FINAL

Long-Term Monitoring
Annual Groundwater Report
SWMU 66

Prepared For

81 CES /CEVR
Keesler Air Force Base, Mississippi





Air Education and Training Command
Randolph Air Force Base, Texas

Contract No. F41689-96-D-0710

Delivery Order 5057

Prepared By

PARSONS ENGINEERING SCIENCE, INC.

Atlanta, Georgia

January 2000

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Report Documentation Page

Form Approved
OMB No. 0704-0188

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1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
00 JAN 2000	**N/A**	**-**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Final Long-Term Monitoring Annual Groundwater Report, SWMU 66, 81 CES/CVER, Keesler AFB, Mississippi	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Parsons Engineering Science, Inc., 1700 Broadway, Suite 900, Denver, CO 80290**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES
The original document contains color images.

14. ABSTRACT

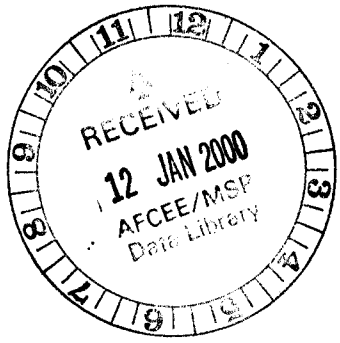
15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**UU**	**509**	

Standard Form 298 (Rev. 8-98)
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January 11, 2000



Ms. Cindy Hall
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2021 First Street West
Randolph, AFB TX 78150-4320

Dear Ms. Hall:

Subject: Contract No. F41689-96-D-0710, Delivery Order 5057, Final Long-Term Monitoring Reports for Three Sites at Keesler Air Force Base, Mississippi

Parsons Engineering Science, Inc. is pleased to submit the following Final Long-Term Monitoring Reports for Delivery Order 5057:

- Annual Groundwater Sampling Report for SWMU 66
- Quarterly Groundwater Sampling Report for Area of Concern A

These reports were revised based on comments received from USEPA and MDEQ and are being distributed to the personnel listed at the bottom of the page.

If you have any questions regarding these submittals, please contact me at (678) 969-2375.

Sincerely,

PARSONS ENGINEERING SCIENCE, INC.

Walker J. Duncan, P.G.
Project Manager

c: Lisa Noble (Keesler AFB, 4 copies)
Rodney Arnold (AFCEE, 1 copy)
Robert Backlund (HQ AETC 1 copy)
Bob Merrill (MDEQ, 1 copy)
Robert Pope (USEPA, 1 copy)

FINAL
LONG-TERM MONITORING
ANNUAL GROUNDWATER REPORT
SWMU 66

PREPARED FOR:

81 CES / CEVR
KEESLER AIR FORCE BASE, MISSISSIPPI

AIR EDUCATION AND TRAINING COMMAND
RANDOLPH AIR FORCE BASE, TEXAS

CONTRACT NO. F41689-96-D-0710
DELIVERY ORDER 5057

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January 2000

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SECTION 1
INTRODUCTION

1.1 PURPOSE

This annual report documents the results of four quarterly groundwater sampling events performed at solid waste management unit (SWMU) 66 at Keesler Air Force Base (AFB) in Biloxi, Mississippi (Figure 1.1). This report will be used to evaluate the extent and attenuation potential of hydrocarbon contamination in the groundwater at SWMU 66. Quarterly groundwater monitoring is being performed at SWMU 66 to fulfill a Resource Conservation and Recovery Act (RCRA) requirement and is approved by the United States Environmental Protection Agency (USEPA) and the Mississippi Department of Environmental Quality (MDEQ). The location of SWMU 66 is shown on Figure 1.2.

1.2 SITE HISTORY

SWMU 66, (Building 4038) is the active military service station (Figure 1.3). An 8000 gallon underground storage tank (UST) was taken out of service and removed from the site in December 1987. Soils containing petroleum hydrocarbons above cleanup criteria were left in place. The site was listed as part of Keesler's corrective action under RCRA and was investigated in 1993. A bioventing study was implemented to remediate soils containing petroleum hydrocarbons under an Air Force Center for Environmental Excellence (AFCEE) bioventing initiative. Three additional USTs at this site were removed in November 1996 and replaced with above ground storage tanks. The site was studied during 1995-96 and recommended for corrective measures that included natural attenuation with monitoring and institutional controls. These corrective measures were approved by USEPA and MDEQ in 1998.

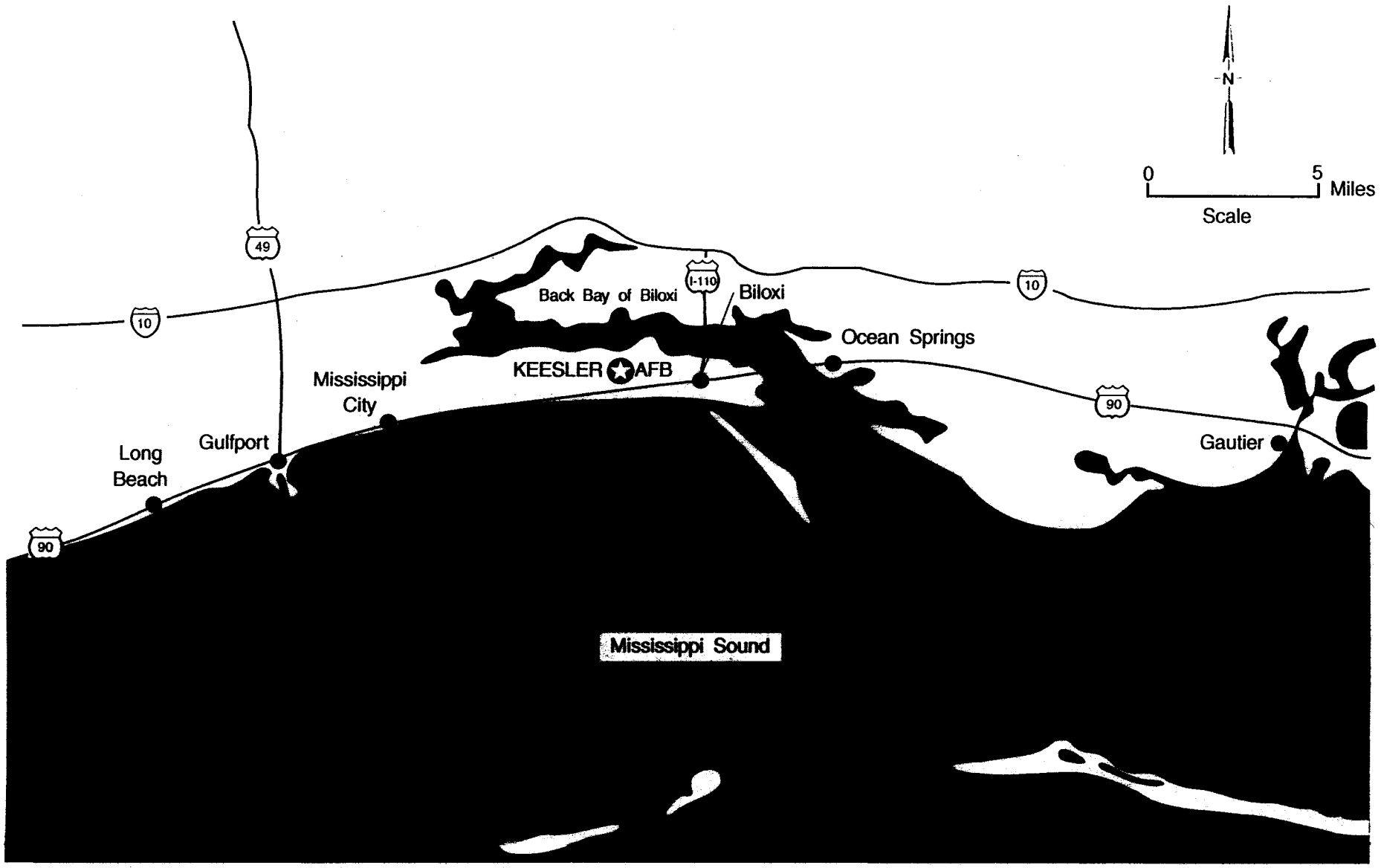
1.3 PROJECT EVENTS

Groundwater sampling was conducted at SWMU 66 on May 14, 1998, August 20, 1998, November 18-19, 1998 and June 22-23, 1999. Seven wells were sampled during the first three events and included four monitoring wells (MW9-1, MW9-2, MW9-6, and MW9-8), and three sentry wells (SW-1, SW-2, SW-3). Well MW9-7, which was included in the long-term monitoring program for SWMU 66 was not sampled as this well had been damaged during construction activities. In June of 1999, a new well was installed to replace damaged well MW9-7. This new well was labeled MW9-7R. For the June 1999 sampling event, a total of eight wells were sampled.

Activities completed during the June 1999 sampling event included the following:

- Monitoring well MW9-7 was replaced with a new well identified as MW9-7R.
- A Peristaltic pump and a Horiba U-10 water quality meter were utilized to purge the wells and obtain field parameters characterizing the groundwater from the surficial aquifer.
- Measurements of monitoring well and sentry well groundwater levels were recorded to develop a potentiometric surface map of groundwater elevations and determine groundwater flow direction.
- Completion of annual groundwater sample collection from monitoring wells and sentry wells, for benzene, toluene, ethylbenzene, xylenes (BTEX), methyl-tertiary-butylether (MTBE), ammonia, methane, ferrous iron, and sulfate analyses in support of a natural attenuation evaluation.

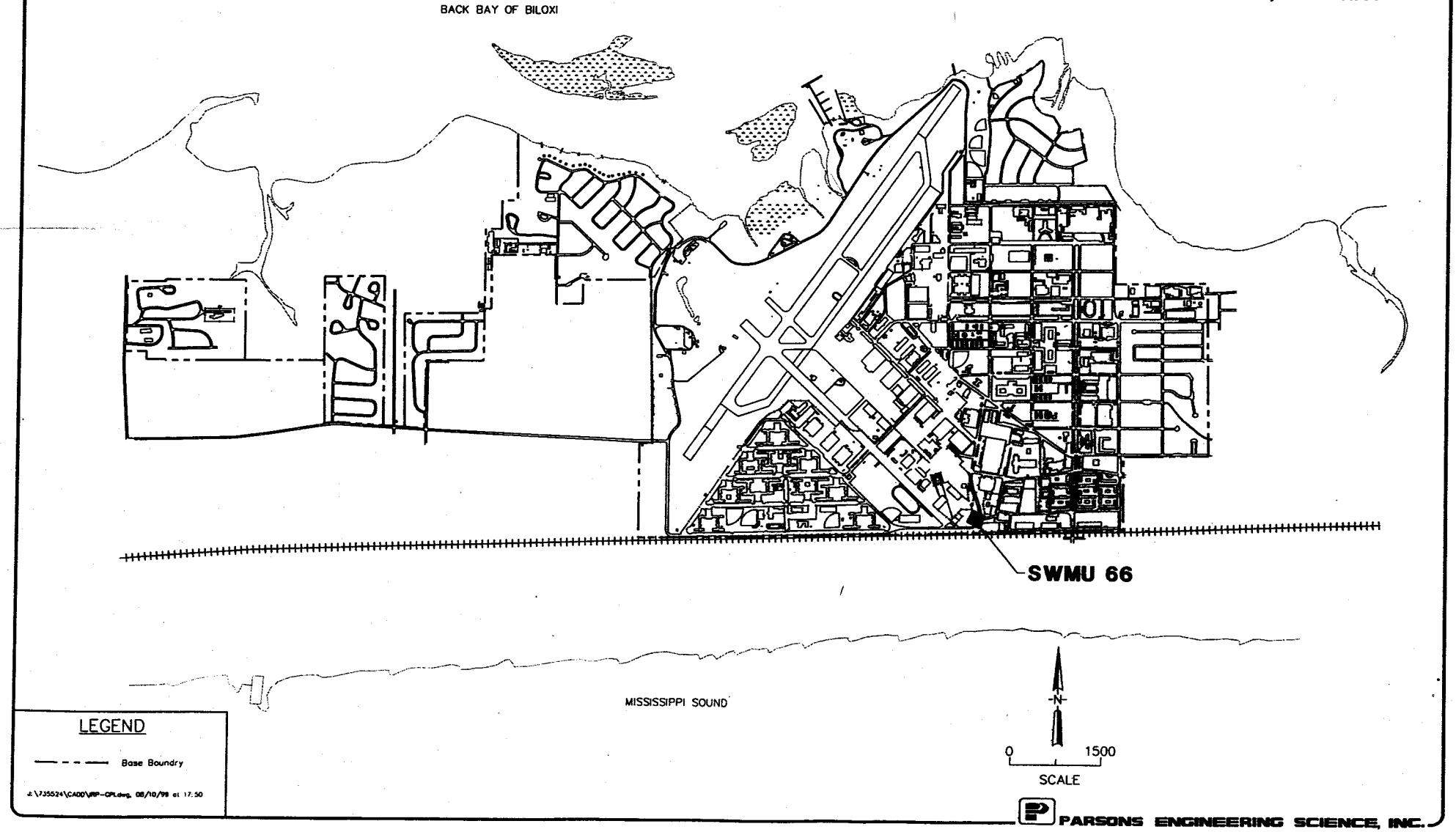
Figure 1.1
Location of Keesler AFB, Mississippi



Source: Commercial Road Map

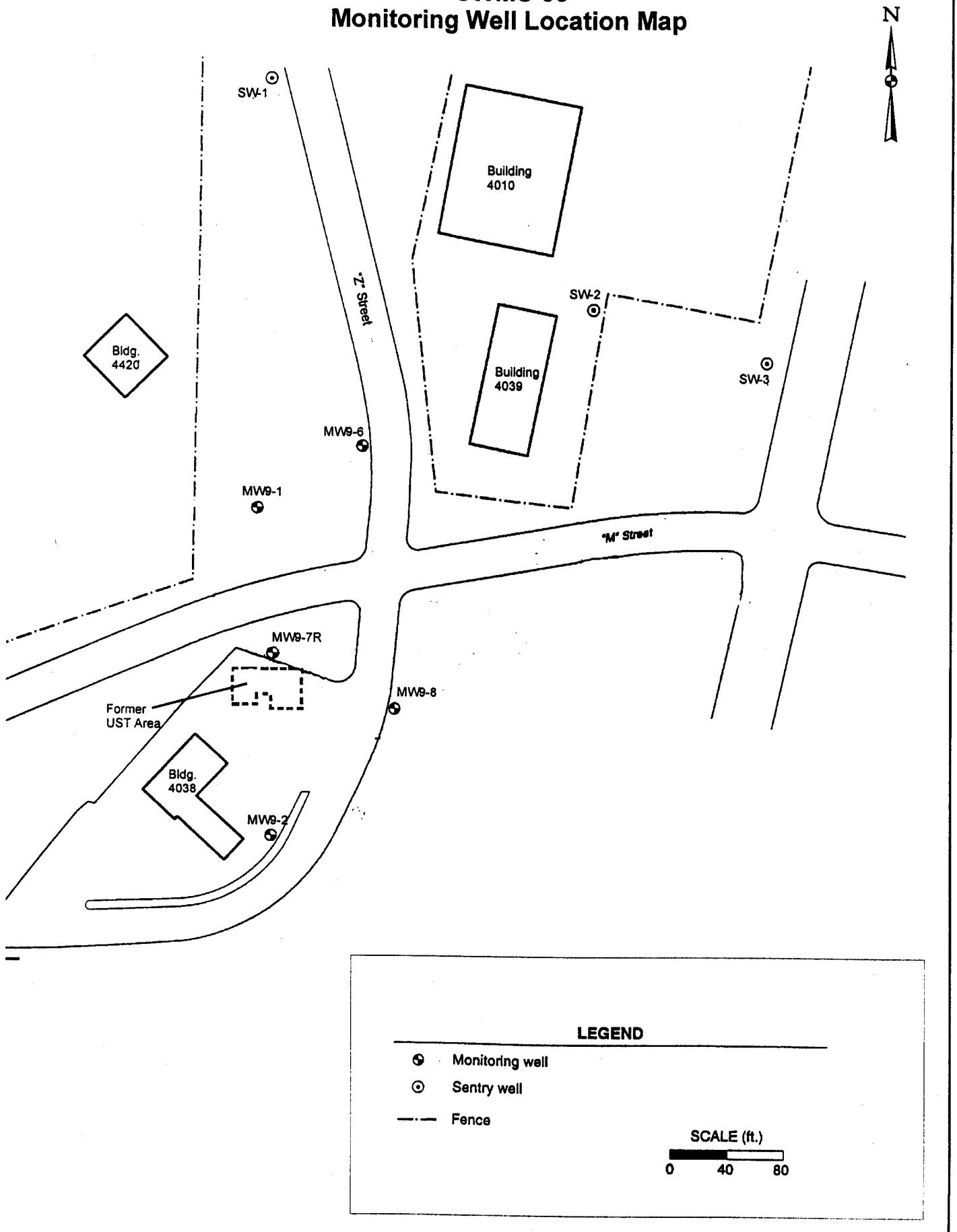
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FIGURE 1.2
SITE LOCATION MAP
KEESLER AIR FORCE BASE
BILOXI, MISSISSIPPI



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Figure 1.3
SWMU 66
Monitoring Well Location Map



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SECTION 2
MONITORING WELL GAUGING AND SAMPLING RESULTS

2.1 MONITORING WELL GAUGING

Groundwater level measurements were recorded at SWMU 66 on May 15, 1998, August 20, 1998, November 19, 1998, and June 24, 1999 and are provided in Table 2.1. Depth to water on June 24, 1999 ranged from 3.91 to 6.23 feet below top of well casing. Potentiometric surface maps were prepared based on these measurements and are provided as Figures 2.1 through 2.4. Groundwater flow at the site is generally toward the north.

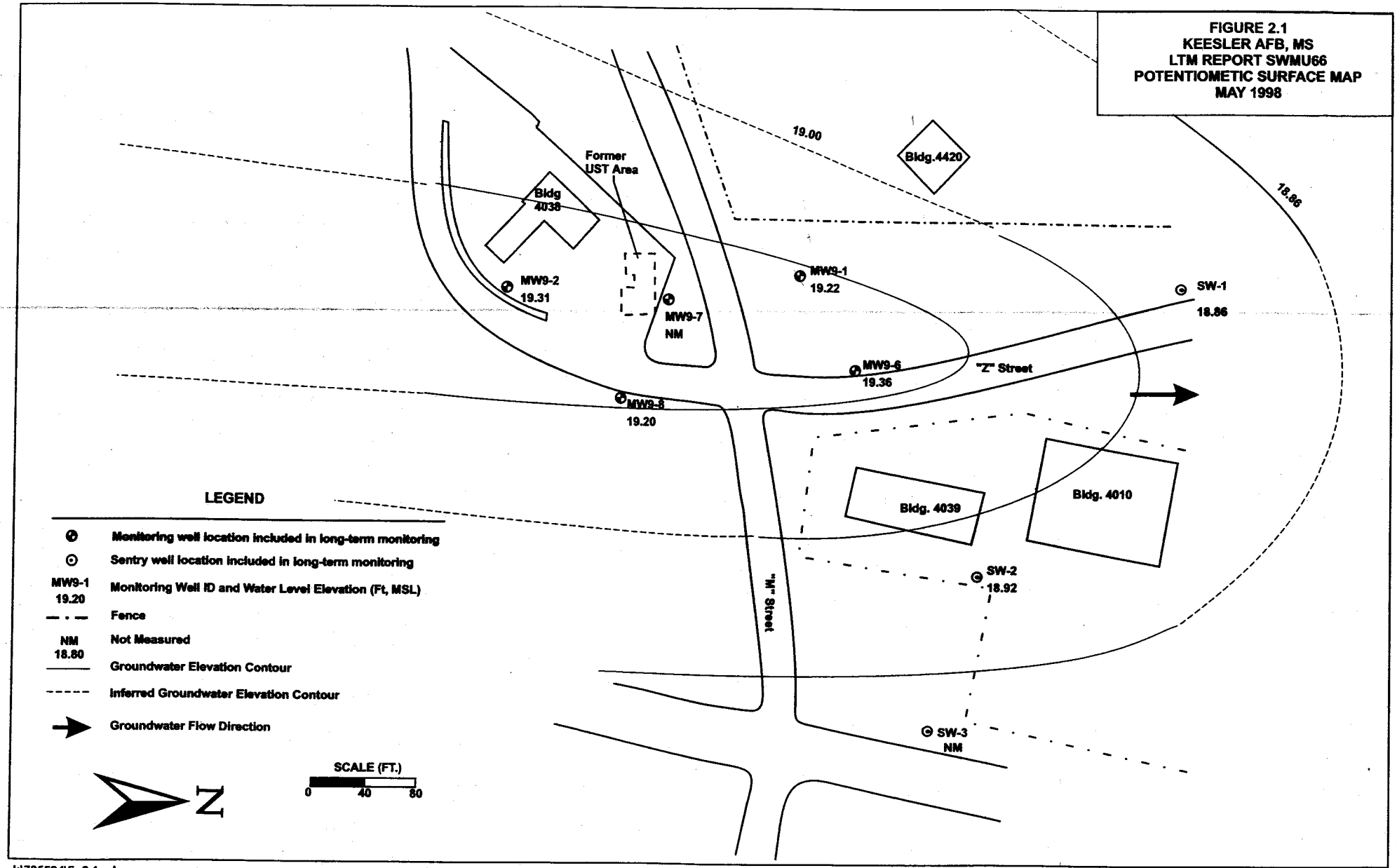
2.2 GROUNDWATER SAMPLING AND ANALYTICAL RESULTS

The monitoring wells and sentry wells at SWMU 66 were sampled on May 14, 1998, August 20, 1998, November 18-19, 1998, and June 22-23, 1999. During the June 1999 sampling event, groundwater samples were collected from monitoring wells MW9-1, MW9-2, MW9-6, MW9-7R, MW9-8, and sentry wells SW-1, SW-2, and SW-3. The samples were analyzed for BTEX, MTBE, and methane by an off site laboratory. In addition, on site analysis for ammonia, sulfate, and ferrous iron was conducted to determine the natural attenuation capacity of the surficial aquifer. The analytical results for all four sampling rounds are presented in Table 2.2. The results of the natural attenuation sampling performed in June 1999 are presented in Section 5. The extent of the plume associated with total BTEX in the groundwater from the four sampling periods is shown on Figures 2.5 through 2.8. The associated concentrations of methane, ferrous iron, nitrate, and sulfate in the groundwater are illustrated on Figures 2.9 through 2.11. A discussion of methane, ferrous iron, and sulfate is provided in Section 5. Nitrate was not sampled for in the last quarterly event as it was not detected in the three previous sampling rounds. Laboratory data sheets for this sampling event are presented in Appendix A.

The analysis for BTEX and MTBE was performed by EPA Method 8021B. For the quarterly sampling event conducted in June 1999, BTEX constituents were detected in wells MW9-1, MW9-7R, and MW9-8. The total BTEX concentrations were as follows: MW9-1 (0.008 mg/L), MW9-7R (0.271 mg/L), and MW9-8 (0.490 mg/L). MTBE was detected in well MW9-7R at a concentration of 0.0016 mg/L.

2.3 FIELD DETERMINED PARAMETERS

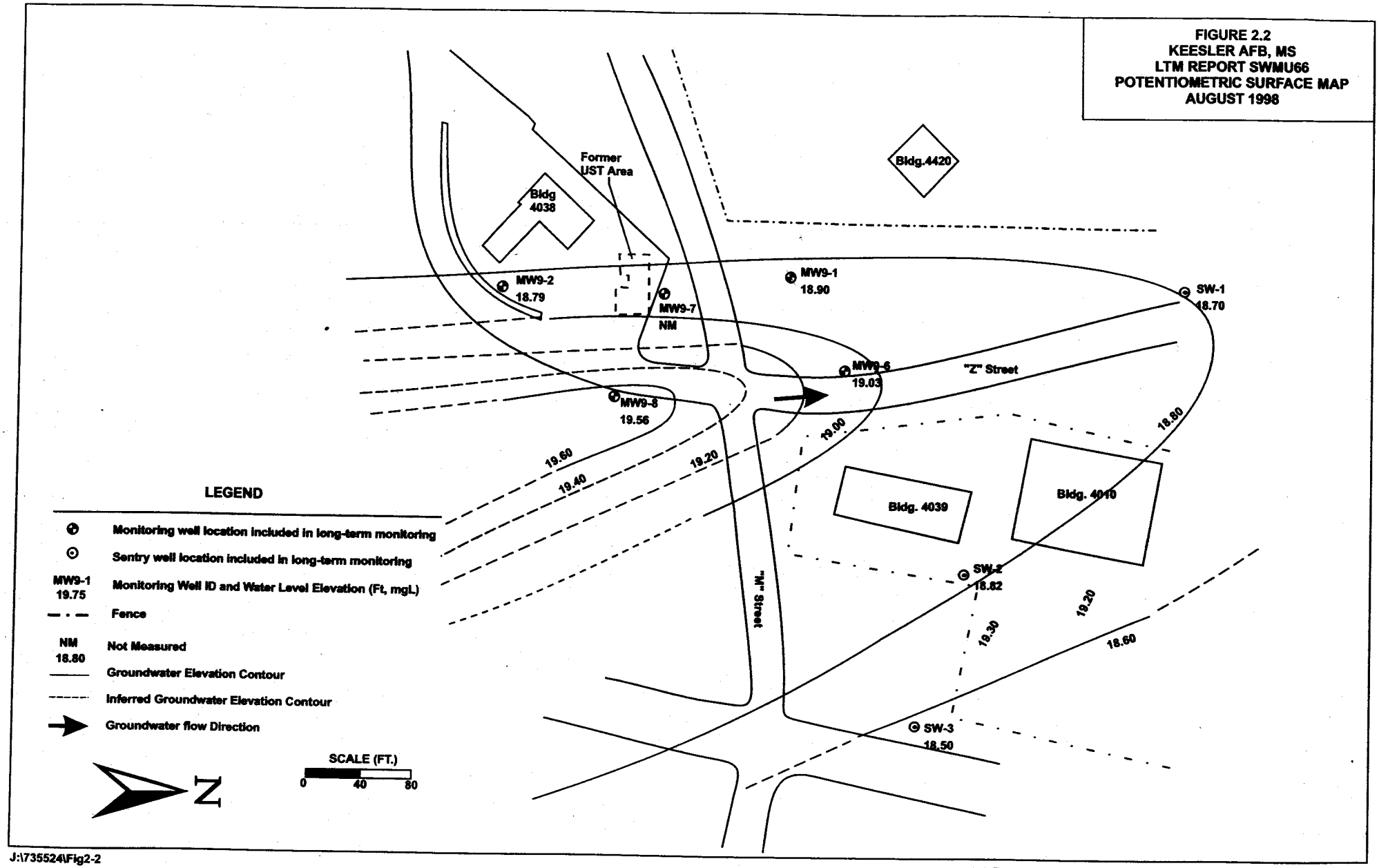
Various parameters measured in the field during well purging activities included temperature, conductivity, pH, and dissolved oxygen. These parameters are summarized in Table 2.3. The values in this table represent the last reading recorded after stabilization of purging parameters. Groundwater sampling records/forms are presented in Appendix B.



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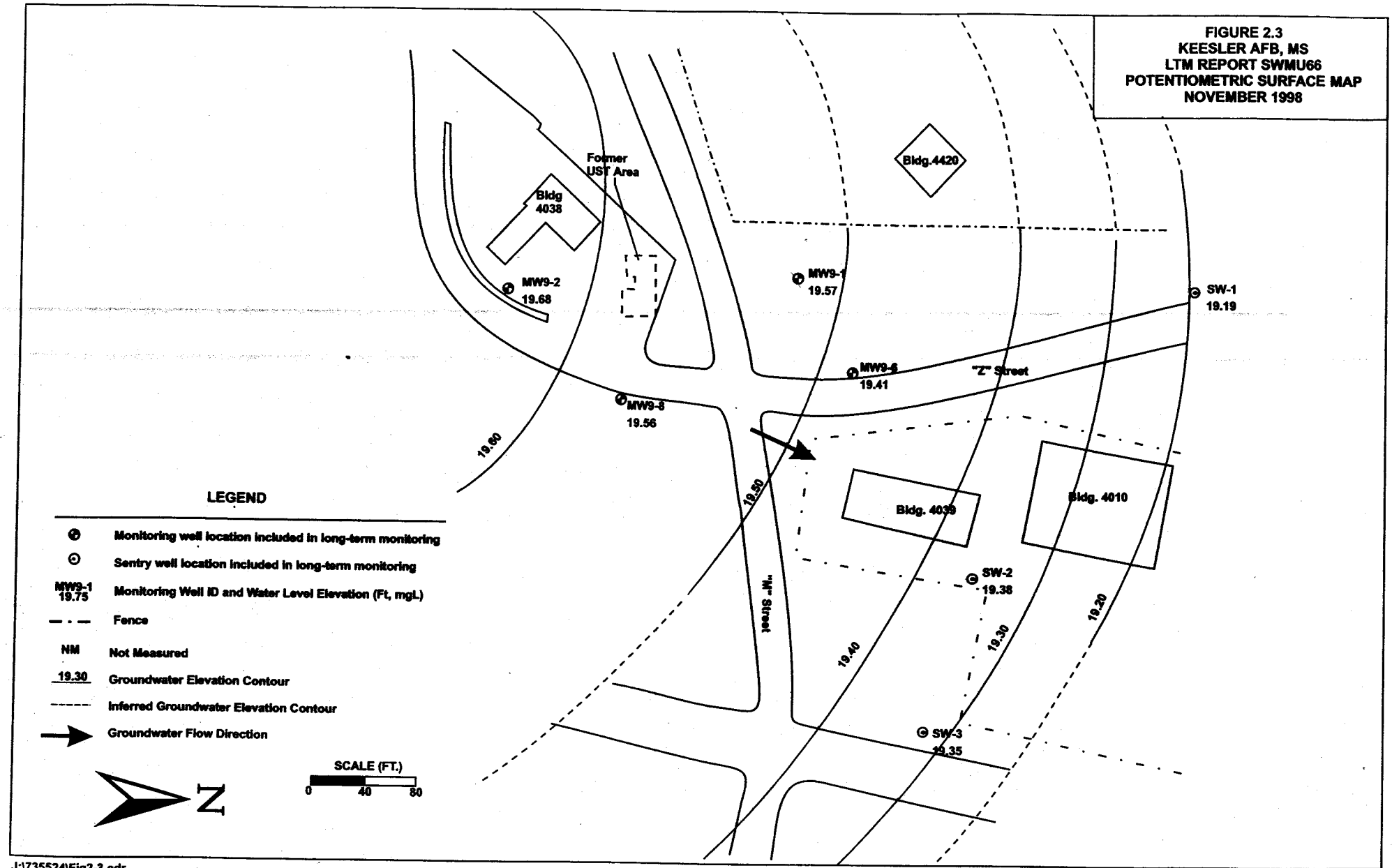
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FIGURE 2.2
KEESLER AFB, MS
LTM REPORT SWMU66
POTENTIOMETRIC SURFACE MAP
AUGUST 1998



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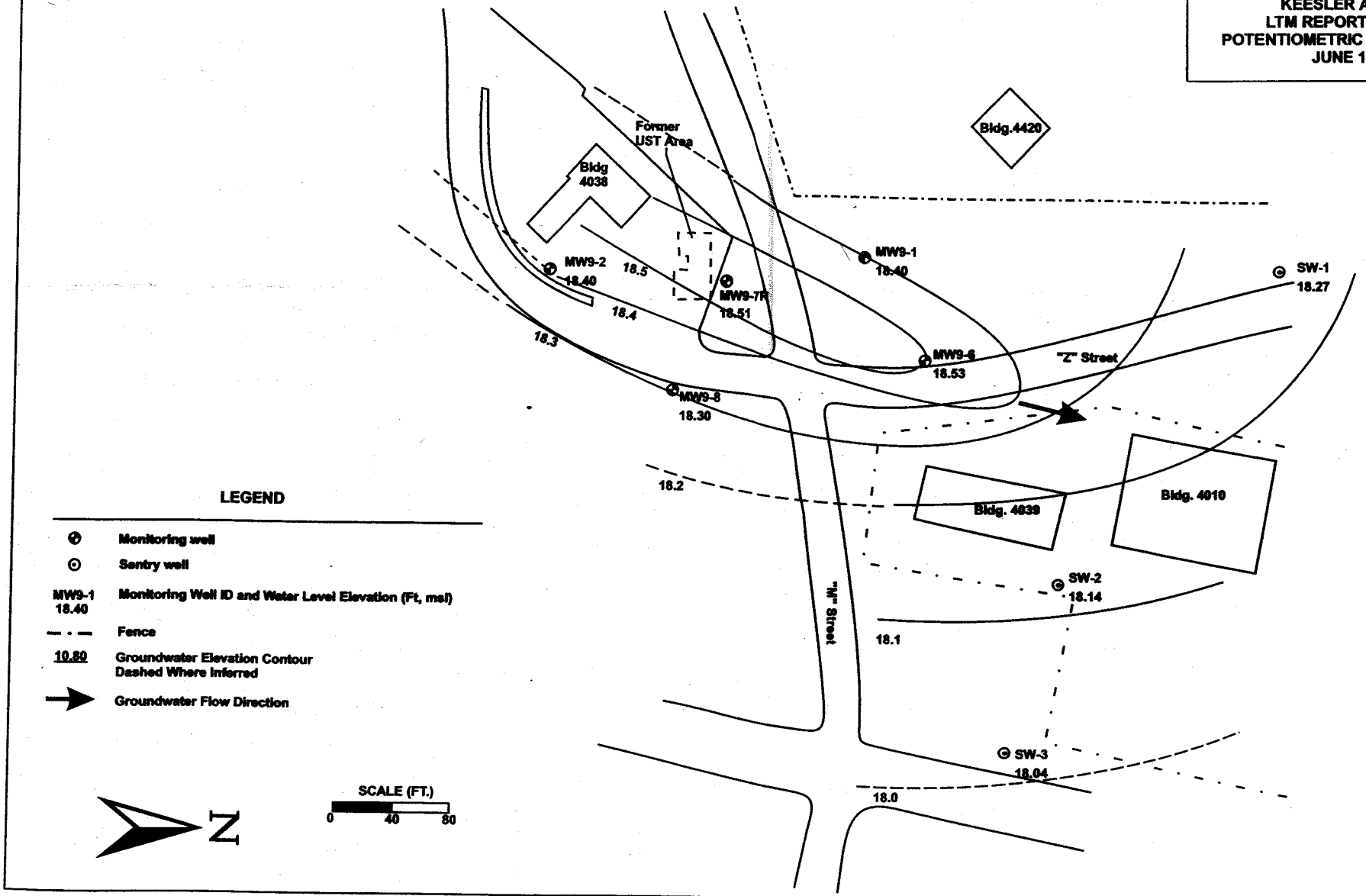
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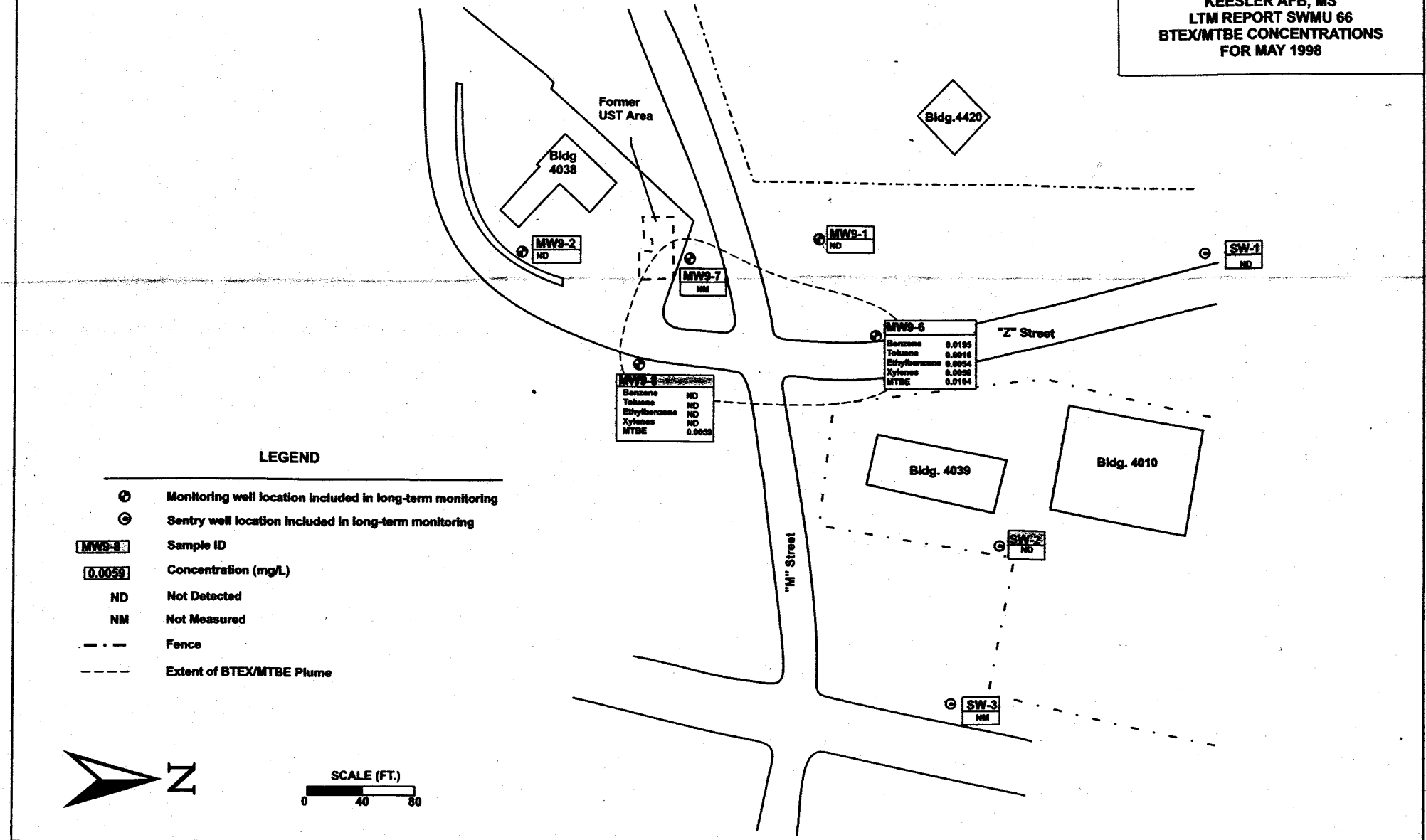
FIGURE 2.4
KEESLER AFB, MS
LTM REPORT SWMU66
POTENTIOMETRIC SURFACE MAP
JUNE 1999



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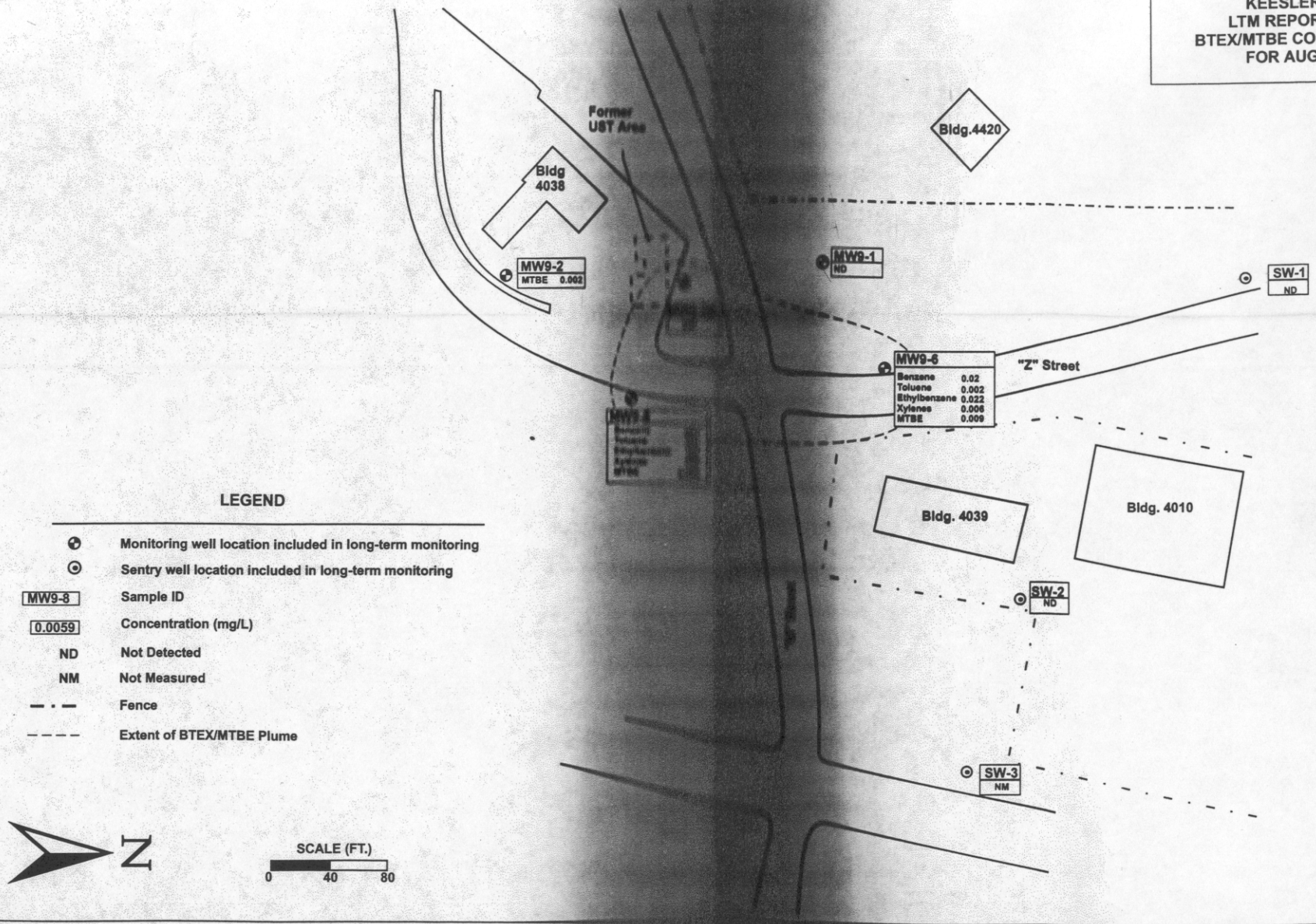
FIGURE 2.5
KEESLER AFB, MS
LTM REPORT SWMU 66
BTEX/MTBE CONCENTRATIONS
FOR MAY 1998



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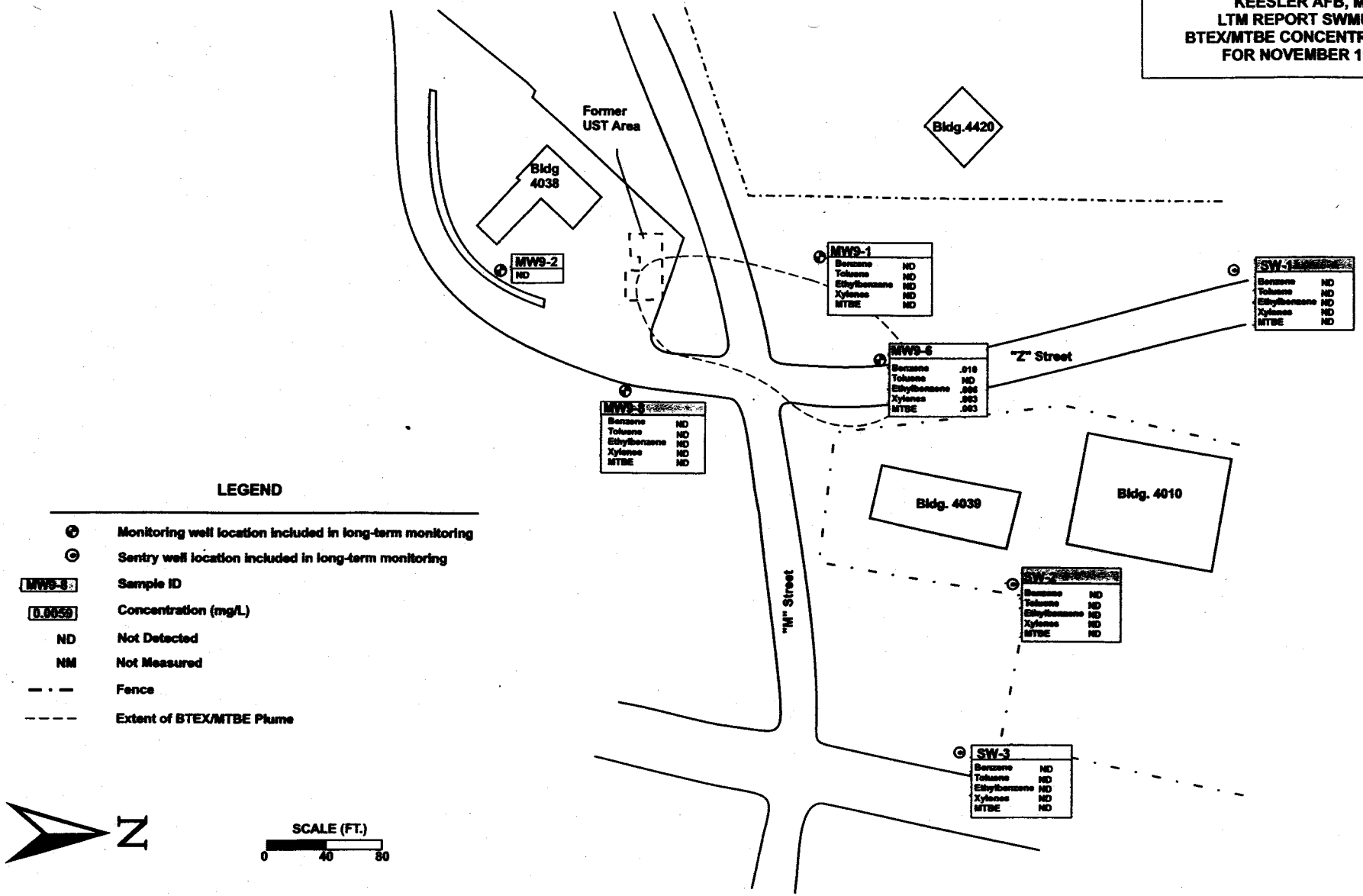
FIGURE 2.6
KEESLER AFB, MS
LTM REPORT SWMU 66
BTEX/MTBE CONCENTRATIONS
FOR AUGUST 1998



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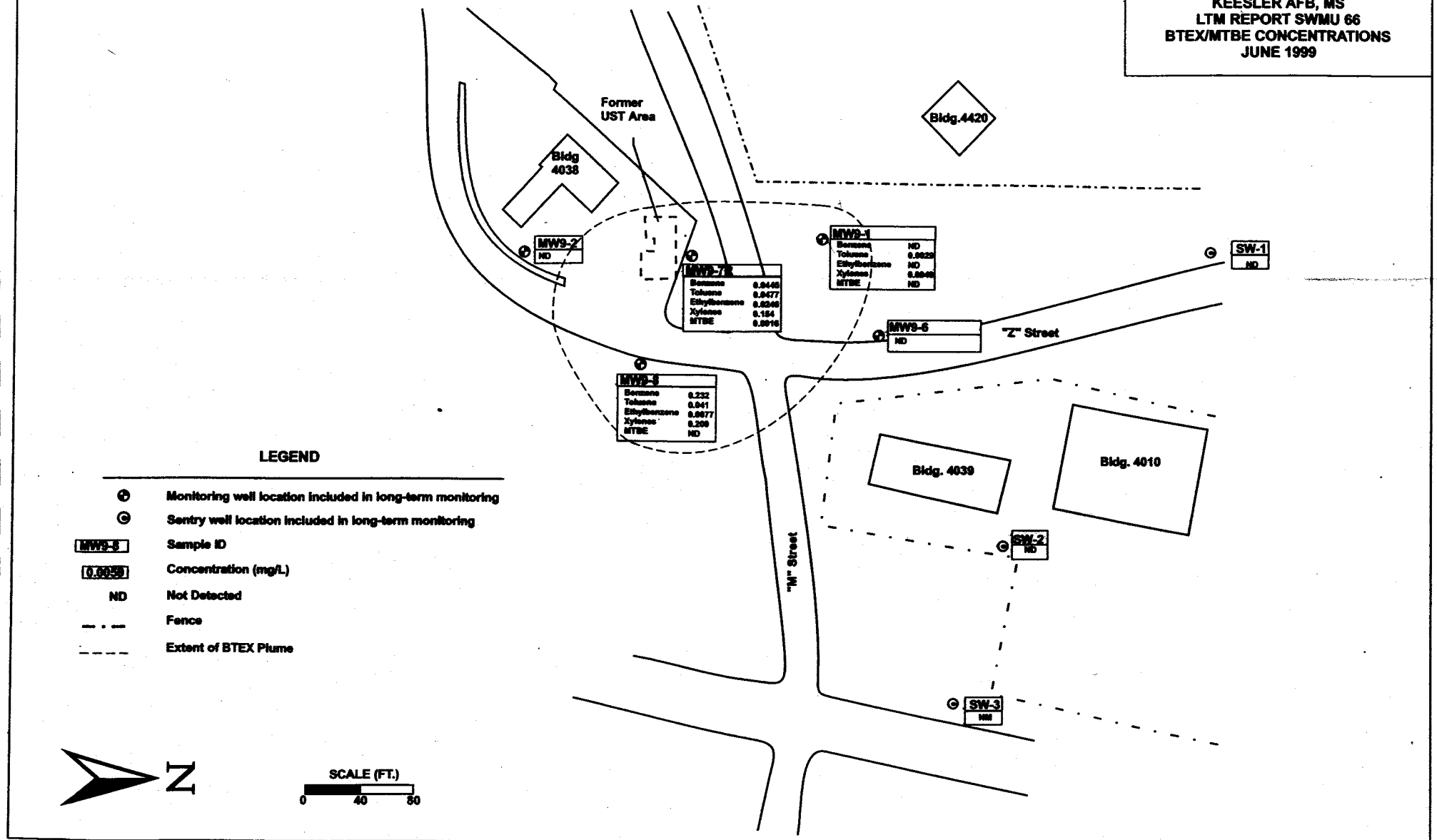
FIGURE 2.7
KEESLER AFB, MS
LTM REPORT SWMU 66
BTEX/MTBE CONCENTRATIONS
FOR NOVEMBER 1998



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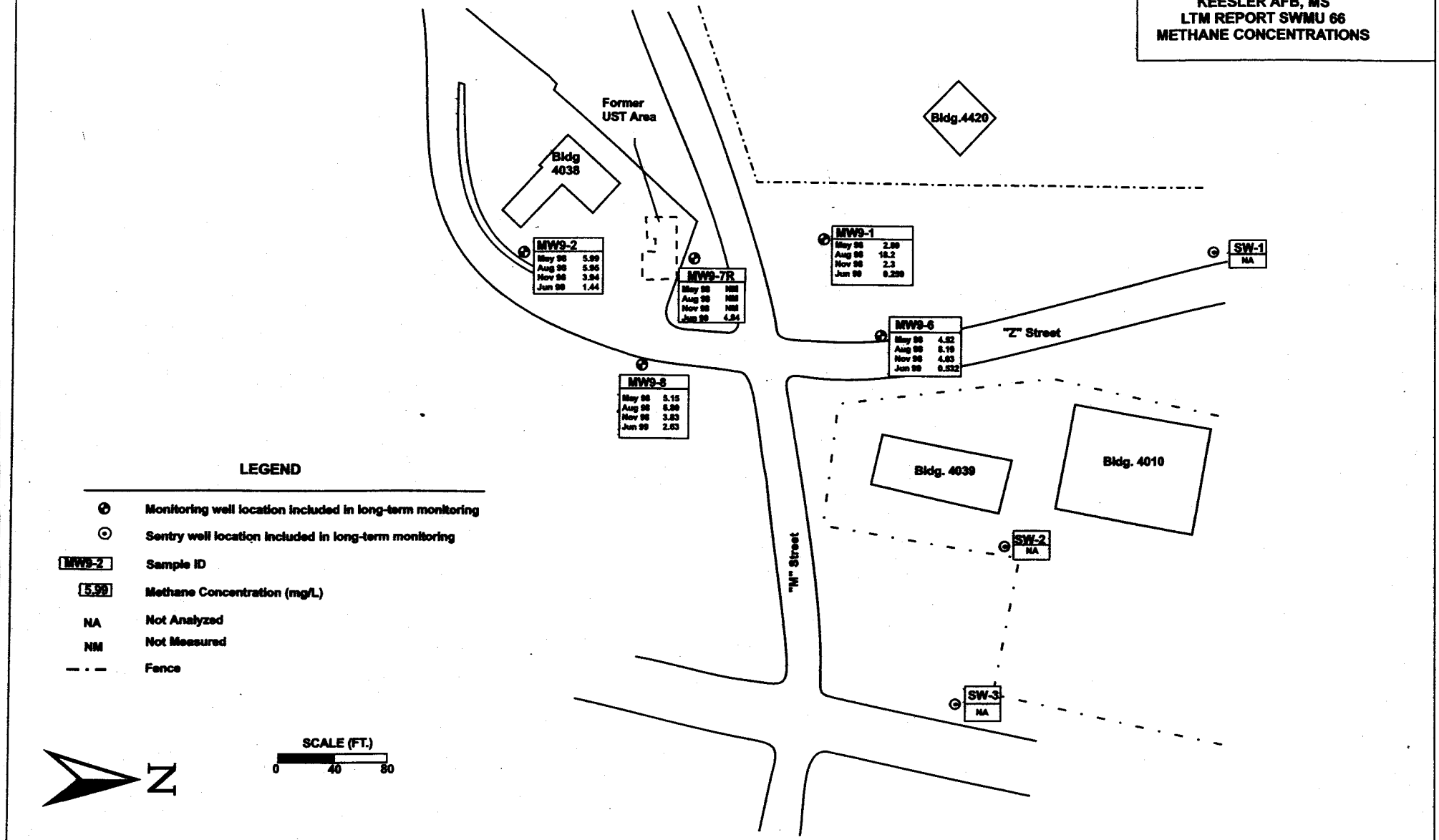
FIGURE 2.8
KEESLER AFB, MS
LTM REPORT SWMU 66
BTEX/MTBE CONCENTRATIONS
JUNE 1999



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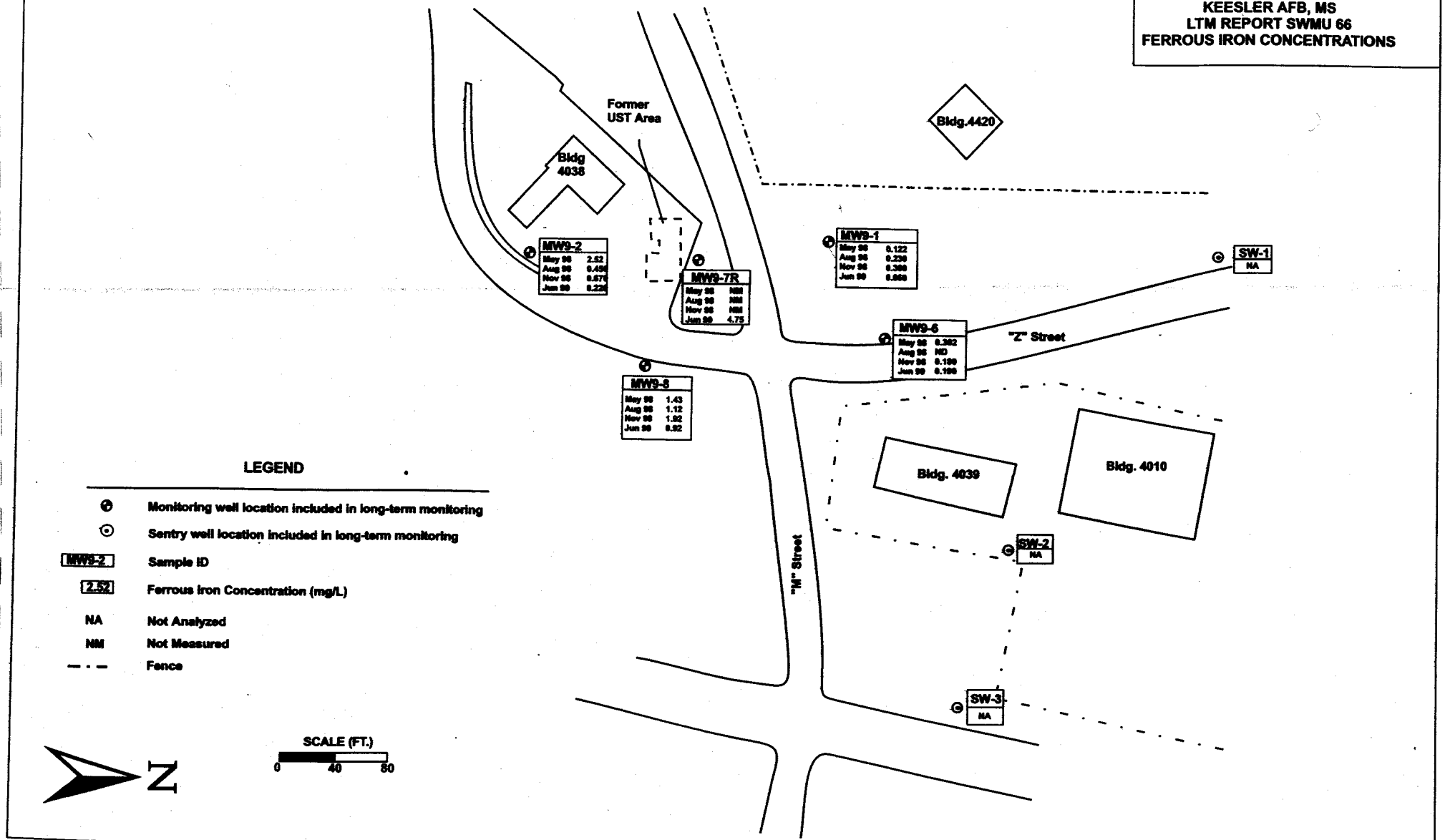
FIGURE 2.9
KEESLER AFB, MS
LTM REPORT SWMU 66
METHANE CONCENTRATIONS



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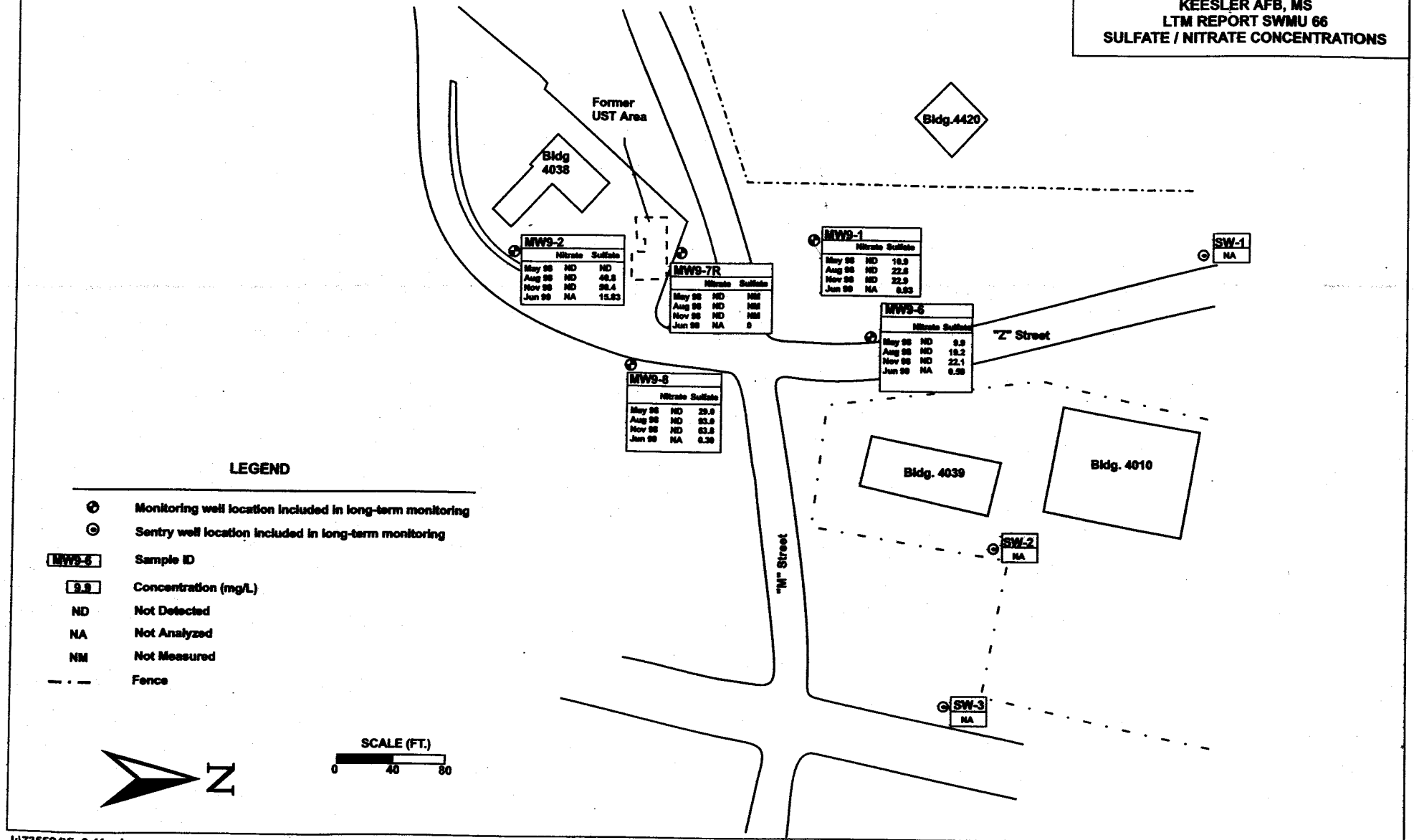
FIGURE 2.10
KEESLER AFB, MS
LTM REPORT SWMU 66
FERROUS IRON CONCENTRATIONS



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FIGURE 2.11
KEESLER AFB, MS
LTM REPORT SWMU 66
SULFATE / NITRATE CONCENTRATIONS



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Table 2.1
Well Gauging Summary
SWMU 66
June 24, 1999
Keesler AFB, MS

Monitoring Well ID	Well TOC Elevation (ft MSL)	Measurement Date	Depth to Water (BTOC)	Water Elevation (ft MSL)
MW9-1	24.20	15-May-98	4.98	19.22
		20-Aug-98	5.30	18.90
		19-Nov-98	4.63	19.57
		24-Jun-99	5.8	18.40
MW9-2	24.44	15-May-98	5.13	19.31
		20-Aug-98	5.65	18.79
		19-Nov-98	4.76	19.68
		24-Jun-99	6.04	18.40
MW9-6	24.14	15-May-98	4.78	19.36
		20-Aug-98	5.11	19.03
		19-Nov-98	4.73	19.41
		24-Jun-99	5.61	18.53
MW9-7*	24.32	15-May-98	<1.0	<23.32
		20-Aug-98	NM	NM
		19-Nov-98	NM	NM
MW9-7R	24.69	24-Jun-99	6.18	18.51
MW9-8	24.53	15-May-98	5.33	19.20
		20-Aug-98	4.78	19.75
		19-Nov-98	4.97	19.56
		24-Jun-99	6.23	18.30
SW-1	22.31	15-May-98	3.45	18.86
		20-Aug-98	3.61	18.70
		18-Nov-98	3.12	19.19
		24-Jun-99	4.04	18.27
SW-2	23.22	15-May-98	4.3	18.92
		20-Aug-98	4.4	18.82
		18-Nov-98	3.84	19.38
		24-Jun-99	5.08	18.14
SW-3	21.95	15-May-98	NM	NM
		20-Aug-98	3.45	18.5
		18-Nov-98	2.6	19.35
		24-Jun-99	3.91	18.04

BTOC - Below Top of Casing
NM - Not Measured
MSL - Mean Sea Level
* - Measurement was not used in Determination of Potentiometric Surface.

Table 2.2
Groundwater Analytical Summary
SWMU 66
Keesler AFB, MS

Monitoring Well	Sampling Date	Sampled Compounds in (mg/L)								
		Benzene	Toluene	Ethylbenzene	Xylenes (Total)	MTBE	Methane	Ferrous Iron	Nitrate	Sulfate
MW9-1	14-May-98	ND	ND	ND	ND	ND	2.89	0.122	ND	10.9
	20-Aug-98	ND	ND	ND	ND	ND	18.2	0.230	ND	22.6
	19-Nov-98	ND	ND	ND	ND	ND	2.3	0.360	ND	22.9
	22-Jun-99	ND	0.0029	ND	0.0049	ND	0.259	0.060	NA	0.93
MW9-2	14-May-98	ND	ND	ND	ND	ND	5.99	2.52	ND	ND
	20-Aug-98	ND	ND	ND	ND	0.002	5.95 J	0.450 J	ND	40.8 J
	19-Nov-98	ND	ND	ND	ND	ND	3.94	0.670	ND	50.4
	23-Jun-99	ND	ND	ND	ND	ND	1.44	0.220	NA	15.83
MW9-6	14-May-98	0.0195	0.0016	0.0054	0.0059	0.0107	4.52	0.302	ND	9.9
	20-Aug-98	0.02	0.002	0.022	0.006	0.009	8.19	ND	ND	19.2
	19-Nov-98	0.01	ND	0.006	0.003	0.003 J	4.03	0.180	ND	22.1
	22-Jun-99	ND	ND	ND	ND	ND	0.532	0.19	NA	0.59
MW9-7	14-May-98	NM	NM	NM	NM	NM	NM	NM	NM	NM
	20-Aug-98	NM	NM	NM	NM	NM	NM	NM	NM	NM
	19-Nov-98	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW9-7R	23-Jun-99	0.0445	0.0477	0.0246	0.154	0.0016	4.84	4.75	NA	0
MW9-8	14-May-98	ND	ND	ND	ND	0.0059	5.15	1.43	ND	29.0
	20-Aug-98	0.004	0.001	ND	0.005	0.008	6.80	1.12	ND	93.0
	19-Nov-98	ND	ND	ND	ND	ND	3.83	1.92	ND	63.8
	23-Jun-99	0.232	0.041	0.0077	0.209	ND	2.63	0.92	NA	0.39
SW-1	14-May-98	ND	ND	ND	ND	ND	NA	NA	NA	NA
	20-Aug-98	ND	ND	ND	ND	ND	NA	NA	NA	NA
	18-Nov-98	ND	ND	ND	ND	ND	NA	NA	NA	NA
	22-Jun-99	ND	ND	ND	ND	ND	NA	NA	NA	NA

Table 2.2
Groundwater Analytical Summary
SWMU 66
Keesler AFB, MS

Monitoring Well	Sampling Date	Sampled Compounds in (mg/L)								
		Benzene	Toluene	Ethylbenzene	Xylenes (Total)	MTBE	Methane	Ferrous Iron	Nitrate	Sulfate
SW-2	14-May-98	ND	ND	ND	ND	ND	NA	NA	NA	NA
	20-Aug-98	ND	ND	ND	ND	ND	NA	NA	NA	NA
	18-Nov-98	ND	ND	ND	ND	ND	NA	NA	NA	NA
	22-Jun-99	ND	ND	ND	ND	ND	NA	NA	NA	NA
SW-3	14-May-98	NM	NM	NM	NM	NM	NM	NM	NM	NM
	21-Aug-98	ND	ND	ND	ND	ND	NA	NA	NA	NA
	18-Nov-98	ND	ND	ND	ND	ND	NA	NA	NA	NA
	22-Jun-99	ND	ND	ND	ND	ND	NA	NA	NA	NA
SW-4*	14-May-98	ND	ND	ND	ND	ND	NA	NA	NA	NA
MW-9-10**	20-Aug-98	ND	ND	ND	ND	**0.002**	**0.687 J**	**0.25 J**	ND	**18.9 J**
MW-9-10***	18-Nov-98	**0.01**	ND	**0.006**	**0.003**	**0.002 J**	**4.03**	**0.160**	ND	**22.1**

ND - Not Detected
NA - Not Analyzed
NM - Not Measured
* - Duplicate sample of SW-2
** - Duplicate sample of MW9-2; The highest detected value in either sample was reported as MW9-2.
*** - Duplicate sample of MW9-6; The highest detected value in either sample was reported as MW9-6.
mg/L - milligrams per liter

Table 2.3
Initial Groundwater Screening Summary
SWMU 66
Keesler AFB, MS

Monitoring Well ID	Sampling Date	Purging Data				
		Temperature (°C)	pH	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Gallons Purged
MW9-1	14-May-98	22	5.92	301	0.28	10
	20-Aug-98	26.7	6.31	361	-0.33	5
	19-Nov-98	24.5	5.93	309	1.8	5
	22-Jun-99	24.4	6.19	328	0.03	3
MW9-2	14-May-98	25.3	5.91	352	0.09	6.5
	20-Aug-98	30.3	6.08	462	-0.40	5
	19-Nov-98	27.8	5.81	324	1.53	5
	23-Jun-99	27.9	6.06	546	0.02	3
MW9-6	14-May-98	22.9	5.86	292	0.06	10
	20-Aug-98	27.4	6.23	388	-0.48	5
	19-Nov-98	24.7	5.92	278	1.62	5
	22-Jun-99	25.1	5.96	367	0.01	3
MW9-7	14-May-98	NM	NM	NM	NM	NM
	20-Aug-98	NM	NM	NM	NM	NM
	19-Nov-98	NM	NM	NM	NM	NM
MW9-7R	23-Jun-99	25.5	6.03	429	0.01	2
MW9-8	14-May-98	22.9	5.6	336	0.04	8.5
	20-Aug-98	27	6.13	547	-0.49	5
	19-Nov-98	26	5.82	381	2.88	5
	23-Jun-99	25.2	5.26	271	0.01	2
SW-1	14-May-98	22.1	6.81	237	1.69	9.5
	20-Aug-98	27.6	6.54	326	0.34	5
	18-Nov-98	24.8	6.96	151	4.7	5
	22-Jun-99	25.2	6.41	367	0.47	4
SW-2	14-May-98	25.3	5.85	202	0.68	9
	20-Aug-98	32.0	5.50	199	-0.15	5
	18-Nov-98	27.3	6.00	163	2.15	5
	22-Jun-99	29.3	5.95	244	0.08	3
SW-3	14-May-98	NM	NM	NM	NM	NM
	20-Aug-98	28.1	5.5	387	-0.36	5
	18-Nov-98	24.7	6.16	335	1.84	5
	22-Jun-99	26.2	6.1	414	0.01	3

Values represent last reading taken after equilibrium was reached
NM - Not Measured

SECTION 3
SAMPLE COLLECTION PROCEDURES AND QUALITY ASSURANCE / QUALITY CONTROL

3.1 SAMPLE COLLECTION

Groundwater sampling was conducted at SWMU 66 on May 14, 1998, August 20, 1998, November 18-19, 1998, and June 22-23, 1999. To the extent possible, the well locations were sampled in order of increasing groundwater contaminant concentrations to minimize cross contamination potential. All sample collection activities and field observations were recorded in the field logbook. General procedures for the handling and collection of groundwater samples during this round of sampling are described in the following sections.

3.1.1 Groundwater Sampling and Handling

Prior to purging, the static water levels and depth to bottom of the wells were measured to the nearest 0.01 foot from the top of the well casing (TOC) using a clean water level indicator. Prior to the collection of groundwater samples at each location, each well was purged using a peristaltic pump. Field parameters including pH, conductivity, dissolved oxygen and temperature were measured during the purging process to ensure that representative aquifer water was being sampled. Purging activities continued until these parameters had stabilized (less than $\pm$ 0.2 standard pH units or a 10-percent change for the other parameters), or until a minimum of three well casing volumes of groundwater had been removed. The meter used (Horiba U-10) to measure the field parameters was calibrated each day prior to use. Table 2.3 summarizes the final field parameters collected during the purging process. The purge water was containerized and taken to an onsite oil/water separator for disposal.

Groundwater samples were collected following stabilization of field parameters using a peristaltic pump with new polyethylene tubing. Groundwater samples were placed in appropriate pre-labeled containers and securely sealed. The bottle labels indicated the sample number and source, sampler's initials and date of sample collection. Sample collection times and all other pertinent information was entered on groundwater sampling forms (Appendix B) or in the bound field logbook. Chain of custody forms accompanied the samples throughout all phases of sample shipment and handling. The samples were placed on ice in a cooler to maintain a temperature of 4 degrees centigrade, and then shipped to Specialized Assays Laboratory in Nashville, TN, for analysis. The groundwater samples and quality control (QC) samples were analyzed as specified in Section 2.2.

Laboratory blanks accompanied each set of sample analyses. The results of these blank analyses and other QC sample results are discussed below.

3.2 QUALITY ASSURANCE/QUALITY CONTROL

Quality Assurance/Quality Control (QA/QC) includes the assessment of precision, accuracy, representativeness, comparability and completeness. QA/QC is evaluated by the review of the field and laboratory methodologies, the collection and analysis of field QC samples (trip blanks and coded field duplicates), as well as the internal laboratory QC analyses (surrogate spikes, method blanks, laboratory control sample/laboratory control sample duplicates). The following discusses the results of the QA/QC review.

3.2.1 Precision

The precision was measured by the relative percent difference (RPD) of results from the coded field duplicate samples and matrix spike/matrix spike duplicate (MS/MSD) analyses. One groundwater coded field duplicate and one MS/MSD sample analyses were conducted during each sampling event.

The coded field duplicate analyses exhibited similar results for all BTEX constituents within 0.001 mg/L. This is within field duplicate RPD limits. The QC limit for coded field duplicate RPD is less than or equal to 20 % unless one or both results are less than the reporting limit. If one or more results are less than the reporting limit, the absolute difference between the two results must be less than two times the reporting limit. The laboratory has established QC criteria for the MS/MSD RPD. All MS/MSD met the laboratory RPD limits with the exception of sulfate in the MS/MSD for the fourth quarter sampling event. The RPD (13.7%) exceeded the lab criteria of 10% maximum RPD. However, it was below the data validation criteria of 20%. No action was required.

3.2.2 Accuracy

The accuracy was measured by the percent recovery (%R) of the surrogate, MS/MSD and LCS spikes. The %Rs for all surrogate analyses met the 70 to 130 % QC limit. All target compounds (benzene, toluene, ethylbenzene, xylenes, methyl-t-butylether, methane, ferrous iron, nitrate, and sulfate) were spiked into the MS/MSD and LCS samples. All %Rs for the representative spike compounds met the 70 to 130 % QC limit.

3.2.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents actual site conditions. The assessment of representativeness is evaluated qualitatively by reviewing the sampling and analysis methodologies and

quantitatively by the assessment of the field and laboratory blanks and field duplicates results.

The field sampling team and the laboratory used standard methodologies. Laboratory method blanks were associated with all analytical batches containing environmental samples. The sample results from the four sampling events are qualitatively representative of the compounds contained in the sample media.

3.2.4 Comparability

Comparability expresses the confidence with which one set of data can be compared with another. Comparability can be related to precision and accuracy as these quantities are measures of data reliability. All measurement data generated were expressed in standard units as defined by the method to allow comparability of data among different sets/sampling efforts. The laboratory results from the four sampling events were comparable.

3.2.5 Completeness

The completeness of the project is measured by the percentage of useable results. The project sample results are 100% complete and all sample results are useable as qualified.

SECTION 4
POTENTIAL RECEPTORS AND MIGRATION PATHWAYS

4.1 POTENTIAL EXPOSURE PATHWAYS

The potential routes of migration for the petroleum hydrocarbons at SWMU 66 are leaching from soil to groundwater, volatilization from soils and groundwater with subsequent vapor-phase movement, and transport with groundwater flow. Human exposure pathways can exist for inhalation, ingestion and dermal contact of site contaminants in various site media that include groundwater, subsurface soils, soil vapor and surface soils. This section discusses the fate, transport, and potential exposure pathways of the contaminants of concern at SWMU 66.

In order to determine which populations may be exposed to hydrocarbons at SWMU 66, it is necessary to evaluate current and future use of the property. By identifying current and future land use, potentially exposed populations can be identified and the exposure pathways can be evaluated. Currently, Keesler AFB is used as an Air Education and Training Command Base. In the future, Keesler AFB will likely continue to be used for similar or other military purposes.

4.1.1 Surface Water Receptor Pathways

Discharge to local surface water does not appear to be a current risk factor associated with hydrocarbons in groundwater beneath SWMU 66. The closest potential aquifer discharge point is the Mississippi Sound located approximately 1845 feet south of the site.

4.1.2 Soil Hydrocarbon Receptor Pathways

Residual hydrocarbons exist in shallow soils at SWMU 66. Inhalation, ingestion, and dermal exposure to soils impacted by hydrocarbons are possible exposure pathways associated with this site. These soils are sufficiently deep to minimize the potential for incidental contact or soil migration away from the site. The potential exposure risk for soils increases during excavation or other intrusive activities.

The entire base is fenced with guarded gates to prevent unauthorized access to this site. The most likely receptors for exposure to the contaminants are future site workers involved with excavation activities. However, by advising site workers of hazard potentials and wearing appropriate protective safety equipment, exposure potential can be minimized or eliminated. Given the current industrial use of the site and anticipated future use as an industrial area, it is highly unlikely that reidential development will ever occur. Land use controls are proposed for this site which will prevent residential use from occurring. The risk potential for hydrocarbon inhalation is insignificant at the site in its current undisturbed condition. However, the risk for inhalation of hydrocarbons would increase during activities that disturb and expose subsurface soils. Through the use of appropriate safety equipment, complete pathways for exposure to the contaminants are eliminated or reduced to acceptable levels for industrial workers during intrusive activities.

4.1.3 Groundwater Receptor Pathways

Groundwater is the primary mechanism for potential off-site hydrocarbon migration. However, human ingestion of hydrocarbons via groundwater consumption is a very low risk associated with this site. No water supply wells exist in the surficial aquifer on Keesler AFB. Therefore, a complete exposure pathway does not exist. Groundwater for consumptive purposes is obtained from the Graham Ferry Formation which is part of the Miocene aquifer system. The surficial aquifer system is separated from the Graham Ferry Formation by less permeable stratigraphic units contained in the upper part of the formation. Therefore a pathway of exposure by consumption or dermal contact is not present.

Even though a complete exposure pathway does not exist at SWMU 66, MDEQ regulates the surficial aquifer as a drinking water source. The proposed corrective action at SWMU 66 includes land use controls which would prevent future development of the site and would also prevent the usage of site groundwater by potential human receptors.

4.2 WATER-SUPPLY WELL SURVEY

Keesler AFB obtains water from a system of 11 potable supply wells all of which pump from the 600-ft sands. These wells range in depth from 611 to 684 feet. Two of the wells are located west of the main base, near the V.A. Hospital. The remaining wells are located south and east of the runway. Newcome (1968) reported a daily pumping rate at Keesler AFB of 3.6 million gallons per day (gpd). Aquifer tests were performed on six of the Keesler AFB wells in 1964. In short, the aquifer thickness of the 600-ft sands

ranged from 60 to 100 ft with an average thickness of 84 ft. Transmissivity in these six wells ranged from 60,000 to 100,000 gpd/ft and hydraulic conductivity ranged from 670 to 1000 gpd/ft^2. Storage coefficients were reported for base wells number 1 and 5 as 0.0003 and 0.0004 (Colson and Boswell 1985). A summary of water-supply wells at Keesler AFB is given in Table 4.1. Figure 4.1 illustrates the relative locations of these wells to SWUM 66. The nearest well to SWMU 66 is Well 9 located approximately 1200 feet to the northeast.

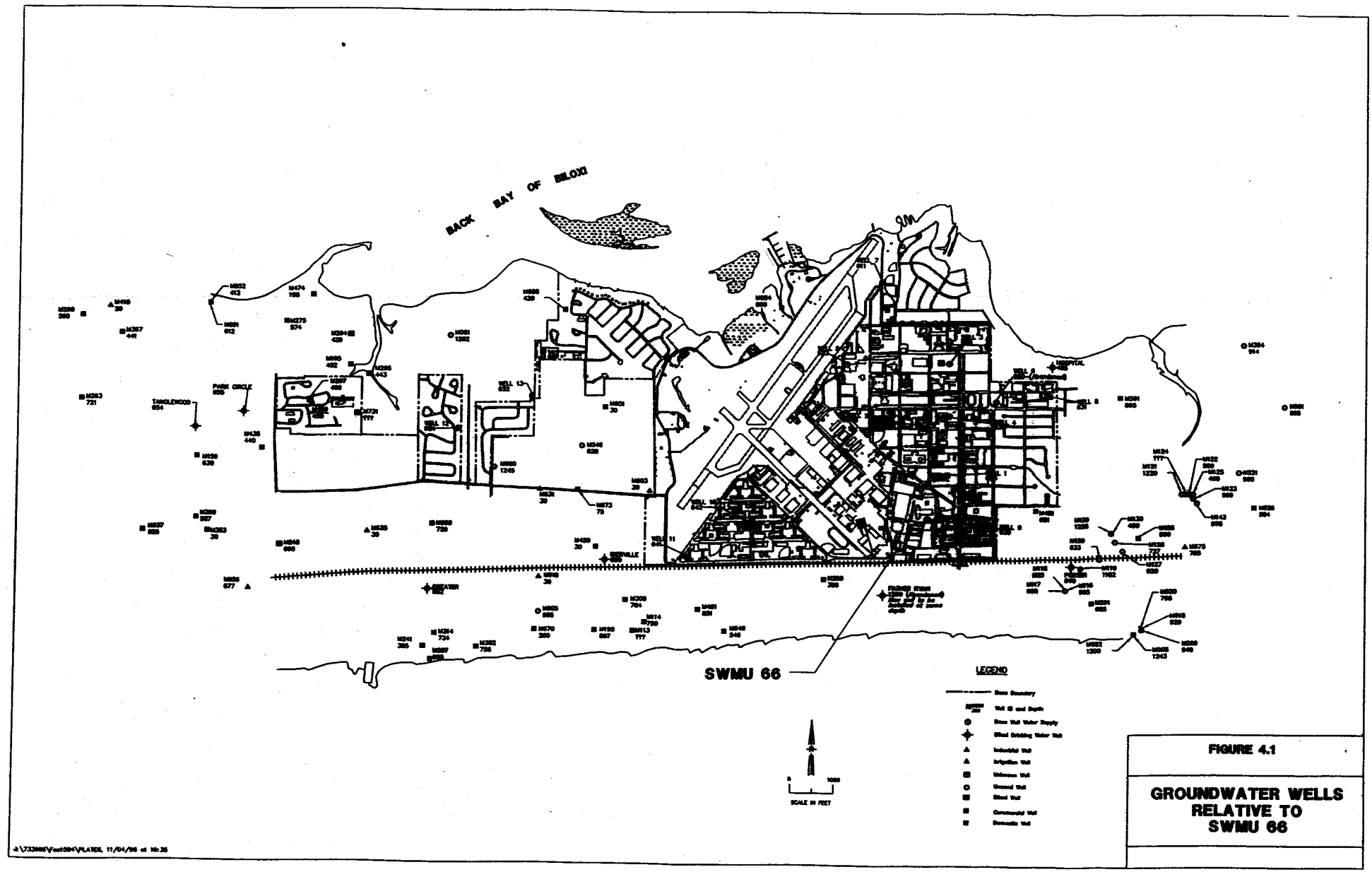


FIGURE 4.1

GROUNDWATER WELLS RELATIVE TO SWMU 66

Table 4.1
Keesler AFB Water Supply Wells

Well Number	Building	USGS Number	Well Depth (ft)	Static Water Level (ft below land surface datum)	Measurement Date	Screen Diameter (inches)	Screen Length (ft)	Primary Aquifer (USGS Classification)	Transmissivity GPD/ft	Hydraulic Conductivity GPD/ft^2	Storage Coefficient
1	3509	M64	624	71.0	1986	10	40	Graham Ferry, fm	100,000	1,000	0.0003
2	1921	M67	640	76.0	1986	10	40	Graham Ferry, fm	–	–	–
3	0621	M66	646	76.0	1986	10	40	Graham Ferry, fm	–	–	–
4	2121	M65	636	73.0	1986	10	40	Graham Ferry, fm	–	–	–
5	0916	M68	623	70.0	1986	10	40	Graham Ferry, fm	60,000	1,000	0.0004
6(a)	5705	M63	650	2.0	1942	10	50	Graham Ferry, fm	–	–	–
7	0242	M75	611	75.0	1986	12	40	Graham Ferry, fm	62,000	960	–
8	6005	M76	631	74.0	1986	12	40	Graham Ferry, fm	67,000	670	–
19	3967	M77	639	83.0	1986	12	40	Graham Ferry, fm	–	–	–
10	7301	M78	642	74.0	1986	12	40	Graham Ferry, fm	73,000	730	–
11	7501	M79	641	81.0	1986	12	40	Graham Ferry, fm	80,000	1,000	–
12	9161	M82	684	48.0	1978	10	60	Graham Ferry, fm	–	–	–
13	7721	M650	652	50	1986	10	85	Graham Ferry, fm	–	–	–
(b)	6634	M681	60	0.5(c)	1984	4	–	–	–	–	–

(a) Abandoned

(b) This well is used to maintain the water level in the golf course pond; it is not used as a drinking water source.

(c) Water level is 0.5 ft above local land surface datum.

Sources: USGS file data

Brown et al., 1944; Newcome, 1968; USGS file data, 1993; Colson-Boswell, 1985

ES, 1984; ESE, 1991

SECTION 5
CONTAMINANT ATTENUATION ASSESSMENT

5.1 INTRODUCTION

Biodegradation of dissolved fuel constituents is assessed in this section and Appendix C to support selection of an appropriate remedial alternative for SWMU 66. As used throughout this report, the term "remediation by natural attenuation" (RNA) refers to a subsurface contaminant management strategy that relies on natural physical, chemical, and biological mechanisms to control exposure of potential receptors to concentrations of contaminants in soil and groundwater that exceed regulatory levels. These mechanisms include the processes of hydrodynamic dispersion, dilution, sorption, volatilization, and biodegradation, which facilitate RNA of a variety of anthropogenic chemicals.

This section summarizes the contaminant attenuation assessment for SWMU 66. The full assessment for this site is presented in Appendix C.

5.2 EVIDENCE OF CONTAMINANT BIODEGRADATION OVER TIME

The first step in determining whether fuel hydrocarbon constituents are biodegrading in groundwater at SWMU 66 was to compare contaminant concentrations at selected sampling locations over time. The purpose of this comparison was to assess the evidence of field-scale contaminant mass loss. Decreases in the magnitude of contaminant concentrations at a site over time that cannot be explained by physical processes (e.g., source removal, mass transport in groundwater) may be the first indication that contaminants are biodegrading at the site.

5.2.1 Hydrocarbon Concentration Trends in Groundwater

Hydrocarbon concentrations were measured at SWMU 66 from six monitoring wells in May 1998, August 1998, and November 1998, and from eight monitoring wells in June 1999. The data from these sampling events are summarized in Table C.1. Three of the eight monitoring wells had measurable concentrations of total BTEX; the BTEX concentrations increased in all three wells since the May 1998 sampling event and can be attributed to the mass transport of the plume in the groundwater. Monitoring well MW9-6 was the only well to have total BTEX concentrations decrease (207.9 µg/L to non detect) since the 1998 sampling event.

Decreasing dissolved hydrocarbon concentrations indicate that the mass of hydrocarbons input into the groundwater system in the source area (through leaching of residual hydrocarbons in soils) is decreasing, and that biodegradation of dissolved BTEX is occurring.

5.3 EVIDENCE OF CONTAMINANT BIODEGRADATION VIA MICROBIALLY MEDIATED REDOX REACTIONS

Groundwater geochemical data can be used to show that fuel hydrocarbons are biodegrading in saturated soil and groundwater at SWMU 66. Fuel hydrocarbon constituents are typically utilized as electron donors in biologically mediated redox reactions under a wide range of geochemical conditions. Therefore, analytical data on potential electron acceptors can be used as geochemical indicators of fuel hydrocarbon biodegradation (Wiedemeier *et al.*, 1995). Reductions in the concentrations of oxidized chemical species that are used by microorganisms to facilitate the oxidation of fuel hydrocarbon compounds within contaminated media are an indication that contaminants are biodegrading. Alternately, an increase in the metabolic byproducts resulting from the reduction of electron acceptors can be used as an indicator of contaminant biodegradation. The availability of potential electron acceptors to participate in contaminant biodegradation reactions can be used to estimate the total contaminant mass that can be biodegraded over time at this site. Coupled with calculated biodegradation rates, this information can be used to predict how much and how quickly fuel hydrocarbons can be removed from saturated soils and groundwater at SWMU 66 as a result of natural processes only.

Throughout the following subsections, the distributions of geochemical parameters are examined by comparing background concentrations to fuel hydrocarbon plume core concentrations. Analytical data from upgradient well MW9-2 is used for background concentrations. Analytical data from MW9-7R, and MW9-8 are used for fuel hydrocarbon plume core concentrations. Hydrocarbon concentrations are presented on Figure 2.8. The following shows qualitatively the expected geochemical parameter response to biodegradation of BTEX compounds, with ↑ referring to relatively high concentrations and ↓ referring to relatively low concentrations (Payne, *et al.* 1995):

BTEX ↑: O_2↓ NO^{3-} ↓ NH_3 ↑ Fe^{2+} ↑ SO^{4-} ↓ H_2S ↑ CH_4 ↑

BTEX ↓: O_2↑ NO^{3-} ↑ NH_3 ↓ Fe^{2+} ↓ SO^{4-} ↑ H_2S ↓ CH_4 ↓

5.3.1 Dissolved Oxygen (O_2)

The overall low magnitude of DO concentrations indicates that oxygen is not currently a significant electron acceptor during microbially mediated degradation of fuel hydrocarbons at SWMU 66.

5.3.2 Ammonia (NH_3)

Ammonia concentrations detected in shallow groundwater varied acros with elevated ammonia concentrations occurring in the fuel hydrocarbon plume core area. Therefore, production of ammonia appears to be occurring due to increased microbial activity stimulated by the relative abundance of organic carbon (fuel hydrocarbons).

5.3.3 Ferrous Iron (Fe^{2+})

The occurrence of elevated ferrous iron concentrations within contaminated areas indicates that ferric iron is acting as an electron acceptor at these locations.

5.3.4 Sulfate (SO^{4-})

In general, there is good correlation between areas of depleted sulfate concentrations and the plume core. The decrease of sulfate within the contaminated area indicates microbial populations are using sulfate to oxidize fuel hydrocarbons at the site.

5.3.5 Dissolved Methane (CH_4)

The presence of elevated methane levels in groundwater at SWMU 66 strongly indicates biodegradation is occurring via methanogenesis.

5.4 THEORETICAL ASSIMILATIVE CAPACITY ESTIMATES

On the basis of theoretical assimilative capacity calculations performed in Appendix C, one pore volume of saturated soil and groundwater at SWMU 66 has the capacity to oxidize an average BTEX concentration of approximately 11.96 mg/L (11,960 µg/L) (Table C.4). The maximum BTEX concentration at SWMU 66 in June 1999 was 0.49 mg/L (489.7 µg/L).

This estimate essentially represents an estimate of the fuel hydrocarbon reduction capability of one pore volume of groundwater at SWMU 66. The estimate identifies how much contaminant mass can be theoretically oxidized as one pore volume travels through the plume core. In reality, one pore volume is expected to move through the contaminated aquifer material in the source area every 7.1 years based on the estimated groundwater velocity of 45 ft/yr and a source area length of approximately 320 feet.

5.5 SUMMARY OF FINDINGS

The results of the chemical fate assessment performed in this section are as follows:

1. Historical groundwater analytical data indicate BTEX concentrations in most wells since May 1998 are increasing over time;

2. Geochemical data strongly indicate that biodegradation of fuel hydrocarbons is occurring primarily through the processes of iron reduction, sulfate reduction, nitrogen fixation and methanogenesis; and
3. The expressed BTEX assimilative capacity of the aquifer (11.96 mg/L) is more than the maximum BTEX concentration detected in SWMU 66 groundwater (0.49 mg/L).

These results are discussed further in Section 6 and Appendix C.

SECTION 6
CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

BTEX constituents have been detected in all wells at SWMU 66 during the last four sampling events with the exception of MW9-2. The detections of toluene in sentry wells SW-1, SW-2 and SW-3 during the November 1998 sampling event may be attributed to trip blank contamination as the BTEX plume has apparently not migrated this far. During the June 1999 sampling event, BTEX compounds were detected in groundwater samples from monitoring wells MW9-1, MW9-7R, and MW9-8. MTBE was detected in only one well; MW9-7R. The contaminant plume is relatively stable based upon the four sampling events. MTBE concentrations have decreased over time to the point where this compound is now found only in the source area well (MW9-7R).

Geochemical data strongly indicate that biodegradation of fuel hydrocarbons is occurring primarily through the processes of iron reduction, sulfate reduction, nitrogen fixation and methanogenesis. The expressed BTEX assimilative capacity of the aquifer (11.96 mg/L) is more than the maximum BTEX concentration detected in SWMU 66 groundwater (0.49 mg/L).

The groundwater flow direction has remained basically the same (north) for the four periods, with some minor shifting between northeast to northwest.

6.2 RECOMMENDATIONS

Long term monitoring of groundwater is currently recommended for SWMU 66. Annual groundwater sampling will be performed for two more years. Monitoring wells included in the sampling program are MW9-1, MW9-2, MW9-6, MW9-7R, MW9-8, SW-1, SW-2, and SW-3. Groundwater samples from these wells will be analyzed for BTEX by EPA Method 8021B. Natural attenuation parameters will also be measured in these wells. If, after this two year period, COCs remain above ARARs, groundwater monitoring will continue. If COCs fall below ARARs at the end of the monitoring period, then monitoring will cease.

SECTION 7
REFERENCES

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Parsons Engineering Science, Inc, 1999. Keesler Air Force Base U.S. Installation Restoration Program Final RCRA Facility Investigation Report. Prepared for U.S. Air Force . EPA I.D. No. MS2 570 024 164. Atlanta, Georgia.

APPENDIX A
LABORATORY DATA

APPENDIX A.1
LABORATORY DATA
MAY 1998

SPECIALIZED ASSAYS, INC.

2960 Foster Creighton Dr.
P.O. Box 40566
Nashville, TN 37204-0566
Phone 1-615-726-0177

ANALYTICAL REPORT

ARSONS ENG./KEESLER AFB,MS 8249
ODGER BALDWIN
390 TRIANGLE PARKWAY STE 100
ORCROSS, GA 30092

roject: 733430
roject Name: KEESLER (LTM) SWMU 66
ampler: B. L.

Lab Number: 98-A55154
Sample ID: SW-1
Sample Type: Water
Site ID:

Date Collected: 5/15/98
Time Collected: 10:20
Date Received: 5/16/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	mg/l	0.0010	0.0010	1	5/21/98	14:00	Duncan, J.	8021B	1732
Toluene	ND	mg/l	0.0010	0.0010	1	5/21/98	14:00	Duncan, J.	8021B	1732
Ethylbenzene	ND	mg/l	0.0010	0.0010	1	5/21/98	14:00	Duncan, J.	8021B	1732
Xylenes, total	ND	mg/l	0.0010	0.0010	1	5/21/98	14:00	Duncan, J.	8021B	1732
Methyl-t-butylether	ND	mg/l	0.0010	0.0010	1	5/21/98	14:00	Duncan, J.	8021B	1732

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	94.	50. - 150.

Report Approved By: Theodore J. Duello Report Date: 6/ 9/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny B. Hale, M.S., Laboratory Director

COPY 3

SPECIALIZED ASSAYS, INC.

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P.O. Box 40566
Nashville, TN 37204-0566
Phone 1-615-726-0177

ANALYTICAL REPORT

ARSONS ENG./KEESLER AFB, MS 8249
OGER BALDWIN
390 TRIANGLE PARKWAY STE 100
ORCROSS, GA 30092

roject: 733430
roject Name: KEESLER (LTM) SWMU 6a
ampler: B. L.

Lab Number: 98-A55152
Sample ID: SW-2
Sample Type: Water
Site ID:

Date Collected: 5/15/98
Time Collected: 9:45
Date Received: 5/16/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	mg/l	0.0010	0.0010	1	5/21/98	13:09	Duncan, J.	8021B	1732
Toluene	ND	mg/l	0.0010	0.0010	1	5/21/98	13:09	Duncan, J.	8021B	1732
Ethylbenzene	ND	mg/l	0.0010	0.0010	1	5/21/98	13:09	Duncan, J.	8021B	1732
Xylenes, total	ND	mg/l	0.0010	0.0010	1	5/21/98	13:09	Duncan, J.	8021B	1732
Methyl-t-butylether	ND	mg/l	0.0010	0.0010	1	5/21/98	13:09	Duncan, J.	8021B	1732

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	95.	50. - 150.

Report Approved By: Theodore J. Duello Report Date: 6/ 9/98

Theodore J. Duello, Ph.D., Q.A. Officer
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COPY 3

SPECIALIZED ASSAYS, INC.

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ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB, MS 8249
ROGER BALDWIN
390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 733430
Project Name: KEESLER (LTM) SWMU 66
Sampler: B. L.

Lab Number: 98-A55153
Sample ID: SW-4
Sample Type: Water
Site ID:

Date Collected: 5/15/98
Time Collected: 8:40
Date Received: 5/16/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	mg/l	0.0010	0.0010	1	5/21/98	13:35	Duncan, J.	8021B	1732
Toluene	ND	mg/l	0.0010	0.0010	1	5/21/98	13:35	Duncan, J.	8021B	1732
Ethylbenzene	ND	mg/l	0.0010	0.0010	1	5/21/98	13:35	Duncan, J.	8021B	1732
Xylenes, total	ND	mg/l	0.0010	0.0010	1	5/21/98	13:35	Duncan, J.	8021B	1732
Methyl-t-butylether	ND	mg/l	0.0010	0.0010	1	5/21/98	13:35	Duncan, J.	8021B	1732

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	93.	50. - 150.

Report Approved By: Theodore J. Duello Report Date: 6/ 9/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny B. Hale, M.S., Laboratory Director

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SPECIALIZED ASSAYS, INC.

2960 Foster Creighton Dr.
P.O. Box 40566
Nashville, TN 37204-0566
Phone 1-615-726-0177

ANALYTICAL REPORT

'ARSONS ENG. /KEESLER AFB, MS 8249
:OGER BALDWIN
:390 TRIANGLE PARKWAY STE 100
:ORCROSS, GA 30092

'roject: 733430
'roject Name: KEESLER (LTM)
:ampler: R. B.

Lab Number: 98-A54140
Sample ID: MW9-1
Sample Type: Water
Site ID:

Date Collected: 5/14/98
Time Collected: 14:45
Date Received: 5/15/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan. Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	mg/l	0.0010	0.0010	1	5/21/98	14:52	J.Mitchell	8021B	936
Toluene	ND	mg/l	0.0010	0.0010	1	5/21/98	14:52	J.Mitchell	8021B	936
Ethylbenzene	ND	mg/l	0.0010	0.0010	1	5/21/98	14:52	J.Mitchell	8021B	936
Xylenes, total	ND	mg/l	0.0010	0.0010	1	5/21/98	14:52	J.Mitchell	8021B	936
Methyl-t-butylether	ND	mg/l	0.0010	0.0010	1	5/21/98	14:52	J.Mitchell	8021B	936
MISCELLANEOUS GC PARAMETERS										
Methane	2.89	mg/L	0.260	0.026	10	5/19/98	11:40	M. Klepper	8015M	942
METALS										
Ferrous Iron	0.122	mg/l	0.100	0.100	1	5/19/98	12:28	A Hardison	3500D	944
MISCELLANEOUS CHEMISTRY										
pH	6.00	pH Units			1	5/15/98	10:32	F. Frye	9040/150.1	937
Nitrate-N as N	ND	mg/l	0.10	0.10	1	5/15/98	23:21	J.Temple	353.2	939
Sulfate	10.9	mg/l	5.00	5.00	1	5/22/98	15:11	G. Baun	9038	3232

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., 4,4,4-trifluorotoluene	95.	50. - 150.

Report Approved By: Theodore J. Duello Report Date: 6/ 9/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny B. Hale, M.S., Laboratory Director

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ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB,MS 8249
ROGER BALDWIN
3390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 733430
Project Name: KEESLER (LTM)
Sampler: R. B.

Lab Number: 98-A54137
Sample ID: MW9-2
Sample Type: Water
Site ID:

Date Collected: 5/14/98
Time Collected: 12:30
Date Received: 5/15/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	mg/l	0.0010	0.0010	1	5/21/98	14:26	J.Mitchell	8021B	936
Toluene	ND	mg/l	0.0010	0.0010	1	5/21/98	14:26	J.Mitchell	8021B	936
Ethylbenzene	ND	mg/l	0.0010	0.0010	1	5/21/98	14:26	J.Mitchell	8021B	936
Xylenes, total	ND	mg/l	0.0010	0.0010	1	5/21/98	14:26	J.Mitchell	8021B	936
Methyl-t-butylether	ND	mg/l	0.0010	0.0010	1	5/21/98	14:26	J.Mitchell	8021B	936
MISCELLANEOUS GC PARAMETERS										
Methane	5.99	mg/L	0.260	0.026	10	5/19/98	10:34	W. Klepper	8015M	942
METALS										
Ferrous Iron	2.52	mg/l	0.100	0.100	1	5/19/98	12:28	A Hardison	3500D	944
MISCELLANEOUS CHEMISTRY										
pH	6.10	pH Units			1	5/15/98	10:30	F. Frye	9040/150.1	937
Nitrate-N as N	ND	mg/l	0.10	0.10	1	5/15/98	23:18	J.Temple	353.2	939
Sulfate	ND	mg/l	5.00	5.00	1	5/22/98	15:11	G. Daun	9038	3232

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	94.	30. - 150.

Report Approved By: Theodore J. Dualla Report Date: 6/ 9/98

Theodore J. Dualla, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny D. Hale, M.S., Laboratory Director

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ANALYTICAL REPORT

ARSONS ENG. /KEESLER AFB, MS 8249
OGER BALDWIN
390 TRIANGLE PARKWAY STE 100
ORCROSS, GA 30092

roject: 733430
roject Name: KEESLER (LTM)
ampler: R. B.

Lab Number: 98-A54138
Sample ID: MW9-6
Sample Type: Water
Site ID:

Date Collected: 5/14/98
Time Collected: 13:20
Date Received: 5/15/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	0.0195	mg/l	0.0010	0.0010	1	5/21/98	15:43	J.Mitchell	8021B	936
Toluene	0.0016	mg/l	0.0010	0.0010	1	5/21/98	15:43	J.Mitchell	8021B	936
Ethylbenzene	0.0054	mg/l	0.0010	0.0010	1	5/21/98	15:43	J.Mitchell	8021B	936
Xylenes, total	0.0059	mg/l	0.0010	0.0010	1	5/21/98	15:43	J.Mitchell	8021B	936
Methyl-t-butylether	0.0107	mg/l	0.0010	0.0010	1	5/21/98	15:43	J.Mitchell	8021B	936
MISCELLANEOUS GC PARAMETERS										
Methane	4.52	mg/L	0.260	0.026	10	5/19/98	11:03	W. Klepper	8015M	942
METALS										
Ferrous Iron	0.302	mg/l	0.100	0.100	1	5/19/98	12:28	A Hardison	3500D	944
MISCELLANEOUS CHEMISTRY										
pH	6.10	pH Units			1	5/15/98	10:30	F. Frye	9040/150.1	937
Nitrate-N as N	ND	mg/l	0.10	0.10	1	5/15/98	23:20	J.Temple	353.2	939
Sulfate	9.90	mg/l	5.00	5.00	1	5/22/98	15:11	G. Baun	9038	3232

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	90.	59. - 150.

Report Approved By: Theodore J. Duello Report Date: 6/ 9/98

Theodore J. Duello, Ph.D , Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny B. Hale, M.S., Laboratory Director

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ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB,MS 8249
ROGER BALDWIN
1390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 733430
Project Name: KEESLER (LTM)
Sampler: R. B.

Lab Number: 98-A54139
Sample ID: MW9-B
Sample Type: Water
Site ID:

Date Collected: 5/14/98
Time Collected: 14:15
Date Received: 5/15/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	mg/l	0.0010	0.0010	1	5/21/98	15:17	J.Mitchell	8021B	936
Toluene	ND	mg/l	0.0010	0.0010	1	5/21/98	15:17	J.Mitchell	8021B	936
Ethylbenzene	ND	mg/l	0.0010	0.0010	1	5/21/98	15:17	J.Mitchell	8021B	936
Xylenes, total	ND	mg/l	0.0010	0.0010	1	5/21/98	15:17	J.Mitchell	8021B	936
Methyl-t-butylether	0.0059	mg/l	0.0010	0.0010	1	5/21/98	15:17	J.Mitchell	8021B	936
MISCELLANEOUS GC PARAMETERS										
Methane	5.15	mg/L	0.260	0.026	10	5/19/98	11:35	W. Klepper	8015M	942
METALS										
Ferrous Iron	1.43	mg/l	0.100	0.100	1	5/19/98	12:28	A Hardison	3500D	944
MISCELLANEOUS CHEMISTRY										
pH	5.70	pH Units			1	5/15/98	10:32	F. Frye	9040/150.1	937
Nitrate-N as N	ND	mg/l	0.10	0.10	1	5/15/98	23:20	J.Temple	353.2	939
Sulfate	29.0	mg/l	5.00	5.00	1	5/22/98	15:11	G. Baun	9038	3232

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	96.	50. - 150.

Report Approved By: Theodore J. Duello Report Date: 6/ 9/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny B. Hale, M.S., Laboratory Director

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PROJECT QUALITY CONTROL DATA

Matrix Spike Recovery

Analyte	units	Orig. Val.	MS Val	Spike Conc	Recovery	Target Range	Q.C. Batch
Benzene	mg/l	< 0.0010	0.0200	0.0200	100.00	69. - 123.	1732
Toluene	mg/l	< 0.0010	0.0210	0.0200	105.00	69. - 122.	1732
Ethylbenzene	mg/l	< 0.0010	0.0210	0.0200	105.00	68. - 124.	1732
Xylenes, total	mg/l	< 0.0010	0.0420	0.0400	105.00	67. - 125.	1732
Methyl-t-butylether	mg/l	< 0.0010	0.0170	0.0200	85.00	66. - 126.	1732
Arsenic, Total	mg/l	0.1320	0.1810	0.0500	98.00	80 - 120	2241
Barium, Total	mg/l	0.0170	1.800	2.000	89.15	80 - 120	2241
Cadmium, Total	mg/l	< 0.0010	0.0470	0.0500	94.00	80 - 120	2241
Chromium, Total	mg/l	< 0.0050	0.1840	0.2000	92.00	80 - 120	2241
Lead, Total	mg/l	< 0.0030	0.0475	0.0500	95.00	80 - 120	2241
Mercury, Total	mg/l	< 0.00020	0.00111	0.00100	111.00	80 - 120	2239
Selenium, Total	mg/l	< 0.0050	0.0430	0.0500	86.00	80 - 120	2241
Silver, Total	mg/l	< 0.0050	0.0420	0.0500	84.00	80 - 120	2241

Matrix Spike Duplicate

Analyte	units	Orig. Val.	Duplicate	RPD	Limit	Q.C. Batch
Benzene	mg/l	0.0200	0.0200	0.00	15.	1732
Toluene	mg/l	0.0210	0.0210	0.00	14.	1732
Ethylbenzene	mg/l	0.0210	0.0210	0.00	14.	1732
Xylenes, total	mg/l	0.0420	0.0420	0.00	16.	1732
Methyl-t-butylether	mg/l	0.0170	0.0170	0.00	19.	1732

Laboratory Control Data

Analyte	units	Known Val.	Analyzed Val	% Recovery	Target Range	Q.C. Batch
Benzene	mg/l	0.0200	0.0200	100.	70 - 130	1732
Toluene	mg/l	0.0200	0.0210	105.	70 - 130	1732
Ethylbenzene	mg/l	0.0200	0.0210	105.	70 - 130	1732
Xylenes, total	mg/l	0.0400	0.0420	105.	70 - 130	1732
Methyl-t-butylether	mg/l	0.0200	0.0199	95.	70 - 130	1732
Arsenic, Total	mg/l	0.0530	0.0620	116.98	80 - 120	2241
Barium, Total	mg/l	0.5060	0.4950	97.83	80 - 120	2241
Cadmium, Total	mg/l	0.0510	0.0530	103.92	80 - 120	2241
Chromium, Total	mg/l	0.2710	0.2720	100.37	80 - 120	2241
Lead, Total	mg/l	0.3060	0.3130	102.29	80 - 120	2241
Mercury, Total	mg/l	0.01290	0.01230	95.35	80 - 120	2239
Selenium, Total	mg/l	0.2030	0.2120	104.43	80 - 120	2241
Silver, Total	mg/l	0.0990	0.0970	97.98	80 - 120	2241

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PROJECT QUALITY CONTROL DATA

Blank Data

Analyte	Blank Value	Units	Q.C. Batch
Benzene	< 0.0010	mg/l	1732
Toluene	< 0.0010	mg/l	1732
Ethylbenzene	< 0.0010	mg/l	1732
Xylenes, total	< 0.0010	mg/l	1732
Methyl-t-butylether	< 0.0010	mg/l	1732
Arsenic, Total	< 0.0050	mg/l	2241
Barium, Total	< 0.0100	mg/l	2241
Cadmium, Total	< 0.0010	mg/l	2241
Chromium, Total	< 0.0050	mg/l	2241
Lead, Total	< 0.0030	mg/l	2241
Mercury, Total	< 0.00020	mg/l	2239
Selenium, Total	< 0.0050	mg/l	2241
Silver, Total	< 0.0050	mg/l	2241

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PROJECT QUALITY CONTROL DATA

Matrix Spike Recovery

Analyte	units	Orig. Val.	MS Val	Spike Conc	Recovery	Target Range	Q.C. Batch
Benzene	mg/l	< 0.0010	0.0200	0.0200	100.00	69. - 123.	936
Toluene	mg/l	< 0.0010	0.0208	0.0200	104.00	69. - 122.	936
Ethylbenzene	mg/l	< 0.0010	0.0206	0.0200	103.00	68. - 124.	936
Xylenes, total	mg/l	< 0.0010	0.0415	0.0400	103.75	67. - 125.	936
Methyl-t-butylether	mg/l	< 0.0010	0.0169	0.0200	84.50	66. - 126.	936
Nitrate-N as N	mg/l	< 0.10	9.48	10.0	94.80	85. - 115.	939
Nitrate-N as N	mg/l	< 0.10	9.50	10.0	95.00	85. - 115.	939
Sulfate	mg/l	< 5.00	10.7	10.0	107.00	76. - 133.	3232

Matrix Spike Duplicate

Analyte	units	Orig. Val.	Duplicate	RPD	Limit	Q.C. Batch
Benzene	mg/l	0.0200	0.0204	1.98	15.	936
Toluene	mg/l	0.0208	0.0211	1.43	14.	936
Ethylbenzene	mg/l	0.0206	0.0210	1.92	14.	936
Xylenes, total	mg/l	0.0415	0.0420	1.20	16.	936
Methyl-t-butylether	mg/l	0.0169	0.0169	0.00	19.	936
Nitrate-N as N	mg/l	9.48	9.50	0.21	9.	939
Sulfate	mg/l	10.7	11.4	6.33	10.	3232

Laboratory Control Data

Analyte	units	Known Val.	Analyzed Val	% Recovery	Target Range	Q.C. Batch
Benzene	mg/l	0.0200	0.0203	102.	70 - 130	936
Toluene	mg/l	0.0200	0.0206	103.	70 - 130	936
Ethylbenzene	mg/l	0.0200	0.0210	105.	70 - 130	936
Xylenes, total	mg/l	0.0400	0.0422	106.	70 - 130	936
Methyl-t-butylether	mg/l	0.0200	0.0188	94.	70 - 130	936
Methane	mg/L	1.33	1.20	90.	60 - 140	942
Nitrate-N as N	mg/l	5.50	5.50	100.00	80 - 120	939
Sulfate	mg/l	49.7	48.6	97.79	80 - 120	3232

Duplicates

Analyte	units	Orig. Val.	Duplicate	RPD	Limit	Q.C. Batch
pH	pH Units	6.10	6.10	0.00	15	937
Nitrate-N as N	mg/l	< 0.10	< 0.10	N/A	15	939
Sulfate	mg/l	114.	116.	1.74	15	3232

Blank Data

Analyte	Blank Value	Units	Q.C. Batch
Benzene	< 0.0010	mg/l	936

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PROJECT QUALITY CONTROL DATA

Blank Data

Analyte	Blank Value	Units	A.C. Batch
Toluene	< 0.0010	mg/l	936
Ethylbenzene	< 0.0010	mg/l	936
Xylenes, total	< 0.0010	mg/l	936
Methyl-t-butylether	< 0.0010	mg/l	936
Nitrate-N as N	< 0.10	mg/l	939
Sulfate	< 5.00	mg/l	3232
Methane	< 0.026	mg/L	942

APPENDIX A.2
LABORATORY DATA
AUGUST 1998

SPECIALIZED ASSAYS, INC.

2960 Foster Creighton Dr.
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Phone 1-615-726-0177

ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB,MS 8249
ROGER BALDWIN
3990 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 733430
Project Name: KESSLER LTM
Sampler: ROGER BALDWIN

Lab Number: 98-A100521
Sample ID: TRIP BLANK
Sample Type: Ground water
Site ID:

Date Collected:
Time Collected:
Date Received: 8/22/98
Time Received: 8:30

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
VOLATILE ORGANICS by GC										
Benzene	ND	ug/l	1	1	1	8/28/98	7:48	E.Smith	8021B	390
Ethylbenzene	ND	ug/l	1	1	1	8/28/98	7:48	E.Smith	8021B	390
Toluene	ND	ug/l	1	1	1	8/28/98	7:48	E.Smith	8021B	390
m,p-Xylenes	ND	ug/l	1	1	1	8/28/98	7:48	E.Smith	8021B	390
o-Xylene	ND	ug/l	1	1	1	8/28/98	7:48	E.Smith	8021B	390
MTBE	ND	ug/l	1	1	1	8/28/98	7:48	E.Smith	8021B	390

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
PID Surr., a,a,a-trifluorotoluene	100.	50. - 150.
Hall Surr., chloroprene	92.	64. - 130.
Hall Surr., 1-chloro-3-fluorobenzene	74.	65. - 132.

Report Approved By: _____ Report Date: 9/ 4/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny B. Hale, M.S., Laboratory Director

Laboratory Certification Number: 387

SPECIALIZED ASSAYS, INC.

2960 Foster Creighton Dr.
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Nashville, TN 37204-0566
Phone 1-615-726-0177

ANALYTICAL REPORT

ARSONS ENG. /KEESLER AFB, MS 8249
OGER BALDWIN
390 TRIANGLE PARKWAY STE 100
ORCROSS, GA 30092

roject: 733430.5000
roject Name: KEESLER LTM (SWMU 66)
ampler: ROGER BALDWIN

Lab Number: 98-A99620
Sample ID: SW-2
Sample Type: Water
Site ID:

Date Collected: 8/20/98
Time Collected: 12:00
Date Received: 8/21/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	ug/l	1.0	1.0	1	8/22/98	1:50	T.Johnson	8021B	8868
Toluene	ND	ug/l	1.0	1.0	1	8/22/98	1:50	T.Johnson	8021B	8868
Ethylbenzene	ND	ug/l	1.0	1.0	1	8/22/98	1:50	T.Johnson	8021B	8868
Xylenes, total	ND	ug/l	1.0	1.0	1	8/22/98	1:50	T.Johnson	8021B	8868
Methyl-t-butylether	ND	ug/l	1.0	1.0	1	8/22/98	1:50	T.Johnson	8021B	8868

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	93.	50. - 150.

Report Approved By: Danny Hale Report Date: 9/ 3/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny B. Hale, M.S., Laboratory Director

Laboratory Certification Number: 387

SPECIALIZED ASSAYS, INC.

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ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB,MS 8249
ROGER BALDWIN
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 733430.5000
Project Name: KEESLER LTM (SWMU 66)
Sampler: ROGER BALDWIN

Lab Number: 98-A99623
Sample ID: MW 9-8
Sample Type: Water
Site ID:

Date Collected: 8/20/98
Time Collected: 15:05
Date Received: 8/21/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	4.0	ug/l	1.0	1.0	1	8/22/98	5:14	T.Johnson	8021B	8868
Toluene	1.0	ug/l	1.0	1.0	1	8/22/98	5:14	T.Johnson	8021B	8868
Ethylbenzene	ND	ug/l	1.0	1.0	1	8/22/98	5:14	T.Johnson	8021B	8868
Xylenes, total	5.0	ug/l	1.0	1.0	1	8/22/98	5:14	T.Johnson	8021B	8868
Methyl-t-butylether	8.0	ug/l	1.0	1.0	1	8/22/98	5:14	T.Johnson	8021B	8868
MISCELLANEOUS GC PARAMETERS										
Methane	6800	ug/l	130.	26.0	5	8/26/98	14:12	W. Klepper	8015M	8739
METALS										
Ferrous Iron	1.12	mg/l	0.100	0.100	1	8/25/98	1:49	G. Baun	3500D	9535
MISCELLANEOUS CHEMISTRY										
Nitrate-N as N	ND	mg/l	0.10	0.10	1	8/21/98	18:47	J.Temple	353.2	7476
Sulfate	93.0	mg/l	50.0	5.00	10	8/28/98	8:26	J.Tyree	9038	9949

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	95.	50. - 150.

Report Approved By: Danny Hale Report Date: 9/ 3/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny B. Hale, M.S., Laboratory Director

Laboratory Certification Number: 387

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ANALYTICAL REPORT

ARSONS ENG./KEESLER AFB,MS 8249
OGER BALDWIN
390 TRIANGLE PARKWAY STE 100
IORCROSS, GA 30092

roject: 733430.5000
roject Name: KEESLER LTM (SWMU 66)
ampler: ROGER BALDWIN

Lab Number: 98-A99625
Sample ID: MW 9-1
Sample Type: Water
Site ID:

Date Collected: 8/20/98
Time Collected: 17:00
Date Received: 8/21/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	ug/l	1.0	1.0	1	8/22/98	6:05	T.Johnson	8021B	8868
Toluene	ND	ug/l	1.0	1.0	1	8/22/98	6:05	T.Johnson	8021B	8868
Ethylbenzene	ND	ug/l	1.0	1.0	1	8/22/98	6:05	T.Johnson	8021B	8868
Xylenes, total	ND	ug/l	1.0	1.0	1	8/22/98	6:05	T.Johnson	8021B	8868
Methyl-t-butylether	ND	ug/l	1.0	1.0	1	8/22/98	6:05	T.Johnson	8021B	8868
MISCELLANEOUS GC PARAMETERS										
Methane	18200	ug/l	260.	26.0	10	8/26/98	14:33	W. Klepper	8015M	8739
METALS										
Ferrous Iron	0.230	mg/l	0.100	0.100	1	8/25/98	1:49	G. Raun	35000	9535
MISCELLANEOUS CHEMISTRY										
Nitrate-N as N	ND	mg/l	0.10	0.10	1	8/21/98	18:48	J.Temple	353.2	7476
Sulfate	22.6	mg/l	5.00	5.00	1	8/28/98	8:26	J.Tyree	9038	9949

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	90.	50. - 150.

Report Approved By: _____ Report Date: 9/ 3/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
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ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB,MS 8249
ROGER BALDWIN
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 733430.5000
Project Name: KEESLER LTM (SWMU 66)
Sampler: ROGER BALDWIN

Lab Number: 98-A99622
Sample ID: MW 9-2
Sample Type: Water
Site ID:

Date Collected: 8/20/98
Time Collected: 13:45
Date Received: 8/21/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	ug/l	1.0	1.0	1	8/22/98	4:49	T.Johnson	8021B	8868
Toluene	ND	ug/l	1.0	1.0	1	8/22/98	4:49	T.Johnson	8021B	8868
Ethylbenzene	ND	ug/l	1.0	1.0	1	8/22/98	4:49	T.Johnson	8021B	8868
Xylenes, total	ND	ug/l	1.0	1.0	1	8/22/98	4:49	T.Johnson	8021B	8868
Methyl-t-butylether	ND	ug/l	1.0	1.0	1	8/22/98	4:49	T.Johnson	8021B	8868
MISCELLANEOUS GC PARAMETERS										
Methane	5950 J	ug/l	260.	26.0	10	8/26/98	14:02	N. Klepper	8015M	8739
METALS										
Ferrous Iron	0.450 J	mg/l	0.100	0.100	1	8/25/98	1:49	G. Baun	3500D	9535
MISCELLANEOUS CHEMISTRY										
Nitrate-N as N	ND	mg/l	0.10	0.10	1	8/21/98	18:47	J.Temple	353.2	7476
Sulfate	40.8 J	mg/l	10.0	5.00	2	8/28/98	8:26	J.Tyree	9038	9949

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	101.	50. - 150.

Report Approved By: _____ Report Date: 9/ 3/98

Theodore J. Duello, Ph.D., Q.A. Officer
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ANALYTICAL REPORT

PARSONS ENG. /KEESLER AFB, MS 8249
ROGER BALDWIN
3390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 733430.5000
Project Name: KEESLER LTM (SWMU 66)
Sampler: ROGER BALDWIN

Lab Number: 98-A99624
Sample ID: MW 9-6
Sample Type: Water
Site ID:

Date Collected: 8/20/98
Time Collected: 16:00
Date Received: 8/21/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	20.0	ug/l	1.0	1.0	1	8/22/98	5:40	T.Johnson	8021B	8868
Toluene	2.0	ug/l	1.0	1.0	1	8/22/98	5:40	T.Johnson	8021B	8868
Ethylbenzene	22.0	ug/l	1.0	1.0	1	8/22/98	5:40	T.Johnson	8021B	8868
Xylenes, total	6.0	ug/l	1.0	1.0	1	8/22/98	5:40	T.Johnson	8021B	8868
Methyl-t-butylether	9.0	ug/l	1.0	1.0	1	8/22/98	5:40	T.Johnson	8021B	8868
MISCELLANEOUS GC PARAMETERS										
Methane	8190	ug/l	260.	26.0	10	8/26/98	14:20	W. Klepper	8015M	8739
METALS										
Ferrous Iron	ND	mg/l	0.100	0.100	1	8/25/98	1:49	G. Baun	3500D	9535
MISCELLANEOUS CHEMISTRY										
Nitrate-N as N	ND	mg/l	0.10	0.10	1	8/21/98	18:37	J.Temple	353.2	7476
Sulfate	19.2	mg/l	5.00	5.00	1	8/28/98	8:26	J.Tyree	9038	9949

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	95.	50. - 150.

Report Approved By: _____ Report Date: 9/ 3/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
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ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB, MS 8249
ROGER BALDWIN
3390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 733430
Project Name: KESSLER LTM
Sampler: ROGER BALDWIN

Lab Number: 98-A100520
Sample ID: SW-3
Sample Type: Ground water
Site ID:

Date Collected: 8/21/98
Time Collected: 13:30
Date Received: 8/22/98
Time Received: 8:30

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
VOLATILE ORGANICS by GC										
Benzene	ND	ug/l	1	1	1	8/28/98	7:08	E.Smith	8021B	390
Ethylbenzene	ND	ug/l	1	1	1	8/28/98	7:08	E.Smith	8021B	390
Toluene	ND	ug/l	1	1	1	8/28/98	7:08	E.Smith	8021B	390
m,p-Xylenes	ND	ug/l	1	1	1	8/28/98	7:08	E.Smith	8021B	390
o-Xylene	ND	ug/l	1	1	1	8/28/98	7:08	E.Smith	8021B	390
MTBE	ND	ug/l	1	1	1	8/28/98	7:08	E.Smith	8021B	390

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
PID Surr., a,a,a-trifluorotoluene	100.	50. - 150.
Hall Surr., chloroprene	96.	64. - 130.
Hall Surr., 1-chloro-3-fluorobenzene	90.	65. - 132.

Report Approved By: Michael H. Dunn Report Date: 9/ 4/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny B. Hale, M.S., Laboratory Director

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ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB, MS 8249
ROGER BALDWIN
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 733430.5000
Project Name: KEESLER LTM (SWMU 66)
Sampler: ROGER BALDWIN

Lab Number: 98-A99626
Sample ID: MW 9-10
Sample Type: Water
Site ID:

Date Collected: 8/20/98
Time Collected: 18:45
Date Received: 8/21/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	ug/l	1.0	1.0	1	8/22/98	9:12	T.Johnson	8021B	8868
Toluene	ND	ug/l	1.0	1.0	1	8/22/98	9:12	T.Johnson	8021B	8868
Ethylbenzene	ND	ug/l	1.0	1.0	1	8/22/98	9:12	T.Johnson	8021B	8868
Xylenes, total	ND	ug/l	1.0	1.0	1	8/22/98	9:12	T.Johnson	8021B	8868
Methyl-t-butylether	2.0	ug/l	1.0	1.0	1	8/22/98	9:12	T.Johnson	8021B	8868
MISCELLANEOUS GC PARAMETERS										
Methane	687. J	ug/l	26.0	26.0	1	8/26/98	14:36	W. Klepper	8015M	8739
METALS										
Ferrous Iron	0.250 J	mg/l	0.100	0.100	1	8/25/98	1:49	G. Baun	3500D	9535
MISCELLANEOUS CHEMISTRY										
Nitrate-N as N	ND	mg/l	0.10	0.10	1	8/21/98	18:49	J.Temple	353.2	7476
Sulfate	18.9 J	mg/l	5.00	5.00	1	8/28/98	8:26	J.Tyree	9038	9949

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	96.	50. - 150.

Report Approved By: _____ Report Date: 9/ 3/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny B. Hale, M.S., Laboratory Director

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ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB,MS 8249
ROGER BALDWIN
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 733430.5000
Project Name: KEESLER LTM (SWMU 66)
Sampler: ROGER BALDWIN

Lab Number: 98-A99621
Sample ID: SW-1
Sample Type: Water
Site ID:

Date Collected: 8/20/98
Time Collected: 12:30
Date Received: 8/21/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	ug/l	1.0	1.0	1	8/22/98	4:23	T.Johnson	8021B	8868
Toluene	ND	ug/l	1.0	1.0	1	8/22/98	4:23	T.Johnson	8021B	8868
Ethylbenzene	ND	ug/l	1.0	1.0	1	8/22/98	4:23	T.Johnson	8021B	8868
Xylenes, total	ND	ug/l	1.0	1.0	1	8/22/98	4:23	T.Johnson	8021B	8868
Methyl-t-butylether	ND	ug/l	1.0	1.0	1	8/22/98	4:23	T.Johnson	8021B	8868

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	93.	50. - 150.

Report Approved By: Danny Hale Report Date: 9/ 3/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny B. Hale, M.S., Laboratory Director

Laboratory Certification Number: 387

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ANALYTICAL REPORT

PARSONS ENG. /KEESLER AFB, MS 8249
ROGER BALDWIN
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 733430.5000
Project Name: KEESLER LTM (SWMU 66)
Sampler: ROGER BALDWIN

Lab Number: 98-A99627
Sample ID: TRIP BLANK
Sample Type: Water
Site ID:

Date Collected: 8/20/98
Time Collected: 11:30
Date Received: 8/21/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	ug/l	1.0	1.0	1	8/28/98	14:29	Duncan, J.	8021B	3400
Toluene	ND	ug/l	1.0	1.0	1	8/28/98	14:29	Duncan, J.	8021B	3400
Ethylbenzene	ND	ug/l	1.0	1.0	1	8/28/98	14:29	Duncan, J.	8021B	3400
Xylenes, total	ND	ug/l	1.0	1.0	1	8/28/98	14:29	Duncan, J.	8021B	3400
Methyl-t-butylether	ND	ug/l	1.0	1.0	1	8/28/98	14:29	Duncan, J.	8021B	3400

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	96.	50. - 150.

Report Approved By: _____ Report Date: 9/ 3/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
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PROJECT QUALITY CONTROL DATA

Matrix Spike Recovery

Analyte	units	Orig. Val.	MS Val	Spike Conc	Recovery	Target Range	Q.C. Batch
Benzene	ng/l	< 0.0010	0.0230	0.0200	115.00	75. - 125.	8868
Benzene	ng/l	< 0.0010	0.0190	0.0200	95.00	75. - 125.	3400
Toluene	ng/l	< 0.0010	0.0190	0.0200	95.00	70. - 125.	8868
Toluene	ng/l	< 0.0010	0.0190	0.0200	95.00	70. - 125.	3400
Ethylbenzene	ng/l	< 0.0010	0.0210	0.0200	105.00	71. - 129.	8868
Ethylbenzene	ng/l	< 0.0010	0.0190	0.0200	95.00	71. - 129.	3400
Xylenes, total	ng/l	< 0.0010	0.0200	0.0200	100.00	71. - 133.	8868
Xylenes, total	ng/l	< 0.0010	0.0180	0.0200	90.00	71. - 133.	3400
Methyl-t-butylether	ng/l	< 0.0010	0.0170	0.0200	85.00	75. - 125.	8868
Methyl-t-butylether	ng/l	< 0.0010	0.0200	0.0200	100.00	75. - 125.	3400
Nitrate-N as N	ng/l	< 0.10	9.82	10.0	98.20	85. - 115.	7476
Nitrate-N as N	ng/l	< 0.10	9.90	10.0	99.00	85. - 115.	7476
Sulfate	ng/l	19.2	39.5	20.0	101.50	76. - 133.	9949

Matrix Spike Duplicate

Analyte	units	Orig. Val.	Duplicate	RPD	Limit	Q.C. Batch
Benzene	ng/l	0.0230	0.0230	0.00	20.	8868
Benzene	ng/l	0.0190	0.0200	5.13	20.	3400
Toluene	ng/l	0.0190	0.0190	0.00	20.	8868
Toluene	ng/l	0.0190	0.0210	10.00	20.	3400
Ethylbenzene	ng/l	0.0210	0.0210	0.00	20.	8868
Ethylbenzene	ng/l	0.0190	0.0210	10.00	20.	3400
Xylenes, total	ng/l	0.0200	0.0200	0.00	20.	8868
Xylenes, total	ng/l	0.0180	0.0200	10.53	20.	3400
Methyl-t-butylether	ng/l	0.0170	0.0170	0.00	20.	8868
Methyl-t-butylether	ng/l	0.0200	0.0220	9.52	20.	3400
Nitrate-N as N	ng/l	9.82	9.90	0.81	9.	7476
Sulfate	ng/l	39.5	39.3	0.51	10.	9949

Laboratory Control Data

Analyte	units	Known Val.	Analyzed Val	% Recovery	Target Range	Q.C. Batch
Benzene	ng/l	0.0200	0.0210	105.	70 - 130	8868
Benzene	ng/l	0.0200	0.0180	90.	70 - 130	3400
Toluene	ng/l	0.0200	0.0210	105.	70 - 130	8868
Toluene	ng/l	0.0200	0.0180	90.	70 - 130	3400
Ethylbenzene	ng/l	0.0200	0.0210	105.	70 - 130	8868
Ethylbenzene	ng/l	0.0200	0.0180	90.	70 - 130	3400
Xylenes, total	ng/l	0.0200	0.0210	105.	70 - 130	8868
Xylenes, total	ng/l	0.0200	0.0180	90.	70 - 130	3400
Methyl-t-butylether	ng/l	0.0200	0.0210	105.	70 - 130	8868
Methyl-t-butylether	ng/l	0.0200	0.0200	100.	70 - 130	3400
Methane	ng/L	1.33	1.20	90.	60 - 140	8739

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PROJECT QUALITY CONTROL DATA

Laboratory Control Data

Analyte	units	Known Val.	Analyzed Val	% Recovery	Target Range	Q.C. Batch
Nitrate-N as N	mg/l	5.50	5.30	96.36	80 - 120	7476
Sulfate	mg/l	49.7	50.0	100.60	80 - 120	9949

Duplicates

Analyte	units	Orig. Val.	Duplicate	RPD	Limit	Q.C. Batch
Nitrate-N as N	mg/l	< 0.10	< 0.10	N/A	15	7476
Sulfate	mg/l	12.7	12.8	0.78	15	9949

Blank Data

Analyte	Blank Value	Units	Q.C. Batch
Benzene	< 0.0010	mg/l	8868
Benzene	< 0.0010	mg/l	3400
Toluene	< 0.0010	mg/l	8868
Toluene	< 0.0010	mg/l	3400
Ethylbenzene	< 0.0010	mg/l	8868
Ethylbenzene	< 0.0010	mg/l	3400
Xylenes, total	< 0.0010	mg/l	8868
Xylenes, total	< 0.0010	mg/l	3400
Methyl-t-butylether	< 0.0010	mg/l	8868
Methyl-t-butylether	< 0.0010	mg/l	3400
Nitrate-N as N	< 0.10	mg/l	7476
Sulfate	< 5.00	mg/l	9949
Methane	< 0.026	mg/L	8739

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PROJECT QUALITY CONTROL DATA

Matrix Spike Recovery

Analyte	units	Orig. Val.	MS Val	Spike Conc	Recovery	Target Range	Q.C. Batch
Benzene	mg/l	< 0.0010	0.0211	0.0200	105.50	84. - 118.	390
Toluene	mg/l	< 0.0010	0.0211	0.0200	105.50	80. - 121.	390
m,p-Xylenes	mg/l	< 0.0010	0.0444	0.0400	111.00	78. - 132.	390

Matrix Spike Duplicate

Analyte	units	Orig. Val.	Duplicate	RPD	Limit	Q.C. Batch
Benzene	mg/l	0.0211	0.0208	1.43	17.	390
Toluene	mg/l	0.0211	0.0209	0.95	17.	390
m,p-Xylenes	mg/l	0.0444	0.0442	0.45	17.	390

Laboratory Control Data

Analyte	units	Known Val.	Analyzed Val	% Recovery	Target Range	Q.C. Batch
Benzene	mg/l	0.0200	0.0205	102.	70 - 130	390
Ethylbenzene	mg/l	0.0200	0.0206	103.	70 - 130	390
Toluene	mg/l	0.0200	0.0205	102.	70 - 130	390
m,p-Xylenes	mg/l	0.0400	0.0432	108.	70 - 130	390
o-Xylene	mg/l	0.0200	0.0215	108.	70 - 130	390

Blank Data

Analyte	Blank Value	Units	Q.C. Batch
Benzene	< 0.0010	mg/l	390
Ethylbenzene	< 0.0010	mg/l	390
Toluene	< 0.0010	mg/l	390
m,p-Xylenes	< 0.0010	mg/l	390
o-Xylene	< 0.0010	mg/l	390
MTBE	< 0.0010	mg/l	390

SPECIALIZED ASSAYS, INC.

2960 Foster Creighton Dr.
P.O. Box 40566
Nashville, TN 37204-0566
Phone 1-615-726-0177

PARSONS ENG./KEESLER AFB,MS 3249
ROGER BALDWIN
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

CHAIN OF CUSTODY

Project Number: 733430.5000 | Sampler: Roger Baldwin

Project Name: Keesler LTM (SWMU 66) | SAS Quote:

Lab No.	Field Number	Date	Time	Matrix	Grab	Comp	Bottles	Analysis Requested: 8021B BTEX/MTBE; Methane, Eth; Nitrate 353.2; Sulfate 375.4; Ferrous Iron 3500
-A99620	SW-2	8/20	1200	H_2O	X		2 40mL	X
-A99621	SW-1	"	1230	"	"		2 40mL	X
-A99622	MW 9-2	"	1345	"	"		4 40mL 1-125mL 1-250mL	X X X X X
-A99623	MW 9-8	"	1505	"	"		4 40mL 1-125mL 1-250mL	X X X X X
-A99624	MW 9-6	"	1600	"	"		12 40mL 3-125mL 3-250mL	X X X X X
-A99625	MW 9-1	"	1700	"	"		4-40mL 1-125mL 1-250mL	X X X X X
-A99626	MW 9-10	"	1845	"	"		4-40mL 1-125mL 1-250mL	X X X X X
-A99627	F.P Blank	"	1130	"	"		2 40mL	X

Relinquished by:	D/T	Received by:	D/T	Relinquished by:	D/T	Received by:	D/T
Roger Baldwin	8/20/98 2000						
Relinquished by:	D/T	Received by:	D/T	Relinquished by:	D/T	Received by: PDK	8/21/98 9:00

Cooler Temperature When Received: 4°C

Laboratory Project Number: 110917

Cooler Seals Intact?

Fed-X Air Bill Number: 807441808478

SPECIAL INSTRUCTIONS: *I had to wash metal Bottles out Wrong Bottles! to Sample for ferrous Iron *

MW 9-6 - (MS/MSD)

MW 9-2 - Could not get the Bubbles out of the VOC's The water was Greasy and Bubbly — Tried 4-ea Do the Best you can with them plese

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PARSONS ENG./KEESLER AFB,MS 3249
ROGER BALDWIN
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

CHAIN OF CUSTODY

Project Number: 733430 | Sampler: Roger Baldwin Jr.

Project Name: Keesler LTM (SWMU66) | SAE Quote:

No.	Field Number	Date	Time	Matrix	Grab	Comp	Bottles	Analysis Requested: 8021B
100520	SW-3	8/21	1330	H_2O	X		2 40 mL	X
100521	Trip Blank (Field Blank)	8/21		H_2O	X		2 40 mL	X

Relinquished by:	D/T	Received by:	D/T	Relinquished by:	D/T	Received by:	D/T
Roger Baldwin	1600 8/21						
Relinquished by:	D/T	Received by:	D/T	Relinquished by:	D/T	Received by:	D/T
						CBB	8/22/98

Cooler Temperature When Received: 4

Laboratory Project Number: 111101

Cooler Seals Intact?

Fed-X Air Bill Number: 807000184035

SPECIAL INSTRUCTIONS:

I only had one Trip Blank sent. So I made my own w/ Distilled water.

APPENDIX A.3
LABORATORY DATA
NOVEMBER 1998

SPECIALIZED ASSAYS, INC.

2960 Foster Creighton Dr.
P.O. Box 40566
Nashville, TN 37204-0566
Phone 1-615-726-0177

ANALYTICAL REPORT

'ARSONS ENG. /KEESLER AFB, MS 8249
OGER BALDWIN
390 TRIANGLE PARKWAY STE 100
ORCROSS, GA 30092

'roject: 733430.02
roject Name: KESSLER LTM (SWMV66)
ampler: ROGER BALDWIN

Lab Number: 98-A145164
Sample ID: SW-1
Sample Type: Water
Site ID:

Date Collected: 11/18/98
Time Collected: 16:45
Date Received: 11/20/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	ug/l	1.0	1.0	1	11/30/98	0:31	T.Johnson	8021B	2903
Toluene	1.6 U	ug/l	1.0	1.0	1	11/30/98	0:31	T.Johnson	8021B	2903
Ethylbenzene	ND	ug/l	1.0	1.0	1	11/30/98	0:31	T.Johnson	8021B	2903
Xylenes, total	ND	ug/l	1.0	1.0	1	11/30/98	0:31	T.Johnson	8021B	2903
Methyl-t-butylether	ND	ug/l	1.0	1.0	1	11/30/98	0:31	T.Johnson	8021B	2903

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	105.	50. - 150.

Report Approved By: J.A. Mitchell Report Date: 11/30/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny B. Hale, M.S., Laboratory Director
Johnny A. Mitchell, Dir. Technical Services

Laboratory Certification Number: 387

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ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB,MS 8249
ROGER BALDWIN
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Lab Number: 98-A145162
Sample ID: SW-2
Sample Type: Water
Site ID:

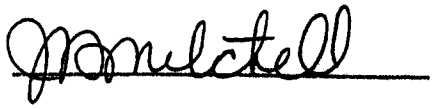
Project: 733430.02
Project Name: KESSLER LTM (SWMV66)
Sampler: ROGER BALDWIN

Date Collected: 11/18/98
Time Collected: 14:30
Date Received: 11/20/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	ug/l	1.0	1.0	1	11/29/98	23:38	T.Johnson	8021B	2903
Toluene	1.4 U	ug/l	1.0	1.0	1	11/29/98	23:38	T.Johnson	8021B	2903
Ethylbenzene	ND	ug/l	1.0	1.0	1	11/29/98	23:38	T.Johnson	8021B	2903
Xylenes, total	ND	ug/l	1.0	1.0	1	11/29/98	23:38	T.Johnson	8021B	2903
Methyl-t-butylether	ND	ug/l	1.0	1.0	1	11/29/98	23:38	T.Johnson	8021B	2903

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	103.	50. - 150.

Report Approved By: 

Report Date: 11/30/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny B. Hale, M.S., Laboratory Director
Johnny A. Mitchell, Dir. Technical Services

Laboratory Certification Number: 387

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ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB,MS 8249
ROGER BALDWIN
3390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 733430.02
Project Name: KESSLER LTM (SWMV66)
Sampler: ROGER BALDWIN

Lab Number: 98-A145163
Sample ID: SW-3
Sample Type: Water
Site ID:

Date Collected: 11/18/98
Time Collected: 15:45
Date Received: 11/20/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	ug/l	1.0	1.0	1	11/30/98	0:05	T.Johnson	8021B	2903
Toluene	1.4 U	ug/l	1.0	1.0	1	11/30/98	0:05	T.Johnson	8021B	2903
Ethylbenzene	ND	ug/l	1.0	1.0	1	11/30/98	0:05	T.Johnson	8021B	2903
Xylenes, total	ND	ug/l	1.0	1.0	1	11/30/98	0:05	T.Johnson	8021B	2903
Methyl-t-butylether	ND	ug/l	1.0	1.0	1	11/30/98	0:05	T.Johnson	8021B	2903

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	103.	50. - 150.

Report Approved By: JA Mitchell Report Date: 11/30/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
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ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB,MS 8249
ROGER BALDWIN
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 733430.02
Project Name: KESSLER LTM (SWMV66)
Sampler: ROGER BALDWIN

Lab Number: 98-A145165
Sample ID: MW9-1
Sample Type: Water
Site ID:

Date Collected: 11/19/98
Time Collected: 9:00
Date Received: 11/20/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	ug/l	1.0	1.0	1	11/30/98	0:58	T.Johnson	8021B	2903
Toluene	1.3 U	ug/l	1.0	1.0	1	11/30/98	0:58	T.Johnson	8021B	2903
Ethylbenzene	ND	ug/l	1.0	1.0	1	11/30/98	0:58	T.Johnson	8021B	2903
Xylenes, total	ND	ug/l	1.0	1.0	1	11/30/98	0:58	T.Johnson	8021B	2903
Methyl-t-butylether	ND	ug/l	1.0	1.0	1	11/30/98	0:58	T.Johnson	8021B	2903
MISCELLANEOUS GC PARAMETERS										
Methane	2300	ug/l	26.0	26.0	1	11/23/98	13:58	W. Klepper	8015M	2901
METALS										
Ferrous Iron	0.360	mg/l	0.100	0.100	1	11/27/98	12:26	S.Brewer	3500D	5725
MISCELLANEOUS CHEMISTRY										
Nitrate-N as N	ND	mg/l	0.10	0.10	1	11/20/98	17:23	D. Hoover	353.2	2905
Sulfate	22.9	mg/l	5.00	5.00	1	11/25/98	16:43	M.Shockley	9038	4596

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	105.	50. - 150.

Report Approved By: JA Mitchell Report Date: 11/30/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny B. Hale, M.S., Laboratory Director
Johnny A. Mitchell, Dir. Technical Services

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ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB,MS 8249
ROGER BALDWIN
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 733430.02
Project Name: KESSLER LTM (SWMV66)
Sampler: ROGER BALDWIN

Lab Number: 98-A145167
Sample ID: MW9-2
Sample Type: Water
Site ID:

Date Collected: 11/19/98
Time Collected: 11:30
Date Received: 11/20/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	ug/l	10.0	1.0	10	11/30/98	14:23	T.Johnson	8021B	2903
Toluene	ND	ug/l	10.0	1.0	10	11/30/98	14:23	T.Johnson	8021B	2903
Ethylbenzene	ND	ug/l	10.0	1.0	10	11/30/98	14:23	T.Johnson	8021B	2903
Xylenes, total	ND	ug/l	10.0	1.0	10	11/30/98	14:23	T.Johnson	8021B	2903
Methyl-t-butylether	ND	ug/l	10.0	1.0	10	11/30/98	14:23	T.Johnson	8021B	2903
MISCELLANEOUS GC PARAMETERS										
Methane	3940	ug/l	26.0	26.0	1	11/23/98	14:11	W. Klepper	8015M	2901
METALS										
Ferrous Iron	0.670	mg/l	0.100	0.100	1	11/27/98	12:26	S.Brewer	3500D	5725
MISCELLANEOUS CHEMISTRY										
Nitrate-N as N	ND	mg/l	0.10	0.10	1	11/20/98	17:34	D. Hoover	353.2	2905
Sulfate	50.4	mg/l	10.0	5.00	2	11/25/98	16:43	M.Shockley	9038	4596

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	108.	50. - 150.

PQL elevated due to sample matrix.

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ANALYTICAL REPORT

Laboratory Number: 98-A145167
Sample ID: MW9-2

Report Approved By: J.A. Mitchell Report Date: 11/30/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny B. Hale, M.S., Laboratory Director
Johnny A. Mitchell, Dir. Technical Services

Laboratory Certification Number: 387

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ANALYTICAL REPORT

ARSONS ENG./KEESLER AFB,MS 8249
OGER BALDWIN
5390 TRIANGLE PARKWAY STE 100
ORCROSS, GA 30092

Project: 733430.02
Project Name: KESSLER LTM (SWMV66)
Sampler: ROGER BALDWIN

Lab Number: 98-A145168
Sample ID: MW9-6
Sample Type: Water
Site ID:

Date Collected: 11/19/98
Time Collected: 10:15
Date Received: 11/20/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	9.8	ug/l	1.0	1.0	1	11/30/98	14:50	T.Johnson	8021B	2903
Toluene	1.7 U	ug/l	1.0	1.0	1	11/30/98	14:50	T.Johnson	8021B	2903
Ethylbenzene	5.4	ug/l	1.0	1.0	1	11/30/98	14:50	T.Johnson	8021B	2903
Xylenes, total	2.6	ug/l	1.0	1.0	1	11/30/98	14:50	T.Johnson	8021B	2903
Methyl-t-butylether	3.0 J	ug/l	1.0	1.0	1	11/30/98	14:50	T.Johnson	8021B	2903
MISCELLANEOUS GC PARAMETERS										
Methane	3380	ug/l	26.0	26.0	1	11/23/98	14:14	W. Klepper	8015M	2901
METALS										
Ferrous Iron	0.180	mg/l	0.100	0.100	1	11/27/98	12:26	S.Brewer	3500D	5725
MISCELLANEOUS CHEMISTRY										
Nitrate-N as N	ND	mg/l	0.10	0.10	1	11/20/98	17:35	D. Hoover	353.2	2905
Sulfate	21.6	mg/l	5.00	5.00	1	11/25/98	16:43	M.Shockley	9038	4596

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	106.	50. - 150.

Report Approved By: JA Mitchell Report Date: 11/30/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny B. Hale, M.S., Laboratory Director
Johnny A. Mitchell, Dir. Technical Services

Laboratory Certification Number: 387

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ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB, MS 8249
ROGER BALDWIN
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 733430.02
Project Name: KESSLER LTM (SWMV66)
Sampler: ROGER BALDWIN

Lab Number: 98-A145166
Sample ID: MW9-8
Sample Type: Water
Site ID:

Date Collected: 11/19/98
Time Collected: 12:30
Date Received: 11/20/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	ug/l	1.0	1.0	1	11/30/98	8:42	T.Johnson	8021B	2903
Toluene	ND	ug/l	1.0	1.0	1	11/30/98	8:42	T.Johnson	8021B	2903
Ethylbenzene	ND	ug/l	1.0	1.0	1	11/30/98	8:42	T.Johnson	8021B	2903
Xylenes, total	ND	ug/l	1.0	1.0	1	11/30/98	8:42	T.Johnson	8021B	2903
Methyl-t-butylether	ND	ug/l	1.0	1.0	1	11/30/98	8:42	T.Johnson	8021B	2903
MISCELLANEOUS GC PARAMETERS										
Methane	3830	ug/l	26.0	26.0	1	11/23/98	14:08	W. Klepper	8015M	2901
METALS										
Ferrous Iron	1.92	mg/l	0.100	0.100	1	11/27/98	12:26	S.Brewer	3500D	5725
MISCELLANEOUS CHEMISTRY										
Nitrate-N as N	ND	mg/l	0.10	0.10	1	11/20/98	17:33	D. Hoover	353.2	2905
Sulfate	63.8	mg/l	10.0	5.00	2	11/25/98	16:43	M.Shockley	9038	4596

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	109.	50. - 150.

Report Approved By: JWMitchell Report Date: 11/30/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny B. Hale, M.S., Laboratory Director
Johnny A. Mitchell, Dir. Technical Services

Laboratory Certification Number: 387

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ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB,MS 8249
ROGER BALDWIN
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Lab Number: 98-A145169
Sample ID: MW9-10
Sample Type: Water
Site ID:

Date Collected: 11/19/98
Time Collected: 8:00
Date Received: 11/20/98
Time Received: 9:00

Project: 733430.02
Project Name: KESSLER LTM (SWMV66)
Sampler: ROGER BALDWIN

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	10.0	ug/l	1.0	1.0	1	11/30/98	17:41	Duncan, J.	8021B	6987
Toluene	2.0 U	ug/l	1.0	1.0	1	11/30/98	17:41	Duncan, J.	8021B	6987
Ethylbenzene	6.0	ug/l	1.0	1.0	1	11/30/98	17:41	Duncan, J.	8021B	6987
Xylenes, total	3.0	ug/l	1.0	1.0	1	11/30/98	17:41	Duncan, J.	8021B	6987
Methyl-t-butylether	2.0 J	ug/l	1.0	1.0	1	11/30/98	17:41	Duncan, J.	8021B	6987
MISCELLANEOUS GC PARAMETERS										
Methane	4030	ug/l	26.0	26.0	1	11/23/98	14:18	W. Klepper	8015M	2901
METALS										
Ferrous Iron	0.160	mg/l	0.100	0.100	1	11/27/98	12:26	S.Brewer	3500D	5725
MISCELLANEOUS CHEMISTRY										
Nitrate-N as N	ND	mg/l	0.10	0.10	1	11/20/98	17:35	D. Hoover	353.2	2905
Sulfate	22.1	mg/l	5.00	5.00	1	11/25/98	16:43	M.Shockley	9038	4596

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	104.	50. - 150.

Report Approved By: J.M. Mitchell Report Date: 11/30/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny B. Hale, M.S., Laboratory Director
Johnny A. Mitchell, Dir. Technical Services

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ANALYTICAL REPORT

PARSONS ENG. /KEESLER AFB, MS 8249
ROGER BALDWIN
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 733430.02
Project Name: KESSLER LTM (SWMU66)
Sampler: ROGER BALDWIN

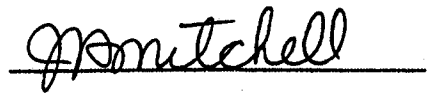
Lab Number: 98-A145161
Sample ID: TRIP BLANK
Sample Type: Water
Site ID:

Date Collected: 11/18/98
Time Collected: 14:00
Date Received: 11/20/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	ug/l	1.0	1.0	1	11/29/98	23:12	T.Johnson	8021B	2903
Toluene	3.1	ug/l	1.0	1.0	1	11/29/98	23:12	T.Johnson	8021B	2903
Ethylbenzene	ND	ug/l	1.0	1.0	1	11/29/98	23:12	T.Johnson	8021B	2903
Xylenes, total	ND	ug/l	1.0	1.0	1	11/29/98	23:12	T.Johnson	8021B	2903
Methyl-t-butylether	ND	ug/l	1.0	1.0	1	11/29/98	23:12	T.Johnson	8021B	2903

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	104.	50. - 150.

Report Approved By:  Report Date: 11/30/98

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny B. Hale, M.S., Laboratory Director
Johnny A. Mitchell, Dir. Technical Services

Laboratory Certification Number: 387

SPECIALIZED ASSAYS, INC.

2960 Foster Creighton Dr.
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Nashville, TN 37204-0566
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PROJECT QUALITY CONTROL DATA

Matrix Spike Recovery

Analyte	units	Orig. Val.	MS Val	Spike Conc	Recovery	Target Range	Q.C. Batch
Benzene	mg/l	< 0.0010	0.0161	0.0200	80.50	75. - 125.	2903
Benzene	mg/l	< 0.0010	0.0190	0.0200	95.00	75. - 125.	6987
Toluene	mg/l	< 0.0010	0.0170	0.0200	85.00	70. - 125.	2903
Toluene	mg/l	< 0.0010	0.0190	0.0200	95.00	70. - 125.	6987
Ethylbenzene	mg/l	< 0.0010	0.0159	0.0200	79.50	71. - 129.	2903
Ethylbenzene	mg/l	< 0.0010	0.0190	0.0200	95.00	71. - 129.	6987
Xylenes, total	mg/l	< 0.0010	0.0329	0.0400	82.25	71. - 133.	2903
Xylenes, total	mg/l	< 0.0010	0.0200	0.0200	100.00	71. - 133.	6987
Methyl-t-butylether	mg/l	< 0.0010	0.0199	0.0200	99.50	75. - 125.	2903
Methyl-t-butylether	mg/l	< 0.0010	0.0220	0.0200	110.00	75. - 125.	6987
Nitrate-N as N	mg/l	< 0.10	10.4	10.0	104.00	85. - 115.	2905
Nitrate-N as N	mg/l	< 0.10	10.3	10.0	103.00	85. - 115.	2905
Sulfate	mg/l	11.6	31.9	20.0	101.50	76. - 133.	4596

Matrix Spike Duplicate

Analyte	units	Orig. Val.	Duplicate	RPD	Limit	Q.C. Batch
Benzene	mg/l	0.0161	0.0187	14.94	20.	2903
Benzene	mg/l	0.0190	0.0200	5.13	20.	6987
Toluene	mg/l	0.0170	0.0196	14.21	20.	2903
Toluene	mg/l	0.0190	0.0200	5.13	20.	6987
Ethylbenzene	mg/l	0.0159	0.0186	15.65	20.	2903
Ethylbenzene	mg/l	0.0190	0.0200	5.13	20.	6987
Xylenes, total	mg/l	0.0329	0.0384	15.43	20.	2903
Xylenes, total	mg/l	0.0200	0.0210	4.88	20.	6987
Methyl-t-butylether	mg/l	0.0199	0.0230	14.45	20.	2903
Methyl-t-butylether	mg/l	0.0220	0.0200	9.52	20.	6987
Nitrate-N as N	mg/l	10.4	10.3	0.97	9.	2905
Sulfate	mg/l	31.9	36.6	13.72#	10.	4596

Laboratory Control Data

Analyte	units	Known Val.	Analyzed Val	% Recovery	Target Range	Q.C. Batch
Benzene	mg/l	0.0200	0.0180	90.	70 - 130	2903
Benzene	mg/l	0.0200	0.0200	100.	70 - 130	6987
Toluene	mg/l	0.0200	0.0177	88.	70 - 130	2903
Toluene	mg/l	0.0200	0.0200	100.	70 - 130	6987
Ethylbenzene	mg/l	0.0200	0.0176	88.	70 - 130	2903
Ethylbenzene	mg/l	0.0200	0.0200	100.	70 - 130	6987
Xylenes, total	mg/l	0.0400	0.0365	91.	70 - 130	2903
Xylenes, total	mg/l	0.0200	0.0210	105.	70 - 130	6987
Methyl-t-butylether	mg/l	0.0200	0.0219	110.	70 - 130	2903
Methyl-t-butylether	mg/l	0.0200	0.0200	100.	70 - 130	6987
Methane	mg/L	1.33	1.30	98.	60 - 140	2901

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PROJECT QUALITY CONTROL DATA

Laboratory Control Data

Analyte	units	Known Val.	Analyzed Val	% Recovery	Target Range	Q.C. Batch
Nitrate-N as N	mg/l	5.50	5.80	105.46	80 - 120	2905
Sulfate	mg/l	49.7	50.8	102.21	80 - 120	4596

Duplicates

Analyte	units	Orig. Val.	Duplicate	RPD	Limit	Q.C. Batch
Nitrate-N as N	mg/l	< 0.10	< 0.10	N/A	15	2905
Sulfate	mg/l	12.3	14.1	13.64	15	4596

Blank Data

Analyte	Blank Value	Units	Q.C. Batch
Benzene	< 0.0010	mg/l	2903
Benzene	< 0.0010	mg/l	6987
Toluene	< 0.0010	mg/l	2903
Toluene	< 0.0010	mg/l	6987
Ethylbenzene	< 0.0010	mg/l	2903
Ethylbenzene	< 0.0010	mg/l	6987
Xylenes, total	< 0.0010	mg/l	2903
Xylenes, total	< 0.0010	mg/l	6987
Methyl-t-butylether	< 0.0010	mg/l	2903
Methyl-t-butylether	< 0.0010	mg/l	6987
Nitrate-N as N	< 0.10	mg/l	2905
Sulfate	< 5.00	mg/l	4596
Methane	< 0.026	mg/L	2901

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PARSONS ENG./KEESLER AFB,MS 9249
ROGER BALDWIN
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

CHAIN OF CUSTODY

Project Number: 733430.02 | Sampler: Roger Baldwin
Project Name: Keesler LTM (SWMU66) | SAE Quote:

Lab No.	Field Number	Date	Time	Matrix	Grab	Comp	Bottles	Analysis Requested: 8021B	353.2	375.4	3500	METHANE
-A145161	TB-1	11/18/98	1400	H_2O	X		1	1				
-A145162	SW-2		1430		X		2	2				
-A145163	SW-3		1545		X		2	2				
-A145164	SW-1		1645		X		2	2				
-A145165	MW9-1	11/19/98	0900		X		15	6	Same Bottles 3			6
8-A145166	MW9-8		1230		X		5	2	Same Bottle 1			2
8-A145167	MW9-2		1130		X		5	2	Same Bottle 1			2
8-A145168	MW9-6		1015		X		5	2	Same Bottle 1			2
8-A145169	MW9-10		0800		X		5	2	Same Bottle 1			2

Relinquished by:	D/T	Received by:	D/T	Relinquished by:	D/T	Received by:	D/T
Roger Baldwin	11/19/98 1415						
Relinquished by:	D/T	Received by:	D/T	Relinquished by:	D/T	Received by:	D/T
							11/20/98 9:00

Cooler Temperature When Received: 4/0C

Laboratory Project Number: 121307

Cooler Seals Intact?

Air Bill Number: 808218736077

SPECIAL INSTRUCTIONS: MW9-1 is (MS/MSD)
8021B is BTEX and MTBE only!
If problem call Roger Baldwin 678-969-2427
RSKSOP175 → METHANE

353.2 - Nitrate
375.4 - Sulfate
3500 - Ferrous Iron

APPENDIX A.4
LABORATORY DATA
JUNE 1999

SPECIALIZED ASSAYS, INC.
2960 Foster Creighton Dr.
P.O. Box 40566
Nashville, TN 37204-0566
Phone 1-615-726-0177

ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB,MS 8249
ROSS SURRENCY
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 735628.03
Project Name: KEESLER A.F.B.
Sampler: BURKINGSTOCK

Lab Number: 99-A95496
Sample ID: SWMU 66-SW 1
Sample Type: Water
Site ID:

Date Collected: 6/22/99
Time Collected: 15:30
Date Received: 6/26/99
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	ug/l	1.0	1.0	1	7/ 4/99	22:38	D.Raney	8021B	7193
Toluene	ND	ug/l	1.0	1.0	1	7/ 4/99	22:38	D.Raney	8021B	7193
Ethylbenzene	ND	ug/l	1.0	1.0	1	7/ 4/99	22:38	D.Raney	8021B	7193
Xylenes, total	ND	ug/l	1.0	1.0	1	7/ 4/99	22:38	D.Raney	8021B	7193
Methyl-t-butylether	ND	ug/l	1.0	1.0	1	7/ 4/99	22:38	D.Raney	8021B	7193

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	87.	50. - 150.

Report Approved By: Gail A Lage Report Date: 7/16/99

Theodore J. Duello, Ph.D., Lab Director
Michael H. Dunn, M.S., Technical Director
Johnny A. Mitchell, Dir. Technical Services
Eric Smith, Assistant Technical Director
Gail A Lage, Technical Services

Laboratory Certification Number: 387

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2960 Foster Creighton Dr.
P.O. Box 40566
Nashville, TN 37204-0566
Phone 1-615-726-0177

ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB,MS 8249
ROSS SURRENCY
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 735628.03
Project Name: KEESLER A.F.B.
Sampler: BURKINGSTOCK

Lab Number: 99-A95512
Sample ID: SWMU 66-SW-2
Sample Type: Water
Site ID:

Date Collected: 6/22/99
Time Collected: 14:30
Date Received: 6/26/99
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	ug/l	1.0	1.0	1	7/ 4/99	20:57	S. Stuart	8021B	7198
Toluene	ND	ug/l	1.0	1.0	1	7/ 4/99	20:57	S. Stuart	8021B	7198
Ethylbenzene	ND	ug/l	1.0	1.0	1	7/ 4/99	20:57	S. Stuart	8021B	7198
Xylenes, total	ND	ug/l	1.0	1.0	1	7/ 4/99	20:57	S. Stuart	8021B	7198
Methyl-t-butylether	ND	ug/l	1.0	1.0	1	7/ 4/99	20:57	S. Stuart	8021B	7198

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	100.	50. - 150.

Report Approved By: Gail A Lage Report Date: 7/16/99

Theodore J. Duello, Ph.D., Lab Director
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Gail A Lage, Technical Services

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ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB,MS 8249
ROSS SURRENCY
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 735628.03
Project Name: KEESLER A.F.B.
Sampler: BURKINGSTOCK

Lab Number: 99-A95495
Sample ID: SWMU 66-SW 3
Sample Type: Water
Site ID:

Date Collected: 6/22/99
Time Collected: 15:00
Date Received: 6/26/99
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	ug/l	1.0	1.0	1	7/ 4/99	22:09	D.Raney	8021B	7193
Toluene	ND	ug/l	1.0	1.0	1	7/ 4/99	22:09	D.Raney	8021B	7193
Ethylbenzene	ND	ug/l	1.0	1.0	1	7/ 4/99	22:09	D.Raney	8021B	7193
Xylenes, total	ND	ug/l	1.0	1.0	1	7/ 4/99	22:09	D.Raney	8021B	7193
Methyl-t-butylether	ND	ug/l	1.0	1.0	1	7/ 4/99	22:09	D.Raney	8021B	7193

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	88.	50. - 150.

Report Approved By: Gail A Lage Report Date: 7/16/99

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ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB,MS 8249
ROSS SURRENCY
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 735628.03
Project Name: KEESLER A.F.B.
Sampler: BURKINGSTOCK

Lab Number: 99-A95498
Sample ID: SWMU 66-MW 9-1
Sample Type: Water
Site ID:

Date Collected: 6/22/99
Time Collected: 16:30
Date Received: 6/26/99
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	ug/l	1.0	1.0	1	7/ 3/99	22:38	S. Stuart	8021B	7202
Toluene	2.9	ug/l	1.0	1.0	1	7/ 3/99	22:38	S. Stuart	8021B	7202
Ethylbenzene	ND	ug/l	1.0	1.0	1	7/ 3/99	22:38	S. Stuart	8021B	7202
Xylenes, total	4.9	ug/l	1.0	1.0	1	7/ 3/99	22:38	S. Stuart	8021B	7202
Methyl-t-butylether	ND	ug/l	1.0	1.0	1	7/ 3/99	22:38	S. Stuart	8021B	7202
MISCELLANEOUS GC PARAMETERS										
Methane	259.	ug/l	26.0	26.0	1	7/ 6/99	19:21	M.Rogers	RSK175M	4622

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	104.	50. - 150.

Report Approved By: Gail A Lage Report Date: 7/16/99

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ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB,MS 8249
ROSS SURRENCY
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 735628.03
Project Name: KEESLER A.F.B.
Sampler: BURKINGSTOCK

Lab Number: 99-A95488
Sample ID: SWMU 66-MW 9-2
Sample Type: Water
Site ID:

Date Collected: 6/23/99
Time Collected: 16:00
Date Received: 6/26/99
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	ug/l	1.0	1.0	1	7/ 4/99	16:46	D.Raney	8021B	7193
Toluene	ND	ug/l	1.0	1.0	1	7/ 4/99	16:46	D.Raney	8021B	7193
Ethylbenzene	ND	ug/l	1.0	1.0	1	7/ 4/99	16:46	D.Raney	8021B	7193
Xylenes, total	ND	ug/l	1.0	1.0	1	7/ 4/99	16:46	D.Raney	8021B	7193
Methyl-t-butylether	ND	ug/l	1.0	1.0	1	7/ 4/99	16:46	D.Raney	8021B	7193
MISCELLANEOUS GC PARAMETERS										
Methane	1440	ug/l	26.0	26.0	1	7/ 6/99	18:12	M.Rogers	RSK175M	4622

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	86.	50. - 150.

Report Approved By: Gail A Lage Report Date: 7/16/99

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ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB,MS 8249
ROSS SURRENCY
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 735628.03
Project Name: KEESLER A.F.B.
Sampler: BURKINGSTOCK

Lab Number: 99-A95497
Sample ID: SWMU 66-MW 9-6
Sample Type: Water
Site ID:

Date Collected: 6/22/99
Time Collected: 16:00
Date Received: 6/26/99
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	ND	ug/l	1.0	1.0	1	7/ 4/99	23:07	D.Raney	8021B	7193
Toluene	ND	ug/l	1.0	1.0	1	7/ 4/99	23:07	D.Raney	8021B	7193
Ethylbenzene	ND	ug/l	1.0	1.0	1	7/ 4/99	23:07	D.Raney	8021B	7193
Xylenes, total	ND	ug/l	1.0	1.0	1	7/ 4/99	23:07	D.Raney	8021B	7193
Methyl-t-butylether	ND	ug/l	1.0	1.0	1	7/ 4/99	23:07	D.Raney	8021B	7193
MISCELLANEOUS GC PARAMETERS										
Methane	532.	ug/l	26.0	26.0	1	7/ 6/99	19:16	M.Rogers	RSK175M	4622

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	91.	50. - 150.

Report Approved By: Gail A Lage Report Date: 7/16/99

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ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB,MS 8249
ROSS SURRENCY
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 735628.03
Project Name: KEESLER A.F.B.
Sampler: BURKINGSTOCK

Lab Number: 99-A95489
Sample ID: SWMU 66-MW 9-7
Sample Type: Water
Site ID:

Date Collected: 6/23/99
Time Collected: 16:30
Date Received: 6/26/99
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	44.5	ug/l	1.0	1.0	1	7/ 4/99	17:15	D.Raney	8021B	7193
Toluene	47.7	ug/l	1.0	1.0	1	7/ 4/99	17:15	D.Raney	8021B	7193
Ethylbenzene	24.6	ug/l	1.0	1.0	1	7/ 4/99	17:15	D.Raney	8021B	7193
Xylenes, total	154.	ug/l	1.0	1.0	1	7/ 4/99	17:15	D.Raney	8021B	7193
Methyl-t-butylether	1.6	ug/l	1.0	1.0	1	7/ 4/99	17:15	D.Raney	8021B	7193
MISCELLANEOUS GC PARAMETERS										
Methane	4840	ug/l	26.0	26.0	1	7/ 6/99	18:18	M.Rogers	RSK175M	4622

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	93.	50. - 150.

Report Approved By: _____ Report Date: 7/16/99

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ANALYTICAL REPORT

PARSONS ENG./KEESLER AFB,MS 8249
ROSS SURRENCY
5390 TRIANGLE PARKWAY STE 100
NORCROSS, GA 30092

Project: 735628.03
Project Name: KEESLER A.F.B.
Sampler: BURKINGSTOCK

Lab Number: 99-A95487
Sample ID: SWMU 66-MW 9-8
Sample Type: Water
Site ID:

Date Collected: 6/23/99
Time Collected: 15:30
Date Received: 6/26/99
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
Benzene	232.	ug/l	5.0	1.0	5	7/ 4/99	16:17	D.Raney	8021B	7193
Toluene	41.0	ug/l	1.0	1.0	1	7/ 4/99	16:17	D.Raney	8021B	7193
Ethylbenzene	7.7	ug/l	1.0	1.0	1	7/ 4/99	16:17	D.Raney	8021B	7193
Xylenes, total	209.	ug/l	1.0	1.0	1	7/ 4/99	16:17	D.Raney	8021B	7193
Methyl-t-butylether	ND	ug/l	1.0	1.0	1	7/ 4/99	16:17	D.Raney	8021B	7193
MISCELLANEOUS GC PARAMETERS										
Methane	2630	ug/l	26.0	26.0	1	7/ 6/99	17:53	M.Rogers	RSK175M	4622

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
BTEX/GRO Surr., a,a,a-trifluorotoluene	74.	50. - 150.

Report Approved By: Gail A Lage Report Date: 7/16/99

Theodore J. Duello, Ph.D., Lab Director
Michael H. Dunn, M.S., Technical Director
Johnny A. Mitchell, Dir. Technical Services
Eric Smith, Assistant Technical Director
Gail A Lage, Technical Services

Laboratory Certification Number: 387

APPENDIX B
GROUNDWATER SAMPLING FORMS

GROUNDWATER SAMPLING RECORD

Sampling Location AAFES, Marina, AOC-A, (SWMU 66) SWMU 64
Sampling Dates 6/22/99

GROUND WATER SAMPLING RECORD - MONITORING WELL SWMU 66-SW1
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 6/22, 1999 1530 a.m. (p.m.)
SAMPLE COLLECTED BY: BKB/BL of Parsons ES
WEATHER: Sunny (mostly)
DATUM FOR WATER DEPTH MEASUREMENT (Describe): TOC

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: good
INNER PVC CASING CONDITION IS: good
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

2 [ ] PRODUCT DEPTH none FT. BELOW DATUM
WATER DEPTH DTW = 3.99' TD = 12.1' FT. BELOW DATUM

4 [ ] WELL EVACUATION:
Method: Peristaltic Pump
Volume Removed:
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors:
Other comments: slight yellowish-brown tint, clear

5 [ ] SAMPLE EXTRACTION METHOD:
[ ] Bailer made of:
[X] Pump, type:
[ ] Other, describe:

6 [ ] ON-SITE MEASUREMENTS:

DIRECT INSTRUMENT READINGS

Time	1509	1514	1518	1522	1526		Measured With
Temp (°C)	25.2	25.2	25.3	25.2	25.2		
pH	6.46	6.43	6.48	6.43	6.41		
Cond (µS/cm)	401	383	379	368	367		
Do (mg/L)	0.49	0.18	0.41	0.49	0.47		
Redox (mv)	35	30	31	30	29		
gallons purged	Initial	1gal	2gal	3gal	4gal		

Additional Comments:

7 [ ] SAMPLE CONTAINERS (material, number, size): 2-40ml VOA's (BTEX, MTBE)

GROUNDWATER SAMPLING RECORD

Sampling Location AAFES, Marina, AOC-A, SWMU 66, SWMU 64
Sampling Dates 6/22/99

GROUND WATER SAMPLING RECORD - MONITORING WELL SWMU66-SW2
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 6/22/99, 1999 1430 a.m./p.m.
SAMPLE COLLECTED BY: BKB, BL of Parsons ES
WEATHER: Sunny
DATUM FOR WATER DEPTH MEASUREMENT (Describe): TOC

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS ~~IS NOT~~) APPARENT
STEEL CASING CONDITION IS: good
INNER PVC CASING CONDITION IS: good
WATER DEPTH MEASUREMENT DATUM (IS ~~IS NOT~~) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

2 [ ] PRODUCT DEPTH None FT. BELOW DATUM
WATER DEPTH DTW: 5.20' TD: 12.20' FT. BELOW DATUM

4 [ ] WELL EVACUATION:
Method: Peristaltic Pump
Volume Removed:
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: none
Other comments: yellowish, clear

5 [ ] SAMPLE EXTRACTION METHOD:
[ ] Bailer made of:
[X] Pump, type:
[ ] Other, describe:

6 [ ] ON-SITE MEASUREMENTS:
(BKB) DIRECT INSTRUMENT READINGS

Time	1422	1418	1421	1427			Measured With
Temp (°C)	28.7	29.1	29.2	29.3			
pH	5.79	5.92	5.95	5.95			
Cond (µS/cm) 278	~~2.06~~	258	246	244			
Do (mg/L)	0.25	0.08	0.07	008			
Redox (mv)	69	65	65	64			
gallons purged	Initial	1 gal	2 gal	3 gal			

Additional Comments:

7 [ ] SAMPLE CONTAINERS (material, number, size): 4-40ml VOA's (BTEX, MTBE, Methanol)

GROUNDWATER SAMPLING RECORD

Sampling Location AAFES, Marina, AOC-A, SWMU 66, SWMU 64
Sampling Dates 6/22/99

GROUND WATER SAMPLING RECORD - MONITORING WELL SWMU66-SW3
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 6/22/99, 1999 1500 a.m./p.m.
SAMPLE COLLECTED BY: BB of Parsons ES
WEATHER: mostly sunny ~50's F
DATUM FOR WATER DEPTH MEASUREMENT (Describe): TOC

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: Good
INNER PVC CASING CONDITION IS: Good
WATER DEPTH MEASUREMENT DATUM (IS ~~IS NOT~~) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

2 [ ] PRODUCT DEPTH None FT. BELOW DATUM
WATER DEPTH 3.90' TD=11.9 FT. BELOW DATUM

4 [ ] WELL EVACUATION:
Method: Peristaltic Pump
Volume Removed:
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: none
Other comments: yellowish, clear

5 [ ] SAMPLE EXTRACTION METHOD:
[ ] Bailer made of:
[X] Pump, type:
[ ] Other, describe:

6 [ ] ON-SITE MEASUREMENTS:

DIRECT INSTRUMENT READINGS

Time	1443	1448	1453	1457			Measured With
Temp (°C)	26.3	26.3	26.3	26.2			Horiba U-10
pH	6.09	6.09	6.13	6.10			
Cond (µS/cm)	434	428	416	414			
Do (mg/L)	0.36	0.06	0.02	0.01			
Redox (mv)	50	50	51	50			VWR 3000
gallons purged	Initial	1 gal	2 gal	3 gal			

Additional Comments:

7 [ ] SAMPLE CONTAINERS (material, number, size): 2-40ml VOAs (BTEX, MTBE)

GROUNDWATER SAMPLING RECORD

Sampling Location AAFES, Marina, AOC-A, (SWMU 66) SWMU 64
Sampling Dates 6/22/99

GROUND WATER SAMPLING RECORD - MONITORING WELL SW mw66-mw9-1
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 6/22, 1999 1630 a.m. (p.m.)
SAMPLE COLLECTED BY: BKB/BL of Parsons ES
WEATHER: cloudy
DATUM FOR WATER DEPTH MEASUREMENT (Describe): TOC

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: good
INNER PVC CASING CONDITION IS: good
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

2 [ ] PRODUCT DEPTH none FT. BELOW DATUM
WATER DEPTH DTW: 5.75' TD: 13.1' FT. BELOW DATUM

4 [ ] WELL EVACUATION:
Method: Peristaltic Pump
Volume Removed:
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: Sulfur slight
Other comments: yellowish-brown tint, clear

5 [ ] SAMPLE EXTRACTION METHOD:
[ ] Bailer made of:
[X] Pump, type:
[ ] Other, describe:

6 [ ] ON-SITE MEASUREMENTS:

DIRECT INSTRUMENT READINGS

Time	1612	1617	1622	1629			Measured With
Temp (°C)	24.6	24.5	24.4	24.4			
pH	6.24	6.21	6.19	6.19			
Cond (µS/cm)	359	342	332	328			
Do (mg/L)	0.31	0.10	0.04	0.03			
Redox (mv)	31	30	31	35			
gallons purged	Initial	1gal	2gal	3gal			

Additional Comments:

7 [ ] SAMPLE CONTAINERS (material, number, size): 4-40ml VOAS (BTEX, DTBE, Methane)

GROUNDWATER SAMPLING RECORD

Sampling Location AAFES, Marina, AOC-A, SWMU 66, SWMU 64
Sampling Dates 6/23/99

GROUND WATER SAMPLING RECORD - MONITORING WELL SWMU66MW9-2
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 6/23/99, 1999 1600 a.m./p.m.
SAMPLE COLLECTED BY: TBL of Parsons ES
WEATHER: SUNNY 75
DATUM FOR WATER DEPTH MEASUREMENT (Describe): TOC

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: GOOD
INNER PVC CASING CONDITION IS: GOOD
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe): THERE IS NO WELL CAP (2")

2 [ ] PRODUCT DEPTH _____ FT. BELOW DATUM
WATER DEPTH 5.99' TO 12.8 FT. BELOW DATUM

4 [ ] WELL EVACUATION:
Method: Peristaltic
Volume Removed:
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: SULFUR
Other comments: YELLOW/BROWN

5 [ ] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of:
[X] Pump, type:
[ ] Other, describe:

6 [ ] ON-SITE MEASUREMENTS:

DIRECT INSTRUMENT READINGS

Time	1539	1543	1552	1558			Measured With
Temp (°C)	28.2	28.0	27.9	27.9			HORIBA U10
pH	5.67	5.65	6.00	6.06			↓
Cond (µS/cm)	381	464	526	546			↓
Do (mg/L)	0.26	0.04	0.01	0.02			↓
Redox (mv)	+104.9	-112.5	-120.3	-120.6			HANNA 902
gallons purged	0	1 gal	2 gal	3 gal			

Additional Comments:

7 [ ] SAMPLE CONTAINERS (material, number, size): 4 40 ml VOAs
BTEX, MTBE, METHANE

GROUNDWATER SAMPLING RECORD

Sampling Location AAFES, Marina, AOC-A, SWMU 66, SWMU 64
Sampling Dates 6/22/99

GROUND WATER SAMPLING RECORD - MONITORING WELL SWMU66 - MW9-6
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 6/22/99, 1999 1600 a.m. (p.m.)
SAMPLE COLLECTED BY: BB of Parsons ES
WEATHER: partly cloudy
DATUM FOR WATER DEPTH MEASUREMENT (Describe): TOC

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: good
INNER PVC CASING CONDITION IS: good
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[X] MONITORING WELL REQUIRED REPAIR (describe): new lock cap

2 [ ] PRODUCT DEPTH none FT. BELOW DATUM
WATER DEPTH DTW: 5.55' TD 12.7' FT. BELOW DATUM

4 [ ] WELL EVACUATION:
Method: Peristaltic Pump
Volume Removed:
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: none
Other comments: slight yellowish-brown tint, clear

5 [ ] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of:
[X] Pump, type:
[ ] Other, describe:

6 [ ] ON-SITE MEASUREMENTS:

DIRECT INSTRUMENT READINGS

Time	1541	1544	1548	1553			Measured With
Temp (°C)	25.1	25.0	25.1	25.1			HORIBA U-10
pH	6.15	6.03	5.98	5.96			
Cond (µS/cm)	395	392	380	367			
Do (mg/L)	0.71	0.11	0.06	0.01			
Redox (mv)	57	51	50	47			YSI MW 3000
gallons purged	Initial	1 gal	2 gal	3 gal			

Additional Comments:

7 [ ] SAMPLE CONTAINERS (material, number, size): 4- 40ml VOA's (BTEX, MTBE, Methane)

GROUNDWATER SAMPLING RECORD

Sampling Location AAFES, Marina, AOC-A, SWMU 66, SWMU 64
Sampling Dates 6/23/99

GROUND WATER SAMPLING RECORD - MONITORING WELL SWMU66MW9-7
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 6/23/99, 1999 1630 a.m./p.m.
SAMPLE COLLECTED BY: BC of Parsons ES
WEATHER: PARTLY CLOUDY 85°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): TOC

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: GOOD
INNER PVC CASING CONDITION IS: GOOD
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

2 [ ] PRODUCT DEPTH ND FT. BELOW DATUM
WATER DEPTH 6.16' TD=14' FT. BELOW DATUM

4 [ ] WELL EVACUATION:
Method: Peristaltic
Volume Removed:
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: SULFUR
Other comments: YELLOW/BROWN

5 [ ] SAMPLE EXTRACTION METHOD:
[ ] Bailer made of:
[X] Pump, type:
[ ] Other, describe:

6 [ ] ON-SITE MEASUREMENTS:

DIRECT INSTRUMENT READINGS

Time	1611	1615	1620				Measured With
Temp (°C)	25.9	25.6	25.5				HORIBA U-10
pH	6.00	6.00	6.03				↓
Cond (µS/cm)	450	434	429				
Do (mg/L)	0.51	0.11	0.01				
Redox (mv)	-72.5	-72.3	-75.0				HANNA 9025
gallons purged	0	1	2				

Additional Comments:

7 [ ] SAMPLE CONTAINERS (material, number, size): 4 40ml VOAs
BTEX/MTBE, METHANE

GROUNDWATER SAMPLING RECORD

Sampling Location AAFES, Marina, AOC-A, SWMU 66, SWMU 64
Sampling Dates 6/23

GROUND WATER SAMPLING RECORD - MONITORING WELL SWMU66MW9-8
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 6/23/99, 1999 1530 a.m./p.m.
SAMPLE COLLECTED BY: of Parsons ES
WEATHER: SUNNY 95°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): TOC

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: GOOD
INNER PVC CASING CONDITION IS: GOOD
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

2 [ ] PRODUCT DEPTH ND FT. BELOW DATUM
WATER DEPTH 6.21' TD=13.2' FT. BELOW DATUM
4 [ ] WELL EVACUATION:
Method: PERISTALTIC
Volume Removed:
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change) 0.09'
Water odors: SULFUR
Other comments: YELLOW/BROWN COLOR

5 [ ] SAMPLE EXTRACTION METHOD:
[ ] Bailer made of:
[X] Pump, type:
[ ] Other, describe:

6 [ ] ON-SITE MEASUREMENTS:

DIRECT INSTRUMENT READINGS

Time	1507	1520	1515				Measured With
Temp (°C)	25.6	25.3	25.2				HORIBA
pH	5.37	5.25	5.26				HORIBA
Cond (µS/cm) 31	153	273	271				
Do (mg/L)	0.89	0.08	0.01				
Redox (mv)	114.0	411.0	-106.5				HANNA
gallons purged	0	1	2				

Additional Comments:

7 [ ] SAMPLE CONTAINERS (material, number, size): 4 40ml VOAS
BTEX, MTBE, METHANE

ON-SITE MEASUREMENTS
HACH AND CHEMetrics ANALYSES
Keesler AFB
(SWMU 66) AOC-A AAFES MARINA

SAMPLE DATE	6/22/99	TIME SAMPLED	1630
		TIME ANALYSIS START	1804
SAMPLE I.D.	SWMU66-MW9-1	TIME ANALYSIS END	1718

FILTERED (circle) (YES) NO

COLOR / ODOR: yellow/sulfur

HACH DR/700 Measurements:

Analyte	Program	Range	Dilution	Reading	Concentration		Blank[a/,b/]
Ferrous	50.01.1	0 - 5.10 mg/L	1	0.06	0.06	mg/L	sample
						mg/L	sample
Sulfate	45.000	0 - 100 mg/L	1	0.93	0.93	mg/L	DI or 50mg/L
						mg/L	DI or 50mg/L

CHEMetrics Color Tests:
Ammonia 2.0 ppm (A)

Technician: BKB

[a/] sulfate blanks contain respective reagents;
Ferrous iron blanks are without reagents.

[b/] Ferrous iron blanks should be diluted accordingly if samples are diluted.

(A) yellow tint could give false readings
initial

Sulfate w/o reagent: ~~3.08~~ 2.69 mg/l
w/ reagent: 3.62 mg/l

ON-SITE MEASUREMENTS
HACH AND CHEMetrics ANALYSES
Keesler AFB
(SWMU 66) AOC-A AAFES MARINA

SAMPLE DATE	6/23/99	TIME SAMPLED	1600
		TIME ANALYSIS START	1628
SAMPLE I.D.	SWMU66-MW9-2	TIME ANALYSIS END	1642

FILTERED (circle) (YES) NO

COLOR / ODOR: yellowish / sulfur

HACH DR/700 Measurements:

Analyte	Program	Range	Dilution	Reading	Concentration		Blank[a,b]
Ferrous	50.01.1	0 - 5.10 mg/L	1	0.22	0.22	mg/L	sample
						mg/L	sample
Sulfate	45.000	0 - 100 mg/L	1	15.83	15.83	mg/L	DI or 50mg/L
						mg/L	DI or 50mg/L

CHEMetrics Color Tests:
Ammonia 6.0 ppm (A)

Technician: BKB

[a] sulfate blanks contain respective reagents;
Ferrous iron blanks are without reagents.

[b] Ferrous iron blanks should be diluted accordingly if samples are diluted.

(A) initial yellowish tint could give false results

Sulfate: W/O reagent: 7.97 mg/L
W/reagent: 23.80 mg/L

ON-SITE MEASUREMENTS
HACH AND CHEMetrics ANALYSES
Keesler AFB
(SWMU 66) **AOC-A AAFES MARINA**

SAMPLE DATE	6/22/99	TIME SAMPLED	1600
		TIME ANALYSIS START	1644
SAMPLE I.D.	SWMU66-MW9-6	TIME ANALYSIS END	1700

FILTERED (circle) (YES) NO

COLOR / ODOR: ~~clear~~ yellowish tint/SULFUR

HACH DR/700 Measurements:

Analyte	Program	Range	Dilution	Reading	Concentration		Blank[a/,b/]
Ferrous	50.01.1	0 - 5.10 mg/L	1	0.19	0.19	mg/L	sample
						mg/L	sample
Sulfate	45.000	0 - 100 mg/L	1	0.59	0.59	mg/L	DI or 50mg/L
						mg/L	DI or 50mg/L

CHEMetrics Color Tests:
Ammonia 3.0 ppm (*)

Technician: BKB

[a/] sulfate blanks contain respective reagents;
Ferrous iron blanks are without reagents.

[b/] Ferrous iron blanks should be diluted accordingly if samples are diluted.

(*) yellow color may give false high readings

Sulfate W/O reagent : 3.08 mg/l
W/reagent : ~~3.08~~ mg/l
3.67

(17)

ON-SITE MEASUREMENTS
HACH AND CHEMetrics ANALYSES
Keesler AFB
(SWMU 66) AOC-A AAFES MARINA

SAMPLE DATE	6/23/99	TIME SAMPLED	1630
		TIME ANALYSIS START	1642
SAMPLE I.D.	SWMU66-MW9-7	TIME ANALYSIS END	1705

FILTERED (circle) (YES) NO

COLOR / ODOR: yellow / hydrocarbon

HACH DR/700 Measurements:

Analyte	Program	Range	Dilution	Reading	Concentration		Blank[a/,b/]
Ferrous	50.01.1	0 - 5.10 mg/L	1	>5.10		mg/L	sample
			5	0.95	4.75	mg/L	sample
Sulfate	45.000	0 - 100 mg/L	1	~~5.82~~ 0	~~5.82~~ 0	mg/L	DI or 50mg/L
						mg/L	DI or 50mg/L

CHEMetrics Color Tests:
Ammonia 8.0 ppm (*)

Technician: BKB

[a/] sulfate blanks contain respective reagents;
Ferrous iron blanks are without reagents.

[b/] Ferrous iron blanks should be diluted accordingly if samples are diluted.

(*) initial yellow tint may cause false readings

Sulfate w/o reagent: 6.55 mg/L
w/reagent: 5.82 mg/L

(15)

ON-SITE MEASUREMENTS
HACH AND CHEMetrics ANALYSES
Keesler AFB
(SWMU 66) AOC-A AAFES MARINA

SAMPLE DATE	6/23/99	TIME SAMPLED	1530
		TIME ANALYSIS START	1613
SAMPLE I.D.	SWMU66-MW9-8	TIME ANALYSIS END	1628

FILTERED (circle) (YES) NO

COLOR / ODOR: yellowish / Hydrocarbon - sulfur

HACH DR/700 Measurements:

Analyte	Program	Range	Dilution	Reading	Concentration		Blank[a/,b/]
Ferrous	50.01.1	0 - 5.10 mg/L	1	0.92	0.98	mg/L	sample
						mg/L	sample
Sulfate	45.000	0 - 100 mg/L	1	0.39	0.39	mg/L	DI or 50mg/L
						mg/L	DI or 50mg/L

CHEMetrics Color Tests:
Ammonia (*) 10.0 ppm ~~can't perform... too yellow~~

Technician: BKB

[a/] sulfate blanks contain respective reagents;
Ferrous iron blanks are without reagents.

[b/] Ferrous iron blanks should be diluted accordingly if samples are diluted.

(*) initial yellowness could cause a false reading

Sulfate: W/O reagent: 5.23
W/reagent: 5.62

APPENDIX C
CONTAMINANT ATTENUATION ASSESSMENT

APPENDIX C
CONTAMINANT ATTENUATION ASSESSMENT
SWMU 66

C.1 INTRODUCTION

Biodegradation of dissolved fuel constituents is assessed in this section to support selection of a long term management (LTM) approach for sites at SWMU 66. As used throughout this report, the term "remediation by natural attenuation" (RNA) refers to a subsurface contaminant management strategy that relies on natural physical, chemical, and biological mechanisms to control exposure of potential receptors to concentrations of contaminants in soil and groundwater that exceed regulatory levels. These mechanisms include the processes of hydrodynamic dispersion, dilution, sorption, volatilization, and biodegradation, which facilitate RNA of a variety of anthropogenic chemicals.

This section summarizes and interprets specific site characterization data relevant to documenting the effectiveness of RNA by:

1. Discussing different attenuation mechanisms (Section C.2);
2. Assessing evidence of contaminant attenuation over time (Section C.3); and
3. Analyzing geochemical data collected during the June 1999 field effort (Sections C.4 and C.5)

C.2 OPERATIVE MECHANISMS OF CONTAMINANT ATTENUATION

Understanding the fate of fuel hydrocarbons in environmental media is critical to evaluating and predicting contaminant distribution patterns. There are several physical, chemical, and biological processes that influence how a chemical behaves in soil and groundwater.

Nondestructive attenuation processes can be described as those physical and chemical processes that may prohibit significant contaminant migration but will not result in a permanent reduction in contaminant mass. Examples of nondestructive attenuation processes include volatilization, sorption, dilution, and hydrodynamic dispersion. These processes must be evaluated when determining whether some type of remediation is warranted because chemical contamination poses or has the potential to pose a risk to human or ecological receptors. If contamination cannot reach a potential receptor exposure point, the contamination poses no risk.

In comparison to nondestructive chemical attenuation processes, destructive chemical attenuation processes result in the permanent removal of contaminant mass from the environment. Documenting and distinguishing the effects of destructive attenuation processes, such as biodegradation, from nondestructive attenuation processes is critical to evaluating the potential for RNA to bring about a reduction in contaminant mass over time. The effectiveness of destructive attenuation processes at reducing contaminant mass at a site depends on how susceptible the chemical is to biodegradation and whether the site is characterized by physical, chemical, and biological conditions favorable to such processes.

C.3 EVIDENCE OF CONTAMINANT BIODEGRADATION OVER TIME

The first step in determining whether fuel hydrocarbon constituents are biodegrading in groundwater at SWMU 66 was to compare contaminant concentrations at selected sampling locations over time. The purpose of this comparison was to assess the evidence of field-scale contaminant mass loss. Decreases in the magnitude of contaminant concentrations at a site over time that cannot be explained by physical processes (e.g., source removal, mass transport in groundwater) may be the first indication that contaminants are biodegrading at the site.

Hydrocarbon concentrations were measured at SWMU 66 from six monitoring wells in May 1998, August 1998, and November 1998, and from eight monitoring wells in June 1999. The data from these sampling events are summarized in Table C.1. Three of the eight monitoring wells had measurable concentrations of total BTEX in June 1999; the BTEX concentrations increased in all three wells since the May 1998 sampling event and can be attributed to the mass transport of the plume in the groundwater. Monitoring well MW9-6 was the only well to have total BTEX concentrations decrease (207.9 µg/L to non detect) since the 1998 sampling event.

Decreasing dissolved hydrocarbon concentrations indicate that the mass of hydrocarbons input into the groundwater system in the source area (through leaching of residual hydrocarbons in soils) is decreasing, and that biodegradation of dissolved BTEX is occurring.

C.4 EVIDENCE OF CONTAMINANT BIODEGRADATION VIA MICROBIALLY MEDIATED REDOX REACTIONS

Groundwater geochemical data also can be used to show that fuel hydrocarbons are biodegrading in saturated soil and groundwater at SWMU 66. Fuel hydrocarbon constituents are typically utilized as electron donors in biologically mediated redox reactions under a wide range of geochemical conditions. Therefore, analytical data on potential electron acceptors can be used as geochemical indicators of fuel hydrocarbon biodegradation (Wiedemeier *et al.*, 1995). Reductions in the concentrations of oxidized chemical species

that are used by microorganisms to facilitate the oxidation of fuel hydrocarbon compounds within contaminated media are an indication that contaminants are biodegrading. Alternately, an increase in the metabolic byproducts resulting from the reduction of electron acceptors can be used as an indicator of contaminant biodegradation. The availability of potential electron acceptors to participate in contaminant biodegradation reactions can be used to estimate the total contaminant mass that can be biodegraded over time at this site. Coupled with calculated biodegradation rates, this information can be used to predict how much and how quickly fuel hydrocarbons can be removed from saturated soils and groundwater at SWMU 66 as a result of natural processes only.

C.4.1 Relevance of Redox Couples in Biodegradation

Microorganisms obtain energy to replenish enzymatic systems and to reproduce by oxidizing organic matter. Biodegradation of dissolved hydrocarbons is the result of a series of redox reactions that maintain the charge balance within the natural environment. Microorganisms facilitate the degradation of these organic compounds by transferring electrons from the electron donor (i.e., fuel hydrocarbons and native organic carbon) to available electron acceptors. Electron acceptors are elements or compounds that occur in relatively oxidized states and can participate in redox reactions involving these available electron donors. Electron acceptors known to be present in saturated soil and groundwater at SWMU 66 are oxygen, nitrate/nitrogen, sulfate, ferric iron (Fe^{3+}), and carbon dioxide.

Microorganisms facilitate fuel hydrocarbon biodegradation to produce energy for their use. The amount of energy that can be released when a reaction occurs or is required to drive the reaction to completion is quantified by the free energy of the reaction (Stumm and Morgan, 1981). Microorganisms are able to utilize electron transport systems and chemiosmosis to combine energetically favorable and unfavorable reactions to produce energy for life processes (i.e., cell production and maintenance). Microorganisms will facilitate only those redox reactions that will yield energy. By coupling the oxidation of fuel hydrocarbon compounds, which requires energy, to the reduction of other compounds (e.g., oxygen, nitrate/nitrite, manganese, ferric iron, sulfate, and carbon dioxide), which yields energy, the overall reaction will yield energy. Detailed information on the redox reactions required to biodegrade dissolved fuel hydrocarbons is included in Table C.2. The reader is encouraged to review this information to more fully understand the chemical basis of biodegradation.

Figure C.1 illustrates the sequence of microbially mediated redox processes based on the amount of free energy released for microbial use. In general, reactions yielding more energy tend to take precedence over processes that yield less energy (Stumm and Morgan, 1981). As Figure C.1 shows, oxygen reduction would be expected to occur in an aerobic environment with microorganisms capable of aerobic respiration because oxygen reduction yields significant energy. However, once the available oxygen is depleted and anaerobic conditions dominate the interior regions of the contaminant plume, anaerobic

microorganisms can utilize other electron acceptors in the following order of preference: nitrate/nitrite, manganese, ferric iron, sulfate, carbon dioxide, and nitrogen. Each successive redox reaction provides less energy to the system, and each step down in redox energy yield would have to be paralleled by an ecological succession of microorganisms capable of facilitating the pertinent redox reactions.

The expected sequence of redox processes can be estimated by the oxidation-reduction potential (ORP) of the groundwater. The ORP measures the relative tendency of a solution or chemical reaction to accept or transfer electrons, and can be measured in the field. This measurement can be used as a crude indicator of which redox reactions may be operating at a site. High ORPs mean that the solution (or available redox couple) has a relatively high oxidizing potential.

Microorganisms can only facilitate the biodegradation (oxidation) of the fuel hydrocarbon compounds using redox couples that have a higher ORP than the contaminants. This is why these electron acceptors can be used to oxidize the fuel hydrocarbon compounds. The reduction of highly oxidized species results in an overall decrease in the oxidizing potential of the groundwater. As shown in Figure C.1, the reduction of oxygen and nitrate will reduce the oxidizing potential to levels at which ferric iron reduction can occur. As each chemical species that can be used to oxidize the contaminants is exhausted, the microorganisms are forced to use other available electron acceptors with lower oxidizing capacity. When sufficiently low (negative) ORP levels have developed as a result of these redox reactions, sulfate reduction, methanogenesis, and nitrogen fixation can occur almost simultaneously (Stumm and Morgan, 1981).

ORP values measured in shallow groundwater at SWMU 66 in June 1999 ranged from -75.0 to -120.6 millivolts (mV) (Table C.3, Figure C.2). Because of a faulty ORP meter, this range includes only three of the eight monitoring wells sampled. The negative ORP results indicate that the progressive use of electron acceptors in the order shown on Figure C.1 has caused the groundwater in the proximity of the contaminated area to become more reducing. These data imply that oxygen, nitrate, manganese, and ferric iron may be used to biodegrade fuel hydrocarbon contaminants at this site. However, many authors have noted that field ORP data alone cannot be used to reliably predict all of the electron acceptors that may be operating at a site, because the platinum electrode probes of ORP meters are not sensitive to some redox couples (e.g., sulfate/sulfide) (Stumm and Morgan, 1981; Godsy, 1994; Lovley *et al.*, 1994). Analytical data on oxidized and reduced species are presented in the following subsections to verify which electron acceptors are actually being used to biodegrade the hydrocarbon fuel hydrocarbons in saturated soil and groundwater at SWMU 66.

Throughout the following subsections, the distributions of geochemical parameters are examined by comparing background concentrations to fuel hydrocarbon plume core concentrations. Analytical data from upgradient well MW9-2 is used for background

concentrations. Analytical data from MW9-7R, and MW9-8 are used for fuel hydrocarbon plume core concentrations. Hydrocarbon concentrations are presented on Figure 2.8. The following shows qualitatively the expected geochemical parameter response to biodegradation of BTEX compounds, with ↑ referring to relatively high concentrations and ↓ referring to relatively low concentrations (Payne, *et al.* 1995):

BTEX ↑ : O_2↓ NO^{3-} ↓ NH_3 ↑ Fe^{2+} ↑ SO^{4-} ↓ H_2S ↑ CH_4 ↑

BTEX ↓ : O_2↑ NO^{3-} ↑ NH_3 ↓ Fe^{2+} ↓ SO^{4-} ↑ H_2S ↓ CH_4 ↓

C.4.2 Dissolved Oxygen (O_2)

Almost all types of fuel hydrocarbons can be biodegraded under aerobic conditions (Borden, 1994). Mineralization of fuel hydrocarbons to carbon dioxide and water under aerobic conditions involves the use of oxygen as a cosubstrate during the initial stages of metabolism, and as a terminal electron acceptor during the later stages of metabolism for energy production. The reduction of molecular oxygen during the oxidation of the fuel hydrocarbon compounds yields a significant amount of free energy that the microorganisms can utilize.

DO concentrations were measured at groundwater sampling locations in June 1999. Table C.3 presents the analytical results for DO by sampling location. As shown on the table, DO concentrations range from 0.01 to 0.47 mg/L. The overall low magnitude of DO concentrations indicates that oxygen is not currently a significant electron acceptor during microbially mediated degradation of fuel hydrocarbons at SWMU 66.

C.4.3 Ammonia (NH_3)

The presence of ammonia in groundwater can result from either nitrate reduction (facilitated by microbes) or fixing of atmospheric nitrogen (also a microbial process). From previous sampling events at SMWU 66 and other Keesler AFB sites, it is known that nitrate is not widespread in groundwater within the surficial aquifer; however, the fixation of atmospheric nitrogen may occur under the anaerobic, methanogenic conditions observed at the site. The presence of ammonia in groundwater is a strong indication of microbial activity.

Ammonia (as N) concentrations measured in groundwater samples collected in June 1999 are summarized in Table C.3, and presented on Figure C.3. The natural yellow color of the groundwater at SWMU 66 may have falsely elevated the detected ammonia concentrations. However, the relative difference between upgradient and plume core wells should still be valid. The background ammonia concentration measured in well MW9-2 was 6 mg/L (Figure C.3). In contrast, the ferrous iron concentrations detected in the plume core wells exhibiting the highest contaminant concentrations were 8 mg/L (MW9-7R) and 10 mg/L (MW9-8). Ammonia concentrations detected in shallow groundwater varied across the site, with elevated ammonia concentrations occurring in the

fuel hydrocarbon plume core area. Therefore, production of ammonia appears to be occurring due to increased microbial activity stimulated by the relative abundance of organic carbon (fuel hydrocarbons).

The measured ORPs of the groundwater at this site are not within the range that would be expected for the ammonia-producing conditions implied by the observed ammonia distribution. However, as described in Section C.4.1, field ORP data alone cannot be used to reliably predict the electron acceptors that may be operating at a site.

C.4.4 Ferrous Iron (Fe^{2+})

Although relatively little is known about the anaerobic metabolic pathways involving the reduction of ferric iron (Fe^{3+}), this process has been shown to be a major metabolic pathway for some microorganisms (Lovley and Phillips, 1988; Chapelle, 1993). Elevated concentrations of ferrous iron (Fe^{2+}) often are found in anaerobic, fuel-contaminated groundwater systems. Concentrations of dissolved ferrous iron once were attributed to the spontaneous and reversible reduction of ferric oxyhydroxides, which are thermodynamically unstable in the presence of organic compounds such as benzene. However, more recent studies suggest that the reduction of ferric iron cannot proceed at all without microbial mediation (Lovley and Phillips, 1988; Lovley *et al.*, 1991; Chapelle, 1993). None of the common organic compounds found in low-temperature, neutral, reducing groundwater could reduce ferric oxyhydroxides to ferrous iron under sterile laboratory conditions (Lovley *et al.*, 1991). This means the reduction of ferric iron to ferrous iron requires mediation by microorganisms with the appropriate enzymatic capabilities.

To determine if ferric iron is being used as an electron acceptor for fuel biodegradation at SWMU 66, ferrous (reduced) iron concentrations were measured at groundwater sampling locations in June 1999 (Table C.3). The background ferrous iron concentration measured in well MW9-2 was 0.22 mg/L (Figure C.4). In contrast, the ferrous iron concentrations detected in the plume core wells exhibiting the highest contaminant concentrations were 4.75 mg/L (MW9-7R) and 0.92 (MW9-8). The occurrence of elevated ferrous iron concentrations within contaminated areas indicates that ferric iron is acting as an electron acceptor at these locations.

C.4.5 Sulfate (SO^{4})

Sulfate also may be used as an electron acceptor during microbial degradation of fuel hydrocarbons under anaerobic conditions (Grbic'-Galic', 1990). Sulfate can be reduced to sulfide (H_2S) during the oxidation of the fuel hydrocarbon compounds. The presence of decreased concentrations of sulfate (and increased concentrations of sulfide) in the source area relative to background concentrations indicates that sulfate is participating in redox reactions at the site. To investigate the potential for sulfate reduction at SWMU 66, sulfate concentrations were measured during the June 1999 groundwater sampling event.

Table C.3 and Figure C.5 show the analytical results for sulfate in groundwater at SWMU 66. The background sulfate concentration measured in well MW9-2 was 15.83 mg/L. In contrast, the ferrous iron concentrations detected in the plume core wells exhibited the lowest contaminant concentrations of non-detect (MW9-7R) and 0.39 mg/L (MW9-8). In general, there is a good correlation between areas of depleted sulfate concentrations and the plume core. The decrease of sulfate within the contaminated area indicates microbial populations are using sulfate to oxidize fuel hydrocarbons at the site.

C.4.6 Dissolved Methane (CH_4)

The carbon dioxide/methane (CO_2/CH_4) redox couple also could be used to oxidize fuel hydrocarbon compounds to carbon dioxide and water once the groundwater is sufficiently reducing. To attain these reducing levels, other highly oxidizing chemical species such as oxygen, nitrate, ferric iron, and sulfate must first be reduced. This redox reaction is called methanogenesis or methane fermentation. Methanogenesis yields the least free energy to the system in comparison to other chemical species (Figure C.1). The presence of methane in groundwater at elevated concentrations relative to background concentrations is a good indicator of methane fermentation.

Dissolved methane was measured at groundwater monitoring wells sampled during the June 1999 sampling event. Tables C.3 and Figure C.6 presents the analytical data for methane. Methane concentrations detected in the contaminant source areas were elevated relative to background concentrations. Methane concentrations measured at plume core area wells were 4.84 mg/L (MW9-7R) to 2.63 mg/L (MW9-8). In contrast, the background concentration at monitoring well MW9-2 was 1.44 mg/L. The presence of elevated methane levels in groundwater at SWMU 66 strongly indicates biodegradation is occurring via methanogenesis.

The measured ORPs of the groundwater at this site are not within the range that would be expected for the methanogenic conditions implied by the observed methane distributions. However, as described in Section C.4.1, field ORP data alone cannot be used to reliably predict the electron acceptors that may be operating at a site.

C.4.7 pH

The pH of groundwater samples collected from groundwater monitoring wells in June 1999 was measured (Table C.3). The pH of a solution is the negative logarithm of the hydrogen ion concentration [H^+]. Groundwater pH values measured at the site ranged from 5.26 to 6.41 standard units (SU) with an average of 6.00 SU. This average pH is within the optimal range for fuel hydrocarbon-degrading microbes of 6 to 8 SU. The presence of acidic pH values indicates groundwater alkalinity may be sufficient to fully buffer the groundwater pH against the organic acids produced during microbial reactions.

C.5 THEORETICAL ASSIMILATIVE CAPACITY ESTIMATES

The preceding discussions have been devoted to determining if fuel hydrocarbons are biodegrading in saturated soils and groundwater at SWMU 66. Analytical data on reduced and oxidized chemical species indicate indigenous microorganisms are facilitating the oxidation of fuel hydrocarbons and the reduction of electron acceptors to generate free energy for cell maintenance and production. The question of how much contaminant mass can be biodegraded must be addressed to assess the full potential for long-term intrinsic bioremediation to minimize plume size and mass over time.

Mass balance relationships can be used to determine how much contaminant mass can be degraded by each of the redox reactions that the microorganisms might use to make free energy available for cell maintenance and production. The stoichiometric relationship between the contaminant and the electron acceptor can be used to estimate the expressed assimilative capacity of the groundwater. Once the redox reactions operating at the site have been defined, it is possible to estimate how much contaminant mass can be assimilated or oxidized by available electron acceptors.

Table C.2 presents the coupled redox reactions that represent the biodegradation of the individual fuel hydrocarbons, including the stoichiometric mass ratio of electron acceptors needed to oxidize each compound. These stoichiometric mass ratios can be used to estimate the assimilative capacity of the groundwater at SWMU 66. For oxygen, nitrate, and sulfate (which are electron acceptors), this is accomplished by first determining the initial (background) mass of each electron acceptor available in the groundwater. Data on these chemical species were collected at sampling locations upgradient from the dissolved plume. As groundwater slowly migrates into the source area, electron acceptors are brought into contact with hydrocarbon-degrading microorganisms and site contamination. The change in the electron acceptor mass from background sampling locations to sampling locations within the plume core is divided by the mass ratio from Table C.2.

For nitrogen fixation, ferric iron reduction, and methanogenesis, the electron acceptor is not measured. Instead, the metabolic byproducts (ammonia, ferrous iron, and methane) are measured. The highest observed concentration of the metabolic byproduct in the plume core wells is divided by the mass ratio from Table C.2. These numbers are summed to estimate the expressed intrinsic capacity of the groundwater to biodegrade fuel hydrocarbons (Table C.4).

On the basis of these calculations, one pore volume of saturated soil and groundwater at SWMU 66 has the capacity to oxidize an average BTEX concentration of approximately 11.96 mg/L (11,960 µg/L) (Table C.4). The maximum BTEX concentration at SWMU 66 in June 1999 was 0.49 mg/L (489.7 µg/L).

This estimate essentially represents an estimate of the fuel hydrocarbon reduction capability of one pore volume of groundwater at SWMU 66. The estimate identifies how much contaminant mass can be theoretically oxidized as one pore volume travels through the plume core. In reality, one pore volume is expected to move through the contaminated aquifer material in the source area every 7.1 years based on the estimated groundwater velocity of 45 ft/yr and a source area length of approximately 320 feet.

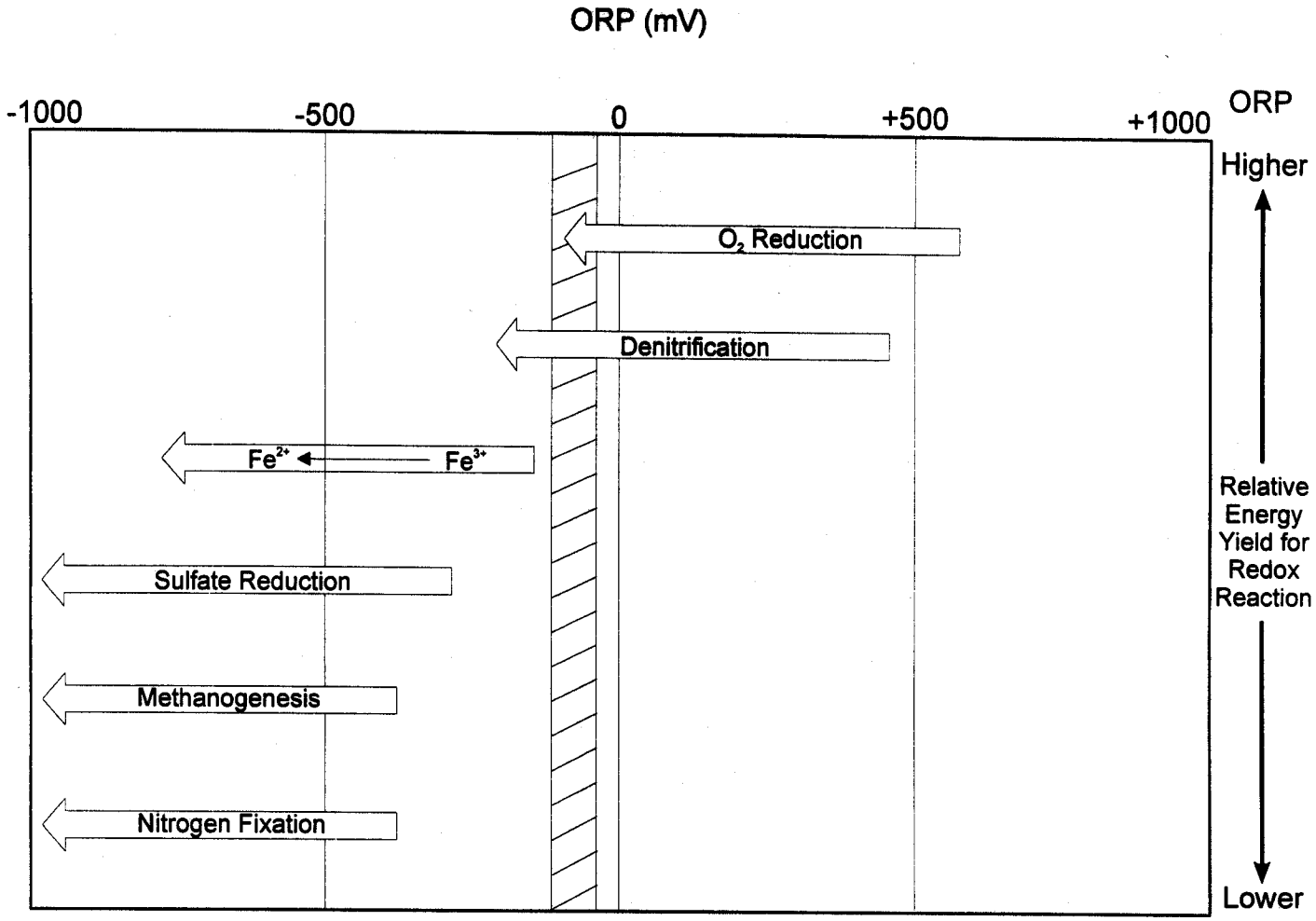
A closed system containing 2 liters of water can be used to help visualize the physical meaning of assimilative capacity. Assume that the first liter contains no fuel hydrocarbons, but it contains fuel-degrading microorganisms and has an assimilative capacity of exactly "x" mg of fuel hydrocarbons. The second liter has no assimilative capacity; however, it contains fuel hydrocarbons. As long as these 2 liters of water are kept separate, biodegradation of fuel hydrocarbons will not occur. If these 2 liters are combined in a closed system, biodegradation will commence and continue until the fuel hydrocarbons or electron acceptors are depleted. If less than "x" mg of fuel hydrocarbons are in the second liter, all of the fuel hydrocarbons will eventually degrade given a sufficient time; likewise, if greater than "x" mg of fuel hydrocarbons were in the second liter of water, only "x" mg of fuel hydrocarbons would ultimately degrade.

This example shows that in a closed system, the measured expressed assimilative capacity eventually should be equivalent to the loss in contaminant mass; however, the groundwater beneath the site is an open system. Electron acceptors can continually enter the system from upgradient flow. Furthermore, contaminant mass can be added to the system through dissolution or leaching from contaminated soils. This means that the assimilative capacity is not fixed as it would be in a closed system, and therefore should not be quantitatively compared to concentrations of dissolved contaminants in the groundwater. Rather, the expressed assimilative capacity of groundwater is intended to serve as a qualitative tool. The fate of fuel hydrocarbons in groundwater is dependent on the relationship between the kinetics of biodegradation and the solute transport velocities (Chapelle, 1994).

C.6 SUMMARY OF FINDINGS

The results of chemical fate assessment performed in this section are as follows:

1. Historical groundwater analytical data indicate BTEX concentrations in most wells since May 1998 are increasing over time;
2. Geochemical data strongly indicate that biodegradation of fuel hydrocarbons is occurring primarily through the processes of iron reduction, sulfate reduction, nitrogen fixation and methanogenesis; and
3. The expressed BTEX assimilative capacity of the aquifer (11.96 mg/L) is more than the maximum BTEX concentration detected in SWMU 66 groundwater (0.49 mg/L).



Notes

ORP = Oxidation Reduction Potential

Range of ORP measured at SWMU 66

1. These reactions would be expected to occur in sequence if the system is moving toward equilibrium.

2. These redox processes occur in order of their energy-yielding potential (provided microorganisms are available to mediate a specific reaction). Reduction of a highly oxidized species decreases the ORP of the system.

3. The ORP of the system determines which electron acceptors are available for organic carbon oxidation.

4. Redox reaction sequence is paralleled by an ecological succession of biological mediators.

Adapted from Stumm and Morgan, 1981.

FIGURE C.1

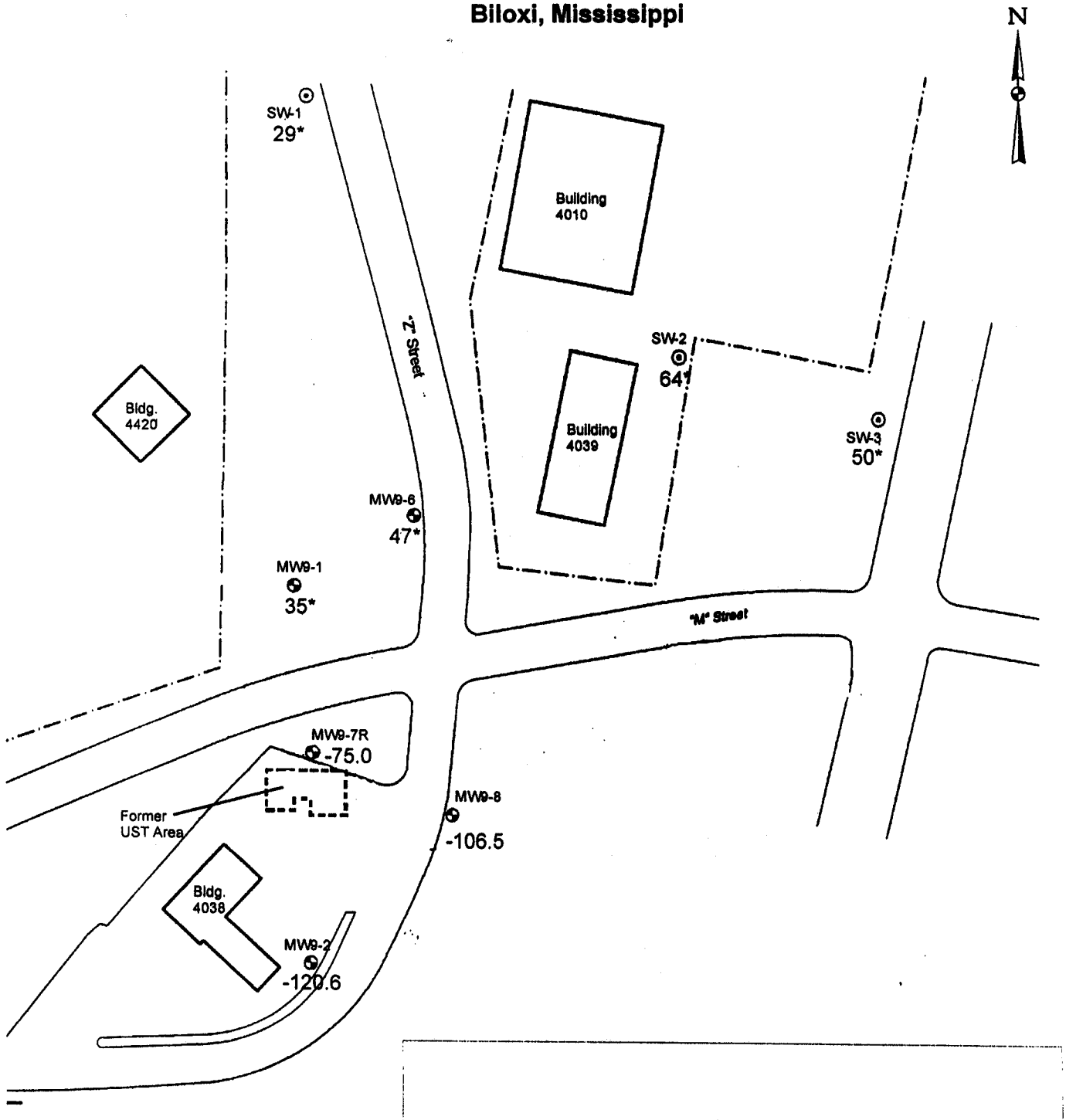
SEQUENCE OF MICROBIALLY MEDIATED REDOX PROCESSES

Risk-Based Approach to Remediation
SWMU 66
Keesler AFB, Mississippi

PARSONS ENGINEERING SCIENCE, INC.
Atlanta, Georgia

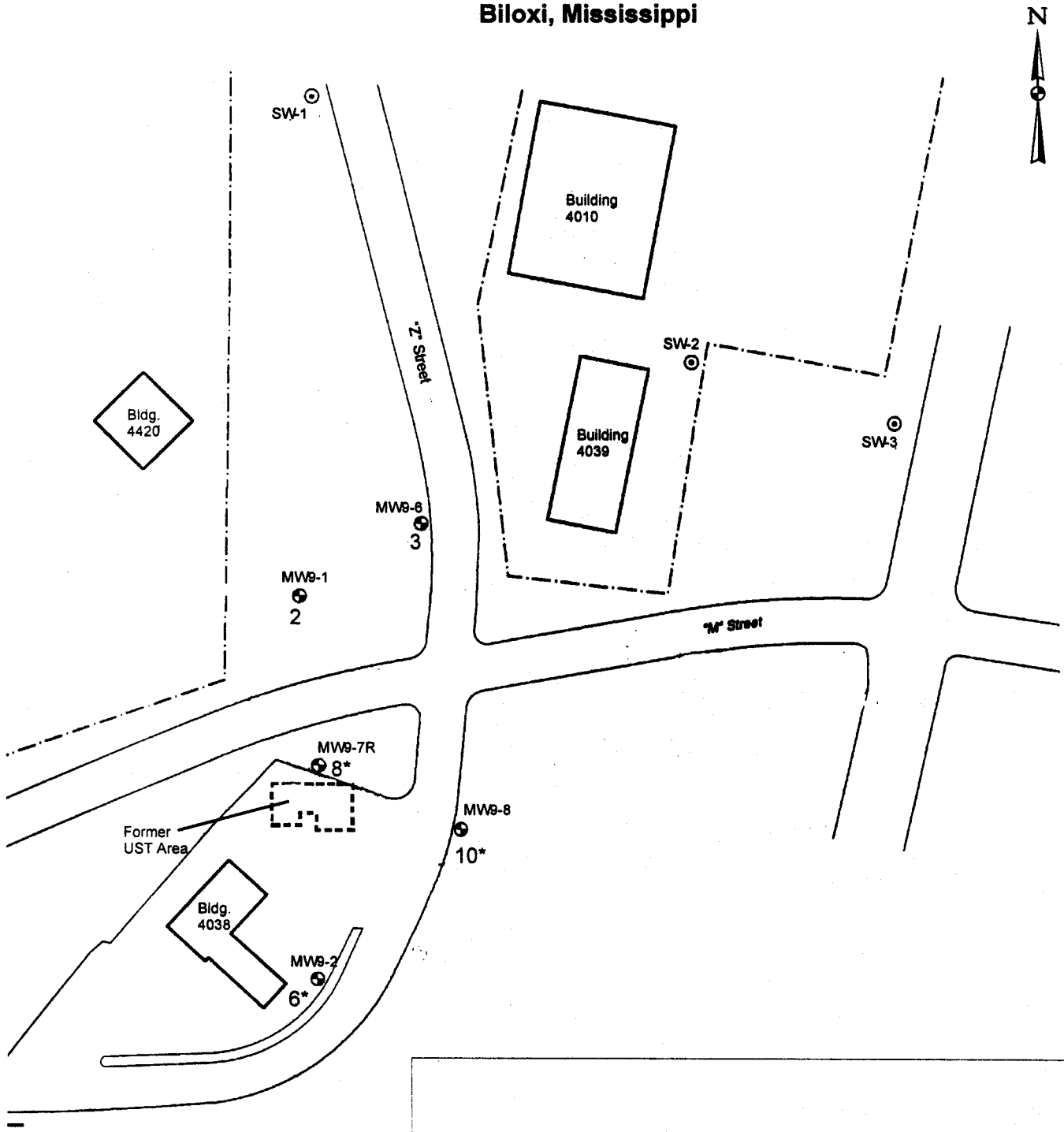
J:\735524\Redx-seq.cdr

Figure C.2
Distribution of Oxidation Reduction Potential in Groundwater
SWMU 66
Keesler AFB
Biloxi, Mississippi



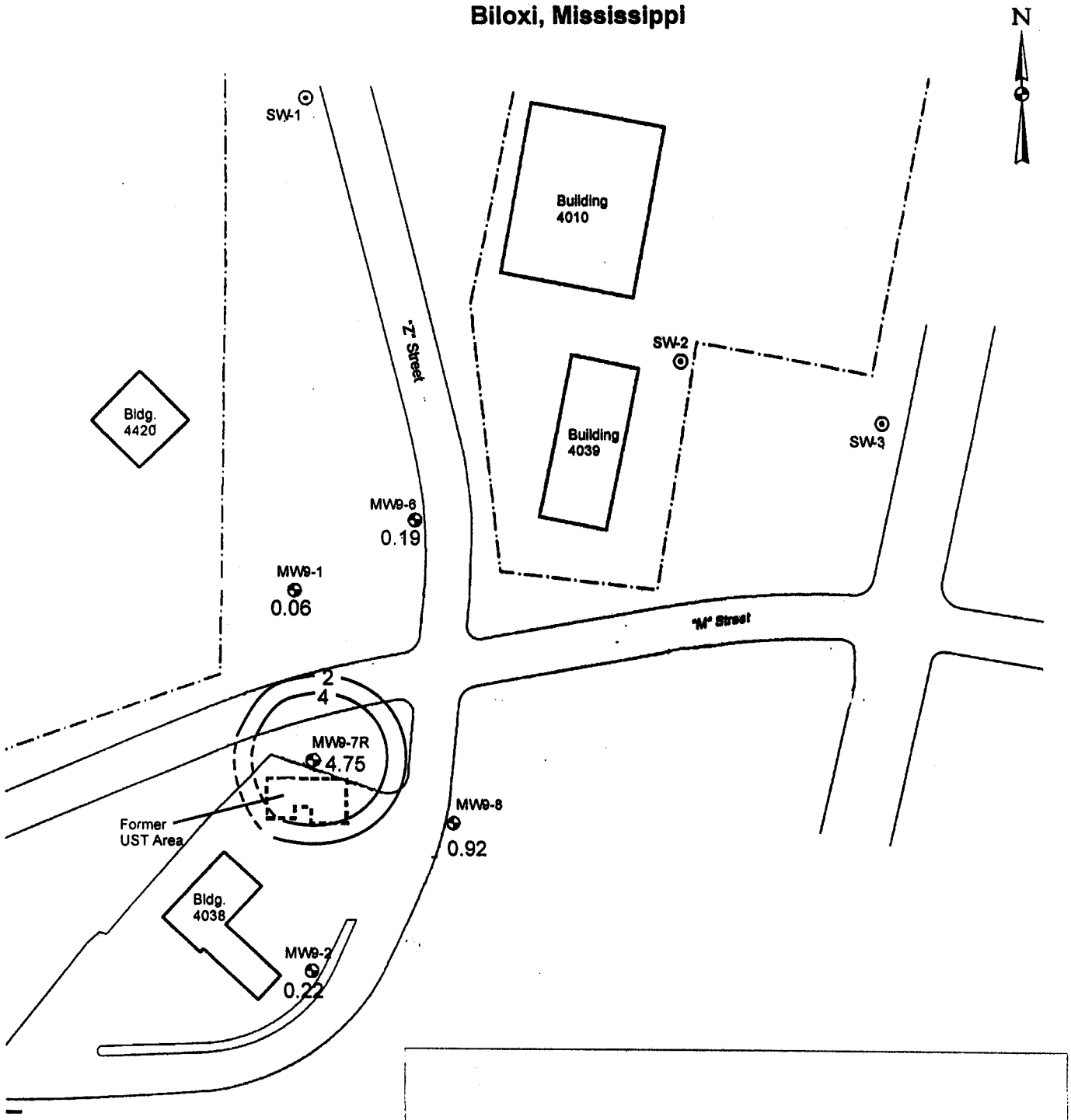
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Figure C.3
Distribution of Ammonia-N in Groundwater
SWMU 66
Keesler AFB
Biloxi, Mississippi



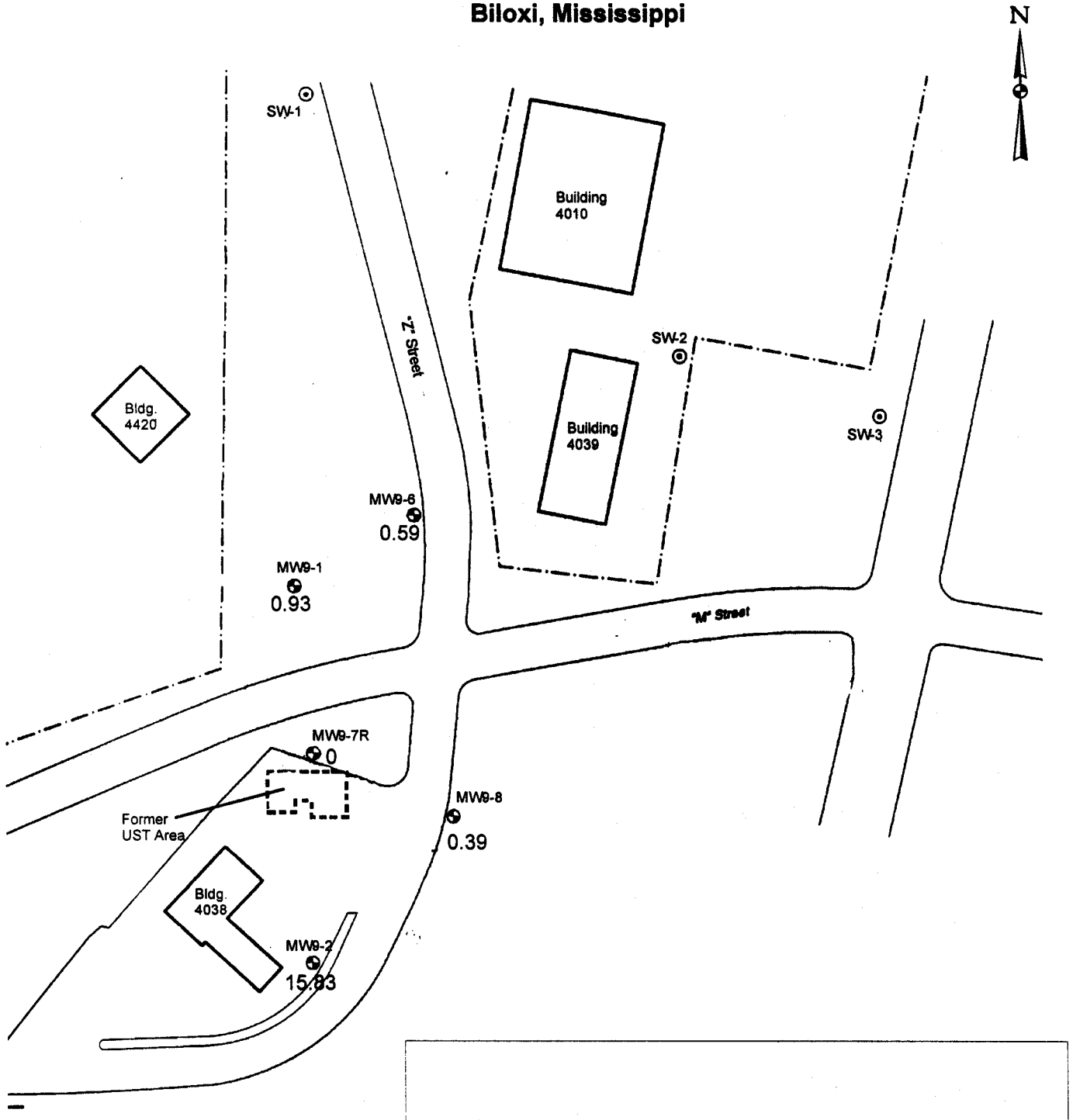
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Figure C.4
Distribution of Ferrous Iron in Groundwater
SWMU 66
Keesler AFB
Biloxi, Mississippi



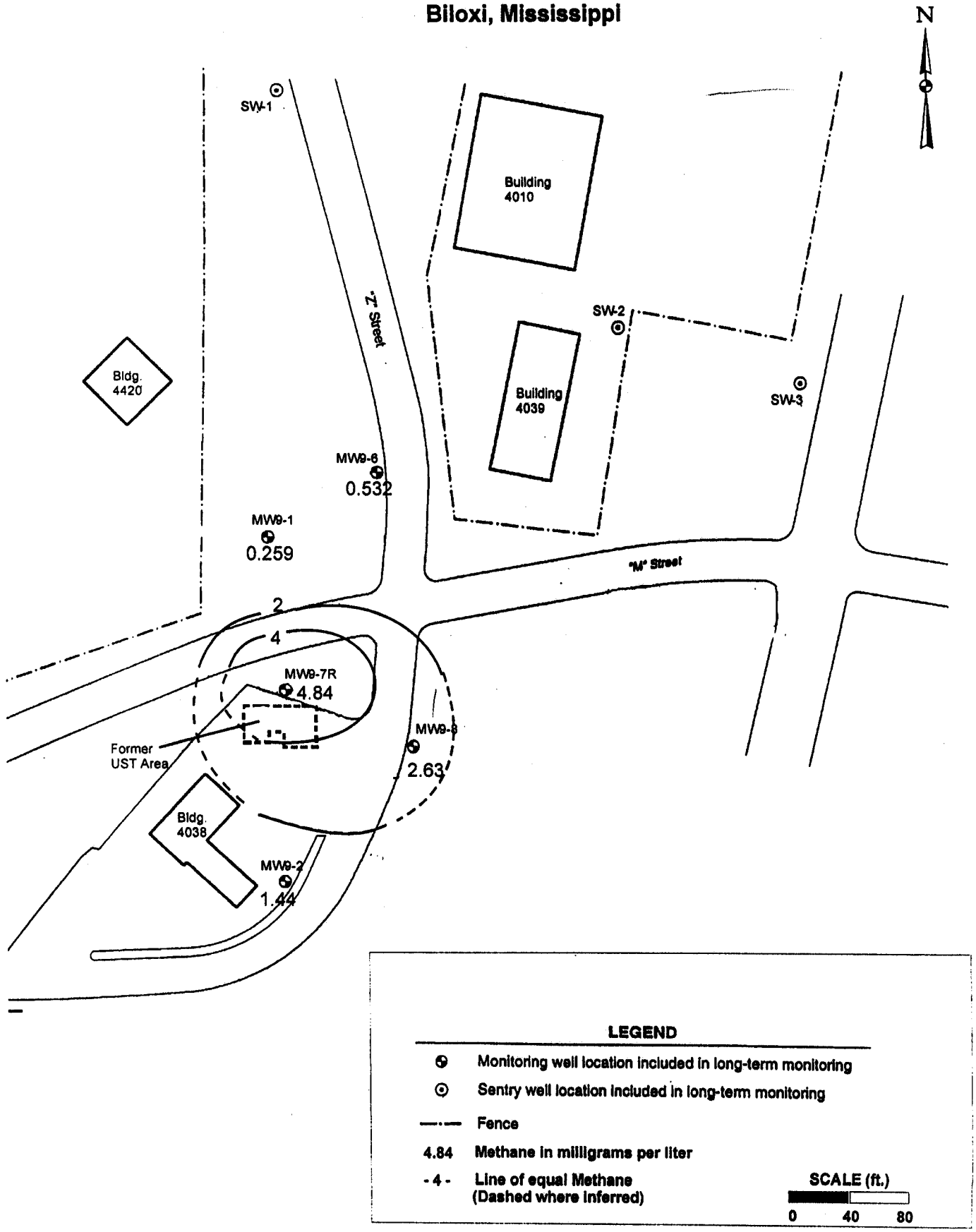
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Figure C.5
Distribution of Sulfate in Groundwater
SWMU 66
Keesler AFB
Biloxi, Mississippi



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Figure C.6
Distribution of Methane in Groundwater
SWMU 66
Keesler AFB
Biloxi, Mississippi



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TABLE C.1
HISTORICAL COMPARISON OF GROUNDWATER ANALYTICAL RESULTS
SWMU 66
Keesler AFB
Biloxi, Mississippi

Location:	MW9-1				MW9-2				MW9-6			
Sample Date:	14-May-98	20-Aug-98	19-Nov-98	22-Jun-99	14-May-98	20-Aug-98	19-Nov-98	23-Jun-99	14-May-98	20-Aug-98	19-Nov-98	22-Jun-99
Benzene	ND	ND	ND	< 1.0	ND	ND	ND	< 1.0	**195**	**20**	**10**	< 1.0
Toluene	ND	ND	**1.3**	**2.9**	ND	ND	ND	< 1.0	**1.6**	**2**	**2**	< 1.0
Ethylbenzene	ND	ND	ND	< 1.0	ND	ND	ND	< 1.0	**5.4**	**22**	**6**	< 1.0
Xylenes	ND	ND	ND	**4.9**	ND	ND	ND	< 1.0	**5.9**	**6**	**3**	< 1.0
Total BTEX	ND	ND	ND	**7.8**	ND	ND	ND	<4.0	**207.9**	**50**	**21**	<4.0
Methyl-t-butylether (MTBE)	ND	ND	ND	< 1.0	ND	**2**	ND	< 1.0	**10.7**	**9**	**3**	< 1.0

Location:	MW9-7R				MW9-8				SW-1			
Sample Date:	14-May-98	20-Aug-98	19-Nov-98	23-Jun-99	14-May-98	20-Aug-98	19-Nov-98	23-Jun-99	14-May-98	20-Aug-98	18-Nov-98	22-Jun-99
		9-7		9-7R								
Benzene	NM	NM	NM	**44.5**	ND	**4**	ND	**232**	ND	ND	ND	< 1.0
Toluene	NM	NM	NM	**47.7**	ND	**1**	ND	**41.0**	ND	ND	**1.6**	< 1.0
Ethylbenzene	NM	NM	NM	**24.6**	ND	ND	ND	**7.7**	ND	ND	ND	< 1.0
Xylenes	NM	NM	NM	**154**	ND	**5**	ND	**209.0**	ND	ND	ND	< 1.0
Total BTEX	NM	NM	NM	**270.8**	ND	**10**	ND	**489.7**	ND	ND	**1.6**	<4.0
Methyl-t-butylether (MTBE)	NM	NM	NM	**1.6**	**5.9**	**8**	ND	< 1.0	ND	ND	ND	< 1.0

Location:	SW-2				SW-3			
Sample Date:	14-May-98	20-Aug-98	18-Nov-98	22-Jun-99	14-May-98	21-Aug-98	18-Nov-98	22-Jun-99
Benzene	ND	ND	ND	< 1.0	NM	ND	ND	< 1.0
Toluene	ND	ND	**1.4**	< 1.0	NM	ND	**1.4**	< 1.0
Ethylbenzene	ND	ND	ND	< 1.0	NM	ND	ND	< 1.0
Xylenes	ND	ND	ND	< 1.0	NM	ND	ND	< 1.0
Total BTEX	ND	ND	**1.4**	<4.0	NM	ND	**1.4**	<4.0
Methyl-t-butylether (MTBE)	ND	ND	ND	< 1.0	NM	ND	ND	< 1.0

1998 data from LTM Report SWMU 66 (January 1998)
Bolded results indicate detected compounds.
Results are in µg/L.
ND = Not Detected
NM = Not Measured

TABLE C.2
COUPLED OXIDATION REACTIONS FOR BTEX COMPOUNDS
SWMU 66
Keesler AFB,
Biloxi, Mississippi

Coupled Benzene Oxidation Reactions	Stoichiometric Mass Ratio of Electron Acceptor/Byproduct to Compound
$7.5O_2 + C_6H_6 \Rightarrow 6CO_{2,g} + 3H_2O$ *Benzene oxidation /aerobic respiration*	3.07:1
$6NO_3^- + 6H^+ + C_6H_6 \Rightarrow 6CO_{2,g} + 6H_2O + 3N_{2,g}$ *Benzene oxidation / denitrification*	4.77:1
$3.75\,NO_3^- + C_6H_6 + 7.5\,H^+ + 0.75\,H_2O \Rightarrow 6\,CO_2 + 3.75\,NH_4^+$ *Benzene oxidation / nitrate reduction*	2.98:1
$60H^+ + 30Fe(OH)_{3,s} + C_6H_6 \Rightarrow 6CO_2 + 30Fe^{2+} + 78H_2O$ *Benzene oxidation / iron reduction*	21.5:1
$7.5H^+ + 3.75SO_4^{2-} + C_6H_6 \Rightarrow 6CO_{2,g} + 3.75H_2S^o + 3H_2O$ *Benzene oxidation / sulfate reduction*	4.61:1
$5\,N_2 + C_6H_6 + 10\,H^+ + 12\,H_2O \Rightarrow 6\,CO_2 + 10\,NH_4^+$ *Benzene oxidation / nitrogen fixation*	2.31:1
$4.5H_2O + C_6H_6 \Rightarrow 2.25\,CO_{2,g} + 3.75\,CH_4$ *Benzene oxidation / methanogenesis*	0.77:1

Coupled Toluene Oxidation Reactions	Stoichiometric Mass Ratio of Electron Acceptor/Byproduct to Compound
$9O_2 + C_6H_5CH_3 \Rightarrow 7CO_{2,g} + 4H_2O$ *Toluene oxidation /aerobic respiration*	3.13:1
$7.2NO_3^- + 7.2H^+ + C_6H_5CH_3 \Rightarrow 7CO_{2,g} + 7.6H_2O + 3.6N_{2,g}$ *Toluene oxidation / denitrification*	4.85:1
$4.5NO_3^- + 9H^+ + 0.5H_2O + C_6H_5CH_3 \Rightarrow 7CO_2 + 4.5NH_4^+$ *Toluene oxidation / nitrate reduction*	3.03:1
$72H^+ + 36Fe(OH)_{3,s} + C_6H_5CH_3 \Rightarrow 7CO_2 + 36Fe^{2+} + 94H_2O$ *Toluene oxidation / iron reduction*	21.86:1
$9H^+ + 4.5SO_4^{2-} + C_6H_5CH_3 \Rightarrow 7CO_{2,g} + 4.5H_2S^o + 4H_2O$ *Toluene oxidation / sulfate reduction*	4.7:1
$6\,N_2 + C_6H_5CH_3 + 12\,H^+ + 14\,H_2O \Rightarrow 7\,CO_2 + 12\,NH_4^+$ *Toluene oxidation / nitrogen fixation*	2.35:1
$5H_2O + C_6H_5CH_3 \Rightarrow 2.5CO_{2,g} + 4.5CH_4$ *Toluene oxidation / methanogenesis*	0.78:1

TABLE C.2 (CONTINUED)
COUPLED OXIDATION REACTIONS FOR BTEX COMPOUNDS
SWMU 66
Keesler AFB,
Biloxi, Mississippi

Coupled Ethylbenzene Oxidation reactions	Stoichiometric Mass Ratio of Electron Acceptor/Byproduct to Compound
$10.5O_2 + C_6H_5C_2H_5 \Rightarrow 8CO_{2,g} + 5H_2O$ *Ethylbenzene oxidation /aerobic respiration*	3.17:1
$8.4NO_3^- + 8.4H^+ + C_6H_5C_2H_5 \Rightarrow 8CO_{2,g} + 9.2H_2O + 4.2N_{2,g}$ *Ethylbenzene oxidation / denitrification*	4.92:1
$5.25NO_3^- + 10.5H^+ + 0.25H_2O + C_6H_5C_2H_5 \Rightarrow 8CO_2 + 5.25NH_4^+$ *Ethylbenzene oxidation / nitrate reduction*	3.07:1
$84H^+ + 42\underline{Fe(OH)_{3,a}} + C_6H_5C_2H_5 \Rightarrow 8CO_2 + 42Fe^{2+} + 110H_2O$ *Ethylbenzene oxidation / iron reduction*	22:1
$10.5H^+ + 5.25SO_4^{2-} + C_6H_5C_2H_5 \Rightarrow 8CO_{2,g} + 5.25H_2S^* + 5H_2O$ *Ethylbenzene oxidation / sulfate reduction*	4.75:1
$7N_2 + C_6H_5C_2H_5 + 14H^+ + 16H_2O \Rightarrow 8CO_2 + 14NH_4^+$ *Ethylbenzene oxidation / nitrogen fixation*	2.38:1
$5.5H_2O + C_6H_5C_2H_5 \Rightarrow 2.75CO_{2,g} + 5.25CH_4$ *Ethylbenzene oxidation / methanogenesis*	0.79:1

Coupled m-Xylene Oxidation Reactions	Stoichiometric Mass Ratio of Electron Acceptor/Byproduct to Compound
$10.5O_2 + C_6H_4(CH_3)_2 \Rightarrow 8CO_{2,g} + 5H_2O$ *m-Xylene oxidation /aerobic respiration*	3.17:1
$8.4NO_3^- + 8.4H^+ + C_6H_4(CH_3)_2 \Rightarrow 8CO_{2,g} + 9.2H_2O + 4.2N_{2,g}$ *m-Xylene oxidation / denitrification*	4.92:1
$5.25NO_3^- + 10.5H^+ + 0.25H_2O + C_6H_4(CH_3)_2 \Rightarrow 8CO_2 + 5.25NH_4^+$ *m-Xylene oxidation / nitrate reduction*	3.07:1
$84H^+ + 42\underline{Fe(OH)_{3,a}} + C_6H_4(CH_3)_2 \Rightarrow 8CO_2 + 42Fe^{2+} + 110H_2O$ *m-Xylene oxidation / iron reduction*	22:1
$10.5H^+ + 5.25SO_4^{2-} + C_6H_4(CH_3)_2 \Rightarrow 8CO_{2,g} + 5.25H_2S^* + 5H_2O$ *m-Xylene oxidation / sulfate reduction*	4.75:1
$7N_2 + C_6H_4(CH_3)_2 + 14H^+ + 16H_2O \Rightarrow 8CO_2 + 14NH_4^+$ *m-Xylene oxidation / nitrogen fixation*	2.38:1
$5.5H_2O + C_6H_4(CH_3)_2 \Rightarrow 2.75CO_{2,g} + 5.25CH_4$ *m-Xylene oxidation / methanogenesis*	0.79:1

TABLE C.3
SUMMARY OF GROUNDWATER GEOCHEMICAL DATA
SWMU 66
Keesler AFB
Biloxi, Mississippi

Analyte	Units	MW9-1 22-Jun-99	MW9-2 23-Jun-99	MW9-6 22-Jun-99	MW9-7R 23-Jun-99	MW9-8 23-Jun-99	SW-1 22-Jun-99	SW-2 22-Jun-99	SW-3 22-Jun-99
Ferrous Iron	mg/L	0.06	0.22	0.19	4.75	0.92	NS	NS	NS
Sulfate	mg/L	0.93	15.83	0.59	0.00	0.39	NS	NS	NS
Ammonia-N	mg/L	2**	6**	3**	8**	10**	NS	NS	NS
Methane	mg/L	0.259	1.44	0.532	4.84	2.63	NS	NS	NS
Temperature	Deg C	24.4	27.9	25.1	25.5	25.2	25.2	29.3	26.2
pH	SU	6.19	6.06	5.96	6.03	5.26	6.41	5.95	6.10
Conductivity	µS/cm	328	546	367	429	271	367	244	414
Dissolved Oxygen	mg/L	0.03	0.02	0.01	0.01	0.01	0.47	0.08	0.01
ORP	mV	35*	-120.6	47*	-75.0	-106.5	29*	64*	50*

Methane analysis performed by Specialized Assays, Inc of Nashville, TN; all other analyses performed in the field

U = The analyte was analyzed for and is not present above the reporting limit

ORP = oxidation reduction potential

mg/L = milligrams per Liter µS/cm = microsiemen per centimeter

Deg C = degrees Celcius mV = millivolt

SU = Standard Units

* = ORP meter was working incorrectly. New meter received on June 23, 1999.

** = Initial yellow tint of sample could cause an elevated reading.

NS = Not sampled.

R = Replacement well

TABLE C.4
ESTIMATED ASSIMILATIVE CAPACITY OF
SATURATED SOIL AND GROUNDWATER
SWMU 66
Keesler AFB
Biloxi, Mississippi

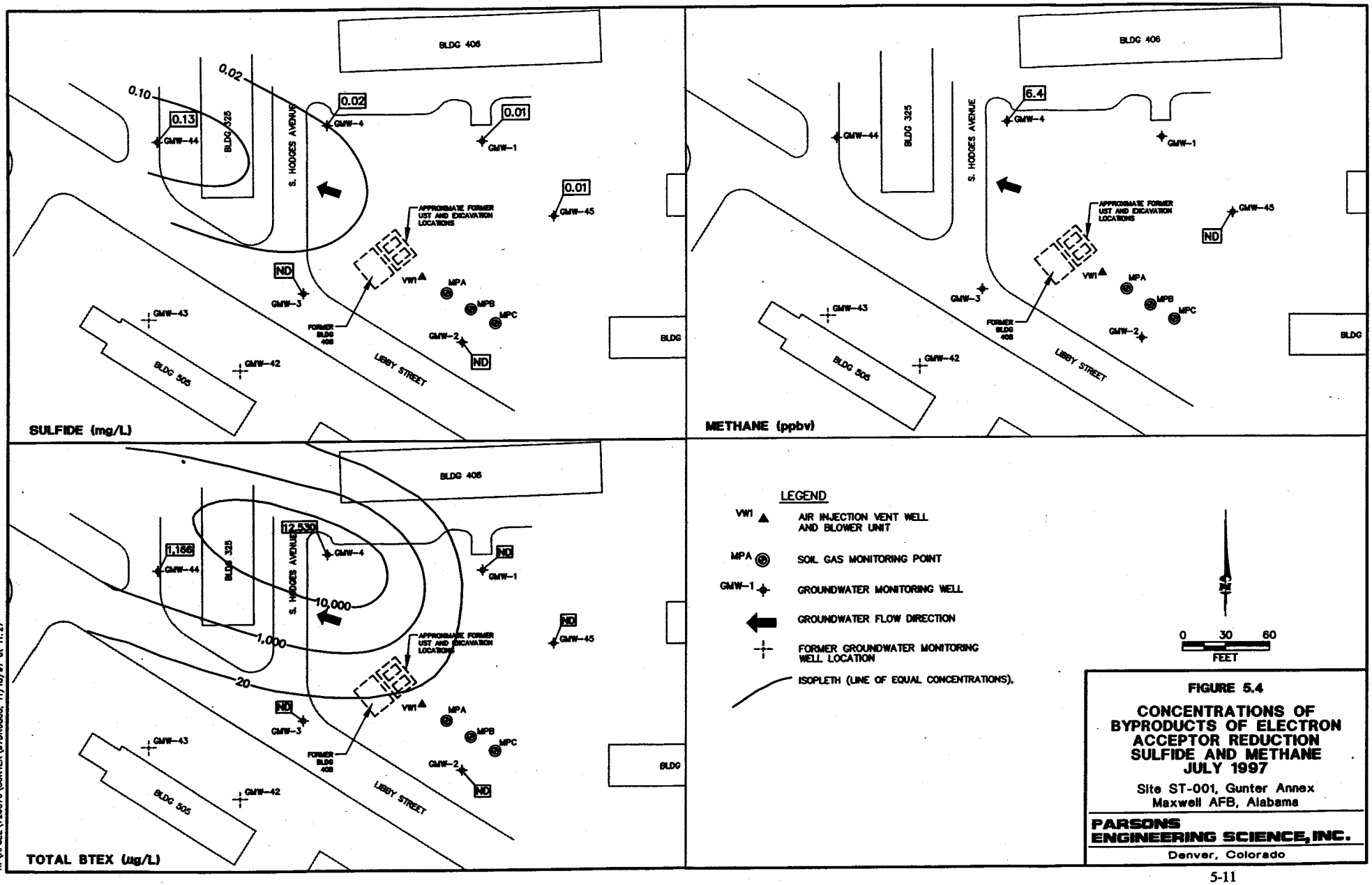
Electron Acceptor or Metabolic Bypoduct	Background Concentration (mg/L)[b/]	Concentration in Core of Plume (mg/L)	BTEX Assimilative Capacity[a/] (mg/L)	Benzene Assimilative Capacity[a/] (mg/L)	Toluene Assimilative Capacity[a/] (mg/L)	Ethylbenzene Assimilative Capacity[a/] (mg/L)	Xylenes Assimilative Capacity[a/] (mg/L)
Oxygen	NA[c/]	NA	NA	NA	NA	NA	NA
Ferrous Iron	NA	4.75	0.22	0.22	0.22	0.22	0.22
Sulfate	15.83	0.00	3.37	3.43	3.37	3.33	3.33
Ammonia[d/]	7.74	12.90	2.19	2.23	2.20	2.17	2.17
Methane	NA	4.84	6.19	6.29	6.21	6.13	6.13
Total			11.96	12.17	11.99	11.84	11.84
Max. 1999 Concentration			0.49				

[a/] Calculation based on the ratio of the total mass of electron acceptor required to oxidize a given mass of the BTEX constituent

[b/] mg/L = milligrams per liter

[c/] NA = not applicable

[d/] Concentration of ammonia = concentration of ammonia reported as N x 1.29 to convert to ammonia as NH_4



K:\AFCEE\726876\GUNTER\97DN0805, 11/18/97 at 11:27

FIGURE 5.4

CONCENTRATIONS OF BYPRODUCTS OF ELECTRON ACCEPTOR REDUCTION SULFIDE AND METHANE JULY 1997

Site ST-001, Gunter Annex
Maxwell AFB, Alabama

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

(0.0064 mg/L). The presence of methane in this groundwater sample indicates that methanogenesis is occurring in the center of the plume where redox conditions can be expected to be the most reducing. The mass of reactive organic material present in the saturated soil and groundwater is potentially sufficient to reduce the oxidizing capacity to levels required for methanogenesis. However, the low magnitude of the detected methane concentration indicates that methanogenesis does not contribute significantly to the BTEX/naphthalene assimilative capacity of the groundwater.

5.4.7 Reduction/Oxidation Potential

Redox potential is a measure of the relative tendency of a solution to accept or transfer electrons. The redox potential of a groundwater system depends on which electron acceptors are being reduced by microbes during BTEX oxidation. The redox potentials measured at Site ST-001 ranges from 37 millivolts (mV) at GMW-4 to 177 mV at GMW-1. These redox potentials are within the range in which reduction of oxygen, nitrate, and manganese occurs (Stumm and Morgan, 1981). Although the redox potentials measured at the existing wells are outside the range for sulfate, ferric iron hydroxide, and carbon dioxide reduction, reduced forms of these compounds measured in downgradient groundwater samples indicates that reduction of these compounds has occurred in the center of the plume where redox conditions are expected to be the most reducing. Many authors have noted that measured redox data alone cannot be used to reliably predict the biodegradation that may be operating at a site (e.g. Stumm and Morgan, 1981; Godsey, 1994; Lovley *et al.*, 1994). This is because the platinum electrode probes are not sensitive to some redox couples (e.g., the sulfate/sulfide redox couple). Redox potential data for the site are summarized in Table 5.1 and shown on Figure 5.1. As expected, areas with lower redox potentials appear to coincide with areas of high BTEX contamination; low DO, sulfate, and nitrate concentrations; and elevated manganese and ferrous iron concentrations.

5.5 EXPRESSED ASSIMILATIVE CAPACITY

The data presented in the preceding subsections suggest that degradation of dissolved BTEX and naphthalene is occurring primarily through the microbially mediated processes of aerobic biodegradation and anaerobic denitrification and sulfate reduction. On the basis of the stoichiometry, the total expressed assimilative capacity of the groundwater resulting from oxygen and sulfate reduction and denitrification is 5,920 µg/L for dissolved BTEX and 6,240 µg/L for dissolved naphthalene (Table 5.2). The additional assimilative capacities resulting from manganese, ferric iron, and carbon dioxide reduction were excluded from these estimates because these processes appear to be less significant degradation mechanisms. In addition, the assimilative capacity calculations may be conservative because they do not account for microbial cell mass production. The highest dissolved BTEX concentration measured at the site in 1998 was 8,500 µg/L and the maximum naphthalene concentration measured in 1997 was 624 µg/L.

The geochemical data indicate that the groundwater has sufficient assimilative capacity to support substantial biodegradation of dissolved BTEX and naphthalene and to limit plume migration. This observation is supported by the fact that the site is an open system and that upgradient groundwater will continue to flow through the site and

TABLE 5.2
ESTIMATE OF ASSIMILATIVE CAPACITY OF SATURATED SOIL AND GROUNDWATER
SITE ST-001, GUNTER ANNEX
MAXWELL AFB, ALABAMA

Electron Acceptor	Background Concentration (µg/L)[b/]	BTEX Assimilative Capacity[a/] (µg/L)	Naphthalene Assimilative Capacity[a/] (µg/L)
Oxygen	7500	2,340	2,400
Nitrate	15,400	3,040	3,270
Sulfate	2,760	540	570
Total		5,920	6,240
Maximum 1997 Concentration		12,530	624

[a/] Calculations based on the ratio of total mass of electron acceptors required to oxidize a given mass of contaminant.

[b/] µg/L = micrograms per liter.

replenish electron acceptor concentrations to sustain biodegradation of the dissolved plume. Ultimately, the fate of dissolved petroleum hydrocarbons in groundwater and the potential impact on receptors are dependent on the relationship between the kinetics of biodegradation and the solute transport velocity (Vroblesky and Chapelle, 1994). Although the expressed assimilative capacity is a strong indicator that biodegradation is occurring, it is not a confirmation that biodegradation will proceed to completion before potential downgradient receptors are impacted.

A closed system with 2 liters of water can be used to help visualize the physical meaning of assimilative capacity. Assume that the first liter contains no fuel hydrocarbons, but it contains fuel-degrading microorganisms and has an assimilative capacity of exactly "x" μg of fuel hydrocarbons. The second liter has no assimilative capacity; however, it contains fuel hydrocarbons. As long as these 2 liters of water are kept separate, biodegradation of the fuel hydrocarbons will not occur. If these 2 liters are combined in a closed system, biodegradation will commence and continue until the fuel hydrocarbons are depleted, the electron acceptors are depleted, or the environment becomes acutely toxic to the fuel-degrading microorganisms. Assuming a nonlethal environment, if fewer than "x" μg of fuel hydrocarbons were in the second liter, all of the fuel hydrocarbons will eventually degrade given a sufficient time; likewise, if greater than "x" μg of fuel hydrocarbons were in the second liter of water, only "x" μg of fuel hydrocarbons would ultimately degrade. The groundwater beneath Site ST-001 is an open system that continually receives additional electron receptors from flow through the aquifer and infiltration of precipitation. This means that the assimilative capacity is not fixed as it is in a closed system, and therefore cannot be compared directly to contaminant concentration in the groundwater. Rather, the expressed assimilative capacity of groundwater is intended to serve as a qualitative tool. The fate of BTEX in groundwater and the potential impact on receptors are dependent on the relationship between the kinetics of biodegradation and the solute transport velocity (Vroblesky and Chapelle, 1994). The significant expressed assimilative capacity (Table 5.2) is a strong indicator that biodegradation is occurring at Site ST-001.

SECTION 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

Twenty-two months of bioventing treatment of vadose-zone soils at Site ST-001 successfully reduced the concentrations of BTEX and PAH compounds to concentrations below the ARBCA RBSLs. Residual hydrocarbons were only detected in laboratory soil samples collected from depths below 22 feet bgs, and only at low concentrations that no longer pose a threat to receptors through leaching to groundwater or volatilization into future onsite buildings or offsite structures. In addition, the presence of high concentrations of soil gas oxygen indicate that subsurface conditions are favorable for continued natural attenuation of the remaining hydrocarbons in the vadose zone.

Dissolved BTEX, PAHs, and lead in the groundwater at Site ST-001 do not and will not present a significant health or environmental risk. All target compounds detected in the confirmation groundwater samples and samples collected in 1998 were below RBSLs for inhalation of emissions by a resident child. *Because the surficial aquifer beneath Gunter Annex is not used as a potable water source, and there are no seeps or other groundwater discharge points in the vicinity of the site, dissolved hydrocarbons in the groundwater do not pose a risk to human health or to ecological receptors through ingestion or direct contact. The depth (greater than 17 feet bgs) of residual soil contamination exceeding ISLs eliminates the direct contact exposure scenario.* Although limited BTEX plume migration may occur, historical groundwater data show an overall decreasing trend for dissolved BTEX concentrations in the ST-001 source area (Table 4.4), and natural hydrodynamic and chemical attenuation processes should continue to reduce dissolved BTEX and PAH concentrations.

6.2 RECOMMENDATIONS

The confirmatory soil and groundwater sampling results presented in Sections 4.1 and 4.2 support an Air Force no-further-response-action-planned (NFRAP) decision for soil and groundwater contaminated by gasoline and diesel fuel in the immediate vicinity and downgradient from the former USTs, pursuant to closure of Site ST-001. Based on the site closure soil and groundwater sample analytical results summarized in Tables 4.1, 4.3 and 4.4, site closure with no further remedial action at the Site ST-001 is recommended. Concentrations of lead and all BTEX and PAH compounds are below their respective RBSLs, and remaining fuel hydrocarbons in the soils and groundwater do not and will not present a significant risk to human health and/or the environment at or downgradient form the site.

ADEM has made the determination that no further subsurface investigative or subsurface corrective actions will be required for Site ST-001 (ADEM, 1999). The bioventing system has been dismantled and removed from the site, and the VW and MPs have been properly abandoned by a base contractor.

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APPENDIX A
CONFIRMATION SAMPLING AND ANALYSIS PLAN

DRAFT FINAL

Confirmation Sampling and Analysis Plan for Site ST-001, Former Building 408, Gunter Annex



Maxwell Air Force Base
Alabama

Prepared For

Air Force Center for Environmental Excellence
Brooks Air Force Base, Texas

and

42 CES/CEVR
Maxwell Air Force Base, Alabama

May 1997

PARSONS
PARSONS ENGINEERING SCIENCE, INC.
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DRAFT FINAL

CONFIRMATION SAMPLING AND ANALYSIS PLAN FOR SITE ST-001, FORMER BUILDING 408, GUNTER ANNEX

MAXWELL AIR FORCE BASE MONTGOMERY, ALABAMA

Prepared for:

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ACRONYMS AND ABBREVIATIONS

°C	degrees centigrade
µg/L	micrograms per liter
ADEM	Alabama Department of Environmental Management
ACL	alternative corrective action limit
AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
ASTM	American Society for Testing and Materials
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAL	corrective action limit
CES/CEVR	Civil Engineering Squadron, Environmental Group
COPC	chemical of primary concern
DO	dissolved oxygen
DOT	US Department of Transportation
ft/ft	foot per foot
ID	inside diameter
mg/kg	milligrams per kilogram
MP	monitoring point
NFRAP	No Further Response Action Planned
PAH	polynuclear aromatic hydrocarbon
Parsons ES	Parsons Engineering Science, Inc.
PID	photoionization detector
QC	quality control
RBCA	risk-based corrective action
RBSL	risk-based screening level
redox	reduction oxidation
SAP	Sampling and Analysis Plan
SSL	soil screening level
TRPH	total recoverable petroleum hydrocarbons
TVH	total volatile hydrocarbons
TVHA	total volatile hydrocarbon analyzer
USACE	US Army Corps of Engineers
USCS	Unified Soil Classification System
USEPA	US Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compound
VW	vent well

SECTION 1

INTRODUCTION

This confirmation sampling and analysis plan (SAP) for former Building 408, Site ST-001, at the Gunter Annex, Maxwell Air Force Base (AFB), Alabama has been prepared by Parsons Engineering Science, Inc. (Parsons ES) for submittal to the Alabama Department of Environmental Management (ADEM); the US Air Force Center for Environmental Excellence (AFCEE), Brooks AFB, Texas; and 42 Civil Engineering Squadron, Environmental Group (CES/CEVR), Maxwell AFB, Alabama. ADEM provides oversight of underground storage tank (UST) work at Gunter Annex. The SAP is intended to guide soil and groundwater sampling at Site ST-001 to document the effectiveness of remediation of petroleum-hydrocarbon-contaminated soils and to provide data for a risk-based assessment of contaminants remaining in site soils and groundwater. Site ST-001 is the location of a release of diesel fuel and/or gasoline from two former USTs and their associated product piping.

In 1994, Site ST-001 was selected as a pilot test site for the AFCEE Extended Bioventing Program. This ongoing program involves more than 50 *in situ* bioventing sites at 32 military installations nationwide and provides funding for pilot- and full-scale bioventing system installation, extended operation of installed bioventing systems, and completion of confirmatory soil sampling and site closure documents, if extended bioventing testing results indicate adequate site remediation has been achieved.

The pilot-scale bioventing system was installed and initial pilot testing was performed in September 1995 (Parsons ES, 1995). Following initial testing, the bioventing system was optimized, and system operation continued for 1 year. One-year testing was performed in October 1996. The purpose of the pilot test at Site ST-001 was to evaluate the effectiveness of bioventing in remediating unsaturated soils contaminated with petroleum hydrocarbons thought to have resulted from diesel fuel and/or gasoline released from the former USTs. Based on the results of the extended bioventing test, *in situ* bioventing appears to have reduced petroleum hydrocarbon contamination in site soils sufficiently to meet current ADEM (1995) corrective action limits (CALs) for total recoverable petroleum hydrocarbon (TRPH) concentrations; however, ADEM is currently in the process of finalizing new risk-based corrective action (RBCA) requirements for petroleum release sites.

The objective of the confirmation soil and groundwater sampling is to document the effectiveness of soil remediation at Site ST-001 and to demonstrate compliance with anticipated ADEM RBCA requirements for closure. The proposed confirmation sampling described in Section 4 targets vadose zone soils and groundwater in the vicinity of the former USTs, as well as impacted groundwater downgradient from the

site. Soil and groundwater data will be used to prepare a streamlined risk-based assessment of residual site contamination, and groundwater data also will be used to evaluate the rate of natural chemical attenuation occurring in groundwater. The groundwater and soil sampling effort is being performed as part of the AFCEE Extended Bioventing project. It is anticipated that analytical results will support an Air Force no-further-response-action-planned (NFRAP) recommendation, and that ADEM will grant site closure.

This SAP consists of nine sections, including this introduction. Section 2 includes site description, history, and summaries of previous investigations and remediation activities. Section 3 summarizes current ADEM CALs and provides a brief discussion of anticipated ADEM RBCA requirements. A detailed SAP is presented in Section 4. Analytical results will be presented in a confirmation sampling report as described in Section 5. Section 6 lists Maxwell AFB support requirements, and Section 7 presents the proposed project schedule. Air Force, regulatory, and contractor points of contact are provided in Section 8, and the cited references are provided in Section 9.

SECTION 2

SITE DESCRIPTION

2.1 SITE LOCATION AND HISTORY

Information provided in this section is summarized from a release investigation report by Radian Corporation (1995). Site ST-001 is located in the west-central portion of Gunter Annex, Montgomery, Alabama (Figure 2.1). The site is bordered by Libby Street on the south and South Hodges Avenue on the west. A grassy, open area bounds the site on the remaining sides. The layout of Site ST-001 is shown in Figure 2.2.

Site ST-001, also known as the old Base Motor Pool Service Station, was originally used for dispensing petroleum products for motorized vehicles beginning in the 1940's. Two 10,000-gallon USTs were located north of Building 408; one tank was used to store diesel fuel, and the other stored gasoline. The tanks and related piping were removed in March 1994. After the tanks were removed, the excavation was backfilled with clean soil and covered with gravel. Building 408 was demolished in 1995, and the site is currently vacant and inactive.

2.2 SITE GEOLOGY AND HYDROGEOLOGY

Site ST-001 is underlain by Quaternary alluvial deposits consisting of sand, gravel, silt, and clay layers. The grain size generally increases with depth, with approximately 8 to 10 feet of silty, sandy clay overlying sand and gravely sand. In the vicinity of the former UST and product piping excavation, much or all of the silty clay appears to have been removed and replaced with clean fill consisting of a mixture of clay, sand, and gravel.

At Site ST-001, shallow groundwater occurs under water table (unconfined) conditions. In July 1996, the surface of the water table was measured between 20 and 25 feet below ground surface (bgs), and groundwater was determined to flow toward the west-northwest with an average hydraulic gradient of 0.005 foot per foot (ft/ft) (Williams Engineering, 1996).

2.3 PREVIOUS INVESTIGATIONS

2.3.1 1991 US Army Corps of Engineers Investigation

During 1991, the United States Army Corps of Engineers (USACE, 1992) performed an initial investigation of Site ST-001 that included the installation of four groundwater monitoring wells (GMW-1 through -4, shown on Figure 2.2). Soil and groundwater samples were collected at these four locations. Soil samples were

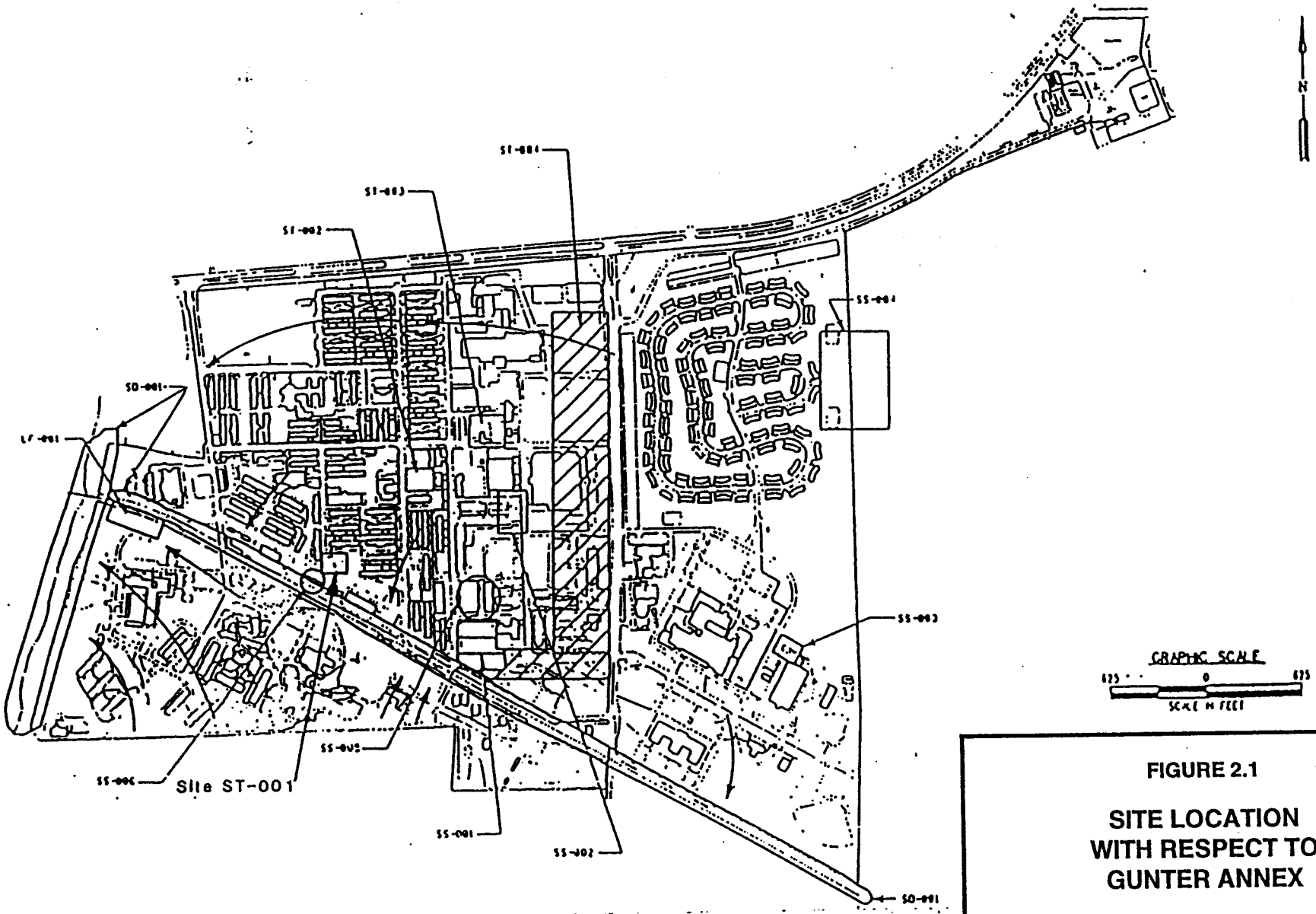


FIGURE 2.1

SITE LOCATION WITH RESPECT TO GUNTER ANNEX

Site ST-001
Gunter Annex
Maxwell AFB, Alabama

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

Source: USACE, 1992.

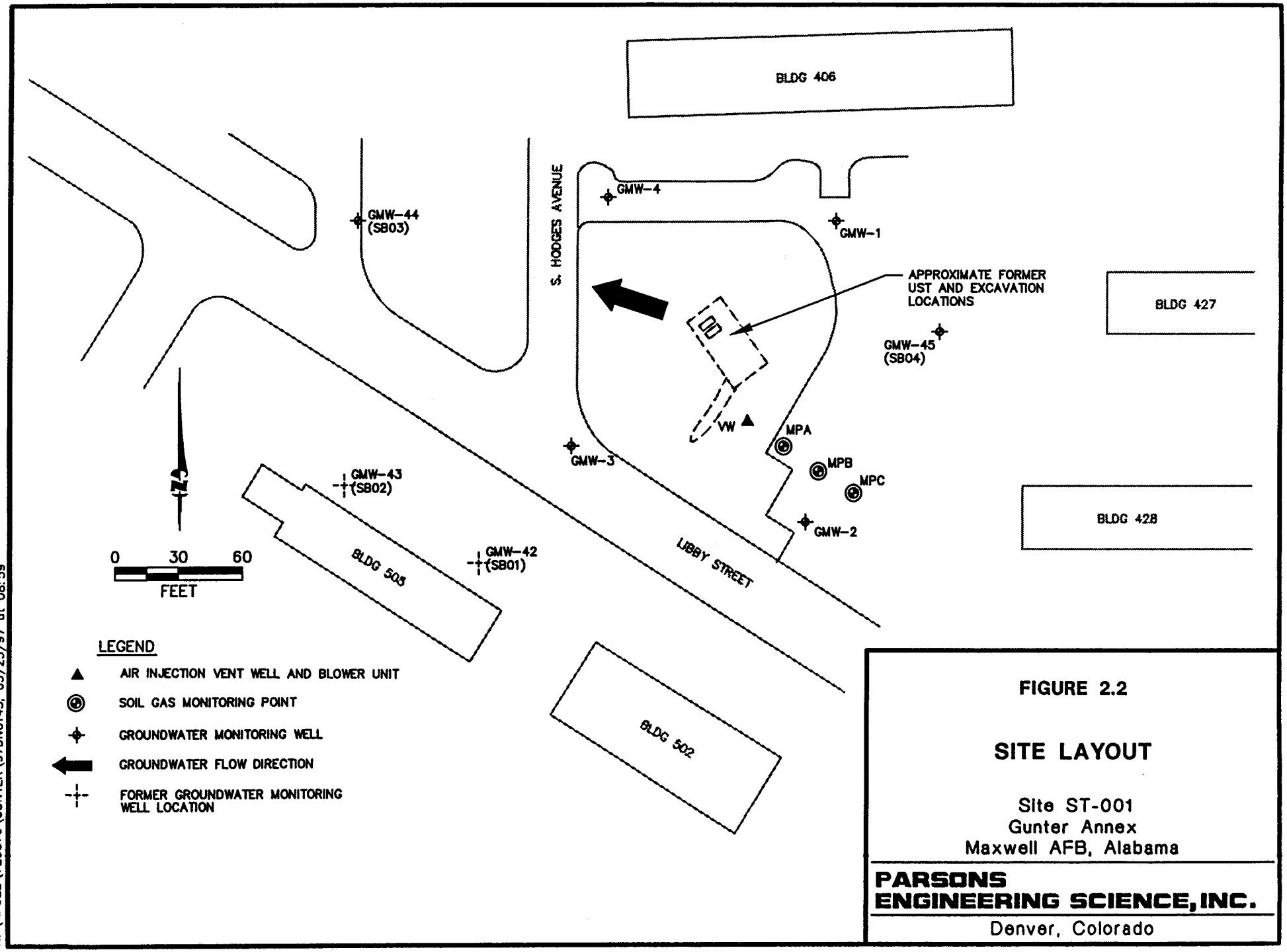


FIGURE 2.2

SITE LAYOUT

Site ST-001
Gunter Annex
Maxwell AFB, Alabama

PARSONS ENGINEERING SCIENCE, INC.

Denver, Colorado

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analyzed for TRPH and groundwater samples were analyzed for benzene, toluene, ethylbenzene, total xylenes (BTEX), and lead. Analytical results indicated that TRPH concentrations exceeded 100 milligrams per kilogram (mg/kg) in soil samples collected from each of the monitoring well borings. The highest TRPH concentration, 1,117 mg/kg, was detected in the boring for GMW-2 at approximately 20 feet bgs. Soil analytical results from the USACE (1992) and subsequent investigations are presented in Table 2.1, and the estimated extent of soil contamination at Site ST-001 is shown on Figure 2.3.

Dissolved contaminant concentrations in a groundwater sample from GMW-4 exceeded current ADEM maximum contaminant levels of 5 micrograms per liter (μg/L) and 1,000 μg/L for benzene and toluene, respectively. The benzene concentrations in the GMW-1 and GMW-3 groundwater samples also exceeded current ADEM contaminant levels. Groundwater analytical results from the USACE (1992) and subsequent investigations are presented in Table 2.2.

2.3.2 1994 Investigations

Following removal of the two USTs in 1994, Radian Corporation (1995) installed four groundwater monitoring wells (GMW-42 through 45) in the vicinity of Site ST-001 (Figure 2.2) and collected soil and groundwater samples at these locations. Soil and groundwater samples were analyzed for TRPH, BTEX, and lead. Findings indicated relatively insignificant TRPH and BTEX concentrations in soil; however, dissolved petroleum contaminant concentrations were detected at GMW-44, approximately 170 feet downgradient from (west of) the former USTs. Soil and groundwater analytical results from the 1994 Radian investigation are included on Tables 2.1 and 2.2, respectively.

Benchmark Engineering (1994) also performed groundwater sampling for volatile organic compounds (VOCs) and polynuclear aromatic hydrocarbons (PAHs) at GMW-1 and GMW-45 during 1994. During this sampling event, petroleum contamination was not evident at GMW-1; however, trace concentrations of some VOCs and PAHs were evident in samples from GMW-45 (Table 2.2).

2.3.3 Parsons ES Investigation and Bioventing Pilot Test

In September 1995, a pilot-scale bioventing system was installed by Parsons ES (1995) at Site ST-001 to assess the potential of air injection bioventing for remediating the hydrocarbon contamination identified in vadose zone soils. The primary objectives of the pilot test were: 1) to assess the potential for supplying oxygen throughout the contaminated soil interval; 2) to determine the rate at which indigenous microorganisms would degrade fuel when supplied with oxygen-rich soil gas; 3) to evaluate the potential for sustaining fuel biodegradation rates until fuel contamination was remediated to concentrations below regulatory standards; and 4) to determine design parameters, such as air injection vent well (VW) spacing and air injection flow rates, if it was determined that a full-scale bioventing system was necessary to treat the entire volume of contaminated soils at Site ST-001.

TABLE 2.1
SOIL ANALYTICAL RESULTS
SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

Sample Location	Sample Depth (feet bgs)[a]	Analyte: TRPH[b] (mg/kg)[c]	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Lead (mg/kg)
Corps of Engineers[d]							
GMW-1	5 - 6	719	—[e]	—	—	—	—
	10 - 11.5	59	—	—	—	—	—
	15 - 16.5	548	—	—	—	—	—
	20 - 21.5	95	—	—	—	—	—
	25 - 26.5	272	—	—	—	—	—
	30 - 31.5	71	—	—	—	—	—
GMW-2	5 - 6	111	—	—	—	—	—
	10 - 11.5	633	—	—	—	—	—
	15 - 16.5	42	—	—	—	—	—
	20 - 21.5	1,117	—	—	—	—	—
	25 - 26.5	48	—	—	—	—	—
	30 - 31.5	—	—	—	—	—	—
GMW-3	5 - 6	97	—	—	—	—	—
	10 - 11.5	ND[f]	—	—	—	—	—
	15 - 16.5	225	—	—	—	—	—
	20 - 21.5	441	—	—	—	—	—
	25 - 26.5	ND	—	—	—	—	—
	30 - 31.5	44	—	—	—	—	—
GMW-4	5 - 6	ND	—	—	—	—	—
	10 - 11.5	ND	—	—	—	—	—
	15 - 16.5	118	—	—	—	—	—
	20 - 21.5	86	—	—	—	—	—
	25 - 26.5	ND	—	—	—	—	—
	30 - 31.5	96	—	—	—	—	—
Radian[g]							
SB01 (GMW-42)	0 - 2.5	ND	ND	ND	ND	ND	8.4
	21 - 23	2.84	ND	ND	ND	0.001	2.5
SB02 (GMW-43)	11.5 - 14	ND	ND	0.001	ND	ND	ND
	14 - 16.5	ND	ND	ND	ND	ND	2.7
	21.5 - 24	ND	ND	ND	ND	0.131	5.4
SB03 (GMW-44)	11.5 - 14	ND	ND	ND	ND	0.004	4.3
	19 - 21.5	ND	ND	ND	ND	0.003	2.8
SB04 (GMW-45)	0 - 4	ND	ND	0.026	0.003	0.008	ND
	11.5 - 14	ND	ND	ND	ND	ND	11.1
	14 - 19	ND	ND	ND	ND	0.004	3.5
Parsons ES[h]							
VW-15	15	120	<0.053[i]	0.38	0.89	7.5	—
VW-20	20	6.9	<0.055	<0.055	1.0	5.9	—
MPA-15	15	410	<0.053	0.12	1.1	7.5	—
MPA-20	20	<3.5	<0.053	<0.053	<0.053	<0.13	—
MPB-15	15	<3.5	<0.052	<0.052	<0.052	<0.13	—
MPB-20	20	<3.7	<0.055	<0.055	<0.055	<0.14	—

[a] bgs = below ground surface.
[b] TRPH = total recoverable petroleum hydrocarbons.
[c] mg/kg = milligrams per kilogram.
[d] Soil samples collected in 1991 by US Army Corps of Engineers (1992).
[e] — = not analyzed.
[f] ND = not detected; method detection limit not available.
[g] Soil samples collected in 1994 by Radian Corporation (1995).
[h] Soil samples collected September 12, 1995, by Parsons ES (1995), prior to bioventing system startup.
[i] < = analyte concentration is less than the laboratory reporting limit shown.

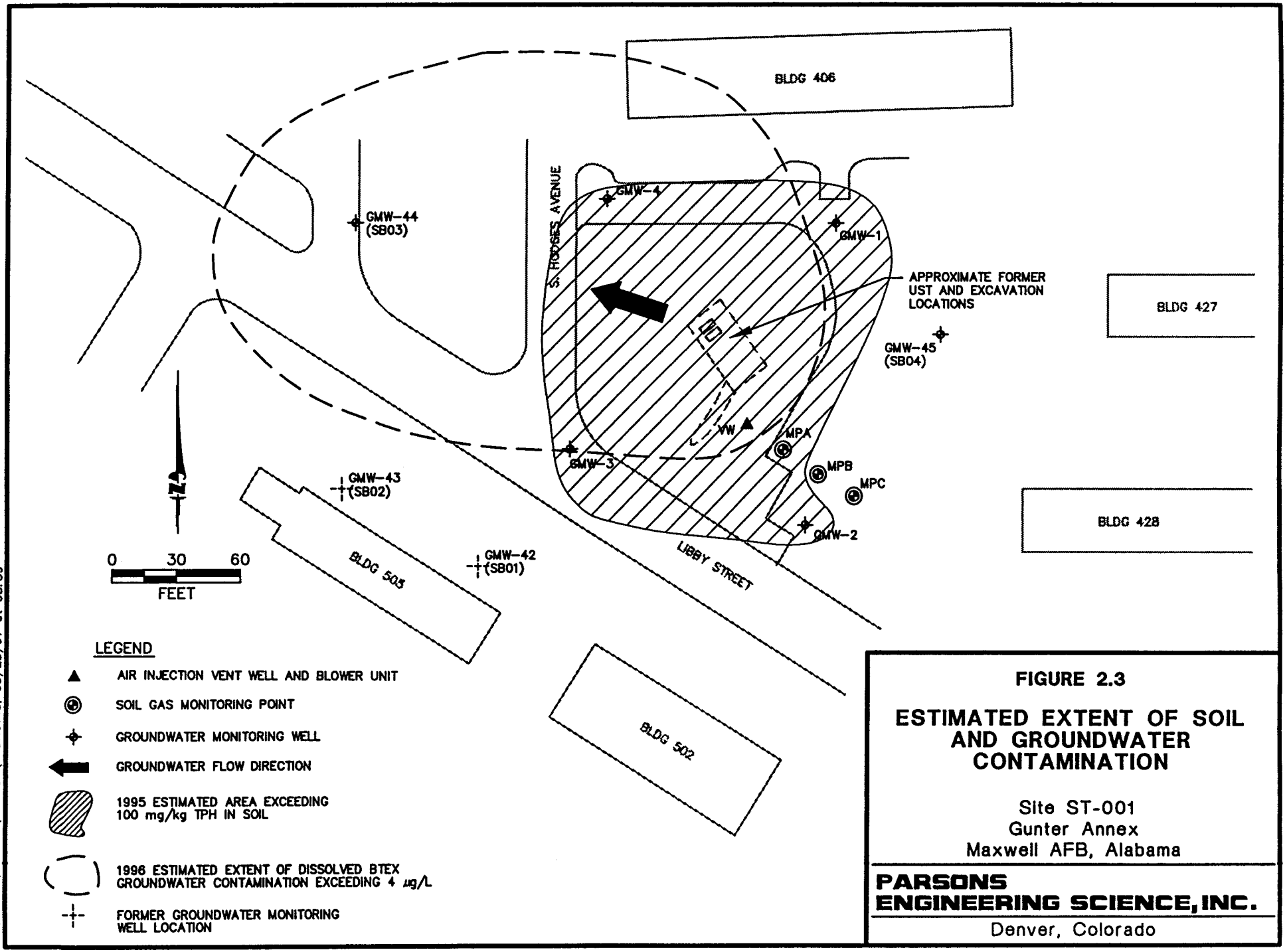


FIGURE 2.3

ESTIMATED EXTENT OF SOIL AND GROUNDWATER CONTAMINATION

Site ST-001
Gunter Annex
Maxwell AFB, Alabama

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

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TABLE 2.2
GROUNDWATER ANALYTICAL RESULTS COMPARED TO ADEM CRITERIA
SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

		Analyte[a] (units)[b]															
		TRPH (mg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Xylenes (µg/L)	Lead (µg/L)	n-Butyl benzene (µg/L)	n-Propyl-benzene (µg/L)	Isopropyl-benzene (µg/L)	1,2,4-TMB (µg/L)	1,3,5-TMB (µg/L)	cis-1,2 DCE (µg/L)	TCE (µg/L)	Naphthalene (µg/L)	1-Methyl-naphthalene (µg/L)	2-Methyl-naphthalene (µg/L)
Corrective Action Limit[c]		NA[d]	5	1,000	700	10,000	15	NA	NA	NA	NA	NA	70	5	NA	NA	NA
Sample Location (Sample Date)																	
GMW-1	(1991) M[e]	----[f]	5.1	ND[g]	2.2	2.5	40	---	---	---	---	---	---	---	ND	ND	ND
	(7/14/94) B[h]	---	<1[i]	<4	<1	<1	---	<1	<1	<1	<1	<1	<1	<1	<2	<2	<2
	(7/25/96) W[j]	---	<1	<1	<1	<1	---	---	---	---	---	---	---	---	---	---	---
GMW-2	(1991) M	---	1.7	ND	ND	ND	5	---	---	---	---	---	---	---	ND	ND	ND
	(7/25/96) W	---	<1	<1	<1	<1	---	---	---	---	---	---	---	---	---	---	---
GMW-3	(1991) M	---	33	39	31	120	78	---	---	---	---	---	---	---	ND	ND	ND
	(7/25/96) W	---	1.1	<1	<1	3	---	---	---	---	---	---	---	---	---	---	---
GMW-4	(1991) M	---	290	3,300	240	5,200	43	---	---	---	---	---	---	---	160	19	39
	(7/25/96) W	---	<500	7,210	1,820	8,020	---	---	---	---	---	---	---	---	---	---	---
GMW-42	(1994) R[k]	0.898	ND	ND	ND	ND	1.3[l]	---	---	---	---	---	---	---	---	---	---
GMW-43	(1994) R	1.15	ND	ND	ND	ND	1.0[l]	---	---	---	---	---	---	---	---	---	---
GMW-44	(1994) R	0.902	43	7	12	25	ND	---	---	---	---	---	---	---	---	---	---
	(7/25/96) W	---	37.3	189	152	423	---	---	---	---	---	---	---	---	---	---	---
GMW-45	(1994) R	0.535	ND	ND	ND	ND	2.9[l]	---	---	---	---	---	---	---	---	---	---
	(7/14/94) B	---	7.7	<4	12	37	---	1.4	6	2.8	32	9.4	3.3	3.3	<2	2.1	<2
	(7/25/96) W	---	<1	<1	<1	<1	---	---	---	---	---	---	---	---	---	---	---

[a] TRPH = total recoverable petroleum hydrocarbons; TMB = trimethylbenzene; DCE = dichloroethene; TCE = trichloroethene.
[b] mg/L = milligrams per liter; µg/L = micrograms per liter.
[c] ADEM, 1995.
[d] NA = no ADEM corrective action level available for this analyte.
[e] Results from 1991 investigation (USACE, 1992).
[f] ---- = not analyzed.
[g] ND = not detected; method detection limit not available.
[h] Results from 1994 investigation (Benchmark Engineering, 1994).
[i] < = analyte concentration is less than the laboratory reporting limit shown.
[j] 1996 groundwater monitoring results (Williams Engineering, Inc., 1996).
[k] Results from 1994 investigation (Radian Corporation, 1995).
[l] Analyte detected in method blank.

The pilot-scale bioventing system was installed in the vicinity of the former USTs and consisted of one VW, three vapor monitoring points (MPs), and a blower unit (Figure 2.2). During installation of the pilot-scale system, soil and soil gas sampling, and respiration and air permeability testing were performed. Based on oxygen influence and air permeability testing performed during installation of the pilot-scale system, the long-term radius of oxygen influence around the VW was expected to exceed 65 feet at all depths and 100 feet at depths between 14 and 20 feet bgs. From this information, it was determined that the pilot-scale bioventing system was capable of delivering oxygen throughout the contaminated soil zone, making installation of a larger bioventing system unnecessary. A detailed description of the pilot-scale bioventing system design and initial testing results are provided in the Interim Pilot Test Results report prepared by Parsons ES (1995) for this site.

Following completion of pilot-scale system installation and testing, the system was started, optimized, and operated continuously until September 1996. In September, the system was shut down for over 1 month to allow soils and soil gas to come to equilibrium in order to compare initial and 1-year conditions. Soil gas samples were collected, and *in situ* respiration testing was performed from 29 October through 1 November 1996 following 1 year of system operation. The blower system was restarted following 1-year testing to continue bioventing treatment of site soils. Initial soil sampling results and initial and 1-year soil gas sampling and respiration testing results have been provided by Parsons ES (1997) to AFCEE and Maxwell AFB and are summarized below.

2.3.3.1 Soil Sampling Results

During installation of the pilot-scale bioventing system, soil samples were collected from the VW and MP boreholes to determine the extent of petroleum hydrocarbon contamination in the vicinity of the former USTs (Figure 2.2). Six soil samples collected at the VW, MPA, and MPB boreholes, from depths of 15 and 20 feet bgs, were submitted for laboratory analysis of several parameters, including TRPH and BTEX. As shown in Table 2.1, TRPH, toluene, ethylbenzene, and xylenes were detected in soil samples collected from the VW and MPA boreholes, which are located nearest the former USTs (Figure 2.2). TRPH concentrations of 120 mg/kg and 410 mg/kg were detected at VW-15 and MPA-15, respectively. These concentrations exceeded the ADEM (1995) CAL of 100 mg/kg for TRPH. Toluene, ethylbenzene, and xylenes were detected at maximum concentrations of 380 µg/kg, 1,100 µg/kg, and 7,500 µg/kg, respectively. Benzene was not detected in any of the six soil samples (Table 2.1).

2.3.3.2 Soil Gas Sampling Results

Soil gas sampling was performed prior to, and following, 1 year of air injection bioventing to determine relative changes in total volatile hydrocarbon (TVH), BTEX, and oxygen concentrations. Initial soil gas field-screening results at the VW and MPs indicated depleted oxygen concentrations and high TVH concentrations, and suggested that air injection would oxygenate contaminated soils and enhance biodegradation of residual petroleum hydrocarbons. As can be seen from the field-screening results

presented in Table 2.3, static oxygen concentrations in soil gas have increased considerably with continued bioventing at the site. At all MPs, the VW, and at GMW-1 and GMW-45, soil gas oxygen levels were measured at, or near, natural atmospheric levels (20.9 percent) following 1 year of air injection bioventing. The widespread development of near atmospheric levels of soil gas oxygen indicate that biological oxygen demand, and consequently, aerobic fuel hydrocarbon biodegradation rates, have decreased substantially throughout the site, and strongly suggests that very little substrate (fuel hydrocarbons) remains in site soils.

The expected low concentrations of residual petroleum hydrocarbon contamination in site soils is further supported by soil gas field TVH measurements and laboratory results. Soil gas field screening results, presented in Table 2.3, indicate a consistent 2 to 3 order of magnitude reduction in the source area (VW, MPA, and MPB) and lesser, but significant reductions at locations surrounding the source area (MPC, GMW-1, and GMW-45). Initial and 1-year analytical results for MPA-15 and MPA-19 indicate BTEX and TVH concentrations in soil gas have been reduced approximately 3 orders of magnitude during 1 year of bioventing. Field and analytical soil gas results demonstrate that significant reductions in TVH and BTEX compounds have taken place within the VW's estimated 100-foot treatment radius.

2.3.3.3 Respiration Test Results

Observed *in situ* microbial respiration (oxygen utilization) rates have decreased significantly as a result of pilot-scale bioventing system operation at Site ST-001. As can be seen from the results presented in Table 2.4, significant reductions occurred in both respiration and fuel biodegradation rates following the first year of system operation. Average 1-year respiration rates measured 4 to 14 percent of the initial values. Similar reductions also are evident in calculated fuel biodegradation rates for the site. Oxygen utilization and fuel biodegradation rates typically decrease with continued bioventing as the lighter, more readily biodegraded hydrocarbons are preferentially destroyed over more biologically recalcitrant, higher-molecular-weight hydrocarbons. As demonstrated by the soil gas results presented in Table 2.3, the BTEX compounds have been almost completely biodegraded.

2.3.4 1996 Williams Engineering, Inc. Groundwater Sampling

In July 1996, Williams Engineering, Inc. (Williams, 1996) collected groundwater samples from wells GMW-1 through 4, GMW-44, and GMW-45, for laboratory analysis. As can be seen from the results presented in Table 2.2, BTEX compounds were detected in groundwater samples from wells GMW-3, GMW-4, and GMW-44. Benzene, detected at a concentration of 37.3 µg/L in the sample from GMW-44, exceeded the ADEM benzene CAL of 5 µg/L. The specific benzene concentration from the sample collected at GMW-4 could not be accurately quantified; however, an ethylbenzene concentration of 1,820 µg/L and a toluene concentration of 7,210 µg/L exceeded the respective ADEM CALs of 700 µg/L and 1,000 µg/L. From this investigation, the maximum downgradient extent of dissolved BTEX contamination was estimated to be approximately 250 feet downgradient from the former USTs (Williams, 1996).

TABLE 2.3
INITIAL AND 1-YEAR SOIL GAS FIELD AND LABORATORY ANALYTICAL RESULTS
SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

Sampling Location[a]	Sampling Event[b]	Field Screening Data			Laboratory Analytical Data[e]				
		Oxygen (percent)	Carbon Dioxide (percent)	TVH[c] (ppmv)[d]	TVH (ppmv)	Benzene (ppmv)	Toluene (ppmv)	Ethylbenzene (ppmv)	Xylenes (ppmv)
VW	Initial	3.8	4.5	10,800	21,000	190	360	160	480
	1-Year	19.5	0.8	9	—[f]	—	—	—	—
MPA-10	Initial	18.0	1.2	5,600	—	—	—	—	—
	1-Year	17.5	1.0	12	—	—	—	—	—
MPA-15	Initial	1.0	7.7	8,000	15,000	140	130	170	400
	1-Year	20.0	0.8	30	48	<0.002[g]	0.041	0.12	0.52
MPA-19	Initial	0.0	8.0	12,000	22,000	200	170	98	250
	1-Year	15.0	3.5	8	25	<0.002	0.098	0.12	0.46
MPB-10	Initial	11.0	3.0	4,000	—	—	—	—	—
	1-Year	18.5	1.5	25	10	<0.002	0.059	0.051	0.10
MPB-14	Initial	0.5	7.8	1,240	—	—	—	—	—
	1-Year	19.0	0.8	12	—	—	—	—	—
MPB-18	Initial	1.4	4.9	2,200	—	—	—	—	—
	1-Year	19.5	0.8	7	—	—	—	—	—
MPC-10	Initial	17.0	0.7	780	290	<0.011	0.160	0.014	0.011
	1-Year	—	—	—	—	—	—	—	—
MPC-14	Initial	5.8	4.1	480	97	<0.004	0.005	<0.004	0.006
	1-Year	19.0	1.0	19	5.2	<0.002	0.044	0.052	0.084
MPC-18	Initial	6.0	4.1	520	160	<0.006	0.019	0.018	0.028
	1-Year	20.0	0.5	5	—	—	—	—	—
GMW-1	Initial	10.0	5.0	280	—	—	—	—	—
	1-Year	20.0	1.0	60	—	—	—	—	—
GMW-45	Initial	10.5	5.5	94	—	—	—	—	—
	1-Year	20.0	2.0	15	—	—	—	—	—

[a] Sampling location identifies the monitoring point and depth in feet below ground surface.
[b] Soil gas sampling performed in September 1995 (initial event) and October 1996 (1-year event).
[c] TVH = total volatile hydrocarbons.
[d] ppmv = parts per million, volume per volume.
[e] Laboratory analysis of soil gas performed using USEPA Method TO-3. Laboratory TVH referenced to a molecular weight of 156 grams per mole.
[f] — = not analyzed.
[g] < = analyte concentration is less than the laboratory reporting limit shown.

TABLE 2.4
INITIAL AND 1-YEAR RESPIRATION AND FUEL BIODEGRADATION RATES
SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

	Initial (September 1995)		1-Year (October 1996)	
Location-Depth[a]	Respiration Rate (% oxygen/hour)	Degradation Rate[b] (mg/kg/year)[c]	Respiration Rate (% oxygen/hour)	Degradation Rate[b] (mg/kg/year)[c]
VW-13-18	0.17	630	NM[d]	NC[e]
MPA-15	0.16	590	0.023	110
MPA-19	0.14	540	0.0051	24
MPB-10	NM	NC	0.0058	31

[a] Location-Depth gives screened interval location and depth in feet below ground surface.
[b] Initial and 1-year degradation rates based on moisture content of the soil during initial sampling. 1-year soil sampling was not performed.
[c] Milligrams of hydrocarbons per kilogram of soil per year.
[d] NM = not measured.
[e] NC = not calculated.

2.3.5 Results Summary

2.3.5.1 Soil

Soil sample results from the 1991 through 1995 investigations indicated the highest concentrations of TRPH and other fuel-related hydrocarbons occurred in vadose zone soils in the immediate vicinity of the former UST. Figure 2.3 shows the estimated extent of TRPH soil contamination at Site ST-001 that originally exceeded the ADEM CAL of 100 mg/kg. Based on the 1991, 1994, and 1995 investigations, soil contamination appeared to exceed regulatory requirements in the area circumscribed by GMW-1 through GMW-4, and as a result, a bioventing pilot-scale system was installed near the former UST location.

Initial and 1-year bioventing pilot test results indicate the effective treatment area of the bioventing system encompasses the entire area of contaminated soil identified on Figure 2.3. Significant reductions in TVH and BTEX soil gas concentrations and in oxygen utilization and fuel biodegradation rates following 1 year of bioventing are evident (Tables 2.3 and 2.4). Based on this information, TRPH concentrations in vadose zone soils at Site ST-001 are expected to be less than the CAL of 100 mg/kg; based on this expectation, AFCEE recommended that planning for confirmation sampling be initiated while the bioventing pilot-scale system continues to operate.

2.3.5.2 Groundwater

Dissolved benzene, toluene, and ethylbenzene concentrations in groundwater have exceeded ADEM (1995) criteria during 1991, 1994, and 1996 sampling events. BTEX concentrations from groundwater samples collected in 1996 from GMW-4 and GMW-44 indicate downgradient contaminant plume migration has occurred (Figure 2.3); dissolved BTEX contamination is estimated to extend approximately 250 feet downgradient from the former USTs (Williams, 1996). There is no indication that floating free product has been present on groundwater at the site, nor is there evidence of a significant smear zone from which chemicals of concern could continue to partition to groundwater. One-year bioventing pilot test results strongly indicate that petroleum contamination present in source area soils has been substantially reduced, and as a result, the extent of the dissolved plume is now thought to be stable, or decreasing.

Elevated levels of lead and trace levels of PAHs and VOCs have been detected in groundwater during previous investigations. Lead and PAH contamination of groundwater is likely to be the result of gasoline and/or diesel fuel releases from the original USTs. The source of VOCs detected at well GMW-45 is unknown. Based on information available from previous site investigations and from personnel at Maxwell AFB, no solvents or other sources of VOCs are known to exist at the former Building 408 site.

SECTION 3

SITE CLEANUP REQUIREMENTS

3.1 SITE CHARACTERIZATION REQUIREMENTS

The objective of the confirmatory soil and groundwater sampling is to support an NFRAP recommendation for the soils and groundwater contaminated by diesel fuel and/or gasoline in the vicinity of the former USTs, pursuant to closure of Site ST-001. This SAP targets unsaturated soils and groundwater in the vicinity of the former USTs, and groundwater immediately downgradient from the site.

3.2 STATE SOIL AND GROUNDWATER CLEANUP STANDARDS

ADEM currently allows evaluation of fuel hydrocarbon contaminants in soil and groundwater by established generic CALs, or by site-specific alternative corrective action limits (ACLs). The ACLs are established by conducting a site-specific risk-based evaluation to determine threats to potential receptors. The procedure for establishing the ACLs is currently reviewed on a site-by-site basis until such time as ADEM finalizes its RBCA program.

The forthcoming ADEM RBCA program will be a tiered, risk-based approach for clean up of petroleum-hydrocarbon-contaminated sites that is similar to the American Society for Testing and Materials (ASTM, 1995) RBCA decision-making process and AFCEE (1996) RBCA strategy. This iterative approach allows first for screening of contaminant concentrations against generic risk-based concentrations, followed by the development of site-specific cleanup criteria based on an analysis of site data and receptors that could potentially be exposed to chemical contamination at, or downgradient from, the release site. For the purpose of this SAP, it is assumed that the forthcoming RBCA standards being developed will be used by ADEM to evaluate the site. The ADEM RBCA program is anticipated to be finalized in Spring/Summer 1997. In the event that the new ADEM RBCA criteria are not available following site confirmation soil and groundwater sampling (Section 4) and prior to formation of the confirmation sampling report (Section 5), Parsons ES and Maxwell AFB will seek guidance from ADEM as to the appropriate course of action.

It is expected that forthcoming ADEM RBCA criteria will require an evaluation of BTEX and possibly other fuel contaminant (e.g., PAHs and lead) concentrations in soil and groundwater, given the likelihood that both diesel fuel and gasoline were released at Site ST-001. Because RBCA criteria are based on current or foreseeable land uses and human receptor exposure scenarios, a review of available information is provided below.

3.2.1 Land Use and Potential Receptors

Current land use adjacent to the site is commercial and residential. Housing is located north and east (upgradient) of Site ST-001. Vacant land and office buildings are located south and west (downgradient) of the site. Future land use for Site ST-001 has not been established, but would likely be industrial or commercial. For purposes of discussion and comparison, residential land use scenarios also are presented below as a very conservative estimate of future land use. Additional research into current zoning and future land use plans will be conducted under this work plan to refine the potential receptors that could be exposed to site related contaminants.

Based on these land use assumptions and the site description presented in Section 2, current and future onsite workers are likely to represent the primary human receptor population. However, residential populations also may represent a conservative potential future receptor if plume migration continues downgradient from the original source area (USTs), and if future residential development occurs in downgradient areas. No ecological receptors are likely to be exposed to contaminants in site media under current or anticipated future land uses.

Currently there is no on-Base beneficial use of groundwater from the shallow aquifer. Gunter Annex obtains its drinking water from the local municipality. As a result, exposure of onsite and off-site human receptors to site contaminants through ingestion of, inhalation of, or dermal contact with contaminants in groundwater extracted for potable use is unlikely. Soil sample results from previous investigations (Table 2.1) indicate that soil contamination appears to be significant only within soils located greater than 5 feet bgs (Table 2.1).

Based on this information, it is anticipated that the most significant contaminant migration pathway resulting from soil contamination at Site ST-001 is the leaching of contaminants from soil to groundwater. Volatilization of fuel hydrocarbons from soil and/or groundwater and vapor migration into onsite or off-site structures is expected to be the most significant exposure pathway resulting from contamination at Site ST-001.

3.2.2 Cleanup Criteria

3.2.2.1 Corrective Action Levels

The current ADEM CAL for petroleum contaminated soils is related to TRPH rather than BTEX or PAH contamination. Considering the TRPH concentrations detected in site soils prior to air injection bioventing (Table 2.1), the site is likely to now meet the current TRPH CAL of 100 mg/kg; however, new RBCA criteria are likely to require an evaluation of the individual petroleum hydrocarbons that pose the greatest risk to potential receptors in the vicinity of the site.

3.2.2.2 Potential ADEM RBCA Criteria

Based on the assumption that the forthcoming ADEM RBCA program will resemble the tiered approach outlined by ASTM (1995), ADEM will develop or adopt generic screening-level concentrations to support Tier 1 analysis and identification of chemicals

of potential concern (COPCs). The screening-level target concentrations will likely resemble the Tier 1 Risk-Based Screening Levels (RBSLs) presented in the ASTM (1995) look-up table. BTEX and other common petroleum contaminant (e.g., PAH and lead) concentrations in soil and groundwater at Site ST-001 will be determined in accordance with Section 4, in order to compare these values with ADEM screening-level concentrations. From this comparison, if the detected site contaminant concentrations do not exceed the most stringent respective screening-level target concentrations or RBSLs, the compounds will not be considered COPCs, and will not be retained for further Tier 2 evaluation. Under these circumstances, no additional remediation would be warranted for such compounds in order to protect human and ecological receptors. If a detected site contaminant exceeds the appropriate screening-level concentration, the compound is identified as a COPC and retained for further quantitative fate and transport and risk analyses. While an estimation of the ADEM Tier 2 process would be premature, an example Tier 1 evaluation presented below demonstrates that collection of soil and groundwater confirmation samples at Site ST-001 is warranted.

For the purpose of comparison, generic screening-level concentrations for both commercial/industrial and residential land use and maximum TRPH, BTEX, and lead soil concentrations detected during previous site investigations (Section 2.3) are presented in Table 3.1. Table 3.2 presents similar data for groundwater. The generic screening-level concentrations shown are from the ASTM (1995) *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites* and the US Environmental Protection Agency (USEPA, 1996*) Soil Screening Guidance: Technical Background Document.* As previously mentioned, leaching of hydrocarbon contaminants from soil to groundwater and volatilization of contaminants from groundwater and vapor intrusion to buildings are likely to represent the most significant contaminant migration and exposure pathways represented by soil and groundwater contamination, respectively. Inhalation of VOCs in indoor air is considered the most likely exposure route.

As can be seen on Table 3.1, the only detected soil contaminant exceeding any of the estimated future risk-based screening concentrations is ethylbenzene. The soil leaching screening level (SSL) of 0.7 mg/kg for ethylbenzene assumes that no dilution or attenuation has occurred between the original source area and the receptor exposure point. This screening level is likely to be extremely conservative. While not readily apparent, benzene concentrations from the 1995 soil sampling event also may have exceeded the ASTM residential leachability RBSL and the USEPA groundwater migration SSLs because the analytical method detection limit shown is higher than these target screening levels. However, following more than 1.5 years of air injection bioventing, residual petroleum hydrocarbon contamination in soil is likely to be less than forthcoming ADEM screening-level concentrations.

The estimated risk-based criteria for groundwater shown in Table 3.2 represent dissolved concentrations of BTEX and naphthalenes that potentially could cause adverse indoor air concentrations resulting from contaminant vapor intrusion. These values represent a worst-case scenario, as no buildings currently are located directly above the area affected by the contaminant plume (Figure 2.3). Dissolved benzene, toluene, and ethylbenzene concentrations in groundwater samples from 1996 exceed their current

TABLE 3.1
SOIL CONTAMINANT LEVELS COMPARED TO EXISTING AND ESTIMATED FUTURE RISK-BASED CLEANUP CRITERIA
SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

	Units[c]	Detected Site Maximum Concentration	Current ADEM CAL[d]	ASTM[a] Residential Leachability RBSL[e]	ASTM[a] Comm/Indus Leachability RBSL[f]	USEPA[b] Ingestion SSL	USEPA[b] Inhalation SSL	USEPA[b] Groundwater Migration SSL (20 DAF)[g]	USEPA[b] Groundwater Migration SSL (1 DAF)[h]
TRPH	mg/kg	1,117	100	NA[i]	NA	NA	NA	NA	NA
Benzene	mg/kg	<0.055[j]	NA	0.0172	0.0578	22	0.8	0.03	0.002
Toluene	mg/kg	0.38	NA	129	361	16,000	650	12	0.6
Ethylbenzene	mg/kg	1.1	NA	575	1,610	7,800	400	13	0.7
Xylenes	mg/kg	7.5	NA	RES[k]	RES	160,000[l]	410[l]	190[l]	9[l]
Naphthalenes	mg/kg	—[m]	NA	22.9	64.2	3,100	NA	84	4
Lead	mg/kg	11.1	NA	NA	NA	400[n]	-[n]	-[n]	-[n]

Note: The corrective action limits or target concentrations exceeded by the maximum site concentration detected are shown in gray.

[a] Risk-based screening levels (RBSLs) from Table X2.1 (ASTM, 1995).

[b] Generic soil screening levels (SSLs) from Table A-1 (USEPA, 1996).

[c] mg/kg = milligrams per kilogram.

[d] ADEM (1995) corrective action limits.

[e] Values shown represent example Tier 1 Risk-Based Screening Levels (RBSLs) for residential receptor scenario considering soil-leachate to protect groundwater ingestion target level (ASTM, 1995).

[f] Values shown represent example Tier 1 Risk-Based Screening Levels (RBSLs) for commercial/industrial receptor scenario considering soil-leachate to protect groundwater ingestion target level (ASTM, 1995).

[g] Generic SSL values for the migration to groundwater pathway developed using a default dilution-attenuation factor (DAF) of 20 to account for natural processes that reduce contaminant concentrations in the subsurface.

[h] Generic SSLs for the migration to groundwater pathway developed assuming no dilution or attenuation between the source and the receptor well (i.e., DAF = 1). Note that the 20 DAF values are not exactly 20 times the 1 DAF values because each SSL is calculated independently with the final value rounded to two significant figures for values greater than 10, and one significant figure if the value is less than 10.

[i] Target data concentrations not available in the sources which are referenced.

[j] < = analyte concentration less than laboratory reporting limit shown.

[k] RES = Selected risk level is not exceeded for pure compound present at any concentration (ASTM, 1995).

[l] SSL data provided is for *o*-Xylene which has the most conservative SSLs of the three xylene isomers.

[m] — = no site data yet available for this analyte.

[n] USEPA has set a screening level of 400 mg/kg for lead based on the *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities (1994).*

TABLE 3.2
GROUNDWATER CONTAMINANT LEVELS COMPARED TO EXISTING AND ESTIMATED FUTURE RISK-BASED CLEANUP CRITERIA
SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

	Units[b]	Detected Site Maximum Concentration	Current ADEM CAL[c]	ASTM[a] Residential Vapor Intrusion RBSL[d]	ASTM[a] Comm/Indus Vapor Intrusion RBSL[e]
Benzene	µg/L	290[f]	5	23.8	73.9
Toluene	µg/L	7,210	1,000	32,800	85,000
Ethylbenzene	µg/L	1,820	700	77,500	>S[g]
Xylenes	µg/L	8,020	10,000	>S	>S
Naphthalenes	µg/L	218[h]	NA[i]	4,740	12,300
Lead	µg/L	78	15[j]	NA	NA

Note: The corrective action limits or target concentrations exceeded by the maximum site concentration detected are shown in gray.

[a] Risk-based screening levels (RBSLs) from Table X2.1 (ASTM, 1995).

[b] µg/L = micrograms per liter.

[c] ADEM (1995) corrective action limits.

[d] Values shown represent example Tier 1 Risk-Based Screening Levels (RBSLs) for residential receptor scenario considering vapor intrusion from groundwater to buildings (ASTM, 1995).

[e] Values shown represent example Tier 1 Risk-Based Screening Levels (RBSLs) for commercial/industrial receptor scenario considering vapor intrusion from groundwater to buildings (ASTM, 1995).

[f] July 1996 sample result from GMW-4 had a method detection limit of 500 µg/L, and as a result, the actual groundwater concentration from this sampling event may have been higher than the 1991 concentration shown.

[g] >S = selected risk level is not exceeded for all possible dissolved levels (less than or equal to solubility of pure component) (ASTM, 1995).

[h] Value shown represents the sum of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene groundwater concentrations from the GMW-4 1991 sample results.

[i] Target data concentrations not available in the sources which are referenced.

[j] Represents the action level for lead in drinking water.

CALs; however, fuel contaminant concentrations in groundwater do not exceed generic ASTM (1995) RBSLs. As can be seen from Tables 2.2 and 3.2, dissolved lead concentrations at GMW-1, GMW-3, and GMW-4 all exceed the federal 15-μg/L action level for lead in drinking water. Because current drinking water sources in the vicinity of Site ST-001 are not threatened by existing groundwater contamination, lead concentrations in shallow groundwater do not pose a risk to ecological or human receptors.

3.3 NATURAL ATTENUATION OF DISSOLVED FUEL CONTAMINANTS

An accurate estimate of the potential for natural biodegradation of BTEX compounds in groundwater is important to consider when determining whether fuel hydrocarbon contamination presents a substantial continuing threat to human health and the environment, and when deciding what type of remedial alternative will be most cost effective in eliminating or abating these threats. Over the past two decades, numerous laboratory and field studies have demonstrated that subsurface microorganisms can degrade a variety of hydrocarbons (Lee, 1988). This process occurs naturally when sufficient oxygen (or other electron acceptors) and nutrients are available in the groundwater. The rate of natural biodegradation is generally limited by the lack of oxygen (or other electron acceptors) rather than by the lack of nutrients such as nitrogen or phosphorus. The supply of oxygen to unsaturated soil is constantly renewed by vertical diffusion from the atmosphere. The supply of oxygen to a shallow, fuel-contaminated aquifer is constantly renewed by the influx of oxygenated, upgradient flow and recharge from precipitation and by the vertical diffusion of oxygen from the unsaturated soil zone into the groundwater (Borden and Bedient, 1986). The rate of natural biodegradation in unsaturated soil and shallow aquifers is largely dependent upon the types and degree of weathering of the contaminants present, and the rates at which oxygen and other electron acceptors enter the contaminated media.

The positive effect of natural attenuation processes (e.g., advection, dispersion, sorption, and biodegradation) on reducing the actual mass of fuel-related contamination dissolved in groundwater has been termed remediation by natural attenuation (RNA). To estimate the impact of natural attenuation on the fate and transport of BTEX compounds dissolved in groundwater at a site, two important lines of evidence should be demonstrated (Wiedemeier *et al.*, 1995). The first is a documented loss of contaminants at the field scale. One way to show loss of contaminant mass is to use historical monitoring data to show that plume concentrations and extents decrease or remain constant over time. At some sites, dissolved concentrations of biologically recalcitrant tracers found in most fuel contamination can be used in conjunction with aquifer hydrogeologic parameters, such as groundwater seepage velocity and dilution, to demonstrate that a reduction in contaminant mass is occurring. The second line of evidence involves the use of geochemical data in mass-balance calculations to show that areas with BTEX contamination can be correlated to areas with depleted electron acceptor (e.g., oxygen, nitrate, and sulfate) concentrations and increases in metabolic fuel degradation byproduct concentrations (e.g., methane and ferrous iron). With this site-specific information, groundwater flow and solute transport data can be used to estimate the extent of RNA occurring in site groundwater. Natural chemical attenuation of dissolved fuel hydrocarbon contaminants also may be occurring at Site

ST-001. The additional time required, if any, for groundwater contamination throughout the plume to be reduced to below cleanup target levels cannot be estimated until the ADEM RBCA procedures and cleanup goals are finalized and additional groundwater data are collected.

SECTION 4

SITE CONFIRMATION SOIL AND GROUNDWATER SAMPLING AND ANALYSIS PLAN

The following SAP describes the sampling locations and procedures, and the analytical methods proposed to collect sufficient data to verify remediation of Site ST-001 soils and groundwater to ADEM cleanup levels, to determine the extent to which natural attenuation processes are reducing contaminant mass in groundwater, and to support site closure. Sampling and laboratory testing will follow the procedures and analytical methods presented in the ADEM (1995) *Alabama Underground Storage Tank Release Investigation and Corrective Action Guidance Manual.*

As described in Section 2, soil contamination at Site ST-001 was characterized during the 1991 through 1996 investigations. Based on results from these investigations, petroleum hydrocarbon contamination exceeding the ADEM (1995) TRPH CAL of 100 mg/kg (prior to initiation of *in situ* bioventing) appear to have been confined to vadose zone soils between 5 and 25 feet bgs and circumscribed by GMW-1, GMW-2, GMW-3, and GMW-4. To confirm that petroleum hydrocarbon contaminants in site soils have been remediated to within acceptable levels, Parsons ES proposes to drill and sample in the vicinity of the former USTs and within the area of previously identified TRPH CAL exceedances (Figure 2.3).

Groundwater concentrations of benzene, toluene, and ethylbenzene exceeded ADEM (1995) CALs in samples collected in 1991, 1994, and 1996 and exceeded criteria for lead in samples collected in 1991. The maximum downgradient extent of detectable dissolved BTEX contamination was estimated to be approximately 250 feet downgradient from the former USTs (Williams, 1996). To determine any changes in the concentrations of the dissolved BTEX contamination plume, groundwater samples for laboratory analysis will be collected from the three crossgradient or downgradient wells previously demonstrating BTEX contamination (GMW-3, GMW-4, and GMW-44), and from one upgradient well (GMW-45). Groundwater samples from these wells and from wells GMW-1 and GMW-2 will be analyzed for BTEX, PAHs, and lead. Samples from these wells also will be analyzed for VOCs due to their presence in trace amounts during the 1994 sampling conducted by Benchmark Engineering (Table 2.2). In addition, samples from these six wells will be collected and analyzed onsite for various geochemical parameters including electron acceptors. Lastly, groundwater samples from a source area well (GMW-4) and an upgradient well (GMW-45) will be collected for laboratory methane analysis. The geochemical/electron acceptor data will be used to assess whether or not natural biodegradation of BTEX compounds is occurring in the groundwater and to assess the groundwater assimilative

capacity for natural chemical attenuation of the remaining concentrations of petroleum hydrocarbon compounds.

4.1 SOIL SAMPLING

This section describes the scope of work required for collecting confirmation soil samples at Site ST-001. An estimated eight boreholes will be drilled and sampled within the area where TRPH results exceeded the ADEM CAL of 100 mg/kg in 1994 and 1995. A maximum of two additional boreholes may be drilled and sampled if field screening results indicate significant contamination extending beyond the proposed sampling area. Proposed borehole locations are shown on Figure 4.1.

Soil sampling will be conducted by qualified Parsons ES scientists and technicians trained in the conduct of soil sampling, records documentation, and chain-of-custody procedures. In order to provide complete documentation of the sampling event, detailed records will be maintained by the Parsons ES field hydrogeologist. In addition, sampling personnel will have thoroughly reviewed this SAP prior to sample collection and will have a copy available onsite for reference.

4.1.1 Drilling, Sampling, and Equipment Decontamination

Boreholes will be advanced using a drill rig equipped with 2.5- or 3.25-inch inside-diameter (ID) hollow-stem augers. Augers and other downhole equipment will be cleaned before use and between boreholes to prevent cross-contamination. Cleaning will be accomplished using a high-pressure, hot-water wash, followed by a potable water rinse. Decontamination will be performed at the site, and decontamination fluids will be discharged on the ground surface adjacent to each borehole. Drill cuttings will be managed as described in Section 4.5. Boreholes not backfilled with clean cuttings will be abandoned using cement/bentonite grout following drilling and sampling. The grout mixture will contain a maximum of 5 percent bentonite.

Boreholes will be drilled to 2 feet below the groundwater table surface; total borehole depths are expected to be between 20 and 27 feet bgs. Relatively undisturbed soil samples, suitable for chemical analysis, will be collected from the ground surface to total depth at approximately 5-foot intervals. Soil types will be classified according to the Unified Soil Classification System (USCS) and described in accordance with the standard Parsons ES soil description format. All soil samples will be visually examined and field analyzed using a photoionization detector (PID) or a total volatile hydrocarbon analyzer (TVHA). Based on field screening results, two samples with the greatest apparent contamination from each boring will be selected and submitted for laboratory analysis of TRPH, PAHs, BTEX, and lead.

Soil samples will be collected in a standard split-barrel sampler that will be lowered through the hollow stem of the augers and driven approximately 1.5 feet ahead of the augers into undisturbed soil. Between sampling events, the split-barrel sampler will be cleaned with Alconox® detergent, followed by successive potable and distilled water rinses.

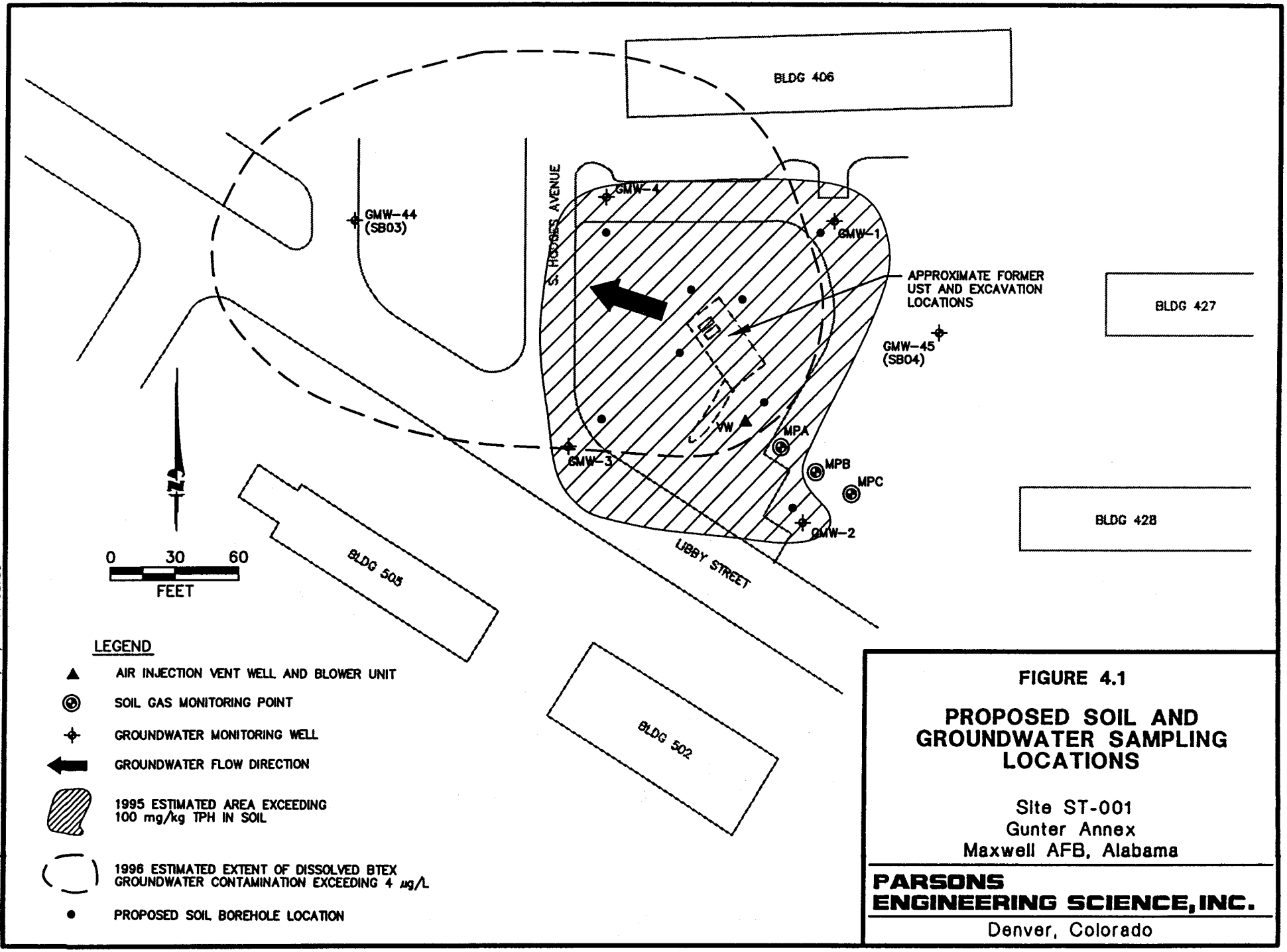


FIGURE 4.1

PROPOSED SOIL AND GROUNDWATER SAMPLING LOCATIONS

Site ST-001
Gunter Annex
Maxwell AFB, Alabama

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

4-3

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The split-barrel sampler will be fitted with three precleaned, 6-inch-long, thin-walled, brass sleeves. Before samples are collected, sample sleeves will be cleaned using the same procedure as that described for the sampler. After collection of a sample, the sampler will be retrieved, split apart, and the sleeves will be removed. In preparation for laboratory submittal, the ends of the lowest (i.e., deepest) brass sleeve will be covered with Teflon® sheets and plastic end caps.

The upper (i.e., shallower) sample sleeves will be used for geologic logging and will be screened in the field for organic vapors using a PID or a THVA. The data obtained from the logging and screening will be recorded on the borehole logs. The sleeves selected for laboratory analysis will be labeled with the site name and borehole number, sample depth, date of collection, project name, and other pertinent data. These sleeves will be sealed in plastic bags and immediately placed in an insulated cooler containing ice. The soil samples will be maintained in a chilled condition until delivered to the analytical laboratory. Chain-of-custody records will be prepared in the field and will accompany the samples to the analytical laboratory.

4.1.2 Soil Sample Analyses

Proposed soil sample analytical methods, estimated number of samples, and reporting limits are presented in Table 4.1. All samples will be analyzed by a State of Alabama-certified and AFCEE-approved laboratory. Parsons ES proposes to analyze samples from Site ST-001 for TRPH by US Environmental Protection Agency (USEPA) Method SW8015, modified for diesel- and gasoline-range organics; for BTEX by USEPA Method SW8020; for PAHs by USEPA Method SW8310; and for lead by USEPA Method SW7421. Quality control (QC) samples also will be analyzed to assess laboratory methods. The laboratory will perform analyses on one matrix spike, one laboratory control, and one laboratory blank for each specific analytical method requested.

4.2 GROUNDWATER SAMPLING

This section describes the scope of work required for collecting groundwater samples at existing groundwater monitoring wells for both field and laboratory analysis. Samples from six existing wells (GMW-1, GMW-2, GMW-3, GMW-4, GMW-44, and GMW-45) will be sent to the laboratory for BTEX, VOC, PAH, and lead analyses. Samples from these six wells also will be analyzed in the field for electron acceptors and other geochemical parameters to assess the degree of natural chemical attenuation occurring in groundwater at the site. Lastly, samples from two wells, one in the source area (GMW-4) and one upgradient (GMW-45), will be collected for laboratory methane analysis. The proposed groundwater sampling locations are shown on Figure 4.1 and the groundwater analyses to be performed are shown in Table 4.2.

As with soil sampling, groundwater sampling will be conducted by qualified Parsons ES scientists and technicians trained in the conduct of well sampling. Groundwater sampling will be performed in accordance with the procedures outlined in this SAP.

TABLE 4.1
PROPOSED SOIL SAMPLE ANALYTICAL METHODS, REPORTING LIMITS, AND NUMBER OF SAMPLES
SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

Analytical Method	Number of Samples[a]	Reporting Limit[b]	Units[c]	Field or Fixed-Base Laboratory
USEPA Method SW8015 Modified				
Diesel-Range Organics	16	10	mg/kg	Fixed-base
Gasoline-Range Organics	16	1	mg/kg	Fixed-base
USEPA Method SW8020				
Benzene	16	1.0	µg/kg	Fixed-base
Toluene	16	2.0	µg/kg	Fixed-base
Ethylbenzene	16	2.0	µg/kg	Fixed-base
Xylenes	16	2.0	µg/kg	Fixed-base
USEPA Method SW8310				
Acenapthene	16	1,200	µg/kg	Fixed-base
Acenaphthylene	16	1,540	µg/kg	Fixed-base
Anthracene	16	440	µg/kg	Fixed-base
Benzo(a)anthracene	16	9	µg/kg	Fixed-base
Benzo(a)pyrene	16	15	µg/kg	Fixed-base
Benzo(a)fluoranthene	16	12	µg/kg	Fixed-base
Benzo(g,h,i)perylene	16	50	µg/kg	Fixed-base
Benzo(k)fluoranthene	16	11	µg/kg	Fixed-base
Chrysene	16	100	µg/kg	Fixed-base
Dibenzo(a,h)anthracene	16	20	µg/kg	Fixed-base
Fluoranthene	16	140	µg/kg	Fixed-base
Fluorene	16	140	µg/kg	Fixed-base
Indeno(1,2,3-cd)pyrene	16	30	µg/kg	Fixed-base
Naphthalene	16	1,200	µg/kg	Fixed-base
Phenanthrene	16	420	µg/kg	Fixed-base
Pyrene	16	180	µg/kg	Fixed-base
USEPA Method SW7421				
Lead	16	500	µg/kg	Fixed-base

[a] Excludes QC samples. If optional boreholes are required, two additional soil samples per optional borehole also will be collected and analyzed.

[b] Project reporting limit as specified in subcontract for analytical services.

[c] mg/kg = milligrams per kilogram; µg/kg = micrograms per kilogram.

TABLE 4.2
PROPOSED GROUNDWATER SAMPLE ANALYTICAL METHODS, REPORTING LIMITS, AND NUMBER OF SAMPLES
SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

Analytical Method	Number of Samples[a]	Reporting Limit[b]	Units[c]	Field or Fixed-Base Laboratory
USEPA Method SW8260A				
1,1,1,2-Tetrachloroethane	6	0.5	µg/L	Fixed-base
1,1,1-Trichloroethane	6	0.8	µg/L	Fixed-base
1,1,2,2-Tetrachloroethane	6	0.4	µg/L	Fixed-base
1,1,2-Trichloroethane	6	1.0	µg/L	Fixed-base
1,1-Dichloroethane	6	0.4	µg/L	Fixed-base
1,1-Dichloroethene	6	1.2	µg/L	Fixed-base
1,1-Dichloropropene	6	1.0	µg/L	Fixed-base
1,2,3-Trichlorobenzene	6	0.3	µg/L	Fixed-base
1,2,3-Trichloropropane	6	3.2	µg/L	Fixed-base
1,2,4-Trichlorobenzene	6	0.4	µg/L	Fixed-base
1,2,4-Trimethylbenzene	6	1.3	µg/L	Fixed-base
1,2-Dibromo-3-chloropropane (DBCP)	6	2.6	µg/L	Fixed-base
1,2-Dibromoethane (EDB)	6	0.6	µg/L	Fixed-base
1,2-Dichlorobenzene	6	0.3	µg/L	Fixed-base
1,2-Dichloroethane	6	0.6	µg/L	Fixed-base
1,2-Dichloropropane	6	0.4	µg/L	Fixed-base
1,3,5-Trimethylbenzene	6	0.5	µg/L	Fixed-base
1,3-Dichlorobenzene	6	1.2	µg/L	Fixed-base
1,3-Dichloropropane	6	0.4	µg/L	Fixed-base
1,4-Dichlorobenzene	6	0.3	µg/L	Fixed-base
1-Chlorohexane	6	0.5	µg/L	Fixed-base
2,2-Dichloropropane	6	3.5	µg/L	Fixed-base
2-Chlorotoluene	6	0.4	µg/L	Fixed-base
4-Chlorotoluene	6	0.6	µg/L	Fixed-base
Benzene	6	0.4	µg/L	Fixed-base
Bromobenzene	6	0.3	µg/L	Fixed-base
Bromochloromethane	6	0.4	µg/L	Fixed-base
Bromodichloromethane	6	0.8	µg/L	Fixed-base
Bromoform	6	1.2	µg/L	Fixed-base
Bromomethane	6	1.1	µg/L	Fixed-base
Carbon tetrachloride	6	2.1	µg/L	Fixed-base
Chlorobenzene	6	0.4	µg/L	Fixed-base
Chloroethane	6	1.0	µg/L	Fixed-base

TABLE 4.2 (Continued)
PROPOSED GROUNDWATER SAMPLE ANALYTICAL METHODS, REPORTING LIMITS, AND NUMBER OF SAMPLES
SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

Analytical Method	Number of Samples[a]	Reporting Limit[b]	Units[c]	Field or Fixed-Base Laboratory
USEPA Method SW8260A (Continued)				
Chloroform	6	0.3	µg/L	Fixed-base
Chloromethane	6	1.3	µg/L	Fixed-base
cis-1,2-Dichloroethene	6	1.2	µg/L	Fixed-base
cis-1,3-Dichloropropene	6	NA[d]	NA	Fixed-base
Dibromochloromethane	6	0.5	µg/L	Fixed-base
Dibromomethane	6	2.4	µg/L	Fixed-base
Dichlorodifluoromethane	6	1.0	µg/L	Fixed-base
Ethylbenzene	6	0.6	µg/L	Fixed-base
Hexachlorobutadiene	6	1.1	µg/L	Fixed-base
Isopropylbenzene	6	0.5	µg/L	Fixed-base
m-Xylene	6	0.5	µg/L	Fixed-base
Methylene Chloride	6	0.3	µg/L	Fixed-base
n-Butylbenzene	6	1.1	µg/L	Fixed-base
n-Propylbenzene	6	0.4	µg/L	Fixed-base
Naphthalene	6	0.4	µg/L	Fixed-base
o-Xylene	6	1.1	µg/L	Fixed-base
p-Isopropyltoluene	6	1.2	µg/L	Fixed-base
p-Xylene	6	1.3	µg/L	Fixed-base
sec-Butylbenzene	6	1.3	µg/L	Fixed-base
Styrene	6	0.4	µg/L	Fixed-base
tert-Butylbenzene	6	1.4	µg/L	Fixed-base
Tetrachloroethene	6	1.4	µg/L	Fixed-base
Toluene	6	1.1	µg/L	Fixed-base
trans-1,2-Dichloroethene	6	0.6	µg/L	Fixed-base
trans-1,3-Dichloropropene	6	NA	NA	Fixed-base
Trichloroethene	6	1.0	µg/L	Fixed-base
Trichlorofluoromethane	6	0.8	µg/L	Fixed-base
Vinyl chloride	6	1.1	µg/L	Fixed-base
USEPA Method SW8310				
Acenaphthene	6	18	µg/L	Fixed-base
Acenaphthylene	6	23	µg/L	Fixed-base
Anthracene	6	6.6	µg/L	Fixed-base

TABLE 4.2 (Continued)
PROPOSED GROUNDWATER SAMPLE ANALYTICAL METHODS, REPORTING LIMITS, AND NUMBER OF SAMPLES
SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

Analytical Method	Number of Samples[a]	Reporting Limit[b]	Units[c]	Field or Fixed-Base Laboratory
USEPA Method SW8310 (Continued)				
Benzo(a)anthracene	6	0.1[e]	µg/L	Fixed-base
Benzo(a)pyrene	6	0.2[e]	µg/L	Fixed-base
Benzo(b)fluoranthene	6	0.18	µg/L	Fixed-base
Benzo(g,h,i)perylene	6	0.76	µg/L	Fixed-base
Benzo(k)fluoranthene	6	0.17	µg/L	Fixed-base
Chrysene	6	0.2[e]	µg/L	Fixed-base
Dibenzo(a,h)anthracene	6	0.3	µg/L	Fixed-base
Fluoranthene	6	2.1	µg/L	Fixed-base
Fluorene	6	2.1	µg/L	Fixed-base
Indeno(1,2,3-cd)pyrene	6	0.4[e]	µg/L	Fixed-base
Naphthalene	6	18	µg/L	Fixed-base
Phenanthrene	6	6.4	µg/L	Fixed-base
Pyrene	6	2.7	µg/L	Fixed-base
USEPA Method SW7421				
Lead	6	5	µg/L	Fixed-base
USEPA SW9056				
Sulfate	6	0.2	mg/L	Fixed-base
RSKSOP 175[f]				
Methane	2	NA	NA	Fixed-base
Hach Method 8000 Series[g]				
Nitrate	6	---	---	Field
Nitrite	6	---	---	Field
Sulfide	6	---	---	Field
Ferrous Iron	6	---	---	Field
Manganese	6	---	---	Field

TABLE 4.2 (Continued)
PROPOSED GROUNDWATER SAMPLE ANALYTICAL METHODS, REPORTING LIMITS, AND NUMBER OF SAMPLES
SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

Analytical Method	Number of Samples[a]	Reporting Limit[b]	Units[c]	Field or Fixed-Base Laboratory
Direct Reading Meter				
pH	6	---	---	Field
Conductivity	6	---	---	Field
Temperature	6	---	---	Field
Dissolved Oxygen	6	---	---	Field
Redox Potential	6	---	---	Field

[a] Excludes QC samples.

[b] Project reporting limit as specified in subcontract for analytical services.

[c] µg/L = micrograms per liter; mg/L = milligrams per liter.

[d] NA = not available.

[e] Number shown represents proposed or actual Federal maximum contaminant level (MCL) for groundwater. Laboratory reporting limits for these and all other analytes will be less than or equal to MCLs.

[f] National Risk Management Research Laboratory (formerly Robert S. Kerr Research Laboratory) Standard Operating Procedure for methane or equivalent.

[g] "Hach" refers to methods described in the Hach Company catalog, 1990.

4.2.1 Well Purging, Sample Collection, and Decontamination

This section describes the scope of work required for collecting groundwater samples at each of six existing groundwater monitoring wells. All water samples collected from groundwater monitoring wells will be obtained using either disposable bailers, decontaminated Teflon® bailers, or a thoroughly decontaminated peristaltic pump. In order to maintain a high degree of QC during this sampling event, the procedures described in the following sections will be followed.

4.2.1.1 Equipment Decontamination

All portions of sampling and test equipment that will contact the sample will be thoroughly cleaned before each use. This equipment includes the peristaltic pump and tubing, Teflon® bailers, water-level probe and cable, oil/water interface probe and cable, lifting line, test equipment for onsite use, and other equipment or portions thereof which will contact the samples. Based on the types of sample analyses to be conducted, the following decontamination protocol will be used:

- Clean with potable water and phosphate-free laboratory detergent;
- Rinse with potable water;
- Triple rinse with distilled or deionized water;
- Air dry the equipment prior to use.

If precleaned, dedicated sampling equipment is used, the decontamination protocol specified above will not be required. Laboratory-supplied sample containers will be cleaned and sealed by the laboratory.

4.2.1.2 Well Purging

Prior to removing any water from the well, the static water level will be measured. An electrical water level probe will be used to measure the depth to groundwater below the datum to the nearest 0.01 foot. After measuring the static water level, the water level probe will be lowered slowly to the bottom of the well, and the total well depth will be measured to the nearest 0.01 foot. Based on these measurements, the volume of water to be purged from the well can be calculated. The volume of water contained within the well casing at the time of sampling will be calculated, and three times the calculated volume will be removed from the well. The pH, temperature, and specific conductivity will be monitored before, during, and after well purging and recorded on well sampling forms. Purge water will be discharged onto the ground surface adjacent to the well from which it was removed.

4.2.1.3 Sample Extraction

Either disposable, polyethylene bailers, reusable Teflon® bailers, or a thoroughly decontaminated peristaltic pump will be used to extract groundwater samples from the

well. The extraction equipment will be lowered into the water gently to prevent splashing and extracted gently to prevent creation of excessive vacuum in the well. The sample will be transferred directly to the appropriate sample container. The water sample will be transferred from the bottom of the bailer using a bottom-emptying device to allow a controlled flow into the sample container. Water from the peristaltic pump can be directly discharged into the sample container. The water will be carefully poured down the inner walls of the sample bottle to minimize aeration of the sample. Unless other instructions are given by the analytical laboratory, sample containers will be completely filled so that no air space remains in the container.

4.2.2 Onsite Chemical Parameter Measurement

Many of the groundwater chemical parameters will be measured onsite by Parsons ES personnel (Table 4.2). Some of the measurements will be made using direct-reading meters, while others will be made using a Hach® portable colorimeter in accordance with specific Hach® analytical procedures. These procedures are described in the following subsections.

All glassware or plasticware used in the analyses will have been cleaned prior to sample collection by thoroughly washing with a solution of Alconox® and water, and rinsing with deionized water and ethanol to prevent interference or cross contamination between measurements. If concentrations of an analyte are above the range detectable by the titrimetric method, the analysis will be repeated by diluting the groundwater sample with double-distilled water until the analyte concentration falls to a level within the range of the method. All rinseate and sample reagents accumulated during field groundwater analysis will be discharged onto the ground surface at the site. Sample reagents to be used for field analysis are composed of innocuous salts and only a few grams of the reagents will be required.

4.2.2.1 Dissolved Oxygen Measurements

Dissolved oxygen (DO) is an important electron acceptor in the aerobic biodegradation of dissolved fuel hydrocarbons. DO measurements will be made using a meter with a downhole oxygen sensor or a sensor in a flow-through cell. Measurements will be taken before and following groundwater sample acquisition. When DO measurements are taken in monitoring wells that have not yet been sampled, the existing monitoring wells will be purged until DO levels stabilize. Measured values will be recorded in the groundwater sampling record.

4.2.2.2 pH, Temperature, and Specific Conductance

Because the pH, temperature, and specific conductance of a groundwater sample can change significantly within a short time following sample acquisition, these parameters will be measured in the field in unfiltered, unpreserved, "fresh" water collected by the same technique as the samples taken for laboratory analyses. The measurements will be made in a clean glass container separate from those intended for laboratory analysis, and the measured values will be recorded in the groundwater sampling record.

4.2.2.3 Other Electron Acceptor Measurements

Nitrate, nitrite, sulfate, and ferrous iron concentrations in groundwater act as potential electron acceptors for fuel hydrocarbon degradation under anaerobic conditions. These analytes will be measured by experienced Parsons ES scientists via colorimetric analysis using a Hach® portable colorimeter according to the appropriate Hach® methods (Table 4.2).

4.2.2.4 Reduction/Oxidation Potential

The oxidation/reduction (redox) potential of groundwater is an indicator of the relative tendency of a solution to accept or transfer electrons. Redox reactions in groundwater often are biologically mediated; therefore, the redox potential of a groundwater system depends upon and influences rates of biodegradation. Redox potentials can be used to provide real-time data on the location of the contaminant plume, especially in areas undergoing anaerobic biodegradation. The redox potential of a groundwater sample can change significantly within a short time following sample acquisition and exposure to atmospheric oxygen. Therefore, this parameter will be measured in the field in unfiltered, unpreserved, "fresh" water collected by the same technique as the samples taken for laboratory analyses. The measurements will be made as quickly as possible in a clean glass container separate from those intended for laboratory analysis.

4.2.3 Sample Handling

Sample containers and appropriate container lids will be provided by the laboratory. The laboratory will add any necessary chemical preservatives prior to shipping the containers to the site. The sample containers will be filled as described in Section 4.2.1.3, and the container lids will be tightly closed. The sample bottles will be labeled with the site name and well number, sample depth, date of collection, project name, and other pertinent data. Samples will be properly prepared for transportation to the laboratory by placing the samples in a cooler containing ice to maintain a shipping temperature of approximately 4 degrees centigrade (°C). Chain-of-custody records will be prepared in the field and will accompany the samples to the analytical laboratory.

4.2.4 Groundwater Analyses

Proposed groundwater sample analytical methods and laboratory reporting limits are presented in Table 4.2. All samples will be analyzed by a State of Alabama-certified and AFCEE-approved laboratory. Parsons ES proposes to analyze groundwater samples from Site ST-001 for BTEX and VOCs by USEPA Method SW8260; for PAHs by USEPA Method SW8310; for lead by USEPA Method SW7421; for sulfate by USEPA Method SW9056; and for methane by Robert S. Kerr Standard Operating Procedure (RSKSOP) 175 or equivalent. QC samples also will be analyzed to assess laboratory methods. The laboratory will perform analyses on one matrix spike, one laboratory control, and one laboratory blank for each specific analysis requested.

4.3 CHAIN-OF-CUSTODY CONTROL

After the samples for laboratory analysis have been collected, chain-of-custody procedures will be followed to establish a written record of sample handling and movement between the sampling site and the laboratory. Samples collected for onsite field analyses will not require chains-of-custody. Each shipping container will have a chain-of-custody form completed in triplicate by the sampling personnel. One copy of this form will be kept by the sampling contractor after sample delivery to the analytical laboratory, and the other two copies will be retained at the laboratory. One of the laboratory copies will become a part of the permanent record for the sample and will be returned with the sample analytical results. The chain-of-custody will contain the following information:

- Site name and address;
- Sample identification number;
- Sample collector's printed name and signature;
- Date and time of collection;
- Place and address of collection;
- Type of sample, i.e. composite, grab, etc.;
- Sample matrix (soil or groundwater);
- Chemical preservatives added;
- Analytical laboratory to be utilized;
- Analyses requested;
- Signatures of individuals involved in the chain of possession; and
- Inclusive dates of possession.

The chain-of-custody documentation will be placed inside the shipping container so that it will be immediately apparent to the laboratory personnel receiving the container, but will not be damaged or lost during transport. The shipping container will be sealed so that it will be obvious if the seal has been tampered with or broken.

4.4 QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

Samples must be collected, preserved, transported, and analyzed in such a manner that sampling results yield information which provides a reliable representation of the soil and groundwater quality at the site. To meet this requirement, the procedures described in Sections 4.1 and 4.2 will be followed during sample collection, handling and analysis. In addition, laboratory QC samples will be analyzed as described in Sections 4.1.2 and 4.2.4.

Field QA/QC for groundwater and soil will include collection of field duplicates, rinseate blanks, and trip blanks. Groundwater QA/QC sampling will include one duplicate sample (minimum frequency of 10 percent), one rinseate blank, and one trip blank for each cooler with samples designated for VOC analysis. Soil QA/QC sampling will include two duplicates (minimum frequency of 10 percent), one rinseate blank, and one trip blank for each cooler with samples designated for VOC analysis.

4.5 MANAGEMENT OF INVESTIGATION-DERIVED WASTES

Soil cuttings generated during drilling will be screened with a PID or a TVHA. Those cuttings that exhibit staining, odor, or headspace readings above background levels will be placed in US Department of Transportation (DOT)-approved 55-gallon drums. The drums will be labeled with the site name, drilling date, borehole number, and depth intervals. The contaminated soil will be transported to the Maxwell AFB contaminated soil staging area and will be disposed of in accordance with the current procedures for ongoing remedial investigations at Maxwell AFB and Gunter Annex. To minimize cuttings disposal costs, cuttings showing no field evidence of contamination will either be replaced into the borehole from which they were generated or spread on the ground surface adjacent to each borehole.

SECTION 5

SITE CONFIRMATION SAMPLING REPORT FORMAT

Following receipt of the laboratory analytical results, a draft confirmation soil and groundwater sampling report will be prepared and submitted to ADEM, Maxwell AFB, and AFCEE.

The report will contain the following information for Site ST-001:

- Site plot plan showing sampling locations;
- Summary of field activities;
- Assessment of analytical results in comparison to applicable ADEM soil cleanup criteria for petroleum hydrocarbons, PAHs, lead, and BTEX;
- Assessment of analytical results in comparison to applicable ADEM groundwater cleanup criteria for PAHs, VOCs, lead, and BTEX;
- Assessment of the potential for RNA in groundwater;
- Evaluation of the applicability and anticipated effectiveness of using a bio-attenuation stimulant (i.e., oxygen release compound) to promote RNA aerobic degradation pathways;
- ADEM required information including ADEM site classification and groundwater monitoring forms, site-specific monitoring well elevation data (based on area benchmarks or topographic maps), and depth to groundwater (referenced to the tops of monitoring well casings or ground level);
- Laboratory analytical reports and chain-of-custody forms;
- Borehole logs; and
- Conclusions and recommendations for NFRAP and site closure, additional cleanup action, or continued groundwater monitoring .

SECTION 6

MAXWELL AFB SUPPORT REQUIREMENTS

The following Maxwell AFB support is needed prior to the arrival of the drillers and the Parsons ES team:

- Assistance in obtaining drilling and digging permits.
- Arrangement of Gunter Annex and site access for Parsons ES and the drilling subcontractor.
- Provision of a potable water supply for drilling and decontamination activities.
- Assistance in handling/disposal of contaminated soil cuttings, if encountered during drilling activities, in accordance with Section 4.5.

SECTION 7

PROJECT SCHEDULE

The following schedule is contingent upon approval of this confirmation SAP and fulfillment of the Maxwell AFB support requirements outlined in Section 6.

Event	Date
Submit Draft Confirmation SAP to AFCEE, and Maxwell AFB	28 March 1997
Receipt of AFCEE and Maxwell AFB Comments	8 April 1997
Submit Draft Final SAP to AFCEE, Maxwell AFB, and ADEM*	9 May 1997
Receipt of AFCEE, Maxwell AFB, and ADEM Comments, if any	6 June 1997
Submit Final SAP to AFCEE, Maxwell AFB, and ADEM, if necessary*	20 June 1997
Begin Confirmation Sampling	7 July 1997
Submit Draft Confirmation Sampling Report to AFCEE and Maxwell AFB	12 September 1997
Receipt of AFCEE and Maxwell AFB Comments	3 October 1997
Submit Draft Final Confirmation Sampling Report to AFCEE, Maxwell AFB, and ADEM	24 October 1997

* Copies of SAP for ADEM sent to Maxwell AFB for submittal.

SECTION 8

POINTS OF CONTACT

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SECTION 9

REFERENCES CITED

ADEM, 1995. Alabama Underground Storage Tank Release Investigation and Corrective Action Guidance Manual. May.

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APPENDIX B
BORING LOGS, GROUNDWATER SAMPLING FORMS

GEOLOGIC BORING LOG

BORING NO. SB01 | CONTRACTOR: CCI | DATE SPUD: 7/8/97 09:15
CLIENT: AFCEE | RIG TYPE: CME | DATE CMPL: 7/8/97
JOB NO.: 726876.24120 | DRLG METHOD: HSA | ELEVATION: NA
LOCATION: Gunter Annex ST-001 | BORING DIA.: 4.5" | TEMP.: 85-90°F
GEOLOGIST: J. Hall | DRLG FLUID: — | WEATHER: p. Sunny
COMMENTS:

Elev. (ft.)	Depth (ft.)	Profile	US CS	Geologic Description	Samples No.	Samples Depth (ft)	Sample Type	Penet. Res.	Remarks TIP = Bkgrnd/Reading (ppm)
	1		CL	CLAY, silty, brn., moist, tr sand no odor				3/4/6	0.8
	5		CL	SAA		4-6	D	3/4/6	0.0
	10				Lab 09:20	9-11	D	4/7/10/14	10.0
			SM	SAND, sm. silt, fine-grained grey/red no odor					
	15		CL	CLAY, silty, moist 14-14.5'		14-16	D	34/8/9	10.0
			SM	SAND, md-coarse, tr-sm gravel tan, moist no odor					
	20		GM-SW	SAA wet @ 21' more gravel	Lab 09:30	19-21	D	35/7/8	10.0
	25		CL	CLAY, silty, grey, v. moist			D	36/9/14	0.2
	30								

sl – slight	v – very	f – fine
tr – trace	lt – light	m – medium
sm – some	dk – dark	c – coarse
& – and	bf – buff	BH – Bore Hole
@ – at	brn – brown	SAA – Same As Above
w – with	blk – black	

SAMPLE TYPE
D – DRIVE
C – CORE
G – GRAB

C Core recovery
Core lost
Water level drilled

GEOLOGIC BORING LOG

BORING NO. SB-02 CONTRACTOR: CCI DATE SPUD: 7/8/97 09:50
CLIENT: AFCEE RIG TYPE: CME DATE CMPL: 7/8/97
JOB NO.: 726876.24120 DRLG METHOD: HSA ELEVATION: —
LOCATION: Gunter Annex ST-001 BORING DIA.: 4.5" TEMP.: 85-90'F
GEOLOGIST: J. Hall DRLG FLUID — WEATHER: P. Sunny
COMMENTS:

Elev. (ft.)	Depth (ft.)	Pro-file	US CS	Geologic Description	Samples No.	Samples Depth (ft)	Sample Type	Penet. Res.	Remarks TIP = Bkgrnd/Reading (ppm)
	1		CL	CLAY, silty, red/brn, moist		0-5			0.0
				no odor					
	5								
				SAA		5-7	D	12 20 18	0.2
			GP	SAND & GRAVEL, white/orange					
				moist (Fill?)					
	10								
				SAA (Fill?)		10-12	D	18 5 4	0.0
	15								
				SAA	Lab 10:05	15-17	D	7 3 1 1	0.0
	20			SAA orange @ 21'					
				wet @ 21' no odor	Lab 10:10	20-22	D	5 9 10 12	0.2
			CL	CLAY, silty, grey, wet		22-24	D	11 3 3 14	0.1
	25			no odor					
				TD					
	30								

al – slight v – very f – fine
tr – trace lt – light m – medium
sm – some dk – dark c – coarse
& – and bf – buff BH – Bore Hole
@ – at brn – brown SAA – Same As Above
w – with blk – black

SAMPLE TYPE
D – DRIVE C Core recovery
C – CORE
G – GRAB Core lost

Water level drilled

GEOLOGIC BORING LOG

BORING NO. SB03 CONTRACTOR: CCI DATE SPUD: 7/8/97 11:15
CLIENT: AFCEE RIG TYPE: CME DATE CMPL: 7/8/97
JOB NO.: 726876.24120 DRLG METHOD: HSA ELEVATION: —
LOCATION: Gunter Annex ST-001 BORING DIA.: 4.5" TEMP.: 90°F
GEOLOGIST: J. Hall DRLG FLUID — WEATHER: p.Sunny
COMMENTS:

Elev. (ft.)	Depth (ft.)	Pro-file	US CS	Geologic Description	Samples No.	Samples Depth (ft)	Sample Type	Penet. Res.	Remarks TIP = Bkgrnd/Reading (ppm)
	1		CL	CLAY, silty, red/brn, moist		0-5			
	5								
			CL	SAA, tr. gravel		5-7	D	2 2 3 4	0.0
	10								
			ML	SILT, tr clay, tr v.f. sand grey-red-orange, moist		10-12	D	6 8 14 18	2.0
	15								
			SP-SM	SAND, f-v.f., tr. silt, moist lt. grey	Lab 11:25	15-17	D	5 6 6 7	2.0
	20								
			GP	SAND & GRAVEL, wht, v. moist wet @ 21, orange @ 21.5	Lab 11:35	20-22	D	10 12 12 16	4.0
				SAA wet, grey stain sl. odor	Lab 12:00	22-24	D	9 9 12 6	400
	25								
	30								

al – slight v – very f – fine
tr – trace lt – light m – medium
sm – some dk – dark c – coarse
& – and bf – buff BH – Bore Hole
@ – at brn – brown SAA – Same As Above
w – with blk – black

SAMPLE TYPE
D – DRIVE C Core recovery
C – CORE
G – GRAB Core lost

Water level drilled

GEOLOGIC BORING LOG

BORING NO. SB04
CLIENT: AFCEE
JOB NO.: 726876.24120
LOCATION: Gunter Annex ST-001
GEOLOGIST: J. Hall
COMMENTS:

CONTRACTOR: CCI
RIG TYPE: CME
DRLG METHOD: HSA
BORING DIA.: 4.5"
DRLG FLUID: —

DATE SPUD: 7/8/97
DATE CMPL: 7/8/97
ELEVATION: —
TEMP.: 90°F
WEATHER: p.Sunny

Elev. (ft.)	Depth (ft.)	Pro-file	US CS	Geologic Description	Samples No.	Samples Depth (ft)	Sample Type	Penet. Res.	Remarks TIP = Bkgrnd/Reading (ppm)
	1		ML	SILT, clayey, brn., moist		0-5			
	5								
				SILT, sm. clay & f. sand, grey/red/ orange, moist		5-7	D		3.0
	10								
			ML-CL	SILT & CLAY, grey/red/orange moist, sl. odor - musty/fuel	Lab 12:05	10-12	D	9 9 10 20	4,000
	15								
			SP	SAND, lt. grey, moist, sl. odor		15-17	D	6 6 6 7	20
	20								
			GP	SAND & GRAVEL, white, v. moist, v. sl. odor, poor recovery		20-22	D	11 9 9	2.0
				SAA, wet		22-24	D	4 8 7 8	400
	25								
	30								

sl – slight	v – very	f – fine
tr – trace	lt – light	m – medium
sm – some	dk – dark	c – coarse
& – and	bf – buff	BH – Bore Hole
@ – at	brn – brown	SAA – Same As Above
w – with	blk – black	

SAMPLE TYPE

D – DRIVE	C	Core recovery
C – CORE		
G – GRAB		Core lost

Water level drilled

GEOLOGIC BORING LOG

BORING NO. SB05 | CONTRACTOR: CCI | DATE SPUD: 7/8/97 14:05
CLIENT: AFCEE | RIG TYPE: CME | DATE CMPL: 7/8/97
JOB NO.: 726876.24120 | DRLG METHOD: HSA | ELEVATION: —
LOCATION: Gunter Annex ST-001 | BORING DIA.: 4.5" | TEMP.: 95°F
GEOLOGIST: J. Hall | DRLG FLUID — | WEATHER: p.sunny
COMMENTS:

Elev. (ft.)	Depth (ft.)	Pro-file	US CS	Geologic Description	Samples No.	Samples Depth (ft)	Sample Type	Penet. Res.	Remarks TIP = Bkgrnd/Reading (ppm)
	1		CL	CLAY, silty, brn., moist		0-5			
	5			SAA		5-7	D	6,12,12	0.0
	10		GP	SAND & GRAVEL, brn/white, moist no odor					
	15			SAA, red-brn		10-12	D	5,2,3	0.0
	20			SAA lt grey-white no odor	Lab 14:15	15-17	D	24,5,5	2.0
	25			SAA		20-22	D	7,8,8	2.0
	30			SAA, grey stain, stg. odor v. moist-wet	Lab 14:25	22-24	D	6,7,7,10	40

sl – slight
tr – trace
sm – some
& – and
@ – at
w – with

v – very
lt – light
dk – dark
bf – buff
brn – brown
blk – black

f – fine
m – medium
c – coarse
BH – Bore Hole
SAA – Same As Above

SAMPLE TYPE
D – DRIVE
C – CORE
G – GRAB

C Core recovery
Core lost

Water level drilled

GEOLOGIC BORING LOG

BORING NO. SB06 | CONTRACTOR: CCI | DATE SPUD: 7/8/97 14:45
CLIENT: AFCEE | RIG TYPE: CME | DATE CMPL.: 7/8/97
JOB NO.: 726876.24120 | DRLG METHOD: HSA | ELEVATION: —
LOCATION: Gunter Annex ST-001 | BORING DIA.: 4.5" | TEMP.: 95°F
GEOLOGIST: J. Hall | DRLG FLUID: — | WEATHER: p. sunny
COMMENTS:

Elev. (ft.)	Depth (ft.)	Pro-file	US CS	Geologic Description	Samples No.	Samples Depth (ft)	Sample Type	Penet. Res.	Remarks TIP = Bkgrnd/Reading (ppm)
	1		CL	CLAY, silty, brn., moist		0-5			
	5								
			ML	SILT, clayey, grey/brn./red moist no odor		5-7	D	8 8 11 12	5.0
	10								
				SAA		10-12	D	4 7 10 12	7.0
			SM-SC	SAND, sm silt & clay, grey/red/ orange, moist					
	15								
			ML	SILT, clayey, sm. f. sand, orange	Lab	15-17	D	3 4 4 7	10.0
			SP	SAND, f.-v.f., lt grey, moist v. sl. odor	14:50				
	20								
			GP	SAND & GRAVEL lt grey, v. moist-wet - Wtr. @ ~21.5	Lab 15:00	20-22	D	7 11 6 10	7.0
			ML-CL	SILT & CLAY, sm. v.f. sand, grey, moist-wet, no odor		22-24	D	2 3 8 11	2.0
	25								
	30								

al – slight | v – very | f – fine
tr – trace | lt – light | m – medium
sm – some | dk – dark | c – coarse
& – and | bf – buff | BH – Bore Hole
@ – at | brn – brown | SAA – Same As Above
w – with | blk – black

SAMPLE TYPE
D – DRIVE
C – CORE
G – GRAB

C Core recovery
Core lost
Water level drilled

GEOLOGIC BORING LOG

BORING NO. SB07 | CONTRACTOR: CCI | DATE SPUD: 7/8/97 15:30
CLIENT: AFCEE | RIG TYPE: CME | DATE CMPL: 7/8/97
JOB NO.: 726876.24120 | DRLG METHOD: HSA | ELEVATION: —
LOCATION: Gunter Annex ST-001 | BORING DIA.: 4.5" | TEMP.: 95°F
GEOLOGIST: J. Hall | DRLG FLUID: — | WEATHER: p. sunny
COMMENTS:

Elev. (ft.)	Depth (ft.)	Profile	USCS	Geologic Description	Samples No.	Samples Depth (ft)	Sample Type	Penet. Res.	Remarks TIP = Bkgrnd/Reading (ppm)
	1		SM	SAND, silty, brn., moist		0-5			
	5								
			ML	SILT, clayey, orange-brn, moist no odor		5-7	D	15 3 7 8	2.0
	10			SAA					
			ML-CL	SILT, sm. f. sand + clay, red/grey, moist, no odor	Lab 15:50	10-12	D	4 6 12 18	4.0
	15								
			ML	SILT, sm clay, lt. brn, moist no odor		15-17	D	4 9 12	0.0
			GP	SAND & GRAVEL, white/orange, moist no odor					
	20								
				SAA, lt. grey-white moist no odor	Lab 16:00	20-22	D	3 7 8 12	4.0
				SAA, grey & orange wet @ 22.5		22-24	D	5 8 11 11	0.0
	25								
	30								

al – slight
tr – trace
sm – some
& – and
@ – at
w – with

v – very
lt – light
dk – dark
bf – buff
brn – brown
blk – black

f – fine
m – medium
c – coarse
BH – Bore Hole
SAA – Same As Above

SAMPLE TYPE
D – DRIVE
C – CORE
G – GRAB

C Core recovery

Core lost

Water level drilled

Sheet 1 of 1

GEOLOGIC BORING LOG

BORING NO. SB08 CONTRACTOR: CCI DATE SPUD: 7/8/97 16:20
CLIENT: AFCEE RIG TYPE: CME DATE CMPL: 7/8/97
JOB NO.: 726876.24120 DRLG METHOD: HSA ELEVATION: —
LOCATION: Gunter Annex ST-001 BORING DIA.: 4.5" TEMP.: ~90°F
GEOLOGIST: J. Hall DRLG FLUID — WEATHER: p.sunny
COMMENTS:

Elev. (ft.)	Depth (ft.)	Pro-file	US CS	Geologic Description	Samples No.	Samples Depth (ft)	Sample Type	Penet. Res.	Remarks TIP = Bkgrnd/Reading (ppm)
	1		ML	SILT, sm clay, brn, moist		0-5			
	5			SAA		5-7	D	4 5 10 14	0.0
	10		GP	SAND & GRAVEL, red/brn/orange, moist, no odor					
	15			SAA, orange		10-12	D	4 12 13 14	2.0
	20		GP-GC	SAND & GRAVEL, sm. clay & silt, orange-brn., moist, no odor	Lab 16:30	15-17	D	6 5 4 6	3.0
				SAA wet @ ~21.5	Lab 16:40		D	3 3 4 3	5.0
	25			SAA			D	3 3 3 4	1.0
			CL	CLAY, silty, grey, v. moist no odor					
	30								

sl – slight	v – very	f – fine
tr – trace	lt – light	m – medium
sm – some	dk – dark	c – coarse
& – and	bf – buff	BH – Bore Hole
@ – at	brn – brown	SAA – Same As Above
w – with	blk – black	

SAMPLE TYPE
D – DRIVE C Core recovery
C – CORE
G – GRAB Core lost

Water level drilled

GROUND WATER SAMPLE

Project Name Gunter Annex
Project Number 726876.24120

Sample Number GMW-1

Type of Sample: (grab) composite depth interval other _____

Bailer Volume (BV)
Bailer Inside Diameter (BID) _____ (in)
Bailer Length (L) _____ (ft)
$(BID/24)^2(L)(\pi)(7.48)$ _____ (gal/bailer)

Total Well Depth (TD) 34.6 (ft)
Static Water Level (SWL) 26.1 (ft)
Water Column (TD-SWL) 8.5 (ft)
Casing Inside Diameter (CID) 2.in (in)
Casing Volume (CV)
$(CID/24)^2(TD-SWL)(\pi)(7.48)$ 1.4 (gal/casing)

Bails/Casing Volume (BCV)
CV/BV or $\frac{(CID/24)^2(TD-SWL)}{(BID/24)^2(L)}$ _____ (bails/casing volume)

Purge Volume (PV) 4.6 ~~(casings)~~ Gal.
(BCV)(PV) _____ (bails)

Time	~~Casing~~/ ~~Bail~~ No. Gal.	Temp °C	pH	Elec Cond µS/cm	DO mg/L	Redox mV	Odor	Visual Appearance
1643	0.1	22.2	NA	32.4	6.79		None	clear
1650	1.0	21.1		32.6	6.89		"	"
1657	2.0	21.0		32.7	6.88		"	"
1705	3.0	20.9		32.7	6.89		"	"
1713	4.0	20.9		32.7	6.88			
1719	4.6	20.9		32.7	6.92	177		

Total Volume Removed (PV) 3 (casings)
(DV)(CV) 4.6 (gallons)

Weather clear, sl breeze, ~97°F, humid

Date Sampled 7/9/97
Time Sampled 1725

Name of Sampler David Teets

GROUND WATER SAMPLE

Project Name Counter Annex
Project Number 726876.24120

Sample Number GU-GMW2

Type of Sample: (grab) composite depth interval other _____

Bailer Volume (BV)
Bailer Inside Diameter (BID) _____ (in)
Bailer Length (L) _____ (ft)
$(BID/24)^2(L)(\pi)(7.48)$ _____ (gal/bailer)

Total Well Depth (TD) 28.2 (ft)
Static Water Level (SWL) 24.24 (ft) 24.92 - after purge
Water Column (TD-SWL) 4 (ft) .16 gal/ft
Casing Inside Diameter (CID) _____ (in)
Casing Volume (CV)
$(CID/24)^2(TD-SWL)(\pi)(7.48)$ 0.65 (gal/casing)

Bails/Casing Volume (BCV)
CV/BV or $\frac{(CID/24)^2(TD-SWL)}{(BID/24)^2(L)}$ _____ (bails/casing volume)

Purge Volume (PV)
(BCV)(PV) 2.0 (~~casings~~) Gal.
_____ (bails)

Time	~~Casing~~/ ~~Bail~~ No. Gal.	Temp °C	pH	Elec Cond µS/cm	D.O mg/l	Redox mV	Odor	Visual Appearance
14:00	1 l	23		45.2	5.57		sl odor	clear
	.5 gal	22.0		42.5	5.33			
14.10	1.0	21.8		42.0	5.25			
	1.5	21.8		41.6	5.17			
14:20	2.0	21.8		41.6	5.18			
7/10/92	16:10		4.40			137		

Total Volume Removed (PV) 3+ (casings)
(DV)(CV) 2.0 (gallons)

Weather overcast, ~90°F, sl breeze, sl rain

Date Sampled 7/9/97
Time Sampled 14:20

Name of Sampler David Teets

GROUND WATER SAMPLE

Project Name Gunter Annex
Project Number 726876.24120

Sample Number GMW3

Type of Sample: (grab) composite depth interval other _____

Bailer Volume (BV)
Bailer Inside Diameter (BID) _____(in)
Bailer Length (L) _____(ft)
$(BID/24)^2(L)(\pi)(7.48)$ _____(gal/bailer)

Total Well Depth (TD) 29.8 (ft)
Static Water Level (SWL) 21.8 (ft)
Water Column (TD-SWL) 8.0 (ft)
Casing Inside Diameter (CID) _____(in)
Casing Volume (CV)
$(CID/24)^2(TD-SWL)(\pi)(7.48)$ 1.28 (gal/casing)

Bails/Casing Volume (BCV)

$$CV/BV \text{ or } \frac{(CID/24)^2(TD-SWL)}{(BID/24)^2(L)}$$ _____(bails/casing volume)

Purge Volume (PV) 3.84 (~~casings~~) Gal.
(BCV)(PV) _____(bails)

Time	~~Casing~~/ ~~Bail~~ No. gal.	Temp °C	pH	Elec Cond	Redox MV	D.O mg/L	Odor	Visual Appearance
11:10	0.5	23.6	5.63	39.0	45.0	3.76	—	Clear
11:15	1.0	23.2	5.01	35.4	79.2	3.72	—	"
11:20	2.0	23.1	4.72	35.9	104.9	3.58	—	"
11:29	3.0	23.1	4.64	35.7	109.3	3.53	—	"
11:35	4.0	23.1	4.62	35.8	111	3.52	—	"

Total Volume Removed (PV) 3+ (casings)
(DV)(CV) 4.0 (gallons)

Weather Sunny ~ 85°F

Date Sampled 7/10/97
Time Sampled 11:40

Name of Sampler John Hall

GROUND WATER SAMPLE

Project Name Custer Annex
Project Number 726876.24120

Sample Number GMW-4

Type of Sample: (grab) composite depth interval other _____

Bailer Volume (BV)
Bailer Inside Diameter (BID) _____ (in)
Bailer Length (L) _____ (ft)
$(BID/24)^2(L)(\pi)(7.48)$ _____ (gal/bailer)

Total Well Depth (TD) 29.1 (ft)
Static Water Level (SWL) 21.42 (ft)
Water Column (TD-SWL) 8.48 (ft)
Casing Inside Diameter (CID) 2. (in)
Casing Volume (CV)
$(CID/24)^2(TD-SWL)(\pi)(7.48)$ 1.4 (gal/casing)

Bails/Casing Volume (BCV)
CV/BV or $\frac{(CID/24)^2(TD-SWL)}{(BID/24)^2(L)}$ _____ (bails/casing volume)

Purge Volume (PV) 6.5 ~~(casings)~~ gal.
(BCV)(PV) _____ (bails)

Time	Casing/ Bail No.	Temp °C	pH	Elec Cond	Redox mV	DO mg/L	Odor	Visual Appearance
0934	0.4	22.2	5.76	47.9	122.5	0.87	pet. odor	clear
0942	1.3	21.5	5.68	64.0	92.0	0.39	"	"
0948	2.3	21.6	5.88	98.0	72.8	0.29		
0956	3.3	21.7	5.87	109.0	75.2	0.25		
1006	4.5	21.7	5.96	115.0	66.4	0.22		
1012	~~5.0~~ 5.5	21.7	6.00	117.3	62.3	0.21		
1018	6.0	21.7	6.08	119.4	39.0	0.21		
1025	6.5	21.7	6.07	120.2	37.2	0.20		

Total Volume Removed (PV) 3+ (casings)
(DV)(CV) 6.5 (gallons)

Weather clear, sl. breeze, ~90°F

Date Sampled 7/10/97
Time Sampled 10:30

Name of Sampler David Teets

GROUND WATER SAMPLE

Project Name Gunter
Project Number 726876.24120

Sample Number GMW 44

Type of Sample: (grab) composite depth interval other _____

Bailer Volume (BV)
Bailer Inside Diameter (BID) _____(in)
Bailer Length (L) _____(ft)
$(BID/24)^2(L)(\pi)(7.48)$ _____(gal/bailer)

Total Well Depth (TD) 32.30 (ft)
Static Water Level (SWL) 19.80 (ft)
Water Column (TD-SWL) 12.5 (ft)
Casing Inside Diameter (CID) _____(in)
Casing Volume (CV)
$(CID/24)^2(TD-SWL)(\pi)(7.48)$ 2.0 (gal/casing)

Bails/Casing Volume (BCV)

CV/BV or $\frac{(CID/24)^2(TD-SWL)}{(BID/24)^2(L)}$ _____(bails/casing volume)

Purge Volume (PV)
(BCV)(PV) _____(casings)
_____(bails)

Time	~~Casing/~~ ~~Bail~~ No. 9al	Temp °C	pH	Elec Cond	~~Redox~~ mV	D.O. mg/L	Odor	Visual Appearance
1435	1 gal	23.2	5.81	23.2	87.1	0.61	fuel odor	clear
14:46	2	23.0	5.85	23.0	76.5	1.13	"	"
1450	3	23.0	5.84	22.9	72.6	1.48	"	"
15:00	4	22.8	5.83	22.8	69.5	1.63	"	"
	5	22						
15:12	6	22.7	5.81	22.8	71.7	1.75	"	"

Total Volume Removed (PV) 3+ (casings)
(DV)(CV) 6 (gallons)

Weather p.cloudy, ~90°F

Date Sampled 7/10/97
Time Sampled 15:20

Name of Sampler John Hall

GROUND WATER SAMPLE

Project Name Gunter
Project Number 726876.24120

Sample Number GMW-45

Type of Sample: grab composite depth interval other _____

Bailer Volume (BV)
Bailer Inside Diameter (BID) _____ (in)
Bailer Length (L) _____ (ft)
$(BID/24)^2(L)(\pi)(7.48)$ _____ (gal/bailer)

Total Well Depth (TD) 35.0 (ft)
Static Water Level (SWL) 25.57 (ft)
Water Column (TD-SWL) 9.43 (ft)
Casing Inside Diameter (CID) 2.0 (in)
Casing Volume (CV)
$(CID/24)^2(TD-SWL)(\pi)(7.48)$ 1.5 (gal/casing)

Bails/Casing Volume (BCV)
CV/BV or $\frac{(CID/24)^2(TD-SWL)}{(BID/24)^2(L)}$ _____ (bails/casing volume)

Purge Volume (PV)
(BCV)(PV) _____ (casings)
_____ (bails)

Time	~~Casing/~~ ~~Bail~~ No. gal	Temp °C	pH	Elec Cond	DO mg/L	Redox mV	Odor	Visual Appearance
1520	0.1	22.9		41.6 mS/cm	7.13		None	Clear
1528	1.0 gal	21.0		40.1	~~7.10~~ 7.38			
1535	2.0	20.8		39.3	7.51			
1542	3.0	20.9		39.3	7.47			
1550	4.0	20.9		39.7	7.52			
1655	4.5	20.9		39.8	7.52			
7/10 15:50			4.69			116		

Total Volume Removed (PV) ~3 (casings)
(DV)(CV) 4.5 (gallons)

Water level after purge 25.58 btoc

Weather clear ~95°F, sl breeze

Date Sampled 7/9/97
Time Sampled 1615

Name of Sampler David Teets

APPENDIX C

THIESSEN POLYGON METHOD CALCULATIONS

THEISSEN POLYGON METHOD ANALYSIS FOR TOTAL BENZENE
GUNTER ANNEX, SITE ST-001

Polygon Element	Soil Boring	Soil Concentration Depth 1 (mg/kg)	Soil Concentration Depth 2 (mg/kg)	Soil Concentration Depth 3 (mg/kg)	Mean Soil Concentration $C_{avg,\,l}$ (mg/kg)	Element Area A_i (ft^2)	$A_i \times C_{avg,l}$ (ft^2 - mg/kg)	Area Weighted Average Concentration (mg/kg)
I	SB01	0.0005	0.0005	NA	0.0005	2910	1.455	
II	SB02	0.0005	0.0005	NA	0.0005	2000	1	
III	SB03	0.0005	0.0005	0.25	0.0837	2370	198	
IV	SB04	0.0030	NA	NA	0.0030	1390	4.17	
V	SB05	0.0005	1.0000	NA	0.5003	2240	1120.56	
VI	SB06	0.0010	0.0005	NA	0.0008	4010	3.0075	
VII	SB07	0.0005	0.0005	NA	0.0005	4830	2.415	
VIII	SB08	0.0010	0.0005	NA	0.0008	3160	2.37	
					TOTAL	22900	1300	**0.06**

Note:
A value equal to 1/2 the method detection limit substituted for non-detect values.

THEISSEN POLYGON METHOD ANALYSIS FOR TOTAL XYLENES
GUNTER ANNEX, SITE ST-001

Polygon Element	Soil Boring	Soil Concentration Depth 1 (mg/kg)	Soil Concentration Depth 2 (mg/kg)	Soil Concentration Depth 3 (mg/kg)	Mean Soil Concentration $C_{avg,\,l}$ (mg/kg)	Element Area A_i (ft^2)	$A_i \times C_{avg,l}$ (ft^2 - mg/kg)	Area Weighted Average Concentration (mg/kg)
I	SB01	0.001	0.001	NA	0.001	2910	2.91	
II	SB02	0.001	0.001	NA	0.001	2000	2	
III	SB03	0.001	0.001	0.55	0.184	2370	436	
IV	SB04	0.006	NA	NA	0.006	1390	8.34	
V	SB05	0.001	28.000	NA	14.0	2240	31400	
VI	SB06	0.001	0.001	NA	0.001	4010	4.01	
VII	SB07	0.001	0.001	NA	0.001	4830	4.83	
VIII	SB08	0.001	0.0015	NA	0.001	3160	3.95	
					TOTAL	22900	31900	1.39

Note:
A value equal to 1/2 the method detection limit substituted for non-detect values.

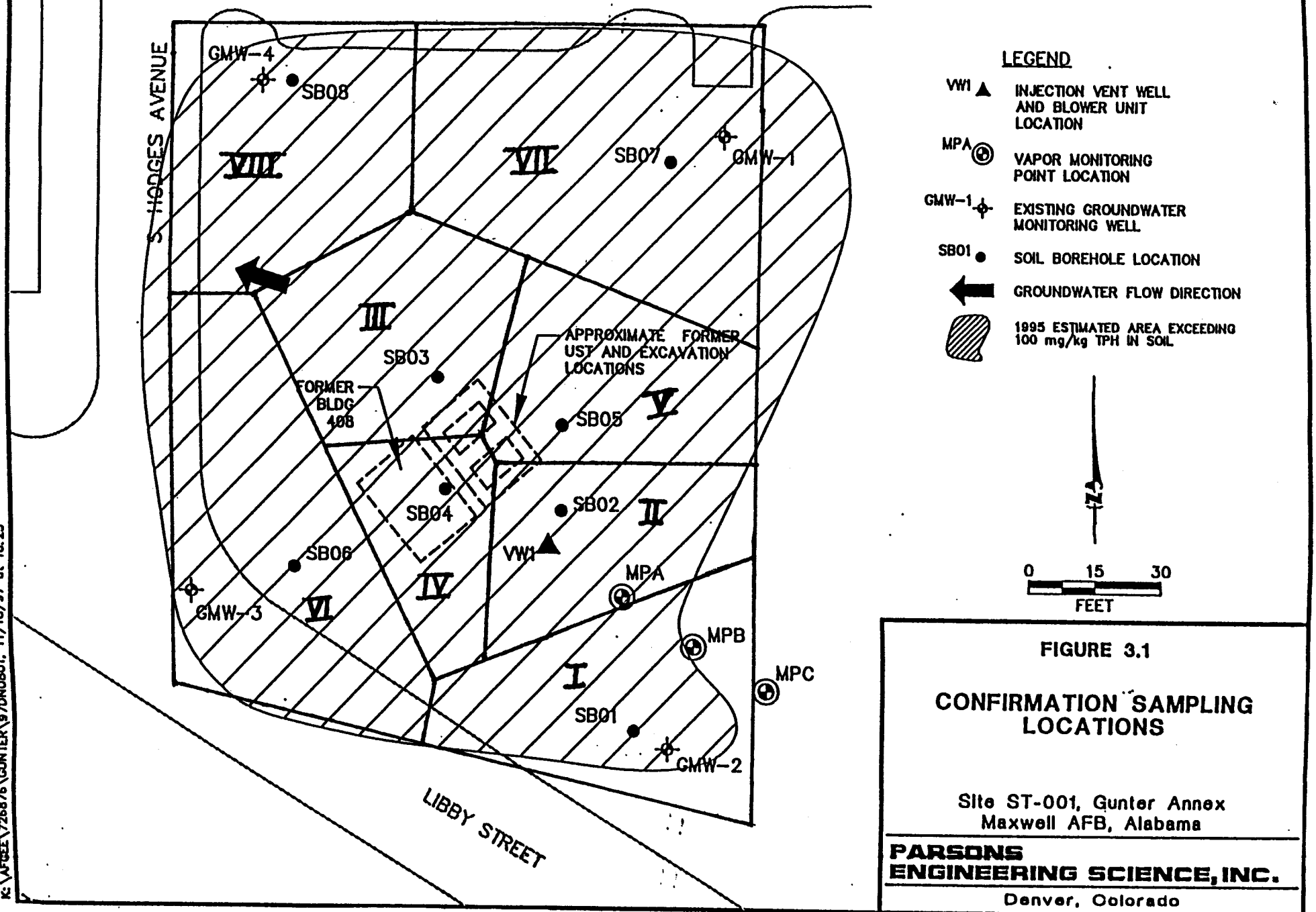


FIGURE 3.1

CONFIRMATION SAMPLING LOCATIONS

Site ST-001, Gunter Annex
Maxwell AFB, Alabama

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

3-2

K:\AFCEE\726876\GUNTER\97ON0801, 11/18/97 at 10:25

APPENDIX D
ADEM REPORTING FORMS

GROUNDWATER MONITORING REPORT

SUBMITTAL DATE:

___/___/___

FACILITY NAME: Maxwell AFB, Gunter Annex, Building 408

FACILITY ADDRESS: Maxwell AFB, Gunter Annex, Cong W.L. Dickinson Drive Montgomery, Alabama 36115

FACILITY I.D. NO.: 15048-101-014625

UST OR AST INCIDENT NO.: _____

BRIEFLY ANSWER THE FOLLOWING QUESTIONS REGARDING THIS SITE:

Number of monitoring wells at the site?	7
Number of monitoring wells containing Free Product?	0
Dissolved constituents above CALs?	Yes, below ACAL's
Dissolved constituents below CALs?	
Are free product recovery activities currently in progress?	No
If yes, what date did recovery activities commence?	

Are free product recovery reports being submitted to the UST Corrective Action Unit? YES ___ NO X
If yes, please indicate the submittal date of the most recent recovery report. _____
If no, please indicate reason (i.e. recently discovered or observed) and complete the following information: _____

Monitoring wells containing free product: Identify and indicate product thickness (ex. MW-2 / 4.0 inches) for this event:

None /_____ _____/_____ _____/_____ _____/_____

_____/_____ _____/_____ _____/_____ _____/_____

Are assessment activities currently being conducted on the site? If yes, indicate status of assessment activities. No

Is the site currently in remediation (approved CAP)? If yes, indicate status of remediation activities (ex. received approval to implement CAP, evaluating effectiveness of remediation system):

Soil remediation (bioventing) September 12, 1995 - present

See confirmation sampling and analysis report for Site ST-001, Former Building 408, Gunter Annex, Maxwell AFB, AL

Miscellaneous information not directly requested:

SUBMIT THIS FORM WITH THE FOLLOWING ATTACHMENTS:

- Scaled site map identifying: all monitoring wells, groundwater elevations, groundwater elevation contours, and primary groundwater flow direction
- Scaled site map identifying: all monitoring wells, free product thickness, and total dissolved BTEX for each monitoring well
- Scaled site map identifying: all monitoring wells, Benzene levels, MTBE levels (if applicable for each monitoring well), or other appropriate constituents detected at this site
- Table containing: historical groundwater elevations for each of the monitoring wells.
- Table containing: historical free product thickness, Benzene levels, MTBE levels (if applicable), Ethylbenzene, Toluene, Xylenes, total BTEX levels and other appropriate constituents detected at this site for each of the monitoring wells
- Copies of lab analysis sheets for this sampling event for each of the monitoring wells
- Copies of chain of custody documentation for this sampling event
- Brief narrative description of procedures utilized to obtain groundwater sampling data

Signature of Preparer of this Report:

Type or print Name: John Hall

Company Name: Parsons Engineering Science, Inc.

Company Address: 1700 Broadway, Suite 900, Denver, CO 80290

ADEM GROUNDWATER BRANCH

UST SITE CLASSIFICATION SYSTEM

CHECKLIST

Please read all of the following statements and mark either yes or no if the statement applies to your site. If you have conducted a Preliminary or Secondary Investigation, all questions should be answered. Closure site assessment reports may not provide you with all the necessary information, but answer the statements with the knowledge obtained during the closure site assessment.

SITE NAME: Maxwell Air Force Base, Gunter Annex, Bldg. 408
SITE ADDRESS: Maxwell AFB, Gunter Annex, Cong.W.L. Dickinson Dr. Montgomery, Alabama 36115

FACILITY I.D. NO.: 15048-010-014625
UST INCIDENT NO.:

OWNER NAME: U.S. Air Force Maxwell AFB, Gunter Annex
OWNER ADDRESS: Cong. W.L. Dickinson Drive, Montgomery, AL 36115

NAME & ADDRESS OF PERSON COMPLETING THIS FORM: John Hall
Parsons Engineering Science, Inc.
1700 Broadway, Suite 900, Denver, CO 80290

CLASSIFICATION	*DESCRIPTION*	*YES*	*NO*
CLASS A	IMMEDIATE THREAT TO HUMAN HEALTH, HUMAN SAFETY OR SENSITIVE ENVIRONMENTAL RECEPTOR		
A.1	Vapor concentrations at or approaching explosive levels that could cause health effects, are present in a residence or building.	☐	☒
A.2	Vapor concentrations at or approaching explosive levels are present in subsurface utility system(s), but no buildings or residences are impacted.	☐	☒
CLASS B	IMMEDIATE THREAT TO HUMAN HEALTH, HUMAN SAFETY OR SENSITIVE ENVIRONMENTAL RECEPTOR		
B.1	An active public water supply well, public water supply line, or public surface water intake is impacted or immediately threatened.	☐	☒
B.2	An active domestic water supply well, domestic water supply line or domestic surface water intake is impacted or immediately threatened.	☐	☒
B.3	The release is located within a designated Wellhead Protection Area I.	☐	☒
CLASS C	IMMEDIATE THREAT TO HUMAN HEALTH, HUMAN SAFETY OR SENSITIVE ENVIRONMENTAL RECEPTOR		
C.1	Ambient vapor/particulate concentrations exceed concentrations of concern from an acute exposure, or safety viewpoint.	☐	☒
C.2	Free product is present on the groundwater, at ground surface, on surface water bodies, in utilities other than water supply lines, or in surface water runoff.	☐	☒

CLASSIFICATION	DESCRIPTION	YES	NO
CLASS D	SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
D.1	There is a potential for explosive levels, or concentrations of vapors that could cause acute effects, to accumulate in a residence or other building.	☐	☒
D.2	A non-potable water supply well is impacted or immediately threatened.	☐	☒
D.3	Shallow contaminated surface soils are open to public access, and dwellings, parks, playgrounds, day care centers, schools or similar use facilities are within 500 feet of those soils.	☐	☒
CLASS E	SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
E.1	A sensitive habitat or sensitive resources (sport fish, economically important species, threatened and endangered species, etc.) are impacted and affected.	☐	☒
CLASS F	SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
F.1	Groundwater is impacted and a public well is located within 1 mile of the site.	☐	☒
F.2	Groundwater is impacted and a domestic well is located within 1,000 feet of the site.	☐	☒
F.3	Contaminated soils and/or groundwater are located within designated Wellhead Protection Areas (Areas II or III).	☐	☒
CLASS G	SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
G.1	Contaminated soils and/or groundwater are located within areas vulnerable to contamination from surface sources.	☐	☒
CLASS H	SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
H.1	Impacted surface water, stormwater or groundwater discharges within 500 feet of a surface water body used for human drinking water, whole body water-contact sports, or habitat to a protected or listed endangered plant and animal species.	☐	☒
CLASS I	LONG TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
I.1.	Site has contaminated soils and/or groundwater but does not meet any of the above mentioned criteria.	☒	☐

ADDITIONAL COMMENTS:

Complete the classification evaluation questions listed above. Upon completion, determine the highest rank of the site (A.1 is the highest rank) based on the statements answered with a yes.

Enter the determined classification ranking:	1.1

ADEM GROUNDWATER BRANCH
SITE CLASSIFICATION CHECKLIST
(5/8/95)

APPENDIX E
LABORATORY ANALYTICAL RESULTS

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED: 10-JUL-1997
REPORT NUMBER: D97-8568
REPORT DATE: 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
Grand JCT, CO 81503
ATTENTION : Mr. John Hall

PROJECT : 726876.24120 Gunter Annex

CASE NARRATIVE SUMMARY

This is an ITS Level 4 data package, containing results for the analysis of volatile organics, semivolatile organics and metals by EPA methodologies.

EPA Method 8020 Volatile Aromatics Analysis

Sample Dilutions

Samples D97-8568-7 and -8 were analyzed at dilutions of 1:500 and 1:5, respectively, due to high levels of non-target analytes.

Sample D97-8568-10 was analyzed at a 1:1000 dilution, respectively, due to high levels of target analytes.

Second Column Confirmations

For the analysis of sample D97-8568-10, the results for the target analytes toluene and m,p-xylene did not agree within ±50% between the primary and confirmation columns. Therefore, the lower result was reported, and should be considered unconfirmed.

Method 8015M Total Volatile Petroleum Hydrocarbons Analysis

Sample Dilutions

Samples D97-8568-7, -8 and -10 were analyzed at dilutions of 1:500, 1:50 and 1:1000, respectively, due to high levels of target analytes.

Method 8015M Total Extractable Petroleum Hydrocarbons Analysis

No observations were documented for the analysis of total extractable petroleum hydrocarbons.

Method 8310 Polynuclear Aromatic Hydrocarbons Analysis

Surrogate Recoveries

For the original analysis of sample D97-8568-13, the recovery for the surrogate p-terphenyl was outside of the QC limits of 22-167%. Therefore, the sample was re-extracted outside of holding time and reanalyzed, yeilding a surrogate recovery within QC limits. The results of the original analysis were reported for this data package. The results for the reanalysis are included in the data package for confirmation.

Second Detector Confirmations

For the analysis of sample D97-8568-7, the results for the target analyte dibenzo(a,h)anthracene did not agree within ±50% between the UV and fluorescence detectors. Therefore, the lower result was reported, and should be considered unconfirmed.

For the analysis of sample D97-8568-10, the results for the target analytes dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene did not agree within ±50% between the UV and fluorescence detectors. Therefore, the lower results were reported, and should be considered unconfirmed.

Metals Analysis

Matrix Spike Analysis

For the matrix spike/matrix spike duplicate analysis of sample D97-8568-1, the recoveries for the spiking compound lead were outside of the QC limits of 75-125%, because the concentration of this analyte in the unspiked sample was greater than four times the spiking level of 2.00 mg/Kg. Since the laboratory control spike analysis was within QC limits, the results were accepted.

No further observations were documented during the sample analysis for this project.

If there are any questions, feel free to contact Ms. Janice McKittrick, at (972) 238-5591.

Alan Humason
Data Review Group Leader

ITS Environmental Laboratories 1089 East Collins Blvd., #100 Richardson, TX 75081 (972) 238-5591 (Page 1 of 1)

CHAIN OF CUSTODY RECORD

Report to:
Company: Parsons ES
Address: 257A 28 Rd
Grand Jct, CO 81503
Contact: John Hall
Phone: 970 244 8829
Fax: "

Invoice to
Company: Parsons ES
Address: 1700 Broadway #900
Denver CO 80290
Contact: John Ratz
Phone: 303 831 8100
PO/SO #: 726876.24120

Lab use Due Date:

Temp. of coolers when received (C°): 1 2 3 4 5

Custody Seal N / Y
Intact N / Y
Screened For Radioactivity ☐

Sampler's Name: John F. Hall
Sampler's Signature:

Proj. No. 726876.24120
Project Name: Gunter Annex Option 2

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	No./Type of Containers[2] VOA	A/G 1 Lt.	250 ml	P/O	TPH SW8015M Diesel/Gasoline	BTEX SW 8020	PAH SW 8310	Lead SW 7421	85681	Lab Sample ID (Lab Use Only)
S	7/8/97	1450		X	GU-SB06-16				2	X	X	X	X	11	
S	7/8/97	1500		X	GU-SB06-21				2	X	X	X	X	12	
S	7/8/97	1550		X	GU-SB07-11				2	X	X	X	X	13	
S	7/8/97	1600		X	GU-SB07-21				2	X	X	X	X	14	
S	7/8/97	1630		X	GU-SB08-16				2	X	X	X	X	15	
S	7/8/97	1640		X	GU-SB08-21				2	X	X	X	X	16	
					TB-1									17	Trip Blank
					COOLER TEMPERATURE WHEN RECEIVED									SCREENED FOR RADIOACTIVITY	
					°C 4										

Turn around time ☒ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
	7/9/97	10:00	Fed Ex	7/9/97	10:00
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
			[illegible]	7/10/97	10:12
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks

Client's delivery of samples constitutes acceptance of Inchcape/ITS-Dallas terms and conditions contained in the Price Schedule.

[1] Matrix: WW - Wastewater; W - Water; S - Soil; SD - Solid; L - Liquid; A - Air Bag; C - Charcoal tube; SL - Sludge; O - Oil
[2] Container: VOA - 40 ml vial; A/G - Amber / Or Glass 1 Liter; 250 ml - Glass wide mouth; P/O - Plastic or other

Inchcape cannot accept verbal changes. Please Fax written changes to 972-238-5592

OFFICE USE ONLY

ITS Environmental Laboratories 1089 East Collins Blvd., #100 Richardson, TX 75081 (972) 238-559 (Page 1 of 2) CHAIN OF CUSTODY RECORD

Report to:
Company: Parsons ES
Address: 257A 28 Rd
Grand Junction, CO 81503
Contact: John Hall
Phone: (970) 244-8829
Fax: "
Alternate John Ratz

Invoice to
Company: Parsons ES
Address: 1700 Broadway #900
Denver CO 80290
Contact: John Ratz
Phone: (303) 831-8100
PO/SO #: 726876.24120

Lab use Due Date:

Temp. of coolers when received (C°): 1 | 2 | 3 | 4 | 5

Custody Seal N / Y
Intact N / Y
Screened For Radioactivity ☐

Sampler's Name: John F. Hall
Sampler's Signature:

Proj. No.: 726876.24120
Project Name: Gunter Annex, Bioventing Option 2

ANALYSIS REQUESTED: TPH SW8015 M Diesel/Gasoline; BTEX SW 8020; PAH SW 8310; Lead SW 7421

8568 ORIGINAL

Lab Sample ID (Lab Use Only)

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	No./Type of Containers[2] VOA	A/G 1 Lt.	250 ml	P/O	TPH	BTEX	PAH	Lead	Lab Sample ID
S	7/8/97	0920		X	GU-SB01-10				2	X	X	X	X	1
S	7/8/97	0930		X	GU-SB01-20				2	X	X	X	X	2
S	7/8/97	1005		X	GU-SB02-16				2	X	X	X	X	3
S	7/8/97	1010		X	GU-SB02-21				2	X	X	X	X	4
S	7/8/97	1125		X	GU-SB03-16				2	X	X	X	X	5
S	7/8/97	1135		X	GU-SB03-21				2	X	X	X	X	6
S	7/8/97	1200		X	GU-SB03-23				2	X	X	X	X	7
S	7/8/97	1205		X	GU-SB04-11				2	X	X	X	X	8
S	7/8/97	1415		X	GU-SB05-16				2	X	X	X	X	9
S	7/8/97	1425		X	GU-SB05-23				2	X	X	X	X	10

SCREENED FOR RADIOACTIVITY

COOLER TEMPERATURE WHEN RECEIVED 4 °C

Turn around time: ☒ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
	7/9/97	10:00	Fed Ex	7/9/97	10:00
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
			For Somerlot	7/10/97	10:12
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks

Client's delivery of samples constitutes acceptance of Inchcape/ITS-Dallas terms and conditions contained in the Price Schedule.

[1] Matrix: WW - Wastewater; W - Water; S - Soil; SD - Solid; L - Liquid; A - Air Bag; C - Charcoal tube; SL - Sludge; O - Oil
[2] Container: VOA - 40 ml vial; A/G - Amber / Or Glass 1 Liter; 250 ml - Glass wide mouth; P/O - Plastic or other

Inchcape cannot accept verbal changes. Please Fax written changes to 972-238-5592

OFFICE USE ONLY

COOLER RECEIPT FORM

Date Received: 7-10-97 Project: 76876.24120

Date Logged-in: _____ Received by: Jon Sowers

No. of coolers received: 1 Cooler Numbers: _____

1	Shipping slip. If yes, carrier and bill number: 972565546	(Yes)	No
2	Custody seals on cooler. If yes, how many and where: 1-front 1-back	(Yes)	No
3	Custody seals intact.	(Yes)	No
4	Chain of Custody in plastic.	(Yes)	No
5	Chain of Custody filled out properly.	(Yes)	No
6	Client signed Chain of Custody.	(Yes)	No
7	Samples shipped on ice. If no, temperature of cooler: _____	(Yes)	No
8	All bottles sealed.	Yes	(No)
9	All bottles received intact.	(Yes)	No
10	Labels in good condition and complete.	(Yes)	No
11	Sample labels agree with Chain of Custody.	(Yes)	No
12	Correct containers used.	(Yes)	No
13	Correct preservative used.	(Yes)	No
14	Sufficient sample provided.	(Yes)	No
15	Bubbles absent from VOA.	(Yes)	No
16	Comments (use corrective action form if necessary): _____		

** If client or project manager need to be notify for any reason, please use the Case Narrative/Corrective Action green form.

ITS Intertek Testing Services
Environmental Laboratories

013

FedEx. USA Airbill

Tracking Number 972565546 1

FedEx Retrieval Copy

248 1000 [redacted] 3761597 6078

1 From

Date 7/9/97 Sender's FedEx Account Number 167402461 [redacted]

Sender's Name John Hall Phone (970)244-8829 ~~(303) 831-8100~~

Dept/Floor/Suite/Room

Company ENGINEERING SCIENCE INC

Address 1700 BROADWAY STE 900

City DENVER State CO Zip 80202

2 Your Internal Billing Reference Information

3 To

Recipient's Name Janice McKitrick Phone (972)238-5591

Dept/Floor/Suite/Room

Company ITS Environmental Laboratories

Address 1089 E. Collins Blvd. #100

City Richardson State TX Zip 75081

For HOLD at FedEx Location check here

1 ☐ Hold Weekday (Not available with FedEx First Overnight) 31 ☐ Hold Saturday (Not available with FedEx First Overnight or FedEx Standard Overnight)

For Saturday Delivery check here

3 ☐ (Extra Charge Not available to all locations) (Not available with FedEx First Overnight or FedEx Standard Overnight)

9 7 2 5 6 5 5 4 6 1

4a Service Delivery commitment may be later in some areas

1 ☒ FedEx Priority Overnight (Next business morning) 5 ☐ FedEx Standard Overnight (Next business afternoon) 3 ☐ FedEx 2Day* (Second business day)

2 ☐ FedEx Govt. Overnight (Authorized user only)

7 ☐ FedEx Overnight Freight 8 ☐ FedEx 2Day Freight

(For packages over 150 pounds. Call for delivery schedule)

6 ☐ NEW FedEx First Overnight (Earliest next business morning delivery, to select locations) (Higher rates apply)

*FedEx Letter Rate not available. Minimum charge: One pound FedEx 2Day rate

4b Packaging

6 ☐ FedEx Letter* 2 ☐ FedEx Pak* 3 ☐ FedEx Box 4 ☐ FedEx Tube 1 ☒ Other Packaging

(Declared value limit $500)

5 Special Handling

Does this shipment contain dangerous goods?

4 ☐ Yes (1 copy per attached Shipper's Declaration) ☐ Yes (Shipper's Declaration not required)

6 ☐ Dry Ice (Dry Ice, 9, UN 1845, III, ____ x ____ kg) (Dangerous Goods Shipper's Declaration not required)

CA ☐ Cargo Aircraft Only

6 Payment

Bill to: 1 ☒ Sender (Account no. in block 1 will be billed) 2 ☐ Recipient 3 ☐ Third Party 4 ☐ Credit Card 5 ☐ Cash/Check

(Enter FedEx account no. or Credit Card no. below)

☐ Obtain Recipient FedEx Account No.

FedEx Account No. ____

Credit Card No. ____ Exp. Date ____

Total Packages 1 Total Weight 57 [redacted] Total Charges $ ____

*When declaring a value higher than $100 per package, you pay an additional charge. See SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY section for further information

Credit Card Auth. ____

7 Release Signature

Your signature authorizes Federal Express to deliver this shipment without obtaining a signature and agrees to indemnify and hold harmless Federal Express from any resulting claims

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Intertek Testing Services NA Inc.
1089 East Collins Boulevard Richardson, TX 75081
Telephone (972) 238-5591 Fax (972) 238-5592

ITS Intertek Testing Services
Environmental Laboratories

ANALYTICAL REPORT

DATE RECEIVED : 10-JUL-1997
REPORT NUMBER : D97-8568
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall
PROJECT : 726876.24120 Gunter Annex

Included in this data package are the analytical results for the sample group which you have submitted to Intertek Testing Services for analysis. These results are representative of the samples as received by the laboratory.

The information contained herein has undergone extensive review and is deemed accurate and complete. Sample analysis and quality control were performed in accordance with all applicable protocols. Please refrain from reproducing this report except in its entirety.

If you have any questions regarding this report and its associated materials please call your Project Manager at (214) 238-5591.

We appreciate the opportunity to serve you and look forward to providing continued service in the future.

Martin Jeffus
General Manager

Intertek Testing Services NA Inc.
1089 East Collins Boulevard Richardson, TX 75081
Telephone (972) 238-5591 Fax (972) 238-5592

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-1
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.42 mg/Kg	< 1.42 mg/Kg	U
Acenaphthylene	1.82 mg/Kg	< 1.82 mg/Kg	U
Anthracene	0.521 mg/Kg	< 0.521 mg/Kg	U
Benzo(a)anthracene	0.0107 mg/Kg	< 0.0107 mg/Kg	U
Benzo(a)pyrene	0.0178 mg/Kg	< 0.0178 mg/Kg	U
Benzo(b)fluoranthene	0.0142 mg/Kg	< 0.0142 mg/Kg	U
Benzo(g,h,i)perylene	0.0592 mg/Kg	< 0.0592 mg/Kg	U
Benzo(k)fluoranthene	0.0130 mg/Kg	< 0.0130 mg/Kg	U
Chrysene	0.118 mg/Kg	< 0.118 mg/Kg	U
Dibenz(a,h)anthracene	0.0237 mg/Kg	< 0.0237 mg/Kg	U
Fluoranthene	0.166 mg/Kg	< 0.166 mg/Kg	U
Fluorene	0.166 mg/Kg	< 0.166 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0355 mg/Kg	< 0.0355 mg/Kg	U
Naphthalene	1.42 mg/Kg	< 1.42 mg/Kg	U

REPORT NUMBER : D97-8568-1
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Phenanthrene	0.498 mg/Kg	<	0.498 mg/Kg	U
Pyrene	0.213 mg/Kg	<	0.213 mg/Kg	U
p-Terphenyl (SS)			0.237 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-1
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	< 0.001 mg/Kg	U
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.063 mg/Kg	

Results are reported on Dry Weight basis when applicable.

Intertek Testing Services NA Inc.
1089 East Collins Boulevard Richardson, TX 75081
Telephone (972) 238-5591 Fax (972) 238-5592

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-1
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.8 mg/Kg	7.6 mg/Kg	J
Triacontane (SS)		8.68 mg/Kg	

Results are reported on Dry Weight basis when applicable.

Intertek Testing Services NA Inc.
1089 East Collins Boulevard Richardson, TX 75081
Telephone (972) 238-5591 Fax (972) 238-5592

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-1
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.18 mg/Kg	< 1.18 mg/Kg	U
Fluorobenzene (SS)		0.059 mg/Kg	

Results are reported on Dry Weight basis when applicable.

Intertek Testing Services NA Inc.
1089 East Collins Boulevard Richardson, TX 75081
Telephone (972) 238-5591 Fax (972) 238-5592

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-1
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS

TEST REQUESTED		DETECTION LIMIT		RESULTS		FLAG
Lead	/1	2	mg/Kg	16	mg/Kg	D.

Dilution Factor : 10
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 21-JUL-1997 by AH
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

Intertek Testing Services NA Inc.
1089 East Collins Boulevard Richardson, TX 75081
Telephone (972) 238-5591 Fax (972) 238-5592

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-1
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	84.4 %	- .
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607			

Results are reported on Dry Weight basis when applicable.

Intertek Testing Services NA Inc.
1089 East Collins Boulevard Richardson, TX 75081
Telephone (972) 238-5591 Fax (972) 238-5592

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 10-JUL-1997 REPORT NUMBER : D97-8568-2
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-20#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.29 mg/Kg	< 1.29 mg/Kg	U
Acenaphthylene	1.65 mg/Kg	< 1.65 mg/Kg	U
Anthracene	0.472 mg/Kg	< 0.472 mg/Kg	U
Benzo(a)anthracene	0.0097 mg/Kg	< 0.0097 mg/Kg	U
Benzo(a)pyrene	0.0161 mg/Kg	< 0.0161 mg/Kg	U
Benzo(b)fluoranthene	0.0129 mg/Kg	< 0.0129 mg/Kg	U
Benzo(g,h,i)perylene	0.0537 mg/Kg	< 0.0537 mg/Kg	U
Benzo(k)fluoranthene	0.0118 mg/Kg	< 0.0118 mg/Kg	U
Chrysene	0.107 mg/Kg	< 0.107 mg/Kg	U
Dibenz(a,h)anthracene	0.0215 mg/Kg	< 0.0215 mg/Kg	U
Fluoranthene	0.150 mg/Kg	< 0.150 mg/Kg	U
Fluorene	0.150 mg/Kg	< 0.150 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0322 mg/Kg	< 0.0322 mg/Kg	U
Naphthalene	1.29 mg/Kg	< 1.29 mg/Kg	U

REPORT NUMBER : D97-8568-2 PAGE 2
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Phenanthrene	0.451 mg/Kg	<	0.451 mg/Kg	U
Pyrene	0.193 mg/Kg	<	0.193 mg/Kg	U
p-Terphenyl (SS)			0.244 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-2
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-20#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		FLAG
Benzene	0.001	mg/Kg	< 0.001	mg/Kg	U
Toluene	0.002	mg/Kg	< 0.002	mg/Kg	U
Ethyl benzene	0.002	mg/Kg	< 0.002	mg/Kg	U
m,p-Xylene	0.002	mg/Kg	< 0.002	mg/Kg	U
o-Xylene	0.002	mg/Kg	< 0.002	mg/Kg	U
Bromofluorobenzene (SS)			0.058	mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services
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DATE RECEIVED : 10-JUL-1997 REPORT NUMBER : D97-8568-2
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-20#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.7 mg/Kg	6.8 mg/Kg	J
Triacontane (SS)		7.26 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997 REPORT NUMBER : D97-8568-2
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-20#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.07 mg/Kg	< 1.07 mg/Kg	U
Fluorobenzene (SS)		0.050 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-2
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-20#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS

TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Lead /1	0.4 mg/Kg	1.3 mg/Kg	D

Dilution Factor : 2
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 21-JUL-1997 by AH
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

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REPORT NUMBER : D97-8568-2
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-20#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	93.2 %	
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607			

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-3
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.33 mg/Kg	< 1.33 mg/Kg	U
Acenaphthylene	1.70 mg/Kg	< 1.70 mg/Kg	U
Anthracene	0.486 mg/Kg	< 0.486 mg/Kg	U
Benzo(a)anthracene	0.0099 mg/Kg	< 0.0099 mg/Kg	U
Benzo(a)pyrene	0.0166 mg/Kg	< 0.0166 mg/Kg	U
Benzo(b)fluoranthene	0.0133 mg/Kg	< 0.0133 mg/Kg	U
Benzo(g,h,i)perylene	0.0553 mg/Kg	< 0.0553 mg/Kg	U
Benzo(k)fluoranthene	0.0122 mg/Kg	< 0.0122 mg/Kg	U
Chrysene	0.111 mg/Kg	< 0.111 mg/Kg	U
Dibenz(a,h)anthracene	0.0221 mg/Kg	< 0.0221 mg/Kg	U
Fluoranthene	0.155 mg/Kg	< 0.155 mg/Kg	U
Fluorene	0.155 mg/Kg	< 0.155 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0332 mg/Kg	< 0.0332 mg/Kg	U
Naphthalene	1.33 mg/Kg	< 1.33 mg/Kg	U

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REPORT NUMBER : D97-8568-3 PAGE 2
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Phenanthrene	0.464 mg/Kg	<	0.464 mg/Kg	U
Pyrene	0.199 mg/Kg	<	0.199 mg/Kg	U
p-Terphenyl (SS)			0.262 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-3
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	< 0.001 mg/Kg	U
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.055 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.0 mg/Kg	7.0 mg/Kg	J
Triacontane (SS)		8.50 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.10 mg/Kg	< 1.10 mg/Kg	U
Fluorobenzene (SS)		0.053 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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SAMPLE SUBMITTED BY : Parsons Engineering Science
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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS

TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Lead /1	1.1 mg/Kg	5.9 mg/Kg	D

Dilution Factor : 5
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 21-JUL-1997 by AH
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-3
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	90.5 %	-
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607			

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-4
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.28 mg/Kg	< 1.28 mg/Kg	U
Acenaphthylene	1.65 mg/Kg	< 1.65 mg/Kg	U
Anthracene	0.470 mg/Kg	< 0.470 mg/Kg	U
Benzo(a)anthracene	0.0096 mg/Kg	< 0.0096 mg/Kg	U
Benzo(a)pyrene	0.0160 mg/Kg	< 0.0160 mg/Kg	U
Benzo(b)fluoranthene	0.0128 mg/Kg	< 0.0128 mg/Kg	U
Benzo(g,h,i)perylene	0.0534 mg/Kg	< 0.0534 mg/Kg	U
Benzo(k)fluoranthene	0.0118 mg/Kg	< 0.0118 mg/Kg	U
Chrysene	0.107 mg/Kg	< 0.107 mg/Kg	U
Dibenz(a,h)anthracene	0.0214 mg/Kg	< 0.0214 mg/Kg	U
Fluoranthene	0.150 mg/Kg	< 0.150 mg/Kg	U
Fluorene	0.150 mg/Kg	< 0.150 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0320 mg/Kg	< 0.0320 mg/Kg	U
Naphthalene	1.28 mg/Kg	< 1.28 mg/Kg	U

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-4
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	< 0.001 mg/Kg	U
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.059 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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SAMPLE SUBMITTED BY : Parsons Engineering Science
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SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.7 mg/Kg	6.0 mg/Kg	J
Triacontane (SS)		7.53 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT NUMBER : D97-8568-4
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.07 mg/Kg	< 1.07 mg/Kg	U
Fluorobenzene (SS)		0.051 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-4
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS

TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Lead /1	0.4 mg/Kg	2.5 mg/Kg	D

Dilution Factor : 2
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 17-JUL-1997 by GGD
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-4
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	93.6 %	
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607			

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-5
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.35 mg/Kg	< 1.35 mg/Kg	U
Acenaphthylene	1.73 mg/Kg	< 1.73 mg/Kg	U
Anthracene	0.493 mg/Kg	< 0.493 mg/Kg	U
Benzo(a)anthracene	0.0101 mg/Kg	< 0.0101 mg/Kg	U
Benzo(a)pyrene	0.0168 mg/Kg	< 0.0168 mg/Kg	U
Benzo(b)fluoranthene	0.0135 mg/Kg	< 0.0135 mg/Kg	U
Benzo(g,h,i)perylene	0.0561 mg/Kg	< 0.0561 mg/Kg	U
Benzo(k)fluoranthene	0.0123 mg/Kg	< 0.0123 mg/Kg	U
Chrysene	0.112 mg/Kg	< 0.112 mg/Kg	U
Dibenz(a,h)anthracene	0.0224 mg/Kg	< 0.0224 mg/Kg	U
Fluoranthene	0.157 mg/Kg	< 0.157 mg/Kg	U
Fluorene	0.157 mg/Kg	< 0.157 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0336 mg/Kg	< 0.0336 mg/Kg	U
Naphthalene	1.35 mg/Kg	< 1.35 mg/Kg	U

REPORT NUMBER : D97-8568-5
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Phenanthrene	0.471 mg/Kg	<	0.471 mg/Kg	U
Pyrene	0.202 mg/Kg	<	0.202 mg/Kg	U
p-Terphenyl (SS)			0.265 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997 REPORT NUMBER : D97-8568-5
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : RFG
PREPARED ON : 22-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 22-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 25-072197

BTEX ANALYSIS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Benzene	0.001 mg/Kg	<	0.001 mg/Kg	U
Toluene	0.002 mg/Kg	<	0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	<	0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	<	0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	<	0.002 mg/Kg	U
Bromofluorobenzene (SS)			0.068 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT NUMBER : D97-8568-5
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.2 mg/Kg	6.1 mg/Kg	J
Triacontane (SS)		7.83 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT NUMBER : D97-8568-4
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Phenanthrene	0.449 mg/Kg	<	0.449 mg/Kg	U
Pyrene	0.192 mg/Kg	<	0.192 mg/Kg	U
p-Terphenyl (SS)			0.246 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-5
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : RFG
PREPARED ON : 22-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 22-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 26-072197

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.12 mg/Kg	< 1.12 mg/Kg	U
Fluorobenzene (SS)		0.050 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-5
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Lead /1	1.1 mg/Kg	3.7 mg/Kg	D

Dilution Factor : 5
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 17-JUL-1997 by GGD
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-5
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	89.2 %	
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607			

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-6
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.26 mg/Kg	< 1.26 mg/Kg	U
Acenaphthylene	1.62 mg/Kg	< 1.62 mg/Kg	U
Anthracene	0.464 mg/Kg	< 0.464 mg/Kg	U
Benzo(a)anthracene	0.0095 mg/Kg	< 0.0095 mg/Kg	U
Benzo(a)pyrene	0.0158 mg/Kg	< 0.0158 mg/Kg	U
Benzo(b)fluoranthene	0.0126 mg/Kg	< 0.0126 mg/Kg	U
Benzo(g,h,i)perylene	0.0527 mg/Kg	< 0.0527 mg/Kg	U
Benzo(k)fluoranthene	0.0116 mg/Kg	< 0.0116 mg/Kg	U
Chrysene	0.105 mg/Kg	< 0.105 mg/Kg	U
Dibenz(a,h)anthracene	0.0211 mg/Kg	< 0.0211 mg/Kg	U
Fluoranthene	0.148 mg/Kg	< 0.148 mg/Kg	U
Fluorene	0.148 mg/Kg	< 0.148 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0316 mg/Kg	< 0.0316 mg/Kg	U
Naphthalene	1.26 mg/Kg	< 1.26 mg/Kg	U

REPORT NUMBER : D97-8568-6 PAGE 2
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		FLAG
Phenanthrene	0.443	mg/Kg	< 0.443	mg/Kg	U
Pyrene	0.190	mg/Kg	< 0.190	mg/Kg	U
p-Terphenyl (SS)			0.258	mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-6
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Benzene	0.001 mg/Kg	<	0.001 mg/Kg	U
Toluene	0.002 mg/Kg	<	0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	<	0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	<	0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	<	0.002 mg/Kg	U
Bromofluorobenzene (SS)			0.057 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-6
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.5 mg/Kg	8.1 mg/Kg	J
Triacontane (SS)		7.79 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.05 mg/Kg	< 1.05 mg/Kg	U
Fluorobenzene (SS)		0.051 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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ADDRESS : 257A 28 Rd.
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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS

TEST REQUESTED		DETECTION LIMIT	RESULTS	FLAG
Lead	/1	0.2 mg/Kg	1.7 mg/Kg	. .

Dilution Factor : 1
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 17-JUL-1997 by GGD
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	94.9 %	
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607			

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997
REPORT NUMBER : D97-8568-7
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.30 mg/Kg	< 1.30 mg/Kg	U
Acenaphthylene	1.67 mg/Kg	< 1.67 mg/Kg	U
Anthracene	0.477 mg/Kg	< 0.477 mg/Kg	U
Benzo(a)anthracene	0.0098 mg/Kg	0.0358 mg/Kg	
Benzo(a)pyrene	0.0163 mg/Kg	0.0195 mg/Kg	
Benzo(b)fluoranthene	0.0130 mg/Kg	< 0.0130 mg/Kg	U
Benzo(g,h,i)perylene	0.0542 mg/Kg	< 0.0542 mg/Kg	U
Benzo(k)fluoranthene	0.0119 mg/Kg	< 0.0119 mg/Kg	U
Chrysene	0.108 mg/Kg	< 0.108 mg/Kg	U
Dibenz(a,h)anthracene	0.0217 mg/Kg	< 0.0217 mg/Kg	U
Fluoranthene	0.152 mg/Kg	0.177 mg/Kg	
Fluorene	0.152 mg/Kg	< 0.152 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0325 mg/Kg	< 0.0325 mg/Kg	U
Naphthalene	1.30 mg/Kg	< 1.30 mg/Kg	U

REPORT NUMBER : D97-8568-7 PAGE 2
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Phenanthrene	0.456 mg/Kg	<	0.456 mg/Kg	U
Pyrene	0.195 mg/Kg	<	0.195 mg/Kg	U
p-Terphenyl (SS)			0.294 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services
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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
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: Grand JCT, CO 81503
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SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 500
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Benzene	0.5 mg/Kg	< 0.5 mg/Kg		DU
Toluene	1.1 mg/Kg	< 1.1 mg/Kg		DU
Ethyl benzene	1.1 mg/Kg	< 1.1 mg/Kg		DU
m,p-Xylene	1.1 mg/Kg	< 1.1 mg/Kg		DU
o-Xylene	1.1 mg/Kg	< 1.1 mg/Kg		DU
Bromofluorobenzene (SS)		33.6 mg/Kg		D

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-7
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.8 mg/Kg	106 mg/Kg	
Triacontane (SS)		7.77 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT NUMBER : D97-8568-7
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SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 500
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	542 mg/Kg	443 mg/Kg	DJ
Fluorobenzene (SS)		19.4 mg/Kg	D

Results are reported on Dry Weight basis when applicable.

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REPORT NUMBER : D97-8568-7
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SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Lead /1	2	mg/Kg	3 mg/Kg	D

Dilution Factor : 10
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 21-JUL-1997 by AH
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	92.2 %	
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607			

Results are reported on Dry Weight basis when applicable.

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ITS Intertek Testing Services
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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-8
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB04-11#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.49 mg/Kg	< 1.49 mg/Kg	U
Acenaphthylene	1.91 mg/Kg	< 1.91 mg/Kg	U
Anthracene	0.545 mg/Kg	< 0.545 mg/Kg	U
Benzo(a)anthracene	0.0112 mg/Kg	< 0.0112 mg/Kg	U
Benzo(a)pyrene	0.0186 mg/Kg	< 0.0186 mg/Kg	U
Benzo(b)fluoranthene	0.0149 mg/Kg	< 0.0149 mg/Kg	U
Benzo(g,h,i)perylene	0.0620 mg/Kg	< 0.0620 mg/Kg	U
Benzo(k)fluoranthene	0.0136 mg/Kg	< 0.0136 mg/Kg	U
Chrysene	0.124 mg/Kg	< 0.124 mg/Kg	U
Dibenz(a,h)anthracene	0.0248 mg/Kg	< 0.0248 mg/Kg	U
Fluoranthene	0.173 mg/Kg	< 0.173 mg/Kg	U
Fluorene	0.173 mg/Kg	< 0.173 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0372 mg/Kg	< 0.0372 mg/Kg	U
Naphthalene	1.49 mg/Kg	< 1.49 mg/Kg	U

REPORT NUMBER : D97-8568-8
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Phenanthrene	0.520 mg/Kg	<	0.520 mg/Kg	U
Pyrene	0.223 mg/Kg	<	0.223 mg/Kg	U
p-Terphenyl (SS)			0.271 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-8
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB04-11#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 5
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.006 mg/Kg	< 0.006 mg/Kg	DU
Toluene	0.012 mg/Kg	< 0.012 mg/Kg	DU
Ethyl benzene	0.012 mg/Kg	< 0.012 mg/Kg	DU
m,p-Xylene	0.012 mg/Kg	< 0.012 mg/Kg	DU
o-Xylene	0.012 mg/Kg	< 0.012 mg/Kg	DU
Bromofluorobenzene (SS)		0.372 mg/Kg	D

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997 REPORT NUMBER : D97-8568-8
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB04-11#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	12.4 mg/Kg	10.5 mg/Kg	J
Triacontane (SS)		8.85 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT NUMBER : D97-8568-8
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB04-11#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 50
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	62.0 mg/Kg	23.5 mg/Kg	DJ
Fluorobenzene (SS)		2.66 mg/Kg	D

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB04-11#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Lead /1	2	mg/Kg	20 mg/Kg	D

Dilution Factor : 10
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 21-JUL-1997 by AH
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB04-11#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	80.7 %	- -
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607			

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-9
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB05-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.26 mg/Kg	< 1.26 mg/Kg	U
Acenaphthylene	1.62 mg/Kg	< 1.62 mg/Kg	U
Anthracene	0.463 mg/Kg	< 0.463 mg/Kg	U
Benzo(a)anthracene	0.0095 mg/Kg	< 0.0095 mg/Kg	U
Benzo(a)pyrene	0.0158 mg/Kg	< 0.0158 mg/Kg	U
Benzo(b)fluoranthene	0.0126 mg/Kg	< 0.0126 mg/Kg	U
Benzo(g,h,i)perylene	0.0526 mg/Kg	< 0.0526 mg/Kg	U
Benzo(k)fluoranthene	0.0116 mg/Kg	< 0.0116 mg/Kg	U
Chrysene	0.105 mg/Kg	< 0.105 mg/Kg	U
Dibenz(a,h)anthracene	0.0211 mg/Kg	< 0.0211 mg/Kg	U
Fluoranthene	0.147 mg/Kg	< 0.147 mg/Kg	U
Fluorene	0.147 mg/Kg	< 0.147 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0316 mg/Kg	< 0.0316 mg/Kg	U
Naphthalene	1.26 mg/Kg	< 1.26 mg/Kg	U

REPORT NUMBER : D97-8568-9
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Phenanthrene	0.442 mg/Kg	<	0.442 mg/Kg	U
Pyrene	0.189 mg/Kg	<	0.189 mg/Kg	U
p-Terphenyl (SS)			0.243 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT NUMBER : D97-8568-9
REPORT DATE : 5-AUG-1997

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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB05-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	< 0.001 mg/Kg	U
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.059 mg/Kg	

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SAMPLE SUBMITTED BY : Parsons Engineering Science
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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB05-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.5 mg/Kg	7.7 mg/Kg	J
Triacontane (SS)		7.38 mg/Kg	

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ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB05-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.05 mg/Kg	< 1.05 mg/Kg	U
Fluorobenzene (SS)		0.046 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB05-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS

TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Lead /1	1.1 mg/Kg	3.0 mg/Kg	D

Dilution Factor : 5
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 21-JUL-1997 by AH
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB05-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	95.0 %	
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607			

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-10
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB05-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.39 mg/Kg	< 1.39 mg/Kg	U
Acenaphthylene	1.78 mg/Kg	< 1.78 mg/Kg	U
Anthracene	0.508 mg/Kg	< 0.508 mg/Kg	U
Benzo(a)anthracene	0.0104 mg/Kg	0.455 mg/Kg	
Benzo(a)pyrene	0.0173 mg/Kg	0.364 mg/Kg	
Benzo(b)fluoranthene	0.0139 mg/Kg	0.318 mg/Kg	
Benzo(g,h,i)perylene	0.0577 mg/Kg	0.206 mg/Kg	
Benzo(k)fluoranthene	0.0127 mg/Kg	0.141 mg/Kg	
Chrysene	0.115 mg/Kg	0.382 mg/Kg	
Dibenz(a,h)anthracene	0.0231 mg/Kg	0.0243 mg/Kg	
Fluoranthene	0.162 mg/Kg	2.09 mg/Kg	
Fluorene	0.162 mg/Kg	< 0.162 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0346 mg/Kg	0.184 mg/Kg	
Naphthalene	1.39 mg/Kg	< 1.39 mg/Kg	U

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084A

REPORT NUMBER : D97-8568-10
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.485 mg/Kg	< 0.485 mg/Kg	U
Pyrene	0.208 mg/Kg	1.48 mg/Kg	
p-Terphenyl (SS)		0.271 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
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: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB05-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1000
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS						
TEST REQUESTED	DETECTION LIMIT		RESULTS			FLAG
Benzene	1	mg/Kg		1	mg/Kg	DJ
Toluene	2	mg/Kg		2	mg/Kg	DJ
Ethyl benzene	2	mg/Kg	<	2	mg/Kg	DU
m,p-Xylene	2	mg/Kg		12	mg/Kg	D
o-Xylene	2	mg/Kg		16	mg/Kg	D
Bromofluorobenzene (SS)				75	mg/Kg	D

Results are reported on Dry Weight basis when applicable.

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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB05-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 C1 /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1000
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Benzene	1 mg/Kg	1	mg/Kg	DJ
Toluene	2 mg/Kg	2	mg/Kg	DJ
Ethyl benzene	2 mg/Kg	< 2	mg/Kg	DU
m,p-Xylene	2 mg/Kg	12	mg/Kg	D
o-Xylene	2 mg/Kg	16	mg/Kg	D
Bromofluorobenzene (SS)		75	mg/Kg	D

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-10
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB05-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : RFG
PREPARED ON : 22-JUL-1997
ANALYSIS METHOD : EPA 8020 C2 /1
ANALYZED BY : MKS
ANALYZED ON : 22-JUL-1997
DILUTION FACTOR : 1000
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Toluene	2 mg/Kg	7 mg/Kg	D
m,p-Xylene	2 mg/Kg	26 mg/Kg	D
o-Xylene	2 mg/Kg	11 mg/Kg	D
Bromofluorobenzene (SS)		74 mg/Kg	D

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SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB05-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.5 mg/Kg	292 mg/Kg	
Triacontane (SS)		8.63 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT NUMBER : D97-8568-10
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SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB05-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1000
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		FLAG
Total Volatile Hydrocarbons	1150	mg/Kg	851	mg/Kg	DJ
Fluorobenzene (SS)			41	mg/Kg	D

Results are reported on Dry Weight basis when applicable.

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB05-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS

TEST REQUESTED		DETECTION LIMIT		RESULTS		FLAG
Lead	/1	2	mg/Kg	6	mg/Kg	D

Dilution Factor : 10
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 21-JUL-1997 by AH
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

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REPORT NUMBER : D97-8568-10
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB05-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	86.6 %	
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607			

Results are reported on Dry Weight basis when applicable.

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ITS Intertek Testing Services
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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-11
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB06-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.36 mg/Kg	< 1.36 mg/Kg	U
Acenaphthylene	1.75 mg/Kg	< 1.75 mg/Kg	U
Anthracene	0.499 mg/Kg	< 0.499 mg/Kg	U
Benzo(a)anthracene	0.0102 mg/Kg	< 0.0102 mg/Kg	U
Benzo(a)pyrene	0.0170 mg/Kg	< 0.0170 mg/Kg	U
Benzo(b)fluoranthene	0.0136 mg/Kg	< 0.0136 mg/Kg	U
Benzo(g,h,i)perylene	0.0567 mg/Kg	< 0.0567 mg/Kg	U
Benzo(k)fluoranthene	0.0125 mg/Kg	< 0.0125 mg/Kg	U
Chrysene	0.113 mg/Kg	< 0.113 mg/Kg	U
Dibenz(a,h)anthracene	0.0227 mg/Kg	< 0.0227 mg/Kg	U
Fluoranthene	0.159 mg/Kg	< 0.159 mg/Kg	U
Fluorene	0.159 mg/Kg	< 0.159 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0340 mg/Kg	< 0.0340 mg/Kg	U
Naphthalene	1.36 mg/Kg	< 1.36 mg/Kg	U

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REPORT NUMBER : D97-8568-11 PAGE 2
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Phenanthrene	0.476 mg/Kg	<	0.476 mg/Kg	U
Pyrene	0.204 mg/Kg	<	0.204 mg/Kg	U
p-Terphenyl (SS)			0.259 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT NUMBER : D97-8568-11
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB06-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		FLAG
Benzene	0.001 mg/Kg		0.001 mg/Kg		J
Toluene	0.002 mg/Kg		< 0.002 mg/Kg		U
Ethyl benzene	0.002 mg/Kg		< 0.002 mg/Kg		U
m,p-Xylene	0.002 mg/Kg		< 0.002 mg/Kg		U
o-Xylene	0.002 mg/Kg		< 0.002 mg/Kg		U
Bromofluorobenzene (SS)			0.062 mg/Kg		

Results are reported on Dry Weight basis when applicable.

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REPORT NUMBER : D97-8568-11
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB06-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.3 mg/Kg	8.8 mg/Kg	J
Triacontane (SS)		8.00 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT NUMBER : D97-8568-11
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB06-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.13 mg/Kg	0.273 mg/Kg	J
Fluorobenzene (SS)		0.050 mg/Kg	

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SAMPLE SUBMITTED BY : Parsons Engineering Science
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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB06-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Lead /1	1.1 mg/Kg	4.8 mg/Kg	D

Dilution Factor : 5
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 21-JUL-1997 by AH
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB06-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES				
TEST REQUESTED		DETECTION LIMIT	RESULTS	FLAG
Total Solids	/1	0.01 %	88.2 %	
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221608				

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-12
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB06-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.48 mg/Kg	< 1.48 mg/Kg	U
Acenaphthylene	1.90 mg/Kg	< 1.90 mg/Kg	U
Anthracene	0.543 mg/Kg	< 0.543 mg/Kg	U
Benzo(a)anthracene	0.0111 mg/Kg	< 0.0111 mg/Kg	U
Benzo(a)pyrene	0.0185 mg/Kg	< 0.0185 mg/Kg	U
Benzo(b)fluoranthene	0.0148 mg/Kg	< 0.0148 mg/Kg	U
Benzo(g,h,i)perylene	0.0617 mg/Kg	< 0.0617 mg/Kg	U
Benzo(k)fluoranthene	0.0136 mg/Kg	< 0.0136 mg/Kg	U
Chrysene	0.123 mg/Kg	< 0.123 mg/Kg	U
Dibenz(a,h)anthracene	0.0247 mg/Kg	< 0.0247 mg/Kg	U
Fluoranthene	0.173 mg/Kg	< 0.173 mg/Kg	U
Fluorene	0.173 mg/Kg	< 0.173 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0370 mg/Kg	< 0.0370 mg/Kg	U
Naphthalene	1.48 mg/Kg	< 1.48 mg/Kg	U

REPORT NUMBER : D97-8568-12
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.519 mg/Kg	< 0.519 mg/Kg	U
Pyrene	0.222 mg/Kg	< 0.222 mg/Kg	U
p-Terphenyl (SS)		0.280 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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SAMPLE SUBMITTED BY : Parsons Engineering Science
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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB06-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Benzene	0.001 mg/Kg	<	0.001 mg/Kg	U
Toluene	0.002 mg/Kg	<	0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	<	0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	<	0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	<	0.002 mg/Kg	U
Bromofluorobenzene (SS)			0.069 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB06-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	12.3 mg/Kg	6.5 mg/Kg	J
Triacontane (SS)		8.60 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB06-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.23 mg/Kg	< 1.23 mg/Kg	U
Fluorobenzene (SS)		0.056 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB06-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS

TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Lead /1	1.2 mg/Kg	6.3 mg/Kg	D

Dilution Factor : 5
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 17-JUL-1997 by GGD
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

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REPORT NUMBER : D97-8568-12
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB06-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	81.0 %	
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221608			

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997
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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB07-11#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.42 mg/Kg	< 1.42 mg/Kg	U
Acenaphthylene	1.82 mg/Kg	< 1.82 mg/Kg	U
Anthracene	0.519 mg/Kg	< 0.519 mg/Kg	U
Benzo(a)anthracene	0.0106 mg/Kg	< 0.0106 mg/Kg	U
Benzo(a)pyrene	0.0177 mg/Kg	< 0.0177 mg/Kg	U
Benzo(b)fluoranthene	0.0142 mg/Kg	< 0.0142 mg/Kg	U
Benzo(g,h,i)perylene	0.0590 mg/Kg	< 0.0590 mg/Kg	U
Benzo(k)fluoranthene	0.0130 mg/Kg	< 0.0130 mg/Kg	U
Chrysene	0.118 mg/Kg	< 0.118 mg/Kg	U
Dibenz(a,h)anthracene	0.0236 mg/Kg	< 0.0236 mg/Kg	U
Fluoranthene	0.165 mg/Kg	< 0.165 mg/Kg	U
Fluorene	0.165 mg/Kg	< 0.165 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0354 mg/Kg	< 0.0354 mg/Kg	U
Naphthalene	1.42 mg/Kg	< 1.42 mg/Kg	U

REPORT NUMBER : D97-8568-13 PAGE 2
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Phenanthrene	0.495 mg/Kg	<	0.495 mg/Kg	U
Pyrene	0.212 mg/Kg	<	0.212 mg/Kg	U
p-Terphenyl (SS)			0.0434 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT DATE : 5-AUG-1997

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SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB07-11#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	< 0.001 mg/Kg	U
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.063 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB07-11#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.8 mg/Kg	7.2 mg/Kg	J
Triacontane (SS)		7.92 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT NUMBER : D97-8568-13
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB07-11#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.18 mg/Kg	< 1.18 mg/Kg	U
Fluorobenzene (SS)		0.058 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB07-11#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Lead /1	2	mg/Kg	9 mg/Kg	D

Dilution Factor : 10
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 21-JUL-1997 by AH
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-13
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB07-11#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	84.8 %	- -
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221608			

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997
REPORT NUMBER : D97-8568-14
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB07-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.27 mg/Kg	< 1.27 mg/Kg	U
Acenaphthylene	1.63 mg/Kg	< 1.63 mg/Kg	U
Anthracene	0.467 mg/Kg	< 0.467 mg/Kg	U
Benzo(a)anthracene	0.0095 mg/Kg	< 0.0095 mg/Kg	U
Benzo(a)pyrene	0.0159 mg/Kg	< 0.0159 mg/Kg	U
Benzo(b)fluoranthene	0.0127 mg/Kg	< 0.0127 mg/Kg	U
Benzo(g,h,i)perylene	0.0530 mg/Kg	< 0.0530 mg/Kg	U
Benzo(k)fluoranthene	0.0117 mg/Kg	< 0.0117 mg/Kg	U
Chrysene	0.106 mg/Kg	< 0.106 mg/Kg	U
Dibenz(a,h)anthracene	0.0212 mg/Kg	< 0.0212 mg/Kg	U
Fluoranthene	0.148 mg/Kg	< 0.148 mg/Kg	U
Fluorene	0.148 mg/Kg	< 0.148 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0318 mg/Kg	< 0.0318 mg/Kg	U
Naphthalene	1.27 mg/Kg	< 1.27 mg/Kg	U

REPORT NUMBER : D97-8568-14
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Phenanthrene	0.445 mg/Kg	<	0.445 mg/Kg	U
Pyrene	0.191 mg/Kg	<	0.191 mg/Kg	U
p-Terphenyl (SS)			0.258 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-14
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB07-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	< 0.001 mg/Kg	U
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	0.001 mg/Kg	J
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.059 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997 REPORT NUMBER : D97-8568-14
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB07-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.6 mg/Kg	4.1 mg/Kg	J
Triacontane (SS)		7.94 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-14
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB07-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.06 mg/Kg	< 1.06 mg/Kg	U
Fluorobenzene (SS)		0.048 mg/Kg	

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB07-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS

TEST REQUESTED		DETECTION LIMIT	RESULTS	FLAG
Lead	/1	0.4 mg/Kg	0.6 mg/Kg	D

Dilution Factor : 2
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 21-JUL-1997 by AH
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-14
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB07-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	94.3 %	
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221608			

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-15
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB08-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.38 mg/Kg	< 1.38 mg/Kg	U
Acenaphthylene	1.78 mg/Kg	< 1.78 mg/Kg	U
Anthracene	0.508 mg/Kg	< 0.508 mg/Kg	U
Benzo(a)anthracene	0.0104 mg/Kg	< 0.0104 mg/Kg	U
Benzo(a)pyrene	0.0173 mg/Kg	< 0.0173 mg/Kg	U
Benzo(b)fluoranthene	0.0138 mg/Kg	< 0.0138 mg/Kg	U
Benzo(g,h,i)perylene	0.0577 mg/Kg	< 0.0577 mg/Kg	U
Benzo(k)fluoranthene	0.0127 mg/Kg	< 0.0127 mg/Kg	U
Chrysene	0.115 mg/Kg	< 0.115 mg/Kg	U
Dibenz(a,h)anthracene	0.0231 mg/Kg	< 0.0231 mg/Kg	U
Fluoranthene	0.161 mg/Kg	< 0.161 mg/Kg	U
Fluorene	0.161 mg/Kg	< 0.161 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0346 mg/Kg	< 0.0346 mg/Kg	U
Naphthalene	1.38 mg/Kg	< 1.38 mg/Kg	U

REPORT NUMBER : D97-8568-15
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Phenanthrene	0.484 mg/Kg	<	0.484 mg/Kg	U
Pyrene	0.208 mg/Kg	<	0.208 mg/Kg	U
p-Terphenyl (SS)			0.246 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services
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DATE RECEIVED : 10-JUL-1997
REPORT NUMBER : D97-8568-15
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB08-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Benzene	0.001 mg/Kg		0.001 mg/Kg	J
Toluene	0.002 mg/Kg	<	0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	<	0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg		0.001 mg/Kg	J
o-Xylene	0.002 mg/Kg	<	0.002 mg/Kg	U
Bromofluorobenzene (SS)			0.063 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services
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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-15
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB08-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.5 mg/Kg	6.5 mg/Kg	J
Triacontane (SS)		8.42 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997
REPORT NUMBER : D97-8568-15
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB08-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.15 mg/Kg	< 1.15 mg/Kg	U
Fluorobenzene (SS)		0.053 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB08-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Lead /1	2	mg/Kg	5 mg/Kg	D

Dilution Factor : 10
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 21-JUL-1997 by AH
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB08-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES

TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	86.7 %	

Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB
QC Batch No : 0716221608

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-16
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB08-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.58 mg/Kg	< 1.58 mg/Kg	U
Acenaphthylene	2.03 mg/Kg	< 2.03 mg/Kg	U
Anthracene	0.579 mg/Kg	< 0.579 mg/Kg	U
Benzo(a)anthracene	0.0118 mg/Kg	< 0.0118 mg/Kg	U
Benzo(a)pyrene	0.0197 mg/Kg	< 0.0197 mg/Kg	U
Benzo(b)fluoranthene	0.0158 mg/Kg	< 0.0158 mg/Kg	U
Benzo(g,h,i)perylene	0.0658 mg/Kg	< 0.0658 mg/Kg	U
Benzo(k)fluoranthene	0.0145 mg/Kg	< 0.0145 mg/Kg	U
Chrysene	0.132 mg/Kg	< 0.132 mg/Kg	U
Dibenz(a,h)anthracene	0.0263 mg/Kg	< 0.0263 mg/Kg	U
Fluoranthene	0.184 mg/Kg	< 0.184 mg/Kg	U
Fluorene	0.184 mg/Kg	< 0.184 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0395 mg/Kg	< 0.0395 mg/Kg	U
Naphthalene	1.58 mg/Kg	< 1.58 mg/Kg	U

REPORT NUMBER : D97-8568-16 PAGE 2
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Phenanthrene	0.553 mg/Kg	<	0.553 mg/Kg	U
Pyrene	0.237 mg/Kg	<	0.237 mg/Kg	U
p-Terphenyl (SS)			0.301 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB08-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Benzene	0.001 mg/Kg	<	0.001 mg/Kg	U
Toluene	0.003 mg/Kg	<	0.003 mg/Kg	U
Ethyl benzene	0.003 mg/Kg	<	0.003 mg/Kg	U
m,p-Xylene	0.003 mg/Kg	<	0.003 mg/Kg	U
o-Xylene	0.003 mg/Kg	<	0.003 mg/Kg	U
Bromofluorobenzene (SS)			0.071 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 10-JUL-1997
REPORT NUMBER : D97-8568-16
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB08-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	13.2 mg/Kg	6.4 mg/Kg	J
Triacontane (SS)		9.68 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997 REPORT NUMBER : D97-8568-16
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB08-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.32 mg/Kg	< 1.32 mg/Kg	U
Fluorobenzene (SS)		0.064 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services
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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-16
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB08-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Lead /1	3 mg/Kg	5 mg/Kg	D

Dilution Factor : 10
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 21-JUL-1997 by AH
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-16
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB08-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	76.0 %	
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221608			

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997
REPORT NUMBER : D97-8568-17
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : FIELDQC#
: TB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : LLB
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : CNA
ANALYZED ON : 19-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 30071897AR

BTEX ANALYSIS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Benzene	2.0 µg/L	<	2.0 µg/L	U
Toluene	2.0 µg/L	<	2.0 µg/L	U
Ethyl benzene	2.0 µg/L	<	2.0 µg/L	U
m,p-Xylene	2.0 µg/L	<	2.0 µg/L	U
o-Xylene	2.0 µg/L	<	2.0 µg/L	U
Bromofluorobenzene (SS)			55.4 µg/L	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-18
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.20 mg/Kg	< 1.20 mg/Kg	U
Acenaphthylene	1.54 mg/Kg	< 1.54 mg/Kg	U
Anthracene	0.440 mg/Kg	< 0.440 mg/Kg	U
Benzo(a)anthracene	0.0090 mg/Kg	< 0.0090 mg/Kg	U
Benzo(a)pyrene	0.0150 mg/Kg	< 0.0150 mg/Kg	U
Benzo(b)fluoranthene	0.0120 mg/Kg	< 0.0120 mg/Kg	U
Benzo(g,h,i)perylene	0.0500 mg/Kg	< 0.0500 mg/Kg	U
Benzo(k)fluoranthene	0.0110 mg/Kg	< 0.0110 mg/Kg	U
Chrysene	0.100 mg/Kg	< 0.100 mg/Kg	U
Dibenz(a,h)anthracene	0.0200 mg/Kg	< 0.0200 mg/Kg	U
Fluoranthene	0.140 mg/Kg	< 0.140 mg/Kg	U
Fluorene	0.140 mg/Kg	< 0.140 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0300 mg/Kg	< 0.0300 mg/Kg	U
Naphthalene	1.20 mg/Kg	< 1.20 mg/Kg	U

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REPORT NUMBER : D97-8568-18 PAGE 2
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Phenanthrene	0.420 mg/Kg	<	0.420 mg/Kg	U
Pyrene	0.180 mg/Kg	<	0.180 mg/Kg	U
p-Terphenyl (SS)			0.239 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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Environmental Laboratories

DATE RECEIVED : 10-JUL-1997
REPORT NUMBER : D97-8568-18
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	< 0.001 mg/Kg	U
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.059 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997
REPORT NUMBER : D97-8568-18
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.0 mg/Kg	7.5 mg/Kg	J
Triacontane (SS)		7.57 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-18
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.00 mg/Kg	< 1.00 mg/Kg	U
Fluorobenzene (SS)		0.046 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT NUMBER : D97-8568-18
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997

TOTAL METALS

TEST REQUESTED		DETECTION LIMIT	RESULTS	FLAG
Lead	/1	0.2 mg/Kg	< 0.2 mg/Kg	U

Dilution Factor : 1
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 21-JUL-1997 by AH
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997
REPORT NUMBER : D97-8568-19
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.20 mg/Kg	2.50 mg/Kg	
Acenaphthylene	1.54 mg/Kg	2.43 mg/Kg	
Anthracene	0.440 mg/Kg	2.36 mg/Kg	
Benzo(a)anthracene	0.0090 mg/Kg	2.91 mg/Kg	
Benzo(a)pyrene	0.0150 mg/Kg	2.78 mg/Kg	
Benzo(b)fluoranthene	0.0120 mg/Kg	2.78 mg/Kg	
Benzo(g,h,i)perylene	0.0500 mg/Kg	2.84 mg/Kg	
Benzo(k)fluoranthene	0.0110 mg/Kg	2.71 mg/Kg	
Chrysene	0.100 mg/Kg	2.76 mg/Kg	
Dibenz(a,h)anthracene	0.0200 mg/Kg	3.08 mg/Kg	
Fluoranthene	0.140 mg/Kg	2.82 mg/Kg	
Fluorene	0.140 mg/Kg	2.58 mg/Kg	
Indeno(1,2,3-cd)pyrene	0.0300 mg/Kg	2.61 mg/Kg	
Naphthalene	1.20 mg/Kg	2.76 mg/Kg	

REPORT NUMBER : D97-8568-19
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.420 mg/Kg	2.49 mg/Kg	
Pyrene	0.180 mg/Kg	2.54 mg/Kg	
p-Terphenyl (SS)		0.262 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-19
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	0.048 mg/Kg	
Ethyl benzene	0.002 mg/Kg	0.052 mg/Kg	
Bromofluorobenzene (SS)		0.059 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.0 mg/Kg	70.1 mg/Kg	
Triacontane (SS)		7.56 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT NUMBER : D97-8568-19
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.00 mg/Kg	0.504 mg/Kg	J
Fluorobenzene (SS)		0.046 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-19
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997

TOTAL METALS

TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Lead /1	0.2 mg/Kg	1.8 mg/Kg	

Dilution Factor : 1
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 17-JUL-1997 by GGD
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-20
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: MS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.42 mg/Kg	3.00 mg/Kg	
Acenaphthylene	1.82 mg/Kg	2.91 mg/Kg	
Anthracene	0.521 mg/Kg	2.78 mg/Kg	
Benzo(a)anthracene	0.0107 mg/Kg	3.44 mg/Kg	
Benzo(a)pyrene	0.0178 mg/Kg	3.27 mg/Kg	
Benzo(b)fluoranthene	0.0142 mg/Kg	3.27 mg/Kg	
Benzo(g,h,i)perylene	0.0592 mg/Kg	3.34 mg/Kg	
Benzo(k)fluoranthene	0.0130 mg/Kg	3.20 mg/Kg	
Chrysene	0.118 mg/Kg	3.28 mg/Kg	
Dibenz(a,h)anthracene	0.0237 mg/Kg	3.65 mg/Kg	
Fluoranthene	0.166 mg/Kg	3.32 mg/Kg	
Fluorene	0.166 mg/Kg	3.08 mg/Kg	
Indeno(1,2,3-cd)pyrene	0.0355 mg/Kg	3.07 mg/Kg	
Naphthalene	1.42 mg/Kg	3.55 mg/Kg	

REPORT NUMBER : D97-8568-20
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.498 mg/Kg	2.95 mg/Kg	
Pyrene	0.213 mg/Kg	3.00 mg/Kg	
p-Terphenyl (SS)		0.295 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-20
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: MS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	0.063 mg/Kg	
Ethyl benzene	0.002 mg/Kg	0.070 mg/Kg	
Bromofluorobenzene (SS)		0.068 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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ITS Intertek Testing Services
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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-20
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: MS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.8 mg/Kg	83.6 mg/Kg	
Triacontane (SS)		9.06 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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ITS Intertek Testing Services
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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-20
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: MS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.18 mg/Kg	0.672 mg/Kg	J
Fluorobenzene (SS)		0.057 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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ITS Intertek Testing Services
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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-20
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: MS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS

TEST REQUESTED		DETECTION LIMIT		RESULTS		FLAG
Lead	/1	2	mg/Kg	9	mg/Kg	D

Dilution Factor : 10
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 17-JUL-1997 by GGD
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-20
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: MS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	84.4 %	
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607			

Results are reported on Dry Weight basis when applicable.

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ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-21
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: SD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.42 mg/Kg	2.99 mg/Kg	
Acenaphthylene	1.82 mg/Kg	2.95 mg/Kg	
Anthracene	0.521 mg/Kg	2.81 mg/Kg	
Benzo(a)anthracene	0.0107 mg/Kg	3.48 mg/Kg	
Benzo(a)pyrene	0.0178 mg/Kg	3.29 mg/Kg	
Benzo(b)fluoranthene	0.0142 mg/Kg	3.32 mg/Kg	
Benzo(g,h,i)perylene	0.0592 mg/Kg	3.41 mg/Kg	
Benzo(k)fluoranthene	0.0130 mg/Kg	3.26 mg/Kg	
Chrysene	0.118 mg/Kg	3.33 mg/Kg	
Dibenz(a,h)anthracene	0.0237 mg/Kg	3.71 mg/Kg	
Fluoranthene	0.166 mg/Kg	3.35 mg/Kg	
Fluorene	0.166 mg/Kg	3.10 mg/Kg	
Indeno(1,2,3-cd)pyrene	0.0355 mg/Kg	3.13 mg/Kg	
Naphthalene	1.42 mg/Kg	3.61 mg/Kg	

REPORT NUMBER : D97-8568-21 PAGE 2
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.498 mg/Kg	2.97 mg/Kg	
Pyrene	0.213 mg/Kg	3.03 mg/Kg	
p-Terphenyl (SS)		0.301 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services
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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: SD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	0.064 mg/Kg	
Ethyl benzene	0.002 mg/Kg	0.070 mg/Kg	
Bromofluorobenzene (SS)		0.065 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997 REPORT NUMBER : D97-8568-21
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: SD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.8 mg/Kg	82.9 mg/Kg	
Triacontane (SS)		8.31 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-21
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: SD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.18 mg/Kg	0.647 mg/Kg	J
Fluorobenzene (SS)		0.057 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-21
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: SD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Lead /1	2 mg/Kg	8 mg/Kg	D.

Dilution Factor : 10
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 17-JUL-1997 by GGD
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

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REPORT NUMBER : D97-8568-21
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: SD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	84.4 %	
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607			

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-22
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : *Parsons Engineering Science*
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : CNA
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : CNA
ANALYZED ON : 19-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 30071897AR

BTEX ANALYSIS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Benzene	2.0 µg/L	<	2.0 µg/L	U
Toluene	2.0 µg/L	<	2.0 µg/L	U
Ethyl benzene	2.0 µg/L	<	2.0 µg/L	U
m,p-Xylene	2.0 µg/L	<	2.0 µg/L	U
o-Xylene	2.0 µg/L	<	2.0 µg/L	U
Bromofluorobenzene (SS)			53.0 µg/L	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-23
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : CNA
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : CNA
ANALYZED ON : 19-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 30071897AR

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	2.0 µg/L	51.0 µg/L	
Ethyl benzene	2.0 µg/L	53.6 µg/L	
Bromofluorobenzene (SS)		49.8 µg/L	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-24
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: LB2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 21-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : RFG
PREPARED ON : 21-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 21-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 25-072197

BTEX ANALYSIS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Benzene	0.001 mg/Kg	<	0.001 mg/Kg	U
Toluene	0.002 mg/Kg	<	0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	<	0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	<	0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	<	0.002 mg/Kg	U
Bromofluorobenzene (SS)			0.061 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT NUMBER : D97-8568-24
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: LB2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 21-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : RFG
PREPARED ON : 21-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 21-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 26-072197

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.00 mg/Kg	< 1.00 mg/Kg	U
Fluorobenzene (SS)		0.047 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services
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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-25
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BS2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 21-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : RFG
PREPARED ON : 21-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 21-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 25-072197

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	0.044 mg/Kg	
Ethyl benzene	0.002 mg/Kg	0.051 mg/Kg	
Bromofluorobenzene (SS)		0.055 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997 REPORT NUMBER : D97-8568-25
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BS2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 21-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : RFG
PREPARED ON : 21-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 21-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 26-072197

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.00 mg/Kg	0.543 mg/Kg	J
Fluorobenzene (SS)		0.045 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997
REPORT NUMBER : D97-8568-26
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 22-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.20 mg/Kg	2.52 mg/Kg	
Acenaphthylene	1.54 mg/Kg	2.48 mg/Kg	
Anthracene	0.440 mg/Kg	2.36 mg/Kg	
Benzo(a)anthracene	0.0090 mg/Kg	2.94 mg/Kg	
Benzo(a)pyrene	0.0150 mg/Kg	2.77 mg/Kg	
Benzo(b)fluoranthene	0.0120 mg/Kg	2.82 mg/Kg	
Benzo(g,h,i)perylene	0.0500 mg/Kg	2.88 mg/Kg	
Benzo(k)fluoranthene	0.0110 mg/Kg	2.74 mg/Kg	
Chrysene	0.100 mg/Kg	2.79 mg/Kg	
Dibenz(a,h)anthracene	0.0200 mg/Kg	3.12 mg/Kg	
Fluoranthene	0.140 mg/Kg	2.84 mg/Kg	
Fluorene	0.140 mg/Kg	2.61 mg/Kg	
Indeno(1,2,3-cd)pyrene	0.0300 mg/Kg	2.64 mg/Kg	
Naphthalene	1.20 mg/Kg	2.92 mg/Kg	

REPORT NUMBER : D97-8568-26 PAGE 2
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.420 mg/Kg	2.51 mg/Kg	
Pyrene	0.180 mg/Kg	2.57 mg/Kg	
p-Terphenyl (SS)		0.265 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 22-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 19-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 19-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	0.049 mg/Kg	
Ethyl benzene	0.002 mg/Kg	0.054 mg/Kg	
Bromofluorobenzene (SS)		0.058 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 22-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.0 mg/Kg	74.2 mg/Kg	
Triacontane (SS)		7.41 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 22-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 19-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 19-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.00 mg/Kg	0.504 mg/Kg	J
Fluorobenzene (SS)		0.046 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT NUMBER : D97-8568-26
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science.
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 22-JUL-1997

TOTAL METALS

TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Lead /1	2 mg/Kg	11 mg/Kg	D-

Dilution Factor : 10
Prepared using EPA 3051 on 15-JUL-1997 by CEL
Analyzed using EPA 7421 on 17-JUL-1997 by GGD
QC Batch No : AC160-16F

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services
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DATE RECEIVED : 10-JUL-1997
REPORT NUMBER : D97-8568-27
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 22-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : CNA
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : CNA
ANALYZED ON : 19-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 30071897AR

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	2.0 µg/L	54.9 µg/L	
Ethyl benzene	2.0 µg/L	57.3 µg/L	
Bromofluorobenzene (SS)		49.6 µg/L	

Results are reported on Dry Weight basis when applicable.

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DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-28
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BD2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 22-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : RFG
PREPARED ON : 21-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 21-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 25-072197

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	0.047 mg/Kg	
Ethyl benzene	0.002 mg/Kg	0.054 mg/Kg	
Bromofluorobenzene (SS)		0.055 mg/Kg	

Results are reported on Dry Weight basis when applicable.

Intertek Testing Services NA Inc.
1089 East Collins Boulevard Richardson, TX 75081
Telephone (972) 238-5591 Fax (972) 238-5592

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-28
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BD2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 22-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : RFG
PREPARED ON : 21-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 21-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 26-072197

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.00 mg/Kg	0.586 mg/Kg	J
Fluorobenzene (SS)		0.048 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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1089 East Collins Boulevard Richardson, TX 75081
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ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 10-JUL-1997
REPORT NUMBER : D97-8568-29
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: LB#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 4-AUG-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 28-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 30-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC143-73A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.20 mg/Kg	< 1.20 mg/Kg	U
Acenaphthylene	1.54 mg/Kg	< 1.54 mg/Kg	U
Anthracene	0.440 mg/Kg	< 0.440 mg/Kg	U
Benzo(a)anthracene	0.0090 mg/Kg	< 0.0090 mg/Kg	U
Benzo(a)pyrene	0.0150 mg/Kg	< 0.0150 mg/Kg	U
Benzo(b)fluoranthene	0.0120 mg/Kg	< 0.0120 mg/Kg	U
Benzo(g,h,i)perylene	0.0500 mg/Kg	< 0.0500 mg/Kg	U
Benzo(k)fluoranthene	0.0110 mg/Kg	< 0.0110 mg/Kg	U
Chrysene	0.100 mg/Kg	< 0.100 mg/Kg	U
Dibenz(a,h)anthracene	0.0200 mg/Kg	< 0.0200 mg/Kg	U
Fluoranthene	0.140 mg/Kg	< 0.140 mg/Kg	U
Fluorene	0.140 mg/Kg	< 0.140 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0300 mg/Kg	< 0.0300 mg/Kg	U
Naphthalene	1.20 mg/Kg	< 1.20 mg/Kg	U

REPORT NUMBER : D97-8568-29 PAGE 2
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Phenanthrene	0.420 mg/Kg	<	0.420 mg/Kg	U
Pyrene	0.180 mg/Kg	<	0.180 mg/Kg	U
p-Terphenyl (SS)			0.230 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-30
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BS#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 4-AUG-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 28-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 30-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC143-73A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.20 mg/Kg	2.37 mg/Kg	
Acenaphthylene	1.54 mg/Kg	2.32 mg/Kg	
Anthracene	0.440 mg/Kg	2.34 mg/Kg	
Benzo(a)anthracene	0.0090 mg/Kg	3.03 mg/Kg	
Benzo(a)pyrene	0.0150 mg/Kg	2.69 mg/Kg	
Benzo(b)fluoranthene	0.0120 mg/Kg	2.91 mg/Kg	
Benzo(g,h,i)perylene	0.0500 mg/Kg	2.95 mg/Kg	
Benzo(k)fluoranthene	0.0110 mg/Kg	2.73 mg/Kg	
Chrysene	0.100 mg/Kg	2.88 mg/Kg	
Dibenz(a,h)anthracene	0.0200 mg/Kg	3.20 mg/Kg	
Fluoranthene	0.140 mg/Kg	2.92 mg/Kg	
Fluorene	0.140 mg/Kg	2.52 mg/Kg	
Indeno(1,2,3-cd)pyrene	0.0300 mg/Kg	2.72 mg/Kg	
Naphthalene	1.20 mg/Kg	2.80 mg/Kg	

REPORT NUMBER : D97-8568-30
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.420 mg/Kg	2.50 mg/Kg	
Pyrene	0.180 mg/Kg	2.70 mg/Kg	
p-Terphenyl (SS)		0.282 mg/Kg	

Results are reported on Dry Weight basis when applicable.

Intertek Testing Services NA Inc.
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ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-31
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BD#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 4-AUG-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 28-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 30-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC143-73A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.20 mg/Kg	2.38 mg/Kg	
Acenaphthylene	1.54 mg/Kg	2.30 mg/Kg	
Anthracene	0.440 mg/Kg	2.33 mg/Kg	
Benzo(a)anthracene	0.0090 mg/Kg	3.04 mg/Kg	
Benzo(a)pyrene	0.0150 mg/Kg	2.72 mg/Kg	
Benzo(b)fluoranthene	0.0120 mg/Kg	2.93 mg/Kg	
Benzo(g,h,i)perylene	0.0500 mg/Kg	2.97 mg/Kg	
Benzo(k)fluoranthene	0.0110 mg/Kg	2.74 mg/Kg	
Chrysene	0.100 mg/Kg	2.89 mg/Kg	
Dibenz(a,h)anthracene	0.0200 mg/Kg	3.22 mg/Kg	
Fluoranthene	0.140 mg/Kg	2.91 mg/Kg	
Fluorene	0.140 mg/Kg	2.49 mg/Kg	
Indeno(1,2,3-cd)pyrene	0.0300 mg/Kg	2.75 mg/Kg	
Naphthalene	1.20 mg/Kg	2.77 mg/Kg	

REPORT NUMBER : D97-8568-31
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.420 mg/Kg	2.47 mg/Kg	
Pyrene	0.180 mg/Kg	2.69 mg/Kg	
p-Terphenyl (SS)		0.282 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-32
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB07-11#
: N2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 4-AUG-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 28-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 31-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC143-73A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.20 mg/Kg	< 1.20 mg/Kg	U
Acenaphthylene	1.54 mg/Kg	< 1.54 mg/Kg	U
Anthracene	0.440 mg/Kg	< 0.440 mg/Kg	U
Benzo(a)anthracene	0.0090 mg/Kg	< 0.0090 mg/Kg	U
Benzo(a)pyrene	0.0150 mg/Kg	< 0.0150 mg/Kg	U
Benzc(b)fluoranthene	0.0120 mg/Kg	< 0.0120 mg/Kg	U
Benzo(g,h,i)perylene	0.0500 mg/Kg	< 0.0500 mg/Kg	U
Benzo(k)fluoranthene	0.0110 mg/Kg	< 0.0110 mg/Kg	U
Chrysene	0.100 mg/Kg	< 0.100 mg/Kg	U
Dibenz(a,h)anthracene	0.0200 mg/Kg	< 0.0200 mg/Kg	U
Fluoranthene	0.140 mg/Kg	< 0.140 mg/Kg	U
Fluorene	0.140 mg/Kg	< 0.140 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0300 mg/Kg	< 0.0300 mg/Kg	U
Naphthalene	1.20 mg/Kg	< 1.20 mg/Kg	U

REPORT NUMBER : D97-8568-32 PAGE 2
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Phenanthrene	0.420 mg/Kg	<	0.420 mg/Kg	U
Pyrene	0.180 mg/Kg	<	0.180 mg/Kg	U
p-Terphenyl (SS)			0.216 mg/Kg	

Results are reported on Dry Weight basis when applicable.

DESCRIPTION OF REPORTING FLAGS

U - Indicates compound was analyzed for but not detected.

J - Indicates an estimated value. This flag is used if the compound is detected but is below the Reporting Limit.

D - Indicates all compounds in an analysis at a secondary dilution.

N - Indicates presumptive evidence of a compound. This flag is only used for tentatively identified compounds where the identification is based on a mass spectral library search.

E - Indicates the compounds whose concentration exceed the limit of the instrument or the Laboratory Information Management System. The concentration will be greater than the concentration listed.

Q - Indicates the surrogate recovery is outside the defined QC limits.

M - Indicates the matrix has interfered with the recovery of the surrogates.

O - Indicates the surrogate was lost because of dilution.

DATE RECEIVED: 12-JUL-1997

REPORT NUMBER: D97-8703
REPORT DATE: 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 1700 Broadway, Suite 900
Denver, CO 80290
ATTENTION : Mr. John Hall

PROJECT : 726876.24120 Gunter Annex

CASE NARRATIVE SUMMARY

This is an ITS Level 4 data package, containing results for the analysis of organic and inorganic parameters by EPA methodologies.

Sample Receipt

Sample TB04 was not received with the sample shipment. Per the client, this sample was not sent, although it is listed on the chain of custody.

EPA Method 8260 Volatile Organics Analysis

Calibrations

For the continuing calibration of instrument ITS7, the percent differences for the following compounds were outside of the QC limits of ≤20%

ITS7 7/17/97 07:23
- chloromethane (39.6%)
- dichlorodifluoromethane (25.6%)
- bromoform (31.8%)
- 1,2,4-trichlorobenzene (26.4%)
- hexachlorobutadiene (30.0%)
- naphthalene (23.4%)
- 1,2,3-trichlorobenzene (468%)
- 2-butanone (30.0%)
- 4-methyl-2-pentanone (28.4%)
- 2-hexanone (28.4%)

ITS7 7/18/97 08:50
- bromoform (39.6%)
- naphthalene (268%)
- 1,2,3-trichlorobenzene (248%)
- acetone (25.2%)
- acrylonitrile (30.2%)
- 2-butanone (40.8%)
- vinyl acetate (30.0%)

ITS Environmental Laboratories 1089 East Collins Blvd., #100 Richardson, TX 75081 (972) 238-3591

CHAIN OF CUSTODY RECORD

Report to:
Company: Parsons ES
Address: 257A 28 Rd
Grand Jct., CO 81503
Contact: John Hall
Phone: (970) 244-8829
Fax: "

Invoice to
Company: Parsons ES
Address: 1700 Broadway
Denver CO 80290
Contact: John Ratz
Phone: (303) 831-8100
PO/SO #: 726876.24120

Sampler's Name: John Hall
Sampler's Signature: John Hall

Proj. No.: 726876.24120
Project Name: Gunter Annex Option 2

ANALYSIS REQUESTED: VOCs 8260 + 8015 M (GRO) TPH; PAH 8310; Sulfate 9056; Lead 7420; VOCs 8260

Lab use only — Due Date:
Temp. of coolers when received (C°): 1 2 3 4 5 — 4
Custody Seal N / Y
Intact N / Y
Screened For Radioactivity

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	No./Type of Containers[2] VOA	A/G 1 Lt.	250 ml	P/O	Lab Sample ID (Lab Use Only)
W	7/9/97	1725		X	GU-GMW1				2	8703-1
W	7/1/97	1420		X	GU-GMW2				2	2
W	7/4/97	1520		X	GU-GMW44				2	3
W	7/4/97	1615		X	GU-GMW-45				2	4
W	7/11/97	1030		X	TB04	1				5

ORIGINAL

Turn around time: X Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
John Hall	7/11/97	13:00	[signature]	7/12/97	0927
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks

Client's delivery of samples constitutes acceptance of Inchcape/ITS-Dallas terms and conditions contained in the Price Schedule.

[1] Matrix: WW - Wastewater; W - Water; S - Soil; SD - Solid; L - Liquid; A - Air Bag; C - Charcoal tube; SL - Sludge; O - Oil
[2] Container: VOA - 40 ml vial; A/G - Amber / Or Glass 1 Liter; 250 ml - Glass wide mouth; P/O - Plastic or other _____

Inchcape cannot accept verbal changes. Please Fax written changes to 972-238-5592

OFFICE USE ONLY

ITS Environmental Laboratories 1089 East Collins Blvd., #100 Richardson, TX 75081 (972) 238-5591

CHAIN OF CUSTODY RECORD

14 OF

Report to:
Company: Parsons ES
Address: 257A 28 Rd
Grand Jct, CO 81503
Contact: John Hall
Phone: (970) 244 8829
Fax:

Invoice to
Company: Parsons ES
Address: 1700 Broadway
Denver CO 80796
Contact: John Ratz
Phone: 303 8318100
PO/SO #: 726876.24120

Lab use only
Due Date:

Temp. of coolers when received (C°): 1 | 2 | 3 | 4 | 5

Custody Seal N Y
Intact N Y Y

Screened For Radioactivity

Sampler's Name: John Hall
Sampler's Signature: John Hall

Proj. No.: 726876.24120
Project Name: Gunter Annex Option 2

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	No./Type of Containers[2] VOA	A/G 1 Lt.	250 ml	P/O	VOCs 8260 + 8015M (GRO)	PAH 8310	Sulfide 9030	Lead 7421	TPH - 8015M (DRO)	Methane RSKSOP 175	Lab Sample ID (Lab Use Only)
W	7/9/97	1725		X	GU-GMW 1	3	2			3	1		1			1
W	7/9/97	1420		X	GU-GMW 2	3	2			3	1		1			2
W	7/14/97	1520		X	GU-GMW-44	6	2			3	1		1	3		3
W	7/14/97	1615		X	GU-GMW-45	3	2			3	1		1	3		4
W	7/10/97	1035			TB-02	1	2									8703-6

Turn around time: ☒ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
John Hall	7/11/97	13:00	Sandra Mayo	7/12/97	0927
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks

Client's delivery of samples constitutes acceptance of Inchcape/ITS-Dallas terms and conditions contained in the Price Schedule.

[1] Matrix: WW - Wastewater; W - Water; S - Soil; SD - Solid; L - Liquid; A - Air Bag; C - Charcoal tube; SL - Sludge; O - Oil
[2] Container: VOA - 40 ml vial; A/G - Amber / Or Glass 1 Liter; 250 ml - Glass wide mouth; P/O - Plastic or other

Inchcape cannot accept verbal changes. Please Fax written changes to 972-238-5592

OFFICE USE ONLY

ITS Environmental Laboratories 1089 East Collins Blvd., #100 Richardson, TX 75081 (972) 238-5591

CHAIN OF CUSTODY RECORD

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Phone: (970) 244-8829
Fax: "

Invoice to
Company: Parsons ES
Address: 1700 Broadway
Denver, CO 80290
Contact: John Ratz
Phone: (303) 831 8100
PO/SO #: 726876.24120

Sampler's Name: John Hall
Sampler's Signature:

Proj. No.: 726876.24120
Project Name: Gunter Annex Option 2

Lab use only
Due Date:

Temp. of coolers when received (C°): 1 | 2 | 3 | 4 | 5
Custody Seal N / Y
Intact N / Y
Screened For Radioactivity

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	No./Type of Containers[2] VOA	A/G 1 Lt.	250 ml	P/O	VOCs 8260 + TPH	PAH 8310	Sulfate 9056	Lead 7420	TPH 8015M (DRO)	Methane RSKSOP 175	Lab Sample ID (Lab Use Only)
W	7/11/97	1140		X	GU-GMW3	3	4			3	1	1	1	1		8703-7
W	7/11/97	1030		X	GU-GMW4	6	4			3	1	1	1	1	3	8
W	7/11/97	1040			~~Trip Blank~~ DT TB-03	1				1						9

Turn around time: [X] Priority 1 or Standard [ ] Priority 2 or 50% [ ] Priority 3 or 100% [ ] Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

	Date:	Time:		Date:	Time:
Relinquished by: (Signature)	7/11/97	13:00	Received by: (Signature)	7/12/97	0927
Relinquished by: (Signature)			Received by: (Signature)		
Relinquished by: (Signature)			Received by: (Signature)		

Remarks

Client's delivery of samples constitutes acceptance of Inchcape/ITS-Dallas terms and conditions contained in the Price Schedule.

[1] Matrix: WW - Wastewater; W - Water; S - Soil; SD - Solid; L - Liquid; A - Air Bag; C - Charcoal tube; SL - Sludge; O - Oil
[2] Container: VOA - 40 ml vial; A/G - Amber / Or Glass 1 Liter; 250 ml - Glass wide mouth; P/O - Plastic or other _____

Inchcape cannot accept verbal changes. Please Fax written changes to 972-238-5592

OFFICE USE ONLY

15

COOLER RECEIPT FORM

Gunter Annex

Date Received: 7/12/97 Project: 726876-24120

Date Logged-in: 7/12/97 Received by:

No. of coolers received: 3 Cooler Numbers: N/A

1	Shipping slip. If yes, carrier and bill number: FED EX 4611683996	Yes	No
2	Custody seals on cooler. If yes, how many and where:	Yes	No
3	Custody seals intact.	Yes	No
4	Chain of Custody in plastic.	Yes	No
5	Chain of Custody filled out properly.	Yes	No
6	Client signed Chain of Custody.	Yes	No
7	Samples shipped on ice. If no, temperature of cooler:	Yes	~~No~~ JDM
8	All bottles sealed.	Yes	No JDM
9	All bottles received intact.	Yes	No
10	Labels in good condition and complete.	Yes	No
11	Sample labels agree with Chain of Custody.	Yes	No
12	Correct containers used.	Yes	No
13	Correct preservative used.	Yes	No
14	Sufficient sample provided.	Yes	No
15	Bubbles absent from VOA.	Yes	No
16	Comments (use corrective action form if necessary):		

** If client or project manager need to be notify for any reason, please use the Case Narrative/Corrective Action green form.

ITS Intertek Testing Services
Environmental Laboratories

SAMPLE PRESERVATION INFORMATION SHEET

Preserved By	KRH	**JOB NUMBER**	87103
Date	7-15-97		
Time		Client Name	Parsons

Sample No.	Container Type	Apparent Volume (mLs)	Initial pH* (20± 2° C)	Final pH	Preservative Added	Filtration	Comments
87103-1	IAG	1L	5.5	5.5	4		NP
-2	1	1	6.0	6.0	1	1	1
-3	1	1	1	1	1	1	1
-4	1	1	5.7	5.7	1	1	1
-7	1	1	5.5	5.5	1	1	1
-8	1	1	5.6	5.6	1	1	1
							includes 1P1L for Sulfate on #s 1,2,3,4,7 & 8
							1AG1L TPH (HCL) on # 1,2,3,4,7 & 8
							1P1L for metals on # 1,2,3,4,7 & 8

pH Duplicate (maximum difference = 0.2): 5.5
Sample No. 87103-1

pH LCS (ph = 7.0 ± 0.2): 7.0
Number: E100

PRESERVATION / FILTRATION KEY

1 = Pre-preserved
2 = H_2SO_4 to pH<2
3 = HNO_3 to pH<2
4 = HCl to pH<2
5 = NaOH to pH>12
6 = $Na_2S_2O_3$ (0.008%)
7 = 2 mL Zn OAc/NaOH to pH>12
8 = No Preservative Required

F = Chain-of-Custody indicates sample was filtered in the field
L = Sample filtered (0.45 pm) in the laboratory before preservation

* The initial pH balance is determined in accordance with EPA methods 150.1 / SW-846 9040 using a sample of aliquot which has been adjusted to 20 ± 2°C

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FedEx USA Airbill

Tracking Number 461168399 6

FedEx Retrieval Copy

1 From
Date 7/11/97 Sender's FedEx Account Number 1674-0246-1
Sender's Name John Hall Phone 303 831 8100
Company Parsons ES Dept/Floor/Suite/Room Suite 900
Address 1700 Broadway
City Denver State CO Zip 80290

2 Your Internal Billing Reference Information 726876.24122

3 To
Recipient's Name J. McKittrick Phone 972 238 5591
Company ITS Environmental Lab Dept/Floor/Suite/Room #100
Address 1089 E. Collins Blvd
City Richardson State TX Zip 75081

For HOLD at FedEx Location check here
Hold Weekday
Hold Saturday (Not available at all locations)

For Saturday Delivery check here
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4a Express Package Service *Packages under 150 lbs.*
1 [X] FedEx Priority Overnight (Next business afternoon)
5 [ ] FedEx Standard Overnight (Next business afternoon)
3 [ ] FedEx 2Day* (Second business day)
6 [ ] NEW FedEx First Overnight (Earliest next business morning delivery) (Higher rates apply)

4b Express Freight Service *Packages over 150 lbs.*
7 [ ] FedEx Overnight Freight (First business day service for any distance)
8 [ ] FedEx 2Day Freight (Second business day service for any distance)
9 [ ] FedEx Express Saver Freight (Up to 3 business days service based upon distance)
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5 Packaging 6 [ ] FedEx Letter 2 [ ] FedEx Pak 3 [ ] FedEx Box 4 [ ] FedEx Tube 1 [X] Other Pkg.

6 Special Handling
Does this shipment contain dangerous goods? 4 [ ] Yes [ ] Yes
6 [ ] Dry Ice kg ons
CA [ ] Cargo Aircraft Only

7 Payment [ ] Obtain Recipient FedEx Account No.
Bill to: 1 [X] Sender 2 [ ] Recipient 3 [ ] Third Party 4 [ ] Credit Card 5 [ ] Cash/Check
FedEx Account No.
Credit Card No. Exp Date
Total Packages 3 Total Weight 135 Total Charges $
Credit Card Auth.

CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY

8 Release Signature
272
Rev. Date 6/96 PART #147957
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[ ] Check here if package was dropped off

4 6 1 1 6 8 3 9 9 6

18

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Environmental Laboratories

ANALYTICAL REPORT

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall
PROJECT : 726876.24120 Gunter Annex

Included in this data package are the analytical results for the sample group which you have submitted to Intertek Testing Services for analysis. These results are representative of the samples as received by the laboratory.

The information contained herein has undergone extensive review and is deemed accurate and complete. Sample analysis and quality control were performed in accordance with all applicable protocols. Please refrain from reproducing this report except in its entirety.

If you have any questions regarding this report and its associated materials please call your Project Manager at (214) 238-5591.

We appreciate the opportunity to serve you and look forward to providing continued service in the future.

Martin Jeffus
General Manager

Intertek Testing Services NA Inc.
1089 East Collins Boulevard Richardson, TX 75081
Telephone (972) 238-5591 Fax (972) 238-5592

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Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-1
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW1#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	< 20.0 µg/L	U
Acrylonitrile	5.00 µg/L	< 5.00 µg/L	U
Benzene	5.00 µg/L	< 5.00 µg/L	U
Bromobenzene	5.00 µg/L	< 5.00 µg/L	U
Bromochloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromodichloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromoform	5.00 µg/L	< 5.00 µg/L	U
Carbon disulfide	5.00 µg/L	< 5.00 µg/L	U
Carbon tetrachloride	5.00 µg/L	< 5.00 µg/L	U
Chlorobenzene	5.00 µg/L	< 5.00 µg/L	U
Chloroethane	5.00 µg/L	< 5.00 µg/L	U
Chloroform	5.00 µg/L	< 5.00 µg/L	U
2-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U
4-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U

REPORT NUMBER : D97-8703-1
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	< 10.0 µg/L	U
Dibromochloromethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dibromo-3-chloropropane	25.0 µg/L	< 25.0 µg/L	U
1,2-Dibromoethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,4-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
trans-1,4-Dichloro-2-butene	100 µg/L	< 100 µg/L	U
1,1-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
cis-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
trans-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
2,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
cis-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
trans-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
Ethylbenzene	5.00 µg/L	< 5.00 µg/L	U
2-Hexanone	50.0 µg/L	< 50.0 µg/L	U
Bromomethane	5.00 µg/L	< 5.00 µg/L	U
Chloromethane	5.00 µg/L	< 5.00 µg/L	U
Dibromomethane	5.00 µg/L	< 5.00 µg/L	U
2-Butanone	100 µg/L	< 100 µg/L	U
Iodomethane	5.00 µg/L	< 5.00 µg/L	U

REPORT NUMBER : D97-8703-1
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	< 5.00 µg/L	U
4-Methyl-2-pentanone	100 µg/L	< 100 µg/L	U
Styrene	5.00 µg/L	< 5.00 µg/L	U
1,1,1,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
Tetrachloroethene	5.00 µg/L	< 5.00 µg/L	U
Toluene	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,1,1-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
Trichloroethene	5.00 µg/L	< 5.00 µg/L	U
Trichlorofluoromethane	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,3,5-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
Vinyl acetate	50.0 µg/L	< 50.0 µg/L	U
Vinyl chloride	2.00 µg/L	< 2.00 µg/L	U
m,p-Xylene	5.00 µg/L	< 5.00 µg/L	U
o-Xylene	5.00 µg/L	< 5.00 µg/L	U
Toluene-d8 (SS)		50.1 µg/L	
Bromofluorobenzene (SS)		57.0 µg/L	
1,2-Dichloroethane-d4 (SS)		51.5 µg/L	
Dibromofluoromethane (SS)		54.5 µg/L	

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-1
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW1#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	10 ug/L	N

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REPORT NUMBER : D97-8703-1
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW1#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 3520B
PREPARED BY : TAP
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 24-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-74

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	18.0 µg/L	< 18.0 µg/L	U
Acenaphthylene	23.0 µg/L	< 23.0 µg/L	U
Anthracene	6.60 µg/L	< 6.60 µg/L	U
Benzo(a)anthracene	0.130 µg/L	< 0.130 µg/L	U
Benzo(a)pyrene	0.120 µg/L	< 0.120 µg/L	U
Benzo(b)fluoranthene	0.180 µg/L	< 0.180 µg/L	U
Benzo(g,h,i)perylene	0.760 µg/L	< 0.760 µg/L	U
Benzo(k)fluoranthene	0.170 µg/L	< 0.170 µg/L	U
Chrysene	1.50 µg/L	< 1.50 µg/L	U
Dibenz(a,h)anthracene	0.300 µg/L	< 0.300 µg/L	U
Fluoranthene	2.10 µg/L	< 2.10 µg/L	U
Fluorene	2.10 µg/L	< 2.10 µg/L	U
Indeno(1,2,3-cd)pyrene	0.430 µg/L	< 0.430 µg/L	U
Naphthalene	18.0 µg/L	< 18.0 µg/L	U

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REPORT NUMBER : D97-8703-1 PAGE 2
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		FLAG
Phenanthrene	6.40	µg/L	< 6.40	µg/L	U
Pyrene	2.70	µg/L	< 2.70	µg/L	U
p-Terphenyl (SS)			8.34	µg/L	

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REPORT NUMBER : D97-8703-1
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW1#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 3510B
PREPARED BY : KDF
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-77

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	1000 µg/L	53.0 µg/L	J
Triacontane (SS)		214 µg/L	

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REPORT NUMBER : D97-8703-1
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW1#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : LLB
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 20-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 29072097RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	100 µg/L	< 100 µg/L	U
Fluorobenzene (SS)		48.6 µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-1
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW1#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997

TOTAL METALS

TEST REQUESTED		DETECTION LIMIT	RESULTS	FLAG
Lead	/1	0.0020 mg/L	0.0017 mg/L	J

Dilution Factor : 1
Prepared using EPA 3015 on 17-JUL-1997 by CEL
Analyzed using EPA 7421 on 22-JUL-1997 by GGD
QC Batch No : AC160-35F

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REPORT NUMBER : D97-8703-1
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW1#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997

MISCELLANEOUS ANALYSES

TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Sulfate /1	1.00 mg/L	0.76 mg/L	DJ

Dilution Factor : 5
Analyzed using EPA 9056 on 21-JUL-1997 by LKD
QC Batch No : 32-0721971

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-2
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW2#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	< 20.0 µg/L	U
Acrylonitrile	5.00 µg/L	< 5.00 µg/L	U
Benzene	5.00 µg/L	< 5.00 µg/L	U
Bromobenzene	5.00 µg/L	< 5.00 µg/L	U
Bromochloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromodichloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromoform	5.00 µg/L	< 5.00 µg/L	U
Carbon disulfide	5.00 µg/L	< 5.00 µg/L	U
Carbon tetrachloride	5.00 µg/L	< 5.00 µg/L	U
Chlorobenzene	5.00 µg/L	< 5.00 µg/L	U
Chloroethane	5.00 µg/L	< 5.00 µg/L	U
Chloroform	5.00 µg/L	< 5.00 µg/L	U
2-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U
4-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U

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REPORT NUMBER : D97-8703-2
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	<	10.0 µg/L	U
Dibromochloromethane	5.00 µg/L	<	5.00 µg/L	U
1,2-Dibromo-3-chloropropane	25.0 µg/L	<	25.0 µg/L	U
1,2-Dibromoethane	5.00 µg/L	<	5.00 µg/L	U
1,2-Dichlorobenzene	5.00 µg/L	<	5.00 µg/L	U
1,3-Dichlorobenzene	5.00 µg/L	<	5.00 µg/L	U
1,4-Dichlorobenzene	5.00 µg/L	<	5.00 µg/L	U
trans-1,4-Dichloro-2-butene	100 µg/L	<	100 µg/L	U
1,1-Dichloroethane	5.00 µg/L	<	5.00 µg/L	U
1,2-Dichloroethane	5.00 µg/L	<	5.00 µg/L	U
1,1-Dichloroethene	5.00 µg/L	<	5.00 µg/L	U
cis-1,2-Dichloroethene	5.00 µg/L	<	5.00 µg/L	U
trans-1,2-Dichloroethene	5.00 µg/L	<	5.00 µg/L	U
1,2-Dichloropropane	5.00 µg/L	<	5.00 µg/L	U
2,2-Dichloropropane	5.00 µg/L	<	5.00 µg/L	U
1,1-Dichloropropene	5.00 µg/L	<	5.00 µg/L	U
1,3-Dichloropropane	5.00 µg/L	<	5.00 µg/L	U
cis-1,3-Dichloropropene	5.00 µg/L	<	5.00 µg/L	U
trans-1,3-Dichloropropene	5.00 µg/L	<	5.00 µg/L	U
Ethylbenzene	5.00 µg/L	<	5.00 µg/L	U
2-Hexanone	50.0 µg/L	<	50.0 µg/L	U
Bromomethane	5.00 µg/L	<	5.00 µg/L	U
Chloromethane	5.00 µg/L	<	5.00 µg/L	U
Dibromomethane	5.00 µg/L	<	5.00 µg/L	U
2-Butanone	100 µg/L	<	100 µg/L	U
Iodomethane	5.00 µg/L	<	5.00 µg/L	U

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REPORT NUMBER : D97-8703-2
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	< 5.00 µg/L	U
4-Methyl-2-pentanone	100 µg/L	< 100 µg/L	U
Styrene	5.00 µg/L	< 5.00 µg/L	U
1,1,1,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
Tetrachloroethene	5.00 µg/L	< 5.00 µg/L	U
Toluene	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,1,1-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
Trichloroethene	5.00 µg/L	< 5.00 µg/L	U
Trichlorofluoromethane	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,3,5-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
Vinyl acetate	50.0 µg/L	< 50.0 µg/L	U
Vinyl chloride	2.00 µg/L	< 2.00 µg/L	U
m,p-Xylene	5.00 µg/L	< 5.00 µg/L	U
o-Xylene	5.00 µg/L	< 5.00 µg/L	U
Toluene-d8 (SS)		49.9 µg/L	
Bromofluorobenzene (SS)		59.7 µg/L	
1,2-Dichloroethane-d4 (SS)		51.0 µg/L	
Dibromofluoromethane (SS)		50.8 µg/L	

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REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW2#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	10 ug/L	N

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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW2#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 3520B
PREPARED BY : TAP
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 25-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-74

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	18.0 µg/L	< 18.0 µg/L	U
Acenaphthylene	23.0 µg/L	< 23.0 µg/L	U
Anthracene	6.60 µg/L	< 6.60 µg/L	U
Benzo(a)anthracene	0.130 µg/L	< 0.130 µg/L	U
Benzo(a)pyrene	0.120 µg/L	< 0.120 µg/L	U
Benzo(b)fluoranthene	0.180 µg/L	< 0.180 µg/L	U
Benzo(g,h,i)perylene	0.760 µg/L	< 0.760 µg/L	U
Benzo(k)fluoranthene	0.170 µg/L	< 0.170 µg/L	U
Chrysene	1.50 µg/L	< 1.50 µg/L	U
Dibenz(a,h)anthracene	0.300 µg/L	< 0.300 µg/L	U
Fluoranthene	2.10 µg/L	< 2.10 µg/L	U
Fluorene	2.10 µg/L	< 2.10 µg/L	U
Indeno(1,2,3-cd)pyrene	0.430 µg/L	< 0.430 µg/L	U
Naphthalene	18.0 µg/L	< 18.0 µg/L	U

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REPORT NUMBER : D97-8703-2
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		FLAG
Phenanthrene	6.40	µg/L	< 6.40	µg/L	U
Pyrene	2.70	µg/L	< 2.70	µg/L	U
p-Terphenyl (SS)			8.23	µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-2
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW2#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 3510B
PREPARED BY : KDF
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-77

TOTAL EXTRACTABLE HYDROCARBONS						
TEST REQUESTED	DETECTION LIMIT		RESULTS			FLAG
Total Extractable Hydrocarbons	1000	µg/L	<	1000	µg/L	U
Triacontane-(SS)				227	µg/L	

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REPORT NUMBER : D97-8703-2
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW2#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : LLB
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 20-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 29072097RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	100 µg/L	< 100 µg/L	U
Fluorobenzene (SS)		49.1 µg/L	

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REPORT NUMBER : D97-8703-2
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW2#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997

TOTAL METALS

TEST REQUESTED		DETECTION LIMIT	RESULTS		FLAG
Lead	/1	0.0020 mg/L	<	0.0020 mg/L	U

Dilution Factor : 1
Prepared using EPA 3015 on 17-JUL-1997 by CEL
Analyzed using EPA 7421 on 22-JUL-1997 by GGD
QC Batch No : AC160-35F

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-2
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW2#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Sulfate /1	0.20 mg/L	0.75 mg/L	

Dilution Factor : 1
Analyzed using EPA 9056 on 21-JUL-1997 by LKD
QC Batch No : 32-0721971

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-3
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW44#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	< 20.0 µg/L	U
Acrylonitrile	5.00 µg/L	< 5.00 µg/L	U
Benzene	5.00 µg/L	7.44 µg/L	
Bromobenzene	5.00 µg/L	< 5.00 µg/L	U
Bromochloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromodichloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromoform	5.00 µg/L	< 5.00 µg/L	U
Carbon disulfide	5.00 µg/L	< 5.00 µg/L	U
Carbon tetrachloride	5.00 µg/L	< 5.00 µg/L	U
Chlorobenzene	5.00 µg/L	< 5.00 µg/L	U
Chloroethane	5.00 µg/L	< 5.00 µg/L	U
Chloroform	5.00 µg/L	< 5.00 µg/L	U
2-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U
4-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U

REPORT NUMBER : D97-8703-3
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	<	10.0 µg/L	U
Dibromochloromethane	5.00 µg/L	<	5.00 µg/L	U
1,2-Dibromo-3-chloropropane	25.0 µg/L	<	25.0 µg/L	U
1,2-Dibromoethane	5.00 µg/L	<	5.00 µg/L	U
1,2-Dichlorobenzene	5.00 µg/L	<	5.00 µg/L	U
1,3-Dichlorobenzene	5.00 µg/L	<	5.00 µg/L	U
1,4-Dichlorobenzene	5.00 µg/L	<	5.00 µg/L	U
trans-1,4-Dichloro-2-butene	100 µg/L	<	100 µg/L	U
1,1-Dichloroethane	5.00 µg/L	<	5.00 µg/L	U
1,2-Dichloroethane	5.00 µg/L	<	5.00 µg/L	U
1,1-Dichloroethene	5.00 µg/L	<	5.00 µg/L	U
cis-1,2-Dichloroethene	5.00 µg/L	<	5.00 µg/L	U
trans-1,2-Dichloroethene	5.00 µg/L	<	5.00 µg/L	U
1,2-Dichloropropane	5.00 µg/L	<	5.00 µg/L	U
2,2-Dichloropropane	5.00 µg/L	<	5.00 µg/L	U
1,1-Dichloropropene	5.00 µg/L	<	5.00 µg/L	U
1,3-Dichloropropane	5.00 µg/L	<	5.00 µg/L	U
cis-1,3-Dichloropropene	5.00 µg/L	<	5.00 µg/L	U
trans-1,3-Dichloropropene	5.00 µg/L	<	5.00 µg/L	U
Ethylbenzene	5.00 µg/L		251 µg/L	
2-Hexanone	50.0 µg/L	<	50.0 µg/L	U
Bromomethane	5.00 µg/L	<	5.00 µg/L	U
Chloromethane	5.00 µg/L	<	5.00 µg/L	U
Dibromomethane	5.00 µg/L	<	5.00 µg/L	U
2-Butanone	100 µg/L	<	100 µg/L	U
Iodomethane	5.00 µg/L	<	5.00 µg/L	U

REPORT NUMBER : D97-8703-3 PAGE 3
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	< 5.00 µg/L	U
4-Methyl-2-pentanone	100 µg/L	< 100 µg/L	U
Styrene	5.00 µg/L	< 5.00 µg/L	U
1,1,1,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
Tetrachloroethene	5.00 µg/L	< 5.00 µg/L	U
Toluene	5.00 µg/L	68.8 µg/L	
1,2,3-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,1,1-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
Trichloroethene	5.00 µg/L	< 5.00 µg/L	U
Trichlorofluoromethane	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,3,5-Trimethylbenzene	5.00 µg/L	120 µg/L	
1,2,4-Trimethylbenzene	5.00 µg/L	328 µg/L	
Vinyl acetate	50.0 µg/L	< 50.0 µg/L	U
Vinyl chloride	2.00 µg/L	< 2.00 µg/L	U
m,p-Xylene	5.00 µg/L	560 µg/L	
o-Xylene	5.00 µg/L	279 µg/L	
Toluene-d8 (SS)		48.6 µg/L	
Bromofluorobenzene (SS)		54.8 µg/L	
1,2-Dichloroethane-d4 (SS)		49.6 µg/L	
Dibromofluoromethane (SS)		51.2 µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-3
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW44#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

TENTATIVELY IDENTIFIED COMPOUNDS					
COMPOUND	RETENTION TIME	FRACTION	RESULT		FLAG
Methylbutane	2.09	VOA	61	ug/L	N
Pentane	2.37	VOA	29	ug/L	N
Methylpentane	3.89	VOA	33	ug/L	N
Hexane	4.35	VOA	11	ug/L	N
Methylcyclopentane	5.25	VOA	91	ug/L	N
Methylcyclohexane	7.65	VOA	26	ug/L	N
Ethylmethylbenzene	12.48	VOA	170	ug/L	N
Ethyldimethylbenzene	13.76	VOA	38	ug/L	N
Ethyldimethylbenzene	13.86	VOA	54	ug/L	N
Dihydromethylindene	13.99	VOA	38	ug/L	N
Methylisopropylbenzene	14.36	VOA	51	ug/L	N
Dihydromethylindene	14.66	VOA	27	ug/L	N
Dihydromethylindene	14.84	VOA	64	ug/L	N
Naphthalene	15.52	VOA	124	ug/L	N

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SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
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: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW44#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 3520B
PREPARED BY : TAP
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 25-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-74

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	18.0 µg/L	< 18.0 µg/L	U
Acenaphthylene	23.0 µg/L	0.0 µg/L	J
Anthracene	6.60 µg/L	< 6.60 µg/L	U
Benzo(a)anthracene	0.130 µg/L	< 0.130 µg/L	U
Benzo(a)pyrene	0.120 µg/L	< 0.120 µg/L	U
Benzo(b)fluoranthene	0.180 µg/L	< 0.180 µg/L	U
Benzo(g,h,i)perylene	0.760 µg/L	< 0.760 µg/L	U
Benzo(k)fluoranthene	0.170 µg/L	< 0.170 µg/L	U
Chrysene	1.50 µg/L	< 1.50 µg/L	U
Dibenz(a,h)antnracene	0.300 µg/L	< 0.300 µg/L	U
Fluoranthene	2.10 µg/L	< 2.10 µg/L	U
Fluorene	2.10 µg/L	< 2.10 µg/L	U
Indeno(1,2,3-cd)pyrene	0.430 µg/L	< 0.430 µg/L	U
Naphthalene	18.0 µg/L	56.2 µg/L	

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REPORT NUMBER : D97-8703-3 PAGE 2
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	6.40 µg/L	< 6.40 µg/L	U
Pyrene	2.70 µg/L	< 2.70 µg/L	U
p-Terphenyl (SS)		7.63 µg/L	

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REPORT NUMBER : D97-8703-3
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW44#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 3510B
PREPARED BY : KDF
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-77

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	1000 µg/L	1470 µg/L	
Triacontane (SS)		233 µg/L	

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REPORT NUMBER : D97-8703-3
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW44#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : CNA
PREPARED ON : 21-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 21-JUL-1997
DILUTION FACTOR : 25
METHOD FACTOR : 1
QC BATCH NO : 29072197RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	2500 µg/L	4640 µg/L	D
Fluorobenzene (SS)		1120 µg/L	D

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REPORT NUMBER : D97-8703-3
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW44#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997

TOTAL METALS

TEST REQUESTED		DETECTION LIMIT	RESULTS		FLAG
Lead	/1	0.0020 mg/L	<	0.0020 mg/L	U

Dilution Factor : 1
Prepared using EPA 3015 on 17-JUL-1997 by CEL
Analyzed using EPA 7421 on 22-JUL-1997 by GGD
QC Batch No : AC160-35F

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-3
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW44#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997

MISCELLANEOUS ANALYSES

TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Sulfate /1	0.20 mg/L	0.40 mg/L	

Dilution Factor : 1
Analyzed using EPA 9056 on 21-JUL-1997 by LKD
QC Batch No : 32-0721971

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-4
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW45#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	< 20.0 µg/L	U
Acrylonitrile	5.00 µg/L	< 5.00 µg/L	U
Benzene	5.00 µg/L	< 5.00 µg/L	U
Bromobenzene	5.00 µg/L	< 5.00 µg/L	U
Bromochloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromodichloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromoform	5.00 µg/L	< 5.00 µg/L	U
Carbon disulfide	5.00 µg/L	< 5.00 µg/L	U
Carbon tetrachloride	5.00 µg/L	< 5.00 µg/L	U
Chlorobenzene	5.00 µg/L	< 5.00 µg/L	U
Chloroethane	5.00 µg/L	< 5.00 µg/L	U
Chloroform	5.00 µg/L	< 5.00 µg/L	U
2-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U
4-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U

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REPORT NUMBER : D97-8703-4 PAGE 2
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	< 10.0 µg/L	U
Dibromochloromethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dibromo-3-chloropropane	25.0 µg/L	< 25.0 µg/L	U
1,2-Dibromoethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,4-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
trans-1,4-Dichloro-2-butene	100 µg/L	< 100 µg/L	U
1,1-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
cis-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
trans-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
2,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
cis-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
trans-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
Ethylbenzene	5.00 µg/L	< 5.00 µg/L	U
2-Hexanone	50.0 µg/L	< 50.0 µg/L	U
Bromomethane	5.00 µg/L	< 5.00 µg/L	U
Chloromethane	5.00 µg/L	< 5.00 µg/L	U
Dibromomethane	5.00 µg/L	< 5.00 µg/L	U
2-Butanone	100 µg/L	< 100 µg/L	U
Iodomethane	5.00 µg/L	< 5.00 µg/L	U

REPORT NUMBER : D97-8703-4
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	< 5.00 µg/L	U
4-Methyl-2-pentanone	100 µg/L	< 100 µg/L	U
Styrene	5.00 µg/L	< 5.00 µg/L	U
1,1,1,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
Tetrachloroethene	5.00 µg/L	< 5.00 µg/L	U
Toluene	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,1,1-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
Trichloroethene	5.00 µg/L	< 5.00 µg/L	U
Trichlorofluoromethane	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,3,5-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
Vinyl acetate	50.0 µg/L	< 50.0 µg/L	U
Vinyl chloride	2.00 µg/L	< 2.00 µg/L	U
m,p-Xylene	5.00 µg/L	< 5.00 µg/L	U
o-Xylene	5.00 µg/L	< 5.00 µg/L	U
Toluene-d8 (SS)		44.9 µg/L	
Bromofluorobenzene (SS)		52.0 µg/L	
1,2-Dichloroethane-d4 (SS)		44.8 µg/L	
Dibromofluoromethane (SS)		47.1 µg/L	

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ITS Intertek Testing Services
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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-4
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW45#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	10 ug/L	N

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-4
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW45#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 3520B
PREPARED BY : TAP
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 25-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 2
QC BATCH NO : AC142-74

POLYNUCLEAR AROMATIC HYDROCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		FLAG
Acenaphthene	30.6	µg/L	< 30.6	µg/L	U
Acenaphthylene	39.1	µg/L	< 39.1	µg/L	U
Anthracene	11.2	µg/L	< 11.2	µg/L	U
Benzo(a)anthracene	0.221	µg/L	< 0.221	µg/L	U
Benzo(a)pyrene	0.204	µg/L	< 0.204	µg/L	U
Benzo(b)fluoranthene	0.306	µg/L	< 0.306	µg/L	U
Benzo(g,h,i)perylene	1.29	µg/L	< 1.29	µg/L	U
Benzo(k)fluoranthene	0.289	µg/L	< 0.289	µg/L	U
Chrysene	2.55	µg/L	< 2.55	µg/L	U
Dibenz(a,n)anthracene	0.510	µg/L	< 0.510	µg/L	U
Fluoranthene	3.57	µg/L	< 3.57	µg/L	U
Fluorene	3.57	µg/L	< 3.57	µg/L	U
Indeno(1,2,3-cd)pyrene	0.731	µg/L	< 0.731	µg/L	U
Naphthalene	30.6	µg/L	< 30.6	µg/L	U

REPORT NUMBER : D97-8703-4 PAGE 2
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		FLAG
Phenanthrene	10.9	µg/L	< 10.9	µg/L	U
Pyrene	4.59	µg/L	< 4.59	µg/L	U
p-Terphenyl (SS)			13.8	µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-4
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW45#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 3510B
PREPARED BY : KDF
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-77

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	1000 µg/L	63.0 µg/L	J
Triacontane (SS)		226 µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-4
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW45#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : CNA
PREPARED ON : 21-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 21-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 29072197RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	100 µg/L	17.2 µg/L	J
Fluorobenzene (SS)		47.2 µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-4
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW45#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
ANALYSIS METHOD : RSK 175 /1
ANALYZED BY : LAJ
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : F071897-1

DISSOLVED GASES IN WATER			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methane	0.5 ppbw	< 0.5 ppbw	U

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-4
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW45#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Lead /1	0.0020 mg/L	0.0071 mg/L	

Dilution Factor : 1
Prepared using EPA 3015 on 17-JUL-1997 by CEL
Analyzed using EPA 7421 on 22-JUL-1997 by GGD
QC Batch No : AC160-35F

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REPORT NUMBER : D97-8703-4
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW45#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997

MISCELLANEOUS ANALYSES

TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Sulfate /1	0.20 mg/L	2.76 mg/L	

Dilution Factor : 1
Analyzed using EPA 9056 on 21-JUL-1997 by LKD
QC Batch No : 32-0721971

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DATE RECEIVED : 12-JUL-1997
REPORT NUMBER : D97-8703-6
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : FIELDQC#
: TB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	< 20.0 µg/L	U
Acrylonitrile	5.00 µg/L	< 5.00 µg/L	U
Benzene	5.00 µg/L	< 5.00 µg/L	U
Bromobenzene	5.00 µg/L	< 5.00 µg/L	U
Bromochloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromodichloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromoform	5.00 µg/L	< 5.00 µg/L	U
Carbon disulfide	5.00 µg/L	< 5.00 µg/L	U
Carbon tetrachloride	5.00 µg/L	< 5.00 µg/L	U
Chlorobenzene	5.00 µg/L	< 5.00 µg/L	U
Chloroethane	5.00 µg/L	< 5.00 µg/L	U
Chloroform	5.00 µg/L	< 5.00 µg/L	U
2-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U
4-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U

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REPORT NUMBER : D97-8703-6 PAGE 2
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	< 10.0 µg/L	U
Dibromochloromethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dibromo-3-chloropropane	25.0 µg/L	< 25.0 µg/L	U
1,2-Dibromoethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,4-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
trans-1,4-Dichloro-2-butene	100 µg/L	< 100 µg/L	U
1,1-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
cis-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
trans-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
2,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
cis-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
trans-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
Ethylbenzene	5.00 µg/L	< 5.00 µg/L	U
2-Hexanone	50.0 µg/L	< 50.0 µg/L	U
Bromomethane	5.00 µg/L	< 5.00 µg/L	U
Chloromethane	5.00 µg/L	< 5.00 µg/L	U
Dibromomethane	5.00 µg/L	< 5.00 µg/L	U
2-Butanone	100 µg/L	< 100 µg/L	U
Iodomethane	5.00 µg/L	< 5.00 µg/L	U

REPORT NUMBER : D97-8703-6
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	< 5.00 µg/L	U
4-Methyl-2-pentanone	100 µg/L	< 100 µg/L	U
Styrene	5.00 µg/L	< 5.00 µg/L	U
1,1,1,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
Tetrachloroethene	5.00 µg/L	< 5.00 µg/L	U
Toluene	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,1,1-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
Trichloroethene	5.00 µg/L	< 5.00 µg/L	U
Trichlorofluoromethane	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,3,5-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
Vinyl acetate	50.0 µg/L	< 50.0 µg/L	U
Vinyl chloride	2.00 µg/L	< 2.00 µg/L	U
m,p-Xylene	5.00 µg/L	< 5.00 µg/L	U
o-Xylene	5.00 µg/L	< 5.00 µg/L	U
Toluene-d8 (SS)		50.7 µg/L	
Bromofluorobenzene (SS)		59.4 µg/L	
1,2-Dichloroethane-d4 (SS)		49.9 µg/L	
Dibromofluoromethane (SS)		53.0 µg/L	

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DATE RECEIVED : 12-JUL-1997 · REPORT NUMBER : D97-8703-6
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : FIELDQC#
: TB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	10 ug/L	N

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-7
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW3#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	< 20.0 µg/L	U
Acrylonitrile	5.00 µg/L	< 5.00 µg/L	U
Benzene	5.00 µg/L	< 5.00 µg/L	U
Bromobenzene	5.00 µg/L	< 5.00 µg/L	U
Bromochloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromodichloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromoform	5.00 µg/L	< 5.00 µg/L	U
Carbon disulfide	5.00 µg/L	< 5.00 µg/L	U
Carbon tetrachloride	5.00 µg/L	< 5.00 µg/L	U
Chlorobenzene	5.00 µg/L	< 5.00 µg/L	U
Chloroethane	5.00 µg/L	< 5.00 µg/L	U
Chloroform	5.00 µg/L	< 5.00 µg/L	U
2-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U
4-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U

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REPORT NUMBER : D97-8703-7 PAGE 2
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	< 10.0 µg/L	U
Dibromochloromethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dibromo-3-chloropropane	25.0 µg/L	< 25.0 µg/L	U
1,2-Dibromoethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,4-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
trans-1,4-Dichloro-2-butene	100 µg/L	< 100 µg/L	U
1,1-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
cis-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
trans-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
2,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
cis-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
trans-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
Ethylbenzene	5.00 µg/L	< 5.00 µg/L	U
2-Hexanone	50.0 µg/L	< 50.0 µg/L	U
Bromomethane	5.00 µg/L	< 5.00 µg/L	U
Chloromethane	5.00 µg/L	< 5.00 µg/L	U
Dibromomethane	5.00 µg/L	< 5.00 µg/L	U
2-Butanone	100 µg/L	< 100 µg/L	U
Iodomethane	5.00 µg/L	< 5.00 µg/L	U

REPORT NUMBER : D97-8703-7
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	< 5.00 µg/L	U
4-Methyl-2-pentanone	100 µg/L	< 100 µg/L	U
Styrene	5.00 µg/L	< 5.00 µg/L	U
1,1,1,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
Tetrachloroethene	5.00 µg/L	< 5.00 µg/L	U
Toluene	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,1,1-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
Trichloroethene	5.00 µg/L	< 5.00 µg/L	U
Trichlorofluoromethane	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,3,5-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
Vinyl acetate	50.0 µg/L	< 50.0 µg/L	U
Vinyl chloride	2.00 µg/L	< 2.00 µg/L	U
m,p-Xylene	5.00 µg/L	< 5.00 µg/L	U
o-Xylene	5.00 µg/L	< 5.00 µg/L	U
Toluene-d8 (SS)		48.2 µg/L	
Bromofluorobenzene (SS)		57.9 µg/L	
1,2-Dichloroethane-d4 (SS)		49.0 µg/L	
Dibromofluoromethane (SS)		51.4 µg/L	

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-7
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW3#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	10 ug/L	N

Intertek Testing Services NA Inc.
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ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-7
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW3#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 3520B
PREPARED BY : TAP
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 25-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-74

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	18.0 µg/L	< 18.0 µg/L	U
Acenaphthylene	23.0 µg/L	< 23.0 µg/L	U
Anthracene	6.60 µg/L	< 6.60 µg/L	U
Benzo(a)anthracene	0.130 µg/L	< 0.130 µg/L	U
Benzo(a)pyrene	0.120 µg/L	< 0.120 µg/L	U
Benzo(b)fluoranthene	0.180 µg/L	< 0.180 µg/L	U
Benzo(g,h,i)perylene	0.760 µg/L	< 0.760 µg/L	U
Benzo(k)fluoranthene	0.170 µg/L	< 0.170 µg/L	U
Chrysene	1.50 µg/L	< 1.50 µg/L	U
Dibenz(a,h)anthracene	0.300 µg/L	< 0.300 µg/L	U
Fluoranthene	2.10 µg/L	< 2.10 µg/L	U
Fluorene	2.10 µg/L	< 2.10 µg/L	U
Indeno(1,2,3-cd)pyrene	0.430 µg/L	< 0.430 µg/L	U
Naphthalene	18.0 µg/L	< 18.0 µg/L	U

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REPORT NUMBER : D97-8703-7
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Phenanthrene	6.40 µg/L	<	6.40 µg/L	U
Pyrene	2.70 µg/L	<	2.70 µg/L	U
p-Terphenyl (SS)			8.84 µg/L	

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SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW3#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 3510B
PREPARED BY : KDF
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-77

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	1000 µg/L	97.0 µg/L	J
Triacontane (C30)		234 µg/L	

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REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW3#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : LLB
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 20-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 29072097RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	100 µg/L	46.5 µg/L	J
Fluorobenzene (SS)		47.4 µg/L	

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REPORT NUMBER : D97-8703-7
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW3#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997

TOTAL METALS

TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Lead /1	0.0020 mg/L	< 0.0020 mg/L	U

Dilution Factor : 1
Prepared using EPA 3015 on 17-JUL-1997 by CEL
Analyzed using EPA 7421 on 22-JUL-1997 by GGD
QC Batch No : AC160-35F

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REPORT NUMBER : D97-8703-7
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW3#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997

MISCELLANEOUS ANALYSES

TEST REQUESTED		DETECTION LIMIT	RESULTS	FLAG
Sulfate	/1	0.20 mg/L	0.34 mg/L	

Dilution Factor : 1
Analyzed using EPA 9056 on 21-JUL-1997 by LKD
QC Batch No : 32-0721971

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-8
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW4#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	< 20.0 µg/L	U
Acrylonitrile	5.00 µg/L	< 5.00 µg/L	U
Benzene	5.00 µg/L	13.4 µg/L	
Bromobenzene	5.00 µg/L	< 5.00 µg/L	U
Bromochloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromodichloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromoform	5.00 µg/L	< 5.00 µg/L	U
Carbon disulfide	5.00 µg/L	< 5.00 µg/L	U
Carbon tetrachloride	5.00 µg/L	< 5.00 µg/L	U
Chlorobenzene	5.00 µg/L	< 5.00 µg/L	U
Chloroethane	5.00 µg/L	< 5.00 µg/L	U
Chloroform	5.00 µg/L	< 5.00 µg/L	U
2-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U
4-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U

REPORT NUMBER : D97-8703-8 PAGE 2
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	< 10.0 µg/L	U
Dibromochloromethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dibromo-3-chloropropane	25.0 µg/L	< 25.0 µg/L	U
1,2-Dibromoethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,4-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
trans-1,4-Dichloro-2-butene	100 µg/L	< 100 µg/L	U
1,1-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
cis-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
trans-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
2,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
cis-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
trans-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
2-Hexanone	50.0 µg/L	< 50.0 µg/L	U
Bromomethane	5.00 µg/L	< 5.00 µg/L	U
Chloromethane	5.00 µg/L	< 5.00 µg/L	U
Dibromomethane	5.00 µg/L	< 5.00 µg/L	U
2-Butanone	100 µg/L	< 100 µg/L	U
Iodomethane	5.00 µg/L	< 5.00 µg/L	U
Methylene chloride	5.00 µg/L	< 5.00 µg/L	U

REPORT NUMBER : D97-8703-8 PAGE 3
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
4-Methyl-2-pentanone	100 µg/L	< 100 µg/L	U
Styrene	5.00 µg/L	< 5.00 µg/L	U
1,1,1,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
Tetrachloroethene	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,1,1-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
Trichloroethene	5.00 µg/L	< 5.00 µg/L	U
Trichlorofluoromethane	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichloropropane	5.00 µg/L	< 5.00 µg/L	U
Vinyl acetate	50.0 µg/L	< 50.0 µg/L	U
Vinyl chloride	2.00 µg/L	< 2.00 µg/L	U
Toluene-d8 (SS)		49.0 µg/L	
Bromofluorobenzene (SS)		56.4 µg/L	
1,2-Dichloroethane-d4 (SS)		49.7 µg/L	
Dibromofluoromethane (SS)		50.7 µg/L	

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Environmental Laboratories

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REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW4#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
Butane, 2-methyl-	2.09	VOA	58 ug/L	N
Pentane	2.37	VOA	29 ug/L	N
Cyclopropane, 1,1-dimethyl-	2.52	VOA	12 ug/L	N
Pentane, 3-methyl-	3.89	VOA	23 ug/L	N
3-Hexene, (Z)-	4.61	VOA	12 ug/L	N
3-Hexyne	4.90	VOA	11 ug/L	N
Cyclopentane, methyl-	5.25	VOA	60 ug/L	N
2,4-Hexadiene	6.72	VOA	98 ug/L	N
Cyclohexane, methyl-	7.65	VOA	65 ug/L	N
3,5-Dimethylcyclopentene	8.34	VOA	28 ug/L	N
Benzene, (1-methylethyl)-	12.48	VOA	49 ug/L	N
Benzene, 2-ethyl-1,3-dimethyl-	13.86	VOA	11 ug/L	N
Benzene, 1-methyl-2-(1-methylethyl	14.35	VOA	15 ug/L	N

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REPORT NUMBER : D97-8703-8
ANALYSIS METHOD : EPA 8260 /1

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
1H-Indene, 2,3-dihydro-4-methyl-	14.84	VOA	13 ug/L	N
Naphthalene	15.51	VOA	669 ug/L	N

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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW4#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 3520B
PREPARED BY : TAP
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 25-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-74

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	18.0 µg/L	< 18.0 µg/L	U
Acenaphthylene	23.0 µg/L	< 23.0 µg/L	U
Anthracene	6.60 µg/L	< 6.60 µg/L	U
Benzo(a)anthracene	0.130 µg/L	< 0.130 µg/L	U
Benzo(a)pyrene	0.120 µg/L	< 0.120 µg/L	U
Benzo(b)fluoranthene	0.180 µg/L	< 0.180 µg/L	U
Benzo(g,h,i)perylene	0.760 µg/L	< 0.760 µg/L	U
Benzo(k)fluoranthene	0.170 µg/L	< 0.170 µg/L	U
Chrysene	1.50 µg/L	< 1.50 µg/L	U
Dibenz(a,h)anthracene	0.300 µg/L	< 0.300 µg/L	U
Fluoranthene	2.10 µg/L	< 2.10 µg/L	U
Fluorene	2.10 µg/L	< 2.10 µg/L	U
Indeno(1,2,3-cd)pyrene	0.430 µg/L	< 0.430 µg/L	U
Naphthalene	18.0 µg/L	624 µg/L	

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REPORT NUMBER : D97-8703-8
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		FLAG
Phenanthrene	6.40	µg/L	< 6.40	µg/L	U
Pyrene	2.70	µg/L	< 2.70	µg/L	U
p-Terphenyl (SS)			6.50	µg/L	

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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW4#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 3510B
PREPARED BY : KDF
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-77

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	1000 µg/L	7500 µg/L	
Triacontane (SS)		221 µg/L	

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SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW4#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : CNA
PREPARED ON : 21-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 21-JUL-1997
DILUTION FACTOR : 50
METHOD FACTOR : 1
QC BATCH NO : 29072197RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	5000 µg/L	8930 µg/L	D
Fluorobenzene (SS)		2330 µg/L	D

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REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW4#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
ANALYSIS METHOD : RSK 175 /1
ANALYZED BY : LAJ
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : F071897-1

DISSOLVED GASES IN WATER			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methane	0.5 ppbw	6.4 ppbw	

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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW4#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Lead /1	0.0020 mg/L	0.0069 mg/L	

Dilution Factor : 1
Prepared using EPA 3015 on 17-JUL-1997 by CEL
Analyzed using EPA 7421 on 22-JUL-1997 by GGD
QC Batch No : AC160-35F

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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW4#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997

MISCELLANEOUS ANALYSES

TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Sulfate /1	0.20 mg/L	0.18 mg/L	J

Dilution Factor : 1
Analyzed using EPA 9056 on 21-JUL-1997 by LKD
QC Batch No : 32-072197I

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-9
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : FIELDQC#
: TB2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 11-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707187001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	< 20.0 µg/L	U
Acrylonitrile	5.00 µg/L	< 5.00 µg/L	U
Benzene	5.00 µg/L	< 5.00 µg/L	U
Bromobenzene	5.00 µg/L	< 5.00 µg/L	U
Bromochloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromodichloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromoform	5.00 µg/L	< 5.00 µg/L	U
Carbon disulfide	5.00 µg/L	< 5.00 µg/L	U
Carbon tetrachloride	5.00 µg/L	< 5.00 µg/L	U
Chlorobenzene	5.00 µg/L	< 5.00 µg/L	U
Chloroethane	5.00 µg/L	< 5.00 µg/L	U
Chloroform	5.00 µg/L	< 5.00 µg/L	U
2-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U
4-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U

REPORT NUMBER : D97-8703-9 PAGE 2
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	< 10.0 µg/L	U
Dibromochloromethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dibromo-3-chloropropane	25.0 µg/L	< 25.0 µg/L	U
1,2-Dibromoethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,4-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
trans-1,4-Dichloro-2-butene	100 µg/L	< 100 µg/L	U
1,1-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
cis-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
trans-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
2,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
cis-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
trans-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
Ethylbenzene	5.00 µg/L	< 5.00 µg/L	U
2-Hexanone	50.0 µg/L	< 50.0 µg/L	U
Bromomethane	5.00 µg/L	< 5.00 µg/L	U
Chloromethane	5.00 µg/L	< 5.00 µg/L	U
Dibromomethane	5.00 µg/L	< 5.00 µg/L	U
2-Butanone	100 µg/L	< 100 µg/L	U
Iodomethane	5.00 µg/L	< 5.00 µg/L	U

REPORT NUMBER : D97-8703-9
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	< 5.00 µg/L	U
4-Methyl-2-pentanone	100 µg/L	< 100 µg/L	U
Styrene	5.00 µg/L	< 5.00 µg/L	U
1,1,1,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
Tetrachloroethene	5.00 µg/L	< 5.00 µg/L	U
Toluene	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,1,1-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
Trichloroethene	5.00 µg/L	< 5.00 µg/L	U
Trichlorofluoromethane	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,3,5-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
Vinyl acetate	50.0 µg/L	< 50.0 µg/L	U
Vinyl chloride	2.00 µg/L	< 2.00 µg/L	U
m,p-Xylene	5.00 µg/L	< 5.00 µg/L	U
o-Xylene	5.00 µg/L	< 5.00 µg/L	U
Toluene-d8 (SS)		50.5 µg/L	
Bromofluorobenzene (SS)		56.8 µg/L	
1,2-Dichloroethane-d4 (SS)		51.6 µg/L	
Dibromofluoromethane (SS)		50.2 µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-9
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : FIELDQC#
: TB2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 11-JUL-1997
ANALYZED BY : MGD
ANALYZED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
METHOD FACTOR : 1
QC BATCH NO : 9707187001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	10 ug/L	N

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-10
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	< 20.0 µg/L	U
Acrylonitrile	5.00 µg/L	< 5.00 µg/L	U
Benzene	5.00 µg/L	< 5.00 µg/L	U
Bromobenzene	5.00 µg/L	< 5.00 µg/L	U
Bromochloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromodichloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromoform	5.00 µg/L	< 5.00 µg/L	U
Carbon disulfide	5.00 µg/L	< 5.00 µg/L	U
Carbon tetrachloride	5.00 µg/L	< 5.00 µg/L	U
Chlorobenzene	5.00 µg/L	< 5.00 µg/L	U
Chloroethane	5.00 µg/L	< 5.00 µg/L	U
Chloroform	5.00 µg/L	< 5.00 µg/L	U
2-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U
4-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U

REPORT NUMBER : D97-8703-10 PAGE 2
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	< 10.0 µg/L	U
Dibromochloromethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dibromo-3-chloropropane	25.0 µg/L	< 25.0 µg/L	U
1,2-Dibromoethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,4-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
trans-1,4-Dichloro-2-butene	100 µg/L	< 100 µg/L	U
1,1-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
cis-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
trans-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
2,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
cis-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
trans-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
Ethylbenzene	5.00 µg/L	< 5.00 µg/L	U
2-Hexanone	50.0 µg/L	< 50.0 µg/L	U
Bromomethane	5.00 µg/L	< 5.00 µg/L	U
Chloromethane	5.00 µg/L	< 5.00 µg/L	U
Dibromomethane	5.00 µg/L	< 5.00 µg/L	U
2-Butanone	100 µg/L	< 100 µg/L	U
Iodomethane	5.00 µg/L	< 5.00 µg/L	U

REPORT NUMBER : D97-8703-10
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	< 5.00 µg/L	U
4-Methyl-2-pentanone	100 µg/L	< 100 µg/L	U
Styrene	5.00 µg/L	< 5.00 µg/L	U
1,1,1,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
Tetrachloroethene	5.00 µg/L	< 5.00 µg/L	U
Toluene	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,1,1-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
Trichloroethene	5.00 µg/L	< 5.00 µg/L	U
Trichlorofluoromethane	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,3,5-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
Vinyl acetate	50.0 µg/L	< 50.0 µg/L	U
Vinyl chloride	2.00 µg/L	< 2.00 µg/L	U
m,p-Xylene	5.00 µg/L	< 5.00 µg/L	U
o-Xylene	5.00 µg/L	< 5.00 µg/L	U
Toluene-d8 (SS)		53.2 µg/L	
Bromofluorobenzene (SS)		59.8 µg/L	
1,2-Dichloroethane-d4 (SS)		51.8 µg/L	
Dibromofluoromethane (SS)		51.7 µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-10
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	10 ug/L	N

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-10
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 3520B
PREPARED BY : TAP
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 24-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-74

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	18.0 µg/L	< 18.0 µg/L	U
Acenaphthylene	23.0 µg/L	< 23.0 µg/L	U
Anthracene	6.60 µg/L	< 6.60 µg/L	U
Benzo(a)anthracene	0.130 µg/L	< 0.130 µg/L	U
Benzo(a)pyrene	0.120 µg/L	< 0.120 µg/L	U
Benzo(b)fluoranthene	0.180 µg/L	< 0.180 µg/L	U
Benzo(g,h,i)perylene	0.760 µg/L	< 0.760 µg/L	U
Benzo(k)fluoranthene	0.170 µg/L	< 0.170 µg/L	U
Chrysene	1.50 µg/L	< 1.50 µg/L	U
Dibenz(a,n)anthracene	0.300 µg/L	< 0.300 µg/L	U
Fluoranthene	2.10 µg/L	< 2.10 µg/L	U
Fluorene	2.10 µg/L	< 2.10 µg/L	U
Indeno(1,2,3-cd)pyrene	0.430 µg/L	< 0.430 µg/L	U
Naphthalene	18.0 µg/L	< 18.0 µg/L	U

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REPORT NUMBER : D97-8703-10
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	6.40 µg/L	< 6.40 µg/L	U
Pyrene	2.70 µg/L	< 2.70 µg/L	U
p-Terphenyl (SS)		8.51 µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-10
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control fcr IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 3510B
PREPARED BY : KDF
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-77

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	1000 µg/L	89.0 µg/L	J
Triacontane (SS)		195 µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-10
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : VHT
PREPARED ON : 20-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 20-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 29072097RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	100 µg/L	< 100 µg/L	U
Fluorobenzene (GS)		47.3 µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-10
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
ANALYSIS METHOD : RSK 175 /1
ANALYZED BY : LAJ
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : F071897-1

DISSOLVED GASES IN WATER						
TEST REQUESTED	DETECTION LIMIT		RESULTS			FLAG
Methane	0.5	ppbw	<	0.5	ppbw	U
Ethane	0.5	ppbw	<	0.5	ppbw	U
Ethene	0.5	ppbw	<	0.5	ppbw	U

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-10
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997

TOTAL METALS

TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Lead /1	0.0020 mg/L	0.0017 mg/L	J

Dilution Factor : 1
Prepared using EPA 3015 on 17-JUL-1997 by CEL
Analyzed using EPA 7421 on 22-JUL-1997 by GGD
QC Batch No : AC160-35F

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-10
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997

MISCELLANEOUS ANALYSES

TEST REQUESTED		DETECTION LIMIT	RESULTS	FLAG
Sulfate	/1	0.20 mg/L	< 0.20 mg/L	U

Dilution Factor : 1
Analyzed using EPA 9056 on 21-JUL-1997 by LKD
QC Batch No : 32-0721971

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-11
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	59.8 µg/L	
Acrylonitrile	5.00 µg/L	31.2 µg/L	
Benzene	5.00 µg/L	44.5 µg/L	
Bromobenzene	5.00 µg/L	46.1 µg/L	
Bromochloromethane	5.00 µg/L	43.4 µg/L	
Bromodichloromethane	5.00 µg/L	39.2 µg/L	
Bromoform	5.00 µg/L	29.3 µg/L	
Carbon disulfide	5.00 µg/L	39.8 µg/L	
Carbon tetrachloride	5.00 µg/L	41.9 µg/L	
Chlorobenzene	5.00 µg/L	46.5 µg/L	
Chloroethane	5.00 µg/L	52.2 µg/L	
Chloroform	5.00 µg/L	43.8 µg/L	
2-Chlorotoluene	5.00 µg/L	53.6 µg/L	
4-Chlorotoluene	5.00 µg/L	45.6 µg/L	

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REPORT NUMBER : D97-8703-11
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	46.3 µg/L	
Dibromochloromethane	5.00 µg/L	36.0 µg/L	
1,2-Dibromo-3-chloropropane	25.0 µg/L	16.5 µg/L	J
1,2-Dibromoethane	5.00 µg/L	43.1 µg/L	
1,2-Dichlorobenzene	5.00 µg/L	44.5 µg/L	
1,3-Dichlorobenzene	5.00 µg/L	43.4 µg/L	
1,4-Dichlorobenzene	5.00 µg/L	42.2 µg/L	
trans-1,4-Dichloro-2-butene	100 µg/L	50.8 µg/L	J
1,1-Dichloroethane	5.00 µg/L	43.7 µg/L	
1,2-Dichloroethane	5.00 µg/L	44.4 µg/L	
1,1-Dichloroethene	5.00 µg/L	44.9 µg/L	
cis-1,2-Dichloroethene	5.00 µg/L	41.4 µg/L	
trans-1,2-Dichloroethene	5.00 µg/L	42.9 µg/L	
1,2-Dichloropropane	5.00 µg/L	46.3 µg/L	
2,2-Dichloropropane	5.00 µg/L	46.4 µg/L	
1,1-Dichloropropene	5.00 µg/L	44.9 µg/L	
1,3-Dichloropropane	5.00 µg/L	46.8 µg/L	
cis-1,3-Dichloropropene	5.00 µg/L	39.8 µg/L	
trans-1,3-Dichloropropene	5.00 µg/L	38.6 µg/L	
Ethylbenzene	5.00 µg/L	83.6 µg/L	
2-Hexanone	50.0 µg/L	43.2 µg/L	J
Bromomethane	5.00 µg/L	43.5 µg/L	
Chloromethane	5.00 µg/L	59.8 µg/L	
Dibromomethane	5.00 µg/L	43.9 µg/L	
2-Butanone	100 µg/L	41.0 µg/L	J
Iodomethane	5.00 µg/L	45.4 µg/L	

REPORT NUMBER : D97-8703-11 PAGE 3
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	44.3 µg/L	
4-Methyl-2-pentanone	100 µg/L	34.9 µg/L	J
Styrene	5.00 µg/L	40.2 µg/L	
1,1,1,2-Tetrachloroethane	5.00 µg/L	42.8 µg/L	
1,1,2,2-Tetrachloroethane	5.00 µg/L	40.4 µg/L	
Tetrachloroethene	5.00 µg/L	48.6 µg/L	
Toluene	5.00 µg/L	43.0 µg/L	
1,2,3-Trichlorobenzene	5.00 µg/L	177 µg/L	
1,2,4-Trichlorobenzene	5.00 µg/L	50.4 µg/L	
1,1,1-Trichloroethane	5.00 µg/L	44.6 µg/L	
1,1,2-Trichloroethane	5.00 µg/L	42.5 µg/L	
Trichloroethene	5.00 µg/L	44.6 µg/L	
Trichlorofluoromethane	5.00 µg/L	50.7 µg/L	
1,2,3-Trichloropropane	5.00 µg/L	45.0 µg/L	
1,3,5-Trimethylbenzene	5.00 µg/L	45.5 µg/L	
1,2,4-Trimethylbenzene	5.00 µg/L	44.6 µg/L	
Vinyl acetate	50.0 µg/L	17.4 µg/L	J
Vinyl chloride	2.00 µg/L	46.9 µg/L	
m,p-Xylene	5.00 µg/L	85.1 µg/L	
o-Xylene	5.00 µg/L	42.9 µg/L	
Toluene-d8 (SS)		44.7 µg/L	
Bromofluorobenzene (SS)		51.3 µg/L	
1,2-Dichloroethane-d4 (SS)		47.0 µg/L	
Dibromofluoromethane (SS)		47.1 µg/L	

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DATE RECEIVED : 12-JUL-1997 REPORT NUMBER : D97-8703-11
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	10 ug/L	N

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-11
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 3520B
PREPARED BY : TAP
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 24-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-74

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	18.0 µg/L	83.3 µg/L	
Acenaphthylene	23.0 µg/L	81.3 µg/L	
Anthracene	6.60 µg/L	74.2 µg/L	
Benzo(a)anthracene	0.130 µg/L	94.0 µg/L	
Benzo(a)pyrene	0.120 µg/L	91.0 µg/L	
Benzo(b)fluoranthene	0.180 µg/L	89.6 µg/L	
Benzo(g,h,i)perylene	0.760 µg/L	90.2 µg/L	
Benzo(k)fluoranthene	0.170 µg/L	86.2 µg/L	
Chrysene	1.50 µg/L	89.0 µg/L	
Dibenz(a,h)anthracene	0.300 µg/L	97.6 µg/L	
Fluoranthene	2.10 µg/L	91.7 µg/L	
Fluorene	2.10 µg/L	86.0 µg/L	
Indeno(1,2,3-cd)pyrene	0.430 µg/L	83.8 µg/L	
Naphthalene	18.0 µg/L	91.0 µg/L	

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REPORT NUMBER : D97-8703-11
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	6.40 µg/L	82.3 µg/L	
Pyrene	2.70 µg/L	83.2 µg/L	
p-Terphenyl (SS)		7.94 µg/L	

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REPORT NUMBER : D97-8703-11
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 3510B
PREPARED BY : KDF
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-77

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	1000 µg/L	2380 µg/L	
Triacontane (S3)		231 µg/L	

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REPORT NUMBER : D97-8703-11
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : VHT
PREPARED ON : 20-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 20-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 29072097RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	100 µg/L	430 µg/L	
Fluorobenzene-(SS)		47.3 µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-11
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
ANALYSIS METHOD : RSK 175 /1
ANALYZED BY : LAJ
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : F071897-1

DISSOLVED GASES IN WATER			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methane	0.5 ppbw	3.9 ppbw	
Ethane	0.5 ppbw	7.8 ppbw	
Ethene	0.5 ppbw	< 0.5 ppbw	U

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REPORT NUMBER : D97-8703-11
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Lead /1	0.0020 mg/L	0.0201 mg/L	

Dilution Factor : 1
Prepared using EPA 3015 on 17-JUL-1997 by CEL
Analyzed using EPA 7421 on 22-JUL-1997 by GGD
QC Batch No : AC160-35F

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-11
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Sulfate /1	0.20 mg/L	3.09 mg/L	

Dilution Factor : 1
Analyzed using EPA 9056 on 21-JUL-1997 by LKD
QC Batch No : 32-0721971

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-12
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW4#
: N2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 50
METHOD FACTOR : 1
QC BATCH NO : 9707187001

VOLATILE ORGANICS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		FLAG
Ethylbenzene	250	µg/L	1730	µg/L	D
Toluene	250	µg/L	2450	µg/L	D
1,3,5-Trimethylbenzene	250	µg/L	508	µg/L	D
1,2,4-Trimethylbenzene	250	µg/L	1380	µg/L	D
m,p-Xylene	250	µg/L	5530	µg/L	D
o-Xylene	250	µg/L	2810	µg/L	D
Toluene-d8 (SS)			50.4	µg/L	D
Bromofluorobenzene (SS)			60.8	µg/L	D
1,2-Dichloroethane-d4 (SS)			51.0	µg/L	D
Dibromofluoromethane (SS)			50.3	µg/L	D

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-13
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707187001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	< 20.0 µg/L	U
Acrylonitrile	5.00 µg/L	< 5.00 µg/L	U
Benzene	5.00 µg/L	< 5.00 µg/L	U
Bromobenzene	5.00 µg/L	< 5.00 µg/L	U
Bromochloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromodichloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromoform	5.00 µg/L	< 5.00 µg/L	U
Carbon disulfide	5.00 µg/L	< 5.00 µg/L	U
Carbon tetrachloride	5.00 µg/L	< 5.00 µg/L	U
Chlorobenzene	5.00 µg/L	< 5.00 µg/L	U
Chloroethane	5.00 µg/L	< 5.00 µg/L	U
Chloroform	5.00 µg/L	< 5.00 µg/L	U
2-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U
4-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U

REPORT NUMBER : D97-8703-13 PAGE 2
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	< 10.0 µg/L	U
Dibromochloromethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dibromo-3-chloropropane	25.0 µg/L	< 25.0 µg/L	U
1,2-Dibromoethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,4-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
trans-1,4-Dichloro-2-butene	100 µg/L	< 100 µg/L	U
1,1-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
cis-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
trans-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
2,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
cis-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
trans-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
Ethylbenzene	5.00 µg/L	< 5.00 µg/L	U
2-Hexanone	50.0 µg/L	< 50.0 µg/L	U
Bromomethane	5.00 µg/L	< 5.00 µg/L	U
Chloromethane	5.00 µg/L	< 5.00 µg/L	U
Dibromomethane	5.00 µg/L	< 5.00 µg/L	U
2-Butanone	100 µg/L	< 100 µg/L	U
Iodomethane	5.00 µg/L	< 5.00 µg/L	U

REPORT NUMBER : D97-8703-13 PAGE 3
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	< 5.00 µg/L	U
4-Methyl-2-pentanone	100 µg/L	< 100 µg/L	U
Styrene	5.00 µg/L	< 5.00 µg/L	U
1,1,1,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
Tetrachloroethene	5.00 µg/L	< 5.00 µg/L	U
Toluene	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,1,1-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
Trichloroethene	5.00 µg/L	< 5.00 µg/L	U
Trichlorofluoromethane	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,3,5-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
Vinyl acetate	50.0 µg/L	< 50.0 µg/L	U
Vinyl chloride	2.00 µg/L	< 2.00 µg/L	U
m,p-Xylene	5.00 µg/L	< 5.00 µg/L	U
o-Xylene	5.00 µg/L	< 5.00 µg/L	U
Toluene-d8 (SS)		50.2 µg/L	
Bromofluorobenzene (SS)		58.5 µg/L	
1,2-Dichloroethane-d4 (SS)		49.7 µg/L	
Dibromofluoromethane (SS)		49.2 µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-13
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
ANALYZED BY : MGD
ANALYZED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
METHOD FACTOR : 1
QC BATCH NO : 9707187001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	10 ug/L	N

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REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : CNA
PREPARED ON : 21-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 21-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 29072197RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	100 µg/L	10.8 µg/L	J
Fluorobenzene (SS)		48.3 µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-14
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707187001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	66.8 µg/L	
Acrylonitrile	5.00 µg/L	28.3 µg/L	
Benzene	5.00 µg/L	51.4 µg/L	
Bromobenzene	5.00 µg/L	55.3 µg/L	
Bromochloromethane	5.00 µg/L	22.1 µg/L	
Bromodichloromethane	5.00 µg/L	43.0 µg/L	
Bromoform	5.00 µg/L	32.0 µg/L	
Carbon disulfide	5.00 µg/L	43.2 µg/L	
Carbon tetrachloride	5.00 µg/L	45.9 µg/L	
Chlorobenzene	5.00 µg/L	53.8 µg/L	
Chloroethane	5.00 µg/L	56.4 µg/L	
Chloroform	5.00 µg/L	49.5 µg/L	
2-Chlorotoluene	5.00 µg/L	59.8 µg/L	
4-Chlorotoluene	5.00 µg/L	52.4 µg/L	

REPORT NUMBER : D97-8703-14
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	38.5 µg/L	
Dibromochloromethane	5.00 µg/L	39.9 µg/L	
1,2-Dibromo-3-chloropropane	25.0 µg/L	41.9 µg/L	
1,2-Dibromoethane	5.00 µg/L	51.1 µg/L	
1,2-Dichlorobenzene	5.00 µg/L	50.1 µg/L	
1,3-Dichlorobenzene	5.00 µg/L	48.5 µg/L	
1,4-Dichlorobenzene	5.00 µg/L	49.4 µg/L	
trans-1,4-Dichloro-2-butene	100 µg/L	43.3 µg/L	J
1,1-Dichloroethane	5.00 µg/L	49.2 µg/L	
1,2-Dichloroethane	5.00 µg/L	50.4 µg/L	
1,1-Dichloroethene	5.00 µg/L	50.5 µg/L	
cis-1,2-Dichloroethene	5.00 µg/L	48.0 µg/L	
trans-1,2-Dichloroethene	5.00 µg/L	50.6 µg/L	
1,2-Dichloropropane	5.00 µg/L	38.5 µg/L	
2,2-Dichloropropane	5.00 µg/L	50.9 µg/L	
1,1-Dichloropropene	5.00 µg/L	50.6 µg/L	
1,3-Dichloropropane	5.00 µg/L	54.8 µg/L	
cis-1,3-Dichloropropene	5.00 µg/L	45.4 µg/L	
trans-1,3-Dichloropropene	5.00 µg/L	42.0 µg/L	
Ethylbenzene	5.00 µg/L	93.6 µg/L	
2-Hexanone	50.0 µg/L	60.6 µg/L	
Bromomethane	5.00 µg/L	41.1 µg/L	
Chloromethane	5.00 µg/L	64.4 µg/L	
Dibromomethane	5.00 µg/L	50.2 µg/L	
2-Butanone	100 µg/L	53.4 µg/L	J
Iodomethane	5.00 µg/L	39.9 µg/L	

REPORT NUMBER : D97-8703-14
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	48.7 µg/L	
4-Methyl-2-pentanone	100 µg/L	45.9 µg/L	J
Styrene	5.00 µg/L	45.9 µg/L	
1,1,1,2-Tetrachlorcethane	5.00 µg/L	48.0 µg/L	
1,1,2,2-Tetrachloroethane	5.00 µg/L	50.9 µg/L	
Tetrachloroethene	5.00 µg/L	55.6 µg/L	
Toluene	5.00 µg/L	50.0 µg/L	
1,2,3-Trichlorobenzene	5.00 µg/L	241 µg/L	
1,2,4-Trichlorobenzene	5.00 µg/L	60.8 µg/L	
1,1,1-Trichloroethane	5.00 µg/L	48.9 µg/L	
1,1,2-Trichloroethane	5.00 µg/L	49.7 µg/L	
Trichloroethene	5.00 µg/L	63.6 µg/L	
Trichlorofluoromethane	5.00 µg/L	55.4 µg/L	
1,2,3-Trichloropropane	5.00 µg/L	52.2 µg/L	
1,3,5-Trimethylbenzene	5.00 µg/L	51.2 µg/L	
1,2,4-Trimethylbenzene	5.00 µg/L	50.0 µg/L	
Vinyl acetate	50.0 µg/L	19.4 µg/L	J
Vinyl chloride	2.00 µg/L	52.0 µg/L	
m,p-Xylene	5.00 µg/L	95.4 µg/L	
o-Xylene	5.00 µg/L	49.3 µg/L	
Toluene-d8 (SS)		50.8 µg/L	
Bromofluorobenzene (SS)		57.0 µg/L	
1,2-Dichloroethane-d4 (SS)		51.8 µg/L	
Dibromofluoromethane (SS)		52.3 µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-14
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : CNA
PREPARED ON : 21-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 21-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 29072197RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	100 µg/L	507 µg/L	
Fluorobenzene (SS)		47.6 µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-15
REPORT DATE : 18-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	71.0 µg/L	
Acrylonitrile	5.00 µg/L	36.9 µg/L	
Benzene	5.00 µg/L	46.9 µg/L	
Bromobenzene	5.00 µg/L	47.6 µg/L	
Bromochloromethane	5.00 µg/L	48.4 µg/L	
Bromodichloromethane	5.00 µg/L	41.7 µg/L	
Bromoform	5.00 µg/L	32.0 µg/L	
Carbon disulfide	5.00 µg/L	43.9 µg/L	
Carbon tetrachloride	5.00 µg/L	42.8 µg/L	
Chlorobenzene	5.00 µg/L	50.0 µg/L	
Chloroethane	5.00 µg/L	54.9 µg/L	
Chloroform	5.00 µg/L	47.5 µg/L	
2-Chlorotoluene	5.00 µg/L	47.8 µg/L	
4-Chlorotoluene	5.00 µg/L	50.2 µg/L	

REPORT NUMBER : D97-8703-15
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	49.2 µg/L	
Dibromochloromethane	5.00 µg/L	39.4 µg/L	
1,2-Dibromo-3-chloropropane	25.0 µg/L	45.1 µg/L	
1,2-Dibromoethane	5.00 µg/L	46.4 µg/L	
1,2-Dichlorobenzene	5.00 µg/L	48.5 µg/L	
1,3-Dichlorobenzene	5.00 µg/L	47.4 µg/L	
1,4-Dichlorobenzene	5.00 µg/L	44.9 µg/L	
trans-1,4-Dichloro-2-butene	100 µg/L	43.3 µg/L	J
1,1-Dichloroethane	5.00 µg/L	47.8 µg/L	
1,2-Dichloroethane	5.00 µg/L	47.8 µg/L	
1,1-Dichloroethene	5.00 µg/L	47.6 µg/L	
cis-1,2-Dichloroethene	5.00 µg/L	46.3 µg/L	
trans-1,2-Dichloroethene	5.00 µg/L	48.8 µg/L	
1,2-Dichloropropane	5.00 µg/L	49.2 µg/L	
2,2-Dichloropropane	5.00 µg/L	50.1 µg/L	
1,1-Dichloropropene	5.00 µg/L	50.4 µg/L	
1,3-Dichloropropane	5.00 µg/L	48.6 µg/L	
cis-1,3-Dichloropropene	5.00 µg/L	42.2 µg/L	
trans-1,3-Dichloropropene	5.00 µg/L	39.9 µg/L	
Ethylbenzene	5.00 µg/L	48.2 µg/L	
2-Hexanone	50.0 µg/L	43.3 µg/L	J
Bromomethane	5.00 µg/L	48.5 µg/L	
Chloromethane	5.00 µg/L	64.5 µg/L	
Dibromomethane	5.00 µg/L	45.7 µg/L	
2-Butanone	100 µg/L	45.4 µg/L	J
Iodomethane	5.00 µg/L	49.8 µg/L	

REPORT NUMBER : D97-8703-15
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	46.8 µg/L	
4-Methyl-2-pentanone	100 µg/L	39.2 µg/L	J
Styrene	5.00 µg/L	43.5 µg/L	
1,1,1,2-Tetrachloroethane	5.00 µg/L	46.2 µg/L	
1,1,2,2-Tetrachloroethane	5.00 µg/L	44.5 µg/L	
Tetrachloroethene	5.00 µg/L	52.2 µg/L	
Toluene	5.00 µg/L	45.6 µg/L	
1,2,3-Trichlorobenzene	5.00 µg/L	276 µg/L	
1,2,4-Trichlorobenzene	5.00 µg/L	65.2 µg/L	
1,1,1-Trichloroethane	5.00 µg/L	48.1 µg/L	
1,1,2-Trichloroethane	5.00 µg/L	46.0 µg/L	
Trichloroethene	5.00 µg/L	48.5 µg/L	
Trichlorofluoromethane	5.00 µg/L	54.5 µg/L	
1,2,3-Trichloropropane	5.00 µg/L	49.0 µg/L	
1,3,5-Trimethylbenzene	5.00 µg/L	48.4 µg/L	
1,2,4-Trimethylbenzene	5.00 µg/L	46.1 µg/L	
Vinyl acetate	50.0 µg/L	21.8 µg/L	J
Vinyl chloride	2.00 µg/L	51.0 µg/L	
m,p-Xylene	5.00 µg/L	87.0 µg/L	
o-Xylene	5.00 µg/L	46.7 µg/L	
Toluene-d8 (SS)		49.0 µg/L	
Bromofluorobenzene (SS)		55.5 µg/L	
1,2-Dichloroethane-d4 (SS)		51.6 µg/L	
Dibromofluoromethane (SS)		52.2 µg/L	

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-15
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 3520B
PREPARED BY : GWG
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 24-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-74

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	18.0 µg/L	89.7 µg/L	
Acenaphthylene	23.0 µg/L	88.4 µg/L	
Anthracene	6.60 µg/L	80.3 µg/L	
Benzo(a)anthracene	0.130 µg/L	102 µg/L	
Benzo(a)pyrene	0.120 µg/L	98.4 µg/L	
Benzo(b)fluoranthene	0.180 µg/L	96.9 µg/L	
Benzo(g,h,i)perylene	0.760 µg/L	97.9 µg/L	
Benzo(k)fluoranthene	0.170 µg/L	93.1 µg/L	
Chrysene	1.50 µg/L	96.2 µg/L	
Dibenz(a,h)anthracene	0.300 µg/L	106 µg/L	
Fluoranthene	2.10 µg/L	99.6 µg/L	
Fluorene	2.10 µg/L	92.7 µg/L	
Indeno(1,2,3-cd)pyrene	0.430 µg/L	90.6 µg/L	
Naphthalene	18.0 µg/L	100 µg/L	

REPORT NUMBER : D97-8703-15
ANALYSIS METHOD : EPA 8310 PR /1

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	6.40 µg/L	88.6 µg/L	
Pyrene	2.70 µg/L	90.4 µg/L	
p-Terphenyl (SS)		8.62 µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-15
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 3520B
PREPARED BY : KDF
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-77

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	1000 µg/L	2150 µg/L	
Triacontane (SS)		216 µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-15
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : CNA
PREPARED ON : 21-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 21-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 29072097RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	100 µg/L	486 µg/L	
Fluorobenzene (SS)		48.4 µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-15
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
ANALYSIS METHOD : RSK 175 /1
ANALYZED BY : LAJ
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : F071897-1

DISSOLVED GASES IN WATER			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methane	0.5 ppbw	3.7 ppbw	
Ethane	0.5 ppbw	7.4 ppbw	
Ethene	0.5 ppbw	< 0.5 ppbw	U

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-15
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997

TOTAL METALS

TEST REQUESTED		DETECTION LIMIT	RESULTS		FLAG
Lead	/1	0.0020 mg/L	<	0.0020 mg/L	U

Dilution Factor : 1
Prepared using EPA 3015 on 17-JUL-1997 by CEL
Analyzed using EPA 7421 on 22-JUL-1997 by GGD
QC Batch No : AC160-35F

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-15
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997

MISCELLANEOUS ANALYSES

TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Sulfate /1	0.20 mg/L	3.15 mg/L	

Dilution Factor : 1
Analyzed using EPA 9056 on 21-JUL-1997 by LKD
QC Batch No : 32-0721971

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-16
REPORT DATE : 18-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BD2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 22-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707187001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	92.2 µg/L	
Acrylonitrile	5.00 µg/L	26.0 µg/L	
Benzene	5.00 µg/L	51.1 µg/L	
Bromobenzene	5.00 µg/L	53.4 µg/L	
Bromochloromethane	5.00 µg/L	49.5 µg/L	
Bromodichloromethane	5.00 µg/L	43.3 µg/L	
Bromoform	5.00 µg/L	31.9 µg/L	
Carbon disulfide	5.00 µg/L	44.8 µg/L	
Carbon tetrachloride	5.00 µg/L	45.7 µg/L	
Chlorobenzene	5.00 µg/L	54.3 µg/L	
Chloroethane	5.00 µg/L	58.2 µg/L	
Chloroform	5.00 µg/L	49.2 µg/L	
2-Chlorotoluene	5.00 µg/L	60.9 µg/L	
4-Chlorotoluene	5.00 µg/L	53.0 µg/L	

REPORT NUMBER : D97-8703-16
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	53.3 µg/L	
Dibromochloromethane	5.00 µg/L	40.5 µg/L	
1,2-Dibromo-3-chloropropane	25.0 µg/L	47.4 µg/L	
1,2-Dibromoethane	5.00 µg/L	53.2 µg/L	
1,2-Dichlorobenzene	5.00 µg/L	51.8 µg/L	
1,3-Dichlorobenzene	5.00 µg/L	52.5 µg/L	
1,4-Dichlorobenzene	5.00 µg/L	48.2 µg/L	
trans-1,4-Dichloro-2-butene	100 µg/L	54.2 µg/L	J
1,1-Dichloroethane	5.00 µg/L	50.8 µg/L	
1,2-Dichloroethane	5.00 µg/L	51.5 µg/L	
1,1-Dichloroethene	5.00 µg/L	53.1 µg/L	
cis-1,2-Dichloroethene	5.00 µg/L	49.7 µg/L	
trans-1,2-Dichloroethene	5.00 µg/L	51.1 µg/L	
1,2-Dichloropropane	5.00 µg/L	53.3 µg/L	
2,2-Dichloropropane	5.00 µg/L	23.6 µg/L	
1,1-Dichloropropene	5.00 µg/L	59.3 µg/L	
1,3-Dichloropropane	5.00 µg/L	53.6 µg/L	
cis-1,3-Dichloropropene	5.00 µg/L	45.2 µg/L	
trans-1,3-Dichloropropene	5.00 µg/L	43.1 µg/L	
Ethylbenzene	5.00 µg/L	96.8 µg/L	
2-Hexanone	50.0 µg/L	61.4 µg/L	
Bromomethane	5.00 µg/L	43.8 µg/L	
Chloromethane	5.00 µg/L	69.9 µg/L	
Dibromomethane	5.00 µg/L	50.1 µg/L	
2-Butanone	100 µg/L	60.9 µg/L	J
Iodomethane	5.00 µg/L	39.5 µg/L	

REPORT NUMBER : D97-8703-16
ANALYSIS METHOD : EPA 8260 /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	50.2 µg/L	
4-Methyl-2-pentanone	100 µg/L	49.3 µg/L	J
Styrene	5.00 µg/L	45.6 µg/L	
1,1,1,2-Tetrachloroethane	5.00 µg/L	48.6 µg/L	
1,1,2,2-Tetrachloroethane	5.00 µg/L	51.7 µg/L	
Tetrachloroethene	5.00 µg/L	53.5 µg/L	
Toluene	5.00 µg/L	50.2 µg/L	
1,2,3-Trichlorobenzene	5.00 µg/L	309 µg/L	
1,2,4-Trichlorobenzene	5.00 µg/L	68.9 µg/L	
1,1,1-Trichloroethane	5.00 µg/L	50.6 µg/L	
1,1,2-Trichloroethane	5.00 µg/L	49.8 µg/L	
Trichloroethene	5.00 µg/L	61.0 µg/L	
Trichlorofluoromethane	5.00 µg/L	55.6 µg/L	
1,2,3-Trichloropropane	5.00 µg/L	60.1 µg/L	
1,3,5-Trimethylbenzene	5.00 µg/L	51.4 µg/L	
1,2,4-Trimethylbenzene	5.00 µg/L	49.9 µg/L	
Vinyl acetate	50.0 µg/L	13.2 µg/L	J
Vinyl chloride	2.00 µg/L	53.7 µg/L	
m,p-Xylene	5.00 µg/L	98.5 µg/L	
o-Xylene	5.00 µg/L	51.3 µg/L	
Toluene-d8 (SS)		52.9 µg/L	
Bromofluorobenzene (SS)		55.2 µg/L	
1,2-Dichloroethane-d4 (SS)		53.0 µg/L	
Dibromofluoromethane (SS)		51.6 µg/L	

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-16
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BD2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 22-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : CNA
PREPARED ON : 22-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 22-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 29072197RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	100 µg/L	464 µg/L	
Fluorobenzene (SS)		47.5 µg/L	

Intertek Testing Services NA Inc.
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DESCRIPTION OF REPORTING FLAGS

U - Indicates compound was analyzed for but not detected.

J - Indicates an estimated value. This flag is used if the compound is detected but is below the Reporting Limit.

D - Indicates all compounds in an analysis at a secondary dilution.

N - Indicates presumptive evidence of a compound. This flag is only used for tentatively identified compounds where the identification is based on a mass spectral library search.

E - Indicates the compounds whose concentration exceed the limit of the instrument or the Laboratory Information Management System. The concentration will be greater than the concentration listed.

Q - Indicates the surrogate recovery is outside the defined QC limits.

M - Indicates the matrix has interfered with the recovery of the surrogates.

O - Indicates the surrogate was lost because of dilution.