

WORK PLAN

**for Soil Excavation in the East Basement
at
Air Force Plant 59
Johnson City, NY**

Prepared for:

**Air Force Center for Environmental Excellence
Brooks Air Force Base, TX**

Prepared by:

**Earth Tech, Inc.
675 North Washington Street, Suite 300
Alexandria, Virginia 22314**

**Contract No. F41624-03-D-8597
Delivery Order No. 0103**

June 2005



PREFACE

This *Work Plan* was written by Earth Tech to describe the field activities associated with the excavation of soils in the east basement at Air Force Plant 59 (AFP 59). All work was completed under Air Force Center for Environmental Excellence (AFCEE) Contract No. F41624-03-D-8597, Task Order No. 0103.

Government agencies and their contractors registered with the Defense Technical Information Center should direct requests for copies of this report to Defense Technical Information Center, 8725 John J. Kingman Road, Suite 0944, Fort Belvoir, Virginia 22060-6218. Non-government agencies may purchase copies of this document from National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161.

The AFCEE Restoration Team Chief is John Glass. The Air Force Aeronautical Systems Center Remedial Project Manager is John Doepker. The Earth Tech Project Manager is Dave Parse.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

1. REPORT DATE (DD-MM-YYYY) 31-06-2005		2. REPORT TYPE Final		3. DATES COVERED (From - To) May 2005 - June 2005	
4. TITLE AND SUBTITLE Work Plan for Soil Excavation in the East Basement at Air Force Plant 59				5a. CONTRACT NUMBER F41624-03-D-8597; T.O. 0103	
				5b. GRANT NUMBER N/A	
				5c. PROGRAM ELEMENT NUMBER N/A	
6. AUTHOR(S) Johnstone, Ken; Parse, Dave				5d. PROJECT NUMBER N/A	
				5e. TASK NUMBER N/A	
				5f. WORK UNIT NUMBER N/A	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) AND ADDRESS(ES) Earth Tech 675 North Washington Street, Suite 300 Alexandria, VA 22314				8. PERFORMING ORGANIZATION REPORT NUMBER N/A	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Air Force Center for Environmental Excellence 3300 Sidney Brooks Brooks City Base, TX 78235-5344				10. SPONSOR/MONITOR'S ACRONYM(S) AFCEE	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S) N/A	
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for Public Release; Distribution is Unlimited.					
13. SUPPLEMENTARY NOTES N/A					
14. ABSTRACT This <i>Work Plan</i> describes the field activities associated with the soil excavation in the East Basement at Air Force Plant 59 (AFP 59). The objective of this removal action is to excavate and dispose of trichloroethene-contaminated soils in the East Basement of AFP 59.					
15. SUBJECT TERMS Soil Excavation, AFP 59					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON David Parse
a. REPORT Unclassified	b. ABSTRACT Unclassified	c. THIS PAGE Unclassified			

Standard Form 298
(Rev. 8-98)
Prescribed by ANSI Std.
Z39.18

TABLE OF CONTENTS

Section No.	Page No.
1.0 INTRODUCTION.....	1-1
1.1 AFP 59 HISTORY.....	1-1
1.2 PROPOSED PROJECT ACTIVITIES	1-1
2.0 SUMMARY OF EXISTING INFORMATION	2-1
2.1 EAST BASEMENT DESCRIPTION.....	2-1
2.2 SOIL CHARACTERIZATION RESULTS.....	2-1
2.2.1 2002 – 2003 Soil Investigation by BAE Systems.....	2-1
2.2.2 2004 Soil Investigation by Earth Tech.....	2-4
3.0 PROPOSED FIELD ACTIVITIES.....	3-1
3.1 STRUCTURAL ASSESSMENT OF THE BUILDING	3-1
3.2 PROJECT INITIATION	3-3
3.3 EXCAVATE TCE-CONTAMINATED SOIL.....	3-3
3.3.1 <i>Hours of Operation and Site Security</i>	3-3
3.3.2 <i>Dust Control</i>	3-3
3.3.3 <i>Excavation</i>	3-3
3.3.4 <i>Materials Staging</i>	3-4
3.3.5 <i>Equipment</i>	3-4
3.4 CHARACTERIZE, TRANSPORT, AND DISPOSE OF ALL WASTE.....	3-4
3.5 BACKFILL EXCAVATED AREA.....	3-5
3.6 SITE RESTORATION	3-5
3.7 SITE PERSONNEL.....	3-5
3.8 SCHEDULE.....	3-5

Appendices

Appendix A Health and Safety Plan

TABLE OF CONTENTS (CONTINUED)

List of Figures

Figure No.		Page No.
Figure 1	Regional Location Map.....	1-2
Figure 2	AFP 59 Site Location Map	1-3
Figure 3	East Basement Layout.....	2-2
Figure 4	East Basement Soil Contamination.....	2-3
Figure 5	Structural Detail of East Basement.....	3-2

List of Tables

Table No.		Page No.
Table 1	Equipment Items	3-4
Table 2	Personnel Responsibilities	3-5

LIST OF ACRONYMS AND ABBREVIATIONS

AFCEE	Air Force Center for Environmental Excellence
AFP 59	Air Force Plant 59
1,1-DCA	1,1-Dichloroethane
DPT	Direct Push Technology
EB-1	East Basement 1
GE	General Electric
HASP	Health and Safety Plan
mg/Kg	Milligrams per Kilogram
NYSDEC	New York State Department of Environmental Conservation
PCB	Polychlorinated Biphenyl
SVOC	Semivolatile Organic Compounds
TAGM	Technical and Administrative Guidance Memorandum
TAL	Target Analyte List
1,1,1-TCA	1,1,1-Trichloroethane
TCE	Trichloroethene
USGS	United States Geological Survey
VEP	Vacuum-Enhanced Pumping
VOC	Volatile Organic Compounds

1.0 INTRODUCTION

This *Work Plan* describes the procedures and techniques that will be used to excavate and dispose of contaminated soils in the east basement of Air Force Plant 59 (AFP 59) in Johnson City, New York. Earth Tech has prepared this *Work Plan* under contract to the U.S. Air Force Center for Environmental Excellence (AFCEE) as part of the requirements for Contract F41624-03-D-8597, Delivery Order 0103. The *Health and Safety Plan* (HASP) for the soil excavation is provided in Appendix A.

1.1 AFP 59 HISTORY

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 (Figure 1). The plant occupies 29.6 acres (including Parking Lot #5, located north of Main Street) and is situated in a highly urbanized area (Figure 2).

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. General Electric (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.

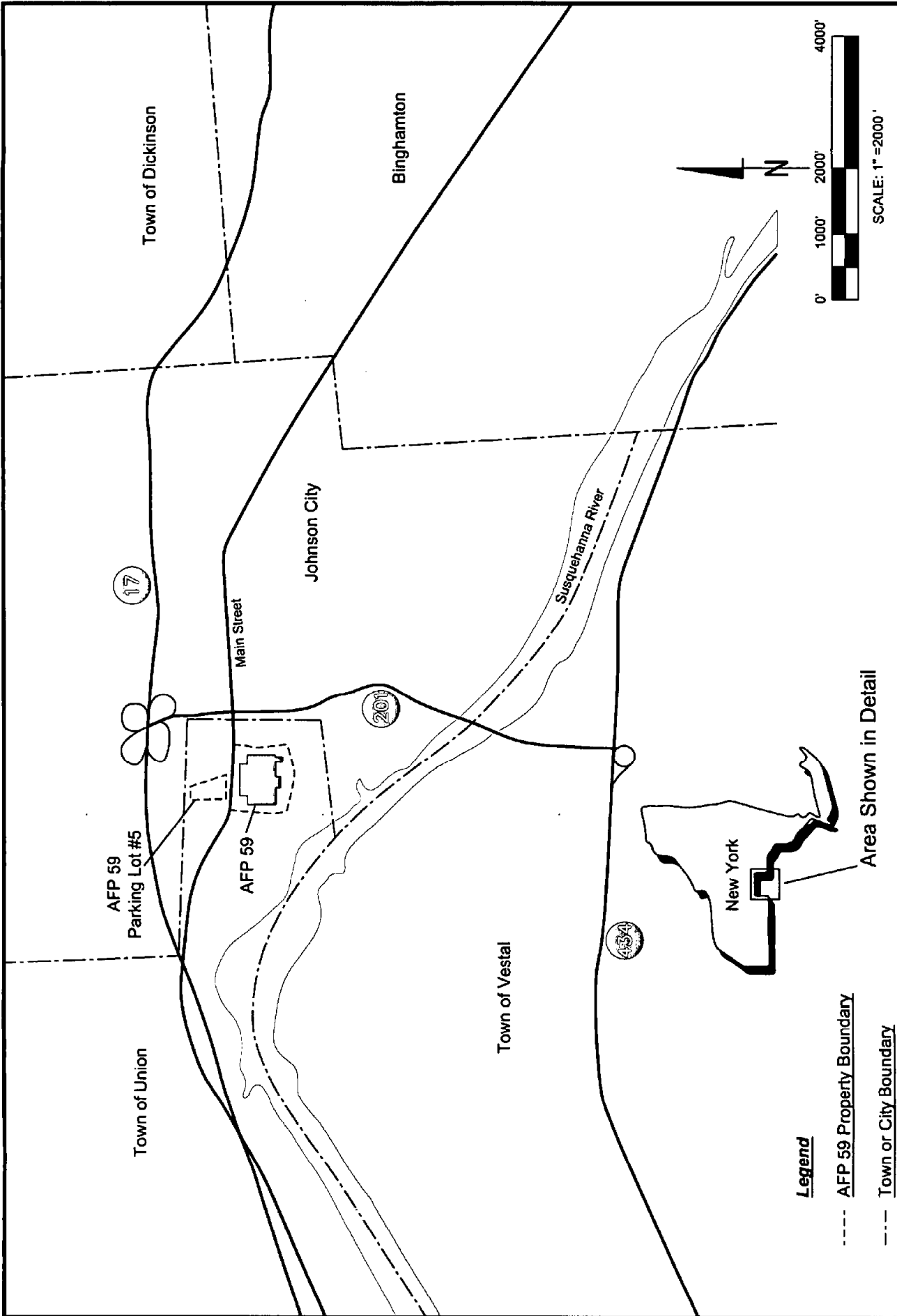
Past and present activities at AFP 59 have generated a variety of waste products, including cutting, lubricating, and coolant oils; degreasing agents; plating acids, caustics, chromium, and cyanide solutions; and paint residues.

AFP 59 is listed as a Class 2 Site on the New York State Department of Environmental Conservation (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.

1.2 PROPOSED PROJECT ACTIVITIES

The following tasks are to be completed during the execution of this delivery order:

1. Perform a structural assessment of the building (based on a site visit and As-Builts) to address the impact to the foundation and support columns during excavation.
2. Project initiation, including removing the basement stairwell to allow access for equipment, setting up a ventilation system, providing proper lighting, and moving the sprinkler system.



Legend

- AFP 59 Property Boundary
- Town or City Boundary
- Road or Highway

Area Shown in Detail

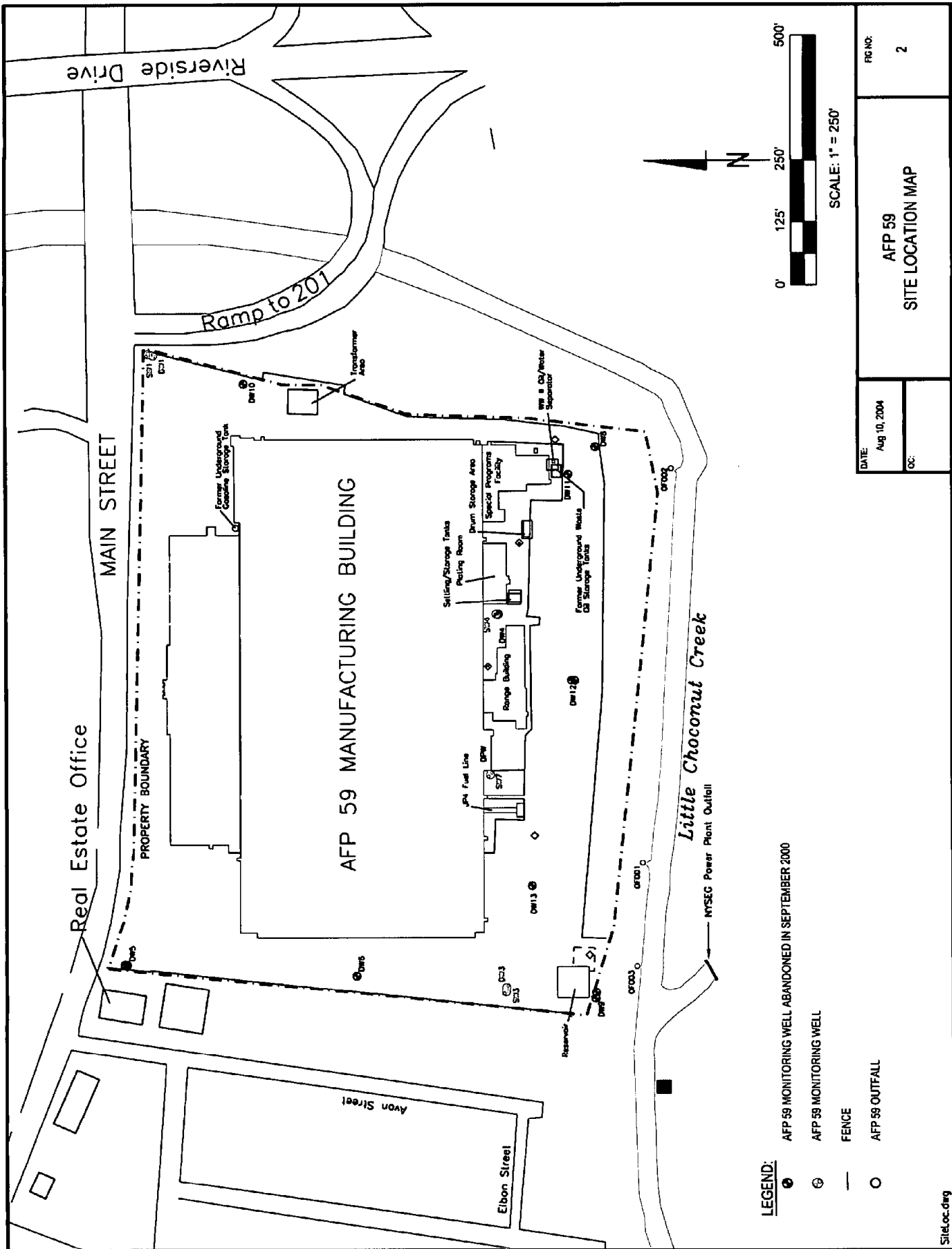
DATE: Nov 28, 2004

DC:

FIG NO:

1

REGIONAL LOCATION MAP



Real Estate Office

MAIN STREET

Riverside Drive

Ramp to 201

AFP 59 MANUFACTURING BUILDING

Little Choconut Creek

NTSEC Power Plant Outfall

PROPERTY BOUNDARY

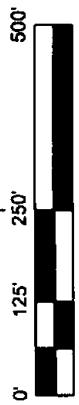
Former Underground Gasoline Storage Tank

Avon Street

Elbon Street

LEGEND:

- ⊕ AFP 59 MONITORING WELL ABANDONED IN SEPTEMBER 2000
- ⊕ AFP 59 MONITORING WELL
- FENCE
- AFP 59 OUTFALL



SCALE: 1" = 250'

DATE: Aug 10, 2004

FIG. NO:

AFP 59
SITE LOCATION MAP

2

3. Excavate up to 120 cubic yards of trichloroethene (TCE)-contaminated soil from the East Basement of the Manufacturing Building at AFP 59.
4. Characterize, transport, and dispose of all waste generated at the site to the Broome County Landfill.
5. Backfill the excavated area with clean fill and compact the fill material.
6. Site restoration, including rebuilding the basement stairwell at the completion of excavation/backfilling activities.

2.0 SUMMARY OF EXISTING INFORMATION

2.1 EAST BASEMENT DESCRIPTION

The East Basement dimensions are approximately 300 feet (north to south) by 70 feet (east to west), and the average height is approximately 6 feet. A grid of brick and concrete columns (10-foot by 10-foot spacing) supports the main floor of the plant, and there is a concrete wall around the perimeter of the basement (Figure 3). There are several vents located along the eastern wall, and there is a ventilation system designed to move air in the basement. The basement is currently used to store scrap material, and it has an unfinished dirt floor throughout. There is one access point on the southeast end of the basement (with concrete stairs).

The floor of the basement consists of packed, brown silty clay soil with pebbles. Elevation varies across its 300-foot length, but generally slopes upward from south to north. The largest soil pile begins approximately 12 feet from the southern basement wall and extends along the western wall for approximately 143 feet. This soil pile has a general width of approximately 8 to 10 feet, and is an average of 3 to 4 feet thick. The soil has a darker color than the basement floor soil, and is a slightly moist, sandy clay with pebbles and cobbles throughout its thickness.

A second soil pile begins approximately 173 feet from the southern basement wall and extends along the western wall for approximately 30 feet. This soil pile has a general width of approximately 8 to 10 feet, and is an average of approximately 3 feet thick. Its composition is a fine, dry, black soil with pebbles and cobbles throughout its thickness.

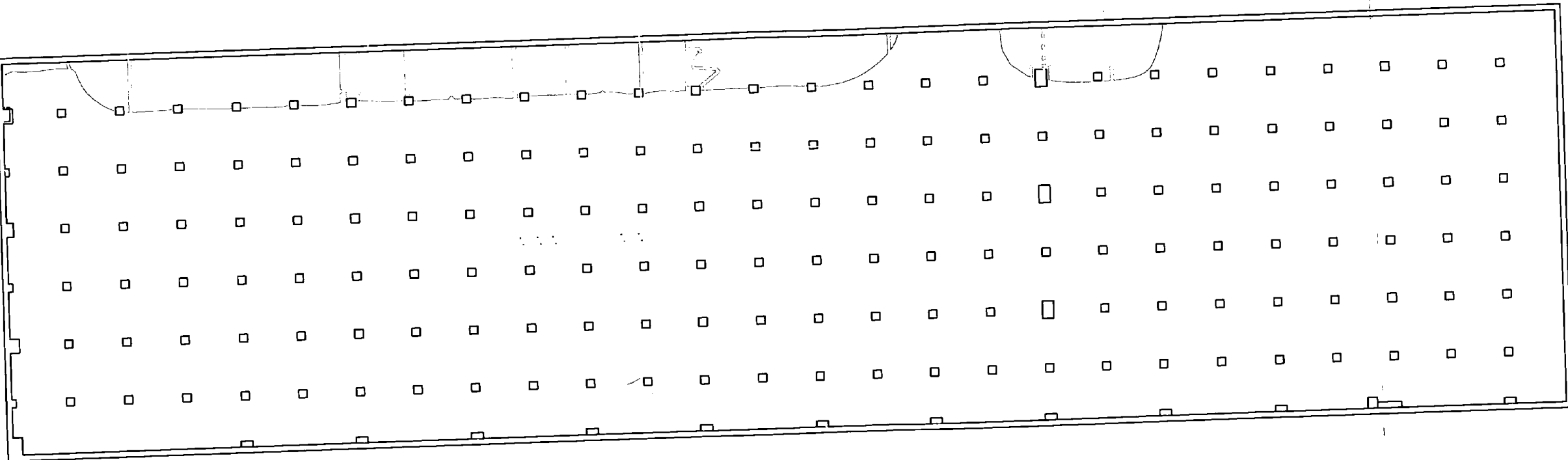
2.2 SOIL CHARACTERIZATION RESULTS


Two soil investigations have been conducted in the East Basement of the Manufacturing Building at AFP 59 to characterize the nature and extent of soil contamination, including an initial soil screening investigation by BAE Systems between August 2002 and April 2003, and a soil investigation by Earth Tech in November 2004. A brief summary of each investigation follows below.

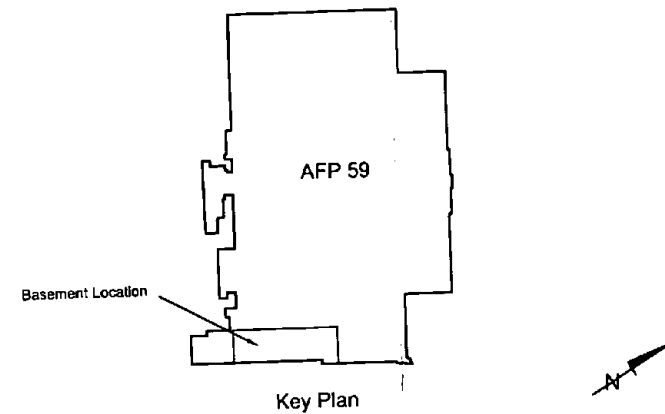
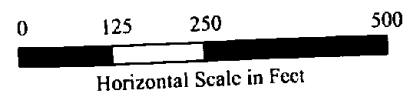
2.2.1 2002 – 2003 Soil Investigation by BAE Systems

In August 2002, BAE Systems collected three soil samples spaced evenly across the basement floor in an attempt to determine if any soil contamination existed. The three samples, each collected at approximately 0 to 6 inches below ground surface, were analyzed for volatile organic compounds (VOCs) by SW8021, semivolatle organic compounds (SVOCs) by SW8270, Target Analyte List (TAL) metals, and polychlorinated biphenyls (PCBs) by SW8082. One soil sample, East Basement 1 (EB-1), collected along the southern portion of the soil pile adjacent to the concrete wall, contained TCE at 0.005 milligrams per kilogram (mg/Kg). No other VOCs were detected at EB-1, EB-2, or EB-3.

Based on the TCE detection at EB-1, BAE Systems collected additional soil samples at 13 locations in the area of EB-1 between January and April 2003 (Figure 4). These samples were



Legend:
 Existing soil piles



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

AFP-59 Johnson City, New York

FIGURE 3
 East Basement Layout

CONTRACT NO. F41624-03-D-B597		TASK NO.	
DESIGNED BY K. Johnstone	DRAWN BY K. Johnstone		
CHECKED BY W. Gee	DATE 06-30-05		
SCALE 1" = 250'	SHEET 1 of 1		
Figure 3.dwg			

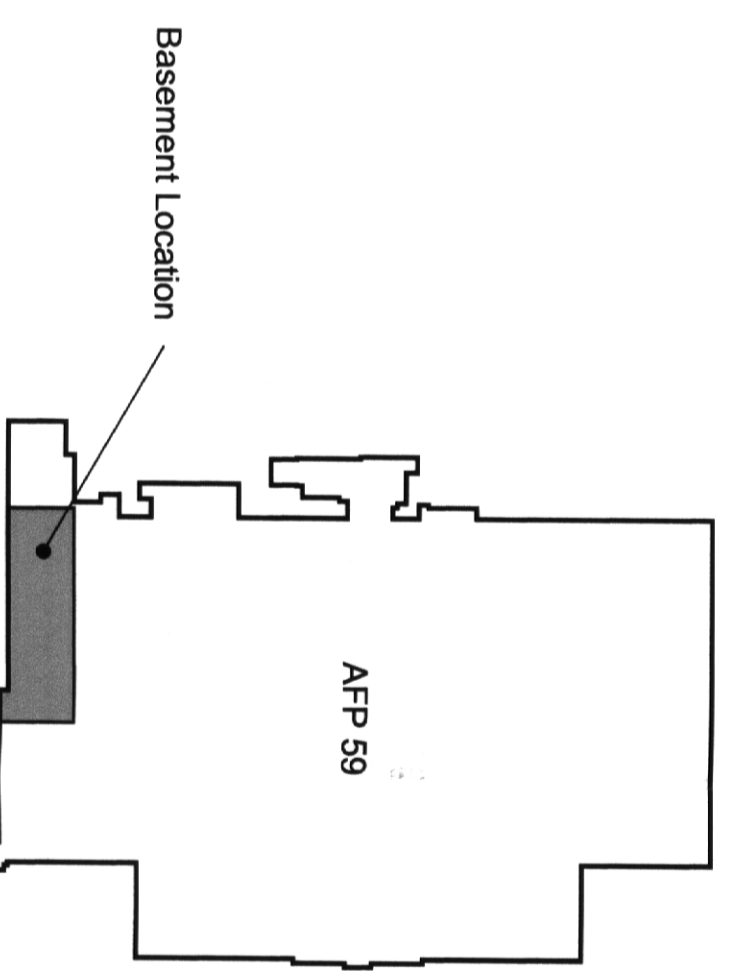
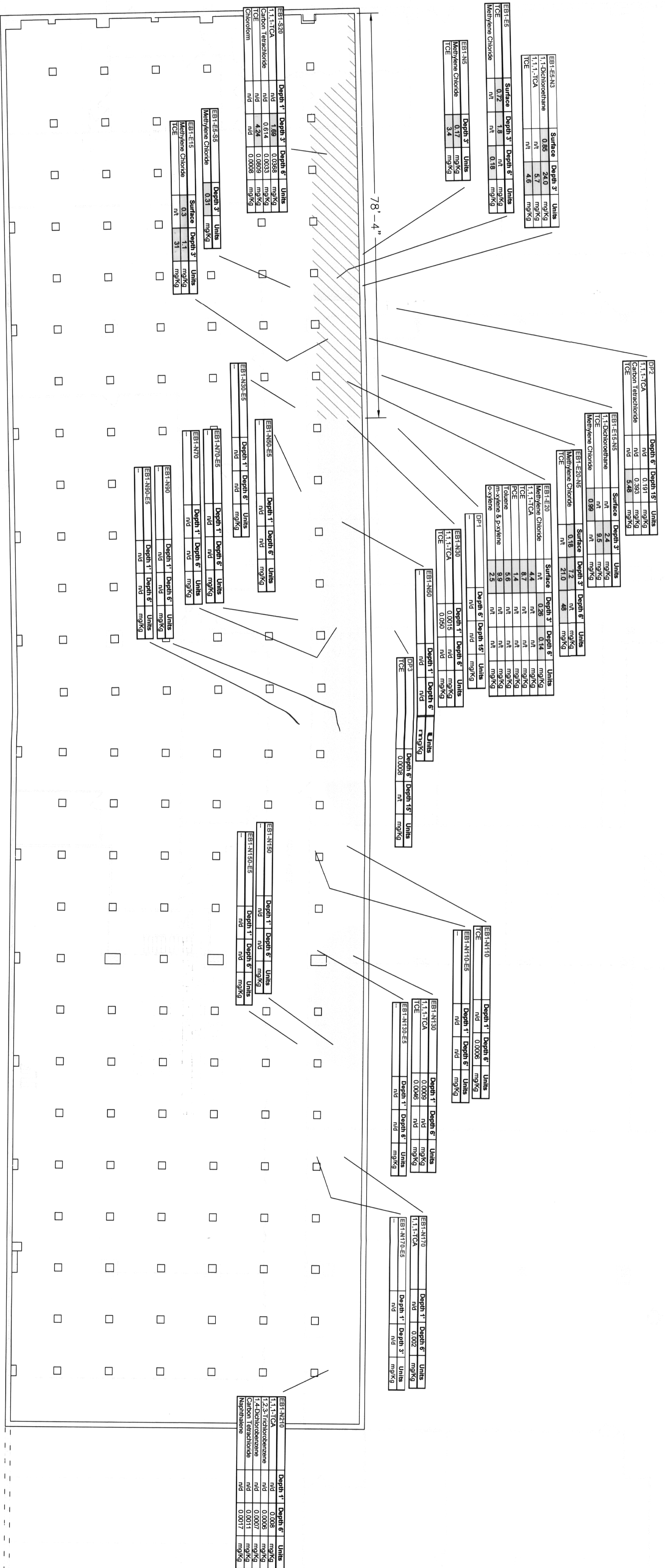
Recommended Soil Cleanup Goals	
1,1,1-Trichloroethane	0.8 mg/kg
1,1,1-Trichloroethane (TCE)	0.7 mg/kg
Tetrachloroethene (PCE)	1.4 mg/kg
Toluene	1.5 mg/kg
m-xylene & p-xylene	1.2 mg/kg
Methylene Chloride	0.2 mg/kg
1,1,2,2-Tetrachloroethane	0.3 mg/kg
1,2,3,4-Tetrachlorobenzene	N/A
Naphthalene	8.5 mg/kg
Carbon Tetrachloride	13.0 mg/kg
	10.8 mg/kg

CONTAMINATION LIMITS:

NOTES:
Although they may NOT exceed contamination limits, all sampling results are shown; exceedances are highlighted in yellow.

LEGEND:

- DIRECT PUSH SAMPLE LOCATION (from 1st floor) BY EARTH TECH
- HAND AUGER SAMPLE LOCATION BY EARTH TECH
- PREVIOUS HAND AUGER SAMPLE LOCATION BY BAE
- SAMPLED SOIL PILE
- /// AREA OF SOIL EXCEEDING TAGM LEVELS TO BE REMOVED
- NON-DETECT
- n/d NO SAMPLE TAKEN



SCALE: 3/32" = 1'-0"



AFP-59 Johnson City, New York

Figure 4

East Basement Soil Contamination

DESIGNED BY: DWG SCALE
P. Georger
DRAWN BY: Sewi Ding
C. Moron
CHECKED BY: J. Dixon
DATE: 12-27-04
FIGURE NO.: 4.09g



www.earthtech.com
675 North Washington Street, Suite 300, Alexandria, Virginia 22314
Telephone 703.549.8728 Facsimile 703.549.9134

NO.	REVISIONS	BY	DATE

collected at depths of 0 to 6 inches, 3 feet, and 6 feet below ground surface, and were analyzed for VOCs by SW8021 and Mercury.

At the 13 locations, TCE detections ranged from 0.72 to 48 mg/Kg, methylene chloride detections ranged from 0.14 to 7.2 mg/Kg, 1,1-dichloroethane (1,1-DCA) detections ranged from 0.85 to 24.0 mg/Kg, and 1,1,1-trichloroethane (1,1,1-TCA) detections ranged from 0.191 to 5.7 mg/Kg. The following compounds were only detected once: tetrachloroethene at 1.4 mg/Kg, toluene at 5.6 mg/Kg, m- & p-xylenes at 9.9 mg/Kg, and o-xylene at 2.5 mg/Kg. TCE, 1,1-DCA, 1,1,1-TCA, and methylene chloride detections exceeded the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046 soil cleanup goals for these contaminants.

2.2.2 2004 Soil Investigation by Earth Tech

Earth Tech conducted the second soil investigation in the East Basement between November 3 and 4, 2004. Eighteen soil sample locations were flagged along the length of the west wall of the East Basement. These flags included locations within the soil piles and immediately east of the piles. Eighteen soil samples were collected from the 0-1 foot interval at each location using Encore® samplers. A two- or four-inch stainless steel hand auger was then used to advance each hole to auger refusal (approximately six feet below the basement floor). Upon reaching auger refusal, a second soil sample was collected from the auger using Encore® samplers. Groundwater was not encountered during the augering and sampling activity.

In addition to the soil samples collected from the East Basement, soil samples were collected west of the western basement wall at three locations using direct push technology (DPT) on November 3, 2004. The results from the DPT samples are presented in a January 14, 2005 letter to Mr. John Glass at AFCEE.

All soil samples were analyzed for VOCs by SW8260. Figure 4 shows the layout of the soil piles within the basement, the sample locations, and the analytical results for each location.

1,1,1-TCA, carbon tetrachloride, TCE, and chloroform were detected at the six-foot interval at EB1-S20, ranging from 0.0008J mg/Kg (chloroform) to 0.0809J mg/Kg (TCE). Each of these detections was below the NYSDEC TAGM #4046 cleanup goals. At the three-foot interval of this sampling location, carbon tetrachloride was detected at 0.614 J mg/Kg, 1,1,1-TCA was detected at 1.69 mg/Kg, and TCE was detected at 4.24 mg/Kg. The 1,1,1-TCA and TCE detections exceeded the TAGM #4046 cleanup goals of 0.8 mg/Kg and 0.7 mg/Kg, respectively, for these contaminants.

TCE and/or 1,1,1-TCA were also detected at EB1-N30 (one-foot interval), EB1-N110 (six-foot interval), EB1-N130 (one-foot interval), EB1-N170 (six-foot interval), and EB1-N210 (six-foot interval). The maximum TCE and 1,1,1-TCA detections at these locations were 0.050 mg/Kg TCE at EB1-N30 and 0.008J mg/Kg 1,1,1-TCA at EB1-N210. These concentrations are below the TAGM #4046 cleanup goals. Additionally, 1,2,3-trichlorobenzene, 1,4 dichlorobenzene, carbon tetrachloride, and naphthalene were detected at the six-foot interval at EB1-N210. These

detections ranged from 0.0006J mg/Kg (1,2,3-trichlorobenzene) to 0.0011J (carbon tetrachloride), and are below the TAGM #4046 cleanup goals.

No VOCs were detected at any of the sample locations immediately east of the piles.

3.0 PROPOSED FIELD ACTIVITIES

Tasks to be completed as part of the soil excavation project are described in detail in the following sections.

3.1 STRUCTURAL ASSESSMENT OF THE BUILDING

An Earth Tech structural engineer conducted a structural analysis of the concrete wall and brick columns around which the soil excavation is to take place. The following summarizes the findings of the analysis. A detailed section of the wall and columns is provided in Figure 5.

The stability of the retaining wall is dependent on the supported soil properties. Precise geotechnical engineering information was not available for this analysis. Therefore, the analysis assumed typical values based on a visual classification.

Soil friction angle of 40.5 degrees
At rest Earth Pressure Coefficient $K_0 = .35$
Friction between footing and supporting soil, $u = 37\%$
Soil unit weight $\gamma = 120 \text{ lbs/ft}^3$
Live load surcharge of 150 psf
No passive pressure at toe

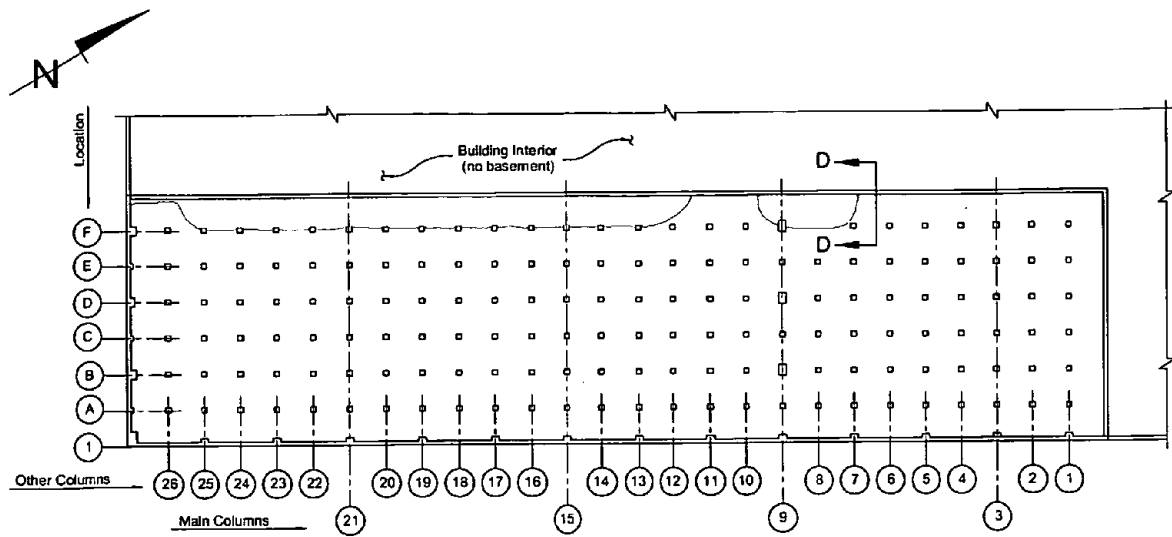
Factor of Safety against overturning is 2.28
Factor of Safety against sliding is 1.02
Maximum bearing pressure is 1.64 tsf

With passive toe fill
 $K_p = 4$ with soil friction angle of 37 degrees

Conclusions. If a clean fine sand or silty/clayey fine to medium sand is supporting the wall, a friction coefficient of 37% can be assumed. Additionally, if a medium dense sand or gravel is supported by the wall, the internal friction of 40.5 degrees is typical with the corresponding at rest lateral pressure coefficient of 0.35. For the temporary condition a sliding factor of safety greater than unity should be sufficient when selectively removing backfill in the phases. The factor of safety for sliding should be 1.5 for a permanent structure on granular material. Permanent toe fill will be required to mobilize passive soil pressures and achieve a desirable sliding factor of safety. The height of properly compacted granular toe fill should be a minimum of 2'-0" above the bottom of the footing.

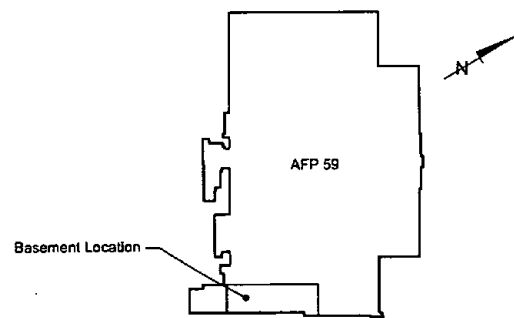
The brace provided from the floor system, the dead load weight of the floor system on the wall, and the dead load weight of the roof system on the wall were not considered in the analysis. Incorporating the effects of the brace, the dead load floor weight, and the dead load roof weight would increase the safety of the wall.

Vehicular forklift operations in the vicinity of the wall system should be terminated until the toe fill is properly re-established.

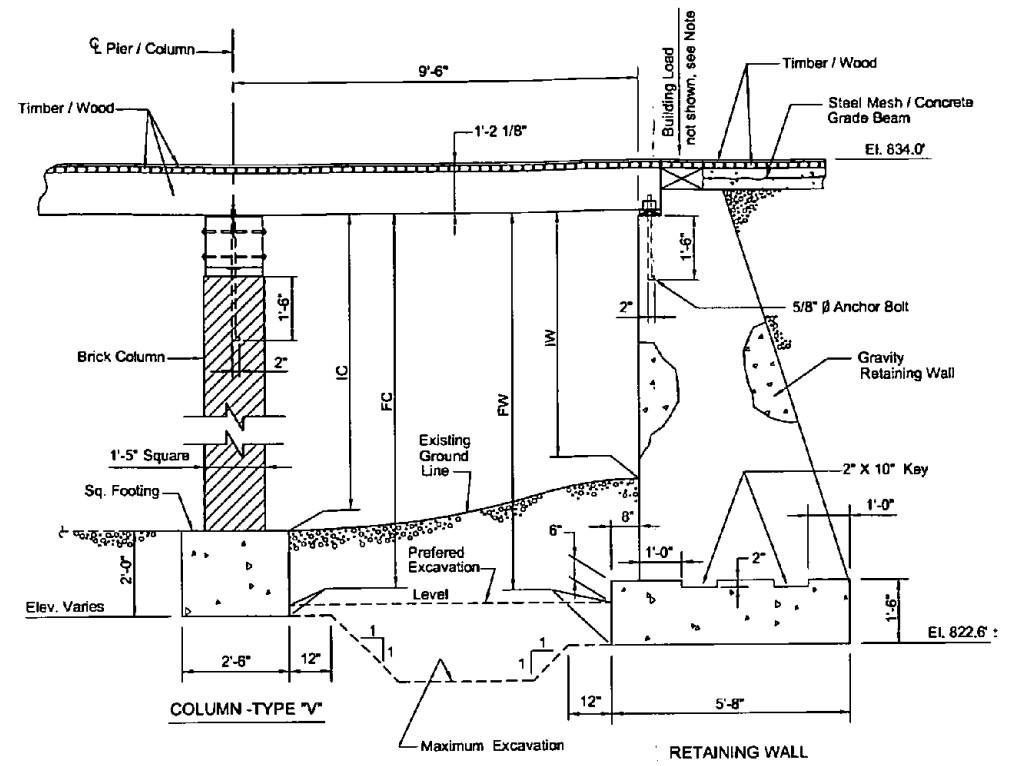


Notes:
Main Columns are presumed to carry floor loading and roof loading.
Other Columns carry floor loading.

BASEMENT PLAN
No Scale



KEY PLAN



SECTION D-D
Scale: 1/2" = 1'-0"

Notes:
Building load on Retaining Wall is believed to be selectively located.
Footing dimensions may be different than Main Columns 3, 9, 15, & 21 and at other locations.

TABLE - FIELD EXCAVATION PARAMETERS (FEET - INCH)

Column @ F Location	F26	F25	F24	F23	F22	F21	F20	F19	F18	F17	F16	F15	F14	F13	F12	F11	F10	F9	F8	F7	F6	F5	F4	F3	F2	F1	
IW																					n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
FW																						n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
IC																						n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
FC																						n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Notes																											

Excavation Notes:
IW = Initial Wall, FW = Final Wall, IC = Initial Column, and FC = Final Column.

www.earthtech.com
675 North Washington Street, Suite 300, Alexandria, Virginia 22314
Telephone: 703.549.8725

E A R T H T E C H

NO. REVISIONS

DATE

AFP-59 Johnson City, New York
Figure 5
Structural Details of East Basement

DESIGNED BY	DWG SCALE
DRAWN BY	See Dwg
CHECKED BY	CONTRACT NO.
	DATE
	CAD FILE NAME

June 27, 2005

3.2 PROJECT INITIATION

All activities associated with the initiation of the excavation project (e.g., securing identification badges, identifying staging areas, removing the basement stairwell to allow access for equipment, setting up a ventilation system, moving the sprinkler system) will be coordinated with BAE Systems prior to the onset of field activities. Prior to any excavation activities, Earth Tech will work with BAE Systems to clear potential underground utilities, including, but not limited to, sanitary and storm sewer lines. Additionally, a ventilation system will be established in the basement to prevent the possible release of VOCs to the main floor of Manufacturing Building. Plastic sheeting will be used to prevent VOC migration, and positive or negative pressure will be established. An Earth Tech geologist or engineer will supervise all field activities.

3.3 EXCAVATE TCE-CONTAMINATED SOIL

3.3.1 *Hours of Operation and Site Security*

Excavation activities will be conducted between 6:00 AM to 8:00 PM Monday through Sunday. A security fence around the area with locked gates at points of entry will be maintained at all times during the site activities. Appropriate signs will be installed to inform BAE Systems personnel that an excavation project is ongoing, and to warn people against entering the area. Caution tape, barriers, and safety cones will be used to clearly mark the construction area. Site security will be informed before starting work activities in the morning and once work has ended for the day.

3.3.2 *Dust Control*

All site preparation and excavation procedures and activities will be designed to minimize and control the generation of dust, and to prevent the exposure of BAE Systems personnel to harmful materials. The controls will include monitoring, decontamination, and techniques designed specifically to minimize dust generation.

A site-specific HASP has been prepared for this project and is included in Appendix A of this Work Plan. The HASP specifies real-time contaminant monitoring that will be performed during all excavation activities. Earth Tech will perform site operations in accordance with the HASP, and will make amendments as necessary. The HASP will confirm that site activities do not spread contamination through the air.

3.3.3 *Excavation*

A maximum of 120 cubic yards of soil will be excavated, transported, and disposed at a permitted facility. The total excavated area is approximately 720 square feet (90 feet by 8 feet) along the western basement wall. The depth of excavation will vary between 1 and 4 feet, depending on the depth of the footers on the brick columns, with the maximum depth not to exceed the bottom of any column footer. Excavation will be performed in a manner that will

minimize the potential for contaminated material to be spread or mixed with uncontaminated material.

Due to building structural issues (i.e., the concrete retaining wall and brick columns), soil will be excavated in sections. There will be some hand digging done close to the brick and concrete pillars to avoid structural issues. Following the excavation of each section, the excavated area will be backfilled with clean, medium sand (granular) with fines to match the previously existing grade.

3.3.4 Materials Staging

During normal business hours, soil removed from the basement will go straight to trucks and transported to the Broome County Landfill. After normal business hours, a roll-off or other type of soil storage unit will be used to temporarily store the soil. The temporary staging area will be located directly across the access road from the basement entrance, inside a fenced area.

3.3.5 Equipment

Excavation activities will require monitoring and sampling equipment, hand tools, and heavy equipment. Table 1 lists anticipated major equipment items.

Table 1. Equipment Items

Heavy Equipment	Hand Tools	Monitoring Equipment
Bobcat	Jackhammer (air powered)	Personal air monitoring pumps
Backhoe	Reciprocating saws	Photo Ionization Detector
Tamper (pan)	Demolition saws	Explosimeter
Dump Trucks	Miscellaneous hand tools	Dust Detector

3.4 CHARACTERIZE, TRANSPORT, AND DISPOSE OF ALL WASTE

Representative samples of the soil have been collected to characterize the soils and determine if the soil will be classified as hazardous or non-hazardous. A Broome County Landfill representative established sampling methods and analytical methods based on requirements for disposal at the Broome County Landfill. Waste profiling by the landfill is pending.

All soil and construction debris will be loaded into appropriate containers and sent off site as quickly as possible for proper disposal. All transportation, disposal, and analytical paperwork will be maintained on-site and in Earth Tech's office in Alexandria, Virginia. Disposal of all waste, contaminated soil, and construction debris will be performed in accordance with all pertinent federal, state, and local regulations.

3.5 BACKFILL EXCAVATED AREA

The excavated area will be backfilled using the Bobcat; some handwork is expected. The area will be backfilled using a medium sand (granular) with fines that will be compacted in 12-inch lifts with a pan tamper. This type of fill material will allow proper drainage, and will also compact easily to provide proper soil stability for this kind of application.

3.6 SITE RESTORATION

The site (basement and parking spaces) will be restored to its previous condition upon completion of the work. The stairs will be rebuilt per BAE Systems' specifications. BAE Systems may specify that the stairs be rebuilt with pressure-treated wood instead of concrete for future accessibility to the basement area. All refuse, excess materials, temporary structures, and equipment will be cleaned and removed, leaving all parts of the site in a neat and presentable condition.

3.7 SITE PERSONNEL

Table 2 lists anticipated project personnel.

Table 2. Personnel Responsibilities

Title	Name
BAE Systems Coordinator	Paul Smetana/Tom Tokos
Air Force Project Manager	John Doepker, ASC
Air Force Project Manager	John Glass, AFCEE
Earth Tech Project Manager	Dave Parse, Earth Tech
Earth Tech Site Manager	Ken Johnstone, Earth Tech
Boland Excavation Project Manager	Mike Boland
Project Foreman	To be Determined
Equipment Operator	To be Determined
Health and Safety Professional	George Sauer, Earth Tech
Site Health and Safety Professional	Ken Johnstone, Earth Tech

3.8 SCHEDULE

The tentative start date for project initiation is July 6, 2005. It is anticipated that excavation activities will commence on July 8, 2005 and end on or before July 20, 2005.

APPENDIX A

Health and Safety Plan

HEALTH AND SAFETY PLAN

AFP59 IRA
600 Main Street
Johnson City, New York 13790

Prepared for:

AFCEE
3300 Brooks
Brooks City Base, Texas 78235

Prepared by:

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

June 2005

Project No: TBD

HEALTH AND SAFETY PLAN APPROVAL

This Health and Safety Plan (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 AFP59 IRA 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:

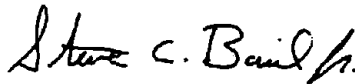


Ryan Wolschleger, OHST
Safety Professional

06/24/05

Date

Reviewed by:

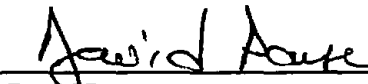


Steve C. Baril, Jr., OHST
Safety Professional

06/24/05

Date

Approved by:



David Parse
Project Manager

7/1/05

Date

TABLE OF CONTENTS

1.0	INTRODUCTION	1-1
1.1	General.....	1-1
1.2	Policy Statement.....	1-1
1.3	References.....	1-1
1.3.1	Earth Tech Safety, Health and Environmental Website.....	1-2
2.0	SITE INFORMATION AND SCOPE OF WORK	2-1
2.1	Site Information.....	2-1
2.1.1	General Description.....	2-1
2.1.2	Site Background/History.....	2-1
2.1.3	Previous Investigations.....	2-1
2.2	Scope Of Work.....	2-2
2.2.1	Equipment.....	2-2
3.0	PROJECT HEALTH AND SAFETY ORGANIZATION	3-1
3.1	Project Manager [David Parse].....	3-1
3.2	Site Supervisor [Ken Johnstone].....	3-1
3.2.1	Responsibilities.....	3-1
3.2.2	Authority.....	3-1
3.2.3	Qualifications.....	3-1
3.3	Site Safety Officer.....	3-1
3.3.1	Responsibilities.....	3-1
3.3.2	Authority.....	3-2
3.3.3	Qualifications.....	3-2
3.4	Employees.....	3-2
3.4.1	Employee Responsibilities.....	3-2
3.4.2	Employee Authority.....	3-2
3.5	Safety Professional.....	3-3
3.6	Subcontractors.....	3-3
3.7	Visitors.....	3-3
4.0	SAFETY PROGRAMS	4-1
4.1	SH&E Standard Operating Procedures.....	4-1
4.2	HAZWOPER Qualifications.....	4-1
4.3	Safety Training.....	4-1
4.3.1	Site-Specific Training/Orientation.....	4-2
4.4	Hazard Communication.....	4-2
4.5	Confined Space Entry.....	4-3
4.6	Hazardous, Solid, Or Municipal Waste.....	4-3
4.7	General Safety Rules.....	4-3
4.7.1	Housekeeping.....	4-3
4.7.2	Smoking, Eating, or Drinking.....	4-3
4.7.3	Personal Hygiene.....	4-3
4.7.4	Buddy System.....	4-4

TABLE OF CONTENTS (continued)

4.7.5	Heat and Cold Stress.....	4-4
4.8	Stop Work Authority.....	4-4
4.9	Client Specific Safety Requirements	4-4
5.0	HAZARD ASSESSMENT	5-1
5.1	Task Hazard Analysis	5-1
5.1.1	Unanticipated Work Activities/Conditions.....	5-1
5.2	Environmental Contaminant Exposure Hazards	5-1
5.2.1	Methylene Chloride	5-1
5.2.2	Acetone	5-1
5.2.3	Heavy Metals (Generic Description).....	5-1
5.2.4	Tetrachloroethylene	5-2
5.2.5	Trichloroethylene.....	5-2
5.2.6	1,1-DCA.....	5-2
5.2.7	1,1-DCE.....	5-2
5.2.8	SVOCs.....	5-3
5.2.9	Assessment of Exposure Hazards	5-3
5.3	Physical Hazards	5-3
5.4	Biological Hazards.....	5-3
6.0	ACTIVITY SPECIFIC REQUIREMENTS.....	6-1
6.1	Supplemental Safety Procedures.....	6-1
6.1.1	Utilities	6-1
6.1.2	Manual Lifting.....	6-1
6.1.3	Heavy Equipment and Vehicle Operations.....	6-1
6.1.4	Slips, Trips, Falls, and Protruding Objects	6-1
6.1.5	Electrical and Powered Equipment.....	6-1
6.1.6	Noise.....	6-2
6.1.7	Excavations and Trenches	6-2
6.2	Exposure Monitoring Procedures.....	6-2
6.2.1	Real-Time Exposure Measurement	6-2
7.0	PERSONAL PROTECTIVE EQUIPMENT	7-1
7.1	Personal Protective Equipment	7-1
7.2	Decontamination	7-2
7.2.1	PPE Doffing and Donning Information.....	7-2
7.2.2	Disposal of PPE & Decontamination Materials.....	7-2
8.0	SITE CONTROL.....	8-1
8.1	General	8-1
8.2	Controlled Work Areas	8-1
8.2.1	Exclusion Zone	8-1
8.2.2	Contamination Reduction Zone	8-1
8.2.3	Support Zone	8-2
8.3	SITE ACCESS DOCUMENTATION	8-2
8.3.1	Visitor Access.....	8-2
8.4	Site Security	8-2

TABLE OF CONTENTS (continued)

9.0	EMERGENCY RESPONSE PLANNING	9-1
9.1	Emergency Action Plan.....	9-1
9.1.1	Emergency Coordinator.....	9-1
9.1.2	Site-Specific Emergency Procedures.....	9-1
9.1.3	Spill Containment Procedure.....	9-2
9.1.4	Accident/Incident Reporting.....	9-2
10.0	PERSONNEL ACKNOWLEDGEMENT	10-1

ATTACHMENTS

Attachment A	Task Hazard Analyses
Attachment B	Material Safety Data Sheets
Attachment C	Chemical Safety Cards
Attachment D	Client-Specific Health & Safety Guidelines
Attachment E	Site-Specific Health and Safety Plan Supplements

FIGURES

Figure 8-1.	Site Control Layout	8-4
Figure 9-1.	Site/Hospital Route/Detail Map	9-4

TABLES

Table 6-1.	Monitoring Parameters and Equipment	6-2
Table 6-2.	Monitoring Procedures and Action Levels	6-4
Table 7-1.	Personal Protective Equipment.....	7-1
Table 9-1.	Emergency Planning	9-1
Table 9-2.	Emergency Contacts	9-3

1.0 INTRODUCTION

This Health and Safety Plan (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 AFP59 IRA 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)/OSHA/U.S. Coast Guard (USCG)/EPA, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, Publication No. 85-115, 1985.

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 AFP59 IRA site. Work will be performed in accordance with the applicable Statement of Work (SOW) and associated Work Plans developed for AFP59 IRA. 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 AFP59 IRA site, and the work procedures to be performed. The Work Plan, 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 (Figure ES-1). The plant occupies 29.6 acres (including Parking Lot #5, located north of Main Street) and is situated in a highly urbanized area (Figure ES-2). Parking Lot #5 was classified as a Category 1 site during the environmental baseline survey (EBS) conducted by EARTH TECH (EARTH TECH, 1995a), meaning it is an area where no storage, release, or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas). Consequently, Parking Lot #5 was not investigated during the RI.

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. General Electric (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.

Lockheed Martin Control 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, and cyanide solutions; and paint residues (United States Air Force [USAF], 1993b).

AFP 59 is listed as a Class 2 Site on the New York State Department of Environmental Conservation (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.

2.1.3 Previous Investigations

Several Installation Restoration Program (IRP) sites and areas of concern have been identified at AFP 59 (see Figure ES-3) and investigated during the three previous IRP investigations, which include an IRP Phase I Records Search conducted by CH₂M Hill in 1984; a Phase II Stage I Confirmation/Quantification Study conducted by Fred C. Hart Associates, Inc., in 1988; and a Phase II Stage II Confirmation/Quantification Study conducted by Argonne National Laboratory in 1994. The potential source areas include the former underground waste oil storage tanks, the drum storage area, the plating operations building, the storage tank and settling pond, the former gasoline storage tank, the JP-4 piping area, and the abandoned oil/water separator.

Chlorinated hydrocarbons have been detected in the groundwater and soil at AFP 59 during the previous IRP investigations. Trichloroethene (TCE) was detected at a maximum concentration of 97 micrograms per liter ($\mu\text{g/L}$) in groundwater from well SW4 near the Plating Room, and 1,1,1-trichloroethane (1,1,1-TCA) was detected at a maximum concentration of 15.2 $\mu\text{g/L}$ in groundwater from well SW9 near the southwestern corner of the property. Other chlorinated compounds detected in groundwater include 1,1-dichloroethane (1,1-DCA), 1,1-dichloroethene (1,1-DCE), and tetrachloroethene. No semivolatile organic compounds (SVOCs), pesticides, or polychlorinated biphenyls (PCBs) were detected in groundwater samples. In addition, metals have been identified as exceeding background in both groundwater and soil samples at locations associated with some of the potential source areas.

Other than acetone and methylene chloride, the only volatile organic compounds (VOCs) detected in soil samples collected during the previous IRP investigations were TCE (maximum detection of 14 $\mu\text{g/L}$) and 1,1,1-TCA (maximum detection of 1 $\mu\text{g/L}$). Numerous SVOCs have been detected at many different soil sampling localities. Additionally, several metals have been identified as exceeding background in soil samples associated with some of the potential source areas.

Five additional soil investigations have been conducted at AFP 59 outside the IRP process related to the closure of the settling tank/storage pond and/or the Plating Room. These studies confirm the presence of VOCs and metals in the soil in the vicinity of the Plating Room.

At the Johnson City municipal wellfield (i.e., the Camden Street Wellfield), located approximately 1,000 feet southwest of AFP 59, 1,1,1-TCA has been detected in groundwater at concentrations exceeding the New York State drinking water standard. The aquifer has been designated a sole-source aquifer by the United States Environmental Protection Agency (USEPA) because it supplies drinking water to the area's 128,000 residents. The NYSDEC conducted a source investigation to determine potential sources of contamination, and an air stripper has been installed at the wellfield by Johnson City. The USAF has voluntarily entered into a Memorandum of Understanding (MOU) with Johnson City to provide partial financial support (subject to the availability of funds) for the operation of the air stripper. The MOU does not constitute a finding by the State of New York or Johnson City that AFP 59 is a source of the contamination (USAF, 1993b)

2.2 SCOPE OF WORK

Activities proposed under this Statement of Work (SOW) include:

- Mobilization/demobilization activities.
- Characterization: Characterize an area (300 feet long x 8 feet wide x 6 feet deep) of soil potentially contaminated with trichloroethene (TCE) in the east basement of Air Force Plant 59 (AFP59). A previous investigation has identified TCE-contaminated soil in a small portion of this larger area. A complete screening-level characterization will be performed to identify the area of excavation and the characteristics of the waste prior to removal, transport, and disposal.
- Surveying: Perform a structural survey of the building to address the impact to the foundation during excavation.
- Demolition: Removal of doorway and concrete stairs.
- Excavation: Remove up to 89 cubic yards (120 tons) of TCE-contaminated soil from the basement of the Manufacturing Building at AFP59. This represents an area of approximately 50 feet x 8 feet x 6 feet.
- T&D: Transport and dispose of all waste generated at the site to the Model City Landfill

2.2.1 Equipment

- Twin axle dump trucks used for soil transporting
- Bobcats with buckets used for excavating soil from the basement
- Halogen lighting to increase overall visibility on the work site
- Plastic (poly) sheeting to isolate work area
- Various hand tools (shovels, rakes, hoes) and wheel barrows
- Walk behind powered tamper for compacting soils

3.0 PROJECT HEALTH AND SAFETY ORGANIZATION

3.1 PROJECT MANAGER [David 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 work plans for the site.

3.2 SITE SUPERVISOR [Ken Johnstone]

The site supervisor has the overall responsibility and authority to direct work operations at the job site according to the provided work plans. 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 work plan with the SSO and PM.
- Discuss safety issues with the PM, Site Safety Officer (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

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 personnel 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 SH&E STANDARD OPERATING PROCEDURES

SH&E standard operating procedures (SOPs) have been developed as guidance documents for specific work tasks and overall SH&E management. A copy of the SH&E SOP Manual must accompany this HASP.

4.2 HAZWOPER QUALIFICATIONS

Personnel performing work at 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 117, *Commercial Vehicle Program*
8. SH&E 118, *Confined Space Entry*
9. SH&E 119, *Lockout-Tagout*
10. SH&E 202, *Safety Meetings*
11. SH&E 204, *Task Hazard Analyses*
12. SH&E 204, *Emergency Action Planning and Prevention*
13. 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. 10-Hour OSHA Construction Safety
4. Hearing Conservation,
5. Respiratory Protection,
6. Site-Specific training/orientation (See Below),
7. First Aid/CPR training (at least one person on site), and
8. Confined Space Entry.

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 on a *Safety Training Log* form attached to SH&E 202, *Safety Meetings* and placed in project files.

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

The following confined spaces have been identified at the AFP59 IRA site:

- Basement/excavation

The SSO/site supervisor shall identify all potential hazards associated with each individual confined space in accordance with SH&E 118, *Confined Space Entry*. In addition, the SSO/site supervisor will inform all employees of the location of confined spaces and their associated hazards. 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 be 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*.

4.7.5.1 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

The client has specified no additional health and safety requirements.

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 with 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 recommended 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 ACGIH TLV is 50 ppm.

5.2.2 Acetone

Exposure to high concentrations of acetone may result in dizziness, light-headedness, and unconsciousness. Prolonged exposure to the skin, eyes, and mucous membranes may result in irritation. Repeated skin exposure may lead to dryness and cracking of the skin. In addition, acetone is a highly flammable liquid which evaporates readily. OSHA's established PEL is 1000 ppm, while the NIOSH REL is 250 ppm.

5.2.3 Heavy Metals (Generic Description)

As a group, the heavy metals (including lead, arsenic, chromium, nickel, and selenium) are toxic to a number of organs and organ systems in the body including the liver, kidneys, blood-forming organs (primarily located in the bones), and the CNS (especially lead). Acute exposure to metals can produce symptoms such as stomach distress and vomiting, mental confusion and sluggishness, heart palpitations, breathing difficulties, and renal

(kidney) failure. Chronic exposures can be characterized by deterioration in function of the liver and kidneys, CNS degradation, and abnormal changes in blood cell counts (especially white blood cells). Exposure to chromium may also lead to formation of lung and gastric cancers.

The primary route of exposure to heavy metals of concern during this project is contact with contaminated soils and water, which can lead to entry through open wounds or contamination and ingestion of food. Preventing this route of exposure necessitates the use of dust control measures and appropriate protective clothing and decontamination procedures.

5.2.4 1,1,1-Trichloroethane

1,1,1-trichloroethane, or 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 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.

5.2.5 Trichloroethylene

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. The OSHA PEL is 100 ppm while the ACGIH TLV is 50 ppm, the ACGIH STEL is set at 100 ppm.

5.2.6 1,1-DCA

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.

5.2.7 1,1-DCE

1,1-dichloroethene or 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.

5.2.8 SVOCs

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.

5.2.9 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 excavation area 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 IRA site:

- Heavy equipment traffic (excavators, loaders, haul trucks, etc.)
- Vehicle traffic (site vehicles, crossing active roads, haul trucks, etc.)
- Excavations (collapse, fall, confined spaces, etc.)
- Confined spaces (basement, excavations deeper than 5 feet)
- Cuts/lacerations/burns (while operating powered equipment, tools, handling sharp objects, etc.)
- Heavy lifting (items heavier than 49 pounds)
- Slips/trips/falls/protruding objects (uneven terrain, potholes, excavations, etc.)
- Heat stress
- Severe weather (lightning, tornadoes, etc.)
- Sunburn

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 419, *Clean Up of Bird Excrement and Amplified Fungal Growth*
2. SH&E 607, *Biohazards*
3. 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:

- Natural and artificial bodies of water (e.g., lakes, rivers, ponds, lagoons, etc.) may contain a variety of microorganisms. Microorganisms, in particular, present a significant hazard to personnel who may come into contact with water bodies. Contact with microorganisms in water may result in dermatitis, infection (i.e., in cuts/lacerations), digestive distress, and other diseases. Always be aware of areas that may contain excessive amounts of microorganisms. Such areas may include areas of standing water; areas of warm water (i.e., cooling tower effluents, etc.); and areas downstream of municipal wastewater treatment. To prevent exposure to microorganisms in water, always adhere to the following:
 - Wear protective gloves (i.e., nitrile, etc.) and other appropriate PPE to prevent skin contact with water.
 - Never drink from natural or artificial bodies of water. Such water is considered non-potable and is not safe for drinking.
- 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 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 Dig Safely New York. The phone number is provided in the Emergency Contacts list found in Section 8. 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 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 Excavations and Trenches

Excavations and trenches present workers with a variety of hazards. If not properly sloped, shored, or boxed, trench walls may collapse and trap workers under the weight of the soil. Soil contaminants and other chemical hazards (e.g., carbon monoxide from equipment/vehicles) may result in a hazardous atmosphere. Confined space entry procedures may need to be followed if the potential for a hazardous atmosphere exists. Buried utilities may exist where excavations/trenches will be placed. Always contact the local utility locator service prior to beginning excavations. Refer to SH&E 402, *Excavation & Trenching* for additional requirements.

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
Photo Ionization Detector (PID)	RAE Systems mini-RAE Photovac Microtip HNU Model Hnu (min. 11.7 eV bulb)	Petroleum hydrocarbons Organic Solvents
Multi or 4 Gas Detectors	RAE Systems Multi-RAE	Lower Explosive Limit Oxygen (O ₂) Carbon Monoxide (CO) Hydrogen Sulfide (H ₂ S) Cyanide Gases (CN ⁻)
Particulate Monitor	MIE Model PDM-3 mini-RAM	Aerosols, mist, dust, and fumes

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)*	Prior to initial entry in to impacted areas and then at least every 30 minutes afterwards in the worker's breathing zone or in the immediate work area. Confined spaces will require initial and continuous monitoring.	< 5	Level D work and continue monitoring (not applicable for initial assessment of unknown drums or containers).
		≥ 5 – 15 (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.
		≥ 15 (Sustained for more than 5 minutes)	Level B ensemble as listed in SH&E 301, <i>Hazardous Waste Operations</i> and per SSO and SH&E Manager.
Dust, Mist, Aerosols (Total by Mini-Ram)*	At least every 30 minutes in the worker's breathing zone during intrusive activities involving impacted materials. In addition, site perimeter monitoring may be initiated by the SSO based on elevated air monitoring results.	Initial excavation or disturbance of unknown materials	Level C ensemble as listed in this HASP and per SSO and SH&E Manager.
		< 1 mg/m ³ (Sustained for more than 5 minutes)	Continue Level D work and continue monitoring.
		≥ 1 mg/m ³ (Sustained for more than 5 minutes)	Upgrade to Level C PPE. Contact the PM and SSO, implement mitigation measures, and continue Level C (minimum GMA/P100 cartridges or equivalent chemical cartridge combined with P100) and continue monitoring.
		≥ 5 mg/m ³ (Sustained for more than 5 minutes)	Temporarily cease work operations, contact the PM and SH&E Manager to discuss improving site mitigation measures. Possible upgrade to Level B for exclusion zone workers.
Oxygen Levels (multi-gas detector or O ₂ meter)	In the breathing zone/work area within the confined space prior to and continuously during entry or in the immediate work area during intrusive activities involving impacted materials.	19.5 – 23.5 percent (%) O ₂	Continue work and monitoring. If significant changes exist in this acceptable range, contact the SSO to investigate the potential for contributing factors.
		< 19.5 or > 23.5 percent (%) O ₂	Cease work, exit the work area or confined space and contact the SSO.
Carbon Monoxide	In the breathing zone/work area prior to and during operation of equipment with combustion motors.	< 25 ppm	Continue work and monitoring. If significant changes exist in this acceptable range, contact the SSO to investigate the potential for contributing factors.
		≥ 25 ppm	Cease work, exit the work area or confined space and contact the SSO.
Hydrogen Sulfide (multi-gas detector or individual H ₂ S meter)	In the breathing zone/work area within the confined space prior to and continuously during entry or in the immediate work area during intrusive activities involving impacted materials.	< 10 ppm	Continue work activities. If significant changes exist in this acceptable range, contact the SSO to investigate the potential for contributing factors.
		≥ 10 ppm	Cease work, exit the area or confined space, and contact the SSO.
Explosive Atmospheres (multi-gas detector or CGI)	In the breathing zone/work area prior to and during entry in to container/drum, impacted work area or confined space.	< 10% LEL	Continue work activities. If significant changes exist in this acceptable range, contact the SSO to investigate the potential for contributing factors.
		≥ 10% LEL	Cease work, exit the area or confined space, and contact the SSO.

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 personal protective equipment (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.

Table 7-1. Personal Protective Equipment

<u>TYPE</u>	<u>MATERIAL</u>	<u>ADDITIONAL INFORMATION</u>
<u>Minimum PPE:</u>		
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
<u>Additional PPE:</u>		
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, Neoprene, Viton	
Protective Chemical Coveralls	Inner: Tyvek® or equivalent Outer: Tychem SL® or equivalent if splash hazard is present.	
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 PPE 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 bootie 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 bootie, then proceed by manually tearing the material down to the sole of the bootie 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:

- **Excavation Activities.** A distance of 20 feet in all directions will be cleared from the excavation area.

All personnel should be alert to prevent unauthorized, accidental entrance into controlled-access areas (the Exclusion Zone and 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 Contamination Reduction Zone 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.

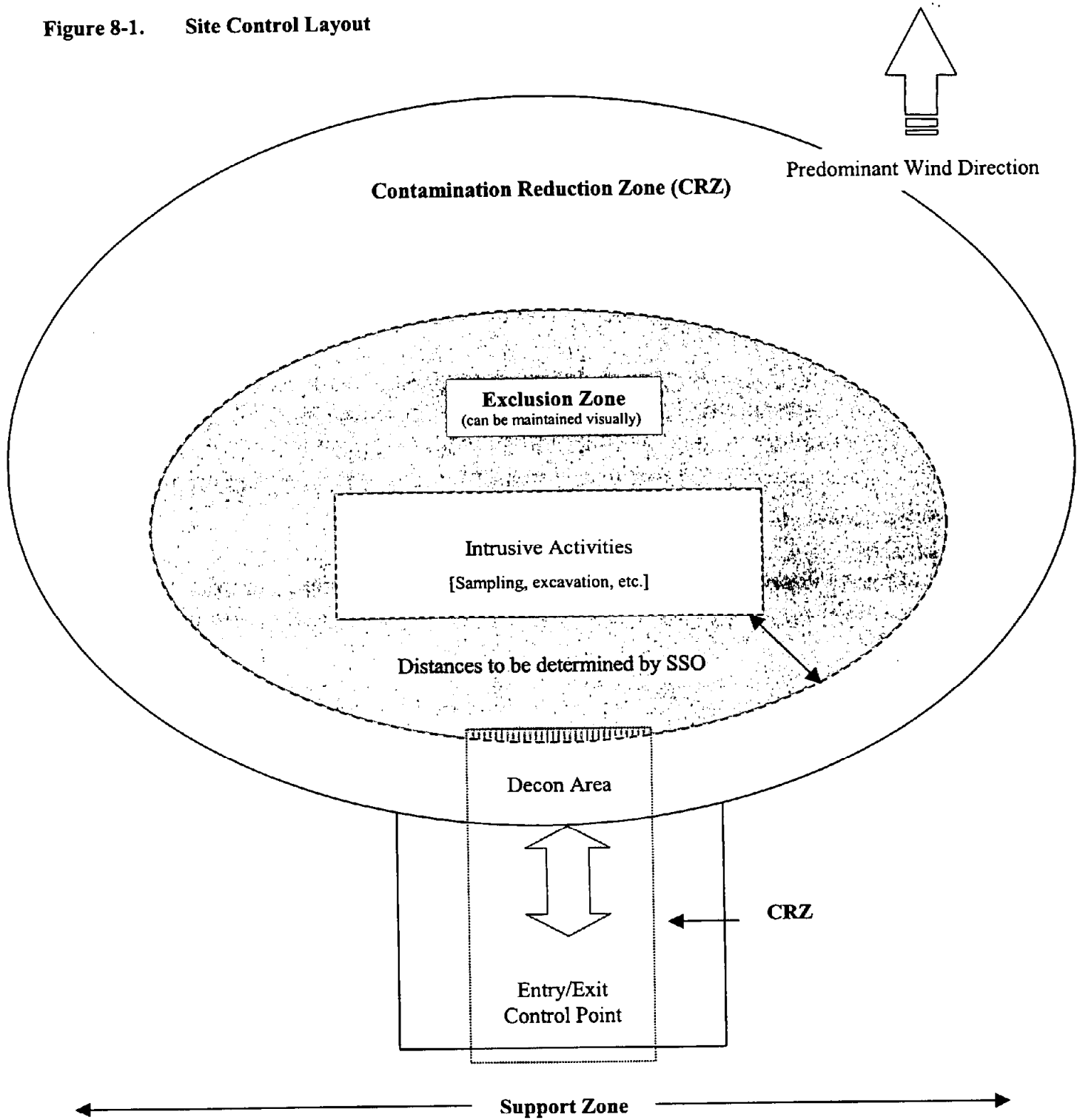
To maintain site security during working hours:

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

9.1 EMERGENCY ACTION PLAN

Although the potential for an emergency to occur is remote, an emergency action plan has been prepared for this project should such critical situations arise. The only significant type of onsite emergency that may occur is physical injury or illness to a member of the Earth Tech team. The emergency action plan will be reviewed by all personnel prior to the start of field activities.

Three major categories of emergencies could occur during site operations:

1. Illnesses and physical injuries (including injury-causing chemical exposure)
2. Catastrophic events (fire, explosion, earthquake, or chemical)
3. Safety equipment problems

9.1.1 Emergency Coordinator

The site supervisor will assume the duties of the emergency coordinator (EC). In addition, the PM will select a competent person to act as the alternate EC. The duties of the EC been specified in SH&E 205, *Emergency Action Planning and Prevention*.

9.1.2 Site-Specific Emergency Procedures

Prior to the start of site operations, the EC shall fill in Table 9-1 with any additional site-specific information regarding evacuations, muster points, communication, and other site-specific emergency procedures:

Table 9-1. Emergency Planning

Emergency Action Plan	
Injury/Illness/Incident: Report to supervisor and seek medical attention. Supervisor will contact the Incident Reporting Line (800-348-5046).	
Security or Other Threat: Contact site security or dial 911 (or other emergency number).	
Chemical Spill: Not anticipated.	
Fire/Explosion: Exit all personnel from area/building. Contact fire department.	
Tornado: [list nearest stable structures or low lying area (i.e., creek bed, ditch, etc.)]	
Lightning: [list nearest stable structures or low lying area (i.e., creek bed, ditch, etc.)]	
Communication Procedures: [list type of communication to be used to alert employees of emergencies while in zone, etc.]	
CPR/First Aid Trained Personnel	[insert names]

9.1.3 Spill Containment Procedure

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.

9.1.4 Accident/Incident Reporting

All accidents and incidents 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*.

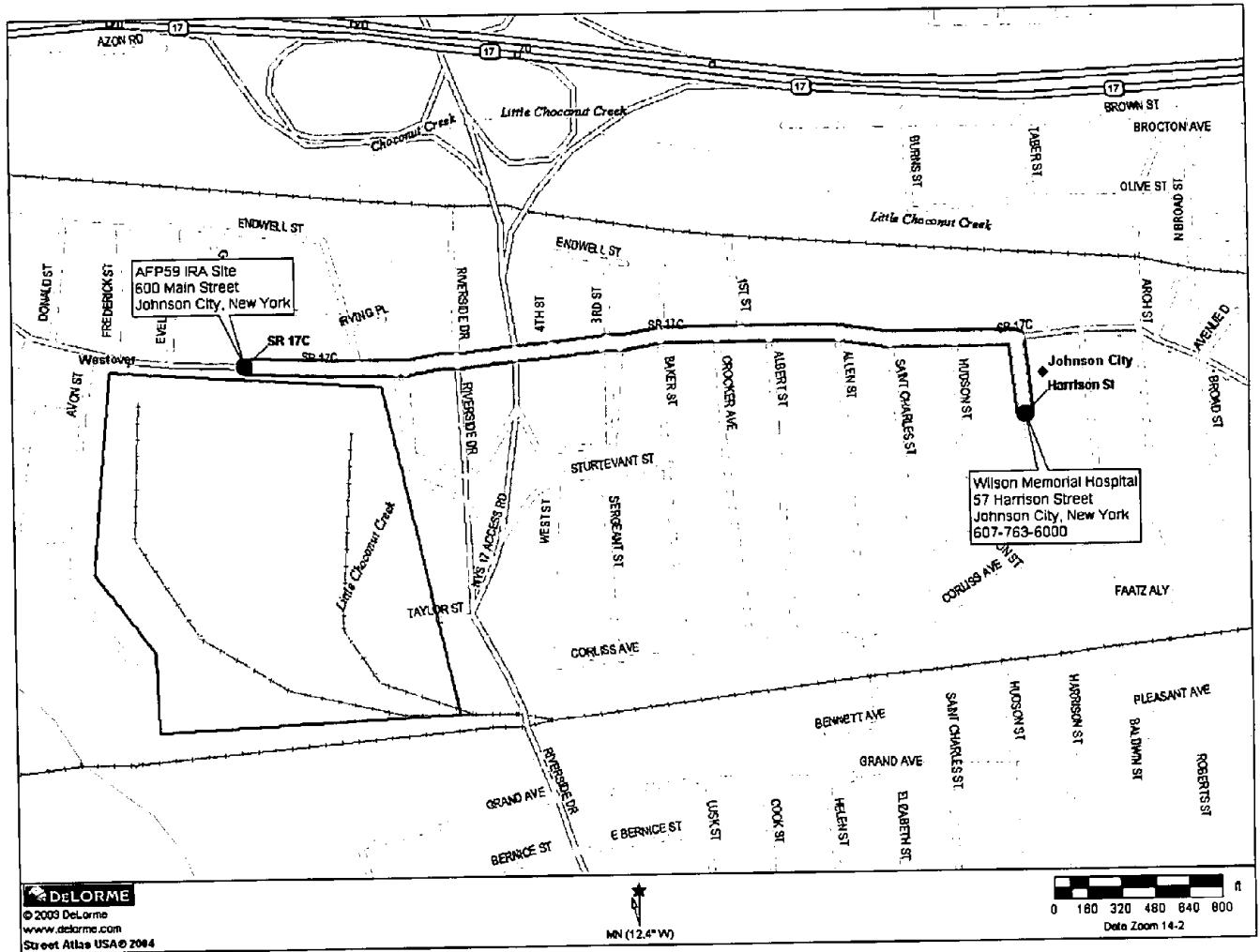
If any Earth Tech employee is injured and requires medical treatment, the FM will contact **Earth Tech's Incident Reporting Line at (800) 348-5046 immediately**. The FM will initiate a written report, using the *Supervisor's Report of Incident* form (see SH&E 101). The FM will complete the first two sections of this form and forward to the CTO Manager for completion of Section 3. The report will then be provided to the H&SP before the end of the following shift.

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.

Table 9-2. Emergency Contacts

<i>Emergency Coordinators / Key Personnel</i>			
<u>Name</u>	<u>Title/Workstation</u>	<u>Telephone Number</u>	<u>Cellular Phone</u>
John Glass	Client Contact	210-536-4405	210-355-1356
David Parse	Project Manager	703-706-0508	202-285-6129
Ken Johnstone	Supervisor/SSO/EC	703-706-0539	571-215-4076
Dale Prokopchak	Safety Manager	804-515-8556	804-839-8312
		(Home) 804-360-3301	
Ryan Wolschleger	Safety Professional	616-940-4235	616-446-6913
Steve Baril	Safety Professional	616-940-4292	616-450-9533
Brett Hodgson	Safety Professional	616-940-4444	616-446-6910
Incident Reporting	Corporate Safety Administrator	800-348-5046	
[insert]	Secondary EC		
<i>Organization / Agency</i>			
<u>Name</u>			<u>Telephone Number</u>
Police Department			911 or
Fire Department			911 or
State Police			911 or
Ambulance Service (<i>EMT will determine appropriate hospital for treatment</i>)			911 or
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
<i>Hospital</i>			
Wilson Memorial Regional (<i>Use by site personnel is only for non-emergency cases</i>)			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 directions to emergency room.			
<i>Public Utilities</i>			
<u>Name</u>			<u>Telephone Number</u>
Dig Safely New York			800-962-7962

Figure 9-1. Site/Hospital Route/Detail Map



Attachment A

Task Hazard Analyses

Evaluated by: Ryan Wolschleger, OHST

Date: June 2005

TASK NAME

MOBILIZATION/DEMobilIZATION

TASK DESCRIPTION

CHEMICAL EXPOSURE HAZARDS

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/work plan. 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.

- None anticipated
- Refer Section 5 of HASP

PPE

OTHER SAFETY EQUIPMENT

PHYSICAL HAZARDS

Level D

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

- 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

- Cuts/lacerations (handling of sharp objects, etc.)
- Heavy lifting (objects over 49 pounds)
- Equipment traffic (bobcat, forklift, 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

ADDITIONAL SAFETY CONSIDERATIONS

- 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

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.

Evaluated by: Ryan Wolschleger, OHST

Date: June 2005

TASK NAME

SAMPLING ACTIVITIES

TASK DESCRIPTION

CHEMICAL EXPOSURE HAZARDS

This task involves the characterization of an area (300 feet long x 8 feet wide x 6 feet deep) of soil potentially contaminated with trichloroethene (TCE) in the east basement of Air Force Plant 59 (AFP59). A previous investigation has identified TCE-contaminated soil in a small portion of this larger area. A complete screening-level characterization will be performed to identify the area of excavation and the characteristics of the waste prior to removal, transport, and disposal.

- See Section 5 of the Master HASP
- Methylene chloride
- Tetrachloroethene (PCE).
- Trichloroethene (TCE).
- Heavy metals,
- 1,1-DCA
- 1,1-DCE, and
- Acetone

PPE

OTHER SAFETY EQUIPMENT

PHYSICAL HAZARDS

Level C (downgrade based on sampling results and Safety Professional approval)

- High-visibility reflective safety vest
- ANSI approved hardhat.
- ANSI approved safety glasses.
- ANSI approved steel toe safety shoes/boots.
- Air Purifying Respirator with GMA/P100 cartridge
- Protective chemical gloves (inner & outer), coveralls (tyvek[®]), and rubber boots/booties when potential exists for contact with impacted materials (all seams must be taped/sealed)

- Fire extinguisher
- Leather outer gloves when operating powered equipment, etc.

- Cuts/lacerations (handling of sharp objects, operating powered tools/equipment, etc.)
- Heavy lifting (objects over 49 pounds)
- Equipment traffic (forklift, street traffic, etc.)
- Slips/trips/falls/protruding objects
- Heat/cold stress
- Bending (while collecting samples)
- Excavations/confined spaces
- Utilities

APPLICABLE OPERATIONAL SAFETY PROCEDURES

ADDITIONAL SAFETY CONSIDERATIONS

- SH&E 118, Confined Space Entry
- SH&E 201, General Safety Rules
- SH&E 402, Excavation & Trenching
- SH&E 403, Drilling
- SH&E 404, Manual Materials Handling
- SH&E 513, Heavy Equipment
- SH&E 604, Decontamination

1. Bend at the knees when collecting soil samples
2. If entering test pits to collect samples, refer to SH&E 402, *Excavation & Trenching* and SH&E 118, *Confined Space Entry* (CSE requirements apply if excavation is deeper than 5 feet).
3. Clear utilities in accordance with HASP and regulatory requirements.

MONITORING PROCEDURES

Continually monitor with PID/FID and 4-gas meter and observe action levels in Section 6 of HASP. All instruments must be calibrated prior to use.

Evaluated by: Ryan Wolschleger, OHST

Date: June 2005

TASK NAME

SITE PREPARATION

TASK DESCRIPTION

CHEMICAL EXPOSURE HAZARDS

This task involves clearing and grubbing operations on the property and as needed. Heavy equipment, chain saws, and possibly wood chippers will be used for these operations. In addition, a survey will be performed and the stairwell and door entrance to the basement may need to be removed to allow access for equipment. It may also be necessary to remove all or part of the entrance to allow for larger equipment into the basement.

- None anticipated
See Section 5 of HASP

PPE

OTHER SAFETY EQUIPMENT

PHYSICAL HAZARDS

- Level D (see Table 6-2 for upgrade/downgrade criteria)**
- High-visibility reflective safety vest.
 - ANSI approved hardhat.
 - ANSI approved safety glasses.
 - ANSI approved steel toe safety shoes/boots.

- Face shield / debris shield
- Leather gloves while handling sharp edges or operating powered tools/machinery.
- Hearing protection (plugs/muffs with min 29 NRR)
- Chainsaw chaps
- Tyvek®, protective gloves, and protective booties if potential exists for contact with impacted materials or poison ivy.
- SPF 15 sunblock when working outdoors.

- Cuts/lacerations/burns (from operating powered tools and equipment)
- Falling/flying debris
- Heavy lifting (objects heavier than 49 pounds)
- Noise
- Heavy equipment
- Slip, trip, falls, and protruding objects
- Heat/cold stress
- Severe weather/sunburn
- Biological
- Electrical

APPLICABLE OPERATIONAL SAFETY PROCEDURES

ADDITIONAL SAFETY CONSIDERATIONS

- SH&E 201, General Safety Rules (ENV 201)
- SH&E 401, Clearing and Grubbing (ENV 533)
- SH&E 404, Manual Materials Handling (ENV 501)
- SH&E 505, Powered Hand Tools (ENV 504)
- SH&E 506, Manual Hand Tools (ENV 505)
- SH&E 513, Heavy Equipment (ENV 520)

1. Evaluate surrounding work area for additional hazards that may be present.
2. All loads in excess of 49 pounds require use of mechanical aids or assistance from other personnel.
3. Determine where trees/limbs will fall prior to cutting.
4. Be aware of heavy equipment locations at all times. Always yield to heavy equipment.
5. Identify areas of poison ivy prior to beginning cutting operations.

MONITORING PROCEDURES

Monitoring is not anticipated for this specific task.

Evaluated by: Ryan Wolschleger, OHST

Date: June 2005

TASK NAME

EXCAVATION

TASK DESCRIPTION

CHEMICAL EXPOSURE HAZARDS

This step will involve excavation of identified impacted areas as determined by sampling. Up to 89 cubic yards (120 tons) of TCE-contaminated soil will be removed from the basement of the Manufacturing Building at AFP59. This represents an area of approximately 50 feet x 8 feet x 6 feet. It is assumed that soils will be non-hazardous. In the event that all or part of this soil is classified as hazardous, steps will be taken to segregate soils to reduce costs for disposal. If hazardous waste is identified for disposal, then the maximum amount of excavated soil will be less than 120 tons.

- See Section 5 of the Master HASP
- Methylene chloride
- Tetrachloroethene (PCE),
- Trichloroethene (TCE).
- Heavy metals,
- 1,1-DCA
- 1,1-DCE, and
- Acetone

PPE

OTHER SAFETY EQUIPMENT

PHYSICAL HAZARDS

Level C (downgrade/upgrade based on monitoring results and Safety Professional approval)

- High-visibility reflective safety vest
- ANSI approved hardhat.
- ANSI approved safety glasses.
- ANSI approved steel toe safety shoes/boots.
- Air Purifying Respirator with GMA/P100 cartridge
- Protective chemical gloves (inner & outer), coveralls (tyvek®), and rubber boots/booties when potential exists for contact with impacted materials (all seams must be taped/sealed)

- Air monitoring equipment
- Ladders
- Fire extinguisher
- Leather outer gloves when handling drums, operating powered equipment, etc.
- Supplied air respirator (SCBA or airline)

- Cuts/lacerations (handling of sharp objects, operating powered tools/equipment, etc.)
- Heavy lifting (objects over 49 pounds)
- Equipment traffic (excavator, street traffic, etc.)
- Slips/trips/falls/protruding objects
- Heat stress
- Bending (while collecting samples)
- Confined spaces (excavation)
- Excavations/trenches (collapse)
- Utilities

APPLICABLE OPERATIONAL SAFETY PROCEDURES

ADDITIONAL SAFETY CONSIDERATIONS

- SH&E 118, Confined Space Entry
- SH&E 201, General Safety Rules
- SH&E 402, Excavation
- SH&E 404, Manual Materials Handling
- SH&E 513, Heavy Equipment
- SH&E 604, Decontamination

1. Bend at the knees when collecting soil samples
2. Enter excavations deeper than 5 feet under confined space permit requirements.
3. Complete "Excavation Checklist" daily
4. Clear utilities in accordance with the HASP and regulatory requirements.

MONITORING PROCEDURES

Continually monitor with PID/FID and 4-gas meter and observe action levels in Section 6 of HASP. All instruments must be calibrated prior to use.

Evaluated by: Ryan Wolschleger, OHST

Date: June 2005

TASK NAME

SITE RESTORATION

TASK DESCRIPTION

CHEMICAL EXPOSURE HAZARDS

This step will involve backfilling excavated areas with clean soil and seeding as necessary. Clean soil confirmed by analysis will replace the excavated materials.

- None

PPE

OTHER SAFETY EQUIPMENT

PHYSICAL HAZARDS

Level D

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

- Fire extinguisher
- Leather outer gloves when handling drums, operating powered equipment, etc.
- Ear plugs/muffs

- Cuts/lacerations (handling of sharp objects, operating powered tools/equipment, etc.)
- Heavy lifting (objects over 49 pounds)
- Equipment traffic (forklift, street traffic, etc.)
- Slips/trips/falls/protruding objects
- Heat stress
- Excavations

APPLICABLE OPERATIONAL SAFETY PROCEDURES

ADDITIONAL SAFETY CONSIDERATIONS

- SH&E 201, General Safety Rules
- SH&E 402, Excavation
- SH&E 404, Manual Materials Handling
- SH&E 513, Heavy Equipment

1. All loads in excess of 49 pounds require use of mechanical aids or assistance from other personnel.
2. Be aware of trip/slip/fall hazards.

MONITORING PROCEDURES

Monitoring is not anticipated for this task

Evaluated by: Ryan Wolschleger, OHST

Date: June 2005

TASK NAME

TRANSPORTATION & DISPOSAL

TASK DESCRIPTION

CHEMICAL EXPOSURE HAZARDS

It is assumed that soils will be disposed of as non-hazardous waste. If hazardous waste is identified for disposal, then the maximum amount of excavated soil will be less than 120 tons.

An Air Force representative will sign waste manifests. Earth Tech will not sign as owner or agent for the waste.

- See Section 5 of the Master HASP
- Methylene chloride
- Tetrachloroethene (PCE),
- Trichloroethene (TCE),
- Heavy metals,
- 1,1-DCA
- 1,1-DCE, and
- Acetone

PPE

OTHER SAFETY EQUIPMENT

PHYSICAL HAZARDS

Level C (downgrade/upgrade based on monitoring results and Safety Professional approval)

- High-visibility reflective safety vest
- ANSI approved hardhat.
- ANSI approved safety glasses.
- ANSI approved steel toe safety shoes/boots.
- Air Purifying Respirator with GMA/P100 cartridge
- Protective chemical gloves (inner & outer), coveralls (tyvek[®]), and rubber boots/booties when potential exists for contact with impacted materials (all seams must be taped/sealed)

- Air monitoring equipment
- Ladders
- Fire extinguisher
- Leather outer gloves when handling sharp edges, operating powered equipment, etc.

- Cuts/lacerations (handling of sharp objects, operating powered tools/equipment, etc.)
- Heavy lifting (objects over 49 pounds)
- Equipment traffic (excavator, street traffic, etc.)
- Slips/trips/falls/protruding objects
- Heat stress
- Falling debris
- Overhead powerlines
- Crush (loading/unloading roll-offs)

APPLICABLE OPERATIONAL SAFETY PROCEDURES

ADDITIONAL SAFETY CONSIDERATIONS

- SH&E 201, General Safety Rules
- SH&E 404, Manual Materials Handling
- SH&E 513, Heavy Equipment
- SH&E 604, Decontamination

1. Identify all power lines prior to site activities. If present, use spotters
2. Keep all personnel clear from roll-off loading/unloading areas.
3. Do not assist vendor personnel with loading/unloading activities.

MONITORING PROCEDURES

Periodically monitor with PID/FID and observe action levels in Section 6 of HASP. All instruments must be calibrated prior to use.

Attachment B

Material Safety Data Sheets

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865



24 Hour Emergency Telephone: 909-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-936-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ACETONE

Product Identification

Synonyms: Dimethylketone; 2-propanone; dimethylketal

CAS No.: 67-64-1

Molecular Weight: 58.08

Chemical Formula: (CH₃)₂CO

Product Codes:

J.T. Baker: 5008, 5018, 5356, 5580, 9001, 9002, 9003, 9004, 9005, 9006, 9007, 9008, 9009, 9010, 9015, 9024, 9036, 9125, 9254, 9271, A134, V655

Mallinckrodt: 0018, 2432, 2435, 2437, 2438, 2440, 2443, 2445, 2850, H451, H580, H981

Composition/Information on Ingredients

Ingredient	CAS No	Percent
hazardous	-----	-----
Acetone	67-64-1	99 - 100%

Hazards Identification

Emergency Overview

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.

SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate

Flammability Rating: 3 - Severe (Flammable)

Reactivity Rating: 0 - None

Contact Rating: 3 - Severe

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:

Inhalation of vapors irritates the respiratory tract. May cause coughing, dizziness, dullness, and headache. Higher concentrations can produce central nervous system depression, narcosis, and unconsciousness.

Ingestion:

Swallowing small amounts is not likely to produce harmful effects. Ingestion of larger amounts may produce abdominal pain, nausea and vomiting. Aspiration into lungs can produce severe lung damage and is a medical emergency. Other symptoms are expected to parallel inhalation.

Skin Contact:

Irritating due to defatting action on skin. Causes redness, pain, drying and cracking of the skin.

Eye Contact:

Vapors are irritating to the eyes. Splashes may cause severe irritation, with stinging, tearing, redness and pain.

Chronic Exposure:

Prolonged or repeated skin contact may produce severe irritation or dermatitis.

Aggravation of Pre-existing Conditions:

Use of alcoholic beverages enhances toxic effects. Exposure may increase the toxic potential of chlorinated hydrocarbons, such as chloroform, trichloroethane.

First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:

Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention.

Fire Fighting Measures

Fire:

Flash point: -20C (-4F) CC

Autoignition temperature: 465C (869F)

Flammable limits in air % by volume:

lcl: 2.5; ucl: 12.8

Extremely Flammable Liquid and Vapor! Vapor may cause flash fire.

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Contact with strong oxidizers may cause fire. Sealed containers may rupture when heated. This material may produce a floating fire hazard. Sensitive to static discharge.

Fire Extinguishing Media:

Dry chemical, alcohol foam or carbon dioxide. Water may be ineffective. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

Exposure Controls/Personal Protection

Airborne Exposure Limits:

Acetone:

-OSHA Permissible Exposure Limit (PEL):

1000 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):

500 ppm (TWA), 750 ppm (STEL) A4 - not classifiable as a human carcinogen

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. **WARNING:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Physical and Chemical Properties

Appearance:

Clear, colorless, volatile liquid.

Odor:

Fragrant, mint-like

Solubility:

Miscible in all proportions in water.

Specific Gravity:

0.79 @ 20C/4C

pH:

No information found.

% Volatiles by volume @ 21C (70F):

100

Boiling Point:

56.5C (133F) @ 760 mm Hg

Melting Point:

-95C (-139F)

Vapor Density (Air=1):

2.0

Vapor Pressure (mm Hg):

400 @ 39.5C (104F)

Evaporation Rate (BuAc=1):

ca. 7.7

. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Concentrated nitric and sulfuric acid mixtures, oxidizing materials, chloroform, alkalis, chlorine compounds, acids, potassium t-butoxide.

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

. Toxicological Information

Oral rat LD50: 5800 mg/kg; Inhalation rat LC50: 50,100mg/m³; Irritation eye rabbit, Standard Draize, 20 mg severe; investigated as a tumorigen, mutagen, reproductive effector.

-----\Cancer Lists\-----

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Acetone (67-64-1)	No	No	None

. Ecological Information

Environmental Fate:

When released into the soil, this material is expected to readily biodegrade. When released into the soil, this

material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into water, this material is expected to readily biodegrade. When released to water, this material is expected to quickly evaporate. This material has a log octanol-water partition coefficient of less than 3.0. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material may be moderately degraded by photolysis. When released into the air, this material is expected to be readily removed from the atmosphere by wet deposition.

Environmental Toxicity:

This material is not expected to be toxic to aquatic life. The LC50/96-hour values for fish are over 100 mg/l.

. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: ACETONE

Hazard Class: 3

UN/NA: UN1090

Packing Group: II

Information reported for product/size: 188L

International (Water, I.M.O.)

Proper Shipping Name: ACETONE

Hazard Class: 3

UN/NA: UN1090

Packing Group: II

Information reported for product/size: 188L

. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----

Ingredient	TSCA	EC	Japan	Australia
Acetone (67-64-1)	Yes	Yes	Yes	

s

-----\Chemical Inventory Status - Part 2\-----

Ingredient	--Canada--			
	Korea	DSL	NDSL	Phil.
Acetone (67-64-1)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----

Ingredient	-SARA 302-		-----SARA 313-----	
	RQ	TPQ	List	Chemical Catg.
Acetone (67-64-1)	No	No	Yes	No

-----\Federal, State & International Regulations - Part 2\-----

Ingredient	-RCRA-		-TSCA-	
	CERCLA	261.33	8(d)	
Acetone (67-64-1)	5000	U002		

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: Yes
 RA 311/312: Acute: Yes Chronic: No Fire: Yes Pressure: No
 activity: No (Pure / Liquid)

Australian Hazchem Code: 2[Y]E
Poison Schedule: None allocated.
WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

Other Information

NFPA Ratings: Health: 1 Flammability: 3 Reactivity: 0

Label Hazard Warning:
 DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE.
 HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND
 RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.

Label Precautions:
 Keep away from heat, sparks and flame.
 Keep container closed.
 Use only with adequate ventilation.
 Wash thoroughly after handling.
 Avoid breathing vapor.
 Avoid contact with eyes, skin and clothing.

Label First Aid:
 Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious

person. Call a physician immediately. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

=====
Product Identification
=====

Product ID:48512, 1,1-DICHLOROETHANE 5G

SDS Date:02/18/1986

SC:6850

IIN:00N032521

SDS Number: BPNCB

== Responsible Party ==

Company Name:SUPELCO INC

Address:SUPELCO PARK

City:BELLEFONTE

State:PA

ZIP:16823-0048

Country:US

Info Phone Num:814-359-3441

Emergency Phone Num:814-359-3441

AGE:54968

== Contractor Identification ==

Company Name:SIGMA-ALDRICH INC.

Address:3050 SPRUCE STREET

Box:14508

City:ST. LOUIS

State:MO

ZIP:63103

Country:US

Phone:314-771-5765/414-273-3850X5996

AGE:54968

=====
Composition/Information on Ingredients
=====

Ingredient Name:P-DIOXANE; (DIOXANE). LD50: (ORAL,RAT) 4200 MG/KG

AS:123-91-1

TECS #:JG8225000

Reaction by Wt: 3%

SHA PEL:S, 100 PPM

CGIH TLV:S, 25 PPM; 9293

PA Rpt Qty:100 LBS

OT Rpt Qty:100 LBS

Ingredient Name:ETHANE, 1,1-DICHLORO- (SARA III). LD50: (ORAL,RAT) 725
MG/KG

AS:75-34-3

TECS #:KI0175000

Reaction by Wt: 97%

SHA PEL:100 PPM

CGIH TLV:200 PPM;250 STEL

PA Rpt Qty:1000 LBS

OT Rpt Qty:1000 LBS

===== Hazards Identification =====

LD50 LC50 Mixture:LD50: (ORAL,RAT) 725 MG/KG

Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES

Reports of Carcinogenicity:NTP:YES IARC:YES OSHA:NO

Health Hazards Acute and Chronic:HARMFUL IF ABSORBED THRU SKIN.

HARMFUL

IF INHALED/SWALLOWED. IRRIT SKIN. DERMATITIS. DEPRESSES CNS. NARCOSIS. LIVER & KIDNEY DMG. CHLOROCARBON MATLS HAVE PRODUCED SENSIT OF THE MYOCARDIUM TO EPINEPHRI NE IN LABORATORY ANIMALS & COULD HAVE ASIMILAR EFT IN HUMANS. ADRENOMIMETICS (E.G., EPINEHPRINE) (EFTS OF OVEREXP)

Explanation of Carcinogenicity:P-DIOXANE: (IARC) GROUP 2B, (NTP) ANTICIPATED TO BE A CARCINOGEN.

Effects of Overexposure:HLTH HAZ: MAY BE CONTRAINDICATED EXCEPT FOR LIFE-SUSTAINING USES IN HUMANS ACUTELY OR CHORNICALLY EXPOSED TO CHLOROCARBONS .

Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

===== First Aid Measures =====

First Aid:EYES: FLUSH EYES WITH WATER FOR AT LEAST 15 MIN. SKIN: FLU SKIN WITH LARGE VOLUMES OF WATER. REMOVE CONTAMINATED CLOTHING. INHAL: IMMEDIATELY MOVE TO FRESH AIR. GIVE OXYGEN IF BREATHING I LABORED. IF BREATHING STOPS, GIVE ARTIFICIAL RESPIRATION. CONTACT A PHYSICIAN. INGEST: GET MD IMMEDIATELY .

===== Fire Fighting Measures =====

Flash Point:17.0F, -8.3C

Lower Limits:6%

Upper Limits:16%

Extinguishing Media:WATER, CO2, DRY CHEMICAL, ALCOHOL FOAM.

Fire Fighting Procedures:WEAR NIOSH/MSHA APPROVED PRESSURE DEMAND SC AND FULL PROTECTIVE EQUIPMENT .

Unusual Fire/Explosion Hazard:VAPS FORM EXPLO MIX W/AIR. FOLLOWING TO
VAPS ARE FORMED WHEN MATL IS HEATED TO DECOMP: HCL GAS & PHOSGEN
GAS.

===== Accidental Release Measures =====

Spill Release Procedures:TAKE UP WITH ABSORBENT MATERIAL. VENTILATE
AREA. FLUSH AREA WITH WATER.

Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

===== Handling and Storage =====

Handling and Storage Precautions:STORE IN SEALED CONTAINER IN COOL,
DRY

LOCATION. KEEP AWAY FROM IGNITION SOURCES. STABILIZED WITH 3%
DIOXANE, A RECOGNIZED CARCINOGEN.

Other Precautions:NO SMOKING IN AREA OF USE. DO NOT USE IN THE GENERAL
VICINITY OF ARC WELDING, OPEN FLAMES OR HOT SURFACES. HEAT AND/OR

RADIATION MAY CAUSE THE FORMATION OF HCL AND/OR PHOSGENE .

===== Exposure Controls/Personal Protection =====

Respiratory Protection:WEAR NIOSH/MSHA APPROVED SCBA.

Ventilation:USE ONLY IN WELL VENTILATED AREA.

Protective Gloves:IMPERVIOUS GLOVES .

Eye Protection:CHEMICAL WORKERS GOGGLES .

Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.

Supplemental Safety and Health

PRECAUTIONS: NONE SPECIFIED BY MANUFACTURER.

===== Physical/Chemical Properties =====

CC:F3

Boiling Pt:B.P. Text:135F,57C

Melt/Freeze Pt:M.P/F.P Text:-143F,-97C

Specific Gravity:1.777 (H2O=1)

Appearance and Odor:COLORLESS LIQUID, CHLOROFORM-LIKE ODOR.

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES

OXIDIZERS, CAUSTIC.

stability Condition to Avoid:WELL RELEASE FLAMMABLE AND TOXIC ACETALDEHYDE GAS ON CONTACT WITH STRONG CAUSTIC.

azardous Decomposition Products:HYDROGEN CHLORIDE GAS AND PHOSGENE GAS.

===== Disposal Considerations =====

aste Disposal Methods:COMPLY WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS.

Disclaimer (provided with this information by the compiling agencies):

This information is formulated for use by elements of the Department of Defense. The United States of America in no manner whatsoever, expressly or implied, warrants this information to be accurate and disclaims all liability for its use. Any person utilizing this document should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation.

=====
Product Identification
=====

Product ID:F29 1,1-DICHLOROETHENE

SDS Date:10/13/1992

SC:6550

IIN:00F037520

SDS Number: BWJGQ

== Responsible Party ==

Company Name:CHEM SERVICE INC

Address:660 TOWER LN

Box:3108

City:WEST CHESTER

State:PA

ZIP:19381-3108

Country:US

Info Phone Num:215-692-3026/800-452-9994

Emergency Phone Num:215-692-3026/800-452-9994

AGE:84898

== Contractor Identification ==

Company Name:CHEM SERVICE INC

Box:3108

City:WEST CHESTER

State:PA

ZIP:19381

Country:US

Phone:215-692-3026

AGE:84898

Company Name:CHEM SERVICE, INC

Address:660 TOWER LN

Box:599

City:WEST CHESTER

State:PA

ZIP:19301-9650

Country:US

Phone:610-692-3026

AGE:8Y898

=====
Composition/Information on Ingredients
=====

Ingred Name:VINYLIDENE CHLORIDE, 1,1-DICHLOROETHENE,
1,1-DICHLOROETHYLENE, VDC

AS:75-35-4

TECS #:KV9275000

ther REC Limits:5 PPM

SHA PEL:1 PPM

CGIH TLV:5 PPM

PA Rpt Qty:100 LBS

OT Rpt Qty:100 LBS

=====
===== Hazards Identification =====

LD50 LC50 Mixture:ORAL LD50 (RAT/MOUSE): 200 MG/KG

Routes of Entry: Inhalation:YES Skin:NO Ingestion:YES

Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO

Health Hazards Acute and Chronic:LACHRYMATOR-EYES: SEVERE IRRITATION

SKIN: IRRITATION/ALLERGIC REACTION/SENSITIZATION. INHALATION:

MUCOUS MEMBRANE IRRITATION. EXPOSURE CAN CAUSE LIVER & KIDNEY

DAMAGE/NERVOUS & CARDIOVASCULAR SYSTEM INJURY/DELAYED ADVERS

HEALTH EFFECTS. NARCOTIC AT HIGH CONCENTRATIONS.

Explanation of Carcinogenicity:NONE

Effects of Overexposure:IRRITATION.

=====
===== First Aid Measures =====

First Aid:EYES: FLUSH CONTINUOUSLY W/WATER FOR 15-20 MINS. SKIN: FLU

W/WATER FOR 15-20 MINS. IF NOT BURNED, WASH W/SOAP & WATER.

INHALATION: REMOVE TO FRESH AIR. GIVE CPR/OXYGEN IF NEEDED. KEEP

WARM & QUIET. INGESTION: DON'T INDUCE VOMITING/GIVE LIQUIDS IF

UNCONSCIOUS/CONVULSING. IF VOMITING OCCURS, WATCH CLOSELY FOR AN

AIRWAY OBSTRUCTION. OBTAIN MEDICAL ATTENTION IN ALL CASES.

=====
===== Fire Fighting Measures =====

Flash Point:5F

Extinguishing Media:CO2, DRY CHEMICAL POWDER. DON'T USE WATER.

Unusual Fire/Explosion Hazard:FLAMMABLE CHEMICAL. EXPLOSIVE. TENDS TO

DEVELOP PRESSURE ON STANDING. SENSITIVE TO HEAT & AIR. MAY

POLYMERIZE UPON STANDING.

=====
===== Accidental Release Measures =====

Spill Release Procedures:EVACUATE AREA. WEAR APPROPRIATE OSHA

REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE/SIMILAR

MATERIAL. SWEEP UP & PLACE IN APPROPRIATE CONTAINER/HOLD FOR

DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.

=====
Handling and Storage
=====

Handling and Storage Precautions: STORE IN A COOL DRY PLACE ONLY
W/COMPATIBLE CHEMICALS. KEEP TIGHTLY CLOSED. STORE UNDER NITROGEN

REFRIGERATION. FOR LABORATORY USE ONLY.

Other Precautions: AVOID CONTACT W/SKIN, EYES & CLOTHING. DON'T BREATHE
VAPORS. CONTACT LENSES SHOULDN'T BE WORN IN THE LABORATORY. ALL
CHEMICALS SHOULD BE CONSIDERED HAZARDOUS. AVOID DIRECT PHYSICAL
CONTACT.

=====
Exposure Controls/Personal Protection
=====

Respiratory Protection: WEAR APPROPRIATE OSHA/MSHA APPROVED SAFETY
EQUIPMENT.

Ventilation: CHEMICAL SHOULD BE HANDLED ONLY IN A HOOD.

Eye Protection: EYE SHIELDS

Work Hygienic Practices: REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE
REUSE.

Supplemental Safety and Health

=====
Physical/Chemical Properties
=====

Boiling Pt: B.P. Text: 87.06F

Melt/Freeze Pt: M.P/F.P Text: -188.5F

Solubility in Water: INSOLUBLE

Appearance and Odor: COLORLESS LIQUID W/FRUITY/PLEASANT ODOR.

=====
Stability and Reactivity Data
=====

Stability Indicator/Materials to Avoid: NO

Stability Condition to Avoid: HEAT, AIR, UPON STANDING.

Conditions to Avoid Polymerization: UPON STANDING.

=====
Disposal Considerations
=====

Waste Disposal Methods: BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN
AFTERBURNER & SCRUBBER IAW/FEDERAL, STATE & LOCAL REGULATIONS.

Disclaimer (provided with this information by the compiling
agencies):

This information is formulated for use by elements of the Department of Defense. The United States of America in no manner whatsoever, expressly or implied, warrants this information to be accurate and disclaims all liability for its use. Any person utilizing this document should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation.

Material Safety Data Sheet

PAH Contaminated Soil

CC# 17974

Section 1 - Chemical Product and Company Identification

SDS Name: PAH Contaminated Soil

atalog Numbers: SRS103100

ynonyms: API separator sludge

ompany Identification:

Fisher Scientific

1 Reagent Lane

Fair Lawn, NJ 07410

or information, call: 201-796-7100

mergency Number: 201-796-7100

or CHEMTREC assistance, call: 800-424-9300

or International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELIN
Not available	Soil	78-99	unlisted
120-12-7	Anthracene	0-2	204-371-1
129-00-0	Pyrene	0-2	204-927-3
132-64-9	Dibenzofuran	0-2	205-071-3
205-99-2	Benzo(b)fluoranthene	0-2	205-911-9
206-44-0	Fluoranthene	0-2	205-912-4
208-96-8	Acenaphthylene	0-2	205-917-1
218-01-9	1,2-benzphenanthrene	0-2	205-923-4
50-32-8	Benzo(a)pyrene	0-2	200-028-5
56-55-3	1,2-Benzanthracene	0-2	200-280-6
83-32-9	Acenaphthene	0-2	201-469-6
85-01-8	Phenanthrene	0-2	201-581-5
86-73-7	Fluorene	0-2	201-695-5
87-86-5	Pentachlorophenol	0-2	201-778-6
91-20-3	Naphthalene	0-2	202-049-5
91-57-6	2-methylnaphthalene	0-2	202-078-3

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: not available solid.

Warning! May cause allergic skin reaction. Causes eye and skin irritation. May cause cancer based on animal studies.

Target Organs: Eyes, skin.

Potential Health Effects

Eye: May cause eye irritation.

Skin: May cause skin irritation. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material.

Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. Naphthalene can cause cataracts, optical neuritis, and cornea injuries. Ingestion of large quantities may cause severe hemolytic anemia and

Inhalation: Causes respiratory tract irritation. May cause effects similar to those described for ingestion.

Chronic: May cause cancer according to animal studies. Prolonged exposure to respirable crystalline quartz may cause delayed lung injury/fibrosis (silicosis).

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

Skin: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.

Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.

Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.

Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam.

Flash Point: Not applicable.

Autoignition Temperature: Not applicable.

Explosion Limits, Lower: Not available.

Upper: Not available.

FPA Rating: Not published.

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section

Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container to avoid generating dusty conditions.

Section 7 - Handling and Storage

Handling: Wash hands before eating. Use with adequate ventilation. Avoid contact with skin and eyes. Keep container tightly closed. Avoid ingestion and inhalation.

Storage: Store in a cool, dry place.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Soil	none listed	none listed	none listed
Anthracene	0.2 mg/m ³ TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m ³ TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m ³ IDLH (listed under Coal tar pitches).	0.2 mg/m ³ TWA (as benzene soluble fraction) (listed under Coal tar pitches).
Pyrene	0.2 mg/m ³ TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m ³ TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m ³ IDLH (listed under Coal tar pitches).	0.2 mg/m ³ TWA (as benzene soluble fraction) (listed under Coal tar pitches).
Dibenzofuran	none listed	none listed	none listed
Benzo(b)fluoranthene	none listed	none listed	none listed
Fluoranthene	none listed	none listed	none listed
Acenaphthylene	none listed	none listed	none listed

1,2-benzphenanthrene	0.2 mg/m ³ TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m ³ TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m ³ IDLH (listed under Coal tar pitches).	0.2 mg/m ³ TWA (as benzene soluble fraction) (listed under Coal tar pitches).
Benzo(a)pyrene	0.2 mg/m ³ TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m ³ TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m ³ IDLH (listed under Coal tar pitches).	0.2 mg/m ³ TWA (as benzene soluble fraction) (listed under Coal tar pitches).
1,2-Benzanthracene	none listed	none listed	none listed
Acenaphthene	none listed	none listed	none listed
Phenanthrene	0.2 mg/m ³ TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m ³ TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m ³ IDLH (listed under Coal tar pitches).	0.2 mg/m ³ TWA (as benzene soluble fraction) (listed under Coal tar pitches).
Fluorene	none listed	none listed	none listed
Pentachlorophenol	0.5 mg/m ³ TWA; Skin - potential significant contribution to overall exposure by the cutaneous route	0.5 mg/m ³ TWA 2.5 mg/m ³ IDLH	0.5 mg/m ³ TWA
Naphthalene	10 ppm TWA; 15 ppm STEL; Skin - potential significant contribution to overall exposure by the cutaneous route	10 ppm TWA; 50 mg/m ³ TWA 250 ppm IDLH	10 ppm TWA; 50 mg/m ³ TWA
2-methylnaphthalene	none listed	none listed	none listed

SHA Vacated PELs: Soil: No OSHA Vacated PELs are listed for this chemical. Anthracene: No OSHA Vacated PELs are listed for this chemical. Pyrene: No OSHA Vacated PELs are listed for this chemical. Dibenzofuran: No OSHA Vacated PELs are listed for this chemical. Benzo(b)fluoranthene: No OSHA Vacated PELs are listed for this chemical. Fluoranthene: No OSHA Vacated PELs are listed for this chemical. Acenaphthylene: No OSHA Vacated PELs are listed for this chemical. 1,2-benzphenanthrene: No OSHA Vacated PELs are listed for this chemical. Benzo(a)pyrene: No OSHA Vacated PELs are listed for this chemical. 1,2-Benzanthracene: No OSHA Vacated PELs are listed for this chemical. Acenaphthene: No OSHA Vacated PELs are listed for this chemical. Phenanthrene: No OSHA Vacated PELs are listed for this chemical. Fluorene: No OSHA Vacated PELs are listed for this chemical. Pentachlorophenol: 0.5 mg/m³ TWA Naphthalene: 10 ppm TWA; 50 mg/m³ TWA 2-ethylnaphthalene: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by

SHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

skin: Wear appropriate gloves to prevent skin exposure.

clothing: Wear appropriate protective clothing to prevent skin exposure.

respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved

respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid

Appearance: not available

Color: none reported

Odor: Not available.

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Evaporation Rate:Not applicable.

Viscosity: Not applicable.

Boiling Point: Not available.

Freezing/Melting Point:Not available.

Decomposition Temperature:Not available.

Solubility: Insoluble in water.

Specific Gravity/Density:Not available.

Molecular Formula:Mixture

Molecular Weight:Not available.

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: High temperatures.

Compatibilities with Other Materials: None reported.

Hazardous Decomposition Products: No data available.

Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

TECS#:**AS#** 120-12-7: CA9350000**AS#** 129-00-0: UR2450000; UR2450100**AS#** 132-64-9: HP4430000**AS#** 205-99-2: CU1400000**AS#** 206-44-0: LL4025000**AS#** 208-96-8: AB1254000; AB1254200**AS#** 218-01-9: GC0700000**AS#** 50-32-8: DJ3675000**AS#** 56-55-3: CV9275000**AS#** 83-32-9: AB1000000**AS#** 85-01-8: SF7175000**AS#** 86-73-7: LL5670000**AS#** 87-86-5: SM6300000; SM6314000; SM6321000**AS#** 91-20-3: QJ0525000**AS#** 91-57-6: QJ9635000**D50/LC50:****AS#** 120-12-7:

Oral, mouse: LD50 = 4900 mg/kg;

AS# 129-00-0:

Draize test, rabbit, skin: 500 mg/24H Mild;

Inhalation, rat: LC50 = 170 mg/m³;Inhalation, rat: LC50 = 170 mg/m³;

Oral, mouse: LD50 = 800 mg/kg;

Oral, rat: LD50 = 2700 mg/kg;

AS# 132-64-9:**AS#** 205-99-2:**AS#** 206-44-0:

Oral, rat: LD50 = 2 gm/kg;

Skin, rabbit: LD50 = 3180 mg/kg;

AS# 208-96-8:

Oral, mouse: LD50 = 1760 mg/kg;

AS# 218-01-9:**AS#** 50-32-8:**AS#** 56-55-3:**AS#** 83-32-9:**AS#** 85-01-8:

Oral, mouse: LD50 = 700 mg/kg;

Oral, rat: LD50 = 1.8 gm/kg;

AS# 86-73-7:**AS#** 87-86-5:

Draize test, rabbit, eye: 100 uL/24H Mild;

Inhalation, mouse: LC50 = 225 mg/m³;Inhalation, mouse: LC50 = 225 mg/m³;Inhalation, rat: LC50 = 355 mg/m³;Inhalation, rat: LC50 = 200 mg/m³;Inhalation, rat: LC50 = 335 mg/m³;

Oral, mouse: LD50 = 36 mg/kg;
Oral, mouse: LD50 = 117 mg/kg;
Oral, mouse: LD50 = 30 mg/kg;
Oral, rabbit: LD50 = 200 mg/kg;
Oral, rat: LD50 = 27 mg/kg;
Oral, rat: LD50 = 27 mg/kg;
Oral, rat: LD50 = 50 mg/kg;
Skin, rat: LD50 = 96

AS# 91-20-3:

Draize test, rabbit, eye: 100 mg Mild;
Inhalation, rat: LC50 = >340 mg/m³/1H;
Oral, mouse: LD50 = 316 mg/kg;
Oral, rat: LD50 = 490 mg/kg;
Skin, rabbit: LD50 = >20 gm/kg;
Skin, rat: LD50 = >2500 mg/kg;

AS# 91-57-6:

Oral, rat: LD50 = 1630 mg/kg;

arcinogenicity:

AS# 120-12-7:

- **ACGIH:** A1 - Confirmed Human Carcinogen (as benzene soluble aerosol) (listed as 'Coal tar pitches').
- **California:** Not listed.
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

AS# 129-00-0:

- **ACGIH:** A1 - Confirmed Human Carcinogen (as benzene soluble aerosol) (listed as 'Coal tar pitches').
- **California:** Not listed.
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

AS# 132-64-9: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

AS# 205-99-2:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

AS# 206-44-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

AS# 208-96-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

AS# 218-01-9:

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans
- **California:** carcinogen, initial date 1/1/90
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

AS# 50-32-8:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

AS# 56-55-3:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 2A carcinogen

AS# 83-32-9: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

AS# 85-01-8:

- **ACGIH:** A1 - Confirmed Human Carcinogen (as benzene soluble aerosol) (listed as 'Coal tar pitches').
- **California:** Not listed.
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

AS# 86-73-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

AS# 87-86-5:

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans
- **California:** carcinogen, initial date 1/1/90
- **NTP:** Not listed.
- **IARC:** Not listed.

AS# 91-20-3:

- **ACGIH:** Not listed.
- **California:** carcinogen, initial date 4/19/02
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

AS# 91-57-6: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

epidemiology: No information available.
eratogenicity: No information available.
eproductive Effects: No information available.
utagenicity: No information available.
eurotoxicity: No information available.
ther Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

CRA P-Series: None listed.

CRA U-Series:

AS# 206-44-0: waste number U120.

AS# 218-01-9: waste number U050.

AS# 50-32-8: waste number U022.

AS# 56-55-3: waste number U018.

AS# 91-20-3: waste

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not regulated as a hazardous material	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

S FEDERAL

SCA

Soil is not listed on the TSCA inventory. It is for research and development use

ly.

CAS# 120-12-7 is listed on the TSCA inventory.

CAS# 129-00-0 is listed on the TSCA inventory.

CAS# 132-64-9 is listed on the TSCA inventory.

CAS# 205-99-2 is not listed on the TSCA inventory. It is for research and development use only.

CAS# 206-44-0 is listed on the TSCA inventory.

CAS# 208-96-8 is listed on the TSCA inventory.

CAS# 218-01-9 is listed on the TSCA inventory.

CAS# 50-32-8 is listed on the TSCA inventory.

CAS# 56-55-3 is listed on the TSCA inventory.

CAS# 83-32-9 is listed on the TSCA inventory.

CAS# 85-01-8 is listed on the TSCA inventory.

CAS# 86-73-7 is listed on the TSCA inventory.

CAS# 87-86-5 is listed on the TSCA inventory.

CAS# 91-20-3 is listed on the TSCA inventory.

CAS# 91-57-6 is listed on the TSCA inventory.

Health & Safety Reporting List

CAS# 129-00-0: Effective 6/1/87, Sunset 6/1/97 CAS# 91-20-3: Effective 6/1/87, Sunset 6/1/97

Chemical Test Rules

CAS# 91-20-3: Testing required by manufacturers, processors

Section 12b

CAS# 91-20-3: Section 4

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

ERCLA Hazardous Substances and corresponding RQs

CAS# 120-12-7: 5000 lb final RQ; 2270 kg final RQ CAS# 129-00-0: 5000 lb final RQ; 2270 kg final RQ CAS# 132-64-9: 100 lb final RQ; 45.4 kg final RQ CAS# 205-99-2: 1 lb final RQ; 0.454 kg final RQ CAS# 206-44-0: 100 lb final RQ; 45.4 kg final RQ CAS# 208-96-8: 5000 lb final RQ; 2270 kg final RQ CAS# 218-01-9: 100 lb final RQ; 45.4 kg final RQ CAS# 50-32-8: 1 lb final RQ; 0.454 kg final RQ CAS# 56-55-3: 10 lb final RQ; 4.54 kg final RQ CAS# 83-32-9: 100 lb final RQ; 45.4 kg final RQ CAS# 85-01-8: 5000 lb final RQ; 2270 kg final RQ CAS# 86-73-7: 5000 lb final RQ; 2270 kg final RQ CAS# 87-86-5: 10 lb final RQ; 4.54 kg final RQ CAS# 91-20-3: 100 lb final RQ; 45.4 kg final RQ

ARA Section 302 Extremely Hazardous Substances

CAS# 129-00-0: 1000 lb TPQ (lower threshold); 10000 lb TPQ (upper threshold)

ARA Codes

CAS # 120-12-7: acute.

CAS # 129-00-0: acute, chronic.

CAS # 206-44-0: acute.

CAS # 50-32-8: acute, chronic.

CAS # 56-55-3: chronic.

CAS # 83-32-9: acute.

CAS # 85-01-8: acute.

CAS # 91-20-3: acute, chronic, flammable.

CAS # 91-57-6: acute.

Section 313

This material contains Anthracene (CAS# 120-12-7, 0-2%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains Dibenzofuran (CAS# 132-64-9, 0-2%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains Benzo(b)fluoranthene (CAS# 205-99-2, 0-2%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains Fluoranthene (CAS# 206-44-0, 0-2%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains 1,2-benzphenanthrene (CAS# 218-01-9, 0-2%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains Benzo(a)pyrene (CAS# 50-32-8, 0-2%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains 1,2-Benzanthracene (CAS# 56-55-3, 0-2%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains Phenanthrene (CAS# 85-01-8, 0-2%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains Pentachlorophenol (CAS# 87-86-5, 0-2%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains Naphthalene (CAS# 91-20-3, 0-2%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 132-64-9 is listed as a hazardous air pollutant (HAP).

CAS# 87-86-5 is listed as a hazardous air pollutant (HAP).

CAS# 91-20-3 is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depletors.

This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 87-86-5 is listed as a Hazardous Substance under the CWA. CAS# 91-20-3 is listed as a Hazardous Substance under the CWA. CAS# 120-12-7 is listed as a Priority

pollutant under the Clean Water Act.	CAS# 129-00-0 is listed as a Priority
pollutant under the Clean Water Act.	CAS# 205-99-2 is listed as a Priority
pollutant under the Clean Water Act.	CAS# 206-44-0 is listed as a Priority
pollutant under the Clean Water Act.	CAS# 208-96-8 is listed as a Priority
pollutant under the Clean Water Act.	CAS# 218-01-9 is listed as a Priority
pollutant under the Clean Water Act.	CAS# 50-32-8 is listed as a Priority Pollutant
under the Clean Water Act.	CAS# 56-55-3 is listed as a Priority Pollutant under

CAS# 83-32-9 is listed as a Priority Pollutant under the Clean Water Act. CAS# 85-01-8 is listed as a Priority Pollutant under the Clean Water Act. CAS# 86-73-7 is listed as a Priority Pollutant under the Clean Water Act. CAS# 87-86-5 is listed as a Priority Pollutant under the Clean Water Act. CAS# 1-20-3 is listed as a Priority Pollutant under the Clean Water Act. CAS# 206-44-0 is listed as a Toxic Pollutant under the Clean Water Act. CAS# 83-32-9 is listed as a Toxic Pollutant under the Clean Water Act. CAS# 87-86-5 is listed as a Toxic Pollutant under the Clean Water Act. CAS# 91-20-3 is listed as a Toxic Pollutant under the Clean Water Act.

SHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 120-12-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Coal tar pitches), Massachusetts.

CAS# 129-00-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Coal tar pitches), Massachusetts.

CAS# 132-64-9 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

CAS# 205-99-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 206-44-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

CAS# 208-96-8 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

CAS# 218-01-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 50-32-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 56-55-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 83-32-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

CAS# 85-01-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Coal tar pitches), Massachusetts.

CAS# 86-73-7 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

CAS# 87-86-5 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 91-20-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 91-57-6 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65

WARNING: This product contains Benzo(b)fluoranthene, a chemical known to the state of California to cause cancer. **WARNING:** This product contains 1,2-benzphenanthrene, a chemical known to the state of California to cause cancer. **WARNING:** This product contains Benzo(a)pyrene, a chemical known to the state of California to cause cancer.

WARNING: This product contains 1,2-Benzanthracene, a chemical known to the state of California to cause cancer. **WARNING:** This product contains Pentachlorophenol, a chemical known to the state of California to cause cancer. **WARNING:** This product contains Naphthalene, a chemical known to the state of California to cause cancer. California No Significant Risk Level: CAS# 205-99-2: 0.096 æg/day NSRL (oral) CAS# 18-01-9: 0.35 æg/day NSRL (oral) CAS# 50-32-8: 0.06 æg/day NSRL CAS# 56-55-3: 0.033 æg/day NSRL (oral) CAS# 87-86-5: 40 æg/day NSRL

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

Not available.

Risk Phrases:

Safety Phrases:

GK (Water Danger/Protection)

CAS# 120-12-7: 2

CAS# 129-00-0: No information available.

CAS# 132-64-9: No information available.

CAS# 205-99-2: No information available.

CAS# 206-44-0: No information available.

CAS# 208-96-8: No information available.

CAS# 218-01-9: No information available.

CAS# 50-32-8: No information available.

CAS# 56-55-3: No information available.

CAS# 83-32-9: No information available.

CAS# 85-01-8: No information available.

CAS# 86-73-7: No information available.

CAS# 87-86-5: 3

CAS# 91-20-3: 2

CAS# 91-57-6: No information available.

Canada - DSL/NDSL

CAS# 120-12-7 is listed on Canada's DSL List.

CAS# 129-00-0 is listed on Canada's DSL List.

CAS# 132-64-9 is listed on Canada's DSL List.

CAS# 218-01-9 is listed on Canada's DSL List.

CAS# 50-32-8 is listed on Canada's DSL List.

CAS# 83-32-9 is listed on Canada's DSL List.

CAS# 85-01-8 is listed on Canada's DSL List.

CAS# 86-73-7 is listed on Canada's DSL List.

CAS# 87-86-5 is listed on Canada's DSL List.

CAS# 91-20-3 is listed on Canada's DSL List.

CAS# 91-57-6 is listed on Canada's DSL List.

CAS# 206-44-0 is listed on Canada's NDSL List.

CAS# 208-96-8 is listed on Canada's NDSL List.

CAS# 56-55-3 is listed on Canada's NDSL List.

Canada - WHMIS

This product has a WHMIS classification of D2A.

Canadian Ingredient Disclosure List

- CAS# 120-12-7 is listed on the Canadian Ingredient Disclosure List.
- CAS# 129-00-0 is listed on the Canadian Ingredient Disclosure List.
- CAS# 205-99-2 is listed on the Canadian Ingredient Disclosure List.
- CAS# 206-44-0 is listed on the Canadian Ingredient Disclosure List.
- CAS# 208-96-8 is not listed on the Canadian Ingredient Disclosure List.
- CAS# 218-01-9 is listed on the Canadian Ingredient Disclosure List.
- CAS# 50-32-8 is listed on the Canadian Ingredient Disclosure List.
- CAS# 56-55-3 is listed on the Canadian Ingredient Disclosure List.
- CAS# 83-32-9 is listed on the Canadian Ingredient Disclosure List.
- CAS# 85-01-8 is listed on the Canadian Ingredient Disclosure List.
- CAS# 86-73-7 is not listed on the Canadian Ingredient Disclosure List.
- CAS# 87-86-5 is not listed on the Canadian Ingredient Disclosure List.
- CAS# 91-20-3 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

SDS Creation Date: 9/02/1997

Revision #3 Date: 3/18/2003

The information above is believed to be accurate and represents the best information currently available. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall we be liable for any claims, losses, or damages of any third party or for lost profits or any special, direct, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.



Material Safety Data Sheet

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response In Canada
CANUTEC: 613-996-6666

Outside U.S. And Canada
Chemtrec: 703-527-3887

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865



NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

1,1,1-TRICHLOROETHANE

Product Identification

Synonyms: Methyl chloroform; trichloroethane; chloroetene
CAS No.: 71-55-6
Molecular Weight: 133.40
Chemical Formula: CH₃CCl₃
Product Codes: 9435, 9437, W509, W510

Composition/Information on Ingredients

Ingredient	CAS No	Percent
zardous		
-----	-----	-----

Methyl Chloroform	71-55-6	96 - 100%
s		
Dioxane	123-91-1	< 3%
s		
1,2-Epoxybutane	106-88-7	< 0.5%
s		

Actual concentrations proprietary

Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, AND CARDIOVASCULAR SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. POSSIBLE CANCER HAZARD. CONTAINS DIOXANE WHICH MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)

Flammability Rating: 1 - Slight

Reactivity Rating: 1 - Slight

Contact Rating: 2 - Moderate

Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES

Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:

Inhalation of vapors will irritate the respiratory tract. Affects the central nervous system. Symptoms include headache, dizziness, weakness, nausea. Higher levels of exposure (> 5000 ppm) can cause irregular heart beat, kidney and liver damage, fall in blood pressure, unconsciousness and even death.

Ingestion:

Harmful if swallowed. Symptoms similar to inhalation will occur along with nausea, vomiting. Aspiration of material into the lungs can cause chemical pneumonitis which can be fatal. If aspirated, may be rapidly absorbed through the lungs and result in injury to other body systems.

Skin Contact:

Causes mild irritation and redness, especially on prolonged contact. Repeated contact may cause drying or flaking of the skin.

Eye Contact:

Liquids and vapors cause irritation. Symptoms include tearing, redness, stinging, swelling.

Chronic Exposure:

Prolonged or repeated skin contact may cause dermatitis. Chronic exposure may affect the kidneys and liver. Dioxane is a suspected human carcinogen based on animal data.

Aggravation of Pre-existing Conditions:

Personnel with CNS, kidney, liver or heart disease may be more susceptible to the effects of this substance. Use of alcoholic beverages may aggravate symptoms.

First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a

physician.

Ingestion:

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give to an unconscious person. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. Call a physician.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Fire Fighting Measures

Fire:

Autoignition temperature: 500C (932F)

Flammable limits in air % by volume:

lcl: 7.0; ucl: 16.0

Vapors in containers can explode if subjected to high energy source.

Dioxane has a flash point below 16C (60F).

Explosion:

Can react with strong caustic, such as potash to form a flammable or explosive material. Air/vapor mixtures may explode when heated. Vapors can flow along surfaces to distant ignition source and flash back. Sealed containers may rupture when heated.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! Do not use aluminum, magnesium or zinc metal for storage container. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Do not use aluminum equipment or storage containers. Contact with aluminum parts in a pressurized fluid system may cause violent reactions.

Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL):

350 ppm (TWA) for trichloroethane

100 ppm (TWA) skin for dioxane

-ACGIH Threshold Limit Value (TLV):

350 ppm (TWA), 450 ppm (STEL) for trichloroethane

20 ppm (TWA) skin, A3 - Animal Carcinogen for dioxane

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134). This substance has questionable warning properties. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Viton is a recommended material for personal protective equipment.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Physical and Chemical Properties

Appearance:

Clear, colorless liquid.

Odor:

Mild chloroform-like odor.

Solubility:

4,400 ppm in water @ 20C (68F)

Specific Gravity:

1.34 @ 20C/4C

pH:

No information found.

% Volatiles by volume @ 21C (70F):

100

Boiling Point:

74C (165F)

Melting Point:

-32C (-26F)

Vapor Density (Air=1):

4.63

Vapor Pressure (mm Hg):

100 @ 20C (68F)

Evaporation Rate (BuAc=1):

12.8

. Stability and Reactivity

Stability:

Requires inhibitor content to prevent corrosion of metals. Slowly hydrolyzes in water to form hydrochloric and acetic acid.

Hazardous Decomposition Products:

May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition. Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:

Hazardous polymerization can occur in contact with aluminum trichloride.

Incompatibilities:

Open flames, welding arcs, nitrogen tetroxide, oxygen, liquid oxygen, sodium, sodium hydroxide, and sodium-potassium alloy, strong alkalis, oxidizers, aluminum and other reactive metals.

Conditions to Avoid:

Insufficient inhibitor, incompatibles, heat, flame and ignition sources

. Toxicological Information

Oral rat LD50: 9600 mg/kg; inhalation rat LC50: 18000 ppm/4H; investigated as a mutagen, tumorigen, reproductive effector; irritation eye rabbit, Standard Draize, 2mg/24H severe.

-----\Cancer Lists\-----

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Methyl Chloroform (71-55-6)	No	No	3
Dioxane (123-91-1)	No	Yes	2B
1,2-Epoxybutane (106-88-7)	No	No	2B

. Ecological Information

Environmental Fate:

When released into the soil, this material is not expected to biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. This material is not expected to significantly bioaccumulate. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition. When released to the atmosphere, this material has an average global half-life of 6.0 - 6.9 years. When released into the air, this material may adversely affect the ozone layer.

Environmental Toxicity:

This material is expected to be slightly toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

. Transport Information**Domestic (Land, D.O.T.)**

Proper Shipping Name: 1,1,1-TRICHLOROETHANE

Hazard Class: 6.1

UN/NA: UN2831

Packing Group: III

Information reported for product/size: 20L

. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----				
Ingredient	TSCA	EC	Japan	Australia

Methyl Chloroform (71-55-6)	Yes	Yes	Yes	
s				
Dioxane (123-91-1)	Yes	Yes	Yes	
s				
1,2-Epoxybutane (106-88-7)	Yes	Yes	Yes	
s				

-----\Chemical Inventory Status - Part 2\-----
 --Canada--

Ingredient	Korea	DSL	NDSL	Phil.
Methyl Chloroform (71-55-6)	Yes	Yes	No	Yes
Dioxane (123-91-1)	Yes	Yes	No	Yes
1,2-Epoxybutane (106-88-7)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----

Ingredient	-SARA 302-		-----SARA 313-----	
	RQ	TPQ	List	Chemical Catg.
Methyl Chloroform (71-55-6)	No	No	Yes	No
Dioxane (123-91-1)	No	No	Yes	No
1,2-Epoxybutane (106-88-7)	No	No	Yes	No

-----\Federal, State & International Regulations - Part 2\-----

Ingredient	CERCLA	-RCRA-	-TSCA-
		261.33	8 (d)
Methyl Chloroform (71-55-6)	1000	U226	No
Dioxane (123-91-1)	100	U108	
1,2-Epoxybutane (106-88-7)	100	No	No

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: No
 RA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
 activity: No (Mixture / Liquid)

WARNING:

THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2[Z]

Poison Schedule: S6

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

. Other Information

NFPA Ratings: Health: 2 Flammability: 1 Reactivity: 0

Label Hazard Warning:

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, AND CARDIOVASCULAR SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. POSSIBLE CANCER HAZARD. CONTAINS DIOXANE WHICH MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

Label Precautions:

Avoid breathing vapor.

Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid contact with eyes, skin and clothing.

Label First Aid:

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS

Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865



24 Hour Emergency Telephone: 908-659-2151
CHEMTREC: 1-800-424-9300

National Response In Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

TRICHLOROETHYLENE

Product Identification

Synonyms: Trichloroethene; TCE; acetylene trichloride; Ethinyl trichloride

CAS No.: 79-01-6

Molecular Weight: 131.39

Chemical Formula: C₂HCl₃

Product Codes:

J.T. Baker: 5376, 9454, 9458, 9464, 9473, 9474

Mallinckrodt: 8598, 8600, 8633

Composition/Information on Ingredients

Ingredient	CAS No	Percent
zardous		
-----	-----	-----

Trichloroethylene	79-01-6	100%
s		

Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS HEART, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES SEVERE SKIN IRRITATION. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)

Flammability Rating: 1 - Slight

Reactivity Rating: 1 - Slight

Contact Rating: 2 - Moderate

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:

Vapors can irritate the respiratory tract. Causes depression of the central nervous system with symptoms of visual disturbances and mental confusion, incoordination, headache, nausea, euphoria, and dizziness. Inhalation of high concentrations could cause unconsciousness, heart effects, liver effects, kidney effects, and death.

Ingestion:

Cases irritation to gastrointestinal tract. May also cause effects similar to inhalation. May cause coughing, abdominal pain, diarrhea, dizziness, pulmonary edema, unconsciousness. Kidney failure can result in severe cases. Estimated fatal dose is 3-5 ml/kg.

Skin Contact:

Cause irritation, redness and pain. Can cause blistering. Continued skin contact has a defatting action and can produce rough, dry, red skin resulting in secondary infection.

Eye Contact:

Vapors may cause severe irritation with redness and pain. Splashes may cause eye damage.

Chronic Exposure:

Chronic exposures may cause liver, kidney, central nervous system, and peripheral nervous system effects. Workers chronically exposed may exhibit central nervous system depression, intolerance to alcohol, and increased cardiac output. This material is linked to mutagenic effects in humans. This material is also a suspect carcinogen.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders, cardiovascular disorders, impaired liver or kidney or respiratory function, or central or peripheral nervous system disorders may be more susceptible to the effects of the substance.

First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a

physician.

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician.

Skin Contact:

Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:

Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

Fire Fighting Measures

Fire:

Autoignition temperature: 420C (788F)

Flammable limits in air % by volume:

lcl: 8; ucl: 12.5

Explosion:

A strong ignition source, e. g., a welding torch, can produce ignition. Sealed containers may rupture when heated.

Fire Extinguishing Media:

Use water spray to keep fire exposed containers cool. If substance does ignite, use CO2, dry chemical or foam.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

Exposure Controls/Personal Protection

Airborne Exposure Limits:

Trichloroethylene:

-OSHA Permissible Exposure Limit (PEL):

100 ppm (TWA), 200 ppm (Ceiling),
300 ppm/5min/2hr (Max)

-ACGIH Threshold Limit Value (TLV):

50 ppm (TWA) 100 ppm (STEL);

listed as A5, not suspected as a human carcinogen.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134). This substance has poor warning properties. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene is a recommended material for personal protective equipment.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Physical and Chemical Properties

Appearance:

Clear, colorless liquid.

Odor:

Chloroform-like odor.

Solubility:

Practically insoluble in water. Readily miscible in organic solvents.

Specific Gravity:

1.47 @ 20C/4C

pH:

No information found.

% Volatiles by volume @ 21C (70F):

100

Boiling Point:

87C (189F)

Melting Point:

-73C (-99F)

Vapor Density (Air=1):

4.5

Vapor Pressure (mm Hg):

57.8 @ 20C (68F)

Evaporation Rate (BuAc=1):

No information found.

. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage. Will slowly decompose to hydrochloric acid when exposed to light and moisture.

Hazardous Decomposition Products:

May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Strong caustics and alkalis, strong oxidizers, chemically active metals, such as barium, lithium, sodium, magnesium, titanium and beryllium, liquid oxygen.

Conditions to Avoid:

Heat, flame, ignition sources, light, moisture, incompatibles

. Toxicological Information

Toxicological Data:

Trichloroethylene: Oral rat LD50: 5650 mg/kg; investigated as a tumorigen, mutagen, reproductive effector.

Reproductive Toxicity:

This material has been linked to mutagenic effects in humans.

-----\Cancer Lists\-----

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Trichloroethylene (79-01-6)	No	Yes	2A

. Ecological Information

Environmental Fate:

When released into the soil, this material may leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. This material has an experimentally-determined bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.

Environmental Toxicity:

The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be slightly toxic to aquatic life.

. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

. Transport Information**Domestic (Land, D.O.T.)**

Proper Shipping Name: TRICHLOROETHYLENE

Hazard Class: 6.1

UN/NA: UN1710

Packing Group: III

Information reported for product/size: 4L

International (Water, I.M.O.)

Proper Shipping Name: TRICHLOROETHYLENE

Hazard Class: 6.1

UN/NA: UN1710

Packing Group: III

Information reported for product/size: 4L

. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----				
Ingredient	TSCA	EC	Japan	Australia
Trichloroethylene (79-01-6)	Yes	Yes	Yes	

-----\Chemical Inventory Status - Part 2\-----

Ingredient	--Canada--			
	Korea	DSL	NDSL	Phil.
Trichloroethylene (79-01-6)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----

Ingredient	-SARA 302-		-----SARA 313-----	
	RQ	TPQ	List	Chemical Catg.
Trichloroethylene (79-01-6)	No	No	Yes	No

-----\Federal, State & International Regulations - Part 2\-----

Ingredient	CERCLA	-RCRA-	-TSCA-
		261.33	8 (d)
Trichloroethylene (79-01-6)	100	U228	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
 RA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
 activity: No (Pure / Liquid)

WARNING:
 THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE
 CANCER.

Australian Hazchem Code: None allocated.

Poison Schedule: S6

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

. Other Information

NFPA Ratings: Health: 2 Flammability: 1 Reactivity: 0

Label Hazard Warning:

WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS HEART, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES SEVERE SKIN IRRITATION. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

Label Precautions:

- Do not get in eyes, on skin, or on clothing.
- Do not breathe vapor.
- Keep container closed.
- Use only with adequate ventilation.
- Wash thoroughly after handling.
- Keep away from heat and flame.

Label First Aid:

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician. Note to physician: Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Attachment C

Chemical Safety Cards

NIOSH Pocket Guide to Chemical Hazards

Acetone		CAS 67-64-1	
<chem>(CH3)2CO</chem>		RTECS <u>AL3150000</u>	
Synonyms & Trade Names Dimethyl ketone, Ketone propane, 2-Propanone		DOT ID & Guide 1090 <u>127</u>	
Exposure Limits	NIOSH REL: TWA 250 ppm (590 mg/m ³)		
	OSHA PEL†: TWA 1000 ppm (2400 mg/m ³)		
IDLH 2500 ppm [10%LEL] See: <u>67641</u>		Conversion 1 ppm = 2.38 mg/m ³	
Physical Description Colorless liquid with a fragrant, mint-like odor.			
MW: 58.1	BP: 133°F	FRZ: -140°F	Sol: Miscible
VP: 180 mmHg	IP: 9.69 eV		Sp.Gr: 0.79
Fl.P: 0°F	UEL: 12.8%	LEL: 2.5%	
Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.			
Incompatibilities & Reactivities Oxidizers, acids			
Measurement Methods NIOSH <u>1300, 3800</u> ; OSHA <u>69</u> See: <u>NMAM</u> or <u>OSHA Methods</u>			
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 immediately Breathing: Respiratory support Swallow: Medical attention immediately	
Respirator Recommendations NIOSH Up to 2500 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, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0087 See MEDICAL TESTS: 0002

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

1,1-DICHLOROETHANE

ICSC: 0249

☒	☒		
<p>1,1-DICHLOROETHANE Ethane, 1,1-dichloro- Ethylidene chloride CH_3CHCl_2 Molecular mass: 99.0</p>			
CAS # 75-34-3 RTECS # KI0175000 ICSC # 0249 UN # 2362 EC # 602-011-00-1	<table border="1" style="border-collapse: collapse;"> <tr> <td style="width: 50%; height: 50px; vertical-align: top;">☒</td> <td style="width: 50%; height: 50px; vertical-align: top;">☒</td> </tr> </table>	☒	☒
☒	☒		

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly 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. Do NOT use compressed air for filling, discharging, or handling.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		PREVENT GENERATION OF MISTS!	
• INHALATION	Dizziness. Drowsiness. Dullness. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• SKIN	Dry skin. Roughness.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
• EYES	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if

			easily possible), then take to a doctor.
• INGESTION	Burning sensation (further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.
SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING	
Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer (extra personal protection: self-contained breathing apparatus).	Fireproof. Separated from: see Chemical Dangers. Cool.	F symbol Xn symbol R: 11-22-36/37 S: 16-23 UN Hazard Class: 3 UN Packing Group: II Marine pollutant.	
SEE IMPORTANT INFORMATION ON BACK			
ICSC: 0249	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993 No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and IDLH values.		

International Chemical Safety Cards

1,1-DICHLOROETHANE

ICSC: 0249

I M P O R T	<p>PHYSICAL STATE; APPEARANCE: COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p>PHYSICAL DANGERS: The vapour is heavier than air and may travel along the ground; distant ignition possible.</p> <p>CHEMICAL DANGERS: The substance decomposes on heating</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation and by ingestion.</p> <p>INHALATION RISK: A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE: The substance may cause effects on</p>
------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p>T A</p>	<p>OCCUPATIONAL EXPOSURE LIMITS (OELs): TLV: 100 ppm; 405 mg/m³ (ACGIH 1992-1993). OSHA PEL: TWA 100 ppm (400 mg/m³) NIOSH REL: TWA 100 ppm (400 mg/m³) See Appendix C (Chloroethanes) NIOSH IDLH: 3000 ppm</p>	
<p>PHYSICAL PROPERTIES</p>	<p>Boiling point: 57°C Melting point: -98°C Relative density (water = 1): 1.2 Solubility in water, g/100 ml at 20°C: 0.6 Vapour pressure, kPa at 20°C: 24</p>	<p>Relative vapour density (air = 1): 3.4 Flash point: -6°C c.c. Auto-ignition temperature: 458°C Explosive limits, vol% in air: 5.6-11.4 Octanol/water partition coefficient as log Pow: 1.8</p>
<p>ENVIRONMENTAL DATA</p>		
<p style="text-align: center;">NOTES</p>		
<p>Do NOT use in the vicinity of a fire or a hot surface, or during welding. Transport Emergency Card: TEC (R)-30G34 NFPA Code: H 2; F 3; R 0;</p>		
<p style="text-align: center;">ADDITIONAL INFORMATION</p>		
<p>ICSC: 0249</p>	<p>1,1-DICHLOROETHANE</p>	
<p style="text-align: center;">© IPCS, CEC, 1993</p>		
<p>IMPORTANT LEGAL NOTICE:</p>	<p>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 IDLH values.</p>	

NIOSH Pocket Guide to Chemical Hazards

Methyl chloroform		CAS 71-55-6
CH₃CCl₃		RTECS KJ2975000
Synonyms & Trade Names Chlorothene; 1,1,1-Trichloroethane; 1,1,1-Trichloroethane (stabilized)		DOT ID & Guide 2831 <u>160</u>
Exposure Limits	NIOSH REL: C 350 ppm (1900 mg/m ³) [15-minute] <u>See Appendix C</u> (Chloroethanes)	
	OSHA PEL†: TWA 350 ppm (1900 mg/m ³)	
IDLH 700 ppm See: <u>71556</u>		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
VP: 100 mmHg	IP: 11.00 eV	Sol: 0.4%
FLP: ?	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: <u>NMAM INDEX</u>		
Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: N.R.		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

See also: INTRODUCTION See ICSC CARD: 0079 See MEDICAL TESTS: 0141

International Chemical Safety Cards

TRICHLOROETHYLENE

ICSC: 0081

<p style="text-align: center;">TRICHLOROETHYLENE 1,1,2-Trichloroethylene Trichloroethene Ethylene trichloride $C_2HCl_3/CICH=CCl_2$ Molecular mass: 131.4</p> <p>CAS # 79-01-6 RTECS # KX4550000 ICSC # 0081 UN # 1710 EC # 602-027-00-9</p>			
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--	--	--

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible under specific conditions. See Notes.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION	Risk of fire and explosion (see Chemical Dangers).		In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE			
• INHALATION	Dizziness. Drowsiness. Headache. 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.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• EYES	Redness. Pain.	Safety spectacles.	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. Wash hands before eating.	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 (extra personal protection: self-contained breathing apparatus).	Separated from metals (see Chemical Dangers), strong bases, food and feedstuffs. Dry. Keep in the dark. Ventilation along the floor.	Do not transport with food and feedstuffs. IMO: Marine Pollutant Xn symbol R: 40 S: 23-36/37 UN Hazard Class: 6.1 UN Packing Group: III
SEE IMPORTANT INFORMATION ON BACK		
ICSC: 0081	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993	

International Chemical Safety Cards

TRICHLOROETHYLENE

ICSC: 0081

I M P	<p>PHYSICAL STATE; APPEARANCE: COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.</p> <p>PHYSICAL DANGERS: The vapour is heavier than air. As a</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p>INHALATION RISK: A harmful contamination of the air can</p>
PHYSICAL PROPERTIES	<p>Boiling point: 87°C Melting point: -73°C Relative density (water = 1): 1.5 Solubility in water, g/100 ml at 20°C: 0.1 Vapour pressure, kPa at 20°C: 7.8</p>	<p>Relative vapour density (air = 1): 4.5 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.3 Auto-ignition temperature: 410°C Explosive limits, vol% in air: 8-10.5 Octanol/water partition coefficient as log Pow: 2.42</p>

<p align="center">PHYSICAL PROPERTIES</p>	<p>Boiling point: 87°C Melting point: -73°C Relative density (water = 1): 1.5 Solubility in water, g/100 ml at 20°C: 0.1 Vapour pressure, kPa at 20°C: 7.8</p>	<p>Relative vapour density (air = 1): 4.5 Relative density of the vapour/air- mixture at 20°C (air = 1): 1.3 Auto-ignition temperature: 410°C Explosive limits, vol% in air: 8-10.5 Octanol/water partition coefficient as log Pow: 2.42</p>
<p align="center">ENVIRONMENTAL DATA</p>	<p>This substance may be hazardous to the environment; special attention should be given to water organisms.</p>	
<p align="center">NOTES</p>		
<p>Combustible vapour/air mixtures difficult to ignite, may be developed under certain conditions. Use of alcoholic beverages enhances the harmful effect. 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. Technical grades may contain small amounts of carcinogenic stabilizers.</p> <p align="right">Transport Emergency Card: TEC (R)-723 NFA Code: H2; F1; R0;</p>		
<p align="center">ADDITIONAL INFORMATION</p>		
<p>ICSC: 0081</p>	<p align="center">TRICHLOROETHYLENE</p> <p align="center">© IPCS, CEC, 1993</p>	
<p align="center">IMPORTANT LEGAL NOTICE:</p>	<p>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.</p>	

Attachment D

Client-Specific Health and Safety Guidelines

Attachment E

Health and Safety Plan Supplements

