitless)	Risk Ratio (unitless)	Hazard Ratio (unitless)
Dieldrin	6.70E-02	3.04E-02	1.54E-01	NA	C	2.2E-06	NA	NA	NA
Heptachlor	4.20E-01	1.83E+00	2.64E+01	NA	C	2.3E-07	NA	NA	NA
Heptachlor Epoxide	5.40E-01	1.08E-01	5.48E-01	6.16E+00	C	5.0E-06	NA	9.9E-07	NA
alpha-Chlordane	3.60E+00	5.34E-02	2.71E-01	NA	C	6.7E-05	NA	NA	NA
gamma-Chlordane	3.60E+00	1.62E+00	1.07E+01	NA	C	2.2E-06	NA	NA	NA
					Total Risk Ratio	8E-05	NA	1E-06	NA
					Threshold[a]	1E-04	1E+00	1E-04	1E+00
					Further Investigation Required?	No	NA	No	NA

Notes:
C = carcinogenic
NA = not applicable

[a]The threshold for carcinogenic risk is based on guidance provided in *Guidance on Preliminary Risk Evaluations (PREs) for the Purpose of Reaching a Finding of Suitability to Lease* (USEPA 1994).

7.0 REFERENCES

EnSafe. (2001). *Sampling Work Plan — Proposed Youth Sports Field, Naval Support Activity (NSA) Mid-South, Millington, Tennessee.* October 16, 2001.

EnSafe. (1999). *Assembly A RCRA Facility Investigation Report Aircraft Fire Fighting Training Facility SWMU 5 Revision: 2.* February 19, 1999.

U.S. Environmental Protection Agency. (2000). *Preliminary Remediation Goal Table.* USEPA Region 9.

U.S. Environmental Protection Agency. (1995). *Supplemental Guidance to RAGS: Region 4 Bulletins 1 through 5 Human Health Risk Assessment — Interim,* USEPA Region 4, Waste Management Division, Office of Health Assessment. November 1995.

USEPA. (1994). *Guidance on Preliminary Risk Evaluations (PREs) for the Purpose of Reaching a Finding of Suitability to Lease* (November 22, 1994)

N:\WP51\patkinson\GSA\Youth Sports Field\PRE.wpd

APPENDIX A

DATA VALIDATION REPORTS AND ANALYTICAL DATA

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	MEM92
Date:	November 28, 2001
Client Name:	Ensafe
Project/Site Name:	NSA Mid-South Youth Sports Field
Date Sampled:	October 31, 2001
Number of Samples:	2 Aqueous Sample(s) with 0 MS/MSD(s) 12 Non-Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	STL - Savannah
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data
QA/QC Level:	DQO Level III
Method(s) Utilized:	SW846 Third Edition
Analytical Fractions:	Pesticides and 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 is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Scarpa
Paul B. Humburg, President

11-28-01.
Date

4127 Plaza 94 South • St. Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# MEM92

Samples and Fractions Reviewed

Sample Identifications Analytical Fraction

ENSAFE ID	MATRIX	PEST		OP PEST	
YSFSHA3301	SOIL		X		X
YSFSHA3001	SOIL		X		X
YSFCHA3001	SOIL		X		X
YSFSHA2901	SOIL		X		X
YSFSHA0901	SOIL		X		X
YSFSHA0801	SOIL		X		X
YSFSHA0701	SOIL		X		X
YSFSHA0601	SOIL		X		X
YSFSHA0501	SOIL		X		X
YSFCHA0501	SOIL		X		X
YSFSHA0401	SOIL		X		X
YSFSHA0301	SOIL		X		X
YSFE103101	WATER	X		X	
YSFF103101	WATER	X		X	
Total Billable Samples (Water/Soil)		2	12	2	12

PEST= Pesticides
OP PEST= Organophosphorus Pesticides

DATA ASSESSMENT NARRATIVE

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 8081A; the National Functional Guidelines for Organic Data Validation, 10/99; 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 #MEM92

A validation was performed on the Pesticides Data from SDG MEM92. The data was evaluated based on the following parameters:

*	• Data Completeness
*	• Holding Times
*	• GC Performance
	• Calibration
*	• Blanks
*	• Surrogate Recoveries
*	• Matrix Spike/Matrix Spike Duplicates
*	• Laboratory Control Samples
*	• Field Duplicates
*	• Compound Identification
	• Compound Quantitation

* - All criteria were met for this parameter.

Calibrations

The continuing calibration standard INV12005 analyzed 11/12/01 at 1022 exhibited one compound with a %D greater than 90%. For the following samples and non-compliant compound, the reported positive results are qualified as estimated, J, and the reported non-detect results are rejected, UR.

YSFSHA0501	methoxychlor (97.8%)
YSFSHA0301	

Calibrations (continued)

The continuing calibration standard INV13014 analyzed 11/13/01 at 1757 exhibited four compounds with %Ds greater than 15% but less than 50% for which qualifications were required. For the following samples and non-compliant compounds, the reported positive results are qualified as estimated, J.

YSFSHA3001	heptachlor epoxide (16.9%)
YSFCHA3001	gamma-chlordane (20.1%)
YSFSHA0701	
YSFCHA0501	
YSFSHA0701	4,4'-DDE (21.9%)
YSFCHA0501	dieldrin (16.3%)

The continuing calibration standard INV13024 analyzed 11/13/01 at 2217 exhibited one compounds with %Ds greater than 15% but less than 50% for which qualifications were required. For the following samples and non-compliant compound, the reported positive results are qualified as estimated, J.

YSFSHA3001	gamma-chlordane (17.0%)
YSFCHA3001	

The continuing calibration standard INV14005 analyzed 11/14/01 at 0948 exhibited one compounds with %Ds greater than 15% but less than 50% for which qualifications were required. For the following samples and non-compliant compound, the reported positive results are qualified as estimated, J.

YSFSHA0901	alpha chlordane (16.0%)

Compound Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. The following guidelines were used to qualify the data:

1. The positive sample result which exhibited a column quantitation difference >40%, but ≤100% is qualified as estimated, J.

2. The positive sample result which exhibited a column quantitation difference >100% and is <10X the respective compound CRQL, is qualified as non-detect, U.

Compound Quantitation (continued)

The following samples and compounds have been qualified for high column quantitation %Ds.

Sample ID	Compound	%D	Lab Qual.	HESI Qual.	Ref. #
YSFSHA3301	heptachlor epoxide	88.9	P	J	1
	alpha-chlordane	50.0	P	J	1
YSFSHA3001	heptachlor epoxide	78.9	P	J	1
YSFCHA3001	heptachlor epoxide	74.3	P	J	1
YSFSHA2901	4,4'-DDE	62.8	P	J	1
YSFSHA2901DL	alpha-chlordane	50.7	P	J	1
YSFSHA0901	delta-BHC	138.5	P	U	2
	heptachlor epoxide	51.7	P	J	1
	dieldrin	42.4	P	J	1
YSFSHA0801	heptachlor epoxide	92.7	P	J	1
	4,4'-DDE	97.9	P	J	1
YSFSHA0701	heptachlor epoxide	55.8	P	J	1
YSFSHA0701DL	alpha-chlordane	48.4	P	J	1
YSFSHA0601	alpha-chlordane	52.6	P	J	1
YSFSHA0501	heptachlor epoxide	78.5	P	J	1
	alpha-chlordane	43.0	P	J	1
YSFCHA0501	heptachlor epoxide	100	P	J	1
YSFCHA0501DL	alpha-chlordane	47.6	P	J	1
YSFSHA0401	heptachlor epoxide	81.7	P	J	1
	alpha-chlordane	41.9	P	J	1

Compound Quantitation (continued)

For the following samples the reported E flagged results are not used in favor of the corresponding D flagged results reported from the dilution analysis. All other results reported in the dilution analysis are not used in favor of the results reported in the undiluted analyses.

YSFSHA3001
YSFCHA3001
YSFSHA2901
YSFSHA0701
YSFSHA0501

System Performance and Overall Assessment

The data, as reported, did require qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the 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
YSFSHA0501 YSFSHA0301	methoxychlor (97.8%)	+/-	J/UR
YSFSHA3001 YSFCHA3001 YSFSHA0701 YSFCHA0501	heptachlor epoxide (16.9%) gamma-chlordane (20.1%)	+/-	J/UJ
YSFSHA0701 YSFCHA0501	4,4'-DDE (21.9%) dieldrin (16.3%)	+/-	J/UJ
YSFSHA3001 YSFCHA3001	gamma-chlordane (17.0%)	+/-	J/UJ
YSFSHA0901	alpha chlordane (16.0%)	+/-	J/UJ
ALL	All P > 40% But ≤ 100%	+	J
ALL	All P > 100% And < 10X CRQL	+	U
YSFSHA3001 YSFCHA3001 YSFSHA2901 YSFSHA0701 YSFSHA0501	All E flagged compounds	+E	Do not use
YSFSHA3001DL YSFCHA3001DL YSFSHA2901DL YSFSHA0701DL YSFSHA0501DL	All except corresponding D flagged compounds	+/-	Do Not Use

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

DATA ASSESSMENT NARRATIVE

ORGANOPHOSPHORUS PESTICIDES (OPP)

General

The organic findings offered in this screening report assumes that all analytical results 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 8141 for OPP; the National Functional Guidelines for Organic Data Validation, 10/99; 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 # MEM92

A validation was performed on the OPP Data from SDG MEM92. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC Performance
*	•	Calibration
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Laboratory Control Samples
*	•	Field Duplicates
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

System Performance and Overall Assessment

The data, as reported, did not require qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the 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

NSA MID-SOUTH - YOUTH SPORTS FIELD
PRELIMINARY RISK EVALUATION
DATA FOR OCT. 2001 SOIL SAMPLING EVENT

MEM92 OP PEST													
	SAMPLE ID ------>	YSF-S-HA03-01		YSF-S-HA04-01		YSF-S-HA05-01		YSF-C-HA05-01		YSF-S-HA06-01		YSF-S-HA07-01	
	ORIGINAL ID ----->	YSFSHA0301		YSFSHA0401		YSFSHA0501		YSFCHA0501		YSFSHA0601		YSFSHA0701	
	LAB SAMPLE ID --->	S117084*12		S117084*11		S117084*9		S117084*10		S117084*8		S117084*7	
	SAMPLE DATE ----->	10/31/01		10/31/01		10/31/01		10/31/01		10/31/01		10/31/01	
	DATE EXTRACTED -->	11/02/01		11/02/01		11/02/01		11/02/01		11/02/01		11/02/01	
	DATE ANALYZED --->	11/06/01		11/06/01		11/06/01		11/06/01		11/06/01		11/06/01	
	MATRIX ---------->	Soil		Soil		Soil		Soil		Soil		Soil	
	UNITS ---------->	UG/KG	A	UG/KG	A	UG/KG	A	UG/KG	A	UG/KG	A	UG/KG	A
CAS #	Parameter												
86-50-0	Azinphos-methyl	78.	U	80.	U	80.	U	80.	U	78.	U	78.	U
35400-43-2	Bolstar (Sulprofos)	39.	U	40.	U	40.	U	40.	U	39.	U	39.	U
2921-88-2	Chlorpyrifos	39.	U	40.	U	40.	U	40.	U	39.	U	39.	U
56-72-4	Coumaphos	390.	U	400.	U	400.	U	400.	U	390.	U	390.	U
298-03-3	Demeton-O	98.	U	100.	U	100.	U	100.	U	99.	U	99.	U
126-75-0	Demeton-S	98.	U	100.	U	100.	U	100.	U	99.	U	99.	U
333-41-5	Diazinon	39.	U	40.	U	40.	U	40.	U	39.	U	39.	U
62-73-7	Dichlorvos	78.	U	80.	U	80.	U	80.	U	78.	U	78.	U
60-51-5	Dimethoate	78.	U	80.	U	80.	U	80.	U	78.	U	78.	U
298-04-4	Disulfoton	78.	U	80.	U	80.	U	80.	U	78.	U	78.	U
13194-48-4	Ethoprop	20.	U	21.	U	21.	U	21.	U	20.	U	20.	U
115-90-2	Fensulfothion	390.	U	400.	U	400.	U	400.	U	390.	U	390.	U
55-38-9	Fenthion	39.	U	40.	U	40.	U	40.	U	39.	U	39.	U
121-75-5	Malathion	39.	U	40.	U	40.	U	40.	U	39.	U	39.	U
150-50-5	Merphos	39.	U	40.	U	40.	U	40.	U	39.	U	39.	U
7786-34-7	Mevinphos	78.	U	80.	U	80.	U	80.	U	78.	U	78.	U
6923-22-4	Azodrin	390.	U	400.	U	400.	U	400.	U	390.	U	390.	U
300-76-5	Naled	390.	U	400.	U	400.	U	400.	U	390.	U	390.	U
56-38-2	Ethyl Parathion	39.	U	40.	U	40.	U	40.	U	39.	U	39.	U
298-00-0	Methyl parathion	20.	U	21.	U	21.	U	21.	U	20.	U	20.	U
298-02-2	Phorate	39.	U	40.	U	40.	U	40.	U	39.	U	39.	U
299-84-3	Ronnel	39.	U	40.	U	40.	U	40.	U	39.	U	39.	U
22248-79-9	Tetrachlorovinphos (Stirophos)	39.	U	40.	U	40.	U	40.	U	39.	U	39.	U
3689-24-5	Sulfotepp	20.	U	21.	U	21.	U	21.	U	20.	U	20.	U
34643-46-4	Tokuthion	39.	U	40.	U	40.	U	40.	U	39.	U	39.	U
327-98-0	Trichloronate	390.	U	400.	U	400.	U	400.	U	390.	U	390.	U
2104-64-5	EPN	39.	U	40.	U	40.	U	40.	U	39.	U	39.	U

*** Validation Complete ***

NSA MID-SOUTH - YOUTH SPORTS FIELD
PRELIMINARY RISK EVALUATION
DATA FOR OCT. 2001 SOIL SAMPLING EVENT

MEM92 OP PEST													
	SAMPLE ID ------>	YSF-S-HA08-01		YSF-S-HA09-01		YSF-S-HA29-01		YSF-S-HA30-01		YSF-C-HA30-01		YSF-S-HA33-01	
	ORIGINAL ID ----->	YSFSHA0801		YSFSHA0901		YSFSHA2901		YSFSHA3001		YSFCHA3001		YSFSHA3301	
	LAB SAMPLE ID --->	S117084*6		S117084*5		S117084*4		S117084*2		S117084*3		S117084*1	
	SAMPLE DATE ----->	10/31/01		10/31/01		10/31/01		10/31/01		10/31/01		10/31/01	
	DATE EXTRACTED -->	11/02/01		11/02/01		11/02/01		11/02/01		11/02/01		11/02/01	
	DATE ANALYZED --->	11/06/01		11/06/01		11/06/01		11/06/01		11/06/01		11/06/01	
	MATRIX ---------->	Soil		Soil		Soil		Soil		Soil		Soil	
	UNITS ---------->	UG/KG	A	UG/KG	A	UG/KG	A	UG/KG	A	UG/KG	A	UG/KG	A
CAS #	Parameter												
86-50-0	Azinphos-methyl	78.	U	81.	U	80.	U	80.	U	77.	U	80.	U
35400-43-2	Bolstar (Sulprofos)	39.	U	41.	U	40.	U	40.	U	38.	U	40.	U
2921-88-2	Chlorpyrifos	39.	U	41.	U	40.	U	40.	U	38.	U	40.	U
56-72-4	Coumaphos	390.	U	410.	U	400.	U	400.	U	380.	U	400.	U
298-03-3	Demeton-O	99.	U	100.	U	100.	U	100.	U	96.	U	100.	U
126-75-0	Demeton-S	99.	U	100.	U	100.	U	100.	U	96.	U	100.	U
333-41-5	Diazinon	39.	U	41.	U	40.	U	40.	U	38.	U	40.	U
62-73-7	Dichlorvos	78.	U	81.	U	80.	U	80.	U	77.	U	80.	U
60-51-5	Dimethoate	78.	U	81.	U	80.	U	80.	U	77.	U	80.	U
298-04-4	Disulfoton	78.	U	81.	U	80.	U	80.	U	77.	U	80.	U
13194-48-4	Ethoprop	20.	U	21.	U	21.	U	21.	U	20.	U	21.	U
115-90-2	Fensulfothion	390.	U	410.	U	400.	U	400.	U	380.	U	400.	U
55-38-9	Fenthion	39.	U	41.	U	40.	U	40.	U	38.	U	40.	U
121-75-5	Malathion	39.	U	41.	U	40.	U	40.	U	38.	U	40.	U
150-50-5	Merphos	39.	U	41.	U	40.	U	40.	U	38.	U	40.	U
7786-34-7	Mevinphos	78.	U	81.	U	80.	U	80.	U	77.	U	80.	U
6923-22-4	Azodrin	390.	U	410.	U	400.	U	400.	U	380.	U	400.	U
300-76-5	Naled	390.	U	410.	U	400.	U	400.	U	380.	U	400.	U
56-38-2	Ethyl Parathion	39.	U	41.	U	40.	U	40.	U	38.	U	40.	U
298-00-0	Methyl parathion	20.	U	21.	U	21.	U	21.	U	20.	U	21.	U
298-02-2	Phorate	39.	U	41.	U	40.	U	40.	U	38.	U	40.	U
299-84-3	Ronnel	39.	U	41.	U	40.	U	40.	U	38.	U	40.	U
22248-79-9	Tetrachlorovinphos (Stirophos)	39.	U	41.	U	40.	U	40.	U	38.	U	40.	U
3689-24-5	Sulfotepp	20.	U	21.	U	21.	U	21.	U	20.	U	21.	U
34643-46-4	Tokuthion	39.	U	41.	U	40.	U	40.	U	38.	U	40.	U
327-98-0	Trichloronate	390.	U	410.	U	400.	U	400.	U	380.	U	400.	U
2104-64-5	EPN	39.	U	41.	U	40.	U	40.	U	38.	U	40.	U

*** Validation Complete ***

NSA MID-SOUTH - YOUTH SPORTS FIELD
PRELIMINARY RISK EVALUATION
DATA FOR OCT. 2001 SOIL SAMPLING EVENT

MEM92 PEST	SAMPLE ID ------>	YSF-S-HA03-01		YSF-S-HA04-01		YSF-S-HA05-01		YSF-C-HA05-01		YSF-S-HA06-01		YSF-S-HA07-01	
	ORIGINAL ID ----->	YSFSHA0301		YSFSHA0401		YSFSHA0501		YSFCHA0501		YSFSHA0601		YSFSHA0701	
	LAB SAMPLE ID --->	S117084*12		S117084*11		S117084*9		S117084*10		S117084*8		S117084*7	
	SAMPLE DATE ----->	10/31/01		10/31/01		10/31/01		10/31/01		10/31/01		10/31/01	
	DATE EXTRACTED -->	11/06/01		11/06/01		11/06/01		11/06/01		11/06/01		11/06/01	
	DATE ANALYZED --->	11/12/01		11/08/01		11/12/01		11/13/01		11/08/01		11/13/01	
	MATRIX ---------->	Soil		Soil		Soil		Soil		Soil		Soil	
	UNITS ----------->	UG/KG	A	UG/KG	A	UG/KG	A	UG/KG	A	UG/KG	A	UG/KG	A
CAS #	Parameter												
319-84-6	Alpha-BHC	100.	U	210.	U	100.	U	41.	U	200.	U	2.	U
58-89-9	gamma-BHC (Lindane)	100.	U	210.	U	100.	U	41.	U	200.	U	2.	U
319-85-7	Beta-BHC	100.	U	210.	U	100.	U	41.	U	200.	U	2.	U
76-44-8	Heptachlor	100.	U	210.	U	100.	U	41.	U	200.	U	2.	U
319-86-8	Delta-BHC	100.	U	210.	U	100.	U	41.	U	200.	U	2.	U
309-00-2	Aldrin	100.	U	210.	U	100.	U	41.	U	200.	U	2.	U
1024-57-3	Heptachlor Epoxide	100.	U	84.	J	48.	J	28.	J	200.	U	4.	J
5103-74-2	gamma-Chlordane	680.		1400.		700.		600.	J	1300.		34.	J
5103-71-9	alpha-Chlordane	1200.		1700.	J	840.	J	800.	DJ	1400.	J	58.	DJ
959-98-8	Endosulfan I	100.	U	210.	U	100.	U	41.	U	200.	U	2.	U
72-55-9	4,4'-DDE	190.	U	400.	U	200.	U	37.	J	390.	U	8.4	J
60-57-1	Dieldrin	190.	U	400.	U	200.	U	67.	J	390.	U	12.	J
72-20-8	Endrin	190.	U	400.	U	200.	U	80.	U	390.	U	3.9	U
72-54-8	4,4'-DDD	190.	U	400.	U	200.	U	80.	U	390.	U	3.9	U
33213-65-9	Endosulfan II	190.	U	400.	U	200.	U	80.	U	390.	U	3.9	U
50-29-3	4,4'-DDT	190.	U	64.	J	200.	U	48.	J	180.	J	23.	
7421-93-4	Endrin aldehyde	190.	U	400.	U	200.	U	80.	U	390.	U	3.9	U
1031-07-8	Endosulfan Sulfate	190.	U	400.	U	200.	U	80.	U	390.	U	3.9	U
72-43-5	Methoxychlor	1000.	UR	2100.	U	1000.	UR	410.	U	2000.	U	20.	U
53494-70-5	Endrin ketone	190.	U	400.	U	200.	U	80.	U	390.	U	3.9	U
8001-35-2	Toxaphene	10000.	U	21000.	U	10000.	U	4100.	U	20000.	U	200.	U

*** Validation Complete ***

NSA MID-SOUTH - YOUTH SPORTS FIELD
PRELIMINARY RISK EVALUATION
DATA FOR OCT. 2001 SOIL SAMPLING EVENT

MEM92 PEST	SAMPLE ID ------>	YSF-S-HA08-01		YSF-S-HA09-01		YSF-S-HA29-01		YSF-S-HA30-01		YSF-C-HA30-01		YSF-S-HA33-01	
	ORIGINAL ID ----->	YSFSHA0801		YSFSHA0901		YSFSHA2901		YSFSHA3001		YSFCHA3001		YSFSHA3301	
	LAB SAMPLE ID --->	S117084*6		S117084*5		S117084*4		S117084*2		S117084*3		S117084*1	
	SAMPLE DATE ----->	10/31/01		10/31/01		10/31/01		10/31/01		10/31/01		10/31/01	
	DATE EXTRACTED -->	11/06/01		11/06/01		11/06/01		11/06/01		11/06/01		11/06/01	
	DATE ANALYZED --->	11/08/01		11/14/01		11/08/01		11/13/01		11/13/01		11/08/01	
	MATRIX ---------->	Soil		Soil		Soil		Soil		Soil		Soil	
	UNITS ----------->	UG/KG	A	UG/KG	A	UG/KG	A	UG/KG	A	UG/KG	A	UG/KG	A
CAS #	Parameter												
319-84-6	Alpha-BHC	200.	U	42.	U	210.	U	21.	U	20.	U	210.	U
58-89-9	gamma-BHC (Lindane)	200.	U	42.	U	210.	U	21.	U	20.	U	210.	U
319-85-7	Beta-BHC	200.	U	42.	U	210.	U	21.	U	20.	U	210.	U
76-44-8	Heptachlor	200.	U	42.	U	210.	U	21.	U	20.	U	210.	U
319-86-8	Delta-BHC	200.	U	4.	U	210.	U	21.	U	20.	U	210.	U
309-00-2	Aldrin	200.	U	42.	U	210.	U	21.	U	20.	U	210.	U
1024-57-3	Heptachlor Epoxide	110.	J	33.	J	540.		23.	J	22.	J	100.	J
5103-74-2	gamma-Chlordane	2300.		340.		2800.		340.	J	320.	J	1600.	
5103-71-9	alpha-Chlordane	3600.		680.	J	2500.	DJ	690.	D	660.	D	1800.	J
959-98-8	Endosulfan I	200.	U	42.	U	210.	U	21.	U	20.	U	210.	U
72-55-9	4,4'-DDE	48.	J	81.	U	120.	J	40.	U	38.	U	400.	U
60-57-1	Dieldrin	390.	U	13.	J	400.	U	40.	U	38.	U	400.	U
72-20-8	Endrin	390.	U	81.	U	400.	U	40.	U	38.	U	400.	U
72-54-8	4,4'-DDD	390.	U	81.	U	400.	U	40.	U	38.	U	400.	U
33213-65-9	Endosulfan II	390.	U	81.	U	400.	U	40.	U	38.	U	400.	U
50-29-3	4,4'-DDT	77.	J	14.	J	260.	J	28.	J	24.	J	400.	U
7421-93-4	Endrin aldehyde	390.	U	81.	U	400.	U	40.	U	38.	U	400.	U
1031-07-8	Endosulfan Sulfate	390.	U	81.	U	400.	U	40.	U	38.	U	400.	U
72-43-5	Methoxychlor	2000.	U	420.	U	2100.	U	210.	U	200.	U	2100.	U
53494-70-5	Endrin ketone	390.	U	81.	U	400.	U	40.	U	38.	U	400.	U
8001-35-2	Toxaphene	20000.	U	4200.	U	21000.	U	2100.	U	2000.	U	21000.	U

*** Validation Complete ***

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	MEM93
Date:	November 28, 2001
Client Name:	Ensafe
Project/Site Name:	NSA Mid-South Youth Sports Field
Date Sampled:	October 31 - November 1, 2001
Number of Samples:	4 Non-Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	STL - Savannah
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data
QA/QC Level:	DQO Level IV
Method(s) Utilized:	SW846 Third Edition and the Tennessee Department of Environment Conservation Method
Analytical Fractions:	Pesticides, Organophosphorus Pesticides and Extractable Petroleum Hydrocarbons

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Simpson
Paul B. Humburg, President

11-28-01.
Date

4127 Plaza 94 South • St. Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# MEM93

Samples and Fractions Reviewed

Sample Identifications Analytical Fraction

ENSAFE ID	MATRIX	PEST		OP PEST		TN-EPH	
YSFSHA3201	SOIL		X		X		
YSFSHA3101	SOIL		X		X		
YSFSDP0708	SOIL						X
YSFSDP0908	SOIL						X
Total Billable Samples (Water/Soil)		0	2	0	2	0	2

PEST= Pesticides
OP PEST= Organophosphorus Pesticides
TN-EPH= Extractable Petroleum Hydrocarbons - TN Method

DATA ASSESSMENT NARRATIVE

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 8081A; the National Functional Guidelines for Organic Data Validation, 10/99; 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 #MEM93

A validation was performed on the Pesticides Data from SDG MEM93. The data was evaluated based on the following parameters:

*	• Data Completeness
*	• Holding Times
*	• GC Performance
	• Calibration
*	• Blanks
*	• Surrogate Recoveries
*	• Matrix Spike/Matrix Spike Duplicates
*	• Laboratory Control Samples
*	• Field Duplicates
*	• Compound Identification
	• Compound Quantitation

* - All criteria were met for this parameter.

Calibrations

The continuing calibration standard JNV12047 analyzed 11/13/01 at 1224 exhibited one compound with a %D greater than 15% but less than 50% for which qualifications were required. For the following samples and non-compliant compounds, the reported positive results are qualified as estimated, J.

YSFSHA3201	4,4'-DDT (38.3%)
YSFSHA3101	

Calibrations (continued)

The continuing calibration standard JNV12047 analyzed 11/13/01 at 1224 exhibited four compounds with %Ds greater than 15% but less than 50% for which qualifications were required. For the following samples and non-compliant compounds, the reported positive results are qualified as estimated, J.

YSFSHA3201	endrin (15.4%)
YSFSHA3101	4,4'-DDT (47.1%)

Compound Quantitation

Several samples exhibited column quantitation %Ds greater than 40%. The following guidelines were used to qualify the data:

1. The positive sample result which exhibited a column quantitation difference >40%, but ≤100% is qualified as estimated, J.

2. The positive sample result which exhibited a column quantitation difference >100% and is <10X the respective compound CRQL, is qualified as non-detect, U.

The following samples and compounds have been qualified for high column quantitation %Ds.

Sample ID	Compound	%D	Lab Qual.	HESI Qual.	Ref. #
YSFSHA3201	heptachlor epoxide	114.9	P	U	2
	endosulfan I	107.7	P	U	2
YSFSHA3201DL	alpha-chlordane	68.5	P	J	1
YSFSHA3101	heptachlor epoxide	122.6	P	U	2
YSFSHA3101DL	alpha-chlordane	58.8	P	J	1

Compound Quantitation (continued)

For the following samples the reported E flagged results are not used in favor of the corresponding D flagged results reported from the dilution analysis. All other results reported in the dilution analysis are not used in favor of the results reported in the undiluted analyses.

YSFSHA3201
YSFSHA3101

System Performance and Overall Assessment

The data, as reported, did require qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the 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
YSFSHA3201 YSFSHA3101	4,4'-DDT (38.3%)	+	J
YSFSHA3201 YSFSHA3101	endrin (15.4%) 4,4'-DDT (47.1%)	+	J
ALL	All P > 40% But ≤ 100%	+	J
ALL	All P > 100% And < 10X CRQL	+	U
YSFSHA3201 YSFCHA3101	All E flagged compounds	+E	Do not use
YSFSHA3201DL YSFSHA3101DL	All except corresponding D flagged compounds	+/-	Do Not Use

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

DATA ASSESSMENT NARRATIVE

ORGANOPHOSPHORUS PESTICIDES (OPP)

General

The organic findings offered in this screening report assumes that all analytical results 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 8141 for OPP; the National Functional Guidelines for Organic Data Validation, 10/99; 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 # MEM93

A validation was performed on the OPP Data from SDG MEM93. The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	GC Performance
*	•	Calibration
*	•	Blanks
*	•	Surrogate Recoveries
*	•	Matrix Spike/Matrix Spike Duplicates
*	•	Laboratory Control Samples
*	•	Field Duplicates
*	•	Compound Identification
*	•	Compound Quantitation

* - All criteria were met for this parameter.

System Performance and Overall Assessment

The data, as reported, did not require qualifications.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the 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

EXTRACTABLE PETROLEUM HYDROCARBONS (EPH)

General

The organic findings offered in this screening report assumes that all analytical results 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 TN-EPH method; the National Functional Guidelines for Organic Data Validation, 10/99, as applicable; 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 # MEM93

A validation was performed on the EPH Data from SDG MEM93. The data was evaluated based on the following parameters:

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

* - All criteria were met for this parameter.

System Performance and Overall Assessment

The data, as reported, did not require qualifications/rejections.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the 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

NSA MID-SOUTH - YOUTH SPORTS FIELD
PRELIMINARY RISK EVALUATION
DATA FOR OCT. 2001 SOIL SAMPLING EVENT

MEM93 OP PEST												
	SAMPLE ID ------>	YSF-S-HA31-01			YSF-S-HA32-01							
	ORIGINAL ID ----->	YSFSHA3101			YSFSHA3201							
	LAB SAMPLE ID --->	S117084A*2			S117084A*1							
	SAMPLE DATE ----->	10/31/01			10/31/01							
	DATE EXTRACTED -->	11/02/01			11/02/01							
	DATE ANALYZED --->	11/06/01			11/06/01							
	MATRIX ---------->	Soil			Soil							
	UNITS ---------->	UG/KG		A	UG/KG		A					
CAS #	Parameter											
86-50-0	Azinphos-methyl	77.	U		80.	U						
35400-43-2	Bolstar (Sulprofos)	38.	U		40.	U						
2921-88-2	Chlorpyrifos	38.	U		40.	U						
56-72-4	Coumaphos	380.	U		400.	U						
298-03-3	Demeton-O	96.	U		100.	U						
126-75-0	Demeton-S	96.	U		100.	U						
333-41-5	Diazinon	38.	U		40.	U						
62-73-7	Dichlorvos	77.	U		80.	U						
60-51-5	Dimethoate	77.	U		80.	U						
298-04-4	Disulfoton	77.	U		80.	U						
13194-48-4	Ethoprop	20.	U		21.	U						
115-90-2	Fensulfothion	380.	U		400.	U						
55-38-9	Fenthion	38.	U		40.	U						
121-75-5	Malathion	38.	U		40.	U						
150-50-5	Merphos	38.	U		40.	U						
7786-34-7	Mevinphos	77.	U		80.	U						
6923-22-4	Azodrin	380.	U		400.	U						
300-76-5	Naled	380.	U		400.	U						
56-38-2	Ethyl Parathion	38.	U		40.	U						
298-00-0	Methyl parathion	20.	U		21.	U						
298-02-2	Phorate	38.	U		40.	U						
299-84-3	Ronnel	38.	U		40.	U						
22248-79-9	Tetrachlorovinphos (Stirophos)	38.	U		40.	U						
3689-24-5	Sulfotepp	20.	U		21.	U						
34643-46-4	Tokuthion	38.	U		40.	U						
327-98-0	Trichloronate	380.	U		400.	U						
2104-64-5	EPN	38.	U		40.	U						

*** Validation Complete ***

NSA MID-SOUTH - YOUTH SPORTS FIELD
PRELIMINARY RISK EVALUATION
DATA FOR OCT. 2001 SOIL SAMPLING EVENT

MEM93 PEST								
	SAMPLE ID ------>	YSF-S-HA31-01		YSF-S-HA32-01				
	ORIGINAL ID ----->	YSFSHA3101		YSFSHA3201				
	LAB SAMPLE ID --->	S117084A*2		S117084A*1				
	SAMPLE DATE ----->	10/31/01		10/31/01				
	DATE EXTRACTED -->	11/12/01		11/12/01				
	DATE ANALYZED --->	11/13/01		11/13/01				
	MATRIX ---------->	Soil		Soil				
	UNITS ---------->	UG/KG	A	UG/KG	A			
CAS #	Parameter							
319-84-6	Alpha-BHC	99.	U	41.	U			
58-89-9	gamma-BHC (Lindane)	99.	U	41.	U			
319-85-7	Beta-BHC	99.	U	41.	U			
76-44-8	Heptachlor	420.		61.				
319-86-8	Delta-BHC	99.	U	41.	U			
309-00-2	Aldrin	99.	U	41.	U			
1024-57-3	Heptachlor Epoxide	120.	U	100.	U			
5103-74-2	gamma-Chlordane	3600.	D	2700.	D			
5103-71-9	alpha-Chlordane	3000.	DJ	2400.	DJ			
959-98-8	Endosulfan I	99.	U	21.	U			
72-55-9	4,4'-DDE	190.	U	85.				
60-57-1	Dieldrin	190.	U	80.	U			
72-20-8	Endrin	91.	J	96.	J			
72-54-8	4,4'-DDD	190.	U	80.	U			
33213-65-9	Endosulfan II	190.	U	80.	U			
50-29-3	4,4'-DDT	60.	J	150.	J			
7421-93-4	Endrin aldehyde	190.	U	80.	U			
1031-07-8	Endosulfan Sulfate	190.	U	80.	U			
72-43-5	Methoxychlor	990.	U	410.	U			
53494-70-5	Endrin ketone	190.	U	80.	U			
8001-35-2	Toxaphene	9900.	U	4100.	U			

*** Validation Complete ***

NSA MID-SOUTH - YOUTH SPORTS FIELD
PRELIMINARY RISK EVALUATION
DATA FOR OCT. 2001 SOIL SAMPLING EVENT

MEM93 TN EPH							
	SAMPLE ID ------->	YSF-S-DP07-08		YSF-S-DP09-08			
	ORIGINAL ID ----->	YSFSDP0708		YSFSDP0908			
	LAB SAMPLE ID --->	S117129A*1		S117129A*2			
	SAMPLE DATE ----->	11/01/01		11/01/01			
	DATE EXTRACTED -->	11/07/01		11/07/01			
	DATE ANALYZED --->	11/15/01		11/15/01			
	MATRIX ---------->	Soil		Soil			
	UNITS ----------->	MG/KG	A	MG/KG	A		
CAS #	Parameter						
9999900-00-3	Extractable Petroleum Hydrocarbons	4.2	U	4.3	U		

*** Validation Complete ***

HEARTLAND
ENVIRONMENTAL SERVICES, INC.

Data Validation Report

SDG#:	MEM94
Date:	November 28, 2001
Client Name:	Ensafe
Project/Site Name:	NSA Mid-South Youth Sports Field
Date Sampled:	November 1, 2001
Number of Samples:	6 Non-Aqueous Sample(s) with 0 MS/MSD(s) 2 Aqueous Sample(s) with 0 MS/MSD(s)
Laboratory:	STL - Savannah
Validation Guidance:	National Functional Guidelines for Organic and Inorganic Data
QA/QC Level:	DQO Level III
Method(s) Utilized:	Tennessee Department of Environment Conservation Method
Analytical Fractions:	Extractable Petroleum Hydrocarbons

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

Craig G. Simpson
for Paul B. Humburg, President

11-28-01.
Date

4127 Plaza 94 South • St. Charles, MO 63304
(636) 936-1332 • Fax (636) 936-1335

SDG# MEM94

Samples and Fractions Reviewed

Sample Identifications Analytical Fraction

ENSAFE ID	MATRIX	TN-EPH	
YSFSDP0308	SOIL		X
YSFSDP0508	SOIL		X
YSFSDP2908	SOIL		X
YSFSDP3008	SOIL		X
YSFSDP3208	SOIL		X
YSFCDP0508	SOIL		X
YSFE110101	WATER	X	
YSFF110101	WATER	X	
Total Billable Samples (Water/Soil)		2	6

TN-EPH= Extractable Petroleum Hydrocarbons - TN Method

DATA ASSESSMENT NARRATIVE

EXTRACTABLE PETROLEUM HYDROCARBONS (EPH)

General

The organic findings offered in this screening report assumes that all analytical results 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 TN-EPH method; the National Functional Guidelines for Organic Data Validation, 10/99, as applicable; 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 # MEM94

A validation was performed on the EPH Data from SDG MEM94. The data was evaluated based on the following parameters:

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

* - All criteria were met for this parameter.

System Performance and Overall Assessment

The data, as reported, did not require qualifications/rejections.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

BLANK QUALIFICATION CODES

CRQL =	The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is rejected and the 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