FINAL
WORK PLAN ADDENDUM

Long-Term Monitoring Activities and Soil-Gas Investigation
at
Air Force Plant 59
Johnson City, New York

Prepared for:

Air Force Center for Engineering and the Environment
Brooks Air Force Base, Texas

Prepared by:

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PREFACE

This *Work Plan* (WP) *Addendum* was written by Earth Tech to describe the field activities associated with the long-term monitoring (LTM) activities and soil-gas investigation at the Air Force Plant 59 (AFP 59). All work is to be completed under the United States Air Force Center for Engineering and the Environment (AFCEE) Contract No. F41624-08-D-8770, Task Order No. 0002.

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14. ABSTRACT

This *Work Plan Addendum* describes the field activities associated with the LTM activities and soil-gas investigation at AFP 59. The objectives of this study are to: 1) determine if soil gas contaminated with VOCs are exiting at AFP 59 and beyond, 2) conduct groundwater sampling to determine concentrations of VOCs in on-site and off-site monitoring wells, 3) conduct groundwater sampling from USGS monitoring wells to determine if decommissioning is necessary, and 4) correlate groundwater concentrations to soil gas concentrations.

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LIST OF ACRONYMS AND ABBREVIATIONS

AFCEE	Air Force Center for Engineering and the Environment
AFP 59	Air Force Plant 59
ASC	Aeronautical Systems Center
bgs	Below Ground Surface
CHSO	Corporate Health and Safety Office
COC	Chain-of-Custody
DCA	Dichloroethane
DQO	Data Quality Objective
DTW	Depth-to-Water
ELAP	Environmental Laboratory Accreditation Program
ERPIMS	Environmental Resources Program Information Management System
HASP	Health and Safety Plan
L/min	Liter per Minute
LTM	Long-Term Monitoring
MTBE	Methyl Tert Butyl Ether
$\mu g/m^3$	Micrograms per Cubic Meter
mL/min	Milliliters per Minute
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCE	Tetrachloroethene
PID	Photoionization Detector
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
SAP	Sampling and Analysis Plan
TCA	Trichloroethane
TCE	Trichloroethene
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

VOC	Volatile Organic Compounds
WBV	Well Bore Volume
WP	Work Plan

1.0 INTRODUCTION

This *Work Plan (WP) Addendum* describes the procedures and techniques that will be used to conduct long-term monitoring (LTM) activities and a soil-gas investigation at Air Force Plant 59 (AFP 59) in Johnson City, New York. Earth Tech has prepared this *WP Addendum* under contract to the United States Air Force Center for Engineering and the Environment (AFCEE) as part of the requirements for Contract F41624-08-D-8770, Task Order 0002. This *WP Addendum* is not intended to be a stand alone document. This document is an addendum to the *Final Soil Vapor Study and LTM Work Plan* (Earth Tech, 2006) and the *Final Work Plan Addendum for the Vapor Intrusion Investigation* (Earth Tech, 2007). This addendum contains proposed project scope and objectives, reporting requirements, and project schedule. Site history and descriptions and the *Quality Assurance Project Plan* (QAPP) are not included; they can be found in the *Final Soil Vapor Study and LTM Work Plan* (Earth Tech, 2006).

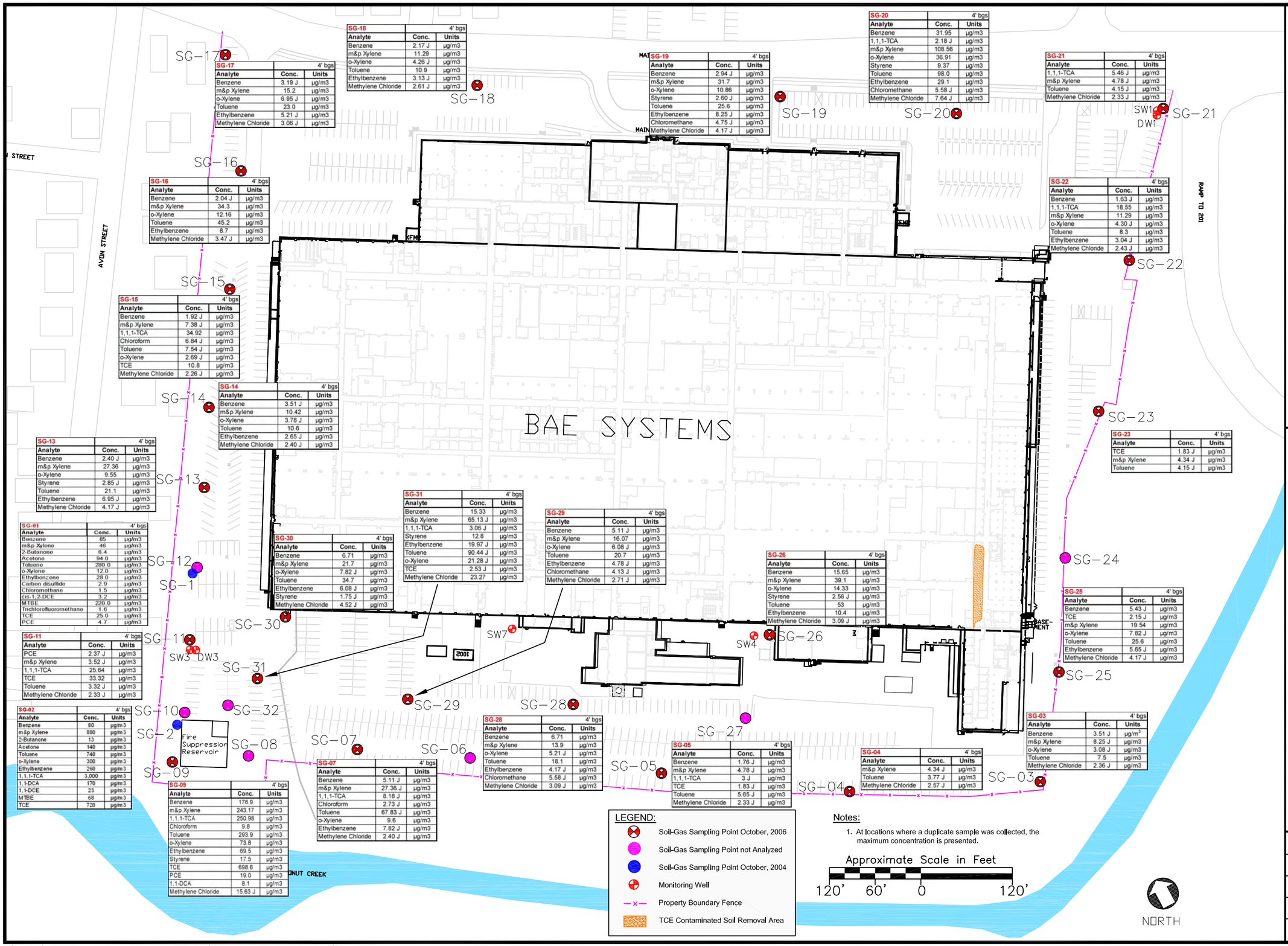
1.1 PROPOSED PROJECT ACTIVITIES

The following activities are to be completed during the execution of this task order:

1. Preparation of this *WP Addendum* and other supporting documents.
2. One round of groundwater sampling of the United States Geological Survey (USGS) monitoring wells located adjacent to AFP 59. Samples will be analyzed for volatile organic compounds (VOCs). Based on concentrations of contaminants in the USGS monitoring wells, a recommendation for decommissioning will be made.
3. Two rounds of groundwater sampling of the on-site AFP 59 monitoring wells. Samples will be analyzed for VOCs. Off-site, downgradient monitoring wells may be substituted to further determine the off-site impact of groundwater contamination.
4. Analysis of five groundwater samples for 1,4-dioxane. Groundwater collected from on-site monitoring wells will be analyzed for 1,4-dioxane in order to determine whether groundwater has been impacted by 1,4-dioxane from AFP 59 operations.
5. Collection of six soil-gas samples to be analyzed for VOCs to address data gaps along the AFP 59 boundary.
6. Correlate groundwater concentrations to soil gas concentrations by collecting a soil gas sample near a monitoring well.
7. Preparation of a letter report presenting the data collected during the field investigation.

1.2 PREVIOUS SOIL-GAS INVESTIGATIONS

In November 2004, a soil-gas survey was conducted to determine the downgradient VOC concentrations at the AFP 59 property boundary (see Figure 1-1). Two soil-gas sample locations were chosen along the southwest (downgradient) property boundary. One sampling location (SG-1) was north and one sampling location (SG-2) was south of groundwater monitoring wells SW-3 and DW-3. Soil-gas samples were analyzed for VOCs using United States Environmental Protection Agency (USEPA) Method TO-15.



SG-17	4' bgs	
Analyte	Conc.	Units
Benzene	3.19 J	µg/m3
m&p Xylene	15.2	µg/m3
o-Xylene	6.95 J	µg/m3
Toluene	23.0	µg/m3
Ethylbenzene	5.21 J	µg/m3
Methylene Chloride	3.06 J	µg/m3

SG-18	4' bgs	
Analyte	Conc.	Units
Benzene	2.17 J	µg/m3
m&p Xylene	11.29	µg/m3
o-Xylene	4.26 J	µg/m3
Toluene	10.9	µg/m3
Ethylbenzene	3.13 J	µg/m3
Methylene Chloride	2.61 J	µg/m3

SG-19	4' bgs	
Analyte	Conc.	Units
Benzene	2.94 J	µg/m3
m&p Xylene	31.7	µg/m3
o-Xylene	10.86	µg/m3
Styrene	2.60 J	µg/m3
Toluene	25.6	µg/m3
Ethylbenzene	8.25 J	µg/m3
Chloromethane	4.75 J	µg/m3
Methylene Chloride	4.17 J	µg/m3

SG-20	4' bgs	
Analyte	Conc.	Units
Benzene	31.95	µg/m3
1,1,1-TCA	2.18 J	µg/m3
m&p Xylene	108.56	µg/m3
o-Xylene	36.91	µg/m3
Styrene	9.37	µg/m3
Toluene	98.0	µg/m3
Ethylbenzene	29.1	µg/m3
Chloromethane	5.58 J	µg/m3
Methylene Chloride	7.64 J	µg/m3

SG-21	4' bgs	
Analyte	Conc.	Units
1,1,1-TCA	5.46 J	µg/m3
m&p Xylene	4.78 J	µg/m3
Toluene	4.15 J	µg/m3
Methylene Chloride	2.33 J	µg/m3

SG-22	4' bgs	
Analyte	Conc.	Units
Benzene	1.63 J	µg/m3
1,1,1-TCA	18.55	µg/m3
m&p Xylene	11.29	µg/m3
o-Xylene	4.30 J	µg/m3
Toluene	8.3	µg/m3
Ethylbenzene	3.04 J	µg/m3
Methylene Chloride	2.43 J	µg/m3

SG-23	4' bgs	
Analyte	Conc.	Units
TCE	1.83 J	µg/m3
m&p Xylene	4.34 J	µg/m3
Toluene	4.15 J	µg/m3

SG-16	4' bgs	
Analyte	Conc.	Units
Benzene	2.04 J	µg/m3
m&p Xylene	34.3	µg/m3
o-Xylene	12.16	µg/m3
Toluene	45.2	µg/m3
Ethylbenzene	8.7	µg/m3
Methylene Chloride	3.47 J	µg/m3

SG-15	4' bgs	
Analyte	Conc.	Units
Benzene	1.92 J	µg/m3
m&p Xylene	7.38 J	µg/m3
1,1,1-TCA	34.92	µg/m3
Chloroform	6.84 J	µg/m3
Toluene	7.54 J	µg/m3
o-Xylene	2.69 J	µg/m3
TCE	10.8	µg/m3
Methylene Chloride	2.26 J	µg/m3

SG-14	4' bgs	
Analyte	Conc.	Units
Benzene	3.51 J	µg/m3
m&p Xylene	10.42	µg/m3
o-Xylene	3.78 J	µg/m3
Toluene	10.6	µg/m3
Ethylbenzene	2.65 J	µg/m3
Methylene Chloride	2.40 J	µg/m3

SG-13	4' bgs	
Analyte	Conc.	Units
Benzene	2.40 J	µg/m3
m&p Xylene	27.36	µg/m3
o-Xylene	9.55	µg/m3
Styrene	2.85 J	µg/m3
Toluene	21.1	µg/m3
Ethylbenzene	6.95 J	µg/m3
Methylene Chloride	4.17 J	µg/m3

SG-31	4' bgs	
Analyte	Conc.	Units
Benzene	15.33	µg/m3
m&p Xylene	65.13 J	µg/m3
1,1,1-TCA	3.06 J	µg/m3
Styrene	12.8	µg/m3
Ethylbenzene	19.97 J	µg/m3
Toluene	90.44 J	µg/m3
o-Xylene	21.28 J	µg/m3
TCE	2.53 J	µg/m3
Methylene Chloride	23.27	µg/m3

SG-30	4' bgs	
Analyte	Conc.	Units
Benzene	6.71	µg/m3
m&p Xylene	21.7	µg/m3
o-Xylene	7.82 J	µg/m3
Toluene	34.7	µg/m3
Ethylbenzene	6.08 J	µg/m3
Styrene	1.75 J	µg/m3
Methylene Chloride	4.52 J	µg/m3

SG-29	4' bgs	
Analyte	Conc.	Units
Benzene	5.11 J	µg/m3
m&p Xylene	16.07	µg/m3
o-Xylene	6.08 J	µg/m3
Toluene	20.7	µg/m3
Ethylbenzene	4.78 J	µg/m3
Chloromethane	4.13 J	µg/m3
Methylene Chloride	2.71 J	µg/m3

SG-26	4' bgs	
Analyte	Conc.	Units
Benzene	15.65	µg/m3
m&p Xylene	39.1	µg/m3
o-Xylene	14.33	µg/m3
Styrene	2.56 J	µg/m3
Toluene	53	µg/m3
Ethylbenzene	10.4	µg/m3
Methylene Chloride	3.09 J	µg/m3

SG-25	4' bgs	
Analyte	Conc.	Units
Benzene	5.43 J	µg/m3
TCE	2.15 J	µg/m3
m&p Xylene	19.54	µg/m3
o-Xylene	7.82 J	µg/m3
Toluene	25.6	µg/m3
Ethylbenzene	5.65 J	µg/m3
Methylene Chloride	4.17 J	µg/m3

SG-11	4' bgs	
Analyte	Conc.	Units
PCE	2.37 J	µg/m3
m&p Xylene	3.52 J	µg/m3
1,1,1-TCA	25.64	µg/m3
TCE	33.32	µg/m3
Toluene	3.32 J	µg/m3
Methylene Chloride	2.33 J	µg/m3

SG-01	4' bgs	
Analyte	Conc.	Units
Benzene	85	µg/m3
m&p Xylene	46	µg/m3
2-Butanone	6.4	µg/m3
Acetone	94.0	µg/m3
Toluene	280.0	µg/m3
o-Xylene	12.0	µg/m3
Ethylbenzene	28.0	µg/m3
Carbon disulfide	2.9	µg/m3
Chloromethane	1.5	µg/m3
cis-1,2-DCE	3.2	µg/m3
MTBE	220.0	µg/m3
Trichlorofluoromethane	1.6	µg/m3
TCE	25.0	µg/m3
PCE	4.7	µg/m3

SG-02	4' bgs	
Analyte	Conc.	Units
Benzene	80	µg/m3
m&p Xylene	880	µg/m3
2-Butanone	13	µg/m3
Acetone	140	µg/m3
Toluene	740	µg/m3
o-Xylene	300	µg/m3
Ethylbenzene	260	µg/m3
1,1,1-TCA	3,000	µg/m3
1,1-DCA	170	µg/m3
1,1-DCE	23	µg/m3
MTBE	68	µg/m3
TCE	720	µg/m3

SG-09	4' bgs	
Analyte	Conc.	Units
Benzene	178.9	µg/m3
m&p Xylene	243.17	µg/m3
1,1,1-TCA	250.98	µg/m3
Chloroform	9.8	µg/m3
Toluene	293.9	µg/m3
o-Xylene	73.8	µg/m3
Ethylbenzene	69.5	µg/m3
Styrene	17.5	µg/m3
TCE	698.6	µg/m3
PCE	19.0	µg/m3
1,1-DCA	8.1	µg/m3
Methylene Chloride	15.63 J	µg/m3

SG-07	4' bgs	
Analyte	Conc.	Units
Benzene	5.11 J	µg/m3
m&p Xylene	27.36 J	µg/m3
1,1,1-TCA	8.18 J	µg/m3
Chloroform	2.73 J	µg/m3
Toluene	67.83 J	µg/m3
o-Xylene	9.6	µg/m3
Ethylbenzene	7.82 J	µg/m3
Methylene Chloride	2.40 J	µg/m3

SG-28	4' bgs	
Analyte	Conc.	Units
Benzene	6.71	µg/m3
m&p Xylene	13.9	µg/m3
o-Xylene	5.21 J	µg/m3
Toluene	18.1	µg/m3
Ethylbenzene	4.17 J	µg/m3
Chloromethane	5.58 J	µg/m3
Methylene Chloride	3.09 J	µg/m3

SG-05	4' bgs	
Analyte	Conc.	Units
Benzene	1.76 J	µg/m3
m&p Xylene	4.78 J	µg/m3
1,1,1-TCA	3 J	µg/m3
TCE	1.83 J	µg/m3
Toluene	5.65 J	µg/m3
Methylene Chloride	2.33 J	µg/m3

SG-04	4' bgs	
Analyte	Conc.	Units
m&p Xylene	4.34 J	µg/m3
Toluene	3.77 J	µg/m3
Methylene Chloride	2.57 J	µg/m3

SG-03	4' bgs	
Analyte	Conc.	Units
Benzene	3.51 J	µg/m3
m&p Xylene	8.25 J	µg/m3
o-Xylene	3.08 J	µg/m3
Toluene	7.5	µg/m3
Methylene Chloride	2.36 J	µg/m3

LEGEND:

- Soil-Gas Sampling Point October, 2006
- Soil-Gas Sampling Point not Analyzed
- Soil-Gas Sampling Point October, 2004
- Monitoring Well
- Property Boundary Fence
- TCE Contaminated Soil Removal Area

Notes:

1. At locations where a duplicate sample was collected, the maximum concentration is presented.

Approximate Scale in Feet

120' 60' 0 120'

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Air Force Plant 59 – Johnson City, New York

Figure 1-1
AFP 59
Previous Soil-Gas Sample Results

CONTRACT NO.	TASK NO.
F41624-08-D-8770	0002
DESIGNED BY: P. Granger	DRAWN BY: P. Granger
CHECKED BY: –	DATE: Sept. 21, 2007
SCALE: 1" = 120'	SHEET: 1 of 1

Previous Soil-Gas Detect.dwg

P:\AFP59\104899 Site Closure Support Activities\Vapor Investigation Workplan\Figures

Location SG-2 exhibited elevated concentrations of 1,1,1-trichloroethane (1,1,1-TCA) at 3,000 micrograms per cubic meter (µg/m^3), m&p-xylene at 880 µg/m^3, ortho-xylene at 300 µg/m^3, toluene at 740 µg/m^3, and trichloroethene (TCE) at 720 µg/m3. Methyl tert butyl ether (MTBE) was detected at both SG-1 (220 µg/m3) and SG-2 (68 µg/m3). With the exception of the MTBE results, the soil-gas VOC concentrations were significantly higher at SG-2 than at SG-1. A complete analysis of the November 2004 soil-gas sampling is presented in the *Downgradient Soil Gas Sampling, Air Force Plant 59, Johnson City, NY Letter Report* (Earth Tech, 2005).

As a result of the November 2004 soil-gas sampling event, it was recommended that a more comprehensive soil-gas survey be conducted to characterize the extent of elevated VOCs in soil gas and to determine if on- or off-site migration is occurring. In October 2006, an additional soil-gas survey was conducted, in which 25 soil-gas samples were collected around the perimeter of the site boundary and manufacturing facility.

Eleven of the 13 maximum detections occurred in SG-09, including: 1,1,1-TCA at 251 µg/m^3, 1,1-dichloroethane (1,1-DCA) at 8.1 µg/m^3, benzene at 179 µg/m^3, chloroform at 9.8 µg/m^3, ethylbenzene at 69.5 µg/m^3, m,p-xylene at 243µg/m^3, o-xylene at 74 µg/m^3, styrene at 17.5 µg/m^3, tetrachloroethene (PCE) at 19 µg/m^3, toluene at 294 µg/m^3, and TCE at 699 µg/m^3. Chloromethane was detected at a maximum concentration of 5.6 J µg/m^3 in SG-20 and SG-28. Methylene chloride was detected at a maximum concentration of 23.3 µg/m^3 in the duplicate sample from SG-31. For a complete report of the soil-gas results and analysis, refer to the *Final Soil-Gas and Groundwater Monitoring Report for the October/November 2006 Sampling Event* (Earth Tech, 2007).

All of the previous soil-gas results are illustrated on Figure 1-1.

2.0 PROJECT SCOPE AND OBJECTIVES

2.1 OBJECTIVES

Data quality objectives (DQOs) are quantitative and qualitative goals that specify the quantity and quality of the data required to support decisions during remedial response activities. Guidelines followed in the preparation of DQOs for the LTM groundwater activities and soil-gas investigation at AFP 59 are detailed in the *Guidance for the Data Quality Objectives Process, USEPA QA/G-4* (USEPA, 1994).

DQOs are determined based on the end use(s) of the data. For the soil-gas investigation, the primary objective will be to determine if soil gas contaminated with chlorinated VOCs is exiting the AFP 59 site. Soil-gas sample data collected during the investigation will be used for different purposes with varying levels of confidence required.

The DQO process for the LTM activities and soil-gas investigation is presented below. The discussion provides a step-by-step description of the development of DQOs and rationale for the LTM activities and soil-gas sampling.

1. **Problem.** Two soil-gas samples were collected in November 2004 and elevated concentrations of chlorinated hydrocarbons were detected. Additional soil-gas samples were collected in October 2006 and elevated concentrations of chlorinated hydrocarbons were once again detected. Based on the results from these previous investigations, the New York State Department of Environmental Conservation (NYSDEC) requested that further soil-gas sampling be completed to fill data gaps along the perimeter of AFP 59 and to correlate soil gas concentrations to groundwater concentrations.

   Six monitoring wells are included in the LTM program at AFP 59. Previous sampling has shown contaminant concentrations have declined to levels approaching regulatory-acceptable levels at the AFP 59 boundary.

   Eight monitoring wells were installed in 1995 by the USGS on behalf of the Aeronautical Systems Center (ASC). The USGS monitoring wells were installed to study the nature and extent of contaminants in the drinking water aquifer serving Broome County, New York. The USGS monitoring wells are no longer needed.

2. **Boundaries of Study.** The boundaries of the study area were determined based on analytical data from previous investigations and property boundaries. The study area for the groundwater sampling includes six wells which have been sampled many times over the course of the AFP 59 LTM program. Off-site, downgradient monitoring wells may be substituted to further determine the off-site impact of groundwater contamination.

   Soil-gas sampling will occur in six locations around the perimeter of the AFP 59 property. The soil-gas sampling will fill data gaps from previous investigations. One soil gas sample will be co-located with an off-site groundwater sample to attempt to correlate soil gas concentrations to groundwater concentrations.

Additionally, eight USGS monitoring wells will be sampled to determine if the monitoring wells are candidates for decommissioning. The USGS monitoring wells are located north of AFP 59.

3. **Sampling Approach.** Screening data are collected to provide preliminary field data, qualitatively evaluate the nature and extent of contamination in soil gas, identify samples to send to the laboratory, and to provide health and safety monitoring. Field equipment, such as a photoionization detector (PID) will be used to collect the screening data.

   One round of soil-gas samples will be collected from the site. The soil-gas samples will be sent to a fixed laboratory to obtain definitive data. Definitive data will be produced by using standard methods in a fixed laboratory. The data will be used to determine if on- or off-site migration of soil-gas contaminants is occurring. Definitive data will be generated in accordance with the site-specific QAPP (Earth Tech, 2006). Based on the results of the soil-gas investigation, additional soil-gas and/or structures sampling may be needed to determine the impact to off-site properties.

   Two rounds of groundwater samples will be collected from six existing monitoring wells, including two screened in the deep aquifer and four screened in the shallow aquifer. The groundwater samples will be sent to a fixed laboratory to obtain definitive data. Definitive data will be produced by using standard methods in a fixed laboratory. The data will be used to determine if the TCE-contaminated soil removal has had any affect to on-site groundwater, and to determine if the LTM program can be discontinued. Off-site, downgradient monitoring wells may be substituted to further determine the off-site impact of groundwater contamination.

   One round of groundwater samples will be collected from eight existing USGS monitoring wells. The groundwater samples will be sent to a fixed laboratory to obtain definitive data. Definitive data will be produced by using standard methods in a fixed laboratory. The data will be used to determine if the USGS monitoring wells are candidates for decommissioning.

2.2 SAMPLE ANALYSIS SUMMARY

The proposed laboratory analyses for the groundwater and soil-gas samples are based on the types of chemicals used at AFP 59 and those chemicals previously detected in groundwater and soil-gas samples collected in the study area. A summary of the proposed laboratory analyses, including the number of environmental samples and quality assurance/quality control (QA/QC) samples, is provided in Table 2-1.

All soil-gas samples will be analyzed for VOCs by Method TO-15. All groundwater samples will be analyzed for VOCs by Method SW8260B. Five groundwater samples will also be analyzed for 1,4-dioxane by Method SW8260SIM. Monitoring wells SW-1, SW-3, DW-3, SW-4, and SW-7 will be sampled for 1,4-dioxane. The samples will be analyzed at an off-site laboratory.

Table 2-1
Sample Analysis Summary

Method	Matrix	# Samples	# Equipment Blanks	# Ambient Blanks	# Trip Blanks	# Field Duplicates	# MS/MSD Samples	Total # Samples
TO-15	Soil Gas	7	0	1	0	1	0	9
8260B	Groundwater	20	2	2	5	3	2	34
8260SIM	Groundwater	5	1	0	1	1	0	8

Key: MS/MSD = Matrix Spike/Matrix Spike Duplicate

Soil-gas QA/QC samples will be collected as described in the QAPP. The QA/QC samples will be collected at the following rates:

- Trip Blanks – No trip blanks will be collected or sent with soil-gas samples.
- Ambient Blanks – One ambient blank will be collected from an upwind location.
- Duplicate Samples – One duplicate will be collected from a soil-gas sampling location that represents a target frequency of approximately 10 percent of project samples; analyze using an off-site laboratory.
- Equipment Blanks – No equipment blanks will be collected during soil-gas sampling.
- MS/MSD – No MS/MSD samples will be collected during soil-gas sampling.

Canister QA/QC:

- Canister Certifications by Laboratory (batch certified).
- Initial vacuum of 28 +/- 2-inch Hg.
- Final vacuum of 5 +/- 1-inch Hg.
- The analytical laboratory is Environmental Laboratory Accreditation Program (ELAP) certified.
- Regulators shall collect a representative air sample at a flow rate that is <200 milliliters per minute (mL/min).
- A specified sample volume suitable to obtain the report limits specified on Table 2-2.

Groundwater QA/QC samples will be collected as described in the QAPP. The QA/QC samples will be collected at the following rates:

- Trip Blanks – One trip blank will be sent with each cooler.
- Ambient Blanks – One ambient blank will be collected per sampling event.
- Duplicate Samples – One duplicate will be collected from a groundwater sampling location that represents a target frequency of approximately 10 percent of project samples; analyze using an off-site laboratory.
- Equipment Blanks – One equipment blank will be collected during each sampling event.
- MS/MSD – One MS/MSD sample will be collected from a groundwater sampling location that represents a target frequency of approximately 20 percent of project samples; analyze using an off-site laboratory.

2.3 FIELD ACTIVITIES

2.3.1 Soil-Gas Samples

Soil-gas samples will be collected from locations on the perimeter of AFP 59 and adjacent to an off-site monitoring well. Where possible, soil-gas sampling depths will correspond to the depth of the basements of surrounding residential structures. Soil gas will be collected using a soil gas vapor probe kit. A total of seven samples will be collected, and one sample location will have a duplicate sample collected for QA/QC purposes. Sample locations can be seen in Figure 2-1 and Figure 2-2.

Table 2-2
Detection and Reporting Limit Requirements for Method TO-15

Analyte	Detection Limit ($\mu g/m^3$)	Reporting Limit ($\mu g/m^3$)
1,1,1-Trichloroethane	0.5	1.0
1,2-Dichloroethane	0.5	1.0
1,2-Dichlorobenzene	0.5	1.0
1,3-Dichlorobenzene	0.5	1.0
1,4-Dichlorobenzene	0.5	1.0
2-Hexanone	0.5	1.0
2-Butanone	0.5	1.0
4-Methyl-2-pentanone	0.5	1.0
Acetone	0.5	1.0
Benzene	0.5	1.0
Bromodichloromethane	0.5	1.0
Bromoform	0.5	1.0
Bromomethane	0.5	1.0
Carbon tetrachloride	0.125	0.25
Chloroform	0.5	1.0
Carbon disulfide	0.5	1.0
Dibromochloromethane	0.5	1.0
Styrene	0.5	1.0
Trichloroethylene	0.125	0.25
m,p-Xylene	0.5	1.0
o-Xylene	0.5	1.0
Tetrachloroethylene	0.5	1.0
Toluene	0.5	1.0
Ethylbenzene	0.5	1.0
cis-1,2-Dichloroethene	0.5	1.0
cis -1,2-Dichloropropene	0.5	1.0
Methylene chloride	0.5	1.0
Chlorobenzene	0.5	1.0
Chloromethane	0.5	1.0
Chloroethane	0.5	1.0

Table 2-2 (Continued)
Detection/Reporting Limit Requirements for Method TO-15

Analyte	Detection Limit ($\mu g/m^3$)	Reporting Limit ($\mu g/m^3$)
Vinyl chloride	0.125	0.25
Vinyl acetate	0.5	1.0
1,1,2,2-Tetrachloroethane	0.5	1.0
1,1-Dichloroethene	0.5	1.0
1,1,2-Trichloroethane	0.5	1.0
1,1-Dichloroethane	0.5	1.0
1,2-Dichloropropane	0.5	1.0
1,2-Dibromoethane	0.5	1.0
Tert-butyl methyl ether	0.5	1.0
Trichlorofluoromethane	0.5	1.0
trans-1,2-Dichloroethene	0.5	1.0
Trans-1,2-Dichloropropene	0.5	1.0
1,2-Dichloroethane-*d4*	0.5	1.0
Toluene-*d8*	0.5	1.0
4-Bromofluorobenzene	0.5	1.0
Bromochloromethane	0.5	1.0
Chlorobenzene-*d5*	0.5	1.0
1,4-Difluorobenzene	0.5	1.0

Key: $\mu g/m^3$ = micrograms per cubic meter

URS_7S
BM 121
URS_5S
URS_9S
URS_2S
URS_8I
JC3
JC2
JC1
SG-17
SG-16
SG-15
SG-14
SG-13
SG-12
SG-1
SG-11
SG-10
SG-2
SG-09
SG-08
SG-07
SG-06
SG-05
SG-04
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SG-22
SG-23
SG-24
SG-25
SG-26
SG-27
SG-28
SG-29
SG-30
SG-31
SG-32
SW1
DW1
SW3
DW3
SW4
SW7
DAYTON STREET
CAMDEN STREET
BERVIN STREET
AVON STREET
ELBON STREET
MAIN STREET
MAIN ENTRANCE
5TH STREET
IRVING PLACE
RAMP TO I-90
EXPRESSWAY
BASEMENT
2001
Fire Suppression Reservoir
BAE SYSTEMS
LITTLE CHOCONUT CREEK

LEGEND:
- Proposed LTM Monitoring Well Sampling Location
- Proposed Soil-Gas Sampling Location
- Off-Site Monitoring Well
- Soil-Gas Sampling Point Oct. '06
- Soil-Gas Sampling Point Oct. '06 not Analyzed
- Soil-Gas Sampling Point Nov. '04
- Property Boundary Fence
- TCE Contaminated Soil Removal Area

Approximate Scale in Feet
150' 75' 0 150'

NORTH

EarthTech
A Tyco International Ltd. Company
675 N. Washington Street, Suite 300, Alexandria VA 22314
Phone: 703.549.8728 Fax: 703.549.9134 earthtech.com

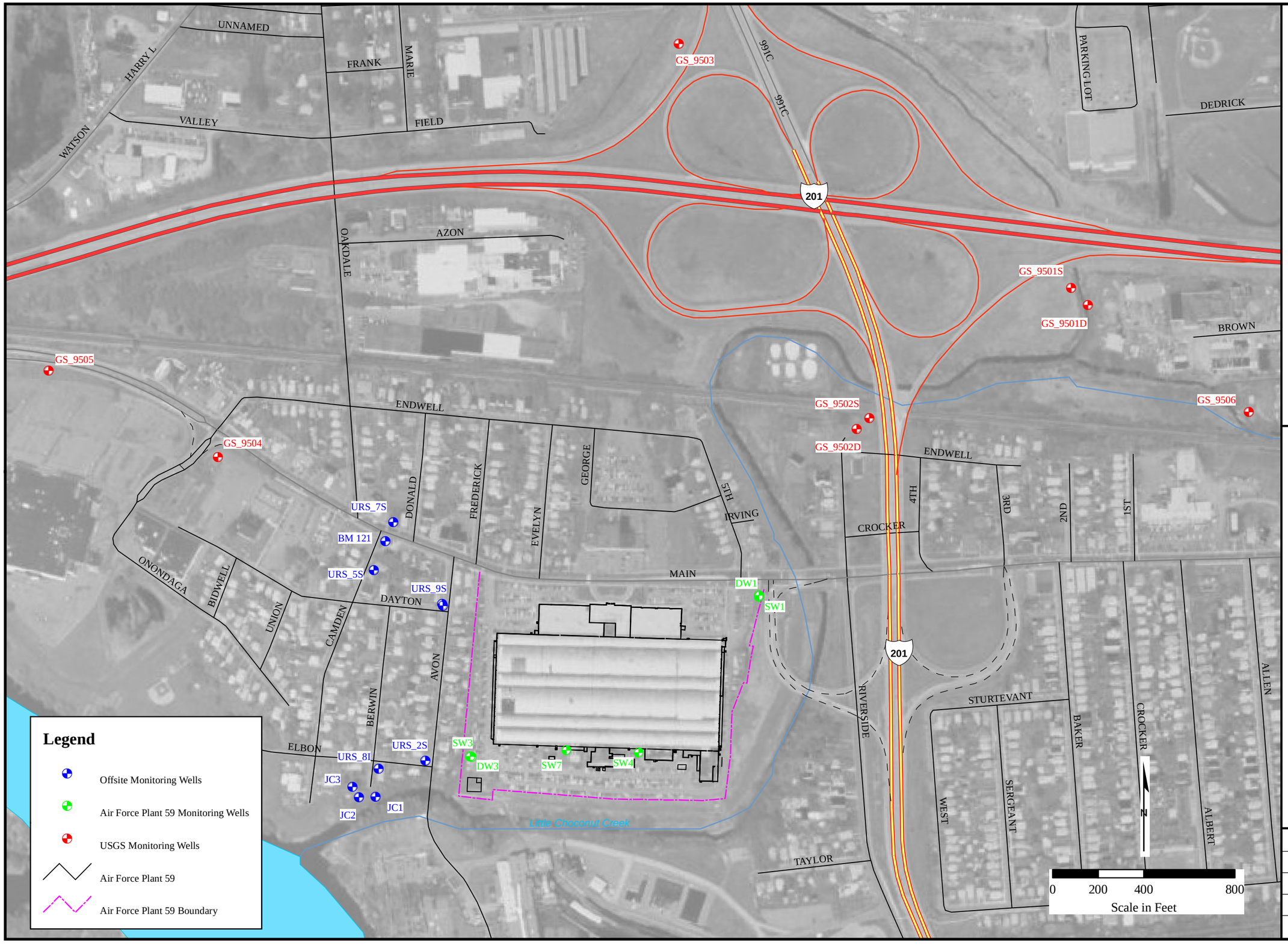
Air Force Plant 59 – Johnson City, New York

Figure 2-1
AFP 59 Proposed Sampling Locations
LTM and Soil Gas Investigation

CONTRACT NO.	TASK NO.
F41624-08-D-8770	0002
DESIGNED BY: P. Granger	DRAWN BY: P. Granger
CHECKED BY:	DATE: May 14, 2008
SCALE: 1" = 150'	SHEET: 1 of 1

ProposedSampleLoc.dwg

P:\AFP59\104899 Site Closure Support Activities\Vapor Investigation Workplan\Figures



EarthTech
A Tyco International Ltd. Company
675 N. Washington Street, Suite 300, Alexandria VA 22314
Phone: 703.549.8728 Fax: 703.549.9134 earthtech.com

Air Force Plant 59 - Johnson City, New York

FIGURE 2-2

AFP 59 Monitoring Well Locations

CONTRACT NO F41624-08-D-8770	TASK NO DO 0002
DESIGNED BY W. Gee	DRAWN BY W. Gee
CHECKED BY D. Parse	DATE May 28, 2008
SCALE 1" = 400'	SHEET 1 of 1

SamplLoc.mxd

The soil-gas sampling protocol will be in accordance with the NY State Department of Health (NYSDOH) *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH, 2006) and is as follows:

- A hole will be drilled to a depth corresponding to the depth of residential basements in the area (approximately 4 feet below ground surface [bgs] in the parking lot, approximately 6 to 8 feet bgs on the embankment along the property boundary, and up to 10 feet bgs at the off-site monitoring well location). If refusal is encountered, an additional attempt will be made to reach the target depth. After successive attempts, the soil gas sample will be collected from refusal depth.
- A piece of laboratory or food grade Teflon-lined tubing will be inserted through the sampling rods. Modeling clay will be used to seal the tubing at the surface and ensure ambient air is not entering the sample container. An adapter will be utilized to connect the Teflon-lined tubing to the vapor probe to prevent ambient air within the drill rods from impacting the sample interval.
- To further ensure ambient air is not entering the sample container, a domed enclosure filled with a tracer gas will cover the sample points. When conducting the tracer gas test, the dome will cover the borehole, drill rods, and as many connections as possible to confirm that ambient air is not impacting the sample.
- A vacuum pump will be used to purge between one and three volumes of the tubing prior to sample collection. Purge rates will be <200 mL/min. All purged air will be containerized, screened with a PID, and released.
- After purging is complete, samples will be collected in a Summa® canister. Samples will be collected at a flow rate less than 200 mL/min.
- One duplicate sample will be collected from a soil-gas sampling point. The duplicate sample will be taken from the same sample point using a new Summa® canister.
- Sample points will be filled with bentonite chips, hydrated, and finished with like surface material.
- If conditions exist where soil gas is unable to be drawn into the Summa® canister, a temporary sampling point as described in the NYSDOH *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH, 2006) will be constructed.

All soil-gas samples will be labeled as SG#–mmddyy and their locations will be marked on a site map.

The following information will be recorded for each soil-gas sample collected:

- Sample identification,
- Date and time of sample collection,
- Sampling depth,
- Identity of samplers,
- Sampling methods and devices,
- Soil-gas purge volume,

- Volume of soil gas extracted,
- Vacuum of Summa® canisters before and after samples are collected, and
- Chain-of-custody (COC) protocols and records used to track samples from sampling point to analysis.

Based on the results of the soil-gas investigation, additional soil-gas sampling may be needed to determine the impact to off-site properties.

2.4 GROUNDWATER SAMPLING PROCEDURES

The following sections provide descriptions of groundwater sampling of monitoring wells that will be performed during this investigation. All groundwater samples will be analyzed for VOCs using USEPA method SW8260B.

Two groundwater sampling methods will be utilized. For the on-site monitoring wells, a similar methodology to previous LTM sampling events will be utilized to gather data that correlates to previous data. For off-site monitoring wells, micropurge methodology will be utilized to reduce purge water volumes.

The construction material of the sampling devices (e.g., polyethylene) discussed below shall be appropriate for the contaminant of concern and shall not interfere with the chemical analyses being performed.

All purging and sampling equipment shall be decontaminated according to the specifications in *Final Soil Vapor Study and LTM Work Plan* (Earth Tech, 2006) prior to any sampling activities and shall be protected from contamination until ready for use.

2.4.1 Groundwater Sampling

When numerous monitoring wells are to be sampled in succession, those monitoring wells expected to have low levels of contamination or no contamination will be sampled prior to those monitoring wells expected to have higher levels of contamination. This practice will help reduce the potential for cross contamination between monitoring wells. All sampling activities will be recorded in the field logbook. Additionally, all sampling data will be recorded on a monitoring well sampling form.

Before groundwater sampling begins, monitoring wells will be inspected for signs of tampering or other damage. If tampering is suspected, (i.e., casing is damaged, lock or cap is missing) this will be recorded in the field logbook and on the monitoring well sampling form, and reported to the Field Supervisor. Monitoring wells that are suspected to have been tampered with will not be sampled until the Field Supervisor has discussed the matter with the Project Manager.

Water in the protective casing or in the vaults around the monitoring well casing will be removed prior to venting and purging. Every time a casing cap is removed to measure water level or collect a sample, the air in the breathing zone will be checked with a PID. Procedures in the *Health and Safety Plan* (HASP) will be followed when high concentrations of organic vapors are detected. Air monitoring data will be recorded on the monitoring well sampling form.

Purge pump intakes will be equipped with a positive foot check valve to prevent purged water from flowing back into the monitoring well. Purging and sampling will be performed in a manner that minimizes aeration in the monitoring well bore and the agitation of sediments in the monitoring well and formation. Equipment will not be allowed to free-fall into a monitoring well.

The following information will be recorded each time a monitoring well is purged and sampled: (1) depth-to-water (DTW) before and after purging; (2) well bore volume (WBV) calculation; (3) sounded total depth of the monitoring well; (4) the condition of each monitoring well; (5) the thickness of any nonaqueous layer; and (6) field parameters, such as pH, temperature, specific conductance, and turbidity. This information will be encoded in Environmental Resources Program Information Management System (ERPIMS) files when required.

2.4.1.1 Purging Prior to Sampling

Purging of monitoring wells is performed to evacuate water that has been stagnant in the monitoring well and may not be representative of the aquifer. Purging will be accomplished using a Teflon bailer or a pump. The temperature, pH, specific conductivity, and turbidity will be measured and recorded on the monitoring well sampling form after removing each well volume during purging.

Groundwater sampling methods for the on-site monitoring wells will follow protocols presented in the *Final Sampling and Analysis Plan* (SAP) (Earth Tech, 1994) that was prepared for the remedial investigation (RI) conducted at AFP 59 and the *USEPA RCRA Ground-Water Monitoring Technical Enforcement Guidance Document* (USEPA, 1986). The only change to the referenced protocols will be the calculation of the WBV. Under the referenced protocols, a WBV was calculated using the diameter of the auger/drill rod used to drill the borehole (in this case 8 inches). Under the revised protocol, the monitoring well casing diameter will be used to calculate the WBV.

Micropurge is an acceptable procedure to use for AFCEE projects. Micropurge will be utilized for off-site monitoring wells. Micropurge is a low flow-rate monitoring well purging and sampling method that induces laminar (non-turbulent) flow in the immediate vicinity of the sampling pump intake, thus drawing groundwater directly from the sampled aquifer horizontally through the monitoring well screen and into the sampling device. Low-flow pumping rates associated with the micropurge technique are in the approximate range of 0.2 to 0.5 liters per minute (L/min). These low-flow rates minimize disturbance in the screened aquifer, resulting in: (1) minimal production of artificial turbidity and oxidation, (2) minimal mixing of chemically distinct zones, (3) minimal loss of VOCs, and (4) collection of representative samples while minimizing purge volume.

2.4.1.2 Sample Collection

Except as noted below, at least three well volumes will be removed from the monitoring well before it is sampled or parameters are stable if the micropurge procedure is used. The sample may be collected after the temperature, pH, and specific conductivity have stabilized. Stabilization will be defined as follows: temperature ± 0.5 ^{o}C, pH ± 0.1 units, specific conductivity ± 3 percent, oxidation-reduction potential ± 10 millivolts, and turbidity ± 10 NTUs. Field equipment will be calibrated in accordance with *Final Soil Vapor Study and LTM Work Plan* (Earth Tech, 2006).

Micropurge sampling will use bladder pumps (or equivalent). Samples to be analyzed for volatile or gaseous constituents will not be withdrawn with pumps or at flows that degas the samples. Water

quality indicators will be monitored during micropurge (turbidity, dissolved oxygen, specific conductance, temperature, etc.).

Before collecting groundwater samples, the sampler will put on clean, phthalate-free protective gloves. Samples to be analyzed for volatile or gaseous constituents will not be withdrawn with pumps that exert a vacuum on the sample (e.g., centrifugal). New polypropylene tubing will be used for each well to prevent cross contamination. The preservative hydrochloric acid will be added to the VOC sample bottle before introducing the sample water. The sample will be collected from the pump tubing using a slow, controlled pour down the side of a tilted sample vial to minimize volatilization. The sample vial will be filled until a meniscus is visible and immediately sealed. When the bottle is capped, it will be inverted and gently tapped to ensure air bubbles are not present in the vial. Vials with trapped air will be refilled until bubbles are not present. After the containers are sealed, sample degassing may cause bubbles to form. These bubbles will be left in the container. These samples will never be composited, homogenized, or filtered.

2.4.2 Utility Clearance

All locations within the facility where intrusive activities occur will be cleared for utilities. Dig Safely New York and affected private utility companies will be notified of Earth Tech's work plans and as such, will identify their utilities to the point at which BAE assumes ownership. BAE facility personnel will mark utilities at the point where BAE assumes private ownership. Based on conversations with facilities personnel, BAE owns all of the affected utilities and will mark all of the affected utilities.

2.4.3 Site Personnel

Table 2-3 lists anticipated project personnel.

Table 2-3
Personnel Responsibilities

Title	Name
BAE Systems Coordinator	Paul Smetana/Tom Tokos
ASC Project Manager	George Walters, ASC
AFCEE Project Manager	Kristi Doll, AFCEE
Earth Tech Project Manager	Dave Parse, Earth Tech
Earth Tech Site Manager	Walt Gee, Earth Tech
Analytical Laboratory-Soil Gas	Centek Laboratories, LLC
Analytical Laboratory-Groundwater	Kemron Environmental Services
Health and Safety Professional	George Sauer, Earth Tech
Site Health and Safety Professional	Walt Gee, Earth Tech

2.5 SCHEDULE

The tentative start date for LTM groundwater activities and soil-gas investigation fieldwork is June 10, 2008. It is anticipated that first phase of field activities will last approximately 1 week. The second phase of field activities will last approximately 4 days and be conducted in November 2008. Laboratory data will take approximately 3 to 4 weeks for analysis following submission to the laboratory, and then the data will be validated. The *LTM Activities and Soil Gas Investigation Data Report* will be submitted to the NYSDEC and NYSDOH for review once all field activities have been conducted. A final report will then be submitted after the agencies' comments have been incorporated. The project schedule is illustrated on Figure 2-2.

Figure 2-2.
AFP59 LTM and Soil-Gas Investigation Schedule

Task Name	May 2008					June 2008				July 2008					August 2008					September 2008					Oc
	04 21	04 28	05 05	05 12	05 19	05 26	06 02	06 09	06 16	06 23	06 30	07 07	07 14	07 21	07 28	08 04	08 11	08 18	08 25	09 01	09 08	09 15	09 22	09 29	10 06
Project Management																									
Project Management																									
Administration																									
Planning Documents (AFP59)																									
Draft																									
Review																									
Final																									
Field Investigation (Phase 1)																									
Mob/Demob																									
Groundwater/Soil-Gas Sampling																									
Field Investigation (Phase 2)																									
Mob/Demob																									
Groundwater Sampling																									
Off-Site Lab Analysis (Phase 1)																									
Off-Site Lab Analysis																									
Off-Site Lab Analysis (Phase 2)																									
Sample Analysis																									
Data Evaluation (AFP 59)																									
Data Review																									
ERPIMS																									
Document Preparation (AFP 59)																									
Reporting																									

Contract #F41624-08-D-8770
Task Order #0002

Task	Milestone	Rolled Up Split	External Tasks	Deadline
Split	Summary	Rolled Up Milestone	Project Summary	
Progress	Rolled Up Task	Rolled Up Progress	External Milestone	

3.0 PROJECT ORGANIZATION AND RESPONSIBILITY

Earth Tech will manage the field services including sample collection, data analysis, site characterization, and reporting. The project organization is shown on Figure 3-1. The following is a list of key Earth Tech personnel. Brief descriptions of their roles are provided below.

1. Program Manager – Ken Vinson – 703-549-8728
2. Project Manager – Dave Parse – 703-549-8728
3. Corporate Health and Safety Officer – Jim Brown – 804-515-8300
4. Project/Site Health and Safety Officer – Walt Gee – 703-549-8728
5. Project Quality Assurance Manager – Devon Chicoine – 703-549-8728
6. Subcontracts Administrator – Amy Harrington – 703-549-8728
7. Cost Administrator – Jan Moran – 703-549-8728

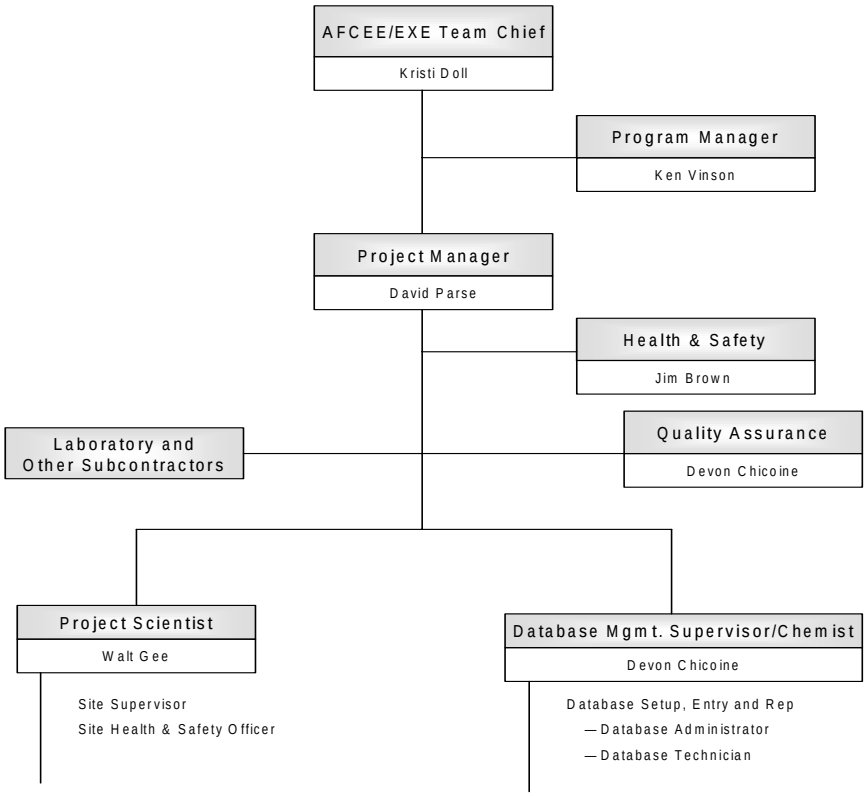
Program Manager. The Program Manager, Ken Vinson, is responsible for overall direction, coordination, technical consistency, and review of the entire contract. His responsibilities include:

1. Final approval and review of WPs, all project deliverables, schedules, contract changes, and labor allocations for each task.
2. Approval of budgets and schedules and any changes in budgets or schedules.
3. Ensuring availability of key personnel assigned to the project for the duration of the contract.
4. Overseeing coordination among management, field teams, and support personnel to ensure consistency of performance.
5. Communicating, as necessary, with the AFCEE Project Manager to evaluate the progress of the program and to facilitate the early resolution of any potential problem.
6. Frequent communication with the Project Manager to ensure that project objectives are being completed in a timely manner.

Project Manager. The Project Manager, Dave Parse, is responsible for the effective day-to-day management of all operations. His responsibilities include:

1. Review and approval of project deliverables including the WP and technical reports.
2. Review and approval of schedules, labor allocations, and sampling methods and QA plans, including chemical analysis parameters.
3. Management of all funds for labor and materials procurement.
4. Oversight of project subcontractors and coordination of all requisitions.
5. Establishment and enforcement of work element milestones to ensure timely completion of project objectives.
6. Communicating developments in the project to the Program Manager.

Figure 3-1
Project Organization Chart



7. Frequent communication with the AFCEE Project Manager with regard to day-to-day progress of the project.
8. Providing technical guidance to project staff.
9. Assisting in resolving nonconformance issues.

Corporate Health and Safety Officer. The Corporate Health and Safety Officer (CHSO), Jim Brown, is responsible for implementing the Corporate Health and Safety Program, reviewing and approving all project-specific *HASPs*, ensuring that all personnel have successfully completed health and safety training as necessary, conducting on-site health and safety inspections, providing health and safety advice and assistance to project teams, and advising the Program Manager. THE CHSO HAS THE AUTHORITY TO IMMEDIATELY STOP ALL WORK AT THE SITE FOR HEALTH AND SAFETY REASONS.

Project/Site Health and Safety Officer. The Project/Site Health and Safety Officer, Walt Gee, is responsible for implementing the Corporate Health and Safety Program, reviewing and monitoring compliance with the site-specific *HASP*, implementing corrective measures for site-specific health and safety deficiencies, ensuring required training and medical monitoring of project personnel, conducting kick-off and daily safety meetings, and maintaining health and safety records (daily logs, meeting sign-in sheets, and accident reports). THE PROJECT/SITE HEALTH AND SAFETY OFFICER HAS THE AUTHORITY TO IMMEDIATELY STOP ALL WORK AT THE SITE FOR HEALTH AND SAFETY REASONS. Specific responsibilities include:

1. Ensuring that all personnel allowed access to the site (including regulatory agency personnel) are aware of all potential hazards and current activities at the site.
2. Ensuring that all personnel are aware of and follow the provisions of this plan, and are instructed in the safety practices established in this plan, including emergency procedures.
3. Keeping BAE staff away from sample containers during sampling.
4. Ensuring that all heavy machinery and equipment are locked or chained each evening upon completion of daily activities.

Project Quality Assurance Manager. Devon Chicoine is designated as the Project QA Manager. She remains independent of the cost, scheduling, and other performance constraints that are the responsibility of the Program Manager and/or the Project Manager. The Project QA Manager's primary functions and responsibilities are to prepare, maintain, and verify compliance with the site-specific *SAP*; ensure that established laboratory and field procedures, as identified in the SAP, are being followed; ensure that QC documentation is provided; and ensure that all QA problems are handled in an expeditious manner. She is responsible for project activity audits to verify conformance with QA objectives, and for informing the Program Manager and the Project Manager of QA findings. The Project QA Manager will also be responsible for ensuring that all subcontractor activities are performed in accordance with QA requirements through review of subcontractor documents, laboratory data, and periodic audits. Final data review is also the responsibility of the Project QA Manager. She has the authority and responsibility to

identify problems, initiate or provide solutions, verify implementation of solutions, and order the stoppage of work, if necessary.

Subcontracts Administrator. The Subcontracts Administrator, Amy Harrington, will be responsible for proper procurement and execution of subcontractor agreements.

Subcontractors

Subcontractors will be needed to complete the LTM groundwater activities and soil-gas investigation project. The following is a complete listing of subcontractors that will be used on this project:

- Off-Site Laboratory Analysis (Soil Gas): Centek Laboratories
- Off-Site Laboratory Analysis (Groundwater): Kemron Environmental Services
- Off-Site Waste Disposal: Clean Harbors Environmental Services
- Surveying (Soil gas locations): Hulbert Engineering and Land Surveying

4.0 REPORTING REQUIREMENTS

The required project reporting deliverables are:

- *WP Addendu*m, including updated *HASP*;
- *LTM Groundwater Activities and Soil-gas Investigation Data Report*;
- ERPIMS Data Submission; and
- Progress Reports.

5.0 REFERENCES

Earth Tech, Inc. 1994. *Final Sampling and Analysis Plan.*

———. 2005. *Downgradient Soil-Gas Sampling, Air Force Plant 59, Letter Report*. January.

———. 2006. *Final Soil Vapor Study and Long-Term Monitoring Work Plan*. October.

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