FINAL
WORK PLAN

Vapor Intrusion Investigation, Monitoring Well Abandonment, Groundwater Monitoring, and Fire Suppression Reservoir Investigation
at
Air Force Plant 59
Johnson City, New York

Prepared for:

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

and

Wright Patterson Air Force Base
Fairborn, Ohio

Prepared by:

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Contract No. FA8903-08-D-8770
Task Order No. 0058

August 2009

PREFACE

This *Work Plan (WP)* was written by AECOM to describe the field activities associated with the vapor intrusion investigation, monitoring well abandonment, groundwater monitoring, and fire suppression reservoir investigation at the Air Force Plant 59 (AFP 59). The work will be conducted from July 2009 through August 2010. The work is to be completed under the Air Force Center for Engineering and the Environment (AFCEE) Contract No. FA8903-08-D-8770, Task Order No. 0058.

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14. ABSTRACT

This *WP* describes the field activities associated with the monitoring well abandonment, groundwater monitoring, and fire suppression reservoir investigation at AFP 59. The objectives of this study are: (1) to decommission eight off-site United States Geological Survey (USGS) monitoring wells; (2) to determine if groundwater contaminated with volatile organic compounds (VOCs) is exiting the AFP 59 property; (3) to further characterize 1,4-dioxane contamination in on- and off-site monitoring wells; and (4) to characterize soil, groundwater, and soil gas contamination in the fire suppression reservoir area.

15. SUBJECT TERMS
Vapor Intrusion, Well Abandonment, Groundwater Monitoring and Fire Suppression Reservoir, Air Force Plant 59

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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
CoC	Chain of Custody
DQO	Data Quality Objective
ERPIMS	Environmental Resources Program Information Management System
FSP	Field Sampling Plan
LTM	Long-Term Monitoring
µg/m^3	Micrograms per Cubic Meter
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PID	Photoionization Detector
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VOC	Volatile Organic Compounds
WP	Work Plan

1.0 INTRODUCTION

This *Work Plan (WP)* describes the procedures and techniques that will be used to conduct the vapor intrusion investigation, monitoring well abandonment, groundwater monitoring activities, and a subsurface investigation of the fire suppression reservoir area at Air Force Plant 59 (AFP 59) in Johnson City, New York. AECOM has prepared this *WP* under contract to the Air Force Center for Engineering and the Environment (AFCEE) as part of the requirements for Contract FA8903-08-D-8770, Task Order 0058. This *WP* contains proposed project scope and objectives, reporting requirements, and project schedule.

1.1 PROPOSED PROJECT ACTIVITIES

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

1. Preparation of this *WP* and other supporting documents.
2. Collection of indoor air, sub-slab air, outside air, air duct vapor, air duct sludge, intake air, soil, soil gas, and groundwater samples from inside AFP 59. Samples will be analyzed for volatile organic compounds (VOCs).
3. Collection of up to 15 geotechnical soil samples from the concrete floor at AFP 59.
4. Abandonment of eight United States Geological Survey (USGS) monitoring wells on properties in the vicinity of AFP 59.
5. One round of groundwater sampling of six on-site AFP 59 monitoring wells and five off-site monitoring wells. Samples will be analyzed for VOCs and 1,4-dioxane.
6. Collection of one groundwater sample at the Camden Street Well Field. The sample will be analyzed for 1,4-dioxane.
7. Collection of up to 70 soil samples and 35 groundwater and soil gas samples around the reservoir area to be analyzed for VOCs.
8. Preparation of a report presenting the data collected during the field investigation.

1.2 SUMMARY OF PREVIOUS INVESTIGATIONS

1.2.1 Indoor and Sub-slab Vapor

Based on the results from previous vapor intrusion investigations around the AFP 59 manufacturing building, the New York State Department of Environmental Conservation (NYSDEC) requested that a VI investigation be initiated for the manufacturing building at AFP 59 (Earth Tech, 2008). In January 2008, six co-located indoor air and sub-slab vapor samples were collected inside the AFP 59 manufacturing building. Based on the New York State Department of Health (NYDOH) *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH, 2006), five samples exceeded concentrations for monitoring and/or mitigation in the guidance matrices for four compounds (TCE, PCE, 1,1,1-TCA, and carbon tetrachloride). Based on the results, NYDEC and

NYDOH recommended further investigation be conducted to determine the extent of vapor intrusion inside AFP 59.

A screening level sub-slab investigation was conducted in July 2009 to determine the areas impacted beneath the concrete slab at AFP 59. A mobile laboratory was utilized to analyze grab samples for VOCs using USEPA Method 8265. A total of 109 sample locations were completed. Additional sampling locations may be added to fill data gaps. The sub-slab locations will be samples along with indoor air samples to evaluate vapor intrusion conditions at AFP 59. See Figure 1-1 for the co-located sample locations completed during the Screening Level Sub-slab Investigation.

Geotechnical samples will be collected from beneath the concrete floor in order to complete a possible feasibility study of remedial options.

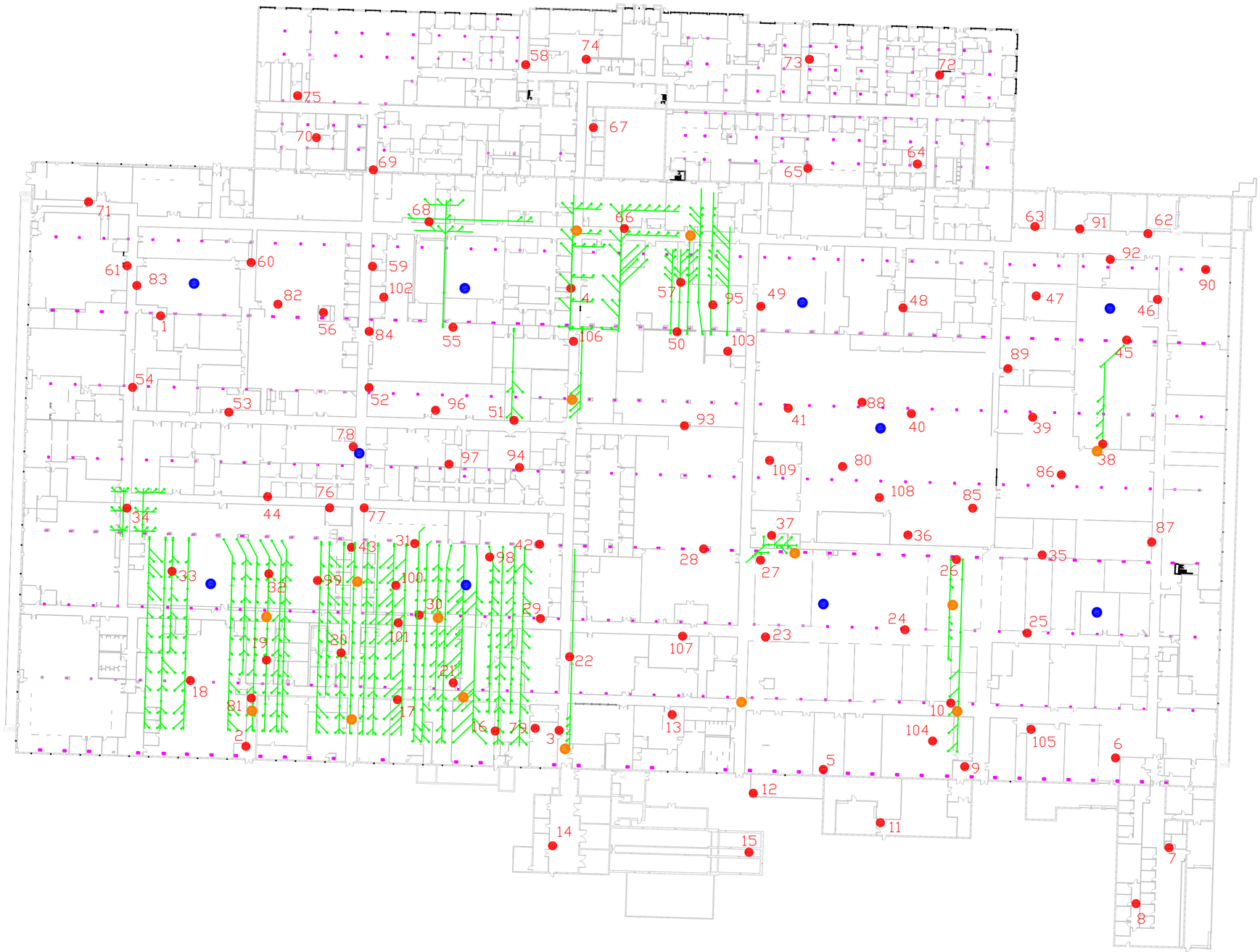
1.2.2 Groundwater

Based on the conclusions presented in the *Final Remedial Investigation Report* (Earth Tech, 1996) and recommendations made by the NYSDEC, it was determined that VOCs represent the only chemicals of potential concern in groundwater at AFP 59. As a result, the *Record of Decision* (Earth Tech, 1999b) for AFP 59 describes the remedial alternative (i.e., the upgrade of the Camden Street Well Field groundwater treatment system) chosen as most appropriate for treating the VOCs in groundwater at AFP 59. As part of the requirements defined in the *Record of Decision* (Earth Tech, 1999b), a long-term monitoring (LTM) program was established for AFP 59. The LTM program, which is defined in the April 27, 1999 letter to the NYSDEC (Earth Tech, 1999a), was concluded with the November 2004 sampling event. The LTM included sampling monitoring wells SW1, DW1, SW3, DW3, SW4, and SW7. Monitoring wells SW1 and DW1 represent upgradient (background) wells, and monitoring wells SW3, DW3, SW4, and SW7 represent downgradient wells. Monitoring wells SW4 and SW7 have historically had the highest concentrations of VOCs.

A soil pile containing trichloroethene contamination in the East Basement of the AFP 59 facility was excavated and removed in July 2005. The soil pile was upgradient of monitoring wells SW3, DW3, SW4, and SW7. Three rounds of groundwater monitoring have been conducted to observe the effect of removal action might have on groundwater concentrations of VOCs.

Based on the results of the previous LTM and groundwater monitoring activities, groundwater exceeding the New York State Drinking Water Standards for TCA, 1-1, DCA, and cis-1,2-DCE is migrating off of AFP 59 property with concentrations observed in offsite in the deep monitoring wells. Refer to Figure 1-2 for results of the 2008 groundwater monitoring activities. Additional groundwater monitoring was recommended in the *LTM Activities and Soil Gas Investigation at AFP 59* (Earth Tech AECOM, 2009) to monitor the migration of contaminants offsite.

Based on the 1,4-dioxane results from the June 2008 groundwater monitoring event, one sample will be collected from the Camden Street Well Field and analyzed for 1,4-dioxane.



LEGEND

- Sub-slab Air Duct System
- Sub-slab Vapor Monitoring Point
- Air Duct Sample Point
- Air Intake Sample Point

0' 35' 70' 140'

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AIR FORCE PLANT 59 VAPOR INTRUSION INVESTIGATION

Co-located Indoor Air and Sub-Slab Vapor & Air Duct and Air Intake Sampling Locations Johnson City, New York

Air Force Center for Engineering and the Environment
3300 Sidney Brooks, Brooks City-Base, TX 78235-5112

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
SL_Sample_Locs_field.dwg	WFG	111886	07/09	1-1

Plotted By: walt.gee
Plot File Date Created: Aug/14/2009 5:41 PM
Layout—Sheet Name: FULL
Filename: P:\PROJECTS\AFP59\111886 VAPOR INTRUSION STUDY\REPORTS\FIGURES\SL_SAMPLE_LOCS_FIELD.DWG

URS_5S

URS_9S

DAYTON STREET

CAMDEN STREET

BERWIN STREET

AVON STREET

MAIN STREET

MAIN ENTRANCE

RAMP TO 201

BASE-MENT

SW1
DW1

DW1	CONCENTRATION (µg/L)	
ANALYTE	Jun 08	Nov 08
VOCs not detected above method detection limits		NS
1,4-Dioxane	NS	NS

SW1	CONCENTRATION (µg/L)	
ANALYTE	Jun 08	Nov 08
VOCs not detected above method detection limits		NS
1,4-Dioxane	ND	NS

URS-2S	CONCENTRATION (µg/L)	
ANALYTE	Jun 08	Nov 08
1,1,1-Trichloroethane	2.25	NS
1,1-Dichloroethane	0.585 J	NS
cis-1,2-Dichloroethene	0.996 J	NS
Trichloroethene	2.22	NS

URS-2D	CONCENTRATION (µg/L)	
ANALYTE	Jun 08	Nov 08
1,1-Dichloroethane	0.239 J	NS
cis-1,2-Dichloroethene	71.9	NS
Vinyl Chloride	0.354 J	NS

SW7	CONCENTRATION (µg/L)	
ANALYTE	Jun 08	Nov 08
1,1,1-Trichloroethane	2.5	1.88
1,1-Dichloroethane	1.59	5.04
cis-1,2-Dichloroethene	6.34	35.3 M
Tetrachloroethene	0.843 J	0.59 J
trans-1,2-Dichloroethene	ND	0.302 J
Trichloroethene	2.94	8.15
Vinyl Chloride	ND	1.21 M
1,4-Dioxane	4.66	NS

URS_2S

URS_2D

ELBON STREET

URS_8I

SW3 DW3

SW7

SW4

JC3

JC2

JC1

SW3	CONCENTRATION (µg/L)	
ANALYTE	Jun 08	Nov 08
1,1,1-Trichloroethane	0.661 J	0.345 J
1,1-Dichloroethane	0.403 J	ND
cis-1,2-Dichloroethene	1.45	ND
Trichloroethene	1.31	0.759 J
1,4-Dioxane	ND	NS

SW4	CONCENTRATION (µg/L)	
ANALYTE	Jun 08	Nov 08
1,1,1-Trichloroethane	2.98	0.513 J
1,1-Dichloroethane	1.51	0.825 J
1,1-Dichloroethene	0.751 J	ND
cis-1,2-Dichloroethene	4.35	2.38
Tetrachloroethene	0.965 J	0.305 J
trans-1,2-Dichloroethene	ND	0.364 J
Trichloroethene	17.8	12.7
1,4-Dioxane	8.18	NS

DW3	CONCENTRATION (µg/L)	
ANALYTE	Jun 08	Nov 08
1,1-Dichloroethane	ND	0.41 J
cis-1,2-Dichloroethene	73.1	67.3
trans-1,2-Dichloroethene	ND	1.18
1,4-Dioxane	14.3	NS

LEGEND:

- LTM Monitoring Well 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

NORTH

Approximate Scale in Feet

150' 75' 0 150'

NOTES:
ND = Analyte not detected above laboratory method detection limits.
NS = Monitoring Well not sampled during event.
J = The analyte was positively detected, but the quantitation is an estimation.
M = Matrix Effect. The analyte concentration was estimated due to a matrix effect and therefore estimated.
- Highlighted values indicate concentrations above New York State Drinking Water Standards.

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AIR FORCE PLANT 59 VAPOR INTRUSION INVESTIGATION

Groundwater Sampling Results
June and November 2008
Johnson City, New York

Air Force Center for Engineering and the Environment
3300 Sidney Brooks, Brooks City-Base, Texas 78235

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
SampleResults.dwg	WFG	111886	07/09	1-2

Plotted By: walt.gee
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Plot File Date Created: Jul/30/2009 12:04 PM

Filename: P:\PROJECTS\AFP59\111886 VAPOR INTRUSION STUDY\REPORTS\FIGURES\SAMPLERESULTS.DWG

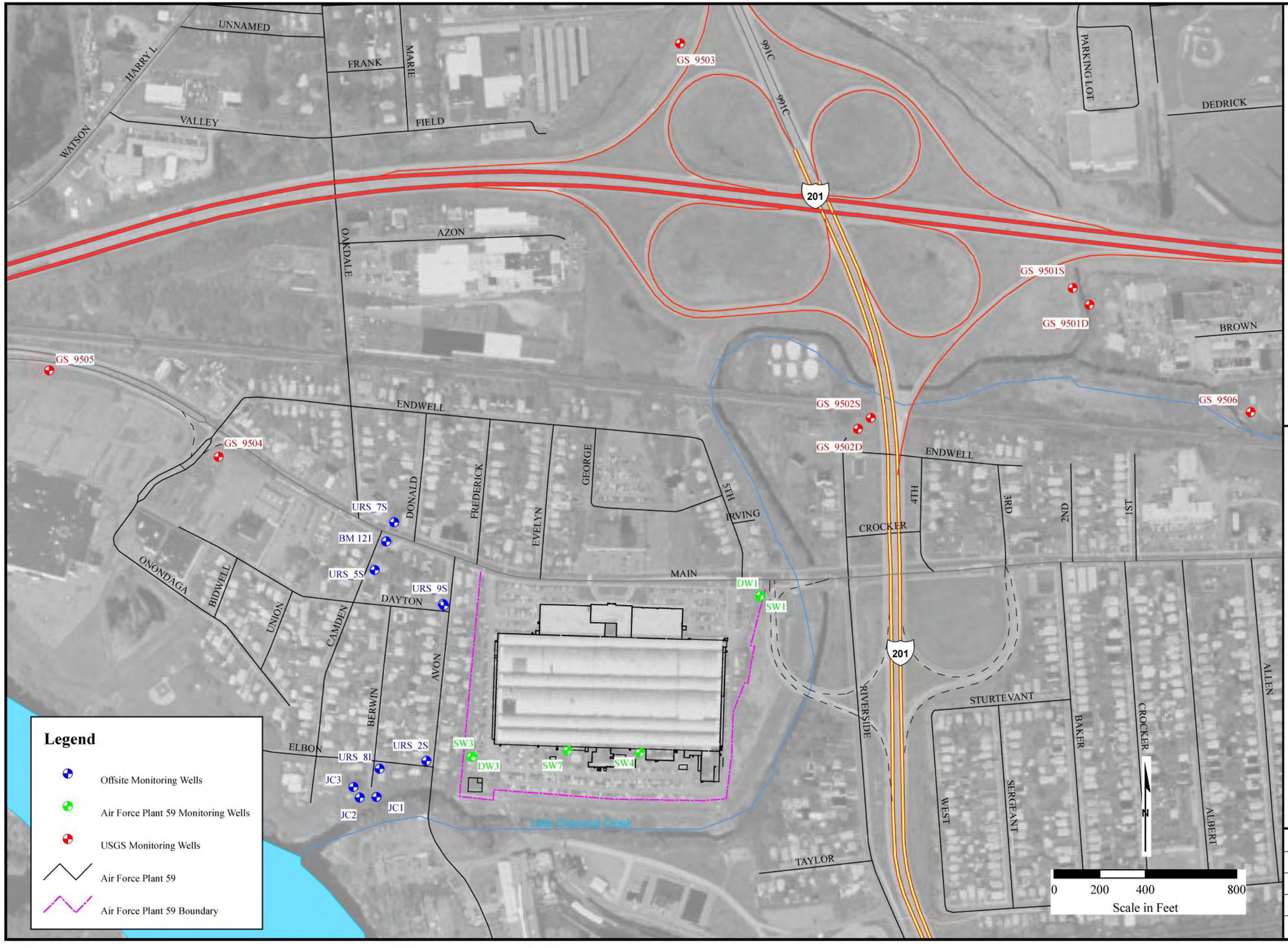
1.2.3 Soil Vapor

A soil gas investigation was conducted in 2004 and elevated concentrations of chlorinated hydrocarbons were detected. In October/November 2006, one round of soil-gas sampling was conducted to determine the nature and extent of potential soil gas contamination, and identify a possible correlation between groundwater and soil gas contamination. Groundwater and soil gas samples were analyzed for VOCs. The soil gas data indicated that the low-level groundwater contaminant plume associated with the AFP 59 manufacturing facility was not the source of the soil gas contamination on-site. The NYSDEC requested additional soil-gas sampling on the western side of AFP 59 to address data gaps.

In 2008, Earth Tech AECOM conducted a more comprehensive vapor intrusion investigation per recommendations from the NYSDEC and New York State Department of Health (NYSDOH). This investigation is documented in the *LTM Activities and Soil Gas Investigation at AFP 59* letter report dated March 19, 2009. Recommendations from the report include additional soil-gas sampling around the fire suppression reservoir.

1.2.4 United States Geologic Survey Monitoring Well Program

The USGS, in cooperation with the United States Air Force (USAF), installed eight monitoring wells in April 1995 in conjunction with an investigation of the hydrogeology and water quality of the Camden Street-Ballpark aquifer near Johnson City, New York. Refer to Figure 1-3 for the locations for the USGS monitoring wells. In 2008, as part of the ongoing groundwater monitoring and soil gas investigation at AFP 59, AECOM inspected and sampled eight USGS monitoring wells. As part of the site closure activities for AFP 59, AECOM evaluated the purpose for the eight USGS monitoring wells in the groundwater sampling program for the site and concluded the USGS monitoring wells were no longer needed.



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Air Force Plant 59 Vapor Intrusion Investigation

FIGURE 1-3

AFP 59 USGS Monitoring Well Locations
Johnson City, New York

CONTRACT NO F41624-08-D-8770	TASK NO DO 0058
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

2.0 PROJECT SCOPE AND OBJECTIVES

2.1 OBJECTIVES

The objectives of the current study are to evaluate vapor intrusion inside the AFP 59 building, abandon eight USGS monitoring wells, collect one additional round of groundwater samples from six on-site and five off-site monitoring wells, and to further investigate the fire suppression reservoir area.

2.1.1 Data Quality 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 vapor intrusion investigation, groundwater monitoring activities and subsurface investigation of the reservoir area at AFP 59 are detailed in the *Guidance for the DQO Process, United States Environmental Protection Agency (USEPA) QA/G-4* (USEPA, 1994a) and the NYSDEC Division of Environmental Remediation *Draft Technical Guidance for Site Investigation and Remediation* (NYSDEC, 2002).

DQOs are determined based on the end use(s) of the data. For the indoor vapor samples, the primary objective is to determine the impact of subsurface vapors to the indoor air quality. For the eight USGS monitoring wells, the monitoring wells are no longer needed in the groundwater monitoring program, and therefore need to be abandoned. For the groundwater monitoring activities, the primary objective is to monitor off-site migration of VOCs and determine if 1,4-dioxane is an emerging contaminant at AFP 59. For the subsurface reservoir investigation, the primary objective will be to characterize the nature and extent of VOC contamination around the fire suppression reservoir area.

The DQO process for the USGS monitoring well abandonment, groundwater monitoring activities, and subsurface reservoir investigation are presented below. The discussion provides a step-by-step description of the development of DQOs and rationale for the USGS monitoring well abandonment, groundwater monitoring activities, and subsurface reservoir investigation.

1. **Problem.** Six co-located indoor air and sub-slab vapor samples exceeded the NYDOH guidance values requiring monitoring and/or mitigation according to the *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH, 2006).

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

   Previous LTM and groundwater monitoring activities have identified that contamination is migrating off-site at AFP 59. Based on groundwater monitoring activities in June 2008, 1,4-dioxane has been identified as an emerging contaminant.

VOC contamination has been confirmed in the area around the fire suppression reservoir; however, limited information is available. Additional data is needed to characterize the nature and extent of contamination in this area.

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 vapor intrusion investigation includes the manufacturing building at AFP 59. Groundwater sampling includes six on-site monitoring wells, which have been sampled over the course of the AFP 59 LTM and groundwater monitoring program. Five off-site downgradient monitoring wells will be sampled to determine the extent of migration of groundwater contamination. Soil, groundwater, and soil gas will be sampled at up to 35 locations around the fire suppression reservoir within the AFP 59 boundary.

3. **Sampling Approach.** Screening data are collected to provide preliminary field data, qualitatively evaluate the nature and extent of contamination, 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 level data.

   Co-located indoor air and sub-slab vapor samples will be collected from the existing 109 sample locations. Additional sample locations will be installed and sampled to fill data gaps from the screening level sub-slab investigation. Deeper soil-gas sample locations will be installed from up to 15 locations to evaluate deeper vapor intrusion sources. Upwind air samples will be collected to address background vapor concentrations. Samples from the HVAC air intakes will be collected to determine the contribution of contaminants from outside air. Sludge and vapor samples will be collected from sub-slab utilities to evaluate potential sources and preferential pathways for vapor intrusion. The data will be used to determine the impact of vapors to the AFP 59 building. The vapor samples will be analyzed for VOCs by USEPA Method TO-15. The soil, groundwater, and sludge samples will be analyzed for VOCs by USEPA Method 8260B.

   Eight existing off-site USGS monitoring wells will be decommissioned.

   One round of groundwater samples will be collected from six existing onsite monitoring wells, including two monitoring wells screened in the deep aquifer and four monitoring wells screened in the shallow aquifer. One round of groundwater samples will be collected from five existing off-site downgradient monitoring wells. The groundwater samples will be sent to a fixed laboratory to obtain definitive data. Definitive data will be produced using standard methods in a fixed laboratory. The data will be used to determine if contamination is migrating off site and to determine if 1,4-dioxane is an emerging contaminate at AFP 59. The groundwater samples will be analyzed for VOCs using USEPA Method SW8260B and for 1,4-dioxane using USEPA Method SW8270C.

   One round of soil, groundwater, and soil gas samples will be collected from up to 35 direct push locations. The samples will be sent to a fixed laboratory to obtain definitive data. Definitive data will be produced using standard methods in a fixed laboratory. The data will be used to characterize the contamination in the area of the fire suppression reservoir. Definitive data will be generated in accordance with the project-

specific *Quality Assurance Project Plan (QAPP)*. The soil, groundwater, and soil gas samples collected for the fire suppression reservoir investigation will be analyzed for VOCs using USEPA Method SW8260B (soil and groundwater) and USEPA Method TO-15 (soil gas).

2.2 SAMPLE ANALYSIS SUMMARY

The proposed laboratory analyses for the indoor air, sub-slab gas, soil, soil gas, and groundwater samples are based on the types of chemicals used at AFP 59 and the chemicals previously detected in 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.

The soil and groundwater samples will be analyzed for VOCs by USEPA Method SW8260B. The indoor air, sub-slab gas, and soil gas samples will be analyzed for VOCs by USEPA Method TO-15. Groundwater samples from existing monitoring wells will be analyzed for 1,4-dioxane by Method SW8270C. The air duct samples will be analyzed for VOCs by USEPA Method SW8260B, semi-volatile organic compounds (SVOCs) by USEPA Method SW8270C, polychlorinated biphenyls (PCBs) by USEPA Method 8082, total metals by USEPA Method SW6010B, and mercury by USEPA Method SW7471A. The samples will be analyzed at an off-site laboratory.

Soil QA/QC samples will be collected as described in the project-specific *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 soil sampling location that represents a target frequency of approximately 10 percent of project samples and analyzed using an off-site laboratory.
- Equipment Blanks – One equipment blank will be collected during sampling event.
- Matrix Spike/Matrix Spike Duplicate (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 and analyzed using an off-site laboratory.

Soil gas, indoor air, and sub-slab vapor QA/QC samples will be collected as described in the project-specific *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 and analyzed using 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
Vapor Intrusion Investigations								
TO-15	Indoor Air	109	0	0	0	10	6	125
TO-15	Sub-slab Vapor	109	0	0	0	10	6	125
TO-15	Outside Air	3	0	0	0	0	0	3
TO-15	Air Intake	10	0	0	0	1	1	12
TO-15	Soil Gas	30	0	0	0	3	2	35
TO-15	Utility Vapor	15	0	0	0	1	1	17
8260B	Ground-water	15	1	1	2	2	1	22
8260B	Soil	15	0	0	2	2	1	20
8260B	Utility Sludge	15	0	0	2	2	1	20
8270C	Utility Sludge	15	0	0	0	2	1	18
8082	Utility Sludge	15	0	0	0	2	1	18
6010B/ 7471A	Utility Sludge	15	0	0	0	2	1	18
ASTM D4318-05	Soil	15	0	0	0	0	0	15
ASTM D7100-06	Soil	15	0	0	0	0	0	15
ASTM D3017/D5220/D2216-92	Soil	15	0	0	0	0	0	15
ASTM D2435/ D4546	Soil	15	0	0	0	0	0	15
ASTM D422-63	Soil	15	0	0	0	0	0	15
D6539-00	Soil	15	0	0	0	0	0	15
ASTM D7263-09	Soil	15	0	0	0	0	0	15

Table 2-1
Sample Analysis Summary (Continued)

Method	Matrix	# Samples	# Equipment Blanks	# Ambient Blanks	# Trip Blanks	# Field Duplicates	# MS/MSD Samples	Total # Samples
Vapor Intrusion Investigations								
D854-06	Soil	15	0	0	0	0	0	15
ASTM 6836-02	Soil	15	0	0	0	0	0	15
Groundwater Monitoring								
8260B	Ground-water	12	1	1	2	2	1	19
8270C	Ground-water	12	1	0	0	2	1	16
Fire Suppression Reservoir Investigation								
8260B	Soil	70	0	0	0	7	4	81
TO-15	Soil Gas	35	0	0	0	4	2	41
TO-15	Outside Air	5	0	0	0	0	0	5
8260B	Ground-water	35	3	1	5	4	2	50

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

Notes: Soil samples will be collected at up to two depths at one location (4 feet and 8 feet below ground surface [bgs]).

Equipment blanks will be collected for soil sampling equipment (VOCs), monitoring well pump (VOCs and 1,4-dioxane), and direct push groundwater probe (VOCs only).

An ambient blank will be collected once during monitoring well sampling, once during soil sampling, and once during soil-gas sampling.

- 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.
- Duplicate Samples – One duplicate will be collected from a canister sampling location that represents a target frequency of approximately 10 percent of project samples and analyzed using an off-site laboratory.
- MS/MSD – One MS/MSD sample will be collected from a canister sampling location that represents a target frequency of approximately five percent of project samples and analyzed using an off-site laboratory.
- The analytical laboratory is Environmental Laboratory Accreditation Program certified.
- Regulators shall collect a representative air sample at a flow rate that is <200 milliliters per minute.
- A specified sample volume suitable to obtain the report limits specified on Table 2-2.

Soil, soil gas, sludge, and 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 during monitoring well sampling.
- Duplicate Samples – One duplicate will be collected from a groundwater sampling location that represents a target frequency of approximately 10 percent of project samples and analyzed using an off-site laboratory.
- Equipment Blanks – One equipment blank will be collected from monitoring well sampling equipment and from direct push groundwater sampling equipment.
- MS/MSD – One MS/MSD sample will be collected from a groundwater sampling location that represents a target frequency of approximately five percent of project samples and analyzed using an off-site laboratory.

Soil, soil gas, and groundwater duplicate and MS/MSD sample identification codes are described in their respective sections below. An example identification code for QA/QC samples not related to sampling location (trip blanks, ambient blanks and equipment blanks) follows:

- **Trip Blanks** = TBMMDDYY; if more than one trip blank is required in one day, an A or B will be used to distinguish.
- **Ambient Blanks** = ABMMDDYY; if more than one ambient blank is required in one day, an A or B will be used to distinguish and a note will be made in the logbook and

chain of custody (CoC) describing location and conditions that warranted collection of second sample.

- **Equipment Blanks** = EBMMDDYY; if more than one equipment blank is required in one day, an A, B, C, etc., will be used to distinguish and a note will be made in the logbook and CoC to describe the equipment sampled.

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

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

3.0 PROJECT TASKS

This section describes all the required tasks to be completed during this event, including field and laboratory activities.

3.1 FIELD INVESTIGATION TASKS

The objectives of the vapor intrusion investigation, monitoring well abandonment, groundwater monitoring, and fire suppression reservoir investigation will be achieved through the field investigation, which will include the following activities: (1) mobilization to and from the site by AECOM personnel and subcontractors; (2) collection of 109 co-located indoor air and sub-slab vapor samples, up to 15 groundwater samples, and up to 30 soil from four and eight foot bgs from the AFP 59 manufacturing building; (3) collection of up to 15 geotechnical samples for future evaluation of remedial options; (4) abandonment of eight USGS monitoring wells; (5) collection of groundwater samples from 11 on- and off-site monitoring wells; (6) collection of up to 35 soil gas and groundwater samples, and 70 soil samples around the fire suppression reservoir; (7) collection of up to 15 vapor and sludge samples from within the sub-slab utility ducts; (8) surveying of the direct push sample locations; and (9) off-site laboratory analysis of the collected samples. A brief description of each field activity is provided in the following sections.

3.1.1 Mobilization

Fieldwork for the vapor intrusion investigation, monitoring well abandonment, groundwater monitoring, and fire suppression reservoir investigation will be conducted in two field mobilizations. Activities associated with the initiation of the field investigation (e.g., securing identification badges and vehicle passes, and identifying and staging areas for equipment) will be coordinated with the facility point-of-contact.

3.1.2 Indoor Vapor Intrusion Sampling

The first objective of the field investigation is to evaluate the vapor intrusion potential inside the AFP 59 building.

Co-located Indoor Air and Sub-slab Vapor Sampling

The sample locations completed during the Screening Level Sub-slab investigation and additional data gap sampling locations will be sampled. Deeper soil gas locations will be completed to 4 and 8 feet bgs to evaluate deeper sources that may contribute to vapor intrusion. Outside air samples will be collected to determine background concentrations of contaminants. Air intake samples will be collected to determine the contribution of outdoor air contaminants to the indoor air.

Soil and Groundwater Sampling

Soil and groundwater samples will be collected using the procedures found in Section 5.0 of the *FSP*. Up to 15 groundwater samples and 30 soil samples will be collected and analyzed at a fixed, offsite laboratory for VOCs using USEPA Method SW8260B. The soil and groundwater samples will be determined based on the results of the Screening Level Sub-slab Investigation and the location of sub-slab utilities.

Utility Sampling

Sludge and vapor samples will be collected from up to 15 locations within the AFP 59 building. The sludge and vapor samples will be used to determine sources within the sub-slab utility system, and whether the utility system serves as a preferential pathway for vapors. The utility sludge and vapor samples will be collected using the procedures found in Section 5.0 of the *FSP*. The utility sample locations will be determined based on access to the sub-slab utilities.

Geotechnical Soil Sampling

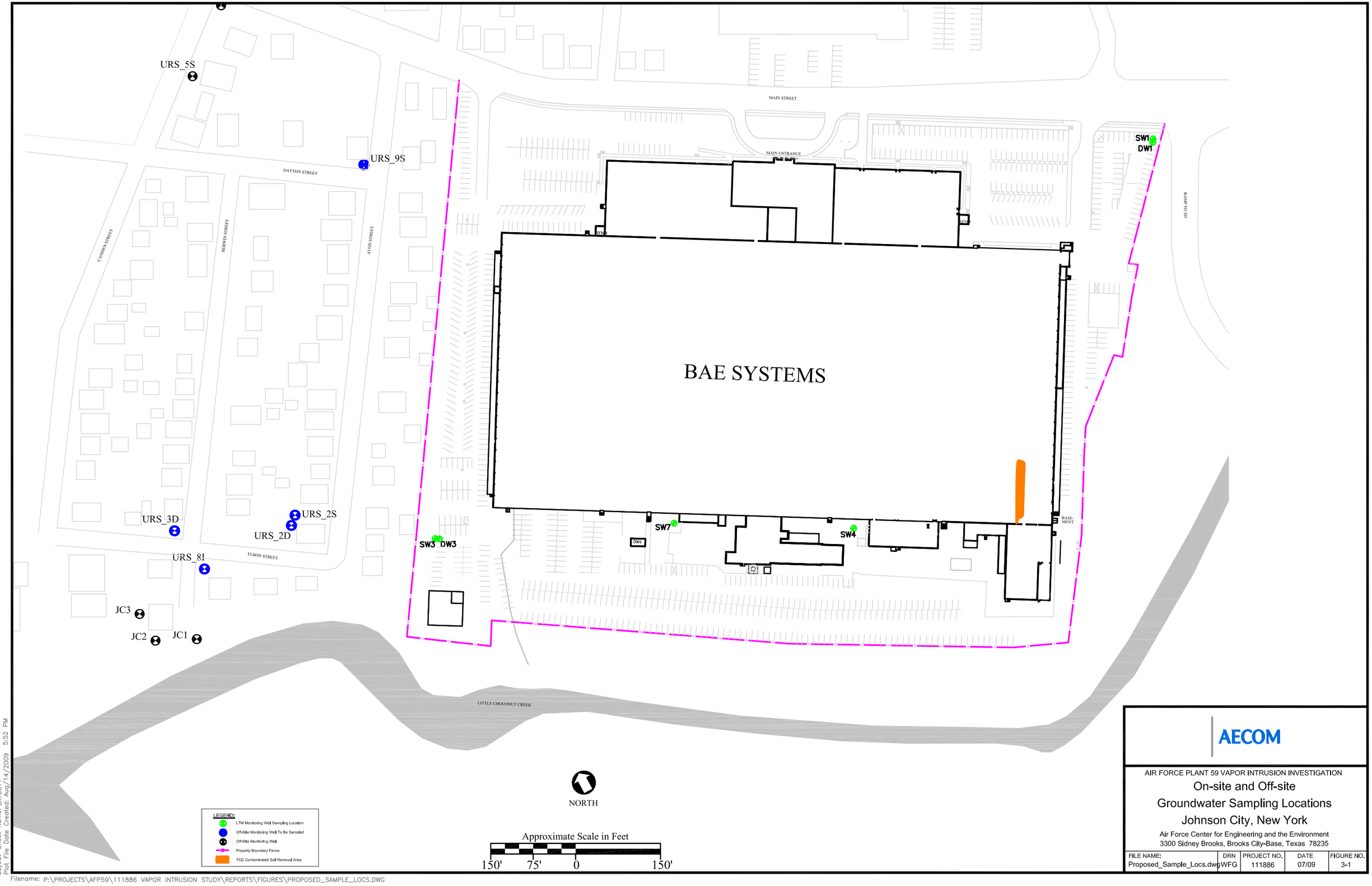
Geotechnical samples will be collected from up to 15 locations within the AFP 59 building. The geotechnical information will be used to evaluate remedial options once the vapor intrusion potential has been determined. Geotechnical soil samples will be collected using the procedures found in Section 5.0 of the *FSP*. The geotechnical samples will be analyzed for Atterberg Limits (plasticity) using ASTM D4318-05, hydraulic conductivity using ASTM D7100-06, soil moisture content (saturation) using ASTM D3017/D5220/D2216-92, Oedometer Test using ASTM D2435/D4546, particle size analysis using ASTM D422-63, air phase permeability (core scale) using ASTM D6539-00, density using ASTM D7263-09, dry bulk density using ASTM D854-06, and soil moisture retention using ASTM 6836-02.

3.1.3 United States Geological Survey Monitoring Well Abandonment

The second objective of the field investigation is to abandon the USGS monitoring wells. The monitoring well abandonment activities will be in accordance with applicable State of New York requirements. A State of New York licensed/registered driller will supervise the abandonment of the monitoring wells, and complete and file necessary monitoring well abandonment records with the State of New York. Figure 1-3 shows the locations of the USGS monitoring wells to be abandoned. Procedures for the monitoring well abandonment are described in Section 5.0 of the AFP 59 *Field Sampling Plan (FSP).*

3.1.4 Monitoring Well Groundwater Sampling

The third objective of the field investigation is to collect groundwater samples from six on-site and five off-site monitoring wells. The following on-site monitoring wells will be sampled: SW1, DW1, SW3, DW3, SW4, and SW7. The off-site monitoring wells will be chosen based on the proximity to the AFP 59 groundwater plume and the ability to locate the monitoring wells in the neighborhood adjacent to AFP 59. Tentatively, the following off-site monitoring wells will be sampled: URS-_2S, URS_2D, URS_3D, URS_8I, and URS_9S. Groundwater samples will be analyzed for VOCs by USEPA Method SW8260B and 1,4-dioxane by USEPA Method SW8270C at an off-site (fixed), AFCEE-approved laboratory equipped with a gas chromatograph/mass spectrometer. Figure 3-1 shows the location of the monitoring wells to be sampled. The number of samples, duplicates, and field blanks to be collected from the monitoring wells is shown in Table 2-1. Procedures for the groundwater sampling are described in Section 5.0 of the AFP 59 FSP.



AECOM

AIR FORCE PLANT 59 VAPOR INTRUSION INVESTIGATION

On-site and Off-site Groundwater Sampling Locations Johnson City, New York

Air Force Center for Engineering and the Environment
3300 Sidney Brooks, Brooks City-Base, Texas 78235

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
Proposed_Sample_Locs.dwg	WFG	111886	07/09	3-1

Plotted By: walt.gee
Layout-Sheet Name: LAYOUT1
Plot File Date Created: Aug/14/2009 5:52 PM

Filename: P:\PROJECTS\AFP59\111886 VAPOR INTRUSION STUDY\REPORTS\FIGURES\PROPOSED_SAMPLE_LOCS.DWG

3.1.5 Direct Push Soil, Soil-Gas and Groundwater Sampling

The fourth objective of the field investigation will be to collect soil, soil gas, and groundwater samples at up to 35 locations from areas adjacent to the fire suppression reservoir. Refer to Figure 3-2 for sample locations. Soil gas samples will be collected using direct push technology from approximately 4 feet bgs. Soil gas samples will be collected using procedures found in the *FSP* in Section 5.0. Temporary direct push monitoring wells will be installed and sampled into the confining unit of the groundwater aquifer. The direct push monitoring well locations will be located adjacent to the fire suppression reservoir. Each direct push monitoring well will be completed using the procedures found in the *FSP* in Section 5.0. During drilling activities, two soil samples will be collected. Two soil samples will be collected from each boring. The soil samples will be collected based on visual staining, PID readings, and professional judgment. The soil samples will be collected using the procedures found in the *FSP* in Section 5.0. One groundwater sample will be collected from the temporary monitoring well once a sufficient sample volume accumulates in the monitoring well. The groundwater sample will be collected using the procedures found in the *FSP* in Section 5.0. Once a groundwater sample is collected from the temporary monitoring wells, the monitoring well casing and screen will be removed and the borehole abandoned using the procedures found in the *FSP* in Section 5.0.

3.1.6 Waste Containment

The investigation-derived waste (if applicable) will be segregated at each location according to matrix (solid or liquid) and as to how it was derived (drill cuttings, drilling fluid, etc.). Drill cuttings will be containerized in 55-gallon Department of Transportation-approved drums, which will be transported to the staging area upon completion of work at the abandonment site or at the end of the day. Material excavated for the purpose of locating buried wells will be used to backfill excavated areas.

3.2 SITE PERSONNEL

Table 3-2 lists anticipated project personnel.

Table 3-2
Personnel Responsibilities

Title	Name
BAE Systems Coordinator	Stacey Whallon/Tom Tokos
ASC Project Manager	George Walters, ASC
AFCEE Project Manager	Eric Bowden, AFCEE
AECOM Project Manager	Dave Parse, AECOM
AECOM Site Manager	Walt Gee, AECOM
Analytical Laboratory-Soil Gas	Centek Laboratories, LLC
Analytical Laboratory-Groundwater	TriMatrix Laboratories, Inc
Health and Safety Professional	Sean Liddy, AECOM
Site Health and Safety Professional	Walt Gee, AECOM

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-18
SG-19
SG-20
SG-21
SG-22
SG-23
SG-24
SG-25
SG-26
SG-27
SG-28
SG-29
SG-30
SG-31
SG-32
SG-36
SG-08
SG-07
SG-06
SG-05
SG-04
SG-03
SG-37
SW3 DW3
SW7
SW4
SW1 DW1
MAIN STREET
MAIN ENTRANCE
MAIN GATE
DAYTON STREET
CAMDEN STREET
DEVON STREET
AVON STREET
ELBON STREET
MAPLE TREE
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

Plotted By: walt.gee
Layout-Sheet Name: LAYOUT1
Plot File Date Created: Aug/14/2009 6:36 PM

Filename: P:\PROJECTS\AFP59\111886 VAPOR INTRUSION STUDY\REPORTS\FIGURES\PROPSG09.DWG

AECOM

AIR FORCE PLANT 59 VAPOR INTRUSION INVESTIGATION

Fire Suppression Reservior Sample Locations Johnson City, New York

Air Force Center for Engineering and the Environment
3300 Sidney Brooks, Brooks City-Base, Texas 78235

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
PropSG09.dwg	WFG	111886	08/09	3-2

3.3 SUBCONTRACTORS

Subcontractors will be needed to complete the vapor intrusion investigation, monitoring well abandonment, groundwater monitoring, and the fire suppression reservoir 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/Soil): TriMatrix Laboratories, Inc
- Off-site Waste Disposal: American Waste Management Services, Inc.
- Surveying: Hulbert Engineering and Land Surveying
- Monitoring Well Abandonment: Parratt Wolff Inc
- Direct Push Services: Zebra Environmental Corp.

4.0 DATA ASSESSMENT, RECORDS, AND REPORTING REQUIREMENTS

The following sections describe data assessment, record keeping, and reporting requirements for the vapor intrusion investigation, monitoring well abandonment, groundwater monitoring, and fire suppression reservoir investigation at AFP 59.

4.1 DATA ASSESSMENT

Data collected during the investigation will generally consist of field and analytical data. Data assessment methods will vary depending on the type of data collected. Data will be analyzed to ensure that accurate and valid data have been generated. The data will then be used to refine the conceptual site model and prepare technical reports.

The process of generating analytical data of known quality begins in the planning stages when data quality objectives are established, continues during sample collection activities and laboratory analysis, and is completed by reviewing the analytical data. After AECOM reviews the field documentation, field procedures, and analytical data, data qualifiers will be assigned. Data qualifiers will be used to indicate data validity and potential limitations of data usage when QA/QC criteria are not met.

All analytical data generated during the investigation will be reviewed for CoC documentation, summarized results, holding time conformance, surrogate recoveries, field duplicate evaluation, and field and laboratory blank contamination. Data will be qualified based on the *USEPA National Functional Guidelines for Organic Data Review* (USEPA, 1994b). A Data Validation Report/Data Usability Summary Report will be generated for the data.

4.2 RECORD KEEPING

Field records will be maintained to recreate all sampling and measurement activities and to meet all Environmental Resources Program Information Management System (ERPIMS) data loading requirements. The requirements listed in this section apply to all measuring and sampling activities. Requirements specific to individual activities are listed in the section of the *AFP 59 FSP and QAPP* that addresses each activity. The information will be recorded with indelible ink in a permanently bound notebook with sequentially numbered pages. These records will be archived in an easily accessible form and made available to the USAF upon request.

The following information will be recorded for all field activities: (1) location, (2) date and time, (3) identity of people performing activity, and (4) weather conditions. The following information will be recorded for all field measurements: (1) the numerical value and units of each measurement, and (2) the identity of and calibration results for each field instrument.

The following additional information will be recorded for all sampling activities: (1) sample type and sampling method, (2) the identity of each sample and depth from which it was collected, (3) the amount of each sample, (4) sample description (e.g., color, odor, clarity), (5) identification of sampling devices, and (6) identification of conditions that might affect the representativeness of a sample.

In addition to the information entered into the logbook, the following AFCEE-approved forms will be completed: field sampling report and monitoring well static water level form. Additional AECOM forms include the decontamination record and equipment calibration daily log.

4.3 REPORTING REQUIREMENTS

After completion of field activities, the following documents are required by the Statement of Work:

- **Site Investigation/Site Inspection Report.** This report will include a description of all field activities conducted during the investigation and provide analysis and interpretation of information gathered during the investigation. A draft and final report will be prepared and submitted.
- **ERPIMS.** This data deliverable will meet the requirements of the most current version of the Installation Restoration Program Information Management System Data Loading Handbook. The data entered in the ERPIMS data files will correspond exactly with the data contained in the original laboratory reports and other documents associated with sampling.

5.0 REFERENCES

Earth Tech. 1996. *Final Remedial Investigation Report at AFP 59.*

———. 1999a. April 27, 1999 letter to NYSDEC defining the LTM program at AFP 59.

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Earth Tech AECOM. 2009. *LTM Activities and Soil Gas Investigation at AFP 59.* July 13, 2009.

New York State Department of Environmental Conservation. 2002. *Draft Technical Guidance for Site Investigation and Remediation.*

United States Environmental Protection Agency (USEPA). 1994a. *Guidance for the Data Quality Objectives Process EPA QA/G4*. Quality Assurance Management Staff, EPA/600/R-96/055. September.

———. 1994b. *USEPA National Functional Guidelines for Organic Data Review.*