FINAL
WORK PLAN ADDENDUM

Soil Vapor Intrusion 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

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PREFACE

This *Work Plan* (WP) *Addendum* was written by Earth Tech to describe the field activities associated with the soil vapor intrusion 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. F41624-03-D-8597, Task Order No. 0220.

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14. ABSTRACT

This *Work Plan Addendum* describes the field activities associated with the soil vapor intrusion investigation at Air Force Plant 59. The objective of this study is to determine if soil vapor contaminated with chlorinated VOCs are entering the manufacturing facility building at Air Force Plant 59 from the subsurface.

15. SUBJECT TERMS
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LIST OF ACRONYMS AND ABBREVIATIONS

AFCEE	Air Force Center for Environmental Excellence
AFP 59	Air Force Plant 59
CHSO	Corporate Health and Safety Office
COC	Chain-of-Custody
1,1-DCA	1,1-Dichloroethane
DQO	Data Quality Objective
ERPIMS	Environmental Resources Program Information Management System
HASP	Health and Safety Plan
LTM	Long-Term Monitoring
MTBE	Methyl Tert Butyl Ether
$\mu g/m^3$	Micrograms per Cubic Meter
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
RTC	Restoration Team Chief
SAP	Sampling and Analysis Plan
1,1,1-TCA	1,1,1-Trichloroethane
TCE	Trichloroethene
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compounds
WP	Work Plan

1.0 INTRODUCTION

This *Work Plan (WP) Addendum* describes the procedures and techniques that will be used to conduct a soil vapor intrusion 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 F41624-03-D-8597, Task Order 0220. This *WP Addendum* is not intended to be a stand alone document. This document is an addendum to the *Final Soil Vapor Study and Long-Term Monitoring (LTM) Work Plan* (Earth Tech, 2006). 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, and can be found in the *Final Soil Vapor Study and LTM Work Plan* (Earth Tech, 2006).

This *WP Addendum* has been prepared following regulatory guidance contained in:

- New York State Department of Environmental Conservation (NYSDEC) *Final DER-10 Technical Guidance for Site Investigation and Remediation* (NYSDEC, 2002)
- NYSDEC *DER-13 Strategy for Evaluating Soil Vapor Intrusion at Remedial Sites in New York* (NYSDEC, 2006)
- New York State Department of Health (NYSDOH) *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH, 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 vapor intrusion sampling, which includes six indoor air and co-located sub-slab samples in the main manufacturing building, two indoor air samples in the basement, one outdoor ambient air sample, and one duplicate sample from a sub-slab sampling location.
3. A product inventory survey documenting sources of volatile organic compounds (VOCs) in the manufacturing facility.
4. Preparation of a letter report presenting the data collected during the field investigation and a preliminary assessment of soil vapor intrusion into the building.

1.2 PREVIOUS SOIL VAPOR INVESTIGATIONS

In November 2004, a soil-gas survey was conducted to determine the downgradient VOC concentrations at the AFP 59 property boundary. 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.

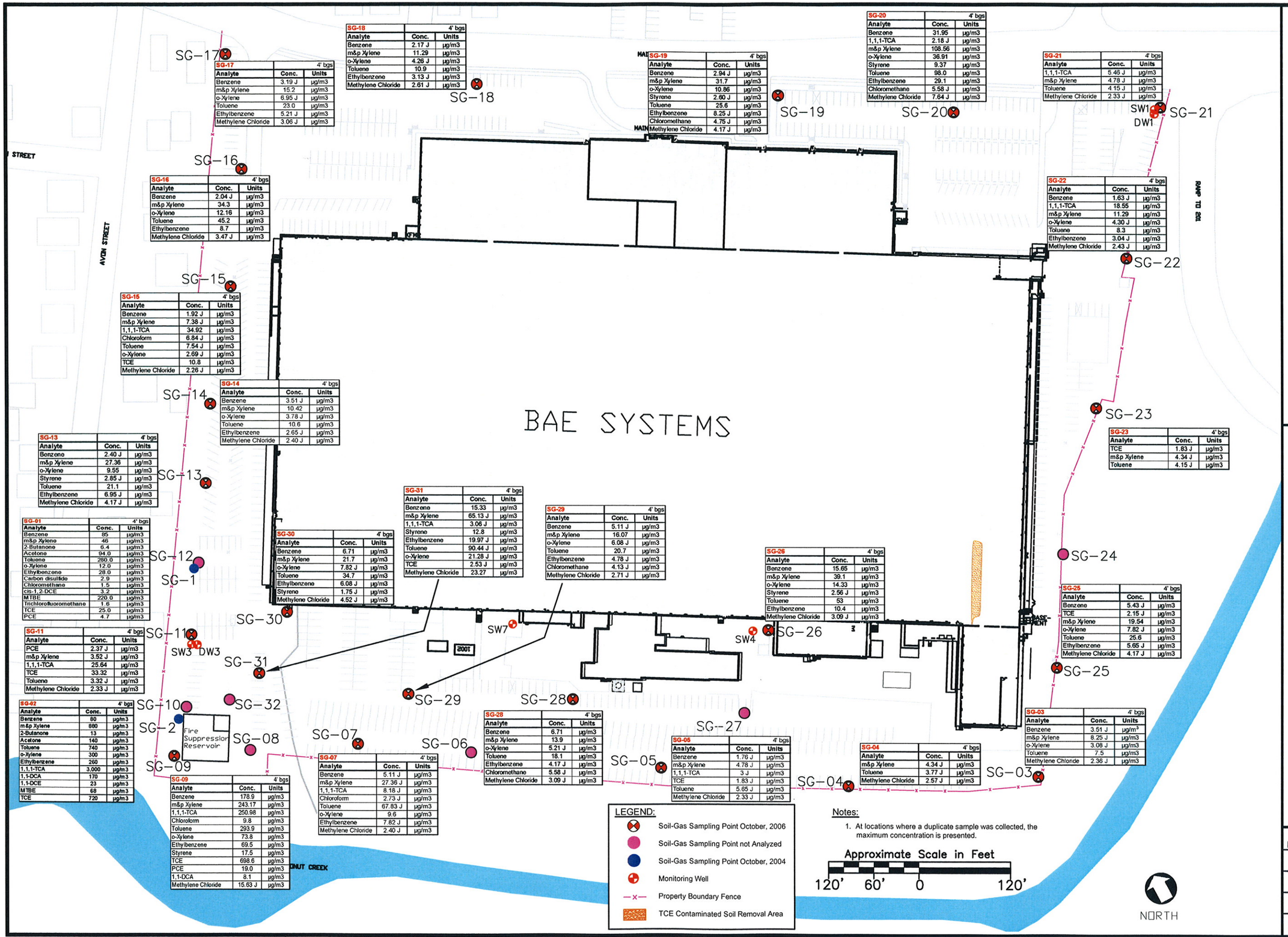
Location SG-2 exhibited elevated concentrations of 1,1,1-trichloroethane (1,1,1-TCA) at 3,000 micrograms per cubic meter (µg/m^3), m&p-xylene at 880 µg/m^3, ortho-xylene at 300 µg/m^3, toluene at 740 µg/m^3, and trichloroethene (TCE) at 720 µg/m3. Methyl tert butyl ether (MTBE) was detected at both SG-1 (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 soil vapor analysis of the November 2004 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 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: 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 in Figure 1-1.



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-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-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-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-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-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-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

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

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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.
F41624–03–D–8597	0220
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

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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 soil vapor intrusion 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 vapor intrusion investigation, the primary objective will be to determine if soil vapor contaminated with chlorinated VOCs is entering the manufacturing building from the subsurface. Air and sub-slab sample data collected during the investigation will be used for different purposes with varying levels of confidence required.

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

1. **Problem.** Two soil-gas samples were taken during November 2004 and elevated concentrations of chlorinated hydrocarbons were observed. Additional soil-gas samples were collected in October 2006 and elevated concentrations of chlorinated hydrocarbons were once again observed. Based on the results from these previous investigations, the NYSDEC requested that a soil vapor intrusion investigation be initiated for the manufacturing building at the AFP 59 site.
2. **Boundaries of Study.** The boundaries of the study area were determined based on analytical data from previous investigations, available funding, and the potential for exposure to on-site workers. The study area for the air sampling includes six indoor air and co-located sub-slab vapor samples throughout the main floor of the manufacturing building, two indoor air samples from basement locations, and one ambient outdoor air sample from an upwind location.
3. **Sampling Approach.** Screening data are collected to provide preliminary field data, qualitatively evaluate the nature and extent of contamination in vapor, identify samples to send to the laboratory, and to provide health and safety monitoring. Field equipment, such as the photoionization detector (PID), and a product inventory survey will be used to collect the screening data.

   One round of indoor air, sub-slab vapor, and ambient air samples will be collected from the site. The vapor 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 current human exposures to soil vapor contaminants exist and the potential for soil vapor intrusion to impact indoor air quality. The data will also be used to develop site-specific attenuation factors. Definitive data will be generated in accordance with the site-specific QAPP (Earth Tech, 2006).

2.2 SAMPLE ANALYSIS SUMMARY

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

All soil-gas samples will be analyzed for VOCs by Method TO-15. The samples will be analyzed at an off-site laboratory. Detection limits and reporting limits specified in the NYSDOH *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH, 2006) are provided in Table 2-2

Table 2-1
Sample Analysis Summary

Method	Matrix	# Samples	# Equipment Blanks	# Ambient Blanks	# Trip Blanks	# Field Duplicates	# MS/MSD Samples	Total # Samples
TO-15	Indoor Air	8	0	0	0	0	0	8
TO-15	Sub-Slab Vapor	6	0	0	0	1	0	7
TO-15	Ambient Air	1	0	0	0	0	0	1

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

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 are collected or sent with vapor samples.
- Ambient Blanks – Collect one ambient air sample from an upwind location; analyze using an off-site laboratory.
- Duplicate Samples – Collect one duplicate from a sub-slab 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 vapor sampling.
- MS/MSD – No MS/MSD samples will be collected during vapor sampling.

Canister QA/QC:

- Canister Certifications by Laboratory (batch certified or individually certified);
- Initial vacuum of 28+/- 2" Hg;
- Final vacuum of 5 +/- 1" Hg;
- The analytical laboratory is ELAP certified;

- Regulators shall collect a representative air sample at a flow rate that is <200 ml/min; and
- A specified sample volume suitable to obtain the report limits specified on Table 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

2.3 FIELD ACTIVITIES

2.3.1 Indoor Air Sampling

Indoor air samples will be collected from inside the main manufacturing building at the AFP 59 and in the basement areas under the building. Six samples will be collected from the main floor of the building and two samples will be collected in the east and west basement areas of the building (Figure 2-1). The sample locations may need to be slightly adjusted at the time of sampling based upon occupied work areas and preferential vapor pathways. The manufacturing building is staffed around the clock, so vapor samples will be collected over a 24-hour period. Sampling will take place during the heating season to help ensure that the samples are collected when the potential for soil vapor intrusion is the greatest and the ability to measure the effect of soil vapor intrusion, if any, is the greatest.

The indoor air sampling protocol will be in accordance with the NYSDOH *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH, 2006) and is as follows:

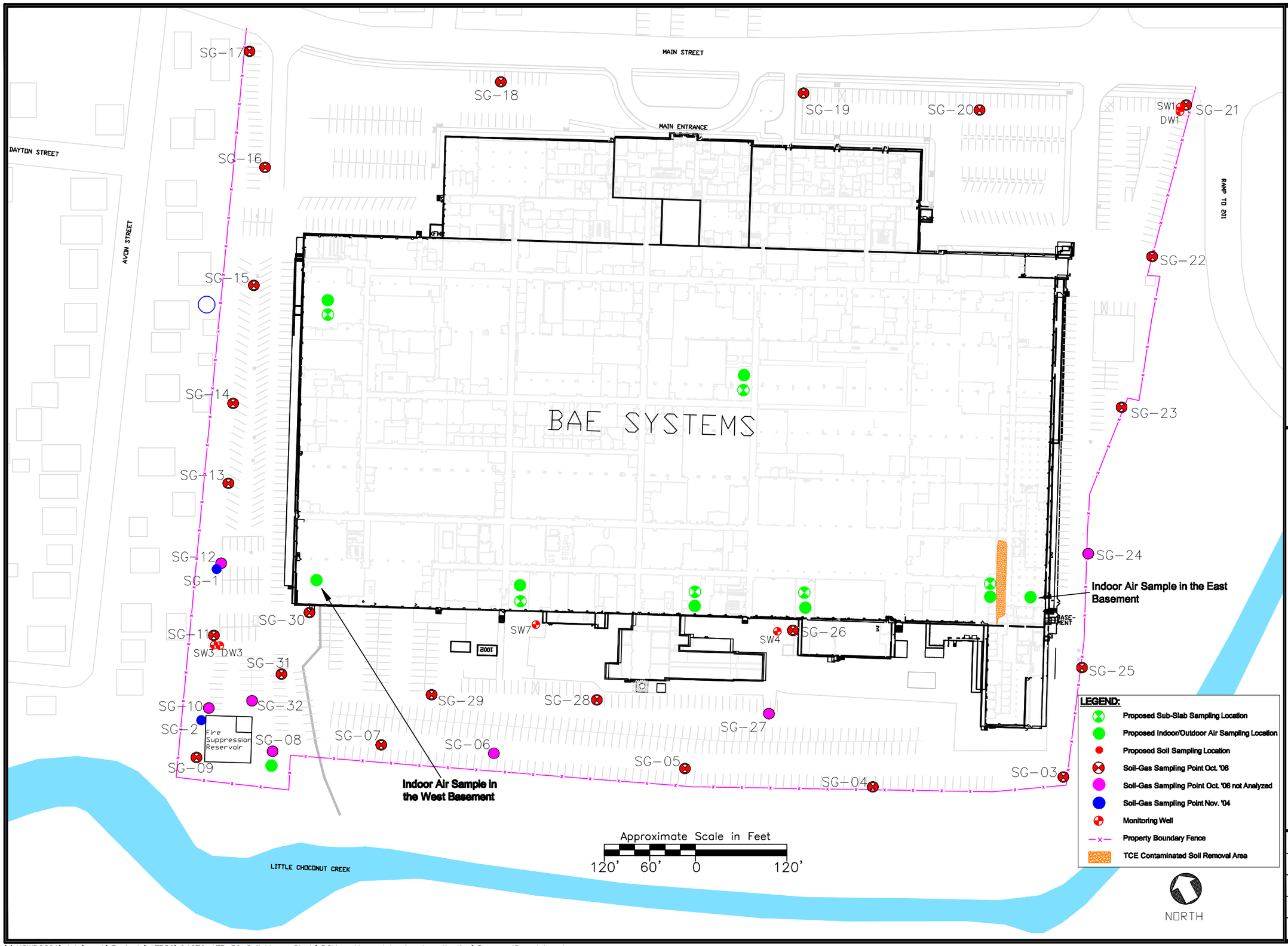
- Summa® canisters will be placed at the various sample locations throughout the building at a height that reflects the average breathing zone (typically 4 to 6 feet) in a manufacturing building setting.
- Indoor air samples will be collected over a 24-hour period to accurately reflect the exposure scenario being evaluated.
- Sampling will take place in January during the heating season. The heating system will be running, and windows will be closed making this the most likely time of the year for soil vapor intrusion to occur.
- Site conditions and the activities occurring in each sampling location will be noted.
- A product inventory of each sampling area will be completed.
- An attempt to define the air pressure gradients in different areas of the building will be made. Sample locations will be biased towards the areas that have a negative pressure gradient (i.e., air flows into the areas from outside of the areas, increasing the chances for vapor intrusion)
- The samples will be shipped to an ELAP and AFCEE-approved laboratory for VOC analysis using USEPA method TO-15.
- A PID readings will be taken from each indoor air sample location. PID reading will be documented in the sample collection log book.

All indoor air samples will be labeled as 59 - IA - # -mmddyy and their locations will be marked on a site map of the building.

The following information will be recorded for each indoor air sample collected:

- Sample identification,
- Date and time of sample collection,
- Sampling height,
- Identity of samplers,

- Sampling methods and devices,
- Volume of air samples,



EarthTech
A Tyco International Ltd. Company
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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
Vapor Intrusion Investigation

CONTRACT NO.	TASK NO.
F41624-03-D-8597	0220
DESIGNED BY: P. Granger	DRAWN BY: P. Granger
CHECKED BY:	DATE: July 31, 2007
SCALE: 1" = 120'	SHEET: 1 of 1

ProposedSampleLoc.dwg

\\USWDCS01\data\work\Projects\AFP59\94679 AFP 59 Soil Vapor Study\DOH – Vapor Intrusion Investigation\ProposedSampleLoc.dwg

- 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.

2.3.2 Sub-Slab Samples

Sub-slab vapor samples will be collected from directly beneath the building slab in the AFP 59 building. Slab samples will be co-located with the indoor air samples and will be collected simultaneously. A total of seven samples will be collected. Six samples will be co-located with a corresponding indoor air sample, and one sample location will have a duplicate sample collected for QA/QC purposes. Sample locations can be seen in Figure 2-1. The sample locations may need to be slightly adjusted at the time of sampling based upon occupied work areas, preferential vapor pathways, and floor conditions (cracks and perforations). The sub-slab samples will be collected concurrently with the indoor air samples over the same 24-hour period. Sampling will take place during the heating season to ensure representative data.

The sub-slab vapor sampling protocol will be in accordance with the NYSDOH *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH, 2006) and is as follows:

- A hole will be drilled through the plant floor and underlying concrete slab into the sub-slab material.
- A piece of laboratory or food grade teflon tubing will be inserted less than 2 inches into the sub-slab material. Modeling clay will be used to seal the tubing at the surface and ensure ambient air is not entering the sample container.
- 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 outside of the building.
- After purging is complete, samples will be collected in a Summa® canister. Samples will be collected at a flow rate less than 200mL/min.
- One duplicate sample will be collected from a sub-slab 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 concrete to prevent soil vapor intrusion.
- Cracks and other openings in the floor will be noted, and sample locations will be moved a suitable distance away so that ambient air entering these openings will not affect the sample.
- Conditions of the sampling areas including floor stains and stored chemicals will be recorded at the time of sampling. Weather conditions will also be recorded.
- Due to scheduling and budget restraints permanent soil-vapor sampling points will not be installed during this investigation. If additional investigation is warranted permanent sampling points will be considered for subsequent sampling events.

All sub-slab vapor samples will be labeled as 59 –SS - # - mmddyy and their locations will be marked on a site map of the building. The unique identifier for each sample will match that of its co-located indoor air sample.

The following information will be recorded for each sub-slab vapor sample collected:

- Sample identification,
- Date and time of sample collection,
- Sampling depth,
- Identity of samplers,
- Sampling methods and devices,
- Soil vapor purge volume,
- Volume of soil vapor extracted,
- Vacuum of Summa® canisters before and after samples are collected, and
- COC protocols and records used to track samples from sampling point to analysis.

2.3.3 Ambient Air Sampling

One outdoor ambient air sample will be collected from an upwind location of the manufacturing building (Figure 2-1). The sample will be collected simultaneously with the indoor air samples to evaluate the potential influence, if any, of outdoor air on the indoor air sampled. The outdoor air sample will be collected from the breathing zone (3 to 5 feet) and away from any obvious sources of volatile chemicals. The outdoor air sample will be collected in the same manner as the indoor air samples, over a 24 hour period, using a Summa® canister. A sketch of the sample area will be drawn noting all pertinent observations (buildings, streets, paved areas, odors, industrial facilities). A PID will be used and the readings noted before, during, and after sample collection.

2.3.4 Sample Area Product Inventory

Products in each localized sample area will be inventoried to provide an accurate assessment of the potential contribution of volatile chemicals stored and/or used in the vicinity of each sample location. In addition, the type of structure, floor layout, air flows, and physical conditions of the sample area being studied will be noted to identify and minimize conditions that may interfere with the samples. The Indoor Air Quality Questionnaire and Building Inventory Form (Appendix B) will be completed for each sample location inside of the manufacturing building.

2.3.5 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.

2.3.6 Site Personnel

Table 2-3 lists anticipated project personnel.

Table 2-3
Personnel Responsibilities

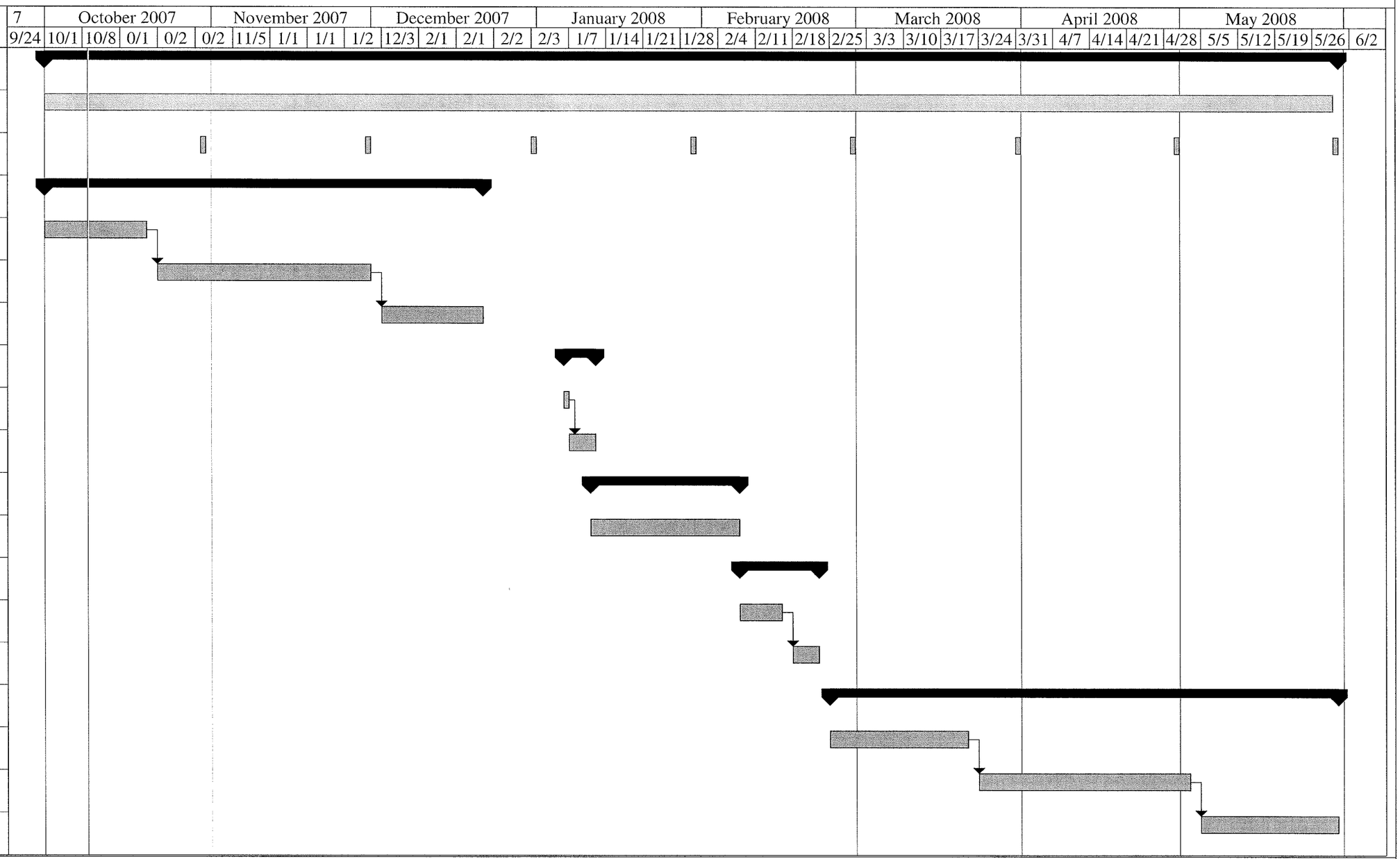
Title	Name
BAE Systems Coordinator	Paul Smetana/Tom Tokos
Air Force Project Manager	George Walters, ASC
Air Force Project Manager	Capt. Craig Holder, AFCEE
Earth Tech Project Manager	Dave Parse, Earth Tech
Earth Tech Site Manager	Phil Granger, Earth Tech
Analytical Laboratory	Centek Laboratories, LLC
Health and Safety Professional	George Sauer, Earth Tech
Site Health and Safety Professional	Phil Granger, Earth Tech

2.4 SCHEDULE

The tentative start date for vapor intrusion investigation fieldwork is January 7, 2008. It is anticipated that field activities will last approximately one week. Preliminary data will be submiited to the State for review as soon as it has been received from the laboratory. Based upon the preliminary data, additional sampling may be required to further characterize vapor intrusion at the site. Validated laboratory data will take approximately 3 to 4 weeks to receive after the samples are submitted to the laboratory. The *Vapor Intrusion Investigation Data Report* will be submitted to the NYSDEC and NYSDOH by the end of March 2008 for review. A final report will then be submitted after the agencies' comments have been incorporated. The project schedule is illustrated in Figure 2-2.

Project Schedule:
Groundwater & Vapor Monitoring
at AFP3 and AFP59

Task Name
Project Management
Project Management
Administration
Planning Documents (AFP59)
Draft
Review
Final
Field Investigation (AFP 59)
Mob/Demob
Groundwater Sampling
Off-Site Lab Analysis (AFP 59)
Off-Site Lab Analysis
Data Evaluation (AFP 59)
Data Review
ERPIMS
Document Preparation (AFP 59)
Draft
Review
Final



Contract #F41624-03-D-8597
Delivery Order #0220, Modification 01

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 in 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 – Phil Granger – 703-549-8728
5. Project Quality Assurance Manager – Devon Chicoine – 703-549-8728
6. Contracts Administrator – Amy Harrington – 703-549-8728
7. Cost Administrator – Debra Bowie/Jan Moran – 703-549-8728

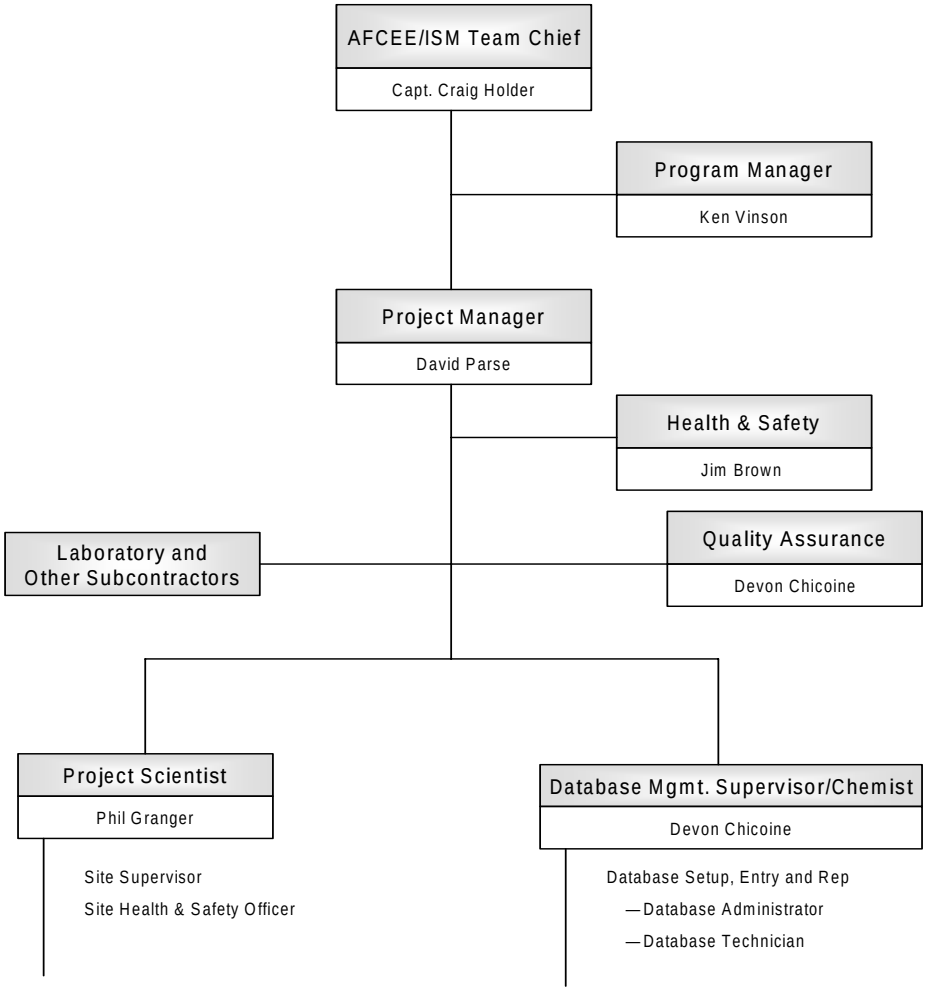
Program Manager. The Program Manager, Ken Vinson, is responsible for overall direction, coordination, technical consistency, and review of the entire contract. His responsibilities include:

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 Restoration Team Chief (RTC) 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.

Figure 3-1
Project Organization Chart



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.
7. Frequent communication with the AFCEE RTC 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 *Health and Safety Plans* (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, Phil Granger, 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 *Sampling and Analysis Plan* (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.

Contracts Administrator. The Contracts Administrator will be responsible for proper procurement and execution of subcontractor agreements.

Subcontractors

Subcontractors will be needed to complete the soil vapor intrusion investigation project. The subcontractor will provide off-site fixed laboratory analysis. The following is a complete listing of subcontractors that will be used on this project.

- Off-Site Laboratory Analysis: Centek Laboratories LLC
  143 Midler Park Drive
  Syracuse, NY 13206
  Tel: (315) 431-9730

4.0 REPORTING REQUIREMENTS

The required project reporting deliverables are:

- WP Addendum, including updated HASP;
- Vapor Intrusion Investigation Data Report;
- Environmental Resources Program Information Management System (ERPIMS) Data Submission; and
- Progress Reports.

5.0 REFERENCES

Earth Tech, Inc. 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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New York State Department of Environmental Conservation (NYSDEC), 2002. *Draft DER-10 Technical Guidance for Site Investigation and Remediation*.

———. 2006. *DER-13 / Strategy for Evaluating Soil Vapor Intrusion at Remedial Sites in New York*. October.

New York State Department of Health (NYSDOH), 2006. *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York*. October.

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

APPENDIX A
Health and Safety Plan

FINAL
HEALTH AND SAFETY PLAN

for Vapor Intrusion Investigation
at
Air Force Plant 59
Johnson City, New York

Prepared for:

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

Prepared by:

Earth Tech, Inc.
5555 Glenwood Hills Parkway
Grand Rapids, Michigan 49512

Contract No. F41624-03-D-8597
Delivery Order No. 0220

October 2007

HEALTH AND SAFETY PLAN APPROVAL

This HASP was prepared for employees performing a specific, limited scope of work. It was prepared based on the best available information regarding the physical and chemical hazards known or suspected to be present on the project site. While it is not possible to discover, evaluate, and protect in advance against all possible hazards, which may be encountered during the completion of this project, adherence to the requirements of the HASP will significantly reduce the potential for occupational injury.

By signing below, I acknowledge that I have reviewed and hereby approve the HASP for the AFP 59 Vapor Intrusion Investigation site. This HASP has been written for the exclusive use of Earth Tech, Inc., its employees, and subcontractors. The plan is written for specified site conditions, dates, and personnel, and must be amended if these conditions change.

Written by:

_____ _____

Date

Safety Professional

Approved by:

_____ _____

Dave Parse
Project Manager

Date

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1.0 INTRODUCTION

This HASP (including Attachments A-E) provides a general description of the levels of personal protection and safe operating guidelines expected of each employee or subcontractor associated with the environmental services being conducted at the AFP 59 Vapor Intrusion Investigation site, located at 600 Main Street in Johnson City, New York. This HASP also identifies chemical and physical hazards known to be associated with the Earth Tech-managed activities addressed in this document.

HASP Supplements will be generated as necessary to address any additional activities or changes in site conditions which may occur during field operations. Once generated, each Supplement will be inserted in Attachment E and reviewed/acknowledged by field personnel prior to the start of applicable work activities.

1.1 GENERAL

The provisions of this HASP are mandatory for all Earth Tech personnel engaged in fieldwork associated with the environmental services being conducted at the subject site. A copy of this HASP, any applicable HASP Supplements and the Earth Tech Safety, Health & Environmental (SH&E) Standard Operating Procedures (SOPs) shall be maintained on site and available for review at all times. Record keeping will be maintained in accordance with this HASP and the applicable SH&E SOPs. In the event of a conflict between this HASP, the SOPs, and federal, state, and local regulations, workers shall follow the most stringent/protective requirements.

1.2 POLICY STATEMENT

Earth Tech has developed ten "Core Values," which form the foundation of our Safety Management System. These Core Values were developed for two basic reasons:

1. To communicate the company's basic safety tenets to Earth Tech employees, partners, and customers; and
2. To serve as a constant reminder for every Earth Tech staff member that our everyday business and operational decisions must be made in concert with these tenets.

The Core Values will be posted at the site in a common area and communicated to all employees prior to beginning work activities.

Earth Tech maintains the following goals for all operations:

- **Zero** work-related injuries or illnesses.
- **Zero** damage to property, and/or equipment from our activities.
- **Zero** releases to the environment from our ongoing projects.

1.3 REFERENCES

This HASP meets the regulatory requirements and guidelines established in the following documents:

- Title 29, Part 1910 of the Code of Federal Regulations (29 CFR 1910), *Occupational Safety and Health Standards* (with special attention to Section 120, *Hazardous Waste Operations and Emergency Response*).
- Title 29, Part 1926 of the Code of Federal Regulations (29 CFR 1926), *Safety and Health Regulations for Construction*.
- National Institute for Occupational Safety and Health (NIOSH)/Occupational Safety & Health Administration (OSHA)/U.S. Coast Guard (USCG)/USEPA, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, Publication No. 85-115, 1985.
- New York State Department of Labor, Division of Safety and Health. *Industrial Code Rules.*

1.3.1 Earth Tech Safety, Health and Environmental Website

Earth Tech's Safety Website is located on the Earth Tech Corporate Intranet, and is available for all Earth Tech employees as a resource for safety information, updates, and procedures. Project management and employees are encouraged to visit the website for key safety items and information, such as:

- The Earth Tech Employee Orientation,
- Contact information for Earth Tech's Safety Department staff,
- Safety Forms,
- Safety Program Manuals,
- Safety Alerts and other communications,
- Accident, Injury, and Near-Miss Reporting Requirements,
- e-Tracking
- Links to safety and regulatory information,
- Training Resources,
- Ergonomics Information, and
- A feedback link to the Earth Tech Safety Director.

The website is located at the following web address:

http://etonline.earthtech.com/etonline/healthsafety/

Please note that the website can only be accessed when connected to Earth Tech's Wide-Area Network (e.g., via iPass).

2.0 SITE INFORMATION AND SCOPE OF WORK

Earth Tech will conduct environmental services at the AFP 59 Vapor Intrusion Investigation site. Work will be performed in accordance with the applicable Statement of Work (SOW) and associated WPs developed for AFP 59 Vapor Intrusion Investigation. Deviations from the listed SOW will require that a Safety Professional review and changes made to this HASP, to ensure adequate protection of personnel and other property.

The following is a summary of relevant data concerning the AFP 59 Vapor Intrusion Investigation site, and the work procedures to be performed. The WP, prepared by Earth Tech as a companion document to this HASP, provides significantly greater details concerning both site history and planned work operations.

2.1 SITE INFORMATION

This section provides a general description and historical information associated with the site.

2.1.1 General Description

AFP 59 is located in south-central New York in the Westover area of the Town of Union, Broome County, immediately west of Johnson City (mailing address); the site is about 3 miles west of the central business district of the City of Binghamton and about 4 miles east of the center of the Village of Endicott. The plant occupies 29.6 acres (including Parking Lot #5, located north of Main Street) and is situated in a highly urbanized area.

2.1.2 Site Background/History

AFP 59 is a government-owned, contractor-operated facility. Remington Rand, Inc., the first manufacturer to occupy the plant, manufactured aluminum aircraft propellers at the plant from 1942 to 1945. The plant closed at the end of World War II and remained idle until April 1949, when it was reopened as an aircraft controls manufacturing facility. GE Aerospace was contracted to operate the facility and to direct manufacturing (primarily of parts for electro-mechanical aircraft control systems). Martin Marietta Aircraft Controls acquired GE Aerospace in 1993 and took over the operation of the facility and the manufacturing activities. BAE Systems currently manufactures flight control, laser, weapons control, internal navigation, and guidance systems at AFP 59.

Past and present activities at AFP 59 have generated a variety of waste products, including cutting, lubricating, and coolant oils; degreasing agents; plating acids, caustics, chromium, cyanide solutions, and paint residues.

AFP 59 is listed as a Class 2 Site on the NYSDEC List of Inactive Hazardous Waste Disposal Sites (Site Code 7-04-020). A Class 2 Site is categorized as posing a "significant threat to the public health or environment." AFP 59 is not on the National Priorities List and is not under a Federal Facility Agreement.

2.2 SCOPE OF WORK

This HASP covers the following Earth Tech activities:

1. Mobilization/demobilization of personnel, equipment, and supplies to and from the site.
2. One round of indoor air and sub-slab vapor sampling.

3.0 PROJECT HEALTH AND SAFETY ORGANIZATION

3.1 PROJECT MANAGER (DAVE PARSE)

The Project Manager (PM) has overall management authority and responsibility for all site operations, including safety. The specific safety responsibilities for the PM are listed in Section 4.0 of SH&E 003, *Operational Structure*. The PM will provide the site supervisor with the appropriate WPs for the site.

3.2 SITE SUPERVISOR (PHIL GRANGER)

The site supervisor has the overall responsibility and authority to direct work operations at the job site according to the provided WPs. The PM may act as the site supervisor while on site.

3.2.1 Responsibilities

The site supervisor is responsible to:

- Discuss deviations from the WP with the Site Safety Officer (SSO) and PM.
- Discuss safety issues with the PM, SSO, and field personnel.
- Assist the SSO with the development and implementation of corrective actions for site safety deficiencies.
- Assist the SSO with the implementation of this HASP and ensuring compliance.
- Assist the SSO with inspections of the site for compliance with this HASP and applicable SH&E SOPs.

3.2.2 Authority

The site supervisor has authority to:

- Verify that all operations are in compliance with the requirements of this HASP, and halt any activity which poses a potential hazard to personnel, property, or the environment.
- Temporarily suspend individuals from field activities for infractions against the HASP pending consideration by the SSO, the Safety Professional, and the PM.

3.2.3 Qualifications

In addition to being Hazardous Waste Operations and Emergency Response (HAZWOPER)-qualified (see Section 4.1), the Site Supervisor is required to have completed an 8-hour HAZWOPER Supervisor Training Course in accordance with 29 CFR 1910.120 (e)(4) within the past three (3) years.

3.3 SITE SAFETY OFFICER (PHIL GRANGER)

The site supervisor will also perform the duties of the SSO unless an alternate SSO is named.

If the SSO must leave the site during field activities, an alternate SSO will be selected by name and informed of his/her duties (see below).

3.3.1 Responsibilities

The SSO is responsible to:

- Update the site-specific HASP to reflect changes in site conditions or the scope of work. HASP updates must be reviewed and approved by the Safety Professional.
- Be aware of changes in Earth Tech Safety Policy. Changes are posted on the Earth Tech Safety Website (see Section 1.3 of this HASP).
- Monitor the lost time incidence rate for this project and work toward improving it.
- Inspect the site for compliance with this HASP and the SH&Es using the appropriate audit inspection checklist provided by an Earth Tech Safety Professional.
- Work with the PM to develop and implement corrective action plans to correct deficiencies discovered during site inspections. Deficiencies will be discussed with project management to determine appropriate corrective action(s).
- Contact the Safety Professional for technical advice regarding safety issues.
- Provide a means for employees to communicate safety issues to management in a discreet manner (i.e., suggestion box, etc.).
- Determine emergency evacuation routes, establishing and posting local emergency telephone numbers, and arranging emergency transportation
- Ensure that all site personnel and visitors have received the proper training and medical clearance prior to entering the site
- Establish any necessary controlled work areas (as designated in this HASP or other safety documentation)
- Initiate tailgate safety meetings and maintain attendance logs and records
- Discuss potential health and safety hazards with the site supervisor, the Safety Professional, and the PM
- Select an alternate SSO by name and inform him/her of their duties, in the event that the SSO must leave or is absent from the site.

3.3.2 Authority

The SSO has authority to:

- Verify that all operations are in compliance with the requirements of this HASP.
- Issue a “Stop Work Order” under the conditions set forth in Section 4.8 of this HASP.
- Temporarily suspend individuals from field activities for infractions against the HASP pending consideration by the site supervisor, Safety Professional and the PM.

3.3.3 Qualifications

In addition to being HAZWOPER-qualified (see Section 4.1), the SSO is required to have completed an 8-hour HAZWOPER Supervisor Training Course in accordance with 29 CFR 1910.120 (e)(4).

3.4 EMPLOYEES

3.4.1 Employee Responsibilities

Responsibilities of employees associated with this project include, but are not limited to:

- Immediately report any injury, illness, or safety incident to the SSO or site supervisor/PM.
- Notifying the SSO, in writing or verbally, of unsafe conditions and acts.
- Understanding and abiding by the policies and procedures specified in the HASP and other applicable safety policies, and clarifying those areas where understanding is incomplete.
- Providing feedback to health and safety management relating to omissions and modifications in the HASP or other safety policies.

3.4.2 Employee Authority

The health and safety authority of each employee assigned to the site includes the following:

- The right to refuse to work and/or stop work authority when the employee feels that the work is unsafe (including subcontractors or team contractors), or where specified safety precautions are not adequate or fully understood.
- The right to refuse to work on any site or operation where the safety procedures specified in this HASP or other safety policies are not being followed.
- The right to contact the SSO or the Safety Professional at any time to discuss potential concerns.

3.5 SAFETY PROFESSIONAL

The Safety Professional is the member of the Earth Tech Safety, Health and Environmental Department assigned to oversee health and safety requirements for the project and provide any needed technical support. The Safety Professional will be the first point-of-contact for all of the project's health and safety matters. Duties include the following:

- Approving this HASP and any required changes.
- Approving of the designated SSO (if site supervisor does not cover SSO duties).
- Providing sound technical safety support.
- Reviewing all personal exposure monitoring results.
- Investigating any reported unsafe acts or conditions.

3.6 SUBCONTRACTORS

The requirements for subcontractor selection and subcontractor safety responsibilities are outlined in SH&E 207, *Contractor and Subcontractor SH&E Requirements*. Each Earth Tech subcontractor is responsible for assigning specific work tasks to their employees. Each subcontractor's management will provide qualified employees and allocate sufficient time, materials, and equipment to safely complete assigned tasks. In particular, each subcontractor is responsible for equipping its personnel with any required personal protective equipment (PPE).

Earth Tech considers each subcontractor to be an expert in all aspects of the work operations for which they are tasked to provide, and each subcontractor is responsible for compliance with the regulatory requirements that pertain to those services. Each subcontractor is expected to perform its operations in accordance with its own unique safety policies and procedures, in order to ensure that hazards associated with the performance of the work activities are properly controlled. Copies of any required safety documentation for a subcontractor's work activities will be provided to Earth Tech for review prior to the start of onsite activities, if required.

Hazards not listed in this HASP but known to any subcontractor, or known to be associated with a subcontractor's services, must be identified and addressed to the Earth Tech PM or the Site Supervisor prior to beginning work operations. The Site Supervisor or authorized representative has the authority to halt any subcontractor operations, and to remove any subcontractor or subcontractor employee from the site for failure to comply with established health and safety procedures or for operating in an unsafe manner.

3.7 VISITORS

Authorized visitors (e.g., client representatives, regulators, Earth Tech management staff, etc.) requiring entry to any work location on the site will be briefed by the RM on the hazards present at that location. Visitors will be escorted by the site supervisor or designee at all times at the work location and will be responsible for compliance with their employer's health and safety policies. In addition, this HASP specifies the minimum acceptable qualifications, training and personal protective equipment which are required for entry to any controlled work area; visitors must comply with these requirements at all times.

Unauthorized visitors, and visitors not meeting the specified qualifications, will not be permitted within established controlled work areas.

4.0 SAFETY PROGRAMS

4.1 SAFETY, HEALTH AND ENVIRONMENTAL STANDARD OPERATING PROCEDURES

SH&E SOPs have been developed as guidance documents for specific work tasks and overall SH&E management. In the table below, SOPs containing specific information regarding tasks anticipated for this project have been identified. A copy of the SH&E SOP Manual must accompany this HASP.

Table 4-1
Applicable Standard Operating Procedures

	SOP #	TOPIC		SOP #	TOPIC
		SH&E 000 Series			**SH&E 200 Series**
☒	001	SH&E Policy Statement	☒	201	General Safety Rules
☒	002	SH&E Dept. Structure & Responsibilities	☒	202	Safety Meetings
☒	003	Operational SH&E Structure & Responsibilities	☒	203	Accident Prevention Program – Requirements for SH&E Documentation
☒	004	SH&E Administration Support	☒	204	Task Hazard Analysis
☒	005	Review of Safety Manual	☒	205	Emergency Action Planning & Prevention
		SH&E 100 Series	☒	206	Stop Work Authority
☒	101	Injury, Illness, & Near Miss Reporting	☒	207	Contractor & Subcontractor SH&E Requirements
☒	102	Incident Investigation and Review	☒	208	General Housekeeping, Hygiene, and Sanitation
☐	103	Regulatory Agency Inspections	☒	209	Disciplinary Actions/Accountability
☒	104	SH&E Audits, Inspections, and Corrective Actions	☒	210	Walking-Working Surfaces Protection
☒	105	SH&E Procedure Variance			**SH&E 300 Series**
☒	106	Drug-Free Workplace Program	☒	301	Hazardous Waste Operations (HAZWOPER)
☐	107	Modified Duty Program	☐	302	Office Safety
☒	108	Medical Monitoring & Surveillance	☐	303	OE and UXO Operations
☒	109	Hearing Conservation Program	☐	304	Landfill Quality Assurance and Operations
☐	110	Fetal Protection Program	☐	305	Demolition Operations
☒	111	Employee Exposure Monitoring Program	☐	306	Structural Steel Operations
☒	112	Respiratory Protection Program	☐	307	Underground Construction & Tunneling
☒	113	Personal Protective Equipment (PPE)	☐	308	Rail Operations
☒	114	Safety Training Programs	☐	309	Marine Operations - Working On/Near Water
☒	115	Hazard Communication Program	☒	310	Overhead Electrical Lines
☒	116	Driver and Vehicle Safety	☐	311	Blasting and Use of Explosives
☐	117	Commercial Vehicle Program			**SH&E 400 Series**
☐	118	Confined Space Entry Program	☐	401	Clearing & Grubbing
☒	119	Lock-Out / Tag-Out Program	☐	402	Excavation & Trenching
☐	120	Fall Protection Program	☐	403	Drilling
☒	121	Electrical Safety Program	☒	404	Manual Lifting
☒	122	Environmental Compliance Program	☐	405	Handling Drums & Large Containers

Table 4-1
Applicable SOPs (Continued)

	SOP #	TOPIC		SOP #	TOPIC
SH&E 100 Series			**SH&E 400 Series**		
☒	123	Ergonomics Program	☐	406	Drum Sampling
☒	124	Heat Stress Prevention Program	☐	407	Tank & Large Container Sampling
☒	125	Cold Stress Prevention Program	☐	408	Unknown Hazardous Waste Drum Handling
☐	126	Radiation Safety Program	☐	409	Tank Cleaning
☐	127	Radiation Protection Plans	☐	410	Tank Removal & Demolition
☐	128	Radiological Exposure Assessment	☐	411	Welding, Cutting, & other Hot Work
☐	129	ALARA	☐	412	Line Entry
☐	130	Non-Ionizing Radiation	☐	413	Cylinder Disposition & Decommissioning
☐	131	Safety Assessment Program	☐	414	Pile Driving
☐	132	Competent Persons	☐	415	Abrasive Blasting
SH&E 500 Series			☒	416	Concrete & Masonry Work
☐	501	Ladders	☐	417	Automotive Service Operations
☐	502	Scaffolding	☐	418	Spray Finishing & Dip Tanks
☐	503	Machine Guarding	☐	419	Cleanup of Bird Excrement/Amplified Fungal Growth
☐	504	Woodworking and Metalworking Machines			
☒	505	Powered Hand Tools	**SH&E 600 Series**		
☒	506	Manual Hand Tools	☒	601	Hazardous Materials Shipping
☐	507	Powder-Actuated Tools	☐	602	Process Safety Management
☒	508	Fire Extinguishers	☐	603	Chemical Hygiene Plan
☐	509	Refuse Packer Units	☒	604	Decontamination
☐	510	High Pressure Washers	☐	605	Protection from Solvents
☐	511	All Terrain Vehicles	☒	606	Flammable & Combustible Materials
☐	512	Forklifts	☒	607	Chemical and Biological
☐	513	Heavy Equipment	☒	608	Blood-Borne Pathogens
☐	514	Manlifts	☐	609	Asbestos
☐	515	Cranes, Lifting Devices & Rigging Requirements	☐	610	Lead
☐	516	Equipment Safety Cards	☐	611	Cadmium
☐	517	Traffic Safety	☐	612	Compressed Gases

4.2 HAZWOPER QUALIFICATIONS

Personnel performing work art the job site must be qualified as HAZWOPER workers (unless otherwise noted in specific THAs or by the SSO), and must meet the medical monitoring and training requirements specified in the following safety procedures:

- SH&E 108, SH&E Medical Monitoring and Surveillance.
- SH&E 301, Hazardous Waste Operations (HAZWOPER)

Personnel must have successfully completed training meeting the provisions established in 29 CFR 1910.120 (e)(2) and (e)(3) (40-hour initial training). As appropriate, personnel must also have completed annual refresher training in accordance with 29 CFR 1910.120 (e)(8); each person's most recent training course must have been completed within the previous 365 days. Personnel must also have completed a physical exam in accordance with the requirements of 29 CFR 1910.120 (f), where the medical evaluation includes a judgment of the employee's ability to use respiratory protective equipment and to participate in hazardous waste site activities. These requirements are further discussed in SH&E 301, *Hazardous Waste Operations.*

If site monitoring procedures indicate that a possible exposure has occurred above the OSHA permissible exposure limit (PEL), employees may be required to receive supplemental medical testing to document specific to the particular materials present.

4.3 SAFETY TRAINING

The following SH&E SOPs contain specific training requirements applicable to all operations:

1. SH&E 109, *Hearing Conservation*
2. SH&E 112, *Respiratory Protection*
3. SH&E 113, *Personal Protective Equipment*
4. SH&E 114, *Safety Training Programs*
5. SH&E 115, *Hazard Communication Program*
6. SH&E 116, *Driver and Vehicle Safety*
7. SH&E 202, *Safety Meetings*
8. SH&E 204, *Task Hazard Analyses*
9. SH&E 204, *Emergency Action Planning and Prevention*
10. SH&E 601, *Hazardous Materials Shipping*

For this project, the training required to perform work includes:

1. HAZWOPER 40-hour and current 8-hour refresher,
2. 8-hour Supervisor (at least one person on site),
3. Hearing Conservation,
4. Respiratory Protection,
5. Site-Specific training/orientation (see below), and
6. First Aid/CPR training (at least one person on site).

The SSO (or designee) will confirm that all appropriate training requirements have been achieved and maintained appropriately. Refer to Section 4.3.1 below for site specific training requirements.

4.3.1 Site-Specific Training/Orientation

In addition to the general health and safety training programs, personnel will be provided with a site-safety orientation to include:

1. HASP: Instructed on the contents of applicable portions of this HASP and THAs developed for the tasks to be performed.
2. Hazard Communication: Informed about the potential routes of exposure, protective clothing, precautionary measures, and symptoms or signs of chemical exposure and heat stress.
3. Hazards and Recognition: Made aware of task-specific physical, chemical, biological hazards and other hazards that may be encountered during site work. This includes any potential confined space and lockout/tagout procedures.
4. Air Monitoring: Made aware of air monitoring requirements, including where to locate action levels.
5. Emergency Response Plan: Made aware of emergency response procedures.

The orientation will be documented by the signing-off of the HASP once all of the above topics have been reviewed by the employee and RM.

4.4 HAZARD COMMUNICATION

Section 5.2 provides information concerning the materials that may be encountered as environmental contaminants during the work activities. In addition, any organization wishing to bring any hazardous material onto any Earth Tech-controlled work site must first provide a copy of the item's Material Safety Data Sheet (MSDS) to the SSO for approval and filing (the SSO will maintain copies of all MSDSs on site). MSDSs may not be available for locally-obtained products, in which case some alternate form of product hazard documentation will be acceptable. In accordance with the requirements of SH&E 115, *Hazard Communication Program*, all personnel shall be briefed on the hazards of any chemical product they use, and shall be aware of and have access to all MSDSs.

All containers on site shall be properly labeled to indicate their contents. Labeling on any containers not intended for single-day, individual use shall contain additional information indicating potential health and safety hazards (flammability, reactivity, etc.).

Attachment B provides copies of MSDSs for those items planned to be brought on site at the time this HASP is prepared. This information will be updated as required during site operations.

4.5 CONFINED SPACE ENTRY

Confined space entry is not anticipated for this site. If confined spaces are identified, the SSO/site supervisor will inform all employees of the location of confined spaces and prevent unauthorized entry. Confined space entry procedures and training requirements are listed in SH&E 118.

4.6 HAZARDOUS, SOLID, OR MUNICIPAL WASTE

If hazardous, solid, and/or municipal wastes are generated during any phase of the project, the waste shall be accumulated, labeled, and disposed of in accordance with applicable Federal, State, and/or local regulations.

4.7 GENERAL SAFETY RULES

All site personnel shall adhere to SH&E 201, *General Safety Rules*, during site operations. In addition, the housekeeping and personal hygiene requirements listed below will also be observed.

4.7.1 Housekeeping

During site activities, work areas will be continuously policed for identification of excess trash and unnecessary debris. Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal. At no time will debris or trash be intermingled with waste PPE or contaminated materials.

4.7.2 Smoking, Eating, or Drinking

Smoking, eating and drinking will not be permitted inside any controlled work area at any time. Field workers will first wash hands and face immediately after leaving controlled work areas (and always prior to eating or drinking). Consumption of alcoholic beverages is prohibited at any Earth Tech site.

4.7.3 Personal Hygiene

The following personal hygiene requirements will be observed:

Water Supply: A water supply meeting the following requirements will be utilized:

Potable Water – An adequate supply of potable water will be available for field personnel consumption. Potable water can be provided in the form of water bottles, canteens, water coolers, or drinking fountains. Where drinking fountains are not available, individual-use cups will be provided as well as adequate disposal containers. Potable water containers will be properly identified in order to distinguish them from non-potable water sources.

Non-Potable Water – Non-potable water may be used for hand washing and cleaning activities. Non-potable water will not be used for drinking purposes. All containers of non-potable water will be marked with a label stating:

Non-Potable Water
Not Intended for Drinking Water Consumption

Toilet Facilities: A minimum of one toilet will be provided for every 20 personnel on site, with separate toilets maintained for each sex except where there are less than 5 total personnel on site. For

mobile crews where work activities and locations permit transportation to nearby toilet facilities on-site facilities are not required.

Washing Facilities: Employees will be provided washing facilities at each work location. The use of water and hand soap (or similar substance, such as wipes) will required by all employees following exit from the Exclusion Zone, prior to breaks, and at the end of daily work activities.

4.7.4 Buddy System

All field personnel will use the buddy system when working within any controlled work area. Personnel belonging to another organization on site can serve as "buddies" for Earth Tech personnel. Under no circumstances will any employee be present alone in a controlled work area.

4.7.5 Heat and Cold Stress

Heat and cold stress may vary based upon work activities, PPE/clothing selection, geographical locations, and weather conditions. To reduce the potential of developing heat/cold stress, be aware of the signs and symptoms of heat/cold stress and watch fellow employees for signs of heat/cold stress. For additional requirements, refer to SH&E 124, *Heat Stress*, and SH&E 125, *Cold Stress*.

4.7.6 Solar Protection

To protect against exposure to solar radiation, workers will observe the following requirements:

1. All workers will wear sunglass-type safety glasses (Z87.1 approved) at all times when working outdoors during daylight hours.
2. Workers will utilize a commercial sunblock with a minimum solar protection factor (SPF) of 15.

4.8 STOP WORK AUTHORITY

All employees have the right and duty to stop work when conditions are unsafe, and to assist in correcting these conditions. Whenever the SSO determines that workplace conditions present an uncontrolled risk of injury or illness to employees, immediate resolution with the appropriate supervisor shall be sought. Should the supervisor be unable or unwilling to correct the unsafe conditions, the SSO is authorized and required to stop work, which shall be immediately binding on all affected Earth Tech employees and subcontractors.

Upon issuing the stop work order, the SSO shall implement corrective actions so that operations may be safely resumed. Resumption of safe operations is the primary objective; however, operations shall not resume until the Safety Professional has concurred that workplace conditions meet acceptable safety standards.

4.9 CLIENT SPECIFIC SAFETY REQUIREMENTS

All contractors are required to attend the BAE contractors safety briefing before conducting any work on site.

5.0 HAZARD ASSESSMENT

5.1 TASK HAZARD ANALYSIS

Task hazard analysis (THA) is a technique used to identify hazards and hazard controls associated with a specific job function. THAs focus on the relationship between the workers, the task, the resources required to complete the task, and the work environment. These variables must be evaluated to identify the potential hazards associated with the task. Once identified, steps can be taken to eliminate, reduce, or control the hazards to an acceptable risk level.

Section 2.2 lists the work activities anticipated during this project. Individual THAs for the tasks associated with this work can be found in Attachment A. Refer to SH&E 204, *Task Hazard Analyses* for additional THA requirements.

5.1.1 Unanticipated Work Activities/Conditions

Operations at the site may require additional tasks not identified in Section 2.2 or addressed in Attachment A, THAs. Before performing any task not covered in this HASP a THA must be prepared, and approved by the Safety Professional.

5.2 ENVIRONMENTAL CONTAMINANT EXPOSURE HAZARDS

The following is a discussion of the hazards presented to worker personnel during this project from on-site chemical and radiological hazards known or suspected to be present on site. Hazards associated with chemical products brought to the site during work operations are addressed separately, under the Hazard Communication process described in Section 4.3.

Exposure symptoms and applicable first aid information for each suspected site contaminant listed in Section 2 are located in the following subsections. Additional data is provided in Chemical Safety Cards, located in Attachment C.

5.2.1 Methylene Chloride

Methylene chloride (MC) is a highly volatile chlorinated solvent. It is used in paint removers, in propellant mixtures for aerosol containers, as a solvent for plastics, as a degreasing agent, as an extracting agent in the pharmaceutical industry, and as a blowing agent in polyurethane foams. MC is a clear colorless liquid with a chloroform-like odor. It is slightly soluble in water and completely miscible wit most organic solvents. MC was historically used as an anesthetic. Inhaling the vapor may cause mental confusion, light-headedness, nausea, vomiting, and headache. Continued exposure may cause increased light-headedness, angina, staggering, unconsciousness, and even death due to the body's metabolism of methylene chloride to carbon monoxide resulting in high carboxyhemoglobin (COHb) levels. Skin exposure to liquid MC may cause irritation and burns, if left on the skin. Viton/Neoprene protective gloves are recommend to minimize skin contact with MC, while respiratory protection should consist of full-face air-purifying respirators equipped with organic vapor cartridges. The OSHA 8-hr TWA PEL for methylene chloride is 25 ppm as stated in

29 CFR 1910.1052, while the American Conference of Governmental Industrial Hygienist (ACGIH) threshold limit value (TLV) is 50 ppm.

5.2.2 Tetrachloroethene

Tetrachloroethene or perchloroethylene affects the central nervous system, causing uncoordination, headache, vertigo (loss of balance), light narcosis, dizziness, and unconsciousness. In extremely high concentrations death may occur. Various types of irritable effects have been attributed to PCE exposure. Some of the symptoms involved include: eye, nose, and throat irritation, indications of nausea and intestinal gas, and possible changes to both the liver and the kidneys. Skin exposure to PCE has not been seen to produce harmful effects in cases where the PCE was allowed to evaporate immediately after contact. However, in cases where skin was exposed to PCE frequently and for prolonged periods of time without evaporating, symptoms of dermatitis by defatting of the skin was evident. PCE is listed as an anticipated human carcinogen by the National Toxicology Program. The OSHA PEL and the ACGIH TLV are 25 ppm with an ACGIH STEL of 100.

5.2.3 1,1,1-Trichloroethane

1,1,1-TCA (also known as methyl chloroform) exhibits low oral toxicity. It can defat exposed skin of workers and cause redness and scaling. Although TCA is has a low systemic toxicity, it is an anesthetic capable of causing death if inhaled at concentrations of 14,000 ppm to 15,000 ppm. Fatalities that have occurred in poorly ventilated areas such as pits or tanks are attributed to anesthesia and/or sensitization of the myocardium to epinephrine. Quick and complete recovery is reported upon prompt removal of unconscious exposed persons from the area of exposure. The exposure standards are set to prevent initial anesthetic effects and/or objections to the odor. Both the OSHA PEL and the ACGIH TLV are 350 ppm, while the OSHA and ACGIH STELS are 450 ppm.

5.2.4 Trichloroethene

Moderate exposures to TCE cause symptoms similar to those of alcohol inebriation. Higher concentrations cause narcotic effects. Ventricular fibrillation has been cited as the cause of death following heavy exposures. TCE-induced hepatocellular carcinomas have been detected in mice during tests conducted by the National Cancer Institute. Organ systems affected by overexposure to TCE are the CNS (euphoria, analgesia, anesthesia), degeneration of the liver and kidneys, the lungs (tachypnea), heart (arrhythmia) and skin (irritation, vesication, and paralysis of fingers when immersed in liquid TCE). Contact with the liquid defats the skin, causing topical dermatitis. Certain people appear to experience synergistic effects from TCE exposure concomitant with exposure to caffeine, alcohol, and other drugs. Other reported symptoms of TCE exposure include abnormal fatigue, headache, irritability, gastric disturbances, and intolerance to alcohol. Both the OSHA PEL is 100 ppm while the ACGIH TLV is 50 ppm, the ACGIH STEL is set at 100 ppm.

5.2.5 1,1-Dichloroethane

1,1-DCA is a relatively non-toxic material. Effects of exposure are limited to slight depression of central nervous system function (anesthesia), and in extremely high exposures (over 1,000 ppm for

prolonged periods) damage to the liver. It is not considered to be a carcinogen based upon current data.

The OSHA PEL and the ACGIH TLV for 1,1-DCA are both 100 ppm. Exposure to 1,1-DCA is not expected to present a significant hazard in this project. Protection against inhalation exposure can be provided through the use of air purifying respiratory protection (using organic vapor cartridges). Use of protective clothing as specified for the work tasks to be performed is adequate to prevent skin contact

5.2.6 1,1-Dichloroethene

1,1-Dichloroethene, 1,1-dichloroethylene, or vinylidene chloride is an industrial chemical not found in the natural environment. 1,1-DCE is used to make certain plastics, such as flexible films like food wrap, and in packaging materials. It is also used to make flame retardant coatings for fiber and carpet backings, and in piping, coating for steel pipes, and in adhesive applications. Although it takes several days for it to break down in the air, 1,1-DCE breaks down very slowly in the water. In soil, 1,1-dichloroethene is slowly transformed to other less harmful chemicals.

Personnel installing groundwater monitoring wells and/or collecting samples may encounter 1,1-DCE. In significant doses and over time, 1,1-DCE *may* be a carcinogen since it has been shown to cause kidney, liver and skin cancer in animals. However the National Toxicology Program (NTP) does not classify it as a human carcinogen. Acute health effects of 1,1-DCE include irritations and burning to the skin, eyes, throat, and nose. When collecting groundwater samples, personnel must use PPE as specified in the THAs of this HASP.

The OSHA PEL of 1,1-DCE is 1 ppm in the air and the ACGIH TLV of 1,1-DCE is 5 ppm.

5.2.7 Semivolatile Organic Compounds

Semivolatile organic compounds (SVOCs) are a class of organic compounds composed primarily of carbon and hydrogen atoms that have boiling points greater than 200, and include such compounds as polynuclear aromatic hydrocarbons, chlorinated hydrocarbons, phthalate esters, organophosphate esters, nitroamines, haloethers, aldehydes, ethers, ketones, anilines, pyridines, quinolines, aromatic nitro compounds, and phenols.

Sites where nonhalogenated SVOCs may be found include burn pits, chemical manufacturing plants and disposal areas, contaminated marine sediments, disposal wells and leach fields, electroplating/metal finishing shops, firefighting training areas, hangars/aircraft maintenance areas, landfills and burial pits, leaking collection and system sanitary lines, leaking storage tanks, mixed waste disposal areas, oxidation ponds/lagoons, pesticide/herbicide mixing areas, solvent degreasing areas, surface impoundments, and vehicle maintenance areas and wood preserving sites.

As a class of compounds, there are both carcinogenic and non-carcinogenic health effects. PELs and TLVs vary depending on the specific compound.

5.2.8 Methyl Tert Butyl Ether

MTBE is present in gasoline as a performance-enhancing agent. MTBE is moderately irritating to the eyes and skin and exhibits moderate toxicity via inhalation. MTBE has no established OSHA PEL, but the ACGIH has established a TLV of 40 ppm. Protection from MTBE inhalation exposure can be provided through the use of air purifying respirators with organic vapor cartridges. Protection against skin contact can be obtained through the use of chemically protective clothing and gloves.

5.2.9 Toluene

Exposure to vapors of toluene may cause irritation of the eyes, nose, upper respiratory tract, and skin. Exposure to 200 ppm for 8 hours causes mild fatigue, weakness, confusion, tearing, and a sensation of prickling, tingling, or creeping on the skin that has no objective cause. Exposure to higher concentrations may cause headache, nausea, dizziness, dilated pupils, and euphoria. In severe cases, exposure to toluene may cause unconsciousness and death. The liquid is irritating to the eyes and the skin. Contact with the eyes may cause transient corneal damage, conjunctival irritation, and burns if not promptly removed. Repeated and/or prolonged contact with the skin may cause drying and cracking. Toluene may be absorbed through the skin in toxic amounts. Ingestion causes irritation of the gastrointestinal tract and may cause effects resembling those from inhalation of the vapor. Chronic overexposure to toluene may cause irreversible liver and kidney injury. Both the OSHA PEL and the ACGIH TLV are 50 ppm.

5.2.10 Xylene

Liquid xylene is a skin irritant that causes itching, dryness, and defatting. Prolonged contact may cause blistering. Inhaling xylenes can depress the CNS. Ingesting xylenes can result in gastrointestinal disturbance and possibly hematemesis (vomiting blood). Effects on the eyes, kidneys, liver, lungs, and the CNS are also reported. Both the OSHA PEL and the ACGIH TLV are 100 ppm.

5.2.11 Assessment of Exposure Hazards

Inhalation – Disturbing impacted areas may result in significant inhalation hazards and exposure to VOCs and dust. Respiratory protection will be identified for each task and outlined in each specific THA.

Skin Contact – Contact with impacted soils may occur during soil excavation and test-pitting/sampling activities. Chemically protective clothing will be outlined in each specific THA.

Ingestion – Ingestion of site contaminants may occur during soil excavation and test-pitting/ sampling activities. Good hygiene practices and decontamination will significantly reduce the potential for ingestion of contaminants.

5.3 PHYSICAL HAZARDS

The following physical hazards may be encountered during operations at the AFP59 site:

- Vehicles/equipment traffic (site vehicles, drill rigs, etc.)
- Cuts/lacerations/burns (while operating powered equipment, tools, handling sharp objects, etc.)
- Overhead/underground utilities
- Flying debris (concrete)
- Hazardous noise
- Electrical/powered equipment
- Overhead/falling objects
- Heavy lifting (items heavier than 49 pounds)
- Ergonomics (bending, etc.)
- Slips/trips/falls/protruding objects (uneven terrain, potholes, excavations, etc.)

5.4 BIOLOGICAL HAZARDS

Biological hazards present a unique obstacle to personnel performing operations involving bio-hazardous materials or working in environments that contain biological hazards. Protection must be identified and provided when biological hazards are anticipated. Specific SH&E requirements can be found in the following SOPs:

1. SH&E 608, Blood-borne Pathogens

Contact with bodies of water, animals, insects, and plants can cause injury and illness to personnel. Care must be taken to ensure that these types of injuries are avoided. Some examples of biological hazards include:

- Wild animals, such as snakes, raccoons, squirrels, and rats. These animals not only can bite and scratch, but can carry transmittable diseases (e.g., rabies). Avoid the animals whenever possible. If bitten, go to the nearest medical facility.
- Insects such as mosquitoes, ticks, bees, and wasps. Mosquitoes can potentially carry and transmit the West Nile Virus. Ticks can transmit Lyme disease or Rocky Mountain Spotted Fever. Bees and wasps can sting by injecting venom, which causes some individuals to experience anaphylactic shock (extreme allergic reaction). Whenever you will enter areas that provide a habitat for insects (e.g., grass areas, woods), wear light-colored clothing, long pants and shirt, and spray exposed skin areas with a DEET-containing repellent. Keep away from high grass wherever possible. Keep your eyes and ears open for bee and wasp nests. If bitten by insects, see a doctor if there is any question of an allergic reaction.
- Plants such as poison ivy and poison oak can cause severe rashes on exposed skin. Be careful where you walk, wear long pants, and minimize touching exposed skin with your hands after walking through thickly vegetated areas until after you have thoroughly washed your hands with soap and water.

6.0 ACTIVITY SPECIFIC REQUIREMENTS

6.1 SUPPLEMENTAL SAFETY PROCEDURES

As discussed in Section 5.0, personnel may be exposed to a variety of chemical, physical, and biological hazards. The requirements for the control of many of these hazards these hazards is discussed in SH&E SOP Manual. Specifically, the 300, 400, 500, and 600 series of the SH&E SOP Manual provide specific information regarding hazard control and the requirements necessary to complete tasks in a safe manner.

6.1.1 Utilities

Various forms of underground/overhead utility lines or pipes may be encountered during site activities. Prior to the start of intrusive operations, utility clearance is mandated, as well as obtaining authorization from all concerned public utility department offices. Should intrusive operations cause equipment to come into contact with utility lines, the SSO and an Earth Tech SH&E Professional will be notified immediately. Work will be suspended until the applicable utility agency is contacted and the appropriate actions for the particular situations can be taken. For this site, the applicable agency is Call 811. The phone number is provided in the Emergency Contacts list found in table 9-1. For additional requirements, refer to SH&E 402, *Excavation & Trenching*; SH&E 403, *Drilling*; and SH&E 310, *Overhead Electrical Lines*.

6.1.2 Manual Lifting

Most materials associated with investigation and remedial activities are moved by hand. The human body is subject to severe damage in the forms of back injury, muscle strains, and hernia if caution is not observed in the handling process. Whenever possible, use at least two people to lift, or roll/lift with your arms as close to the body as possible. Under no circumstances should any one person lift more than 49 pounds unassisted. For additional requirements, refer to SH&E 404, *Manual Materials Handling*.

6.1.3 Heavy Equipment and Vehicle Operations

Heavy equipment and site vehicles present serious hazards site personnel. Blind spots, failure to yield, and other situations may cause heavy equipment/vehicles to come into contact with personnel. To reduce the possibility of contact between equipment/traffic and personnel, always adhere to the following:

- Personnel must wear a high visibility, reflective safety vest at all times when working near heavy equipment and/or other vehicle traffic.
- Personnel must always yield to equipment/vehicle traffic and stay at least 100 feet away from all equipment/vehicle traffic. Always maintain eye contact with operators.
- When feasible, place barriers between work areas and equipment/vehicle traffic.
- Always ensure reverse warning alarms are working and louder than surrounding noise. Personnel must report inoperative reverse warning alarms.

For additional requirements, refer to SH&E 513, *Heavy Earth Working Equipment*.

6.1.4 Slips, Trips, Falls, and Protruding Objects

A variety of conditions may exist that may result in injury from slips, trips, falls, and protruding objects. Slips and trips may occur as a result of wet, slippery, or uneven walking surfaces. To prevent injuries from slips and trips, always keep work areas clean; keep walkways free of objects and debris; and report/clean up liquid spills. Serious injuries may occur as a result of falls from elevated heights. Always wear fall protection while working at heights of 6 feet or greater above the next lower level. Protruding objects are any object that extends into the path of travel or working area that may cause injury when contacted by personnel. Always be aware of protruding objects and when feasible remove or label the protruding object with an appropriate warning.

6.1.5 Electrical and Powered Equipment

Electrical and powered equipment may be used during a variety of site activities. Injuries associated with electrical and powered equipment include electric shock, cuts/lacerations, eye damage (from flying debris), and burns. To reduce the potential of injury from the hazards associated with electrical and powered equipment, always comply with the following:

- Wear American National Standards Institute (ANSI)-approved (Z87.1) safety glasses. Faceshields may be required to provide additional face protection from flying debris.
- Wear appropriate work gloves. Work gloves may reduce the severity of burns and cuts/lacerations.
- Use ground fault circuit interrupters (GFCIs) when using electrical powered tools/equipment. GFCIs prevent electrical shock by detecting the loss of electricity from a power cord and/or electrical device.
- Use lockout/tagout procedures when performing maintenance or repairs on equipment.

6.1.6 Noise

Hazardous noise may be produced during site activities by heavy equipment, powered tools, and other equipment or operations. Refer to SH&E 109, *Hearing Conservation Program* for requirements regarding hazardous noise and hearing protection.

6.1.7 Spill Prevention

Work activities may involve the use of hazardous materials (i.e. fuels, solvents) or work involving drums or other containers. The following procedures will be used to prevent or contain spills:

- All hazardous material will be stored in appropriate containers
- Tops/lids will be placed back on containers after use.
- Containers of hazardous materials will be stored appropriately away from moving equipment.

At least one spill response kit, to include an appropriate empty container, materials to allow for booming or diking the area to minimize the size of the spill, and appropriate clean-up material (i.e. speedy dri) shall be available at each work site (more as needed).

- All hazardous commodities in use (i.e. fuels) shall be properly labeled.
- Containers shall only be lifted using equipment specifically manufactured for that purpose.
- For drums/containers, follow the procedures in SH&E 405, *Handling of Drums and Large Containers*, to minimize spillage.

6.2 EXPOSURE MONITORING PROCEDURES

Monitoring procedures will be employed during site characterization activities to assess employee exposure to chemical and physical hazards. Monitoring will consist primarily of onsite determination of various parameters (e.g., airborne contaminant concentrations and heat stress effects), but may be supplemented by more sophisticated monitoring techniques, if necessary. Refer to SH&E 111, *Employee Exposure Monitoring* and SH&E 301, *Hazardous Waste Operations* for additional requirements.

6.2.1 Real-Time Exposure Measurement

Monitoring shall be performed within the work area on site in order to detect the presence and relative levels of toxic substances. The data collected throughout monitoring shall be used to determine the appropriate levels of PPE. Monitoring shall be conducted as specified in each THA (Attachment A) as work is performed.

Table 6-1 specifies the real-time monitoring equipment which will be used for this project.

Table 6-1
Monitoring Parameters and Equipment

Instrument	Manufacturer/Model*	Substances Detected
Photoionization Detector (PID)	RAE Systems mini-RAE Photovac Microtip HNu Model Hnu (min. 10.2 eV bulb)	Petroleum hydrocarbons Organic Solvents

6.2.1.1 Health and Safety Action Levels

An action level is a point at which increased protection is required due to the concentration of contaminants in the work area or other environmental conditions. The concentration level (above background level) and the ability of the PPE to protect against that specific contaminant determine each action level. The action levels are based on concentrations in the breathing zone.

If ambient levels are measured which exceed the action levels in areas accessible to unprotected personnel, necessary control measures (barricades, warning signs, and mitigative actions, etc.) must be implemented prior to commencing activities at the specific work area.

Personnel should also be able to upgrade or downgrade their level of protection with the concurrence of SSO or the Safety Professional.

Reasons to upgrade:

- Known or suspected presence of dermal hazards.
- Occurrence or likely occurrence of gas, vapor, or dust emission.
- Change in work task that will increase the exposure or potential exposure to hazardous materials.

Reasons to downgrade:

- New information indicating that the situation is less hazardous than was originally suspected.
- Change in site conditions that decrease the potential hazard.
- Change in work task that will reduce exposure to hazardous materials.

Table 6-2
Monitoring Procedures and Action Levels

Parameter	Location and Interval	Response Level (Meter Units/Ppm Above Background)	Response
Hydrocarbons (Total by PID)*	Continuously during disturbance of potentially impacted materials (drilling, sampling, etc.) in the worker's breathing zone or in the immediate work area.	< 10	Level D work and continue monitoring (not applicable for initial assessment of unknown drums or containers.
		≥ 10 – 50 (Sustained for more than 5 minutes)	Contact the SSO, and if no potential for change in conditions exist (drum/container activities increasing airborne levels), don Level C (GMA/P100 cartridges or equivalent chemical cartridge combined with P100) and continue monitoring.
		≥ 50 (Sustained for more than 5 minutes)	Level B ensemble as listed in SH&E 301, *Hazardous Waste Operations* and per SSO and SH&E Manager.

6.2.1.2 Monitoring Equipment Calibration

All instruments used will be calibrated at the beginning and end of each work shift, in accordance with the manufacturer's recommendations. If the owner's manual is not available, the personnel operating the equipment will contact the applicable office representative, rental agency, or manufacturer for technical guidance for proper calibration. If equipment cannot be pre-calibrated to specifications, site operations requiring monitoring for worker exposure or off-site migration of contaminants will be postponed or temporarily ceased until this requirement is completed.

6.2.1.3 Personal Sampling

Should site activities warrant performing personal sampling to better assess chemical exposures experienced by Earth Tech employees, the SSO, under the direction of a Certified Industrial Hygienist (CIH), will be responsible for specifying the monitoring required. Within five working days after the receipt of monitoring results, the CIH will notify each employee, in writing, of the results that represent that employee's exposure. Copies of air sampling results will be maintained in the project files.

Should the site activities warrant, the subcontractor will ensure its employees' exposures are quantified via the use of appropriate sampling techniques. The subcontractor shall notify the employees sampled in accordance with health and safety regulations, and provide the results to the SSO for use in determining the potential for other employees' exposure.

7.0 PERSONAL PROTECTIVE EQUIPMENT

7.1 PERSONAL PROTECTIVE EQUIPMENT

The purpose of PPE is to provide a barrier, which will shield or isolate individuals from the chemical and/or physical hazards that may be encountered during work activities. SH&E 113, *Personal Protective Equipment*, lists the general requirements for selection and usage of PPE. Table 7-1 lists the minimum PPE required during site operations and additional PPE that may be necessary. The specific PPE requirements for each work task are specified in the individual THAs found in Attachment A.

By signing this HASP you are agreeing that you have been properly trained in the use, limitations, care and maintenance of the protective equipment you will use at this project. If you have not received training on the proper use, care, and limitations of the PPE required for this project, please see the PM/SSO for the proper training prior to signing this HASP.

Table7-1
Personal Protective Equipment

Type	Material	Additional Information
Minimum PPE:		
Safety Vest	High-visibility	Must have reflective tape and be visible from all sides
Boots	Leather	ANSI Z41-approved safety toe
Safety Glasses w/sideshields		ANSI Z87.1-approved
Hard Hat		ANSI-approved
Work Uniform		No shorts/cutoff jeans or sleeveless shirts
Additional PPE:		
Hearing Protection	Ear plugs and/ or muffs (minimum 29 NRR)	In hazardous noise areas
Work Gloves	Leather	If working with sharp objects or powered equipment.
Protective Chemical Gloves	Inner: Nitrile Outer: Heavy Duty Nitrile	
Protective Chemical Coveralls	Inner: Tyvek® or equivalent Outer: Tychem SL® or equivalent	Wear outer coveralls if potential for splash hazard exists.
Protective Chemical Boots	Rubber, neoprene, PVC	
Level C Respiratory Protection	MSA (Full Face or equivalent) equipped with GMA/P100	Cartridge change out schedule: At the end of each work shift.
Level B Respiratory Protection	Self Contained Breathing Apparatus (SCBA), Airline with 5 minute escape pack.	Grade "D" Certified Air (Certificate Required). Obtain certificate of analysis from compressed gas vendor.
Face Protection	Debris/splash shield	

7.2 DECONTAMINATION

All requirements for performing personal and equipment decontamination may be found in SH&E 604, *Decontamination*.

7.2.1 Personal Protective Equipment Doffing and Donning Information

The following information is to provide field personnel with helpful hints that, when applied, make donning and doffing of PPE a more safe and manageable task:

- Never cut disposable booties from your feet with basic utility knives. This has resulted in workers cutting through the booty and the underlying sturdy leather work boot, resulting in significant cuts to the legs/ankles. Recommend using a pair of scissors or a package/letter opener (cut above and parallel with the work boot) to start a cut in the edge of the booty, then proceed by manually tearing the material down to the sole of the booty for easy removal.
- When applying duct tape to PPE interfaces (wrist, lower leg, around respirator, etc.) and zippers, leave approximately one inch at the end of the tape to fold over onto itself. This will make it much easier to remove the tape by providing a small handle to grab while still wearing gloves. Without this fold, trying to pull up the tape end with multiple gloves on may be difficult and result in premature tearing of the PPE.
- Have a "buddy" check your ensemble to ensure proper donning before entering controlled work areas. Without mirrors, the most obvious discrepancies can go unnoticed and may result in a potential exposure situation.
- Never perform personal decontamination with a pressure washer.

7.2.2 Disposal of PPE & Decontamination Materials

All PPE and decontamination materials (i.e., rinsate, tubs, brushes, etc.) must be disposed of in accordance with federal, state, and local regulations. Contaminated PPE and decontamination materials may need to be disposed of as hazardous waste based on the types and degree of contamination.

8.0 SITE CONTROL

8.1 GENERAL

The purpose of site control is to minimize potential contamination of workers, protect the public from site hazards, and prevent vandalism. The degree of site control necessary depends on the site characteristics, site size, and the surrounding community.

Controlled work areas will be established at each work location, and if required, will be established directly prior to the work being conducted. Diagrams designating specific controlled work areas will be drawn on site maps, posted in the support vehicle or trailer, and discussed during the daily safety meetings. If the site layout changes, the new areas and their potential hazards will be discussed immediately after the changes are made. A general example of a zone layout has been developed for site activities and is attached to this section.

8.2 CONTROLLED WORK AREAS

Each HAZWOPER controlled work area will consist of the following three zones:

- Exclusion Zone: Contaminated work area.
- Contamination Reduction Zone: Decontamination area.
- Support Zone: Uncontaminated or "clean area" where personnel should not be exposed to hazardous conditions.

Each zone will be periodically monitored in accordance with the air monitoring requirements established in this HASP. The Exclusion Zone and the Contamination Reduction Zone are considered work areas. The Support Zone is accessible to the public (e.g., vendors, inspectors).

8.2.1 Exclusion Zone

The Exclusion Zone is the area where primary activities occur, such as sampling, remediation operations, installation of wells, cleanup work, etc. This area must be clearly marked with hazard tape, barricades or cones, or enclosed by fences or ropes. Only personnel involved in work activities, and meeting the requirements specified in the applicable THA and Sections 4.1 and 4.2, will be allowed in an Exclusion Zone.

The extent of each area will be sufficient to ensure that personnel located at/beyond its boundaries will not be affected in any substantial way by hazards associated with sample collection activities. To meet this requirement, the following minimum distances will be used:

- **Direct Push Drilling and Sampling Activities**. A distance of 30 feet in all directions will be cleared from the area.

All personnel should be alert to prevent unauthorized, accidental entrance into controlled-access areas (the Exclusion Zone and Contamination Reduction Zone [CRZ]). If such an entry should occur, the trespasser should be immediately escorted outside the area, or all HAZWOPER-related

work must cease. All personnel, equipment, and supplies that enter controlled-access areas must be decontaminated or containerized as waste prior to leaving (through the CRZ only).

8.2.2 Contamination Reduction Zone

The CRZ is the transition area between the contaminated area and the clean area. Decontamination is the main focus in this area. The decontamination of workers and equipment limits the physical transfer of hazardous substances into the clean area. This area must also be clearly marked with hazard tape and access limited to personnel involved in decontamination. Decontamination procedures are further explained in SH&E 604.

8.2.3 Support Zone

The Support Zone is an uncontaminated zone where administrative and other support functions, such as first aid, equipment supply, emergency information, etc., are located. The Support Zone shall have minimal potential for significant exposure to contaminants (i.e., background levels).

Employees will establish a Support Zone (if necessary) at the site before the commencement of site activities. The Support Zone would also serve as the entry point for controlling site access.

8.3 SITE ACCESS DOCUMENTATION

All personnel entering the site shall complete the "Site Entry/Exit Log" located at the Command Post.

If implemented by the PM, all personnel required to enter established site control zones shall complete the Exclusion and/or "Hot Zone" Log located at the decontamination area.

8.3.1 Visitor Access

Visitors to any HAZWOPER controlled-work area must comply with the health and safety requirements of this HASP, and demonstrate an acceptable need for entry into the work area. All visitors desiring to enter any controlled work area must observe the following procedures:

1. A written confirmation must be received by Earth Tech documenting that each of the visitors has received the proper training and medical monitoring required by this HASP. Verbal confirmation can be considered acceptable provided such confirmation is made by an officer or other authorized representative of the visitor's organization.
2. Each visitor will be briefed on the hazards associated with the site activities being performed and acknowledge receipt of this briefing by signing the appropriate tailgate safety briefing form.
3. All visitors must be escorted by the PM or designee.

If the site visitor requires entry to any Exclusion Zone, but does not comply with the above requirements, all work activities within the Exclusion Zone must be suspended. Until these requirements have been met, entry will not be permitted.

8.4 SITE SECURITY

Site security is necessary to:

- Prevent the exposure of unauthorized, unprotected people to site hazards.
- Avoid the increased hazards from vandals or persons seeking to abandon other wastes on the site.
- Prevent theft.
- Avoid interference with safe working procedures.

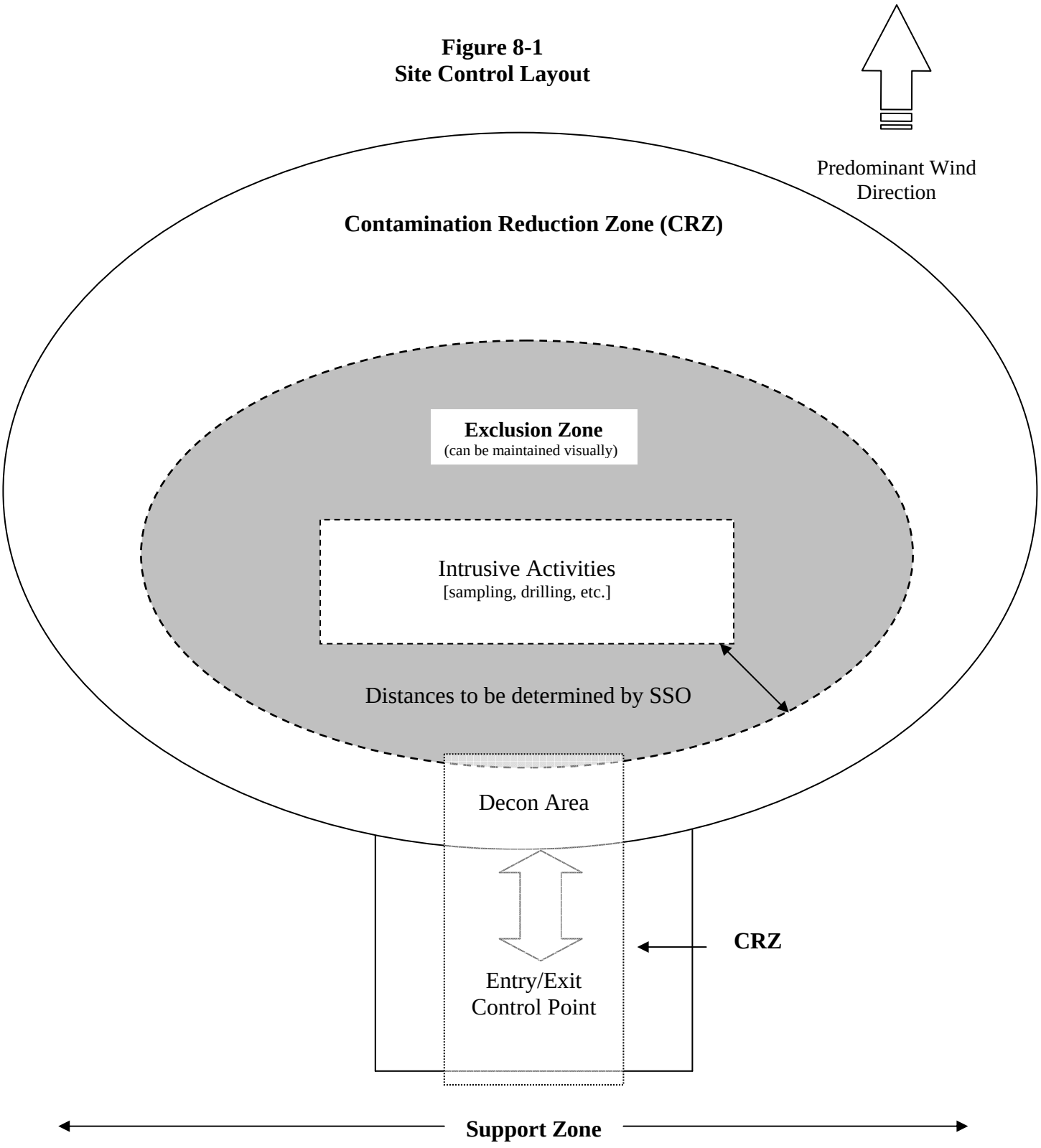
To maintain site security during working hours:

1. Maintain security in the Support Zone and at access control points.
2. Establish an identification system to identify authorized persons and limitations to their approved activities.
3. Assign responsibility for enforcing authority for entry and exit requirements.
4. When feasible, install fencing or other physical barrier around the site.
5. If the site is not fenced, post signs around the perimeter and whenever possible, use guards to patrol the perimeter. Guards must be fully apprised of the hazards involved and trained in emergency procedures.
6. Have the PM approve all visitors to the site. Make sure they have valid purpose for entering the site. Have trained site personnel accompany visitors at all times and provide them with the appropriate protective equipment.

To maintain site security during off-duty hours:

1. If possible, assign trained, in-house technicians for site surveillance. They will be familiar with the site, the nature of the work, the site's hazards, and respiratory protection techniques.
2. If necessary, use security guards to patrol the site boundary. Such personnel may be less expensive than trained technicians, but will be more difficult to train in safety procedures and will be less confident in reacting to problems around hazardous substances.
3. Enlist public enforcement agencies, such as the local police department, if the site presents a significant risk to local health and safety.
4. Secure the equipment.

Figure 8-1
Site Control Layout



9.0 EMERGENCY RESPONSE PLANNING

Emergencies are uncontrolled circumstances that can result in damage to personnel or property. Emergencies can be a result of the work process (e.g., hazardous material spills), or environmental conditions, such as severe weather. Once identified, response to emergencies typically occurs in three stages: communication, evacuation, and mitigation (response or control method). In addition, the emergency response procedures will vary with each situation. Table 9-2 at the end of this plan serves as a guideline for responding to emergencies at the AFP 59 Vapor Intrusion Investigation site.

9.1 COMMUNICATION PROCEDURES

Communication procedures consist of the verbal, audio, and visual methods of notifying the appropriate personnel of an emergency, as well as the necessary protocols for notification. The communication of an emergency consists of three (3) phases:

1. Initial communication:

   The individual(s) who identify an emergency must immediately notify the Emergency Coordinator (EC). If necessary, the individual(s) may contact emergency services (e.g., 911) and/or order an evacuation of the work area prior to contacting the EC.

2. Evacuation:

   If necessary, the EC will notify all personnel to evacuate the work area and proceed to the appropriate muster location(s). Additional notifications will be made to subcontractors, other employers, the client, and public if necessary. See Section 1.2 below.

3. Mitigation/Control Measures:

   The EC will communicate any necessary measures to control or reduce the potential impact of the emergency to employees or emergency units. See Section 1.3 below.

Prior to performing any site activities, emergency communication and alarm methods must be developed (see Table 9-2) and communicated to ensure all site personnel are knowledgeable of protocol. When developing the alarm methods, consideration must also be given as to how the employees who hear/see the alarm will respond. For example, some alarms consist of a long, steady whistle to signify a fire, whereas two short alarm bursts, followed by a pause, followed by two short bursts, can signify that equipment shall be shut down and all personnel shall immediately proceed to the muster location(s).

In addition, personnel must be able to contact the EC and/or outside emergency units as needed. Therefore, mobile communication systems (e.g., radio, cell phone, horn, etc.) must be available to employees in the work zone. Emergency numbers are listed in Table 9-1 and must be posted at all exits of the site/project office and in all site vehicles.

9.1.1 Earth Tech Corporate Incident Reporting Procedures

All accidents, incidents, near-misses, and emergency situations that occur on-site during any field activity will be promptly reported to the SSO and the PM in accordance with Earth Tech Safety Procedure SH&E 101, *Injury, Illness, and Near-Miss Reporting*.

If any Earth Tech employee is injured and requires medical treatment, the PM will contact **Earth Tech's Incident Reporting Line at (800) 348-5046 immediately**. The PM will initiate a written report, using the ***Supervisor's Report of Incident*** form (see SH&E 101). The PM will complete the form and forward to the Section Manager and Corporate Safety Administrator by the following work day.

If any employee of a subcontractor is injured, documentation of the incident will be accomplished in accordance with the subcontractor's procedures; however, copies of all documentation (which at a minimum must include the OSHA Form 301 or equivalent) must be provided to the SSO within 24 hours after the accident has occurred.

9.2 EVACUATION PROCEDURES

Evacuation of the work zone and other areas will be required if it is determined that an emergency may result in injury or illness to personnel. Specific examples include large fire/explosion, chemical spill or release, severe weather event, and security threats. The EC will determine if an evacuation is necessary based on the severity of the emergency. However, any person may order an evacuation or sound an evacuation alarm to protect the safety of site personnel.

Upon the issuance of an evacuation order or alarm, personnel must evacuate the work zone and proceed directly to the appropriate muster location(s). Muster locations must be of sufficient distance from the emergency location and/or of sufficient structure and stability to protect personnel from the hazards.

Prior to beginning site operations, the EC will identify the appropriate emergency routes and muster locations in Table 9-2. If necessary, the EC may develop evacuation routes and muster locations for various buildings or sections of the site. In addition, the EC may and is encouraged to use site specific maps to identify the appropriate evacuation routes and muster locations. Emergency routes must be posted in the appropriate work areas and communicated to personnel.

In the event that an evacuation is ordered, the following general requirements apply:

- Work activities will cease and all personnel will be evacuated from the work location. The evacuation will proceed in a direction opposite the critically affected area, with all personnel assembling in a pre-designated location outside of the site.
- A headcount will be taken of the assembled employees by the EC.
- In the event that outside response agencies must respond, an individual will be identified to meet emergency responders at the site entrance or pre-determined location.

9.3 MITIGATION & CONTROL MEASURES

The implementation of mitigation and control measures are designed to reduce and/or eliminate the potential effects of emergencies. Known control measures for emergencies will be listed in Table 9-2.

9.4 RESPONSIBILITIES & TRAINING

9.4.1 Emergency Coordinator

The RM will assume the duties of the EC. In addition, the RM will select a competent person to act as the alternate EC. The duties of the EC and the alternate EC have been specified in SH&E 205 and are listed below:

- Responsible for the completing the emergency information (e.g., signals, muster points, etc.) located in Table 9-2 *Emergency Procedures* prior to beginning site activities and updating as needed. Table 9-2 must be posted in prominent locations on site.
- Responsible for directing all actions in emergency situations, until relieved by outside emergency response units (i.e., Fire Department).
- Responsible for ensuring all Earth Tech employees on site are trained in the provisions of this plan, and the required actions.
- Designates specific communication procedures to ensure that all personnel are alerted to potential emergency conditions, and what actions are required.
- Continually reviews this plan to ensure that identified hazards and actions are adequate for the office and/or facility.
- Designates personnel to perform specific duties during emergencies, such as taking muster, and directing emergency responders to the site(s).
- Responsible for ensuring other contractors at the office are notified as to the potential emergencies associated with Earth Tech work, and that the contractors provide information as to potential emergencies associated with their work processes. Also, ensures that the contractor's hazards and emergency warning systems are communicated to Earth Tech employees.
- Ensures that all hazard signs (e.g., exit signs) and floor plans are posted as required. Ensures that emergency exit doors are not blocked, are labeled, and are not locked at any time.
- Establishes criteria and scheduling of emergency drills for Earth Tech employees. Critiques the drill results, and works with the supervisors to correct any observed deficiencies.
- Ensures that new employees are trained on the provisions of this plan prior to entering the work site. Ensures that visitors are either trained on the provisions of this plan, or are continually escorted by a trained employee.

9.4.2 Site Personnel

- Ensure compliance with all provisions of this plan.
- Alert the Emergency Coordinator/Supervisor to any observed conditions that can create an emergency situation.
- Notify the Emergency Coordinator/Supervisor of any change in work conditions that may impact the identified hazards in this plan.
- Do not block emergency exits or accesses.
- Participate in drills that are conducted to ensure the adequacy of the plan.

9.4.3 Subcontractors, Visitors, and Client Personnel

Subcontractors, visitors, and client personnel will follow the emergency action plans of their respective employers for the operations being performed.

Table 9-1
Emergency Contacts

Emergency Coordinators / Key Personnel			
Name	**Title/Workstation**	**Telephone Number**	**Cellular Phone**
George Walters	Client Contact	937-255-1988	
David Parse	Project Manager	703-706-0508	
Phil Granger	Supervisor/SSO/EC	949-330-2316	Same
Jim Brown	Safety Manager	814-515-8300	804-564-4733
George Sauer	Safety Professional	703-706-0514	703-625-8664
Brett Hodgson	Safety Professional	616-940-4444	616-446-6910
Incident Reporting	**Corporate Safety**	**800-348-5046**	
Organization / Agency			
Name			**Telephone Number**
Police Department			911
Fire Department			911
State Police			911
Ambulance Service ***(EMT will determine appropriate hospital for treatment)***			911
Poison Control Center			800-222-1222
Pollution Emergency			800-292-4706
National Response Center			800-424-8802
Chem-Trec			800-424-9300
Title 3 Hotline			800-424-9346
Hospital			
Wilson Memorial Regional ***(Use by site personnel is only for non-emergency cases)***			703-670-6000
57 Harris Street			
Johnson City, New York (Hospital Route Maps on following page)			
Hospital Route: From site go east on Main Street to Harrison and turn right. Follow			
Earth Tech Approved Occupational Clinic			
Health Care Occupational Services			607 762-6312
33 Mitchell Ave.Binghamton, NY			
South on Rt. 201, East on Vestal Pkwy E, Right on Pennsylvania Ave, Left on Vestal Ave., Right on Mitchell Ave.			
Public Utilities			
Name			**Telephone Number**
Call 811			811

Figure 9-1
Site/Hospital Route/Detail Map

Figure 9-2
Site/Occupational Clinic Route/Detail Map

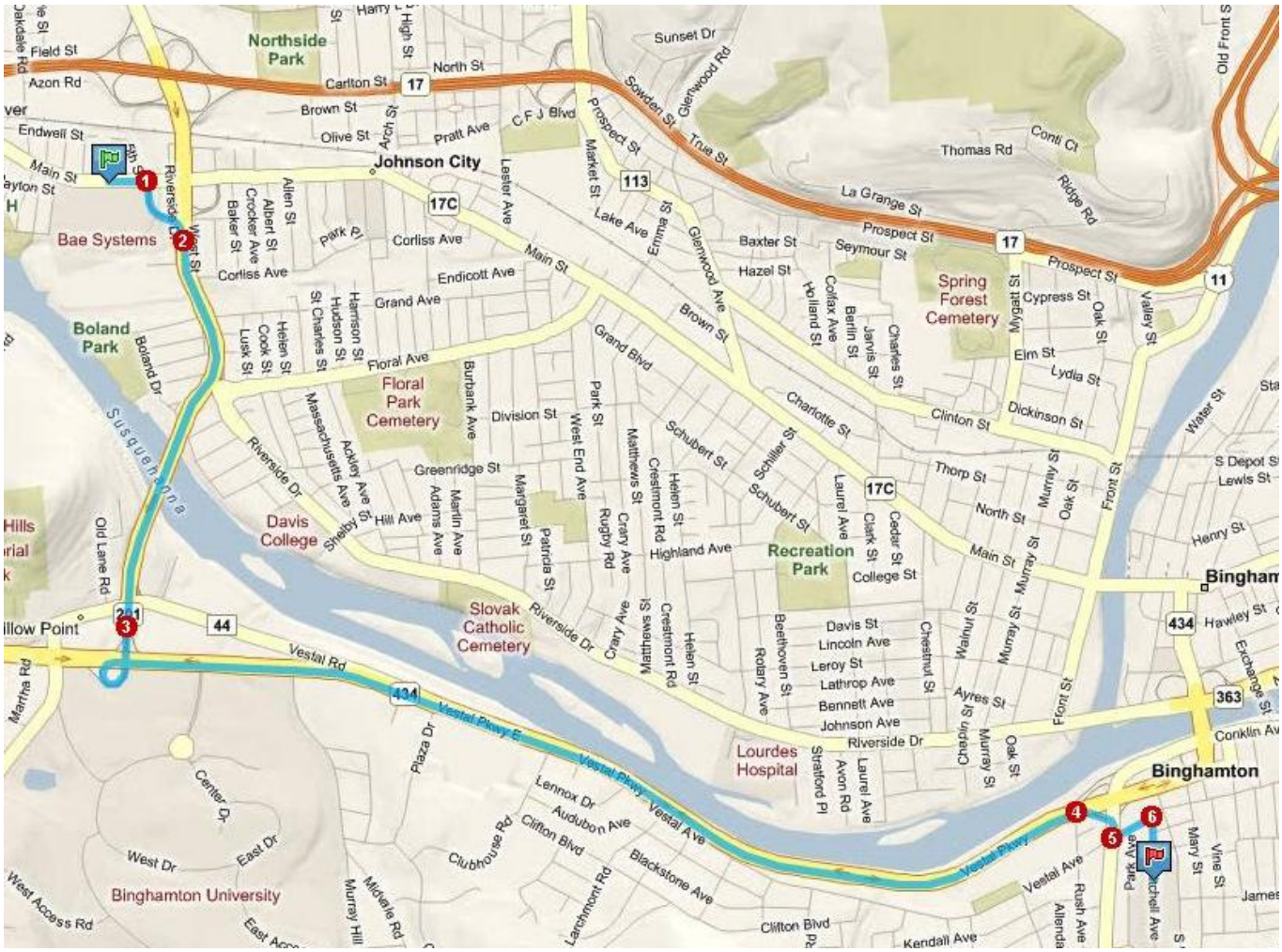


Table 9-2
Emergency Procedures (SSO to complete Table 9-2 during site orientation/morning tailgate and communicate to crew)

Emergency	Response Procedures		
	Communication	**Mitigation/Control**	**Evacuation**
Medical Emergency	If life-threatening, **contact 911** immediately and notify Supervisor.	If qualified, perform First Aid-CPR. Keep victim calm and watch for symptoms of shock. Emergency response personnel will transport victims to hospital.	Do not move victim unless imminent threat (e.g., fire, explosion, chemical exposure, etc.) is present.
Chemical Exposure	Report incident to Supervisor immediately.	Refer to chemical safety card or MSDS for appropriate treatment measures.	Remove individual from danger area.
Other Incident/Near Miss	Report incident to Supervisor immediately. Supervisor will contact safety department.	For non-life threatening injuries or illness, transport victim to the hospital listed in Figure 9-1.	None anticipated
Severe Weather	Supervisor will notify foreman via radio when severe weather is approaching or use the following signal:	Allow sufficient time for decontamination and shut down of operations.	**If severe weather is imminent, evacuate to the following shelter(s):**
Tornado	Supervisor will notify foreman via radio if severe weather may result in tornado activity **or use the following signal:**	Allow sufficient time for decontamination and shut down of operations.	**Tornado shelter location(s):**
Small Fire* * *Less than the size of a small trash can.*	Notify Supervisor to **contact 911** immediately. **Notify all personnel evacuate or use the following signal:**	Determine if fire can be safely contained with a fire extinguisher.	See evacuation route map(s). **Exit facility and muster at the following location(s):**
Large Fire/Explosion	Notify Supervisor to **contact 911** immediately. **Notify all personnel to evacuate or use the following signal:**	None anticipated. Evacuate immediately.	See evacuation route map(s). **Exit facility and muster at the following location(s):**
Spills/Release	Notify Supervisor. Supervisor will contact PM and determine if additional agencies must be notified.	Don Level B PPE (see HASP). Complete THA. Use spill kit and diking procedures to contain spill.	See evacuation route map(s). Exit facility and move upwind at least 1000 feet.
Security Threat	Notify Supervisor. **Contact 911**.	Keep vehicles locked and valuables out of sight.	None anticipated.

10.0 PERSONNEL ACKNOWLEDGEMENT

By signing below, the undersigned acknowledges that he/she has read and reviewed the Earth Tech HASP for the AFP 59 Vapor Intrusion Investigation site. The undersigned also acknowledges that he/she has been instructed in the contents of this document and understands the information pertaining to the specified work, and will comply with the provisions contained therein.

Print Name	Signature	Organization	Date

ATTACHMENT A
Task Hazard Analyses

TASK NAME

MOBILIZATION/DEMOBILIZATION

TASK DESCRIPTION

This task hazard analysis refers to the process of mobilizing and demobilizing the people and the materials to complete the tasks outlined in the HASP/WP. This applies primarily to moving/loading/unloading of equipment and materials and the set up of office trailers and work zones. This THA does not cover the actual hazards present within the exclusion zone and work areas. This THA does apply whenever new materials are brought to the site or removed from the site.

CHEMICAL EXPOSURE HAZARDS

- None anticipated
- Refer Section 5 of HASP

PPE

Level D

- High-visibility reflective safety vest
- ANSI-approved hardhat.
- ANSI-approved safety glasses.
- ANSI-approved steel toe safety shoes/boots.

OTHER SAFETY EQUIPMENT

- Leather gloves when handling sharp object or operating powered equipment
- Hearing protection (minimum 29 NRR)
- Fall protection (contact Safety Professional)
- First aid kit
- Fire extinguisher

PHYSICAL HAZARDS

- Cuts/lacerations (handling of sharp objects, etc.)
- Heavy lifting (objects over 49 pounds)
- Equipment traffic (drill rig street traffic, etc.)
- Slips/trips/falls/protruding objects
- Heat/cold stress
- Hazardous noise levels
- Falls/elevated heights (6 feet or more above next lower level, site trailer set-up, etc.)

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- SH&E 201, General Safety Rules
- SH&E 210, Walking/Working Surfaces Protection
- SH&E 404, Manual Materials Handling
- SH&E 505, Powered Hand Tools
- SH&E 506, Manual Hand Tools

ADDITIONAL SAFETY CONSIDERATIONS

1. Use spotters when loading/unloading heavy equipment, forklifts, etc. Stand clear of these operations.
2. Do not enter tank, vats, sumps, holes, or other potential confined spaces without a Confined Space Entry Procedure, Hazard Evaluation, and Permit completed.

MONITORING PROCEDURES

Monitoring is not anticipated for this task.

EarthTech
A tyco International Ltd. Company

Task Hazard Analysis (THA)
AFP 59 Vapor Intrusion Investigation
Johnson City, New York

ADMINISTRATIVE INFORMATION

Job/Task Name: Concrete slab drilling	
Project Name: AFP 59 Vapor Intrusion Investigation	Project Location: AFP 59 Johnson City, NY
Project Manager: Dave Parse	Analysis Performed By: Phil Granger
Date Job/Task to be performed: Jan. 7-11, 2008	Type of Job/Task: ☐ One time ☒ Routine job/task
Responsible Organization: Earth Tech, Inc.	Job Supervisor: Phil Granger

Job Event Sequence

LIST ONE STEP OF THE JOB FOR EACH LINE. (*ATTACH ADDITIONAL JOB EVENT SEQUENCE FORM(S) AS NECESSARY*) **PAGE** 1 **OF** 2

1. Daily tailgate safety briefing	6. Drill a 2 inch hole the wooden floor w/ drill
2. Don applicable PPE	7. Drill a 1/2 –inch hole through concrete slab using a hammer drill
3. Mark locations of sub-slab samples	8. Insert sample tubing into sub-base material, seal tubing with modeling clay and collect sample
4. Have on-site facilities personnel clear locations for utilities	9. Remove modeling clay and tubing
5. Inspect Drill and correct any deficiencies	10. Patch hole with concrete mix

Chemical Hazards

- ☐ Asbestos
- ☐ Acids
- ☐ Caustics
- ☒ Chlorinated hydrocarbons (TCE)
- ☐ Lead
- ☐ Gasoline or diesel fuel
- ☐ BTEX
- ☐ Jet fuel (JP-4, JP-5, JP-8)
- ☐ PCBs
- ☐ Cadmium
- ☐ Compressed gases/asphyxiants
- ☐ PAHs
- ☐ Welding fumes
- ☐ Hydrogen sulfide
- ☐ Other metals
- ☐ Bunker fuel/oil
- ☐ Explosives (TNT)
- ☒ Dust
- ☐ Dioxins
- ☐ Pesticides/Herbicides
- ☐ MTBE
- ☐ Methylene chloride
- ☐ Waste oil
- ☐ Hydraulic fluid
- ☐ Petroleum hydrocarbons

PHYSICAL HAZARDS

- ☐ Electricity/High voltage
- ☐ Elevated work areas (fall hazard)
- ☒ Manual materials handling/Back
- ☐ OE/UXO
- ☒ Hand tool usage
- ☒ Power tool usage
- ☐ Heavy equipment operations
- ☐ Drill rig (HSA, DP, Air Rotary)
- ☐ Excavations (engulfment/collapse)
- ☐ Confined space entry
- ☐ Ionizing radiation
- ☒ Eye hazards (impact, light, etc.)
- ☒ Slips, trips, and falls
- ☒ Hazardous noise
- ☐ Heat or cold stress
- ☐ Oxygen-deficient atmosphere
- ☐ Oxygen-enriched atmosphere
- ☐ Explosive atmosphere
- ☐ Powder-actuated tools
- ☐ Vehicular traffic

Other Chemical/Physical Hazards (*List*): flying concrete, rotating hammer drill

PERSONAL PROTECTIVE EQUIPMENT (PPE) REQUIRED

Boots:
- ☐ Rubber (safety-toe)
- ☒ Leather (safety-toe)

General:
- ☐ Coveralls _____(*type*)
- ☒ Hearing protection (plugs/muffs)
- ☐ FF APR _____(*cartridges*)
- ☐ ½-face APR _____(*cartridges*)
- ☐ Safety harness & lanyard
- ☒ ANSI-approved Hard hat

Eye Protection:
- ☐ Faceshield
- ☒ Safety glasses or goggles
- ☐ Welder's helmet/goggles

Gloves:
- ☐ Chemically-protective N-Dex nitrile rubber (*type*)
- ☒ Leather/cloth
- ☐ Welder's
- ☐ Electrical safety _____(*volts*)

OTHER SAFETY EQUIPMENT/CONSIDERATIONS

- ☒ Fire ext. 1A:10B:C (*rating*)
- ☒ First-aid kit
- ☒ Dust control/mitigation
- ☒ Portable eyewash
- ☐ Fire watch
- ☐ Traffic control measures

Other (*List*): _____

Inspect/Permit Requirements	EQUIPMENT TO BE USED
PPE power tools prior to use	PPE-specific Hammer drill

Applicable SOPs (See HASP/SSHP/APP)

SH&E 403, SH&E 404, SH&E 506, SH&E 508, SH&E 517

Training Requirements

40-hr HAZWOPER, 8-hr Supervisor, First Aid, CPR, PPE-specific,

EarthTech
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Task Hazard Analysis (THA)
AFP 59 Vapor Intrusion Investigation
Johnson City, New York

ADMINISTRATIVE INFORMATION	
Job/Task Name: Concrete slab drilling	
Project Name: AFP 59 Vapor Intrusion Investigation	Project Location: AFP 59 Johnson City, NY
Project Manager: Dave Parse	Analysis Performed By: Phil Granger
Date Job/Task to be performed: Jan. 7-11, 2008	Type of Job/Task: ☐ One time ☒ Routine job/task
Responsible Organization: Earth Tech, Inc.	Job Supervisor: Phil Granger

MONITORING PROCEDURES
No air monitoring required.

Accepted Signatures	
Site/Field Supervisor:	**SSO/SH&E:**
Phil Granger	Brett Hodgson

I HAVE READ OR BEEN BRIEFED ON THE HAZARDS AND PROTECTIVE MEASURES IDENTIFIED FOR THE ABOVE-LISTED JOB/TASK AND FULLY UNDERSTAND THE JOB/TASK-SPECIFIC REQUIREMENTS THAT HAVE BEEN ESTABLISHED FOR IT.

DATE	EMPLOYEE NAME	EMPLOYEE SIGNATURE	EMPLOYER NAME

ATTACHMENT B
Material Safety Data Sheets

ATTACHMENT C
Chemical Safety Cards

International Chemical Safety Cards

VINYLIDENE CHLORIDE

ICSC: 0083

1,1-Dichloroethene
1,1-Dichloroethylene
VDC
$C_2H_2Cl_2$ / $H_2C=CCl_2$
Molecular mass: 97

ICSC # 0083
CAS # 75-35-4
RTECS # KV9275000
UN # 1303 (stabilized)
EC # 602-025-00-8

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Extremely flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Use non-sparking handtools.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		PREVENT GENERATION OF MISTS!	
•INHALATION	Dizziness. Drowsiness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
•SKIN	Redness. Pain.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety goggles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Sore throat (further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest.

SPILLAGE DISPOSAL	STORAGE	PACKAGING &

		LABELLING
Evacuate danger area! Consult an expert! Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. (Extra personal protection: complete protective clothing including self-contained breathing apparatus).	Fireproof. Provision to contain effluent from fire extinguishing. Separated from incompatible materials (see Chemical Dangers). Cool. Keep in the dark. Store only if stabilized.	Airtight. Unbreakable packaging; put breakable packaging into closed unbreakable container. Marine pollutant. Note: D F+ symbol Xn symbol R: 12-20-40 S: (2-)7-16-29 UN Hazard Class: 3 UN Packing Group: I

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0083

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 2000. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

VINYLIDENE CHLORIDE

ICSC: 0083

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
VOLATILE COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air and may travel along the ground; distant ignition possible.

CHEMICAL DANGERS:
The substance can readily form explosive peroxides. The substance will polymerize readily due to heating or under the influence of oxygen, sunlight, copper or aluminium, with fire or explosion hazard. May explode on heating or on contact with flames. The substance decomposes on burning producing toxic and corrosive fumes hydrogen chloride phosgene Reacts violently with oxidants.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 5 ppm; A4 (ACGIH 1999).
OSHA PEL: none
NIOSH REL: Ca See Appendix A
NIOSH IDLH: Potential occupational carcinogen No data

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance irritates the eyes, the skin and the respiratory tract. Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. Exposure at high levels could cause lowering of consciousness.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the kidneys liver

PHYSICAL PROPERTIES		
	Boiling point: 32°C Melting point: -122°C	Relative density of the vapour/air-mixture at 20°C (air = 1): 2.5

	Relative density (water = 1): 1.2 Solubility in water, g/100 ml at 25°C: 0.25 Vapour pressure, kPa at 20°C: 66.5 Relative vapour density (air = 1): 3.3	Flash point: -25°C c.c. Auto-ignition temperature: 570°C Explosive limits, vol% in air: 5.6-16 Octanol/water partition coefficient as log Pow: 1.32
ENVIRONMENTAL DATA	The substance is harmful to aquatic organisms. 	

N O T E S

Depending on the degree of exposure, periodic medical examination is indicated. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding.

Transport Emergency Card: TEC (R)-641
NFPA Code: H2; F4; R2;

ADDITIONAL INFORMATION

ICSC: 0083 **VINYLIDENE CHLORIDE**

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

NIOSH Pocket Guide to Chemical Hazards

Methyl chloroform	**CAS** 71-55-6
CH_3CCl_3	**RTECS** KJ2975000
Synonyms & Trade Names Chlorothene; 1,1,1-Trichloroethane; 1,1,1-Trichloroethane (stabilized)	**DOT ID & Guide** 2831 160

Exposure Limits	NIOSH REL: C 350 ppm (1900 mg/m^3) [15-minute] See Appendix C (Chloroethanes)
	OSHA PEL†: TWA 350 ppm (1900 mg/m^3)
IDLH 700 ppm See: 71556	**Conversion** 1 ppm = 5.46 mg/m^3

Physical Description
Colorless liquid with a mild, chloroform-like odor.

MW: 133.4	BP: 165°F	FRZ: -23°F	Sol: 0.4%
VP: 100 mmHg	IP: 11.00 eV		Sp.Gr: 1.34
Fl.P: ?	UEL: 12.5%	LEL: 7.5%	

Combustible Liquid, but burns with difficulty.

Incompatibilities & Reactivities
Strong caustics; strong oxidizers; chemically-active metals such as zinc, aluminum, magnesium powders, sodium & potassium; water [Note: Reacts slowly with water to form hydrochloric acid.]

Measurement Method
Charcoal tube; CS_2; Gas chromatography/Flame ionization detection; IV [#1003, Halogenated Hydrocarbons] See: NMAM INDEX

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA Up to 700 ppm: (APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms irritation eyes, skin; headache, lassitude (weakness, exhaustion), central nervous system depressant/depression, poor equilibrium; dermatitis; cardiac arrhythmias; liver damage
Target Organs Eyes, skin, central nervous system, cardiovascular system, liver

International Chemical Safety Cards

2-METHOXY-2-METHYL PROPANE

ICSC: 1164

2-METHOXY-2-METHYL PROPANE
tert-Butyl methyl ether
Methyl tert-butyl ether
MTBE
$(CH_3)_3COCH_3$
Molecular mass: 88.2

CAS # 1634-04-4
RTECS # KN5250000
ICSC # 1164
UN # 2398

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking. NO contact with oxidants.	Water spray. Alcohol-resistant foam. Carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive. Risk of fire and explosion.	Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE			
• **INHALATION**	Cough. Dizziness. Unconsciousness. Weakness.	Ventilation.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
• **SKIN**	Dry skin.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• **EYES**	Redness. Pain.	Safety goggles or face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• **INGESTION**	Abdominal pain. Dizziness. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING

Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Use self-contained breathing apparatus in the case of large spills.	Fireproof. Separated from strong oxidants, strong acids. Keep in a well-ventilated room.	UN Haz Class: 3 UN Pack Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 1164

International Chemical Safety Cards

2-METHOXY-2-METHYL PROPANE

ICSC: 1164

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR. **PHYSICAL DANGERS:** The vapour is heavier than air and may travel along the ground; distant ignition possible. The vapour mixes well with air, explosive mixtures are easily formed. As a result of flow, agitation, etc., electrostatic charges can be generated. **CHEMICAL DANGERS:** Reacts violently with strong oxidants causing fire hazard. **OCCUPATIONAL EXPOSURE LIMITS (OELs):** TLV not established.	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation and by ingestion. **INHALATION RISK:** **EFFECTS OF SHORT-TERM EXPOSURE:** Inhalation of high concentrations of vapour may cause irritation of respiratory tract. Exposure to high concentrations could cause lowering of consciousness. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
PHYSICAL PROPERTIES	Boiling point: 55°C Melting point: -109°C Relative density (water = 1): 0.7 Solubility in water, g/100 ml: 4.8 Solubility in water: 6.9% by volume Vapour pressure, kPa at 25°C: 32.7	Relative vapour density (air = 1): 3.0 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.7 Flash point: -28°C Auto-ignition temperature: 224°C Explosive limits, vol% in air: 1.6-15.1 Octanol/water partition coefficient as log Pow: 1.3
ENVIRONMENTAL DATA		

NOTES

Other explosive limits: 1.6-8.4 volume %. Much less likely to form peroxides than other ethers.

Transport Emergency Card: TEC (R)-30G30

ADDITIONAL INFORMATION

ICSC: 1164	2-METHOXY-2-METHYL PROPANE

IMPORTANT LEGAL NOTICE:	Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.

Polynuclear Aromatic Hydrocarbons

Anthrene
Benzo(a)anthracene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(g,h,i)perylene
Benzo(d,e,f)phenanthrene
Benzo(a)pyrene
Chrysene
Fluoranthene
Fluorene
Indeno(1,2,3,c,d)pyrene
Phenanthrene

These are polynuclear aromatic hydrocarbons and in the pure state are yellowish crystalline solids. These chemicals are found in coal tar and in products of incomplete combustion. These chemicals have varying degrees of potency for causing cancer, with benzo(a)pyrene being among the most potent. These polynuclear aromatic hydrocarbons are evaluated collectively as *COAL TAR PITCH VOLATILES*. Coal tar pitch volatiles may cause photo-sensitization and a rash where sunlight strikes the skin. Exposure may also cause cancer of lungs, skin, bladder or kidneys. Benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, and indeno(1,2,3,c,d)pyrene have been identified as carcinogenic. Polynuclear aromatic compounds are formed when petroleum fuels are burned in a smokey flame.

International Chemical Safety Cards

TETRACHLOROETHYLENE

ICSC: 0076

1,1,2,2-Tetrachloroethylene
Perchloroethylene
Tetrachloroethene
C_2Cl_4 / $Cl_2C=CCl_2$
Molecular mass: 165.8

ICSC # 0076
CAS # 127-18-4
RTECS # KX3850000
UN # 1897
EC # 602-028-00-4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			
EXPOSURE		STRICT HYGIENE! PREVENT GENERATION OF MISTS!	
•INHALATION	Dizziness. Drowsiness. Headache. Nausea. Weakness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
•SKIN	Dry skin. Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety goggles, face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain (further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING

Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours).	Separated from metals see Chemical Dangers food and feedstuffs Keep in the dark. Ventilation along the floor.	Do not transport with food and feedstuffs. Marine pollutant. Xn symbol N symbol R: 40-51/53 S: (2-)23-36/37-61 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0076	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 2000. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

TETRACHLOROETHYLENE

ICSC: 0076

PHYSICAL PROPERTIES	Boiling point: 121°C Melting point: -22°C Relative density (water = 1): 1.6 Solubility in water, g/100 ml at 20°C: 0.015	Vapour pressure, kPa at 20°C: 1.9 Relative vapour density (air = 1): 5.8 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.09 Octanol/water partition coefficient as log Pow: 2.9
ENVIRONMENTAL DATA	The substance is toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment. 	

N O T E S

Depending on the degree of exposure, periodic medical examination is indicated. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert.

Transport Emergency Card: TEC (R)-722
NFPA Code: H2; F0; R0;

ADDITIONAL INFORMATION

ICSC: 0076 **TETRACHLOROETHYLENE**

NIOSH Pocket Guide to Chemical Hazards

Toluene	**CAS** 108-88-3
$C_6H_5CH_3$	**RTECS** XS5250000
Synonyms & Trade Names Methyl benzene, Methyl benzol, Phenyl methane, Toluol	**DOT ID & Guide** 1294 130

Exposure Limits	NIOSH REL: TWA 100 ppm (375 mg/m^3) ST 150 ppm (560 mg/m^3)
	OSHA PEL†: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)

IDLH 500 ppm See: 108883	**Conversion** 1 ppm = 3.77 mg/m^3

Physical Description
Colorless liquid with a sweet, pungent, benzene-like odor.

MW: 92.1	BP: 232°F	FRZ: -139°F	Sol(74°F): 0.07%
VP: 21 mmHg	IP: 8.82 eV		Sp.Gr: 0.87
Fl.P: 40°F	UEL: 7.1%	LEL: 1.1%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1500, 1501, 3800, 4000; OSHA 111
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style,

front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact
Symptoms Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage
Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0078 See MEDICAL TESTS: 0232

NIOSH Pocket Guide to Chemical Hazards

p-Xylene	**CAS** 106-42-3
$C_6H_4(CH_3)_2$	**RTECS** ZE2625000
Synonyms & Trade Names 1,4-Dimethylbenzene; para-Xylene; p-Xylol	**DOT ID & Guide** 1307 130

Exposure Limits	NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)
	OSHA PEL†: TWA 100 ppm (435 mg/m^3)
IDLH 900 ppm See: 95476	**Conversion** 1 ppm = 4.41 mg/m^3

Physical Description
Colorless liquid with an aromatic odor. [Note: A solid below 56°F.]

MW: 106.2	BP: 281°F	FRZ: 56°F	Sol: 0.02%
VP: 9 mmHg	IP: 8.44 eV		Sp.Gr: 0.86
Fl.P: 81°F	UEL: 7.0%	LEL: 1.1%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH 1501, 3800; OSHA 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 900 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis
Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0086 See MEDICAL TESTS: 0243

ATTACHMENT D
Client-Specific Health and Safety Guidelines

ATTACHMENT E
Health and Safety Plan Supplements

APPENDIX B
New York State Department of Health Indoor Air Quality Questionnaire and Building Inventory

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name _____ Date/Time Prepared _____

Preparer's Affiliation _____ Phone No._____

Purpose of Investigation_____

1. OCCUPANT:

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

Number of Occupants/persons at this location _____ Age of Occupants _____

2. OWNER OR LANDLORD: (Check if same as occupant ___)

Interviewed: Y / N

Last Name: _____First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential	School	Commercial/Multi-use
Industrial	Church	Other: _____

If the property is residential, type? (Circle appropriate response)

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:_____

If multiple units, how many? _____

If the property is commercial, type?

Business Type(s) _____

Does it include residences (i.e., multi-use)? Y / N If yes, how many? _____

Other characteristics:

Number of floors_____ Building age_____

Is the building insulated? Y / N How air tight? Tight / Average / Not Tight

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

_____

_____

_____

Airflow near source

_____

_____

_____

Outdoor air infiltration

_____

_____

_____

Infiltration into air ducts

_____

_____

_____

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

a. Above grade construction:	wood frame	concrete	stone	brick
b. Basement type:	full	crawlspace	slab	other _____
c. Basement floor:	concrete	dirt	stone	other _____
d. Basement floor:	uncovered	covered	covered with _____	
e. Concrete floor:	unsealed	sealed	sealed with _____	
f. Foundation walls:	poured	block	stone	other _____
g. Foundation walls:	unsealed	sealed	sealed with _____	
h. The basement is:	wet	damp	dry	moldy
i. The basement is:	finished	unfinished	partially finished	
j. Sump present?	Y / N			
k. Water in sump?	Y / N / not applicable			

Basement/Lowest level depth below grade: _____(feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

_____

_____

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

Hot air circulation	Heat pump	Hot water baseboard	
Space Heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other _____

The primary type of fuel used is:

Natural Gas	Fuel Oil	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: _____

Boiler/furnace located in:	Basement	Outdoors	Main Floor	Other_____
Air conditioning:	Central Air	Window units	Open Windows	None

Are there air distribution ducts present? Y / N

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

_____

_____

_____

_____

7. OCCUPANCY

Is basement/lowest level occupied? Full-time Occasionally Seldom Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
Basement	_____
1st Floor	_____
2nd Floor	_____
3rd Floor	_____
4th Floor	_____

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Y / N

b. Does the garage have a separate heating unit? Y / N / NA

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) Y / N / NA Please specify_____

d. Has the building ever had a fire? Y / N When?_____

e. Is a kerosene or unvented gas space heater present? Y / N Where? _____

f. Is there a workshop or hobby/craft area? Y / N Where & Type? _____

g. Is there smoking in the building? Y / N How frequently? _____

h. Have cleaning products been used recently? Y / N When & Type? _____

i. Have cosmetic products been used recently? Y / N When & Type? _____

j. Has painting/staining been done in the last 6 months? Y / N Where & When? _____

k. Is there new carpet, drapes or other textiles? Y / N Where & When? _____

l. Have air fresheners been used recently? Y / N When & Type? _____

m. Is there a kitchen exhaust fan? Y / N If yes, where vented?_____

n. Is there a bathroom exhaust fan? Y / N If yes, where vented?_____

o. Is there a clothes dryer? Y / N If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y / N When & Type?_____

Are there odors in the building? Y / N
If yes, please describe: _____

Do any of the building occupants use solvents at work? Y / N
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? _____

If yes, are their clothes washed at work? Y / N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly) No
Yes, use dry-cleaning infrequently (monthly or less) Unknown
Yes, work at a dry-cleaning service

Is there a radon mitigation system for the building/structure? Y / N Date of Installation: _____
Is the system active or passive? Active/Passive

9. WATER AND SEWAGE

Water Supply:	Public Water	Drilled Well	Driven Well	Dug Well	Other: _____
Sewage Disposal:	Public Sewer	Septic Tank	Leach Field	Dry Well	Other: _____

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: _____

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

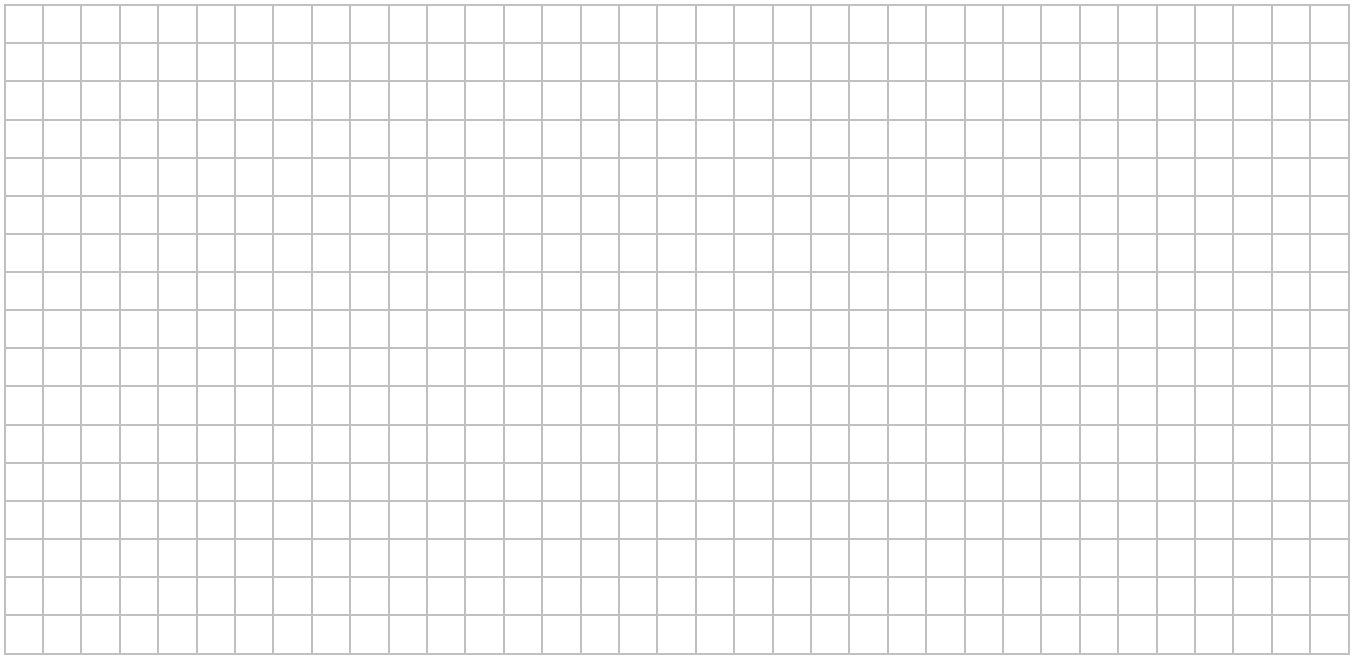
c. Responsibility for costs associated with reimbursement explained? Y / N

d. Relocation package provided and explained to residents? Y / N

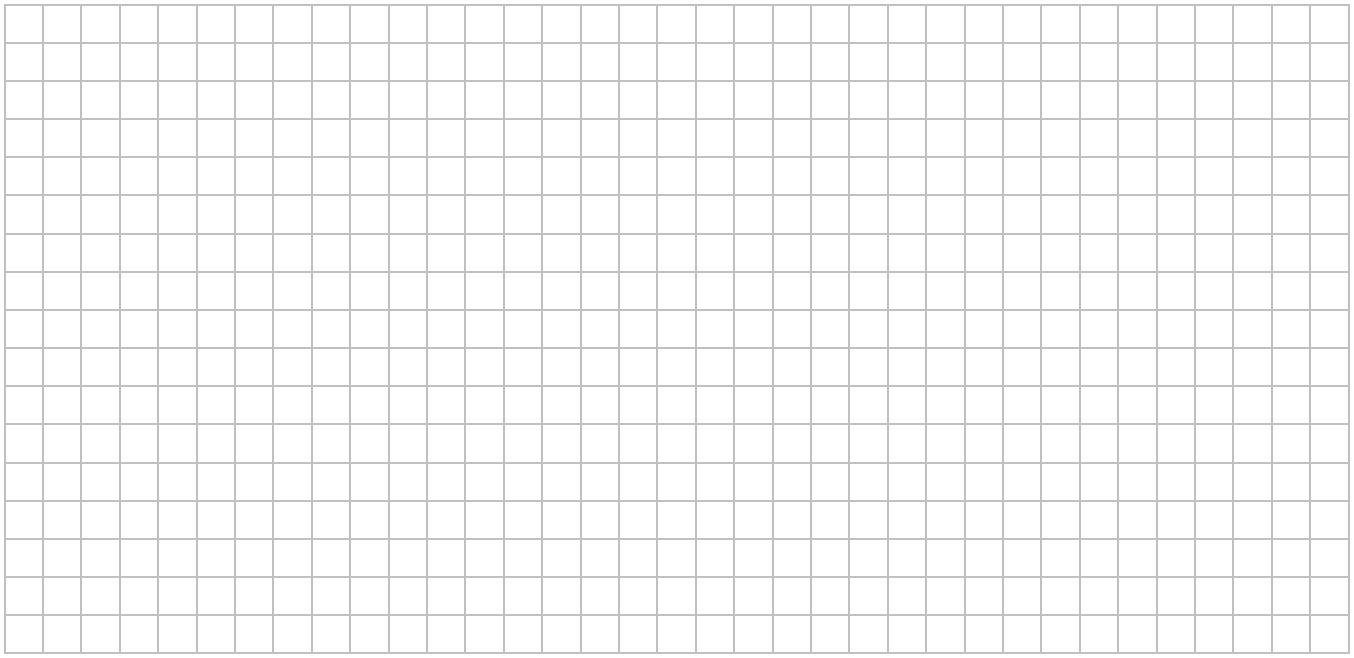
11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

Basement:



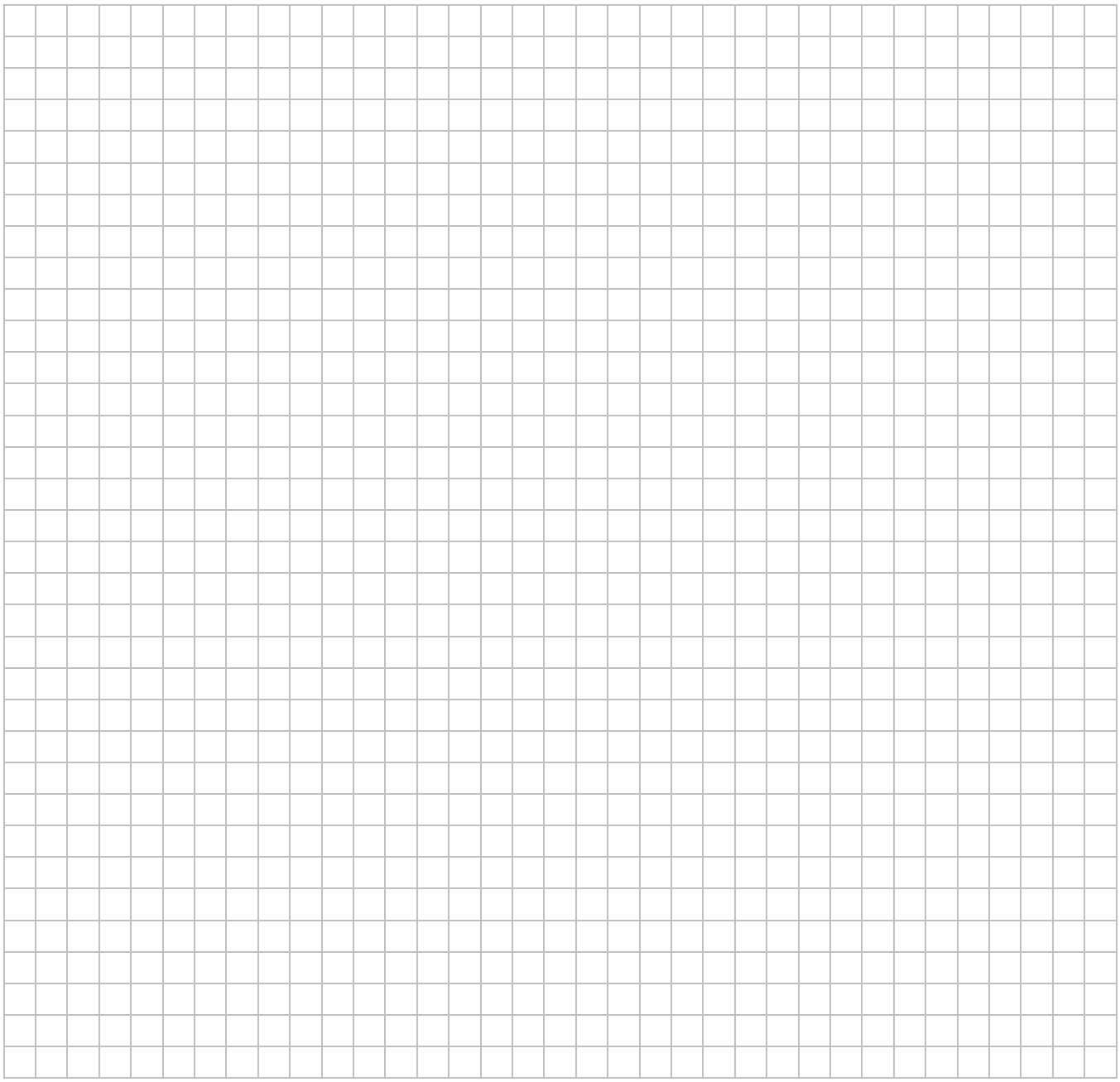
First Floor:



12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.



13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: _____

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition*	Chemical Ingredients	Field Instrument Reading (units)	Photo** Y / N

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

OSR – 3 Example 1 Correct

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name Mary Jones Date/Time Prepared 10/22/04 10:00am

Preparer's Affiliation XYZ Consulting Phone No. 518-555-1212

Purpose of Investigation Thomasville Soil Vapor Intrusion Investigation (Site#32141)

1. OCCUPANT:

Interviewed: (Y)/ N

Last Name: Smith First Name: Carol

Address: 25 Main Street Thomasville, New York 25230

County: Albany

Home Phone: 518-556-2222 Office Phone: 518-556-2400

Number of Occupants/persons at this location 2 Age of Occupants 36, 10

2. OWNER OR LANDLORD: (Check if same as occupant ___)

Interviewed: Y (N)

Last Name: White First Name: Frank

Address: 64 Mountain Road Bainbridge, New York 26390

County: Dutchess

Home Phone: 845-876-1301 Office Phone: 845-227-2430

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

(Residential)	School	Commercial/Multi-Use
Industrial	Church	Other: _____

Example Correct 2

If the property is residential, type? (Circle appropriate response)

(Ranch)	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:_____

If multiple units, how many? NA

If the property is commercial, type?

Business Type(s) NA

Does it include residences (i.e. multi-use)? Y / N If yes, how many? _____

Other characteristics:

Number of floors 1 Building age 20 years

Is the building insulated? (Y) / N How air tight? (Tight) / Average / Not Tight

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

Basement air flows up to 1st floor through plumbing waste line and domestic water line floor penetrations

Airflow near source

Yes, furnace/oil tank area open to rest of basement

Outdoor air infiltration

Outdoor air enters at loose bilco doorway openings, and at sill plate near furnace.

Infiltration into air ducts

Basement air flows into bottom of hot air unit and in loose cold air return joints.

Example Correct 3

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

a. Above grade construction:	(wood frame)	concrete	stone	brick
b. Basement type:	(full)	crawlspace	slab	other _____
c. Basement floor:	(concrete)	dirt	stone	other _____
d. Basement floor:	(uncovered)	covered	covered with _____	
e. Concrete floor:	(unsealed)	sealed	sealed with _____	
f. Foundation walls:	(poured)	block	stone	other _____
g. Foundation walls:	(unsealed)	sealed	sealed with _____	
h. The basement is:	wet	damp	(dry)	moldy
i. The basement is:	finished	(unfinished)	partially finished	
j. Sump present?	Y (N)			
k. Water in sump?	Y / N / (not applicable)			

Basement/Lowest level depth below grade: 6 (feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

Floor drain in laundry area

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

(Hot air circulation)	Heat pump	Hot water baseboard	
Space Heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other _____

The primary type of fuel used is:

Natural Gas	(Fuel Oil)	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: gas

Boiler/furnace located in: (Basement) Outdoors Main Floor Other _____

Air Conditioning: Central Air (Window units) Open Windows None

Example Correct

Are there air distribution ducts present? (Y) / N

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

Cold air return ductwork on ceiling in basement. Cold air return joints appear loose.

7. OCCUPANCY

Basement / Is lowest level occupied? Full time Occasionally (Seldom) Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
Basement	Storage and laundry
1st Floor	living area and bedrooms
2nd Floor	
3rd Floor	
4th Floor	

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? (Y) / N

b. Does the garage have a separate heating unit? Y / (N) / NA

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car etc.) (Y) / N / NA
Please specify lawnmower, car

d. Has the building ever had a fire? Y / (N) When? _____

e. Is a kerosene or unvented gas space heater present? Y / (N) Where? _____

f. Is there a workshop or hobby/craft area? Y / (N) Where & Type? _____

g. Is there smoking in the building? Y / (N) How frequently? _____

h. Have cleaning products been used recently? (Y) N When & Type? w/in week - windex, tilex

i. Have cosmetic products been used recently? (Y) / N When & Type? yesterday - hairspray

Example Correct

j. Has painting/staining been done in the last 6 months? Y / (N) Where & When? _____

k. Is there new carpet, drapes or other textiles? (Y) / N Where & When? carpet in dining room

l. Have air fresheners been used recently? Y / (N) When & Type? _____

m. Is there a kitchen exhaust fan? (Y) / N If yes, where vented? outside

n. Is there a bathroom exhaust fan? Y / (N) If yes, where vented? _____

o. Is there a clothes dryer? (Y) / N If yes, is it vented outside? (Y) / N

p. Has there been a pesticide application? Y / (N) When & Type? _____

Are there odors in the building? Y / (N)
If yes, please describe: _____

Do any of the building occupants use solvents at work? (Y) / N
(e.g., chemical manufacturing or laboratory, automechanic or autobody shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist etc.)

If yes, what types of solvents are used? hair salon dyes, alcohols, peroxides, acetone

If yes, are their clothes washed at work? Y / (N)

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly) — No
(Yes, use dry-cleaning infrequently (monthly or less)) — Unknown
Yes, work at a dry-cleaning service

Is there a radon mitigation system for the building/structure? (Y) / N Date of Installation: June 2000
Is the system active or passive? (Active)/Passive

9. WATER AND SEWAGE

Water Supply:	Public Water	(Drilled Well)	Driven Well	Dug Well	Other: _____
Sewage Disposal:	Public Sewer	(Septic Tank)	Leach Field	Dry Well	Other: _____

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: not applicable

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

c. Responsibility for costs associated with reimbursement explained? Y / N

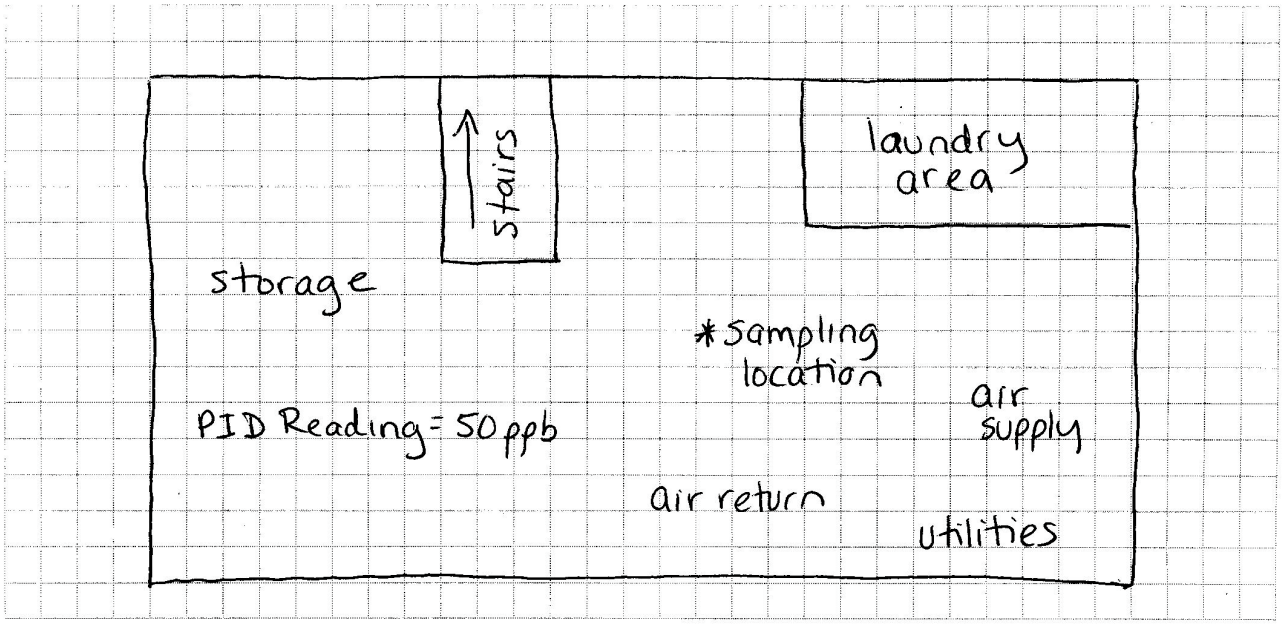
d. Relocation package provided and explained to residents? Y / N

Example Correct

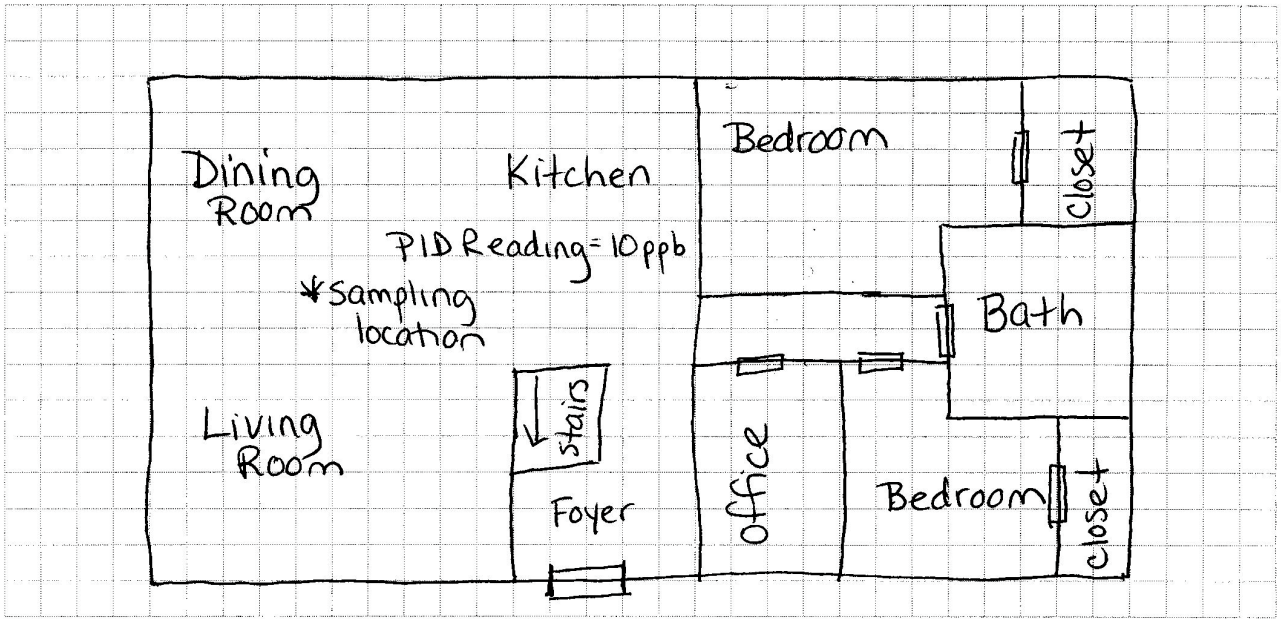
11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

Basement:



First Floor:

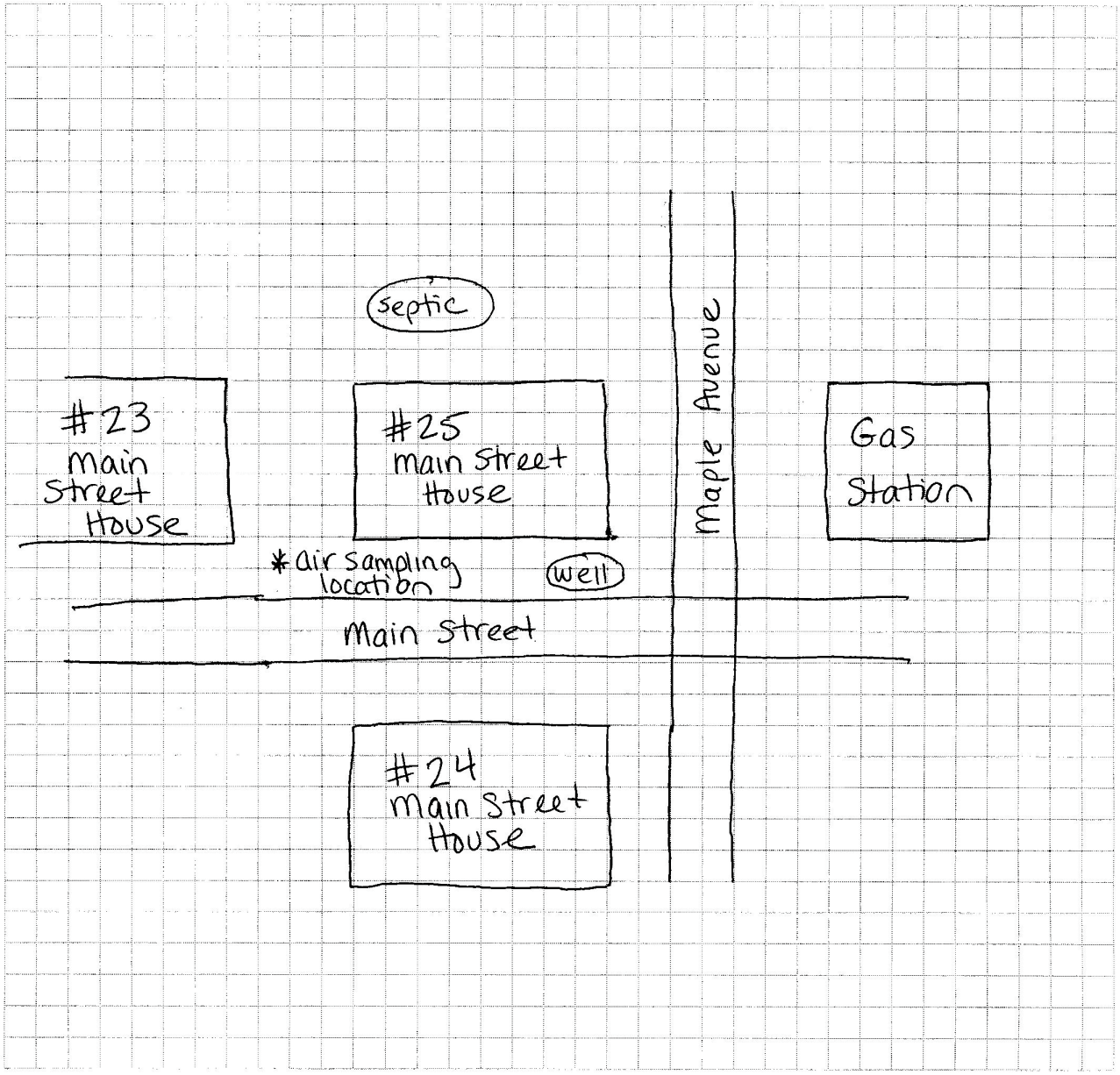


Example Correct

12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.



N

Wind direction = NE

Example Correct 8

13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: RAE photoionization detector

List specific products found in the residence that have the potential to affect indoor air quality.

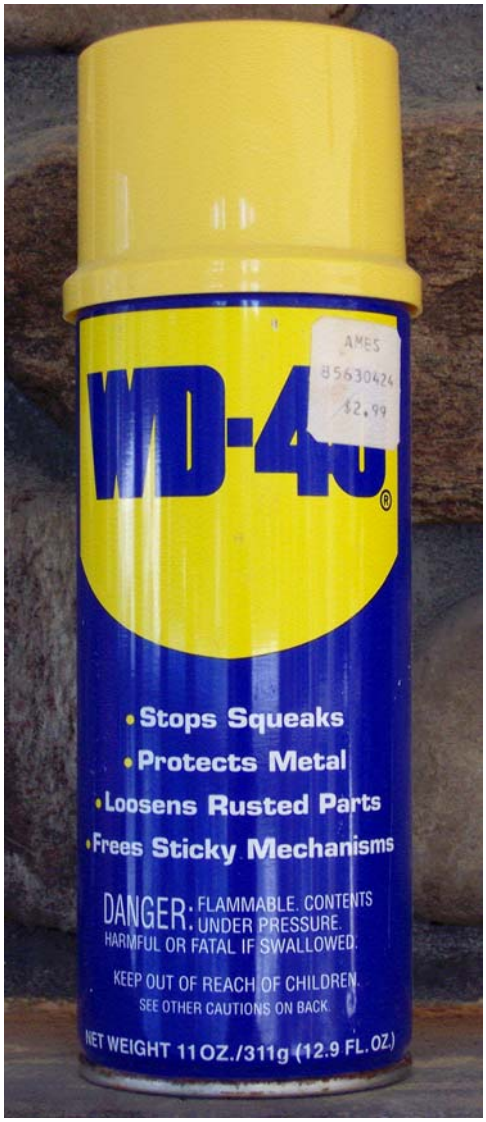
Location	Product Description	Size (oz.)	Condition*	Chemical Ingredients	Field Instrument Reading	Photo** Y / N
Kitchen	WD-40	12oz	UO	See photo	10 ppb	Y
garage	mineral spirits	24oz	U	benzene, toluene	15 ppb	N
garage	American Semi-Gloss latex paint	64oz	U	titanium dioxide, ethylene, glycol, aluminum hydroxide, 2,2,4-trimethyl 1-1,3-pentanediol isobutyrate, Vinyl acetate	2 ppb	N
garage	Krylon Semi-gloss oil paint	64oz	D	butane, propane, titanium dioxide, xylene, ethylbenzene, acetone, MEK, butanol, MIK	10 ppb	N
garage	Rustoleum	12oz	U	talc, calcium carbonate, titanium dioxide, xylene, ethylbenzene, acetone, liquified petroleum gases, pentaerythritol	4 ppb	N
garage	Deep 6 Double Strength Insect Repellent	8oz	D	propane, isobutane, N,N-Diethyl-meta-toluamide	0.5 ppb	N
				Di-n-propyl isocinchomeronate		
basement	12 cans latex paint	128oz	U	talc, titanium dioxide, Kaolin clay, 2,24-trimethyl-1,3 pentanediol isobutyrate, vinyl acetate	0	N

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**

** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

Product Inventory Attachment — 25 Main Street, City

WD-40 FRONT



WD-40 INGREDIENTS