

**UNITED STATES AIR FORCE
ELMENDORF AIR FORCE BASE, ALASKA**

ENVIRONMENTAL QUALITY PROGRAM

**STMP 476
SERA PHASE VII ST 703
RELEASE INVESTIGATION REPORT
FINAL DRAFT**

FEBRUARY 1999

CONTENTS

EXECUTIVE SUMMARY	ES -1
1.0 INTRODUCTION	1-1
1.1 SERA	1-1
1.2 Regional Setting	1-2
1.3 Site Background	1-2
1.4 Report Outline	1-6
2.0 FIELD METHODS	2-1
2.1 Initial Activities	2-1
2.2 Borings	2-1
2.3 Sampling	2-2
2.3.1 Soil Sampling	2-2
2.3.2 Groundwater Development and Sampling	2-5
2.3.3 Field Quality Control Samples	2-5
2.3.4 Sample Packaging and Shipping	2-6
2.3.5 Sampling Control	2-6
2.4 Decontamination	2-7
2.5 Disposition of Investigation-Derived Waste	2-8
2.6 Field Equipment Calibration	2-9
2.7 Survey	2-9
2.8 Data Interpretation	2-9
2.8.1 Field Screening Data	2-9
2.8.2 Comparison to ADEC Soil Cleanup Standards – Method One	2-9
2.8.3 Comparison to ADEC Soil Cleanup Standards – Method Two	2-11
2.8.4 Comparison to ADEC Groundwater Cleanup Standards	2-11
2.8.5 Soil Nutrient Data	2-11
3.0 RESULTS	3-1
3.1 1998 SERA VII Field Program	3-1
3.1.1 Soil Boring/Monitoring Well Installation	3-1
3.1.2 Well Development and Sampling	3-2
3.2 Discussion of Findings	3-2
3.2.1 Soil Findings	3-2
3.2.2 Groundwater Findings	3-6
4.0 CONCLUSIONS	4-1
4.1 Summary	4-1
4.2 Data Gaps	4-1
5.0 REFERENCES	5-1

APPENDICES

- A DATA ASSESSMENT REPORT
- B BORING LOGS
- C ANALYTICAL DATA
- D ADEC FORMS
- E SITE PHOTOGRAPHS

LIST OF TABLES

Table 2-1. Sample Analytical Summary for ST703.	2-4
Table 2-2. Matrix Score Sheet Cleanup Standards.....	2-10
Table 2-3. ADEC Soil Cleanup Standards.....	2-12
Table 2-4. ADEC Groundwater Cleanup Standards.....	2-13

LIST OF FIGURES

Figure 1-1. Elmhurst AFB Location Map.....	1-3
Figure 1-2. Site Location Map.....	1-4
Figure 1-3. Generalized Groundwater Flow Direction.	1-5
Figure 2-1. Monitoring Well Completion Detail.....	2-3
Figure 3-1. 1998 Soil Boring Locations and Sample Results.	3-3
Figure 3-2. 1998 Groundwater Sample Results.	3-7
Figure 3-3. Site Map Showing Cross Sections.....	3-9
Figure 3-4. Cross Sections A-A' and B-B'.	3-11

3.0 RESULTS

3.1 1998 SERA VII Field Program

3.1.1 Soil Boring/Monitoring Well Installation

On June 30, July 1, and July 2, 1998, a series of five soil borings (703BH01 through 703BH05) and two monitoring wells (703WL01 and 703WL02) were drilled at Green Lake cabin. Figure 3-1 shows the location of soil borings. The five soil borings were located in the vicinity of the former tank excavation. The two wells were located in (presumed) hydraulically downgradient locations on the south side of the cabin. Of the two wells, the one on the east side (703WL02) was shifted west because of an on-site septic system that could not be accurately located in the field.

The five soil borings located in the excavation were sampled continuously (every 2 feet) to depths ranging from 6 to 12 feet. A possible confining unit was encountered at approximately 5 feet and was logged as clay and silt. ATH screening results indicated that contaminants were not migrating through the silt unit. A petroleum odor was noted on samples collected as deep as 6 feet in borings 703BH01, 703BH02, 703BH03, and 703BH04. Field observations did not indicate the presence of significant amounts of petroleum constituents in 703BH05. All borings were terminated while still in the silt unit to prevent vertical migration of contaminants in case a more permeable unit was found to be present below it.

Monitoring well 703WL01 was sampled continuously from grade to a depth of 12 feet. A petroleum odor was noted in the drill cuttings from approximately 8 feet bgs. There had been no recovery in the sample driven from 6 to 8 feet, and there was no indication of petroleum in the 8 to 10 foot sample. The boring was terminated at 10 feet and an offset hole was drilled in order to determine if there was truly petroleum present at approximately 8 feet bgs. The 6 to 8 foot sample was collected in the offset hole and submitted for laboratory analysis. The offset hole was advanced to 12 feet and completed as the monitoring well; soils were predominantly silt and sand. The water level was measured at approximately 10.5 feet bgs while drilling; the well screen was placed from 6 to 16 feet bgs.

Monitoring well 703WL02 was sampled continuously starting at 4 feet bgs to a total depth of 12 feet bgs. The only ATH result above background was the sample collected from 6 to 8 feet, which had a result of 6 PID units. This sample was also noted as having a slight petroleum odor. Water was measured while drilling at approximately 13 feet bgs. The well was screened from 6 to 16 feet bgs.

Soil samples were submitted to the laboratory for DRO, GRO, and BTEX analysis. Select samples were also submitted for PAH analysis. During the work planning stage, ADEC and

EAFB agreed that analysis for RRO would not be required at ST703 because the former UST was known to have held diesel fuel.

3.1.2 Well Development and Sampling

Monitoring well 703WL01 and 703WL02 were developed over a 2 day period as the wells were purged dry and the groundwater was slow to recover (less than 80% recovery in 3 hours). The wells were purged dry three times and considered developed.

Due to the slow groundwater recovery rate, the on-site wells were purged dry once, allowed to recover, and then samples were collected for laboratory analysis of DRO, GRO/BTEX, and PAHs.

3.2 Discussion of Findings

3.2.1 Soil Findings

Soil sample results indicate that petroleum hydrocarbons have impacted soils at ST703 in excess of Method One Level B and Method Two chemical-specific cleanup standards. Figure 3-1 shows soil locations and results, and Appendix C contains all sample results.

Following the Method Two soil cleanup standards (outlined in Section 2.8.3), the exposure pathway with the most stringent values was chosen for comparison with analytical results. Because, in most cases, the migration to groundwater exposure pathway has the most stringent cleanup values, sample results are compared to values for this exposure pathway unless otherwise noted. Table 2-3 shows cleanup standards under the migration to groundwater exposure pathway for typical petroleum hydrocarbon chemicals of concern (COCs) under the SERA program.

DRO was found in boreholes 703BH01, 703BH02, and 703BH04 in excess of the ADEC Method Two cleanup standard of 250 mg/Kg, at depths ranging from 4.5 to 6 feet bgs. These three borings are on the east and south sides of the former UST location. The highest concentration of DRO detected, 11,100 mg/Kg, was measured in 703BH04 at 5 feet bgs. In all three borings, DRO concentrations decreased with depth; it is likely that the clay and silt layer first observed at approximately 5 feet bgs is deterring further vertical migration of DRO.

Benzene was also detected in excess of the Method Two cleanup standard, 0.02 mg/Kg, in borings 703BH02 and 703BH04. The highest benzene concentration measured was 0.258 mg/Kg in 703BH04 at 10.5 feet bgs. GRO, ethylbenzene, toluene, and xylene were not detected above their respective Method Two cleanup standards.

52-668
WELL #24

DRIVEWAY

GENERAL
GROUNDWATER
FLOW
DIRECTION

APPROXIMATE
LIMITS OF EXCAVATION
AS VISUALLY IDENTIFIED
DURING 1998 RELEASE
INVESTIGATION

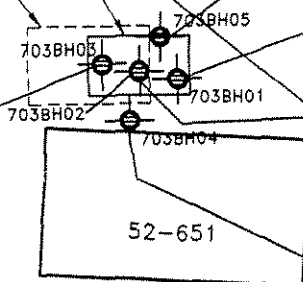
LIMITS OF EXCAVATION
AS SHOWN IN TANK
REMOVAL REPORT

Depth	6'
DRO	11.1
GRO	(1.70) U
B	(0.0426) U
T	(0.0426) U
E	(0.0426) U
X	(0.0426) U

Depth	5'	10'
DRO	285	7.75
GRO	14.3	(1.38) U
B	(0.0284) U	(0.0346) U
T	0.138	(0.0346) U
E	0.0372	(0.0346) U
X	0.1707	0.2168

Depth	2.5'
DRO	37.8
GRO	(1.14) U
B	(0.0285) U
T	(0.0285) U
E	(0.0285) U
X	(0.0285) U

Depth	4.5'	4.5' Dup.	6'
DRO	5680	4730	20.5
GRO	92.1	NA	(3.76) U
B	0.0401	NA	(0.094) U
T	0.35	NA	(0.094) U
E	0.804	NA	(0.094) U
X	3.23	NA	(0.094) U



Depth	6'
DRO	9.17 b
GRO	(2.45) U
B	(0.0613) U
T	(0.0613) U
E	(0.0613) U
X	(0.0613) U



Depth	7.5'
DRO	10.9 b
GRO	(2.85) U
B	(0.0712) U
T	(0.0712) U
E	(0.0712) U
X	(0.0712) U

Depth	5'	5' Dup.	6'	10.5'
DRO	11100	10300	3350	6.55 b
GRO	294	294	134	6.15
B	0.16	0.0718	(0.0518) U	0.258
T	0.254	1.78	0.0896	0.574
E	1.8	1.23	1.42	0.211
X	5.29	6.4	2.29	0.968

GREEN LAKE



0 15 30

APPROX. SCALE IN FEET

LEGEND

- 1998 SOIL BORING LOCATION
- 1998 MONITORING WELL LOCATION

NOTE: ANALYTICAL SOIL RESULTS
REPORTED AS mg/Kg

- UST = UNDERGROUND STORAGE TANK
- DRO = DIESEL RANGE ORGANICS
- GRO = GASOLINE RANGE ORGANICS
- B = BENZENE
- T = TOLUENE
- E = ETHYLBENZENE
- X = TOTAL XYLENES
- U = UNDETECTED AT LABORATORY MRL
- NA = NOT ANALYZED
- b = ANALYTE FOUND IN BLANK ASSOCIATED WITH SAMPLE

SOURCE: SOURCE: ELMENDORF G7-5 1995

3 CES/CEVQ
SERA VII
ELMENDORF AFB, ALASKA

FIGURE 3-1
ST703, BLDG. 52-651
1998 SOIL BORING LOCATIONS
AND SAMPLE RESULTS

DATE: 1/22/99	DRAWN BY: SSR	SCALE: AS SHOWN	DRAWING: 9000-168/ 703SB898
C/SC: 1:30	DISK: 26/98	PM: E. HEDFIELD	CHECKED: E. HEDFIELD
			PROJECT: FXSB 95701123

Two soil borings were installed farther downgradient (703WL01 and 703WL02), between the cabin and the shore of Green Lake to determine if petroleum hydrocarbons are present on the south side of the cabin. Although low levels of DRO were detected in soil samples in these two borings (9.17 and 10.9 mg/Kg DRO), DRO levels were well below the ADEC Method Two cleanup standard. GRO and BTEX compounds were not detected in these samples.

Four soil samples (those containing the highest PID readings) were also analyzed for PAHs; although low concentrations of some PAHs were detected in the soil samples, the concentrations detected are below the ADEC Method Two soil cleanup standards. This data will support the development of an alternate cleanup level (ACL) for DRO in soil.

When comparing benzene results to the ADEC Method Two cleanup standard, it is important to note that original data quality objectives for this project were based on the ADEC UST Matrix Score Sheet cleanup standards applicable at the time (18 AAC 78.315). The sensitivity goal for benzene was specified at 0.050 mg/Kg (USAF 1998b), which met the UST Matrix Score Sheet Level A cleanup standard for benzene of 0.1 mg/Kg. However, the newly promulgated Method Two soil cleanup standard for benzene of 0.02 mg/Kg is lower than the method reporting limit specified to the analytical laboratory. When significant levels of DRO and GRO were reported in project samples, dilutions were necessary to accurately report the detected BTEX compounds. These dilutions often elevated the detection limit for the BTEX compounds to greater than the Method Two benzene standard. Therefore, in cases where benzene was reported as not detected at a MRL greater than 0.02 mg/Kg, the benzene results are indeterminate when determining whether the Method Two benzene standard was exceeded.

Qualitative interpretation of DRO chromatograms show that samples from 703BH01 and 703BH02 exhibit the characteristics of a weathered middle distillate product, while samples from 703BH04 exhibit the characteristics of a middle distillate product. The Data Assessment Report, in Appendix A, provides further details on the qualitative interpretation.

A silt/clay layer was encountered at approximately 5 to 6 feet below grade on the north side of the cabin (in the tank excavation) and on the south side of the cabin. The samples collected from 2 to 6 feet bgs in BH01 were saturated; no other samples had significant free water present. Concentrations of petroleum hydrocarbons were lower in samples collected from the clay layer, indicating that the unit may be acting as a confining unit. Any water that perches above this unit would presumably migrate towards Green Lake. Figures 3-3 and 3-4 are cross section diagrams of ST703. Appendix B contains boring logs for ST703.

The lateral extent of soil contamination on the south and southeast sides of the former UST has not been fully defined. It is possible that contamination extends underneath the cabin; however, the presence of the cabin prevents further sampling immediately south of existing borings. The soils north and west of the former UST have been adequately characterized, as have the soils on the south side of the cabin.

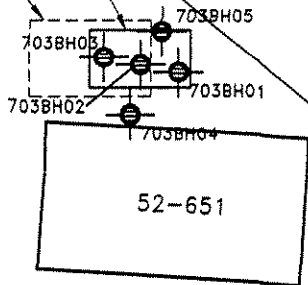
52-668
WELL #24

DRIVEWAY

GENERAL
GROUNDWATER
FLOW
DIRECTION

APPROXIMATE
LIMITS OF EXCAVATION
AS VISUALLY IDENTIFIED
DURING 1998 RELEASE
INVESTIGATION

LIMITS OF EXCAVATION
AS SHOWN IN TANK
REMOVAL REPORT



DRO	(0.102) U
GRO	(0.04) U
B	(0.001) U
T	(0.001) U
E	(0.001) U
X	(0.001) U

703WL01

703WL02

DRO	(0.11) U
GRO	(0.04) U
B	(0.001) U
T	(0.001) U
E	(0.001) U
X	(0.001) U

GREEN LAKE



0 15 30

APPROX. SCALE IN FEET

LEGEND

- 1998 SOIL BORING LOCATION
- 1998 MONITORING WELL LOCATION

- UST = UNDERGROUND STORAGE TANK
- DRO = DIESEL RANGE ORGANICS
- GRO = GASOLINE RANGE ORGANICS
- B = BENZENE
- T = TOLUENE
- E = ETHYLBENZENE
- X = TOTAL XYLENES
- U = UNDETECTED AT LABORATORY MRL

NOTE: ANALYTICAL WATER RESULTS
REPORTED AS mg/L

SOURCE: SOURCE: ELMENDORF G7-5 1995

3 CES/CEVQ
SERA VII
ELMENDORF AFB, ALASKA

FIGURE 3-2

ST703, BLDG. 52-651
1998 GROUNDWATER SAMPLE RESULTS

DATE: 1/22/99	DRAWN BY: SSR	SCALE: AS SHOWN	DRAWING: 9000-168/ 703GW898
C/SC: 1:30	DISK: 2698	PM: E. HEDFIELD	CHECKED: E. HEDFIELD
			PROJECT: FXSB 95701123

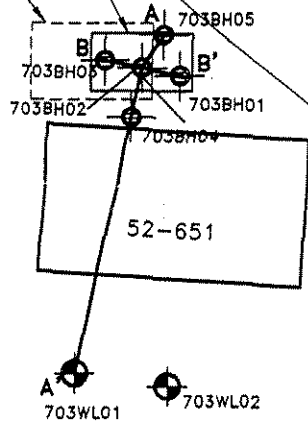
52-668
WELL #24

DRIVEWAY

GENERAL
GROUNDWATER
FLOW
DIRECTION

APPROXIMATE
LIMITS OF EXCAVATION
AS VISUALLY IDENTIFIED
DURING 1998 RELEASE
INVESTIGATION

LIMITS OF EXCAVATION
AS SHOWN IN TANK
REMOVAL REPORT





GREEN LAKE



0 15 30

APPROX. SCALE IN FEET

LEGEND

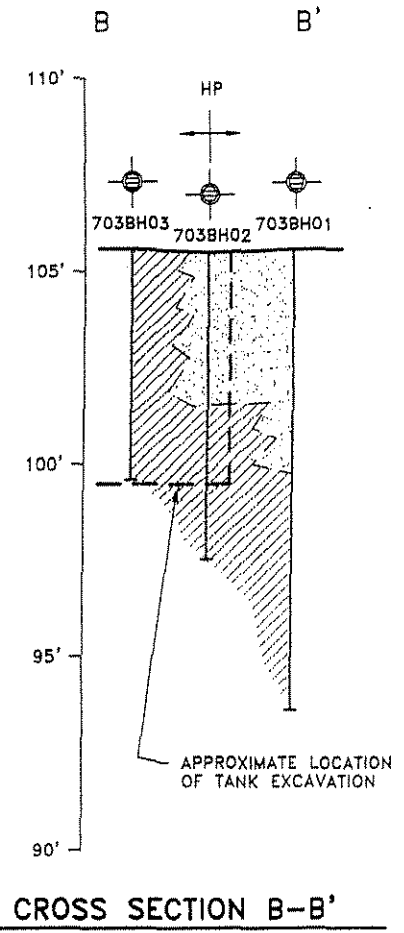
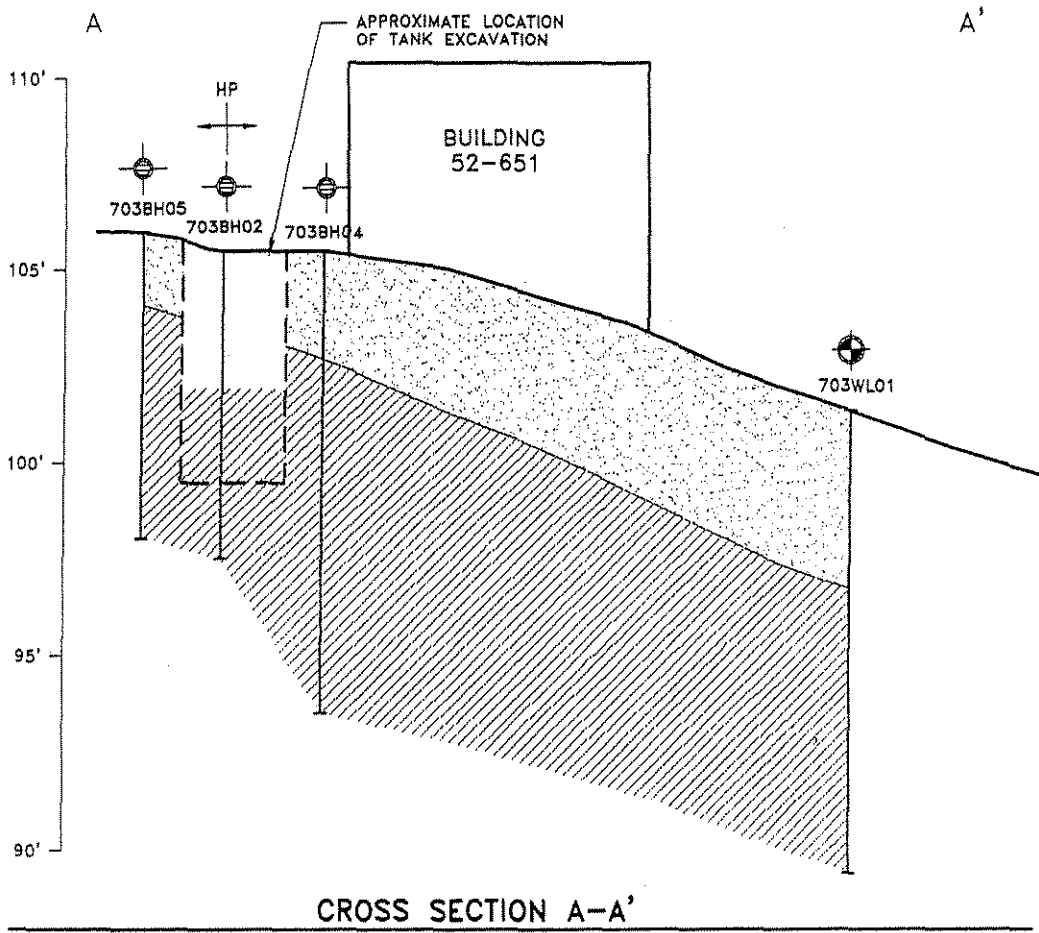
-  1998 SOIL BORING LOCATION
-  1998 MONITORING WELL LOCATION

SOURCE: SOURCE: ELMENDORF G7-5 1995



3 CES/CEVQ
SERA VII
ELMENDORF AFB, ALASKA

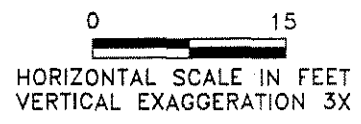
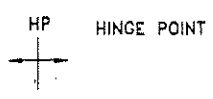
FIGURE 3-3
ST703, BLDG. 52-651
SITE MAP SHOWING
CROSS SECTIONS

DATE: 1/13/99	DRAWN BY: SSR	SCALE: AS SHOWN	DRAWING: 9000-168/ 70398
C/SC: 1:30	DISK: 26/98	PM: E. HEDFIELD	CHECKED: E. HEDFIELD
			PROJECT: FXSB 95701123



LEGEND

-  SANDS AND GRAVELS (<12% FINES)
-  SILT/CLAY, SAND AND GRAVELS W/>12% FINES



DRAWING: 9000-168/
703CS98

DRAWN: SR

C/SC: 1:15

DISK: 26/98

DATE: 10/09/98

CHECK: J.S.

FIGURE 3-4

ST703, BLDG. 52-651

CROSS SECTIONS A-A' AND B-B'

3 CES/CEVQ

SERA VII

ELMENDORF AFB, ALASKA

PROJECT FXSB 95701123

APPENDIX D

**Data Quality Assessment
Analytical Data Package**

Sample Summary Table

Location	Sample ID	Laboratory	Lab Sample ID	Collection Date	Matrix	Secondary Lab	Secondary Lab Sample ID
JE01ELM-ST703SP01-01SO	EL-A200801	CTE	1014345006	7/13/01	SO		
JE01ELM-ST703SP02-01SO	EL-A200802	CTE	1014345007	7/13/01	SO		
JE01ELM-ST703SP03-01SO	EL-A200803	CTE	1014345008	7/13/01	SO		
JE01ELM-ST703SP04-01SO	EL-A200804	CTE	1014345009	7/13/01	SO		
JE01ELM-ST703SP05-01SO	EL-A200805	CTE	1014345010	7/13/01	SO		
JE01ELM-ST703SP06-01SO	EL-A200806	CTE	1014345011	7/13/01	SO		
JE01ELM-ST703SP07-01SO	EL-A200807	CTE	1014345012	7/13/01	SO		
JE01ELM-ST703SP8	EL-A200808	CTE	1014345013	7/13/01	SO		
JE01ELM-ST703SP04-02SO	EL-A201201	CTE	1014792001	7/23/01	SO	-	-
	EL-A201402	CTE	1014792002	7/28/01	SO	CAS	K2105461-001
	EL-A201402	CTE	1014792003	7/28/01	SO	CAS	K2105461-002

DATA QUALITY ASSESSMENT

Sample collection, handling, analysis and reporting procedures were followed as defined in the Field Sampling Plan (FSP) and Quality Assurance Project Plans (QAPP). Most data acceptance criteria were met with the few exceptions defined in this section.

The analytical data was provided by the laboratory in both hardcopy and electronic formats. One hundred percent of the analytical hardcopy data and fifty percent of the electronic data was reviewed. The primary laboratory, CT&E Environmental Services, Inc. (CT&E), supported the analytical requirements of the 2001 field effort.

The completeness check and electronic data review was done by Jacobs. This process included a review of the analytical methodology, chain of custody (COC) and sample receipt records, sample holding times, laboratory and field blank results, analytical reporting limits, surrogates, laboratory control samples, calibrations, matrix spikes and duplicates, run logs, and extraction logs. The data were reviewed against the Quality Assurance Project Plan and EPA *National Functional Guidelines* (EPA 1994, 1999).

The quality assurance project plan (QAPP), laboratory acceptance criteria and the Environmental Protection Agency (EPA) *National Functional Guidelines* (EPA 1994, 1999) were referenced by Jacobs to assess the data usability and apply validation qualifiers to the summary tables. The Jacobs project chemist performed a completeness check on the hardcopy data and reviewed the hardcopy and electronic data to evaluate comparability and accuracy. The review process did not include verification of calculations.

The analytical data quality objectives (DQO) for this field investigation shall be met when the quality of the sample data meet precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS) requirements as defined in the field sampling plan (FSP), QAPP, laboratory quality assurance project plan (LQAPP), and analytical methods. These DQO were evaluated by reviewing the following QA parameters and criteria:

- PRECISION
 - Matrix Spike Duplicates (MSD); and
 - Field Duplicates.

- ACCURACY
 - Calibrations - initial and continuing; acceptance, frequency;
 - Surrogates - recovery, frequency;
 - Lab Control Samples/Spikes (LCS);
 - Matrix Spikes (MS);
 - Retention Times;
 - Relative Response Factors (RRFs); Relative Standard Deviation (%RSD);
 - Method Blanks;
 - Tune Criteria gas chromatography/mass spectroscopy (GC/MS) - acceptability, frequency; and
 - Internal Standards (GC/MS) - acceptability, frequency.

- REPRESENTATIVENESS
 - Sample Chain-of-Custody;
 - Holding Times and Preservation; and
 - Work Plans.

- COMPARABILITY
 - Standard Operating Procedures (SOPs); and
 - Established analytical methods.

- COMPLETENESS
 - Samples (field, QA, and QC);
 - Data Packages (forms, runlogs, extraction logs, etc.); and
 - Ninety-five percent completeness.

- SENSITIVITY
 - Analytical laboratory reporting limits

All reported data within this package should be considered valid unless otherwise noted and may be biased (qualifications noted in the body of this report). The qualifiers used to flag data are defined as follows:

- “U” - synonymous with “ND” for nondetect; not detected above the reporting limit (practical quantitation limit); final numerical result becomes the reporting limit flagged with “U.”
- “J” - analyte was positively identified, but numerical value of concentration is approximate due to compromised quality control or inherent inability to analyze the sample (e.g. matrix effects).
- “UJ” - the analyte was not reported above the practical quantitation limit, but the reported quantitation limit is approximate (due to compromised quality control or inherent inability to analyze the sample).
- “UR” - the analyte was not detected above the reporting limit, but sample results were rejected due to significant deficiencies in quality control(s) or inherent ability to analyze the sample (e.g. matrix effects).

The qualifiers listed above, or “flags”, are hyphenated in the report to reflect the basic rationale behind the qualification (e.g. “J-S”). The following qualifiers were used in the text of this report to indicate which QA/QC protocols were not met:

- S - surrogate recovery;
- L - lab control sample;
- C - calibration;
- T - instrument 12-hour tuning criteria;
- M - matrix spike and/or spike duplicate;
- I - internal standard;
- B - method blank;
- H - holding times;
- P - incorrect or inadequate preservation methods;
- E - value exceeds instrument calibration range;
- TE – sample cooler temperatures; and
- UB/RL – although the analyte was detected, the result should be considered nondetected at the reporting limit or reported value due to potential laboratory contamination.

DATA QUALITY SUMMARY

In general, the overall quality of the data was acceptable. The data quality was determined as acceptable, estimated, or rejected. Acceptable data are associated with QC data that meet all QC criteria or with QC samples that did not meet QC criteria but data quality objectives were not affected. Estimated (J) results are considered inaccurate due to a bias created by matrix interference or QC acceptance criteria which were not met. Rejected data are not usable.

All Chain-of-Custody (COC) sample identification numbers include EL (Elmendorf – various sites), -A (Alaska), four numbers (COC number) followed by two additional numbers that identify the samples collected in sequence that are specific to the location and analytical suite of analyses (i.e. EL-A200801). This sample appears on COC number 2008, and is the first sample collected for GRO. For ease in referring to the results tables and readability of this report, the last six digits of the sample identification number will be used to identify each sample (i.e. 200801 would identify EL-A200801 found on COC # 2008). The original COC is on file in the Jacobs Anchorage office with the original data package. An extra dash was occasionally used on this project to separate the sample number from the COC number (e.g. EL-A2008-01) and will remain unchanged in this text as it appears in the analytical summary table, data tables, and COCs.

The term “positive result(s)” is used to identify all analytes that are detected above the laboratory reporting limit. The term “nondetected” refers to results that are less than the laboratory reporting limit and are therefore not reported by the laboratory. “All results” refers to both nondetected and positive results. Details of the evaluation are provided in the following section by method and include the associated samples and analytes:

Gasoline Range Organics (GRO) AK101. Overall, the quality of the data are acceptable with the following qualifications:

- Holding Times and Sample Handling: All holding time and sample handling criteria were met.
- Method Blanks: GRO was not detected in the method blanks.
- Reporting Limits: All minimum reporting limit requirements were met.
- Surrogates: Surrogate recoveries exceeded recovery limits for samples EL-A200801, EL-A200802, EL-A200803, and EL-A200804 due to matrix interference. Sample results are considered estimated (J-S).
- LCS: All acceptance criteria were met.
- Calibration: All acceptance criteria were met.
- MS/MSD: All acceptance criteria were met.

Benzene, Toluene, Ethylbenzene, and Total Xylenes (BTEX) by SW8260B. Overall, the quality of the data are acceptable with the following qualifications:

- Holding Times and Sample Handling: All holding time and sample handling criteria were met.
- Method Blanks: Target analytes were not detected in the method blanks; therefore, data were not qualified based on this criteria.
- Reporting Limits: All minimum reporting limit requirements were met.
- Surrogates: All acceptance criteria were met.
- LCS: All acceptance criteria were met.
- Calibration: All acceptance criteria were met.
- MS/MSD: All acceptance criteria were met.

Diesel Range/Residual Range Organics (DRO/RRO) AK102/103. Overall, the quality of the data are acceptable with the following qualifications:

- Holding Times and Sample Handling: All hold time criteria were met.
- Method Blanks: Target analytes were not detected in the method blanks; therefore, data were not qualified based on this criteria.
- Reporting Limits: All minimum reporting limit requirements were met.
- Surrogates: Surrogate recoveries in EL-A200802, EL-A200803, EL-A200806 and EL-A201201 exceeded limits due to matrix interference. Surrogate recovery limits were exceeded in sample EL-A200804 due to dilution. The results in these samples are considered estimated (J-S).
- LCS: All acceptance criteria were met.
- Calibration: All acceptance criteria were met.
- MS/MSD: All acceptance criteria were met

Total Organic Carbon (TOC) SW9060

. Overall, the quality of the data are acceptable with the following qualifications:

- Holding Times and Sample Handling: All hold time criteria were met.
- Method Blanks: Target analytes were not detected in the method blanks; therefore, data were not qualified based on this criteria.
- Reporting Limits: All minimum reporting limit requirements were met.
- Surrogates: All acceptance criteria were met.
- LCS: All acceptance criteria were met
- Calibration: All acceptance criteria were met.
- MS/MSD: All acceptance criteria were met.

Considering these noncompliance issues the data are still considered usable. The overall project completeness goal of 95 percent was met.

Location	E01ELM-ST703SP01-01SO	JE01ELM-ST703SP02-01SO	JE01ELM-ST703SP03-01SO	JE01ELM-ST703SP04-01SO	JE01ELM-ST703SP05-01SO
Sample ID	EL-A200801	EL-A200802	EL-A200803	EL-A200804	EL-A200805
Laboratory	CTE	CTE	CTE	CTE	CTE
Lab Sample ID	1014345006	1014345007	1014345008	1014345009	1014345010
Collection Date	7/13/01	7/13/01	7/13/01	7/13/01	7/13/01
Matrix	SO	SO	SO	SO	SO

Analyte	Method	Units										
Total Solids	A2540G	PERCENT	90.4	[0]	91.3	[0]	92.4	[0]	90	[0]	85.7	[0]
Gasoline Range Organics	AK101	MG/KG	41.3	[3.77]J-S	36.3	[3.61]J-S	11.6	[3.86]J-S	287	[27.4]J-S	ND	[3.86]
Diesel Range Organics	AK102	MG/KG	45.7	[11.4]J-S	369	[11]J-S	25.4	[11.2]J-S	6080	[110]J-S	11.5	[11.5]
Total Organic Carbon (TOC) SW9060		MG/KG										
Total Organic Carbon (TOC) D4129		PERCENT										
Benzene	SW8260B	MG/KG	ND	[0.0196]	ND	[0.0188]	ND	[0.02]	0.0159	[0.0285]J	ND	[0.0201]
Ethylbenzene	SW8260B	MG/KG	ND	[0.0377]	ND	[0.0361]	ND	[0.0386]	0.149	[0.0548]	ND	[0.0386]
Toluene	SW8260B	MG/KG	0.0279	[0.0377]J	0.026	[0.0361]J	0.0285	[0.0386]J	0.121	[0.0548]	0.0347	[0.0386]J
Total Xylenes	SW8260B	MG/KG	0.026	[0.0377]J	0.0238	[0.0361]J	0.0239	[0.0386]J	0.3046	[0.0548]	0.0266	[0.0386]J

Notes:
 J= Result is below laboratory reporting limits and is considered estimated (J)
 ND= Analyte not detected
 [] = laboratory reporting limit

Location	JE01ELM-ST703SP06-01SO	JE01ELM-ST703SP07-01SO	JE01ELM-ST703SP8	JE01ELM-ST703SP04-02SO			
Sample ID	EL-A200806	EL-A200807	EL-A200808	EL-A201201	EL-A2014 01/1014792002	EL-A2014 02/1014792003	
Laboratory	CTE	CTE	CTE	CTE	CASK	CASK	
Lab Sample ID	1014345011	1014345012	1014345013	1014792001	K210546101	K210546102	
Collection Date	7/13/01	7/13/01	7/13/01	7/23/01	7/28/01	7/28/01	
Matrix	SO	SO	SO	SO	SO	SO	

Analyte	Method	Units								
Total Solids	A2540G	PERCENT	90.2	[0]	91	[0]	95.2	[0]	87.2	[0]
Gasoline Range Organics	AK101	MG/KG	15.6	[2.78]	ND	[3.68]	ND	[3.3]	-	-
Diesel Range Organics	AK102	MG/KG	378	[11.4]	6.78	[11.1] J	ND	[10.4]	4850	[144] J-S
Total Organic Carbon (TOC) SW9060		MG/KG							-	-
Total Organic Carbon (TOC) D4129		PERCENT							2800	[500]
Benzene	SW8260B	MG/KG	ND	[0.0145]	ND	[0.0191]	ND	[0.0172]	-	-
Ethylbenzene	SW8260B	MG/KG	0.0145	[0.0278] J	ND	[0.0368]	ND	[0.033]	-	-
Toluene	SW8260B	MG/KG	0.0253	[0.0278] J	0.0298	[0.0368] J	0.0264	[0.033] J	-	-
Total Xylenes	SW8260B	MG/KG	0.02	[0.0278] J	0.0269	[0.0368] J	0.0201	[0.033] J	-	-

Notes:
 J= Result is less than laboratory reporting limits and is considered estimated (J)
 ND= Analyte is nondetect
 [] = laboratory reporting limit



4300 B STREET, SUITE 600, ANCHORAGE, ALASKA 99503-5922
TELEPHONE (907) 563-3322 FAX (907) 563-3320

CHAIN OF CUSTODY RECORD

USE A BALLPOINT PEN, BLACK INK, AND PRESS FIRMLY. INSTRUCTIONS ARE ON THE BACK Page 1 of 2

PROJECT NAME: <i>Elmendorf SERA sites</i>					LABORATORY NAME & ADDRESS: <i>CT&E Environmental Services</i>				
PROJECT NUMBER: <i>05m31201</i>					200 W. Kotze Drive				
WBS CODE:			CONTRACT / D.O. No.		Anchorage, AK 99518				
Jesse Container Control #)	COLLECTION		DATE	TIME	METHOD	TEMP	SO	ANALYSIS REQUESTED	LABORATORY CONTROL
	SAMPLE NUMBER	DATE							
6) EL-A2008 01	7/13/01	1545	WW	1	4oz. glass Septum	methanol, 40C	SO	AK101, SW82608 (BTEX)	
EL-A2008 01	7/13/01	1545	WW	1	8oz. glass Amber	40C	SO	AK102	
7) EL-A2008 02	7/13/01	1555	WW	1	4oz. glass Septum	methanol, 40C	SO	AK101, SW82608 (BTEX)	
EL-A2008 02	7/13/01	1555	WW	1	8oz. glass Amber	40C	SO	AK102	
8) EL-A2008 03	7/13/01	1600	WW	1	4oz. glass Septum	methanol, 40C	SO	AK101, SW82608 (BTEX)	
EL-A2008 03	7/13/01	1600	WW	1	8oz. glass Amber	40C	SO	AK102	
9) EL-A2008 04	7/13/01	1610	WW	1	4oz. glass Septum	methanol, 40C	SO	AK101, SW82608 (BTEX)	
EL-A2008 04	7/13/01	1610	WW	1	8oz. glass Amber	40C	SO	AK102	
10) EL-A2008 05	7/13/01	1620	WW	1	4oz. glass Septum	methanol, 40C	SO	AK101, SW82608 (BTEX)	
COMMENTS:									
COLLECTED & RELEASED BY: <i>L. W. M.</i> DATE: <i>7/13/01</i> TIME: <i>17:05</i> TURNAROUND TIME: <i>7 day TAT</i>									
RECEIVED BY: <i>Weatherhead</i> DATE: <i>7/13/01</i> TIME: <i>17:15</i> RELINQUISHED BY: DATE: TIME:									
RECORD RETURNED BY: DATE: TIME: SHIPPING NUMBER:									

1014345
RUSH



4300 B STREET, SUITE 800, ANCHORAGE, ALASKA 99503-5922
TELEPHONE (907) 563-3322 FAX (907) 563-3320

CHAIN OF CUSTODY RECORD

USE A BALLPOINT PEN, BLACK INK, AND PRESS FIRMLY. INSTRUCTIONS ARE ON THE BACK Page 2 of 2

PROJECT NAME: Elmendorf SERA SITES				LABORATORY NAME & ADDRESS: CT&E Environmental Services				
PROJECT NUMBER: 05m31201				200 W. Potter Drive				
WBS CODE:		CONTRACT / D.O. No.		Anchorage, AK 99518				
(Jesse-Container Control #)	COLLECTION		DATE	TIME	METHOD	VOL	SD	ANALYSIS
	SAMPLE NUMBER	DATE						
10) EL-A2008 05	7/13/01	1620	WN	1	802 glass amber	40L	SD	AK102
11) EL-A2008 06	7/13/01	1625	WN	1	402 glass Septum	method, 40L	SD	AK101, SW8260B (BTEX)
12) EL-A2008 06	7/13/01	1625	NW	1	802 glass Septum	40L	SD	AK102
EL-A2008 07	7/13/01	1635	WN	1	402 glass Septum	method, 40L	SD	AK101, SW8260B (BTEX)
EL-A2008 07	7/13/01	1635	WN	1	802 glass Septum	40L	SD	AK102
EL-A2008 08	7/13/01	1645	WN	1	402 glass Septum	method, 40L	SD	AK101, SW8260B (BTEX)
EL-A2008 08	7/13/01	1645	NW	1	802 glass amber	40L	SD	AK102
COMMENTS:								
COLLECTED & RELEASED BY <i>E. Wall</i>			DATE 7/13/01	TIME 17:05	TURNAROUND TIME 7 day TAT			
RECEIVED BY <i>Weatherford</i>			DATE 7/13/01	TIME 17:45	RELINQUISHED BY			DATE / /
RECORD RETURNED BY			DATE / /	TIME :	SHIPPING NUMBER:			

1014345
RUSH

Case Narrative

Customer: JACOBSE

Jacobs Engineering Group

Project: 1014345

Elmendorf SERA Sites 05M31201

NPDL WO: NA

1014345001 PS

DRO/RRO - Unknown hydrocarbon with several peaks.

DRO/RRO - Surrogate recoveries are outside controls due to matrix interference.

1014345002 PS

DRO/RRO - Unknown hydrocarbon with several peaks.

DRO - Surrogate recovery is outside controls due to matrix interference.

1014345003 PS

DRO/RRO - Pattern consistent with weathered middle distillate.

DRO/RRO - Surrogate recoveries are outside controls due to matrix interference.

GRO/BTEX - Surrogate recovery is biased high due to matrix interference. Results are not affected.

1014345006 PS

DRO - Pattern consistent with weathered middle distillate.

GRO/BTEX - Surrogate recovery is biased high due to matrix interference. Results are not affected.

1014345007 PS

DRO - Pattern consistent with weathered middle distillate.

DRO - Surrogate recovery is outside controls due to matrix interference.

GRO/BTEX - Surrogate recovery is biased high due to matrix interference. Results are not affected.

1014345008 PS

DRO - Pattern consistent with weathered middle distillate.

DRO - Surrogate recovery is outside controls due to matrix interference.

1014345009 PS

DRO - Pattern consistent with weathered middle distillate.

DRO - Surrogate recovery is outside controls due to matrix interference.

GRO/BTEX - Surrogate recovery is biased high due to matrix interference. Results are not affected.

1014345010 PS

DRO - Unknown hydrocarbon with several peaks.

1014345011 PS

DRO - Pattern consistent with weathered middle distillate.

DRO - Surrogate recovery is outside controls due to matrix interference.

1014345014 BMS

DRO/RRO - Surrogate/s are biased high due to interference by method required petroleum spike.

PAHSIM - MS recovery for Acenaphthylene, Fluoranthene, Pyrene and Benzo(b)fluoranthene is outside QC goals.

The LCS/LCSD met all recovery and RPD goals. The results are not significantly affected.

8260 - Surrogate 4-Bromofluorobenzene is biased high and did not meet QC recovery goals. All internal standards met QC recovery goals.

RRO - MS does not meet recovery goals. Sample may not be homogeneous.

Case Narrative

Customer: JACOBSE

Jacobs Engineering Group

Project: 1014345

Elmendorf SERA Sites 05M31201

NPDL WO: NA

1014345015 BMSD

DRO/RRO - Surrogate/s are biased high due to interference by method required petroleum spike.

PAHSIM - MS recovery for Acenaphthylene, Fluoranthene, Pyrene and Benzo(b)fluoranthene is outside QC goals. The LCS/LCSD met all recovery and RPD goals. The results are not significantly affected.

PAHSIM - RPD for Acenaphthylene is outside QC goals. The LCS/LCSD met all recovery and RPD goals. The results are not significantly affected.

8260 - Surrogate 4-Bromofluorobenzene is biased high and did not meet QC recovery goals. All internal standards met QC recovery goals.

378244 LCS

DRO/RRO LCS/LCSD - Surrogate/s are biased high due to interference by method required petroleum spike.

379273 LCS

DRO/RRO LCS/LCSD - Surrogate/s are biased high due to interference by method required petroleum spike.

378245 LCSD

DRO/RRO LCS/LCSD - Surrogate/s are biased high due to interference by method required petroleum spike.

379274 LCSD

DRO/RRO LCS/LCSD - Surrogate/s are biased high due to interference by method required petroleum spike.

379167 CCV

PAHSIM - CCV recovery for Phenanthrene (biased high) and Anthracene (biased low) is outside QC goals. These compounds were not reported under this CCV. The results are not significantly affected.



CT&E Ref.# 1014345006
 Client Name Jacobs Engineering Group
 Project Name/# Elmendorf SERA Sites 05M31201
 Client Sample ID EL-A200801
 Matrix Soil/Solid
 Ordered By

Client PO#
 Printed Date/Time 07/27/2001 20:43
 Collected Date/Time 07/13/2001 15:45
 Received Date/Time 07/13/2001 17:45
 Technical Director Stephen C. Ede

Released By *Heather Hall*

Sample Remarks:

DRO/RRO - Pattern consistent with weathered middle distillate.
 GRO/BTEX - Surrogate recovery is biased high due to matrix interference. Results are not affected.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
<u>Solids</u>								
Total Solids	90.4	0.00	%	SM20 2540G			07/17/01	DMR
<u>Volatile Fuels Department</u>								
Gasoline Range Organics	41.3	3.77	mg/Kg	AK101 GRO		07/13/01	07/22/01	RMV
<u>Surrogates</u>								
1,4-Difluorobenzene <Surr>	87.4		%	AK101 GRO	60-120	07/13/01	07/22/01	RMV
4-Bromofluorobenzene <Surr>	394	!	%	AK101 GRO	50-150	07/13/01	07/22/01	RMV
<u>Semivolatile Organic Fuels Department</u>								
Diesel Range Organics	45.7	11.4	mg/Kg	AK102 DRO		07/16/01	07/17/01	MCM
<u>Surrogates</u>								
5a Androstane <surr>	118		%	AK102 DRO	50-150	07/16/01	07/17/01	MCM
<u>Volatile Gas Chromatography/Mass Spectroscopy</u>								
Benzene	0.0196 U	0.0196	mg/Kg	BTEX by SW8260B		07/13/01	07/19/01	GMD
Toluene	0.0279	0.0196	mg/Kg	BTEX by SW8260B		07/13/01	07/19/01	GMD
Ethylbenzene	0.0196 U	0.0196	mg/Kg	BTEX by SW8260B		07/13/01	07/19/01	GMD
P & M -Xylene	0.0260	0.0196	mg/Kg	BTEX by SW8260B		07/13/01	07/19/01	GMD
o-Xylene	0.0196 U	0.0196	mg/Kg	BTEX by SW8260B		07/13/01	07/19/01	GMD
<u>Surrogates</u>								
1,2-Dichloroethane-D4 <surr>	94		%	BTEX by SW8260B	74-133	07/13/01	07/19/01	GMD
Toluene-d8 <surr>	96.9		%	BTEX by SW8260B	78-134	07/13/01	07/19/01	GMD
4-Bromofluorobenzene <Surr>	82.5		%	BTEX by SW8260B	72-141	07/13/01	07/19/01	GMD



CT&E Ref.# 1014345006
Client Name Jacobs Engineering Group
Project Name/# Elmendorf SERA Sites 05M31201
Client Sample ID EL-A200801
Matrix Soil/Solid
Ordered By

Client PO#
Printed Date/Time 07/27/2001 20:43
Collected Date/Time 07/13/2001 15:45
Received Date/Time 07/13/2001 17:45
Technical Director Stephen C. Ede

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
<u>Volatile Gas Chromatography/Mass Spectroscopy</u>								
Dibromofluoromethane <sur>	101		%	BTEX by SW8260B	78-128	07/13/01	07/19/01	GMD



CT&E Ref.# 1014345007
 Client Name Jacobs Engineering Group
 Project Name/# Elmendorf SERA Sites 05M31201
 Client Sample ID EL-A200802
 Matrix Soil/Solid
 Ordered By

Client PO#
 Printed Date/Time 07/27/2001 20:43
 Collected Date/Time 07/13/2001 15:55
 Received Date/Time 07/13/2001 17:45
 Technical Director Stephen C. Ede

Released By *Deborah Hall*

Sample Remarks:

DRO/RRO - Pattern consistent with weathered middle distillate.
 DRO/RRO - Surrogate recoveries are outside controls due to matrix interference.
 GRO/BTEX - Surrogate recovery is biased high due to matrix interference. Results are not affected.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	91.3	0.00	%	SM20 2540G			07/17/01	DMR
Volatile Fuels Department								
Gasoline Range Organics	36.3	3.61	mg/Kg	AK101 GRO		07/13/01	07/22/01	
Surrogates								
1,4-Difluorobenzene <Surr>	86.9		%	AK101 GRO	60-120	07/13/01	07/22/01	RMV
4-Bromofluorobenzene <Surr>	234	!	%	AK101 GRO	50-150	07/13/01	07/22/01	RMV
Semivolatile Organic Fuels Department								
Diesel Range Organics	369	11.0	mg/Kg	AK102 DRO		07/16/01	07/17/01	MCM
Surrogates								
5a Androstane <surr>	241	!	%	AK102 DRO	50-150	07/16/01	07/17/01	MCM
Volatile Gas Chromatography/Mass Spectroscopy								
Benzene	0.0188 U	0.0188	mg/Kg	BTEX by SW8260B		07/13/01	07/19/01	GMD
Toluene	0.0260	0.0188	mg/Kg	BTEX by SW8260B		07/13/01	07/19/01	GMD
Ethylbenzene	0.0188 U	0.0188	mg/Kg	BTEX by SW8260B		07/13/01	07/19/01	GMD
P & M -Xylene	0.0238	0.0188	mg/Kg	BTEX by SW8260B		07/13/01	07/19/01	GMD
o-Xylene	0.0188 U	0.0188	mg/Kg	BTEX by SW8260B		07/13/01	07/19/01	GMD
Surrogates								
1,2-Dichloroethane-D4 <surr>	93.9		%	BTEX by SW8260B	74-133	07/13/01	07/19/01	
Toluene-d8 <surr>	99		%	BTEX by SW8260B	78-134	07/13/01	07/19/01	GMD



CT&E Ref.# 1014345007
Client Name Jacobs Engineering Group
Project Name/# Elmendorf SERA Sites 05M31201
Client Sample ID EL-A200802
Matrix Soil/Solid
Ordered By

Client PO#
Printed Date/Time 07/27/2001 20:43
Collected Date/Time 07/13/2001 15:55
Received Date/Time 07/13/2001 17:45
Technical Director Stephen C. Ede

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
<u>Volatile Gas Chromatography/Mass Spectroscopy</u>								
4-Bromofluorobenzene <Surr>	85.2		%	BTEX by SW8260B	72-141	07/13/01	07/19/01	GMD
Dibromofluoromethane <surr>	98.8		%	BTEX by SW8260B	78-128	07/13/01	07/19/01	GMD



CT&E Ref.# 1014345008
 Client Name Jacobs Engineering Group
 Project Name/# Elmendorf SERA Sites 05M31201
 Client Sample ID EL-A200803
 Matrix Soil/Solid
 Ordered By

Client PO#
 Printed Date/Time 07/27/2001 20:43
 Collected Date/Time 07/13/2001 16:00
 Received Date/Time 07/13/2001 17:45
 Technical Director Stephen C. Ede

Released By *Maathey Hall*

Sample Remarks:

DRO - Pattern consistent with weathered middle distillate.
 DRO - Surrogate recoveries outside controls due to matrix interference.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	92.4	0.00	%	SM20 2540G			07/17/01	DMR
Volatile Fuels Department								
Gasoline Range Organics	11.6	3.86	mg/Kg	AK101 GRO		07/13/01	07/22/01	RMV
Surrogates								
1,4-Difluorobenzene <Surr>	86.4		%	AK101 GRO	60-120	07/13/01	07/22/01	RMV
4-Bromofluorobenzene <Surr>	62.1		%	AK101 GRO	50-150	07/13/01	07/22/01	RMV
Semivolatile Organic Fuels Department								
Diesel Range Organics	25.4	11.2	mg/Kg	AK102 DRO		07/16/01	07/17/01	MCM
Surrogates								
5a Androstane <surr>	152	!	%	AK102 DRO	50-150	07/16/01	07/17/01	MCM
Volatile Gas Chromatography/Mass Spectroscopy								
Benzene	0.0200 U	0.0200	mg/Kg	BTEX by SW8260B		07/13/01	07/19/01	GMD
Toluene	0.0285	0.0200	mg/Kg	BTEX by SW8260B		07/13/01	07/19/01	GMD
Ethylbenzene	0.0200 U	0.0200	mg/Kg	BTEX by SW8260B		07/13/01	07/19/01	GMD
P & M -Xylene	0.0239	0.0200	mg/Kg	BTEX by SW8260B		07/13/01	07/19/01	GMD
o-Xylene	0.0200 U	0.0200	mg/Kg	BTEX by SW8260B		07/13/01	07/19/01	GMD
Surrogates								
1,2-Dichloroethane-D4 <surr>	96.4		%	BTEX by SW8260B	74-133	07/13/01	07/19/01	GMD
Toluene-d8 <surr>	95.3		%	BTEX by SW8260B	78-134	07/13/01	07/19/01	GMD
4-Bromofluorobenzene <Surr>	81		%	BTEX by SW8260B	72-141	07/13/01	07/19/01	GMD



CT&E Ref.# 1014345008
Client Name Jacobs Engineering Group
Project Name/# Elmendorf SERA Sites 05M31201
Client Sample ID EL-A200803
Matrix Soil/Solid
Ordered By

Client PO#
Printed Date/Time 07/27/2001 20:43
Collected Date/Time 07/13/2001 16:00
Received Date/Time 07/13/2001 17:45
Technical Director Stephen C. Ede

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
<u>Volatile Gas Chromatography/Mass Spectroscopy</u>								
Dibromofluoromethane <sur>	101		%	BTEX by SW8260B	78-128	07/13/01	07/19/01	GMD



CT&E Ref.# 1014345009
 Client Name Jacobs Engineering Group
 Project Name/# Elmendorf SERA Sites 05M3 1201
 Client Sample ID EL-A200804
 Matrix Soil/Solid
 Ordered By

Client PO#
 Printed Date/Time 07/27/2001 20:43
 Collected Date/Time 07/13/2001 16:10
 Received Date/Time 07/13/2001 17:45
 Technical Director Stephen C. Ede

Released By *Heather Hall*

Sample Remarks:

DRO/RRO - Pattern consistent with weathered middle distillate.
 DRO/RRO - Surrogate recoveries are outside controls due to matrix interference.
 GRO/BTEX - Surrogate recovery is biased high due to matrix interference. Results are not affected.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	90.0	0.00	%	SM20 2540G			07/17/01	DMR
Volatile Fuels Department								
Gasoline Range Organics	287	27.4	mg/Kg	AK101 GRO		07/13/01	07/22/01	
Surrogates								
1,4-Difluorobenzene <Surr>	85.4		%	AK101 GRO	60-120	07/13/01	07/22/01	RMV
4-Bromofluorobenzene <Surr>	1050	!	%	AK101 GRO	50-150	07/13/01	07/22/01	RMV
Semivolatile Organic Fuels Department								
Diesel Range Organics	6080	110	mg/Kg	AK102 DRO		07/16/01	07/18/01	MCM
Surrogates								
5a Androstane <surr>	1060	!	%	AK102 DRO	50-150	07/16/01	07/18/01	MCM
Volatile Gas Chromatography/Mass Spectroscopy								
Benzene	0.0159F	0.0285	mg/Kg	BTEX by SW8260B		07/13/01	07/19/01	GMD
Toluene	0.121	0.0285	mg/Kg	BTEX by SW8260B		07/13/01	07/19/01	GMD
Ethylbenzene	0.149	0.0285	mg/Kg	BTEX by SW8260B		07/13/01	07/19/01	GMD
P & M -Xylene	0.252	0.0285	mg/Kg	BTEX by SW8260B		07/13/01	07/19/01	GMD
o-Xylene	0.0526	0.0285	mg/Kg	BTEX by SW8260B		07/13/01	07/19/01	GMD
Surrogates								
1,2-Dichloroethane-D4 <surr>	92.2		%	BTEX by SW8260B	74-133	07/13/01	07/19/01	
Toluene-d8 <surr>	97.4		%	BTEX by SW8260B	78-134	07/13/01	07/19/01	GMD



CT&E Ref.# 1014345009
 Client Name Jacobs Engineering Group
 Project Name/# Elmendorf SERA Sites 05M31201
 Client Sample ID EL-A200804
 Matrix Soil/Solid
 Ordered By

Client PO#
 Printed Date/Time 07/27/2001 20:43
 Collected Date/Time 07/13/2001 16:10
 Received Date/Time 07/13/2001 17:45
 Technical Director Stephen C. Ede

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
<u>Volatile Gas Chromatography/Mass Spectroscopy</u>								
4-Bromofluorobenzene <Surr>	80.7		%	BTEX by SW8260B	72-141	07/13/01	07/19/01	GMD
Dibromofluoromethane <surr>	97.2		%	BTEX by SW8260B	78-128	07/13/01	07/19/01	GMD



CT&E Ref.# 1014345010
 Client Name Jacobs Engineering Group
 Project Name/# Elmendorf SERA Sites 05M31201
 Client Sample ID EL-A200805
 Matrix Soil/Solid
 Ordered By

Client PO#
 Printed Date/Time 07/27/2001 20:43
 Collected Date/Time 07/13/2001 16:20
 Received Date/Time 07/13/2001 17:45
 Technical Director Stephen C. Ede

Released By *Deborah Hall*

Sample Remarks:

DRO - Unknown hydrocarbon with several peaks.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	85.7	0.00	%	SM20 2540G			07/17/01	DMR
Volatile Fuels Department								
Gasoline Range Organics	3.86 U	3.86	mg/Kg	AK101 GRO		07/13/01	07/24/01	RMV
Surrogates								
1,4-Difluorobenzene <Surr>	95.9		%	AK101 GRO	60-120	07/13/01	07/24/01	RMV
4-Bromofluorobenzene <Surr>	73.4		%	AK101 GRO	50-150	07/13/01	07/24/01	RMV
Semivolatile Organic Fuels Department								
Diesel Range Organics	11.5	11.5	mg/Kg	AK102 DRO		07/16/01	07/17/01	MCM
Surrogates								
5a Androstane <surr>	124		%	AK102 DRO	50-150	07/16/01	07/17/01	MCM
Volatile Gas Chromatography/Mass Spectroscopy								
Benzene	0.0201 U	0.0201	mg/Kg	BTEX by SW8260B		07/13/01	07/20/01	GMD
Toluene	0.0347	0.0201	mg/Kg	BTEX by SW8260B		07/13/01	07/20/01	GMD
Ethylbenzene	0.0100F	0.0201	mg/Kg	BTEX by SW8260B		07/13/01	07/20/01	GMD
P & M -Xylene	0.0266	0.0201	mg/Kg	BTEX by SW8260B		07/13/01	07/20/01	GMD
o-Xylene	0.0201 U	0.0201	mg/Kg	BTEX by SW8260B		07/13/01	07/20/01	GMD
Surrogates								
1,2-Dichloroethane-D4 <surr>	95.9		%	BTEX by SW8260B	74-133	07/13/01	07/20/01	GMD
Toluene-d8 <surr>	99.5		%	BTEX by SW8260B	78-134	07/13/01	07/20/01	GMD
4-Bromofluorobenzene <Surr>	89.5		%	BTEX by SW8260B	72-141	07/13/01	07/20/01	GMD
Dibromofluoromethane <surr>	103		%	BTEX by SW8260B	78-128	07/13/01	07/20/01	GMD



CT&E Ref.# 1014345011
 Client Name Jacobs Engineering Group
 Project Name/# Elmendorf SERA Sites 05M31201
 Client Sample ID EL-A200806
 Matrix Soil/Solid
 Ordered By

Client PO#
 Printed Date/Time 07/27/2001 20:43
 Collected Date/Time 07/13/2001 16:25
 Received Date/Time 07/13/2001 17:45
 Technical Director Stephen C. Ede
 Released By *Deborah Wall*

Sample Remarks:

DRO - Pattern consistent with weathered middle distillate.
 DRO - Surrogate recoveries outside controls due to matrix interference.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	90.2	0.00	%	SM20 2540G			07/17/01	DMR
Volatile Fuels Department								
Gasoline Range Organics	15.6	2.78	mg/Kg	AK101 GRO		07/13/01	07/22/01	RMV
Surrogates								
1,4-Difluorobenzene <Surr>	89.5		%	AK101 GRO	60-120	07/13/01	07/22/01	RMV
4-Bromofluorobenzene <Surr>	87.2		%	AK101 GRO	50-150	07/13/01	07/22/01	RMV
Semivolatile Organic Fuels Department								
Diesel Range Organics	378	11.4	mg/Kg	AK102 DRO		07/16/01	07/17/01	MCM
Surrogates								
5a Androstane <surr>	211	!	%	AK102 DRO	50-150	07/16/01	07/17/01	MCM
Volatile Gas Chromatography/Mass Spectroscopy								
Benzene	0.0145 U	0.0145	mg/Kg	BTEX by SW8260B		07/13/01	07/20/01	GMD
Toluene	0.0253	0.0145	mg/Kg	BTEX by SW8260B		07/13/01	07/20/01	GMD
Ethylbenzene	0.0145	0.0145	mg/Kg	BTEX by SW8260B		07/13/01	07/20/01	GMD
P & M -Xylene	0.0200	0.0145	mg/Kg	BTEX by SW8260B		07/13/01	07/20/01	GMD
o-Xylene	0.0145 U	0.0145	mg/Kg	BTEX by SW8260B		07/13/01	07/20/01	GMD
Surrogates								
1,2-Dichloroethane-D4 <surr>	95.5		%	BTEX by SW8260B	74-133	07/13/01	07/20/01	GMD
Toluene-D8 <surr>	100		%	BTEX by SW8260B	78-134	07/13/01	07/20/01	GMD
4-Bromofluorobenzene <Surr>	79.8		%	BTEX by SW8260B	72-141	07/13/01	07/20/01	GMD



CT&E Ref.# 1014345011
Client Name Jacobs Engineering Group
Project Name/# Elmendorf SERA Sites 05M31201
Client Sample ID EL-A200806
Matrix Soil/Solid
Ordered By

Client PO#
Printed Date/Time 07/27/2001 20:43
Collected Date/Time 07/13/2001 16:25
Received Date/Time 07/13/2001 17:45
Technical Director Stephen C. Ede

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
<u>Volatile Gas Chromatography/Mass Spectroscopy</u>								
Dibromofluoromethane <sur>	101		%	BTEX by SW8260B	78-128	07/13/01	07/20/01	GMD



CT&E Ref.# 1014345012
 Client Name Jacobs Engineering Group
 Project Name/# Elmendorf SERA Sites 05M31201
 Client Sample ID EL-A200807
 Matrix Soil/Solid
 Ordered By

Client PO#
 Printed Date/Time 07/27/2001 20:43
 Collected Date/Time 07/13/2001 16:35
 Received Date/Time 07/13/2001 17:45
 Technical Director Stephen C. Ede

Released By

Weather Hall

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	91.0	0.00	%	SM20 2540G			07/17/01	DMR
Volatile Fuels Department								
Gasoline Range Organics	3.68 U	3.68	mg/Kg	AK101 GRO		07/13/01	07/22/01	RMV
Surrogates								
1,4-Difluorobenzene <Surr>	88.2		%	AK101 GRO	60-120	07/13/01	07/22/01	RMV
4-Bromofluorobenzene <Surr>	52		%	AK101 GRO	50-150	07/13/01	07/22/01	RMV
Semivolatile Organic Fuels Department								
Diesel Range Organics	6.78F	11.1	mg/Kg	AK102 DRO		07/16/01	07/17/01	MCM
Surrogates								
5a Androstane <surr>	143		%	AK102 DRO	50-150	07/16/01	07/17/01	MCM
Volatile Gas Chromatography/Mass Spectroscopy								
Benzene	0.0191 U	0.0191	mg/Kg	BTEX by SW8260B		07/13/01	07/20/01	GMD
Toluene	0.0298	0.0191	mg/Kg	BTEX by SW8260B		07/13/01	07/20/01	GMD
Ethylbenzene	0.0191 U	0.0191	mg/Kg	BTEX by SW8260B		07/13/01	07/20/01	GMD
P & M -Xylene	0.0269	0.0191	mg/Kg	BTEX by SW8260B		07/13/01	07/20/01	GMD
o-Xylene	0.0191 U	0.0191	mg/Kg	BTEX by SW8260B		07/13/01	07/20/01	GMD
Surrogates								
1,2-Dichloroethane-D4 <surr>	96.7		%	BTEX by SW8260B	74-133	07/13/01	07/20/01	GMD
Toluene-d8 <surr>	97.3		%	BTEX by SW8260B	78-134	07/13/01	07/20/01	GMD
4-Bromofluorobenzene <Surr>	89.7		%	BTEX by SW8260B	72-141	07/13/01	07/20/01	GMD
Dibromofluoromethane <surr>	103		%	BTEX by SW8260B	78-128	07/13/01	07/20/01	GMD



CT&E Ref.# 1014345013
 Client Name Jacobs Engineering Group
 Project Name/# Elmendorf SERA Sites 05M31201
 Client Sample ID EL-A200808
 Matrix Soil/Solid
 Ordered By

Client PO#
 Printed Date/Time 07/27/2001 20:43
 Collected Date/Time 07/13/2001 16:45
 Received Date/Time 07/13/2001 17:45
 Technical Director Stephen C. Ede

Released By *Deborah Hall*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	95.2	0.00	%	SM20 2540G			07/17/01	DMR
Volatile Fuels Department								
Gasoline Range Organics	3.30 U	3.30	mg/Kg	AK101 GRO		07/13/01	07/22/01	RMV
Surrogates								
1,4-Difluorobenzene <Surr>	89.2		%	AK101 GRO	60-120	07/13/01	07/22/01	RMV
4-Bromofluorobenzene <Surr>	52.9		%	AK101 GRO	50-150	07/13/01	07/22/01	RMV
Semivolatile Organic Fuels Department								
Diesel Range Organics	10.4 U	10.4	mg/Kg	AK102 DRO		07/16/01	07/17/01	MCM
Surrogates								
5a Androstane <surr>	147		%	AK102 DRO	50-150	07/16/01	07/17/01	MCM
Volatile Gas Chromatography/Mass Spectroscopy								
Benzene	0.0172 U	0.0172	mg/Kg	BTEX by SW8260B		07/13/01	07/20/01	GMD
Toluene	0.0264	0.0172	mg/Kg	BTEX by SW8260B		07/13/01	07/20/01	GMD
Ethylbenzene	0.0172 U	0.0172	mg/Kg	BTEX by SW8260B		07/13/01	07/20/01	GMD
P & M -Xylene	0.0201	0.0172	mg/Kg	BTEX by SW8260B		07/13/01	07/20/01	GMD
o-Xylene	0.0172 U	0.0172	mg/Kg	BTEX by SW8260B		07/13/01	07/20/01	GMD
Surrogates								
1,2-Dichloroethane-D4 <surr>	95.7		%	BTEX by SW8260B	74-133	07/13/01	07/20/01	GMD
Toluene-d8 <surr>	96.4		%	BTEX by SW8260B	78-134	07/13/01	07/20/01	GMD
4-Bromofluorobenzene <Surr>	92.9		%	BTEX by SW8260B	72-141	07/13/01	07/20/01	GMD
Dibromofluoromethane <surr>	101		%	BTEX by SW8260B	78-128	07/13/01	07/20/01	GMD

Case Narrative

Customer: JACOBSE

Jacobs Engineering Group

Project: 1014792

Elmendorf SERA Sites 05M31201

NPDL WO: NA

1014792001 PS

DRO - Pattern consistent with weathered middle distillate.

DRO - Surrogate does not meet QC goals due to matrix interference. Results are not affected.

382561 LCS

DRO/RRO LCS/LCSD - Surrogate/s are biased high due to interference by method required petroleum spike.

382562 LCSD

DRO/RRO LCS/LCSD - Surrogate/s are biased high due to interference by method required petroleum spike.



CT&E Ref.# 1014792001
 Client Name Jacobs Engineering Group
 Project Name/# Elmendorf SERA Sites 05M31201
 Client Sample ID EL-A201201
 Matrix Soil/Solid
 Ordered By

Client PO#
 Printed Date/Time 08/20/2001 19:24
 Collected Date/Time 07/23/2001 14:30
 Received Date/Time 07/30/2001 9:39
 Technical Director Stephen C. Ede

Released By *Heather Hall*

Sample Remarks:

DRO - Pattern consistent with weathered middle distillate.
 DRO - Surrogate does not meet QC goals due to matrix interference. Results are not affected.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
<u>Solids</u>								
Total Solids	87.2	0.00	%	SM20 2540G			08/01/01	DMR
<u>Semivolatile Organic Fuels Department</u>								
Diesel Range Organics	4850	144	mg/Kg	AK102 DRO		08/02/01	08/03/01	MCM
<u>Surrogates</u>								
5a Androstane <surr>	652	!	%	AK102 DRO	50-150	08/02/01	08/03/01	MCM

COLUMBIA ANALYTICAL SERVICES, INC.

Client: CT& E Environmental Services, Inc.
Project: 05M31201
Sample Matrix: Soil

Service Request No.: K2105461
Date Received: 8/1/01

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Two soil samples were received for analysis at Columbia Analytical Services on 8/1/01. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Organic Carbon by EPA Method 9060

No anomalies associated with the analysis of these samples were observed.

Approved by _____ Date 8/16/01

00004

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CT&E Environmental Services, Inc.
Project: 05M31201
Sample Matrix: Soil

Service Request: K2105461
Date Collected: 7/28/01
Date Received: 8/1/01

Carbon, Total Organic

Prep Method: NONE
Analysis Method: 9060
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Sample Name	Lab Code	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
EL-A2014 01/1014792002	K2105461-001	500	1	NA	8/14/01	2800	
EL-A2014 02/1014792003	K2105461-002	500	1	NA	8/14/01	2200	
Method Blank	K2105461-MB	500	1	NA	8/14/01	ND	

Approved By: _____



Date: _____

8/15/01

