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AIR FORCE REAL PROPERTY AGENCY

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FROM: AFRPA/DA-Griffiss
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153 Brooks Road
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SUBJECT: Draft Field Sampling Plan, Revision 2.0
Draft Site Safety and Health Plan, Revision 2.0
Long-Term Monitoring Program at the former Griffiss Air Force Base, Rome, NY

Enclosed please find the subject Draft Field Sampling Plan and Draft Site Safety and Health Plan for the Long-Term Monitoring Program at the former Griffiss Air Force Base.

The purpose of the plans is to consolidate and update information from previously submitted plans:

- Draft-Field Sampling Plan, Petroleum Spill Sites, Long-Term Monitoring Program, Rev. 0.0, August 2001 (including subsequent Addenda)
- Draft Field Sampling Plan, Areas of Concern Long-Term Monitoring Baseline Study, Vers. 1.2, December 1998.
- Draft Work Plan, Long-Term Monitoring, Three Mile Creek and Six Mile Creek AOCs, February 2003.

Please review and advise of any comments.

A handwritten signature in black ink, appearing to read "Michael F. Mc Dermott".

MICHAEL F. MCDERMOTT
BRAC Environmental Coordinator

Attachments: As Noted

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Certification of Compliance

On behalf of FPM Group, Ltd. (FPM), the undersigned certify that the document(s) listed below were developed in conformance with FPM's Quality Control Plan, and further, that the work was performed in accordance with acceptable standards of engineering and scientific practice. Comments made by reviewers will be maintained in the project files in accordance with company policy.

**Site Safety and Health Plan for Long Term Monitoring Program
Former Griffiss Air Force Base
Rome, New York
December 2003
Revision 2.0**

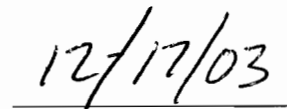
**Contract Number: DACW41-02-D-0020
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Prepared for:

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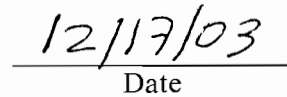


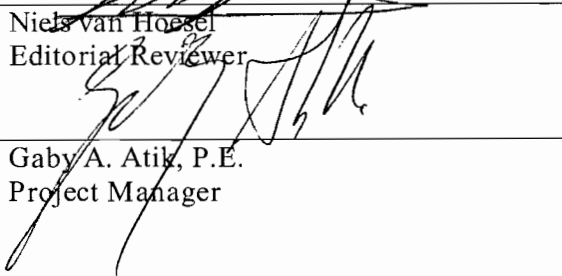
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Project Manager


Date



SITE SAFETY AND HEALTH PLAN

FOR

LONG TERM MONITORING PROGRAM

**FORMER GRIFFISS AIR FORCE BASE
ROME, NEW YORK**

Prepared for:

**AIR FORCE REAL PROPERTY AGENCY
Former Griffiss Air Force Base
Rome, New York**

Prepared by:

**FPM Group, Ltd.
153 Brooks Road
Rome, NY 13441**

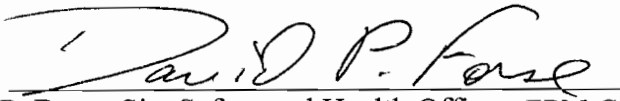
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December 2003**

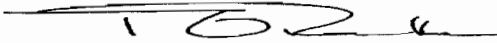
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**SITE SAFETY AND HEALTH PLAN
FOR
LONG TERM MONITORING PROGRAM

FORMER GRIFFISS AIR FORCE BASE
ROME, NEW YORK**

REVISION 2.0, December 2003

Prepared by:  Date: 12/17/03
David P. Forse, Site Safety and Health Officer, FPM Group

Approved by:  Date: 12/17/03
Timothy O'Rourke, Certified Industrial Hygienist, FPM Group

Approved by:  Date: 12/17/03
Gaby Atik, Project Manager, FPM Group

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LIST OF ACRONYMS AND ABBREVIATIONS

ACC	Air Combat Command
ACGIH	American Conference of Industrial Hygienists
AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
AFRPA	Air Force Real Property Agency
ASTM	American Society for Testing and Materials
BRAC	Base Realignment And Closure
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
COPC	Chemical of Potential Concern
COR	Contracting Officer Representative
ERP	Emergency Response Plan
FOM	Field Operations Manager
FPM	FPM Group, Ltd.
ID	identification
LEL	Lower Explosive Limit
LTM	long-term monitoring
MSDS	Material Safety Data Sheet
MSL	mean sea level
NYSDEC	New York State Department of Environmental Conservation
OP	Occupational Physician
OSHA	Occupational Safety and Health Administration
P.E.	Professional Engineer
PEL	Permissible Exposure Limit
PgM	Program Manager
PID	photoionization detector
PM	Project Manager
PPE	personal protective equipment
ppm	parts per million
SSHO	Site Health and Safety Officer
SSHPP	Site Safety and Health Plan
SVOC	semi-volatile organic compound
TLV	threshold limit value
USACE	United States Army Corps of Engineers

USAF United States Air Force
USEPA United States Environmental Protection Agency
VOC volatile organic compound

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1.0 INTRODUCTION

This Basewide Site Safety and Health Plan (SSHP) has been prepared by FPM Group, Ltd. (FPM) for the basewide sampling activities at the former Griffiss Air Force Base. Work will be performed in accordance with all applicable Federal, State and local health and safety laws and regulations. In addition to these requirements, work under this plan will be conducted to comply with Occupational Safety and Health Administration (OSHA) standards 29 Code of Federal Regulations (CFR) 1910 / 29 CFR 1926, and applicable portions of the USACE Safety and Health Requirements Manual (EM 385-1-1, ER 385-1-92, Appendix C).

Any changes to the procedures presented in this plan will be documented, approved by the Site Safety and Health Officer (SSHO) and Certified Industrial Hygienist (CIH), and issued as an addendum to this plan.

1.1 Scope and Applicability of the SSHP

This SSHP establishes procedures and provides guidelines to protect the personnel performing work during drilling and field sampling activities associated with site-specific Work Plans. The appropriateness of the information presented should always be evaluated with respect to unforeseen site conditions which may arise. The SSHO will be present at the site to inspect the implementation of the SSHP. It is the sole responsibility of the contractor to comply with the SSHP.

1.2 Program Objective

The primary objective of this Site-Specific Health and Safety Plan is to ensure the well-being and safety of all employees, as measured by having ZERO recordable incidents, injuries or illnesses.

To assist in compliance with the objective, all project staff will acknowledge and adhere to the policies and procedures established in this Site-Specific Health and Safety Plan. Accordingly, all project personnel will read this Site Specific Health and Safety Plan and sign the Plan Review Form (section 5) to certify they have read, understand and agree to abide by its provisions.

1.3 Site Work Zone and Visitors

The site work zone (a.k.a. exclusion zone) during a sampling event will be defined by the SSHO and will be, at a minimum, a 30-foot radius about the sampling point. This work zone may be extended if, in the judgment of the SSHO, site conditions warrant a larger work zone. Each work zone will be established by placing traffic pylons at the work zone's outer boundary. One entrance/exit to the work zone will be established to control access to the work zone (access control point). If personnel decontamination procedures become necessary as a result of

upgrading to Level C equipment, the decontamination will occur at the access control point. Personnel decontamination procedures at the access control point will be described later in the Decontamination Procedures subsection.

No visitors will be permitted within the work zone without the consent of the SSHO. All visitors will be required to be familiar with, and comply with, the SSHP. The SSHO will deny access to those whose presence within the work zone is unnecessary or those who are deemed by the SSHO to be in non-compliance with the SSHP.

The SSHO will also give an on-site health and safety discussion to all site personnel prior to initiating the site work. Workers not in attendance during the health and safety talk will be required to have the discussion with the SSHO prior to entering the work zone.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

This section presents discussion of the health and safety responsibilities of the FPM personnel associated with the execution of this Basewide Monitoring SSHP. A list of these key personnel is provided in Table 2-1.

**Table 2-1
 Key Participants for Griffiss AFB**

Position	Name	Affiliation	Phone Number
BRAC ¹ Environmental Coordinator	Michael McDermott	AFRPA ²	(315) 330-2275
Environmental Engineer	Catherine Jerrard Mark Rabe Michael Wojnas	AFRPA/DA	(315) 330-2275
USACE Project Manager	Amy Darpinian, Ph.D.	USACE	(816) 983-3897
AFCEE Team Chief	Roy Willis	AFCEE/ ERB-F	(210) 536-6452
AFCEE Field Engineer	Richard Petkovsek	AFCEE	(315) 330-4017
Program Manager (PgM)	Dr. Kevin Phillips, P.E.	FPM	(631) 737-6200
Project Manager (PM)	Gaby Atik, P.E.	FPM	(315) 336-7721
Chemical Quality Control Coordinator (CQCC)	Connie van Hoesel, E.I.T.	FPM	(315) 336-7721
Field Operations Manager (FOM)	Niels van Hoesel	FPM	(315) 336-7721
Certified Industrial Hygienist (CIH)	Timothy O'Rourke, CIH	FPM	(315) 336-7721 (607) 427-4714
Site Safety & Health Officer (SSHO)	David Forse	FPM	(315) 336-7721
Occupational Physician (OP)	Dr. Usha Raghavan Medical Director for Occupational Health	Riverfront Medical Services	(315) 451-8868
Subcontractors			
Environmental Drilling	Bill Morrow	Parratt Wolff	(315)-437-1429
Environmental Laboratories	Mark Nemec	STL	(716)-691-2600

¹Base Realignment and Closure.

²Air Force Real Property Agency.

2.1 Program Manager (PgM)

The PgM is responsible for executive oversight and overall conformance with the contract requirements. The PgM will manage the PM and SSHO and ensure that all work is performed to the satisfaction of the client.

2.2 Project Manager (PM)

The PM will be the primary point of contact for the contractor. The PM has primary responsibility for plan development, plan implementation, and report production, including data assessment. The PM has the authority to initiate corrective actions on any level of the work subject to PgM approval.

2.3 Field Operations Manager (FOM)

The FOM will coordinate support staff for field activities and manage daily activities associated with the project. The FOM reports directly to the PM and has the authority to initiate corrective actions on field operations subject to PM approval.

2.4 Certified Industrial Hygienist (CIH)

Under direction of the PM, the CIH will assist in the preparation, implementation, and enforcement of the SSHP, provide consultation, and coordinate modifications to the SSHP with the PM and the SSHO.

2.5 Occupational Physician (OP)

Under direction of the FOM, the OP will be responsible for the review of examination/test results performed in compliance with 29 CFR 1910.134 Respiratory Protection, 29 CFR 1910.120(f), and 1926.65(f) Hazardous Waste Operations and Emergency Response. The OP will provide the FOM with a written opinion of each employee's ability to perform hazardous site work.

2.6 Site Safety and Health Officer (SSHO)

The SSHO will be responsible for reviewing SSHP implementation and identifying the need for modifications to the SSHP. Additionally, the SSHO will ensure that the SSHP is implemented and will oversee daily health and safety issues, including emergency response actions. The SSHO shall have specific training, knowledge, and experience necessary to verify compliance with applicable safety and health requirements and will have authority to stop work activities if unacceptable health or safety conditions exist and take necessary action to re-establish and maintain safe working conditions. The SSHO and field technicians will work as a team in order to accomplish the health and safety goals of this SSHP. An alternate SSHO will be named to

serve in the absence of the SSHO. Both the SSHO and Alternate SSHO will be trained in first aid and adult CPR. The SSHO will make daily inspections of all active site areas.

2.7 FPM Subcontractors

All on-site subcontractors and supporting contractor personnel who participate in site activities will be responsible for adhering to this SSHP. Should a subcontractor’s scope of work not be covered by this SSHP, the subcontractor is required to prepare a SSHP for their scope of work. All subcontractors must provide employee training, medical clearance, and respirator fit test records (if applicable) to FPM prior to beginning work on-site.

Subcontractors and visitors are also required to take positive actions to avoid or correct potential hazards and to ensure that safe and healthful workplace conditions are maintained. Subcontractors are responsible for any legal liability arising from or in connection with the failure of their employees, agents and subcontractors to act in compliance with all applicable federal, state, and local requirements.

2.8 Emergency Telephone Numbers

Emergency telephone numbers are provided in Table 2-2. Section 11.0 provides a detailed discussion of the Emergency Response Plan.

Directions to Rome Memorial Hospital are as follows: Exit Mohawk Gate (near B-52 memorial), continue straight on Chestnut street until reaching Black River Blvd., turn left onto boulevard (hospital will be in sight, on right), followed by first right onto Oak street. Follow signs for Emergency Room (the hospital route is illustrated in Figure 11-1).

Table 2-2
Emergency Contact Information

Contact	Telephone Number
Rome Memorial Hospital Emergency Room	315-338-7000 or 911
Rome Fire Department	315-336-1234 or 911
Rome Ambulance	315-336-1234 or 911
Rome Police Department	315-339-3311 or 911
Project Manager, FPM (Gaby A. Atik)	315-336-7721
FOM, FPM (Niels van Hoesel)	315-336-7721
CIH, FPM (Timothy O’Rourke)	315-336-7721 or 607-427-4714
SSHO, FPM (David Forse)	315-336-7721
Environmental Coordinator, AFRPA Griffiss	315-330-2275
National Response Center	800-424-8802
NYSDEC (Chemical Spills)	800-457-7362
Rome Fire Department (HAZMAT Team)	315-339-5600

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3.0 SITE BACKGROUND AND CONTAMINATION HISTORY

Griffiss AFB is a former United States Air Force (USAF) Air Combat Command (ACC) installation located in Rome, New York (see Figure 3-1). The former Base lies within the Mohawk Valley between the Appalachian Plateau and the Adirondack Mountains. The topography across the former Base is relatively flat with elevations ranging from 435 to 595 feet above mean sea level (MSL). The highest elevations are to the northeast. A rolling plateau northeast of the former Base reaches an elevation of 1300 feet. The New York State Barge Canal and the Mohawk River valley south of the Base lie 430 feet above MSL.

The 416th Wing, under the ACC, was the host unit at Griffiss AFB. The primary mission of the Wing was maintaining and implementing effective aerial refueling operations and providing bombardment capabilities on a global scale.

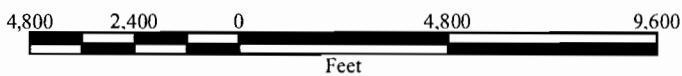
3.1 Site Descriptions and Contamination History

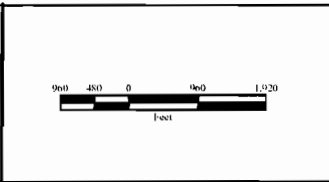
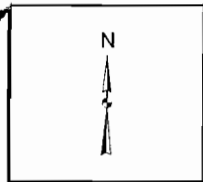
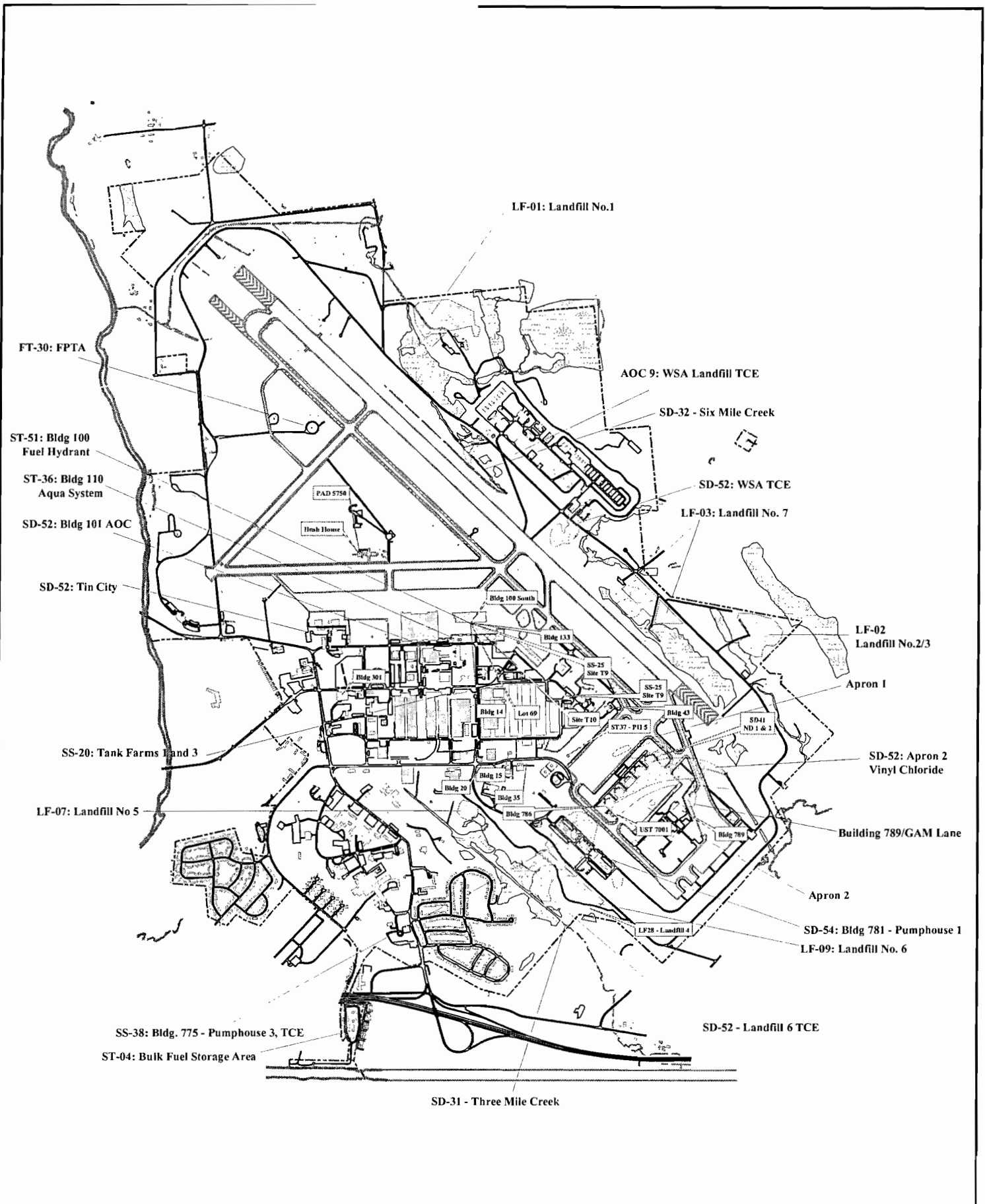
The location of the sites covered under this SSHP is provided in Figure 3-2. There are a total of 12 Contaminated On-Base Groundwater Sites, 9 Contaminated Landfill Sites, 6 Contaminated Petroleum Source Removal Area Sites, and 14 Contaminated Petroleum Spill Sites. The complete list of the sites covered under this SSHP along with the matrices to be sampled at each site is provided in Table 3-1. For specific site descriptions and contaminant history information, please refer to the respective chapter in the site-specific Work Plans.




FIGURE 3-1
Base Location Map

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK





Key To Features	
Sediment / Surface Water	Basemap
▲ Fish Tissue Sampling	□ Demolished
○ Sampling Location	□ Existing
Plumes	□ Wetland
▨ Chlorinated	▨ Landfill
▨ Petroleum	



**UNITED STATES AIR FORCE
FORMER GRIFFISS AIR FORCE BASE
ROME, NEW YORK**

Basewide Monitoring Sites

Figure 3-2

FPM Group

Page 3-3

Table 3-1
Basewide Monitoring Sites

Site	Groundwater	Surface Water	Sediment	Fish
Contaminated On-Base Groundwater Sites				
Bldg 20	X			
Bldg 35	X			
Lot 69	X			
SD-52: Bldg 101	X			
Bldg 301	X			
SD41: Nose Docks 1&2	X			
SD-52: Apron 2 VC Plume	X			
SS-38: Pumphouse 3	X			
Landfill 6 TCE	X			
SD-52: WSA TCE	X			
AOC 9 TCE	X			
Contaminated Landfill Sites and other Areas of Concern				
LF-01: Landfill 1	X	X		
LF-02: Landfill 2/3	X	X		
LF-03: Landfill 7	X			
LF-07: Landfill 5	X	X		
LF-09: Landfill 6	X	X		
LF-28: Landfill 4	X			
SS-54: Pump House 1	X			
SD-31: Three Mile Creek		X	X	X
SD-32: Six Mile Creek		X	X	X
Contaminated Petroleum Source Removal Area Sites				
ST-51: Bldg 100 FHS	X			
ST-36: Bldg 110	X			
ST-37: Pumphouse 5	X	X		
Bldg 43	X			
SS-20: Tank Farms 1 &3	X			
FT-30: FPTA	X			
Contaminated Petroleum Spill Sites				
Apron 1	X			
Apron 2	X			
SS-25: T-9	X			
T-10	X			
Bldg 14	X			
Bldg 786	X			
Bldg 789/GAM Lane	X			
UST 7001	X			
ST-04: BFSA	X			
Hush House	X			
Bldg 5773	X			
Pad 5750	X			
Bldg 133	X			
Bldg 15	X			
Bldg 100 South	X			

4.0 HAZARD/RISK ANALYSIS

This section will present the hazard analysis summary for various drilling and sampling activities at the former Griffiss AFB. Sections 4.1 through 4.3 discuss the details of specific chemical and physical hazards associated with Basewide Monitoring of the sites covered under this SSHP.

4.1 Direct Push Probing and Hollow-Stem Auger Drilling

Direct push probing and hollow-stem auger drilling may be employed to obtain groundwater samples at sites where existing monitoring wells may not provide sufficient information to achieve the long-term monitoring (LTM) objectives. In this case, the probing and installation of monitoring wells will be completed by an independent drilling company which will be subcontracted and must adhere to this SSHP for all work completed. The drilling and probing subcontractors will be observed by the SSHO. No subsurface borings or other sample collection activities are to be conducted without the presence of the SSHO.

Level D personal protective equipment is anticipated to be utilized by the probing and drilling crew and field personnel during probing, drilling, sampling, and decontamination events. Level D protection includes eye protection, hard hats, steel-toed/steel-shank work boots, and appropriate clothing. Hearing protection may be required if work conditions warrant its use. The personal protective equipment level will be upgraded as necessary based on the criteria detailed in this section.

Based on the sites covered under this SSHP and their respective sampling locations, it has been determined that the chemicals of potential concern (COPC) consist of petroleum-derived volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs). COPCs can be found listed in Appendix A. At some Petroleum Spill Sites, the COPCs may include free product of jet fuel or gasoline VOCs and SVOCs. VOC/SVOC concentrations shall be monitored in the work zone during probing and/or drilling operations by utilizing a photoionization detector (PID). The PID shall be "zeroed" by exposing the PID to a canister of hydrocarbon-free air (<0.1 parts per million (ppm) hydrocarbons). If ambient air conditions are void of any hydrocarbon emitting sources, then ambient air may be used as the zero gas. Background VOC concentrations will then be established in the work zone prior to field activities and recorded in the SSHO's field book. Calibration of the PID will be performed at the beginning of each work day including the calibration span. PID calibration procedures are discussed in detail in Section 9.0.

PID air monitoring shall be conducted by the SSHO. PID readings will be continuously monitored in the worker's breathing zone during all drilling activity. The worker's breathing zone will be defined as the area 1 foot above or around the top of the direct push apparatus or hollow-stem rod or auger. Readings will be recorded following initial ground penetration and at each sampling interval. All readings and observations will be recorded in the SSHO's field book. Steady-state PID readings greater than five (5) ppm in the worker's breathing zone will

require upgrading to Level C personal protective equipment. Steady-state readings, for this purpose, will be defined as readings exceeding five (5) ppm above background for a minimum of ten seconds.

At certain Petroleum Spill Sites with free product, combustible gas monitoring shall be conducted by the SSHO. Combustible gas monitoring shall also be conducted by the SSHO at all landfill sites. Steady state readings greater than 10% of the Lower Explosion Limit (LEL) will require the stopping or modifying the method of auger advancement. Modification of the method of auger advancement will be limited to the addition of potable water to suppress the potential methane off-gassing or organic vapors. If this modification does not suppress the off-gassing to below the 10% LEL level, the borehole location will be properly abandoned and the borehole location moved farther away from the landfill mass or drilling location in increments of 50 feet.

4.1.1 Well Boring and Drill Rig Safety

Only necessary personnel for drilling operations should be present in the operating area. Other parties present should remain outside the drilling area until their presence is needed.

Potential electrical hazards consist mainly of underground and overhead power lines. Hazards of underground utilities will be minimized by having all utilities identified and marked for each site where subsurface drilling and/or sampling will occur. A digging permit will be obtained from the Base. The Base utility plans will be reviewed and a Base clearance to dig will be obtained. Drill rigs can come in contact with overhead power lines. Before raising the tower, determine if overhead utilities are present. Sampling locations may need to be modified to maintain 20 foot clearance from all over head utilities. Never raise the tower if visibility is restricted.

Some sampling locations may be remote and require the rig to travel on slopes or uneven terrain. Care must be taken to assure the rig remains upright. Travel on hills and slope should be avoided if at all possible. The rig must not be moved with the tower in the raised position and all equipment must be properly stowed when moving the rig. The rig must also be prevented from moving once setup by braking and/or blocking wheels.

The mast should not be moved during high wind conditions and work must be suspended during electrical storms.

Rigging failure is a drilling hazard. All rigging equipment must be inspected daily, in accordance with 29 CFR 1926.522 and 29 CFR 1926.251. Each member of the drilling crew or field personnel should report any item that he/she observes to be defective, worn, or unsafe and immediately place that equipment out of service.

All personnel working at elevations greater than 6 feet above the derrick floor or other working surfaces must wear a full body harness, with an attached lanyard secured to the derrick, except during rig up and rig down.

All boring equipment used should have an equipment emergency stop device. All field personnel and members of the drilling crew should be aware of the location and use of this device. This device must be confirmed to be in working order before and after completion of drilling activities. Moving augers should not be handled unless an additional person is standing by to activate the emergency stop device. The drilling crew should not leave the controls of the boring apparatus while it is in operation unless all personnel are removed from the sampling or boring area.

Being caught in moving parts of the rig is a hazard. A long-handled tool such as a shovel should be used to remove drill cuttings from the boring hole and machinery in motion. Hands and/or feet are not acceptable as a substitute for this purpose. Never reach around augers for any purpose. No loose clothing or jewelry is allowed and long hair must be pulled back when working with the drill rig. Never place a finger between augers when hoisting them into place.

A remote sampling device must be used to sample drill cuttings if machinery is in motion or has the possibility of being in motion. If field personnel must work near machinery that is or could be in motion, it is the drilling crew's responsibility to shut down the drilling apparatus before such sampling begins.

Minimum PPE required when working with the drill rig includes; hard hat, safety glasses, and safety shoes (steel toe/shank).

Due to the fact that most drilling operations are loud, hearing protection must be worn when the drill rig is in operation.

4.2 Groundwater Sampling

Groundwater samples will be collected using bailers, bladder pumps, or peristaltic pumps. Bladder pumps or peristaltic pump sampling will require a battery or generator. During groundwater sampling at monitoring wells with free product, unknown conditions, or historically known elevated air monitoring conditions, PID air monitoring of the breathing zone will be performed during sampling procedures. Steady-state PID readings above 5 ppm above background in the workers breathing zone will necessitate Level C personal protection to include air-purifying respirators (as detailed in the PPE subsection). The workers breathing zone will be defined as the area one ft above or around the top of the monitoring well casing.

Latex, nitrile, or butyl gloves will be worn by samplers to avoid dermal contact. In addition, approved ANSI eye protection will be worn by samplers during periods when the potential for splashing of groundwater is present (such as during bailing, purging, pumping and sampling).

4.3 Sediment, Surface Water, and Leachate Sampling

Creek sediment, surface water, and leachate sampling will be performed manually. Sediment samples will be collected with a hand auger or by scooping sediment from the bottom of the creek. The hand auger will be decontaminated between sampling locations. Surface water will be collected manually using a disposable or decontaminated beaker from standing water, leachate, or running water.

4.4 Fish Tissue Sampling

This sampling will be performed using an electric fishing apparatus. During this sampling, a 100-yard section of the creek will be fenced off with nets and all fish within this stretch of the creek will be collected, measured and weighed. The electric fishing apparatus will be utilized according to their manuals and will be run by qualified personnel with training in the use of these specific apparatus.

4.4.1 Safety Analysis

Groundwater, sediment, surface water, leachate and fish tissue samples will be collected during sampling activities associated with Basewide Monitoring of the sites covered under this SSHP. Refer to the site-specific Work Plan for a discussion of the project scope of work, summarizing the specific tasks to be performed at each site. Table 4-1 summarizes the known COPCs at the sites covered under this SSHP.

During drilling/Geoprobe[®] activities, contaminant-laden dust, VOC emissions and direct skin contact may pose inhalation and dermal threats to personnel. Groundwater sampling and well development may pose similar threats, however, to a lesser degree. Table 4-2 lists the potential health effects and properties of the known COPCs at the sites covered under this SSHP. A more detailed list of chemical hazard data for specific COPCs is included in Appendix A. Possible routes of exposure may include the following:

- Inhalation of volatile organic vapors,
- Skin/eye contact with contaminants, and
- Ingestion as a result of contaminants from hand to mouth.

**Table 4-1
 Basewide Monitoring Sites – Chemical Compounds of Potential Concern**

Site	Free Product	Petroleum VOCs	Organic Solvents	Chlorinated Solvents	MTBE	CH ₄	SVOCs	Pesticides	PCBS	Metals	Radiological Constituent
Contaminated On Base Groundwater Sites											
Bldg 20							X			X	
Bldg 35			X	X			X			X	
Lot 69										X	
SD-52: Bldg 101				X							
Bldg 301							X			X	
SD41: Nose Docks 1&2	X	X	X	X							
SD-52: Apron 2 VC Plume				X	X						
SS-38: Pumphouse 3				X							
Landfill 6 TCE				X							
SD-52: WSA TCE				X							
AOC 9 TCE				X							
Contaminated Landfill Sites and Other Areas of Concern											
LF-01: Landfill 1		X	X	X		X		X	X	X	
LF-02: Landfill 2/3		X		X						X	
LF-03: Landfill 7		X	X	X						X	
LF-07: Landfill 5		X							X	X	
LF-09: Landfill 6		X	X	X						X	
LF-28: Landfill 4											X
SS-54: Pump House 1	X	X									
SD-31: Three Mile Creek		X					X	X	X	X	
SD-32: Six Mile Creek		X		X			X	X	X	X	
Contaminated Petroleum Source Removal Area Sites											
ST-51: Bldg 100 FHS		X									
ST-36: Bldg 110		X									
ST-37: Pumphouse 5		X					X		X	X	
Bldg 43		X					X				
SS-20: Tank Farms 1 &3		X					X				
FT-30: FPTA		X									
Contaminated Petroleum Spill Sites											
Apron 1	X	X									
Apron 2	X	X					X				
SS-25: T-9		X					X				
T-10		X					X				
Bldg 14		X					X				
Bldg 786		X									
Bldg 789/GAM Lane	X	X									
UST 7001		X			X		X				
ST-04: BFS A		X					X				
Bldg 5773		X					X				
Pad 5750		X					X				
Bldg 133		X					X				
Bldg 15		X					X				
Bldg 100 South		X					X				

**Table 4-2
 Basewide Monitoring Sites Health Effects/Properties of COPCs**

Substance	Current OSHA Permissible Exposure Limit (PEL)	ACGIH ⁽¹⁾ Recommendation for Environmental Exposure Limit	Health Effects	Properties
Pesticides	Varies with specific compound	Varies with specific compound	Inhalation, absorption, ingestion, skin and/or eye contact: blurred vision, confusion, ataxia, delirium, cough, abdominal pain, nausea, vomiting, diarrhea, irritability, tremor, limbjerk, convulsions, anuria. Lung, liver and kidney damage. Target organs: Central nervous system, eyes, lungs, liver, kidneys, skin.	Properties vary depending upon specific compounds
Petroleum Constituents	Varies with specific compound	Varies with specific compound	Inhalation, ingestion, contact: repeated dermal exposure can result in dermatitis; CNS depressant.	Clear aromatic volatile liquid. Dark or gray staining in soils. FLP: 50 °F (varies) LEL: 1.3% (varies) UEL: 60%

Table 4-2 (Continued)
 Basewide Monitoring Sites Health Effects/Properties of COPCs

Substance	Current OSHA Permissible Exposure Limit (PEL)	ACGIH Recommendation for Environmental Exposure Limit	Health Effects	Properties
Organic Solvents (General)	Varies with specific compound	Varies with specific compound	<p>Aliphatic and alicyclic-narcosis, (principle hazard: fire/explosion). Aromatic hydrocarbons: benzene is a carcinogen, others are toxic but less than benzene, pleasant odors at low concentrations, narcotic, irritating.</p> <p>Halogenated aliphatic and aromatic: narcosis, some are carcinogenic (i.e., vinyl chloride).</p> <p>Aliphatic alcohols: narcosis.</p> <p>Cyclic and aromatic alcohols: phenol acts on the CNS and an overexposure by any route leads to rapid collapse and death, probably by respiratory paralysis.</p> <p>Ketones: narcotic irritant and the irritation of eyes and nose usually suffice to limit exposure.</p>	Fire and explosion potential due to chemical properties of certain solvents.
Radionuclides ⁽²⁾	Varies with specific compound	Varies with specific compound	<p>Chronic Exposure: Genetic effects, increased risk of cancer, precancerous lesions, benign tumors, cataracts, skin changes, congenital defects.</p> <p>Acute Exposure: Radiation sickness, gastrointestinal disorders, bacterial infections, electrolyte imbalance, cancer, as well as those effects found under chronic exposure. (dosage dependent)</p>	Properties vary depending upon specific compounds

Table 4-2 (Continued)
Basewide Monitoring Sites Health Effects/Properties of COPCs

Substance	Current OSHA Permissible Exposure Limit (PEL)	ACGIH Recommendation for Environmental Exposure Limit	Health Effects	Properties
Metals (General)	Varies with specific compound	Varies with specific compound	Varies from compound to compound; Exposure to specific metals can perpetrate the following: Central nervous system and GI disorders, skin sensitization; hemolysis; metal fume fever; Burton line; teratogenic effects; mental effects; eye; skin; respiratory irritation.	This general section is included as various metals are present. It is expected that metal contamination will adhere to dust particles, and proper PPE should afford protection.
Chlorinated Solvents	Varies with specific compound	Varies with specific compound	Confirmed carcinogen: arsenic, nickel, and chromium (hexavalent). Suspected carcinogens: beryllium, lead, and cadmium. Inhalation, absorption, ingestion, contact: irritating to eyes, skin, acne-forming dermatitis, dark urine. Suspected carcinogen, embryotoxic. Target organs: skin, eyes, liver.	Properties vary depending upon specific compounds
PCBs	Varies with specific compound		Inhalation, absorption, ingestion, contact: irritating to eyes, skin, acne-forming dermatitis, dark urine. Suspected carcinogen, embryotoxic. Target organs: skin, eyes, liver.	Properties vary depending upon specific compounds

(1) American Conference of Industrial Hygienists

(2) Radiological analytes limited to Landfill 4 AOC. A 1997 excavation removed the source of contamination and its underlying soil (Parsons/OHM, September 1997). Post-excavation sampling and radionuclide pathway analysis determined that the site possessed no significant threat to the public or environment.

Air monitoring of VOCs, combustible gases, and oxygen levels, as described in Section 4.1, using direct PID and/or Lower Explosive Limit (LEL) readings shall be performed during drilling activities. Nitrile (or butyl) gloves will be worn by samplers to avoid dermal contact. In addition, safety glasses or full face shield eye protection will be worn by samplers during periods when the potential for splashing of groundwater is present (such as during purging). Proper personal hygiene habits and decontamination procedures will be employed to reduce/eliminate the potential of ingestion of hazardous materials.

At all sites, the methods listed below will be used to reduce or eliminate exposure to contaminants:

- Adherence to decontamination procedures (Section 4.5) and
- Personal protection equipment (Section 4.5.2).

4.5 Other Safety Considerations

4.5.1 Noise

During boring, drilling and generator operations or any other operation which may generate potentially harmful levels of noise, hearing protection will be worn. Hearing protection will be available to all site workers and will be required for exceedance(s) of noise exposure limits. The hearing protection will consist of foam, expansion-fit ear plugs (or other approved hearing protection) with a U.S. Environmental Protection Agency (USEPA) noise reduction rating of at least 29 dB. Hearing protection must alleviate worker exposure to noise to an eight-hour time-weighted average of 85 dB or below. In the event that the hearing protection is inadequate, work will cease until a higher level of hearing protection can be incorporated. Table 4-3 contains information pertaining to permissible noise exposures.

Table 4-3
Permissible Noise Exposures

Duration Per Day <u>Hours</u>	Sound Level dBA <u>Slow Response*</u>
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25	115

Notes: When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following fractions: $C_1/T_1 + C_2/T_2 + \dots + C_n/T_n$ exceeds unity, then, the mixed exposure should be considered to exceed the limit value. C_n indicates the total time of exposure at a specified noise level, and T_n indicates the total time of exposure permitted at that level.

Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.

*Standards derived from 29 CFR 1910.95

4.5.2 Slip/Trip/Fall Preventative Measures

To reduce the potential for slipping, tripping, or falling, all work zones will be kept clear of unnecessary equipment. All site workers will be required to wear work boots with adequate tread to reduce the potential for slipping (work boots must be leather or chemical-resistant and contain steel toes and steel shanks).

For fieldwork performed in late summer/early fall, or times when vegetation in and around the work zones has grown to full size, some areas will be difficult to access. Safe access to these locations might involve taking a detour in order to avoid damage to vegetation. Only if no other option is available, a path or work area may be cleared. Such path will avoid any threatened or endangered species which may be known to be present at the site.

For sampling performed in creek(s) or areas of high standing water, field personnel may opt to wear (chest) waders which severely restrict movement. Moreover, the creek may have a soft bottom or round gravel/rocks, which might create an instable or slippery bottom. Felt bottom wading shoes are recommended when wadding or traversing a stream. If chest waders are worn, a wader belt is required. A wader belt helps prevent water from entering waders if the individual falls in the stream

Sample locations which contain greater than 3 feet of water will be sampled from a boat. The inherent instability of a boat creates additional hazards. Type III, US Coast Guard Approved, orange, personal floatation devices must be properly worn by each individual in the boat. Life vests must be inspected prior to each use. Additionally a Type IV throwable life ring must be available.

4.5.3 Heat Stress and Cold Exposure

4.5.3.1 Heat Stress

Heat stress may become a concern during sampling activities taking place in late summer/early fall, especially if protective clothing is donned which will decrease natural ventilation. Exposure to heat stress is especially likely at remote sampling locations where relatively heavy sampling equipment will be manually hauled in.

Individuals who may be at increased risk of heat stress include:

- Workers doing heavy labor that become fatigued and/or wet from either sweating or exposure to water.
- Workers who are taking certain medications (sedatives) or who drink alcohol.
- Workers with circulatory system problems.
- Workers who are not physically fit or who are not acclimated to working in the heat.

To assist in reducing heat stress the following measures will be taken:

- An adequate supply of ice and water or other liquids will be brought on site. To prevent dehydration, personnel will be encouraged to drink generous amounts of water even if not thirsty. Water will be consumed outside the established work zone.
- A shady rest area will be designated to provide shelter during sunny days.
- In hot weather, workers wearing protective clothing may be rotated.
- Monitor yourself and your “buddy” for signs of heat stress, as discussed below.
- Utilize a work/rest regime.

When the temperature is over 70 degrees Fahrenheit and personnel are wearing protective clothing, physiological monitoring will be implemented.

When temperatures exceed 80 degrees heat stress monitoring will be conducted for all employees. Monitoring will consist of wet bulb dry globe temperature (WBGT) readings. When WBGT exceeds the screening criteria listed in the Table 4-3, physiological monitoring and heat stress mitigation will be implemented. Physiological monitoring will be performed as follows:

- Heart rate may be measured by counting the radial pulse for 30 seconds at the beginning of the rest period. The heart rate should not exceed 110 beats per minute. If the rate is higher, the next work period will be shortened by ten minutes (or 33%). If the pulse rate is 100 beats per minute at the beginning of the next rest period, the following work cycle will be shortened by 33%. The SSHO will decide on the length of work periods and rest periods based on site conditions.

- Body temperature may be measured, if deemed necessary, at the beginning of the rest period. Oral temperature should not exceed 99 degrees Fahrenheit. If it does, the next work period will be shortened by ten minutes (or 33%). However, if the oral temperature exceeds 99 degrees Fahrenheit at the beginning of the next period, the following work cycle will be further shortened by 33%. Work will not re-commence until body temperature has dropped below 99 degrees Fahrenheit.

**Table 4-4
 Screen Criteria for Heat Stress Monitoring**

Acclimatized				
Work Demands	Light⁽¹⁾	Moderate⁽¹⁾	Heavy⁽¹⁾	Very Heavy⁽¹⁾
100 % Work	29.5	27.5	26.0	M ⁽²⁾
75 % Work/ 25 % Rest	30.5	28.5	27.5	M ⁽²⁾
50 % Work/ 50 % Rest	31.5	29.5	28.5	27.5
25 % Work/ 75 % Rest	32.5	31.0	30.0	29.5
Unacclimatized				
100 % Work	27.5	25.0	22.5	M ⁽²⁾
75 % Work/ 25 % Rest	29.0	26.5	24.5	M ⁽²⁾
50 % Work/ 50 % Rest	30.0	28.0	26.5	25.0
25 % Work/ 75 % Rest	31.0	29.0	28.0	26.5

(1) - WBGT values in degrees Centigrade

(2) - Perform physiological monitoring

Indications of heat stress range from mild (fatigue, irritability, anxiety, decreased concentration, dexterity or movement) to fatal. Medical help will be obtained for serious conditions.

Heat-related problems are:

- Heat rash: caused by continuous exposure to heat and humid air and aggravated by chafing clothes. Decreases ability to tolerate heat as well as being a nuisance.

- Heat cramps: caused by profuse perspiration with inadequate fluid intake and chemical replacement (especially salts). Signs: muscle spasm and pain in the extremities and abdomen.
- Heat exhaustion: caused by increased stress on various organs to meet increased demands to cool the body. Signs: shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and lassitude.
- Heat stroke: the most severe form of heat stress. Can be fatal. Medical help must be obtained immediately. Body must be cooled immediately to prevent severe injury and/or death. Signs: red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma.

4.5.3.2 Cold Stress

Cold exposure is a concern if work is conducted during cold weather or marginally cold weather during precipitation periods or moderate to high wind velocity periods. To assist in reducing cold exposure the following measures will be taken:

- All personnel will be required to wear adequate and appropriate clothing. This will include headgear to prevent the high percentage loss of heat that occurs in this area (thermal liners for hard hats if hard hats are required). Wearing several layers of loosely fitted dry clothes with a layer of water and wind proof clothing is best.
- Provide a readily available warm shelter near each work zone.
- Carefully schedule work and rest periods to account for the current temperature and wind velocity conditions.
- Monitor work patterns and physical condition of workers and rotate personnel, as necessary.

Indications of cold exposure include shivering, dizziness, numbness, confusion, weakness, impaired judgment, impaired vision and drowsiness. Medical help will be obtained for serious conditions if they occur.

Cold exposure-related problems are:

- Frostbite: Ice crystal formation in body tissues. The restricted blood flow to the injured part results in local tissue destruction. Areas of the body which have high surface area-to-volume ratios such as fingers, toes, and ears are the most susceptible to frostbite. Frostbite of the extremities can be categorized into three categories: (1) Frost nip or incident frostbite characterized by suddenly blanching or whitening of skin, (2) Superficial frostbite where skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient, and deep frostbite where tissues are cold, pale, and solid (extremely serious injury).

- **Hypothermia:** Severe exposure to cold temperature resulting in the body losing heat at a rate faster than the body can generate heat. The stages of hypothermia are: shivering, apathy, loss of consciousness, decreasing pulse rate and breathing rate, and death.

Non-emergency work will cease when ambient air temperature is below -15 degrees Fahrenheit. When working at temperatures below -15 degrees Fahrenheit, the work / warm-up schedule shown in Table 4-5 will be followed.

4.5.4 Potential Electrical Hazards

Potential electrical hazards consist mainly of underground and over head utilities. Underground electrical hazards will be minimized by having a utility mark-out performed for each site where subsurface drilling and/or sampling will occur. A digging permit will be obtained from the Base. The Base utility plans will be reviewed and a Base clearance to dig will be obtained.

Drill rig operators also must take care to keep equipment away from overhead power lines. A minimum of 20-foot clearance from overhead power lines is required to minimize the possibility of electricity arcing from the line to the equipment.

4.5.5 Biological Hazards

Insect, plant, and animal hazards may be present during field work activities. Insect bites (mosquitoes) are the most likely prevalent biological hazard during sampling activities conducted in late summer/early fall in areas of ample free standing water. In addition, there is a potential for tick bites, particularly in areas of tall grass and/or wooded areas. Other insect hazards include horse flies, wasps, hornets and yellow jackets. Black widow spiders are another biological hazard, especially since their habitat includes wooded areas with low shrubs and bushes.

Significant vegetation in and around some of the sites, may also pose a risk due to the presence of poison ivy and poison oak. Other potential hazards include snakes (rattlesnakes and other poisonous species). Small mammals and rodents may also come into contact and carry disease (rabies) that may be present at the site.

All areas will be inspected for biological hazards prior to conducting work activities, especially in dark, damp areas. Employees working in areas of tall grass and wooded areas will periodically inspect themselves for the presence of ticks, especially on the scalp. In the event of a snake and/or spider bite, the victim should remain calm and be transported to the nearest medical facility as soon as possible.

**Table 4-5
 Work/Warm-up Schedule for Moderate to Heavy Work Activity**

Air Temperature °C (Sunny Skies)	No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind	
	Max. Work Period	No. Of Breaks	Max. Work Period	No. Of Breaks	Max. Work Period	No. Of Breaks	Max. Work Period	No. Of Breaks	Max. Work Period	No. Of Breaks
- 26 to - 28	Normal	1	Normal	1	75 mins.	2	55 mins.	3	40 mins.	4
- 29 to - 31	Normal	1	75 mins.	2	55 mins.	3	40 mins.	4	30 mins.	5
- 32 to - 34	75 mins.	2	55 mins.	3	40 mins.	4	30 mins.	5		
- 35 to - 37	55 mins.	3	40 mins.	4	30 mins.	5				
- 38 to - 39	40 mins.	4	30 mins.	5						
- 40 to - 42	30 mins.	5								
- 43 and below										

In all shaded areas non-emergency work should cease.

This schedule applies to any 4-hour work period. This schedule applies to moderate-to-heavy work with breaks of 10 minutes in a warm location to allow workers to warm up. *For light-to-moderate work (little physical movement), apply the schedule one step lower. For example, at - 35 °C with no noticeable wind, a worker at a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4-hour shift instead of 55 minute work periods and 3 breaks.*

Workers on site should be careful during field activities not to disturb flora or fauna that would put oneself at risk. Gloved hands or utensils will be used to remove vegetation. Persons who are highly allergic to insect bites/stings or poison ivy should inform the SSHO/contractor prior to the beginning of field work for reassignment to other tasks to avoid exposure.

All personnel will take precautionary measures including wearing protective clothing, use of repellants, use of good work practices and recognition of symptoms early. If a work area is a high risk zone for any of these biological dangers, special precautions will be assigned by the SSHO officer on site.

4.6 Activity Hazard Analysis

Table 4-6
 Activity Hazard Table

<u>Activity: Sampling</u>	<u>Analyzed by/date:</u>
<p>Principal Steps</p> <p>Conduct base-wide, surface water, monitoring well, leachate, and sediment sampling along with sample preparation and shipment.</p>	<p>Potential Safety & Health Hazards</p> <p>Chemical Hazards: Potential exposure to fuel contaminants and VOCs during monitoring well sampling. Potential exposure to preservatives, during sample preparation.</p> <p>Biological Hazards: Potential exposure to poisonous plants, snakes, spiders, rodents, insects, and ticks.</p> <p>Physical Hazards: Potential exposure to physical hazards: material handling, tools, machinery, and equipment use, electrical equipment, noise exposure, heat stress, cold stress, and miscellaneous physical hazards.</p>
Recommended Hazard Controls	
<p>Chemical Hazards: Jet fuel contaminants may be present during sampling along with preservatives during sample preparation and shipment. Use prescribed levels of protection described in the PPE section of the SSHP for the applicable work task; properly don and doff protective gear; avoid contact with contaminated surfaces whenever possible and use prescribed decontamination procedures.</p>	
<p>Biological Hazards: Biological hazards will be present in work areas. Be cognizant for contact with, poisonous plants, snakes spiders, rodents, insects, and ticks. Wearing insect repellent is recommended to field crews working in areas that may have insects and ticks.</p>	
<p>Material Handling: Material handling will involve lifting and carrying during sampling work. Wear prescribed levels of PPE when handling materials; watch out for items that can cut, puncture, pinch, or crush; use proper lifting techniques, lift with legs not with back, and do not twist when lifting.</p>	
<p>Tools, Machinery, and Equipment Use: Hand power tools and equipment may be used during sampling. Use proper tool for the job; wear appropriate PPE; assess tool condition, do not use damaged tools; make sure area is adequately clear of possible obstructions; inspect all cords and hoses.</p>	
<p>Electrical Equipment and Lockout/Tagout: Generators or batteries may be used to provide electrical power. Inspect electrical extension cords for damage; keep equipment/cords away from water and fuel materials; use lockout/tagout procedures.</p>	
<p>Heat Stress: Heat stress may occur when elevated levels ambient temperatures, moderate to heavy work loads, and/or use of impermeable protective clothing occur. Adjust work-rest schedule as needed; work at a comfortable pace; drink plenty of fluids; use shaded rest area; know signs and symptoms of heat exposure and emergency treatment.</p>	
<p>Cold Stress: Cold stress may occur during fall/winter/spring months when decreased ambient temperatures are present. For cold stress prevention, minimize exposure to temperatures below 45°F; wear insulated clothing for cold temperature work; know the signs/symptoms of cold exposure and emergency treatment.</p>	
<p>Inclement Weather and Adverse Environmental Conditions: Strong winds, heavy rain or lightning, may occur during outdoor operations. Suspend operations during inclement weather or when other adverse environmental conditions exist.</p>	

Activity Hazard Analysis (continued)

Recommended Hazard Controls		
Equipment to be Used	Inspection Requirements	Training Requirements
<p>Miscellaneous Physical Hazards: General safety hazards will be present during all work tasks. Use PPE for head, eye, hand, foot, and body; follow safe work practices; watch for slip trip and fall hazards from uneven, wet, slippery ground surfaces; keep areas clear of tripping hazards; look where walking; maintain balance; use short steps when walking on slippery surfaces; communicate general safety information during safety meetings.</p> <p>Site Emergencies: Preparation for site emergencies is always a requirement for site work. Set up emergency communications; prepare supplies; post contact and hospital route information. Maintain emergency phone list/hospital location/route map on site; have first aid kit, and safety supplies available; have phones available; designate evacuation location and emergency signals.</p> <p>Note taking supplies Electronic control boxes Compressor Batteries Collection supplies Photoionization detector Decontamination supplies Various associated tools PPE</p>	<p>Safety Inspection</p>	<p>Site orientation briefing and SSHP review HazWoper training First-aid/CPR training (use buddy system)</p>

Activity: Well Installation / Decommission

Principal Steps	Analyzed by/date: Potential Safety & Health Hazards
Installation of basewide monitoring wells and the decommissioning of these monitoring wells.	<p>Chemical Hazards: Potential exposure to fuel contaminants and VOCs during drilling and decommissioning.</p> <p>Biological Hazards: Potential exposure to poisonous plants, snakes, spiders, rodents, insects, and ticks.</p> <p>Physical Hazards: Potential exposure to physical hazards: material handling, tools, machinery, and equipment use, electrical equipment, noise exposure, heat stress, cold stress, and miscellaneous physical hazards.</p>
Recommended Hazard Controls	
Chemical Hazards: Jet fuel contaminants may be present during installation and decommissioning. Use prescribed levels of protection described in the PPE section of the SSHP for the applicable work task; properly don and doff protective gear; avoid contact with contaminated surfaces whenever possible and use prescribed decontamination procedures.	
Biological Hazards: Biological hazards will be present in work areas. Be cognizant for contact with, poisonous plants, snakes spiders, rodents, insects, and ticks. Wearing insect repellent is recommended to field crews working in areas that may have insects and ticks.	
Fire Protection: Soil contaminants may emit combustible vapors. Gasoline and diesel fuels will be used for vehicles, heavy equipment, and machinery operation. Conduct air monitoring for combustible vapors during drilling operations. Require fire extinguishers for each site location; allow smoking only in designated areas; use OSHA-approved metal dispenser cans for flammable liquids; use bonding and grounding for combustible and flammable liquid transfers.	
Overhead Utilities: Overhead lines may be present near working areas. Survey for overhead utilities before bringing equipment with high extensions (heavy equipment, drill rigs) into an area; do not operate equipment within 10 feet of overhead lines.	
Underground Utilities: Underground utilities may be present near working areas. Dig safe permits will be completed prior to any intrusive underground work. Survey for underground utilities with the aid of the dig safe permit before bringing drilling equipment into an area; do not operate equipment within 10 feet of underground lines.	
Material Handling: Material handling will involve lifting and carrying during site work. Wear prescribed levels of PPE when handling materials; watch out for items that can cut, puncture, pinch, or crush; use proper lifting techniques, lift with legs not with back, and do not twist when lifting.	
Tools, Machinery, and Equipment Use: Hand power tools and equipment may be used during well installation/decommissioning, use backup alarms on moving equipment Use proper tool for the job; wear appropriate PPE; asses tool condition, do not use damaged tools; make sure area is adequately clear of possible obstructions; inspect all cords and hoses.	
Electrical Equipment and Lockout/Tagout: Generators or batteries may be used to provide electrical power. Inspect electrical extension cords for damage; keep equipment/cords away from water and fuel materials; use lockout/tagout procedures.	
Noise Exposure: Noise exposure above 85 dba is expected when working near or when equipment is in operation. Wear earplugs when operating or working near heavy equipment.	

Activity Hazard Analysis (continued)

Recommended Hazard Controls		
Equipment to be Used	Inspection Requirements	Training Requirements
<p>Heat Stress: Heat stress may occur when elevated levels ambient temperatures, moderate to heavy work loads, and/or use of impermeable protective clothing occur. Adjust work-rest schedule as needed; work at a comfortable pace; drink plenty of fluids; use shaded rest area; know signs and symptoms of heat exposure and emergency treatment.</p> <p>Cold Stress: Cold stress may occur during fall/winter/spring months when decreased ambient temperatures are present. For cold stress prevention, minimize exposure to temperatures below 45°F; wear insulated clothing for cold temperature work; know the signs/symptoms of cold exposure and emergency treatment.</p> <p>Inclement Weather and Adverse Environmental Conditions: Strong winds, heavy rain or lightning, may occur during outdoor operations. Suspend operations during inclement weather or when other adverse environmental conditions exist.</p> <p>Miscellaneous Physical Hazards: General safety hazards will be present during all work tasks. Use PPE for head, eye, hand, foot, and body; follow safe work practices; watch for slip trip and fall hazards from uneven, wet, slippery ground surfaces; keep areas clear of tripping hazards; look where walking; maintain balance; use short steps when walking on slippery surfaces; communicate general safety information during safety meetings.</p> <p>Site Emergencies: Preparation for site emergencies is always a requirement for site work. Set up emergency communications; prepare supplies; post contact and hospital route information. Maintain emergency phone list/hospital location/route map on site; have first aid kit, and safety supplies available; have phones available; designate evacuation location and emergency signals.</p>	<p>Safety Inspection Inspect Tools and Equipment before use Calibration of instruments before and after use Inspect PPE before use</p>	<p>Site orientation briefing and SSHP review HazWoper training First-aid/CPR training (use buddy system)</p>
<p>Note taking supplies Drill rig Associated drilling equipment Photoionization detector</p>		

Activity: Fish Tissue Sampling

Analyzed by / date:

Principal Steps	Potential Safety & Health Hazards
<p>Conducting fish tissue collection by electrofishing techniques</p>	<p>Chemical Hazards: Potential exposure to fuel contaminants and VOCs during fish tissue sampling. Potential exposure to preservative chemicals used for preserving fish tissue samples.</p> <p>Biological Hazards: Potential exposure to poisonous plants, snakes, spiders, rodents, insects, and ticks.</p> <p>Physical Hazards: Potential exposure to physical hazards: material handling, tools, machinery, and equipment use, electrical equipment, noise exposure, heat stress, cold stress, and miscellaneous physical hazards.</p>
<p>Various preservative chemicals will be present in work areas. Be cognizant for contact with, poisonous plants, snakes spiders, rodents, insects, and ticks. Wearing insect repellent is recommended to field crews working in areas that may have insects and ticks.</p> <p>Combustible vapors may be present while using equipment. Gasoline and diesel fuels will be used for vehicles, heavy equipment, and machinery operation. Conduct air monitoring for combustible vapors during soil excavation. Require fire extinguishers for each site location; allow smoking in designated areas; use OSHA-approved metal dispenser cans for flammable liquids; use bonding and grounding for combustible and flammable liquid transfers</p> <p>Material handling will involve lifting, carrying, and carrying by backpack during site work. Wear prescribed levels of PPE when handling materials; watch out for items that can cut, puncture, pinch, or crush; use proper lifting techniques, lift with legs not with back, and do not twist when lifting</p> <p>Hand power tools and equipment will be used during electrofishing procedures, Use proper tool for the job; wear appropriate PPE; asses tool condition, do not use damaged tools; make sure area is adequately clear of possible obstructions; inspect all cords and hoses.</p> <p>AC voltage from the generator will be isolated from the ground either by removing the ground strap from the generator case or by adding and isolation transformer. Rated voltages of insulation of conductors used to deliver output current from the pulsator to the electrodes must exceed the maximum potential voltage of the pulsator or generator by the next higher rating. Net handles will be constructed of a nonconductive material and will be sufficient length to avoid hand contact with the water. Personnel using the electroshocker will wear rubber footwear which will insulate the wearer from electrical shock. All footwear will be equipped with non-slip soles. Rubber linesman gloves, rated above the voltage being used in the electrofishing operation will be worn.</p> <p>Noise exposure levels are not expected to range above the acceptable exposure level of 85dba for 8-hour periods.</p>	<p>Use prescribed levels of protection described in the PPE section of the SSHP for the applicable work task; properly don and doff protective gear; avoid contact with contaminated surfaces whenever possible and use prescribed decontamination procedures.</p>

Activity Hazard Analysis (continued)

Recommended Hazard Controls		
	Inspection Requirements	Training Requirements
<p>Heat Stress: Heat stress may occur when elevated levels ambient temperatures, moderate to heavy work loads, and/or use of impermeable protective clothing occur. Adjust work-rest schedule as needed; work at a comfortable pace; drink plenty of fluids; use shaded rest area; know signs and symptoms of heat exposure and emergency treatment.</p> <p>Cold Stress: Cold stress may occur during fall/winter/spring months when decreased ambient temperatures are present. For cold stress prevention, minimize exposure to temperatures below 45°F; wear insulated clothing for cold temperature work; know the signs/symptoms of cold exposure and emergency treatment.</p> <p>Inclement Weather and Adverse Environmental Conditions: Strong winds, heavy rain or lightning, may occur during outdoor operations. Suspend operations during inclement weather or when other adverse environmental conditions exist.</p> <p>Miscellaneous Physical Hazards: General safety hazards will be present during all work tasks. Use PPE for head, eye, hand, foot, and body; follow safe work practices; watch for slip trip and fall hazards from uneven, wet, slippery ground surfaces; keep areas clear of tripping hazards; look where walking; maintain balance; use short steps when walking on slippery surfaces; communicate general safety information during safety meetings. Use caution and safe operating procedures when using a boat for electrofishing.</p>		
<p>Site Emergencies: Preparation for site emergencies is always a requirement for site work. Set up emergency communications; prepare supplies; post contact and hospital route information. Maintain emergency phone list/hospital location/route map on site; have first aid kit, and safety supplies available; have phones available; designate evacuation location and emergency signals.</p>	<p>Safety Inspection Inspect Tools and Equipment before use Inspect PPE before each use</p>	<p>Completion of a principles and techniques of electrofishing course. OSHA training First-aid/CPR training (use buddy system)</p>
<p>Equipment to be Used</p> <p>PPE Electrofishing equipment Sample collection equipment Various associated tools</p>		

5.0 PERSONNEL TRAINING REQUIREMENTS

All contractor personnel will receive adequate training prior to entering the site. Contractor personnel will, at a minimum, have completed initial 40 hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training and an 8 hour HAZWOPER refresher course within one year prior to commencing field work. The SSHO will have received the eight-hour course on managing hazardous waste operations. Training will meet the requirements of 29 CFR 1910.120 and 29 CFR 1910.65

The SSHO will maintain a summary of employee initial and refresher training dates.

5.1 Site-Specific Training

5.1.1 Initial Site Training

An initial site-specific training session shall be conducted by the SSHO and CIH. All site personnel (including employees, subcontractors, engineer representatives and visitors working in the support zone) shall receive site-specific training in the form of an onsite briefing to ensure that all personnel are familiar with the requirements and responsibilities for maintaining a safe and healthful work environment.

The Site Safety and Health Officer shall be responsible for keeping a record of all training periods. During the site-specific training, employees shall be instructed on the following topics:

- Employee and Supervisor personnel responsibilities, including those for reporting all accidents,
- Content and implementation of the Site-Specific Health and Safety Plan,
- Site hazards and controls, including applicable Activity Hazard Analysis,
- Site-specific hazardous procedures (i.e. Confined space, etc.),
- Levels of protection,
- Action levels for upgrading PPE,
- Emergency information, including procedures for obtaining medical treatment or emergency assistance, and
- Procedures for reporting and correcting unsafe conditions or work practices.

5.1.2 Periodic Training

Periodic safety training shall be provided by the Site Safety and Health Officer. The Site Safety and Health Officer shall be responsible for keeping a record of all training periods. Safety meetings will be held daily.

The training will address daily work activities, safety and health procedures, work practices, changes to the Site-Specific Health and Safety Plan, activity hazard analysis review, air monitoring results and a review of safety discrepancies and accidents.

A copy of the SSHP will be made available to all workers at the FPM field office. All personnel performing field work will indicate (by signing Table 5-1) that they have read and understand the contents of the SSHP and will abide by its provisions, recommended practices, and restrictions. The SSHP Review Acknowledgment Form is included as Table 5-1.

5.2 Other Required Training

Employees will receive hazard communication training in accordance with 29 CFR 1910.120. Training will be conducted during the initial site-specific training session. Additional training will be provided as identified as necessary.

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6.0 MEDICAL SURVEILLANCE PROGRAM

All workers at the site must participate in a medical surveillance program in accordance with 29 CFR 1910.120. A medical examination and consultation must have been performed within the last 12 months to be eligible for field work.

The content of the examination and consultation will include a medical and work history. It will show special emphasis on symptoms related to the handling of hazardous substances, health hazards, and fitness for duty including the ability to wear required personal protective equipment under conditions (i.e., temperature extremes) that may be expected at the work site.

All medical examinations and procedures shall be performed by, or under the supervision of, a licensed physician.

The physician shall furnish a written opinion containing:

- The results of the medical examination and tests;
- The physician's opinion as to whether the employee has any detected medical conditions which would place the worker at increased risk of material impairment of his/her health from work in hazardous waste operations;
- The physician's recommended limitations upon the worker assigned to the work; and
- A statement that the worker has been informed by the physician of the results of the medical examination and any need for further examination or treatment.

An accurate record of the medical surveillance will be retained. The record will consist of at least the following information:

- The name and social security number of the employee;
- Physician's written opinions, recommended limitations, and results of examinations and tests; and
- Any medical complaints the worker may have related to exposure to hazardous substances.

These medical records will be kept on file for a duration of 30 years after the project is completed. The United States Environmental Protection Agency (USEPA) will be given 90 days notification prior to destroying the records.

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7.0 EXPOSURE MONITORING

Based on the procedures identified in Section 4.1, real-time monitoring will be conducted during all direct push and hollow-stem auger drilling activities and any other time the potential for exposure to volatile organic compounds are identified. Monitoring will be used for collecting information on selecting PPE (downgrading or upgrading) and assessing potential health effects of exposure. Appendix A includes a compound specific list of contaminants of concern that is found at various sites covered under this plan. All exposure monitoring will be performed by the SSHO, unless otherwise directed by the PM.

7.1 Organic Vapor Monitoring

A PID set at the appropriate span setting and equipped with a 10.2 eV probe or equivalent device (a copy of the PID Operator's Manual will be kept onsite) will be used for volatile organic vapor monitoring during all intrusive drilling activities. Readings will be recorded in the SSHO's field log book, along with date, time, and location of monitoring. The PID will be calibrated on a daily basis following the procedures outlined in Section 9.1, and calibration logs will be maintained onsite.

7.2 Combustible Gas and Oxygen Levels

For all drilling activities taking place at Landfill sites and certain Petroleum Spill Sites with free product, a portable gas monitor will be utilized to monitor for explosive and oxygen enriched/deficient atmospheres. Readings will be recorded in the SSHO's field log book, along with date, time, and location of monitoring. The portable gas monitor will be calibrated on a daily basis following the procedures outlined in the Operator's Manual, and calibration logs will be maintained onsite. A copy of the Operator's Manual will be kept onsite.

7.3 Personal Exposure Monitoring

Although not anticipated, personal exposure monitoring for specific VOCs may be performed if exposures measured by the PID are above anticipated levels. Personal air monitoring may also be performed if Level C operations are required. Personal air monitoring methods will be developed by the CIH and conducted by the SSHO or the CIH.

7.4 Operational Action Levels

Table 7-1 presents a summary of the exposure monitoring requirements and decision-making protocol for upgrade in levels of protection and/or withdrawal of personnel from work areas. All readings will be conducted in the worker's breathing zone as described in Section 4.1 unless otherwise directed by the SSHO or CIH.

Table 7-1
Operational Action Levels

Contaminants	Action Level	Action
Volatile Organic Compounds	1 to 5 ppm Above Background, Sustained ¹	Level D, Continuous Monitoring
Volatile Organic Compounds	5 to 50 ppm Above Background, Sustained	Upgrade to Level C, Continuous Monitoring
Volatile Organic Compounds	> 50 ppm Sustained	Stop Work, Evacuate Work Zone, Continuous Monitoring
Combustible Gas in Air	Less Than 10% LEL	Continue with Caution, Continuous Monitoring
	Greater Than 10% LEL	Stop Work, Immediate Withdrawal, Investigate
Oxygen in Air	Less than 19.5%	Stop Work and Ventilate
	19.5% to 23.5%	Level D, Continuous Monitoring
	Greater than 23.5%	Stop Work, Immediate Withdrawal, Investigate

¹ For a minimum of ten seconds.

8.0 PERSONAL PROTECTIVE EQUIPMENT

8.1 General Considerations

PPE is used to decrease exposure to chemical and biological hazards and to shield against physical hazards. No single combination of protective equipment and clothing can protect against all possible hazards; therefore, PPE must be used in conjunction with safe work practices and (whenever possible) engineering controls.

All work is expected to be performed during daylight hours and workdays, in general, are expected to be eight to ten hours in duration. Any work performed beyond daylight hours will require the permission of the SSHO. This decision will be based on the adequacy of artificial illumination and the type and necessity of the task being performed.

Personal protection levels for the field activities, based on past investigations, are anticipated to be Level D and Modified Level D with the possibility of upgrading to Level C. The equipment included for each level of protection is provided as follows:

8.1.1 Level C Protection

PPE (* indicates optional):

- Air-purifying respirator, full- or half-face with chemical sorbent cartridges for organic vapors.
- Chemical-resistant clothing includes: Tyvek (spunbonded olefin fibers) for particulate and limited splash protection or Saranex (plastic film-laminated Tyvek) for permeation resistance to solvents.
- Coveralls*, or
- Long cotton underwear*
- Gloves (outer), chemical-resistant
- Gloves (inner), chemical-resistant
- Boots (outer), leather or chemical-resistant, steel toe and shank
- Boot covers (outer), chemical-resistant (disposable)*
- Hard hat (face shield*)
- Escape mask*
- Two-way radio communications (intrinsically safe)*

8.1.2 Criteria for Selection of Level C Protection

Use of level C protection will be permitted under the following conditions:

- Oxygen concentrations are not less than 19.5% or greater than 23.5% by volume;

- LEL is not greater than 10%;
- Measured air concentrations of identified substances will be reduced by the respirator below the substance's threshold limit value (TLV);
- Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any body area left unprotected by chemical-resistant clothing;
- Job functions do not require self-contained breathing apparatus; and
- Direct readings are below 50 ppm on the PID.

8.1.3 Level D Protection

PPE (* indicates optional):

- Coveralls* or long pants & shirt
- Gloves*
- Safety boots/shoes, or chemical-resistant, steel toe and shank
- Safety glasses or chemical splash goggles
- Hard hat (face shield*)
- Escape mask*

8.1.4 Criteria for Selection of Level D Protection

Use of level D protection is permitted if any of the following conditions are met:

- Direct readings are below 5 ppm (above background) on the PID
- No dusty conditions and no splash risks are present
- Work functions preclude splashes, immersion, or the reasonable potential for unexpected inhalation of any chemicals above the threshold limit value (TLV).

8.1.5 Modified Level D Protection

PPE (* indicates optional):

- Coveralls* or long pants & shirt
- Gloves
- Safety boots/shoes, or chemical-resistant, steel toe and shank
- Safety glasses or chemical splash goggles
- Hard hat (face shield*)
- Escape mask*

8.1.6 Criteria for Selection of Modified Level D Protection

Use of modified level D protection is permitted if any of the following conditions are met:

- Direct readings are below 5 ppm (above background) on the PID;

- Dusty conditions are present; and splash risks are present
- Work functions preclude immersion, or the reasonable potential for unexpected inhalation of any chemicals above the threshold limit value (TLV).
- There is potential for skin contact with contaminated soils or waters. Modified level D is appropriate for most sampling activities.

8.1.7 Additional Considerations for Selecting Levels of Protection

Another factor which will be considered in selecting the appropriate level of protection is heat and physical stress. The use of protective clothing and respirators increases physical stress, particularly heat stress on the wearer. Chemical protective clothing greatly reduces natural ventilation and diminishes the body's ability to regulate its temperature. Even in moderate ambient temperatures, the diminished capacity of the body to dissipate heat can result in one or more heat-related problems.

All chemical protective garments can be a contributing factor to heat stress. Greater susceptibility to heat stress occurs when protective clothing requires the use of a tightly fitted hood against the respirator face piece, or when gloves or boots are taped to the suit. As more body area is covered, less cooling takes place, increasing the probability of heat stress.

Wearing protective equipment also increases the risk of accidents. It is heavy, cumbersome, decreases dexterity and agility, interferes with vision, and is fatiguing to wear. These factors all increase physical stress and the potential for accidents. In particular, the necessity of selecting a level of protection will be balanced against the increased probability of heat stress and accidents.

8.2 Decontamination Procedures

8.2.1 Equipment

All equipment that may directly or indirectly contact contaminants shall be decontaminated in a designated decontamination area or, as an alternative, will be decontaminated in a mobile or fixed decontamination area. This includes all non-disposable sampling devices, instruments, augers and monitoring equipment.

The following procedure shall be used to decontaminate sampling and smaller drilling devices that can be hand manipulated, such as water level indicators, non-disposable bailers, water monitoring probes, split spoons, hand augers, and stainless steel bowls/spoons. This type of equipment shall be scrubbed with a solution of potable water and Alconox[®], or equivalent laboratory-grade detergent (for creek sediment sampling devices, the equipment can first be scrubbed with creek water to remove any sediment or debris). The equipment shall then be rinsed with potable water and/or distilled water.

In extreme cases when the equipment has come in contact with free product, oil or grease and the Alconox[®]/water wash has not been effective, the equipment may be rinsed with pesticide-grade methanol. Pesticide-grade methanol shall be purchased, stored, and dispensed only in glass, stainless steel, or Teflon[®] containers. These containers shall have Teflon[®] caps or cap liners. It is the contractor's responsibility to assure these materials remain free of contaminants. If any question of purity exists, new materials shall be used.

The equipment will then be air-dried on a clean surface or rack, such as Teflon[®], stainless steel, or oil-free aluminum elevated at least 2 feet above ground. If the sampling device shall not be used immediately after being decontaminated, it shall be wrapped in oil-free aluminum foil, or placed it in a closed stainless steel, glass, or Teflon[®] container.

Larger drilling equipment will also be decontaminated. This includes casing, drill bits, auger flights, the portions of drill rigs that stand above boreholes, sampling devices, and instruments, such as slugs and sounders. In addition, the contractor shall take care to prevent the sample from coming into contact with potentially contaminating substances, such as tape, oil, engine exhaust, corroded surfaces, and dirt.

The following procedure shall be used to decontaminate large pieces of equipment. The external surfaces of equipment shall be washed with high-pressure hot water and Alconox[®], or equivalent laboratory-grade detergent, and if necessary, scrubbed until all visible dirt, grime, grease, oil, loose paint, rust flakes, etc., have been removed. The equipment shall then be rinsed with potable water. The inside surfaces of casing, drill rod, and auger flights shall also be washed as described. All water used for personal and equipment decontamination will be collected and properly disposed.

Appendix B provides the Material Safety Data Sheets (MSDSs) for chemicals used to decontaminate equipment.

8.2.2 Personal Protective Equipment

For drilling activities, the daily decontamination procedure for personal protective equipment shall be as follows:

- Establish a decontamination area;
- At each station establish a basin with detergent (Alconox[®] or equivalent), a rinse basin with tap water, and a garbage can lined with a plastic bag;
- Wash and rinse boots (or remove disposable boot covers and discard in plastic bag);
- Remove outside gloves and discard in plastic bag;
- Remove disposable coveralls and discard in plastic bag (if applicable);
- Remove spent organic vapor cartridges from respirators and discard in plastic bag.

The final closure of the decontamination area will involve double-bagging all disposable clothing before transfer to an approved disposal facility. Decontamination and rinse solutions will be

contained in 55-gallon drums for subsequent lab testing. All rinse basins, buckets, etc. will be thoroughly washed, rinsed and dried prior to removal from the site.

For sampling activities, the daily decontamination procedure will consist of cleaning of boots and protective shades. All other PPE used (i.e. nitrile gloves, paper towels, etc.) will be disposable and does not need to be decontaminated.

8.3 Donning and Doffing Ensembles

8.3.1 Donning an Ensemble

A routine will be established and practiced periodically for donning a Level C ensemble. Assistance may be provided for donning and doffing since these operations are difficult to perform alone. Table 8-1 lists sample procedures for donning a Level C ensemble. These procedures should be modified depending on the particular type of suit and/or when extra gloves and/or boots are used.

**Table 8-1
Sample Donning Procedures**

- | |
|---|
| <ol style="list-style-type: none">1. Inspect the clothing and respiratory equipment before donning (see Inspection in subsection 8.4).2. Standing or sitting, step into the legs of the suit; ensure proper placement of the feet within the suit; then gather the suit around the waist.3. Put on chemical-resistant safety boots over the feet of the suit. Tape the leg cuff over the tops of the boots.4. Don the respirator and adjust it to be secure, but comfortable.5. Perform negative and positive respirator facepiece seal test procedures.<ul style="list-style-type: none">• To conduct a negative-pressure test, close the inlet part with the palm of the hand or squeeze the breathing tube so that it does not pass air, and gently inhale for about ten seconds. Any inward rushing of air indicated a poor fit. Note that a leaking facepiece may be drawn tightly to the face to form a good seal, giving a false indication of adequate fit.• To conduct a positive-pressure test, gently exhale while covering the exhalation valve to ensure that a positive pressure can be built up. Failure to build a positive pressure indicates a poor fit. |
|---|

6. Depending on type of suit:

- Put on inner gloves (surgical gloves).
- Additional overgloves, worn over the attached suit gloves, may be donned later. Duct tape may then be used to secure the suit over the tops of the gloves and boots.

7. Adjust hardhat or headpiece, if worn, to fit the user's head.

8. Put on hardhat prior to securing suit. Once secured, suit can then be zipped up completely.

9. Have assistant accompany the wearer for a period of time to ensure that the wearer is comfortable, psychologically stable, and that the equipment is functioning properly.

8.3.2 Doffing an Ensemble

Exact procedures for removing Level C ensembles must be established and followed to prevent contaminant migration from the work area and transfer of contaminants to the wearer's body, the doffing assistant, and others. Sample doffing procedures are provided in Table 8-2. These procedures should be performed only after decontamination of the suited worker. They require a suitably attired assistant.

Table 8-2
Sample Doffing Procedures

1. Remove any extraneous or disposable clothing, boot covers, outer gloves, and tape.
2. Remove respirator by loosening straps and pulling straps over the top of the head and move mask away from head. Do not pull mask over the top of the head.
3. Remove arms, one at a time, from suit, avoiding any contact between the outside surface of the suit and wearer's body and lay the suit out flat behind the wearer. Leave internal gloves on, if any.
4. Sitting, if possible, remove both legs from the suit.
5. After suit is removed, remove internal gloves by rolling them off the hand, inside out. Throughout the procedures, both worker and assistant should avoid any direct contact with the outside surface of the suit.

8.4 Respirator Fit Testing

The fit or integrity of the facepiece-to-face seal of a respirator affects its performance. Most facepieces fit only a certain percentage of the population; thus, each facepiece must be tested on the potential wearer in order to ensure a tight seal. Facial features such as scars, hollow temples, very prominent cheekbones, deep skin creases, dentures or missing teeth, and the chewing of gum and tobacco may interfere with the respirator-to-face seal. A respirator shall not be worn when such conditions prevent a good seal. No facial hair which interferes with a satisfactory fit of the mask-to-face seal is allowed on personnel required to wear respiratory protective equipment. Contact lenses are not allowed when the level of protection is upgraded from Level D. The worker's diligence in observing these factors shall be evaluated by periodic checks. Fit testing will comply with 29 CFR 1910.134 regulations. Fit testing will be performed at least annually, by the SSHO or the CIH.

8.5 Inspection

The PPE inspection program will entail five different inspections:

- Inspection and operational testing of equipment received from the factory or distributor;
- Inspection of equipment as it is issued to workers;
- Inspection after use;
- Periodic inspection of stored equipment; and
- Periodic inspection when a question arises concerning the appropriateness of the selected equipment, or when problems with similar equipment arise.

The inspection checklist is provided in Table 8-3. Records will be kept of all inspection procedures. Individual identification numbers will be assigned to all reusable pieces of equipment and records should be maintained by those numbers. At a minimum, each inspection should record the identification (ID) number, date, inspector, and any unusual conditions or findings. Periodic review of these records may indicate an item or type of item with excessive maintenance costs or a particularly high level of down time.

Respirators shall be inspected each day before use. These routine checks are vital in maintaining a respirator that will protect you from hazardous chemicals.

If any major problems are found with your respirator, it should be disposed of and replaced immediately.

**Table 8-3
PPE Inspection Checklist**

CLOTHING

Before use:

- Determine that the clothing material is correct for the specified task at hand.
- Visually inspect for:
 - imperfect seams
 - non-uniform coatings
 - tears
 - malfunctioning closures
- Hold up to light and check for pinholes.
- Flex product:
 - Observe for cracks
 - Observe for other signs of shelf deterioration
- If the product has been used previously, inspect inside and out for signs of chemical attack:
 - discoloration
 - swelling
 - stiffness

During the work task, periodically inspect for:

- Evidence of chemical attack such as discoloration, swelling, stiffening, and softening. Keep in mind, however, that chemical permeation can occur without any visible effects.
- Closure failure
- Tears
- Punctures
- Seam discontinuities

GLOVES

Before use:

- Pressurize glove to check for pinholes. Either blow into glove, then roll gauntlet toward fingers or inflate glove and hold under water. In either case, no air should escape.

Table 8-3
Sample PPE Inspection Checklists (Continued)

AIR-PURIFYING RESPIRATORS

- Inspect air-purifying respirators:
 - before each use to be sure they have been adequately cleaned
- Check material conditions for:
 - signs of pliability
 - signs of deterioration
 - signs of distortion
- Examine cartridges to ensure that:
 - they are the proper type for the intended use
 - the expiration date has not been passed
 - they have not been opened or used previously
- Check faceshields and lenses for:
 - cracks
 - crazing
 - fogginess
- Air purifying respirators will be stored individually in resealable plastic bags.

8.6 Storage

Clothing and respirators will be stored properly to prevent damage or malfunction due to exposure to dust, moisture, sunlight, damaging chemicals, extreme temperatures, and impact. Storage procedures are discussed in the following sections:

8.6.1 Clothing

- Potentially contaminated clothing will be stored in an area separate from street clothing.
- Potentially contaminated clothing will be stored in a well-ventilated area, with good air flow around each item, if possible.
- Different types and material of clothing and gloves will be stored separately to prevent issuing the wrong material by mistake.
- Protective clothing will be folded or hung in accordance with manufacturer's recommendations.

8.6.2 Respirators

Air-purifying respirators should be dismantled, washed, and allowed to air-dry prior to being placed in sealed plastic bags. Respirators must be stored in a way that protects it from dust, sunlight, heat, extreme cold, excessive moisture and damaging chemicals. A clean reusable bag provides a contaminate-free storage method. Do not hang the respirator by the headbands or place it in any position that may cause distortion, which could lead to a damaged face mask seal.

Each employee is responsible for storing his own respirator in an appropriate manner. Respirators will be stored in the site office when not in use.

8.7 Maintenance

Specialized maintenance will be performed only by the factory or an authorized repair person. Routine maintenance, such as cleaning, will be performed by the personnel to whom the equipment is assigned.

8.8 Decontamination Methods

All personnel, clothing, equipment, and samples leaving the work zone of the site must be decontaminated to remove any harmful chemicals or infectious organisms that may have adhered to them. Decontamination methods either (1) physically remove contaminants, (2) inactivate contaminants by chemical detoxification or disinfection/sterilization, or (3) remove contaminants by a combination of both physical and chemical means. In many cases, gross contamination can be removed by physical means involving dislodging/displacement, rinsing, wiping off, and evaporation. Contaminants that can be removed by physical means include dust, vapors, and volatile liquids. All reusable equipment will be decontaminated by rinsing in a bath of detergent and water. Monitoring equipment will be decontaminated by wiping with paper towels and water. All used PPE to be discarded will be placed in plastic bags and disposed of in Base-assigned garbage disposal bins.

The effectiveness of the decontamination will be evaluated at the beginning of sampling activities and will be modified if determined to be ineffective. Visual observation will be used for this purpose. The SSHO will periodically inspect decontaminated materials for discoloration, stains, corrosive effects, visible dirt, or other signs of possible residual contamination. The decontamination procedure is outlined in Section 8.2.

9.0 CALIBRATION PROCEDURES, FREQUENCIES, AND MAINTENANCE OF MONITORING INSTRUMENTS

This section will present the calibration procedures, frequencies, and maintenance for the health and safety field monitoring instruments. During field work, a PID (or similar VOC detection instrument) and/or a water quality monitor (e.g. Horiba U-22) will be used. The use of these instruments is presented as follows (the manufacturers' owner's manuals for all equipment used will be present at the Base):

9.1 Photoionization Detectors

This instrument is a PID that measures the concentration of airborne ionizable gases and vapors. The PID does not distinguish between individual compounds and will not read methane. The calibration will be performed with a cylinder of hydrocarbon-free air (<0.1 ppm hydrocarbons) to "zero" the instrument and a 100 ppm cylinder of isobutylene to calibrate the span. If ambient air conditions are void of any hydrocarbon-emitting sources, then ambient air may be used as a zero gas.

The calibration procedures and frequencies for this instrument are presented as follows:

Isobutylene at 100 ppm in air will be used as the span gas. A commercial "zero-grade" gas (or ambient air, when appropriate) will be used as the zero gas. To calibrate the instrument, use the Calibration Kit as follows:

1. Connect the supplied regulator to the span gas cylinder. Hand tighten the fittings.
2. Open the valve on a clean gas bag by turning the valve stem fully counter clockwise.
3. Attach the gas bag adapter nut to the regulator. Hand tighten the fittings.
4. Turn the regulator knob counter clockwise about half turn to start the flow of gas.
5. Fill the gas bag about half full and then close the regulator fully counter clockwise to turn off the flow the gas.
6. Disconnect the bag from the adapter and empty it. Flush the bag a few times with the span gas and then fill it.
7. Close the gas bag by turning the valve clockwise.
8. Press SETUP and select the desired Cal Memory with arrow keys and press ENTER. Press EXIT to leave Setup.

9. Press CAL and expose PID to ambient air (on the zero-grade gas). Press ENTER and PID sets its zero point.
10. PID then asks for the span gas concentration. Enter the known span gas concentration and then connect the span gas bag adapter to the inlet.
11. Press ENTER and PID sets its sensitivity.
12. When PID's display reverts to normal, PID is calibrated and ready for use. Remove the span gas bag from the inlet.

Note: With the appropriate regulator and adapter, the PID may be alternatively calibrated by direct connection to the span gas cylinder.

The instrument will be calibrated prior to the commencement of each day's work. The instrument will be charged overnight prior to each day's work. The instrument will be checked with the span gas periodically throughout the day and recalibrated as necessary.

9.2 Horiba U-22 Multi-Parameter Water Quality Monitoring System

This instrument is a water quality monitor that measures several water parameters either in batch or flow-through configuration. The calibration will be performed with the supplied calibration fluid which contains known amounts of calibration constituents for each separate water parameter.

The calibration procedures and frequencies for each instrument are presented as follows:

To calibrate the instrument, use the calibration fluid as follows:

1. Press power on the meter and give the meter two minutes to warm up.
2. Spray the probe with a solution of Alconox[®] in distilled water and then spray the cleaned probe with distilled water to remove any soap residue.
3. Fill the calibration cup up to the designated black line with calibration fluid.
4. Insert the probe into the calibration cup.
5. Press CAL on the meter.
6. Press ENT on the meter.

7. The meter will go through the entire calibration program and calibrate all individual probes that are installed in the multi-parameter probe.
8. When the calibration is performed correctly, the meter will mention END.
9. Press MEAS and the probe will show the current pH measurement.

The pH of the calibration fluid and the measured pH after the calibration procedure has been completed, will be recorded on calibration log sheets for inclusion in the final report.

9.3 Oxygen / Combustible Gas Monitor

This instrument is a LEL sensor that measures and monitors the concentrations of airborne combustible gases and vapors. The instrument used will be able to detect LEL, oxygen, hydrogen sulfide and carbon monoxide. The calibration will be performed using “fresh air” which contains 20.9% oxygen and no detectable toxic or combustible gases to zero the instrument, and also a reference gas which contains a known concentration to calibrate the span.

Using the Calibration Kit, the calibration procedures and frequencies for this instrument are presented as follows:

1. Connect the supplied regulator to the span gas cylinder. Hand tighten the fittings.
2. Open the valve on a clean gas bag by turning the valve stem fully counter clockwise.
3. Attach the gas bag adaptor nut to the regulator. Hand tighten the fittings.
4. Turn the regulator knob counter clockwise about half turn to start the flow of the gas.
5. Fill the gas bag about half full and then close the regulator fully counter clockwise to turn off the flow of gas.
6. Disconnect the bag from the adapter and empty it. Flush the bag a few times with the span gas and then fill it.
7. Close the gas bag by turning the valve clockwise.
8. Under calibrate monitor on the menu, expose the monitor to ambient air (zero-grade gas) and press the Y/+ to start the “fresh air calibration” The display should show a reading of 20.9% for the oxygen and a small number or 0 for all other sensors. The display should then read “zero cal done”
9. Continuing, the display should now ask for the span gas calibration. Press the Y/+, the display shows all the preselected gases for the sampling bag filled with mixed gas and “OK?” question. Press Y/+ to accept the selection or N/- to modify the selection.

10. Connected to the gas bag, turn on the valve and start the flow of the span gas. When the gas has reached the sensor the display will show in progress, with a timer. The display will then read cal'ed and the calibrated values for each gas.
11. Turn off the flow of gas and disconnect the calibration adapter from the monitor.

10.0 STANDARD OPERATING SAFETY PROCEDURES

10.1 Emergency Safety Equipment

The following emergency equipment will be available onsite, at each work area, each day of the field work:

- 5-pound ABC or equivalent portable fire extinguisher;
- First aid kit; 16 unit
- Portable mobile phone or radio; and
- Potable drinking water.
- Portable eyewash station/kit

This equipment will be staged in visible, easily accessible locations. The SSHO will be responsible for staging this equipment and reviewing its use with field personnel. The SSHO will inspect the first aid kits on a weekly basis.

10.2 The Buddy System

All activities in contaminated or potentially contaminated areas will be conducted by pairing off the site workers in groups of two (or three if necessary). Each person (buddy) will be able to:

- Provide his or her partner with assistance;
- Observe his or her partner for signs of chemical or heat exposure;
- Periodically check the integrity of his or her partner's protective clothing; and
- Notify the SSHO or others if emergency help is needed.

The buddy system will be instituted at the beginning of each workday. If new workers arrive on Base, a buddy will be chosen prior to the new worker entering the work zone.

10.3 Site Communications

Two sets of communication systems will be established at the site: internal communication among personnel on site, and external communication between on-site and off-site personnel.

Internal communication will be used to:

- Alert team members to (potential) emergencies;
- Pass along safety information such as heat stress check, protective clothing check, etc;
- Communicate changes in the work to be accomplished; and
- Maintain site control.

An external communication system between on-site and off-site personnel will be established to:

- Coordinate emergency response;
- Report to the Project Manager; and
- Maintain contact with essential off-site personnel.

A field telephone will be available at all times on the SSHO's person. In addition, the nearest stationary phone will be identified prior to the commencement of site operations and this location will be relayed to all site workers.

10.4 Hazard Communication Program

No hazardous materials other than minor quantities of decontamination products and sample preservatives are anticipated to be brought on Base. Any hazardous materials brought on Base will be accompanied by MSDSs, which will be maintained by the SSHO. All site workers who will use these chemicals will be trained in their safe handling. Although not anticipated, any hazardous materials brought on Base will be clearly labeled, properly stored, and if used, will be disposed of in accordance with local, state, and federal regulations.

10.5 Spill Containment

In the event of a chemical spill, a 25-pound bag of Solid-A-Sorbo[®] (granular diatomaceous earth) will be kept on site. The sorbent will be placed on the spill and absorbed. The liquid-laden sorbent will then be placed in a 55-gallon drum, marked, and sealed for disposal. In addition to this measure, the New York State Department of Environmental Conservation (NYSDEC) Spill Response Department (phone number 1-800-457-7362) will be contacted at the following address:

New York State Emergency Response Commission
1220 Washington Avenue, Building 22, Suite 101
Albany, NY 12226-2251

10.6 Safe Work Practices

All activities will follow FPM health and safety safe operating procedures, where appropriate. The requirements described below are FPM Health and Safety Standard Work Procedures (derived from USEPA, 1988).

- The SSHO must make an entry into the health and safety report sheet each day that includes weather conditions, site personnel, new arrivals and "clearance for site work," air monitoring data summary, indications or suspicions of inhalation exposure, PPE used per task, deviations

from the SSHP, and general health and safety problems and corrective actions which is included in Appendix C.

- The SSHO will perform a daily health and safety inspection that will be documented in the health and safety inspection sheet which is included in Appendix C. These forms will be filed with daily health and safety report sheets.
- Eating, drinking, chewing gum or tobacco, taking medication, and smoking are prohibited in the work zone of any location where the possibility for the transfer of contamination exists.
- Upon leaving a contaminated area, hands and face must be thoroughly washed. Any protective outer clothing (if used) is to be decontaminated, removed, and left at a designated area before entering a clean area.
- Contact with potentially contaminated substances must be avoided. Whenever possible, contact with the ground or with contaminated equipment must also be avoided.
- No facial hair, which interferes with a satisfactory fit of the mask-to-face seal, is allowed on personnel required to wear respiratory protective equipment.
- All personnel must satisfy medical monitoring procedures.
- Safety glasses and steel-toe, hard-sole boots or shoes are the minimum PPE requirement for on-site work.
- All electrical tools must be connected to a grounded outlet and/or must be grounded with a third wire and the cord set must be double insulated and in good working condition.
- The locations of all underground utilities must be identified and marked before initiation of any subsurface activities. A copy of a dig permit must be kept on-site.
- No flames or open fires will be permitted on site.
- Loose fitting clothing or loose long hair, as well as tank tops or shorts, will be prohibited in the work zone during drilling operations.
- Personnel must develop hand signals with equipment operators.
- A copy of the appropriate SSHP must be available at the FPM field office.
- Site personnel are not to undertake any activity that would be considered a confined-space entry without first being trained in the proper procedures and obtaining a Confined-Space/Limited-Egress Permit. Similarly, no spark-producing work can be conducted until proper training is undertaken and a Burn Permit is obtained.
- Site personnel must immediately notify the Project Manager (PM) of all incidents for OSHA record keeping purposes.
- If personnel note any warning properties of chemicals (irritation, odors, symptoms, etc.) or even remotely suspect the occurrence of exposure, they must immediately notify the SSHO for further direction.
- Any new analytical data must be promptly conveyed by telephone to the SSHO by the laboratory technician or team leader.
- Workers must be advised and aware of the dangers of heat stress. Workers must take breaks at a frequency necessary to prevent excessive overheating, rapid heart rate, dizziness, and/or nausea. The SSHO must watch closely for the signs and symptoms of heat stress and, if necessary, provide effective control measures including fluid intake supervision.

- Decontamination solutions and sample preservatives must be handled in well-ventilated areas. Workers should stand upwind when possible.
- The buddy system shall be employed for all site activities.
- Work shall be discontinued in the event of severe inclement weather (i.e., electrical storms) at the discretion of the SSHO and the FOM or the Contracting Officer Representative (COR).
- All work areas must be kept free of clutter.
- Areas must be designated for chemical storage. Acids, bases, and flammables shall be stored separately. Storage areas must be labeled to indicate the contents of the storage area.
- A signal person will direct the backing of work vehicles.
- Equipment operators will be instructed to check equipment for abnormalities such as oozing liquids, frayed cables, unusual odors, etc.

The following safety procedures/controls are not applicable to this SSHP as no construction activities will be taking place as part of this contract:

- Confined space entry;
- Electrical safety;
- Excavation and trench safety;
- Guarding of machinery/equipment;
- Lockout/Tagout; and
- Fall protection.

11.0 EMERGENCY RESPONSE PLAN

This section will present the Emergency Response Plan (ERP) for the sites. Pre-emergency planning will consist of reviewing the ERP with all workers at each site prior to initiation of work.

11.1 Personnel Roles

Employees are responsible to report all occupationally-related illnesses, injuries, and substantial property damage to the SSHO as soon as possible. All injuries and accidents must be reported using EM Form 3394 and the Emergency Response Action Form included in Appendix C. The employer is responsible for reporting all serious injuries or death to the designated authority within 24 hours. An accident that causes serious injury or death to an employee must be reported to the regional OSHA representative.

Should an emergency situation arise at a site, the SSHO will inform all personnel immediately. The SSHO will resolve all disputes concerning health and safety requirements and precautions. The SSHO will also:

- Be authorized to seek and purchase supplies as necessary; and
- Have control over activities of every person entering the site.

In the event that the SSHO is not present at a site, the designated assistant SSHO will assume the duties of the SSHO.

The SSHO will communicate, by field telephone or other, with off-site personnel including the Project Manager and COR to evaluate data and assist in the decision-making process. The hospital that will be utilized during an emergency will be Rome Memorial Hospital (see Figure 11-1). Phone numbers for the fire department, police, ambulance, Rome Memorial Hospital Emergency room, and NYSDEC Spill Response Department, are listed in Table 2-2. The directions to the hospital along with the hospital's emergency room phone number are presented in Table 11-1.

Table 11-1
Directions to Rome Hospital (315)338-7000

Exit Mohawk Gate (near B-52 memorial), continue straight on Chestnut Street until reaching Black River Blvd., turn left onto boulevard (hospital will be in sight, on right), followed by first right onto Oak Street. Follow signs for Emergency Room.

Note: Directions to hospital from daily site locations will be reviewed with all site workers prior to commencement of work.

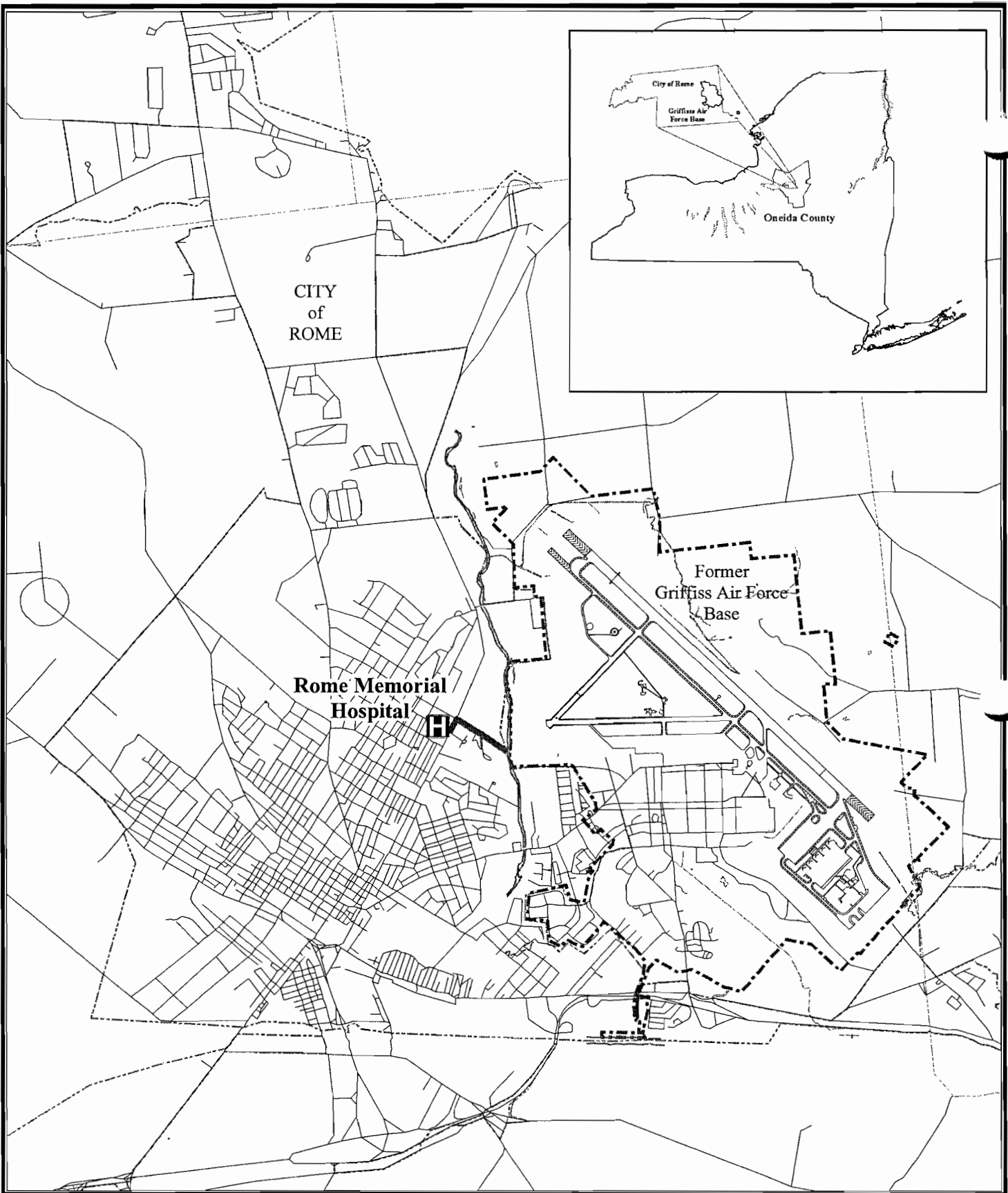
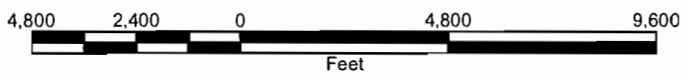


FIGURE 11-1
Rome Memorial Hospital Location



UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK



11.2 Response Follow-Up

Following an emergency or incident, the SSHO will conduct an accident investigation and develop a detailed report. The CIH is available to assist with investigation. The purpose of the investigation is to determine root cause of the incident. At a minimum, the information will be recorded on USACE ENG Form 3394 which is provided in Appendix C and will be completed and provided to the appropriate client COR. All equipment will be restored to pre-emergency conditions. The SSHP will be reviewed following an incident to determine if it provides adequate information to assist in dealing with the emergency. The SSHP may be revised to incorporate additional information as needed. Any changes to the SSHP will be communicated to employees in a daily safety briefing.

11.3 Emergency Recognition and Prevention

Before daily work assignments begin each day, a brief on-site meeting will be held by the SSHO, which will address health and safety issues related to the day's work. Prior to initiation of work, a detailed on-site health and safety meeting will be held to review all potential hazards, contingencies, and safety measures.

11.4 Safe Distances and Places of Refuge

The main potential cause of work zone evacuation is a significant organic vapor release. Vapor release evacuation will be discussed prior to boring at each location and in general will be in the upwind direction. Wind direction will be monitored at each work location and all workers will be notified of the direction of evacuation prior to commencement of work. Safe distances will be discussed at each location and determined by the SSHO. The PID and Combustible Gas indicator will be used to determine if workers have evacuated a sufficient distance.

At all times, vehicles which may be utilized in an emergency for transport to the hospital (or other destination) will have clear access to leave the site. The SSHO will assure that an emergency vehicle does not become blocked in by other vehicles.

11.5 Site Security and Control

The SSHO will control entry of personnel into the work zone. No unnecessary person shall be permitted in the work zone.

11.6 Decontamination Procedures During Emergencies

In the event of a medical emergency, decontamination will be performed if it does not interfere with essential treatment. Decontamination will be performed by washing, rinsing, and/or cutting off protective clothing and equipment. Emergency and off-Base medical personnel will be alerted to the potential contamination.

11.7 Emergency Medical Treatment and First Aid

Medical emergencies will be treated by medical experts after transporting the victim to the nearby hospital. A first aid kit will be present on-site, at each work area, for minor medical treatment. The emergency response action form can be found in Appendix C.

12.0 REFERENCES

NIOSH Pocket Guide to Chemical Hazards, June 1997.

OSHA Regulations: 29 CFR 1910 and 1926.

Parsons Engineering Science, Inc., and OHM Remediation Services Corp., Final Closure Certification Report for the Remediation of Landfill 4 at the Former Griffiss AFB, Rome, NY, September 1997.

USACE, Safety and Health Requirements, EM 385-1-1, September 1996.

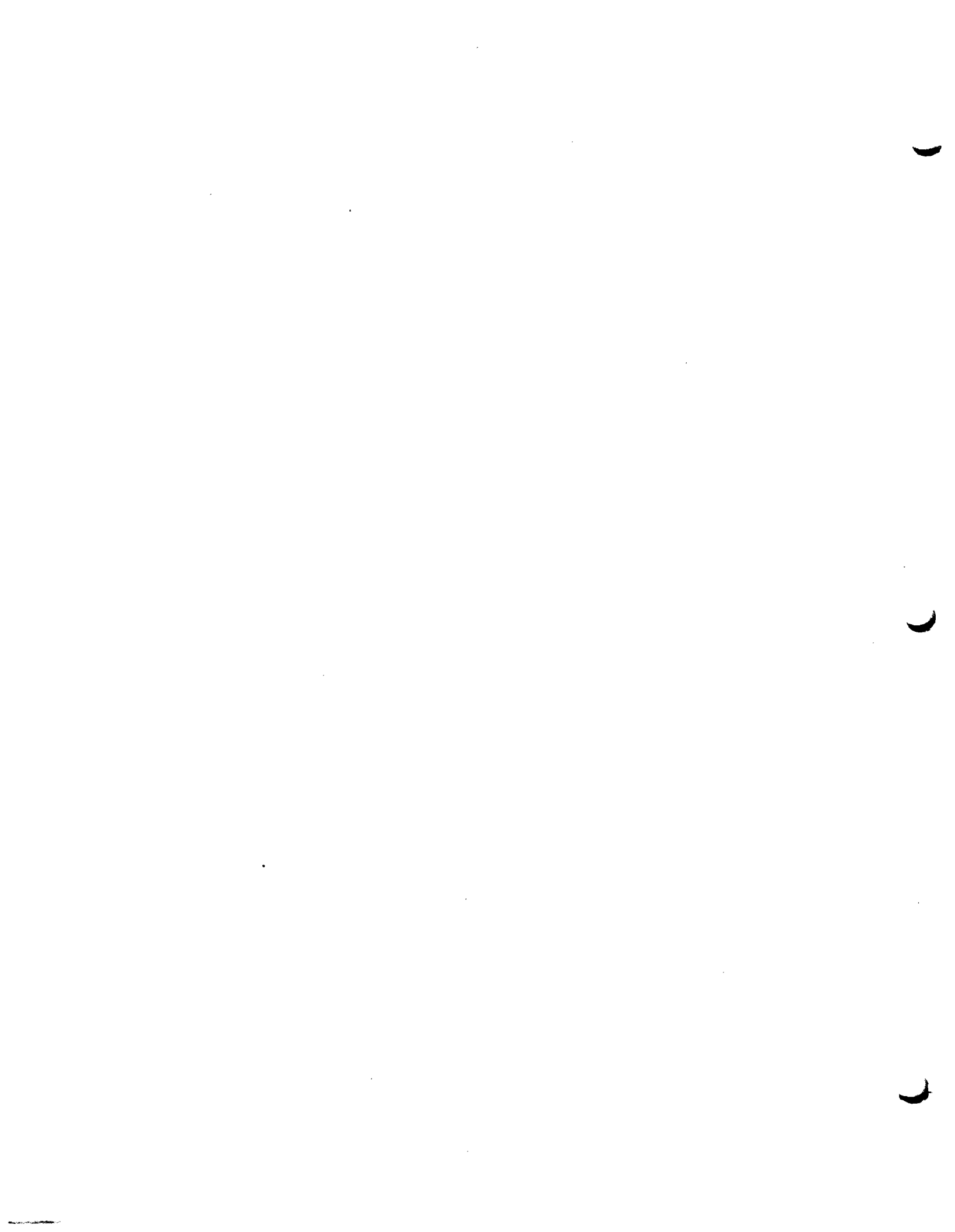
USACE, Safety and Occupational Health Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) Activities, ER 385-1-92, September 2000.

U.S. Department of Health and Human Services, Occupational Safety and Health Guideline Manual for Hazardous Waste Activities, 1985.

USEPA, Standard Operating Safety Guidelines, Office of Solid Waste and Emergency Response, June 1992.

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APPENDIX A
CHEMICAL OF POTENTIAL CONCERN DATA



Summary of Chemical Hazard Data

<i>Chemical Class</i>	<i>Chemical Name</i>	<i>Potential Locations</i>	<i>Exposure Limits</i>	<i>Characteristics</i>	<i>Likely Route of Exposure</i>	<i>Symptoms of Exposure Health Effects</i>
Volatile Organic Compounds	1,2,4-Trimethylbenzene	Ground Water, Surface Water	OSHA - NA, ACGIH - 25 ppm	Clear, colorless liquid with a distinctive, aromatic odor.	Inhalation, Skin Contact	Irritation eyes, skin, nose, throat, respiratory system; bronchitis; anemia (deficient red blood cells) ; headache, drowsiness, fatigue, dizziness, nausea, incoordination; vomiting, confusion;
Volatile Organic Compounds	1,2-Dibromo-3 chloropropane	Ground Water, Surface Water	OSHA - 0.001 ppm, ACGIH - NA	Dense yellow or amber liquid with a pungent odor at high concentrations. Pesticide	Inhalation, Skin Contact	Irritation eyes, skin, nose, throat; drowsiness; nausea, vomiting; pulmonary edema (fluid in lungs) ; liver, kidney injury; sterility; [potential occupational carcinogen]
Volatile Organic Compounds	1,2-Dichlorobenzene	Ground Water, Surface Water	OSHA - 50 ppm C, ACGIH - 25 ppm	Colorless to pale-yellow liquid with a pleasant, aromatic odor	Inhalation, Skin Contact	Irritation eyes, nose; liver, kidney damage; skin blisters
Volatile Organic Compounds	1,3,5-Trimethylbenzene	Ground Water, Surface Water	OSHA - NA, ACGIH - 25 ppm	Clear, colorless liquid with a distinctive, aromatic odor.	Inhalation, Skin Contact	Irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion;



Chemical Class **Chemical Name** **Potential Locations** **Exposure Limits** **Characteristics** **Likely Route of Exposure** **Symptoms of Exposure** **Health Effects**

Volatile Organic Compounds	1,4-Dichlorobenzene	Ground Water, Surface Water	OSHA - 75 ppm, ACGIH - 10 ppm	Colorless or white crystalline solid with a mothball-like odor. [insecticide]	Inhalation, Skin Contact	Irritation eyes, nose; liver, kidney damage; skin blisters	
Volatile Organic Compounds	Benzene	Ground Water, Surface Water	OSHA - 1ppm, ACGIH - 0.5 ppm	Colorless to light-yellow liquid with an aromatic odor.	Inhalation, Skin Contact	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]	
Volatile Organic Compounds	Chlorobenzene	Ground Water, Surface Water	OSHA - 75 ppm, ACGIH - 10 ppm	Colorless liquid with an almond-like odor.	Inhalation, Skin Contact	Irritation eyes, skin, nose; drowsiness, incoordination; central nervous system depression; in animals: liver, lung, kidney injury	
Volatile Organic Compounds	Chloroform	Ground Water, Surface Water	OSHA - 50 ppm C, ACGIH - 10 ppm	Colorless liquid with a pleasant odor	Inhalation, Skin Contact	Irritation eyes, skin; dizziness, mental dullness, nausea, confusion; headache, lassitude (weakness, exhaustion); anesthesia; enlarged liver; [potential occupational carcinogen]	
Volatile Organic Compounds	Dichloroethylene	Ground Water, Surface Water	OSHA - NA, ACGIH - 200 ppm	Colorless liquid or gas (above 89°F) with a mild, sweet, chloroform-like odor	Inhalation, Skin Contact	Irritation eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty); liver, kidney disturbance; pneumonitis; [potential occupational carcinogen]	

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Exposure limits reported as 8 hr TWA, unless otherwise noted

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Chemical Class **Chemical Name** **Potential Locations** **Exposure Limits** **Characteristics** **Likely Route of Exposure** **Symptoms of Exposure Health Effects**

Volatile Organic Compounds	Ethyl Benzene	Ground Water, Surface Water	OSHA - 100 ppm, ACGIH - 100 ppm	Colorless liquid with an aromatic odor.	inhalation, Skin Contact	Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma
Volatile Organic Compounds	Isopropyl Benzene	Ground Water, Surface Water	OSHA - 50 ppm, ACGIH - NA	Colorless liquid with a sharp, penetrating, aromatic odor	Inhalation, Skin Contact	Irritation eyes, skin, mucous membrane; dermatitis; headache, narcosis, coma
Volatile Organic Compounds	Methyl Tertiary Butyl Ether (MTBE)	Ground Water, Surface Water	OSHA - NA, ACGIH - 40 ppm	Highly flammable liquid	Inhalation, Skin Contact	Limited and conflicting health data, kidney and reproductive effects, possible carcinogen
Volatile Organic Compounds	Napthalene	Ground Water, Surface Water	OSHA - 10 ppm, ACGIH - 10 ppm	Colorless to brown solid with an odor of mothballs	Inhalation, Skin Contact	Irritation eyes; headache, confusion, excitement; malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; dermatitis
Volatile Organic Compounds	n-Butylbenzene	Ground Water, Surface Water	OSHA - NA, ACGIH - NA	Colorless liquid with an aromatic odor	Inhalation, Skin Contact	May be harmful by ingestion, inhalation or through skin contact. Defatting action on skin. May act as an irritant - toxicology not fully investigated

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Chemical Class **Chemical Name** **Potential Locations** **Exposure Limits Characteristics** **Likely Route of Exposure** **Symptoms of Exposure Health Effects**

Volatile Organic Compounds	n-Propylbenzene	Ground Water, Surface Water	OSHA - NA, ACGIH - NA	Colorless or light yellow liquid	Inhalation, Skin Contact	May be harmful, or act as an irritant. Toxicology not fully investigated
Volatile Organic Compounds	Perchloroethylene	Ground Water, Surface Water	OSHA - 100 ppm, ACGIH - 25 ppm	Colorless liquid with a mild, chloroform-like odor	Inhalation, Skin Contact	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]
Volatile Organic Compounds	p-isopropyltoluene	Ground Water, Surface Water	OSHA - NA, ACGIH - NA	Colorless to pale yellow liquid / fresh citrus	Inhalation, Skin Contact	Irritating to eyes, respiratory system, and skin, Toxicology not fully investigated
Volatile Organic Compounds	Sec-Butylbenzene	Ground Water, Surface Water	OSHA - NA, ACGIH - NA	Colorless liquid with an aromatic odor	Inhalation, Skin Contact	May be harmful by ingestion, inhalation or through skin contact. Defatting action on skin. May act as an irritant - toxicology not fully investigated
Volatile Organic Compounds	Toluene	Ground Water, Surface Water	OSHA - 200 ppm, ACGIH - 50 ppm	Colorless liquid with a sweet, pungent, benzene-like odor.	Inhalation, Skin Contact	Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia (tingling sensation); dermatitis; liver, kidney damage

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Griffiss Long Term Monitoring Project

Exposure limits reported as 8 hr TWA, unless otherwise noted

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Chemical Class **Chemical Name** **Potential Locations** **Exposure Limits** **Characteristics** **Likely Route of Exposure** **Symptoms of Exposure Health Effects**

Volatile Organic Compounds	Trichloroethylene	Ground Water, Surface Water	OSHA 100 ppm, ACGIH - 50 ppm	Colorless liquid (unless dyed blue) with a chloroform-like odor.	Inhalation, Skin Contact	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias (irregular beat), paresthesia (tingling sensation); liver injury; [potential carcinogen
Volatile Organic Compounds	Vinyl Chloride	Ground Water, Surface Water	OSHA - 1 ppm, ACGIH - 1 ppm	Colorless gas or liquid (below 7°F) with a pleasant odor at high concentrations	Inhalation, Skin Contact	Lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis (bluing due to lack of O2) of extremities; liquid: frostbite; [potential occupational carcinogen
Volatile Organic Compounds	Xylene	Ground Water, Surface Water	OSHA - 100 ppm, ACGIH - 100 ppm	Colorless liquid with an aromatic odor	Inhalation, Skin Contact	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization (fluid or air bubbles); anorexia, nausea, vomiting, abdominal pain; dermatitis
Pesticides	Aldicarb	Ground Water, Surface Water	OSHA - NA, ACGIH - NA	White crystalline solid	Inhalation, Skin Contact	Aldicarb is a cholinesterase inhibitor and so can result in a variety of symptoms including weakness, blurred vision, headache, nausea, tearing, sweating, and tremors
Pesticides	Aldrin	Ground Water, Surface Water	OSHA - 0.25 mg/m ³ , ACGIH - 0.25 mg/m ³	Colorless to dark-brown crystalline solid with a mild chemical odor.	Inhalation, Skin Contact	Headache, dizziness; nausea, vomiting, malaise (vague feeling of discomfort); myoclonic jerks of limbs; clonic, tonic convulsions; coma; hematuria (blood in the urine), azotemia; [potential occupational carcinogen

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Griffiss Long Term Monitoring Project



Chemical Class**Chemical Name****Potential Locations****Exposure Limits****Characteristics****Likely Route of Exposure****Symptoms of Exposure Health Effects**

Pesticides	Beta BHC	Ground Water, Surface Water	See Lindane	See Lindane	Inhalation, Skin Contact	See Lindane
Pesticides	Dieldrin	Ground Water, Surface Water	OSHA - 0.25 mg/m ³ , ACGIH - 0.25 mg/m ³	Colorless to light-tan crystals with a mild, chemical odor	Inhalation, Skin Contact	Headache, dizziness; nausea, vomiting, malaise (vague feeling of discomfort), sweating; myoclonic limb jerks; clonic, tonic convulsions; coma; [potential occupational carcinogen]; in animals: liver, kidney damage
Pesticides	Endrin	Ground Water, Surface Water	OSHA - 0.1 mg/m ³ , ACGIH - 0.1 mg/m ³	Colorless to tan, crystalline solid with a mild, chemical odor	Inhalation, Skin Contact	Epileptiform convulsions; stupor, headache, dizziness; abdominal discomfort, nausea, vomiting; insomnia; aggressiveness, confusion; drowsiness, lassitude (weakness, exhaustion); anorexia; in animals: liver damage
Pesticides	Lindane	Ground Water, Surface Water	OSHA - 0.5 mg/m ³ , ACGIH - 0.5 mg/m ³	White to yellow, crystalline powder with a slight, musty odor	Inhalation, Skin Contact	Irritation eyes, skin, nose, throat; headache; nausea; clonic convulsions; respiratory difficulty; cyanosis (bluing due to lack of O ₂); aplastic anemia; muscle spasm; in animals: liver, kidney damage
PCBs	Aroclor 1242 and 1254	Ground Water, Surface Water, Sediment	OSHA - NA, ACGIH - NA	Colorless to pale yellow, Nonflammable liquid	Inhalation, Skin Contact	Irritation eyes, nose, throat, nausea, diarrhea, discolored skin, numbness, weakness, liver damage, reproductive effects

FPM Group**Griffiss Long Term Monitoring Project**



APPENDIX B
MATERIAL SAFETY DATA SHEETS



Please reduce your browser font size for better viewing and printing.

MSDS Material Safety Data Sheet

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



24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-6300

National Response in Canada
CANUTEC: 813-853-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

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.

ALCONOX(tm)

MSDS Number: A2052 — Effective Date: 12/08/96

1. Product Identification

Synonyms: Alkyl Aryl Sulfonates
CAS No.: Not applicable.
Molecular Weight: Not applicable.
Chemical Formula: Not applicable.
Product Codes: A461

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Alconox (tm)	N/A	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! CAUSES IRRITATION.

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

Health Rating: 1 - Slight

Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:

None identified.

Ingestion:

May be harmful.

Skin Contact:

Irritation.

Eye Contact:

Irritation.

Chronic Exposure:

No information found.

Aggravation of Pre-existing Conditions:

No information found.

4. First Aid Measures

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Prompt action is essential.

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes.

Eye Contact:

In case of eye contact, immediately flush with plenty of water for at least 15 minutes.

5. Fire Fighting Measures

Fire:

Not expected to be a fire hazard.

Explosion:

None identified.

Fire Extinguishing Media:

Use extinguishing media appropriate for 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.

6. Accidental Release Measures

Wear self-contained breathing apparatus and full protective clothing. With clean shovel, carefully place material into clean, dry container and cover; remove from area. Flush spill area with water.

7. Handling and Storage

Keep container tightly closed. Suitable for any general chemical storage area. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

None established.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. 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):

For conditions of use where exposure to the substance is apparent, consult an industrial hygienist. For emergencies, or instances where the exposure levels are not known, use a full-facepiece 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 full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

White Powder.

Odor:

No information found.

Solubility:

Appreciable (>10%)

Specific Gravity:

0.00

pH:

No information found.

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

N/A

Boiling Point:

No information found.

Melting Point:

No information found.

Vapor Density (Air=1):

Not applicable.

Vapor Pressure (mm Hg):

Not applicable.

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

No information found.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

No information found.

Conditions to Avoid:

No information found.

11. Toxicological Information

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Alconox (tm)	No	No	None

12. Ecological Information

Environmental Fate:

No information found.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal 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.

14. Transport Information

Not regulated.

15. Regulatory Information

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

Alconox(tm) Yes No No No

-----\Chemical Inventory Status - Part 2\-----
Ingredient Korea --Canada-- DSL NDSL Phil.

Alconox(tm) No No Yes No

-----\Federal, State & International Regulations - Part 1\-----
Ingredient -SARA 302- -SARA 313-
RQ TPQ List Chemical Catg.

Alconox(tm) No No No No

-----\Federal, State & International Regulations - Part 2\-----
Ingredient CERCLA -RCRA- -TSCA-
261.33 8(d)

Alconox(tm) No No No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Solid)

Australian Hazchem Code: No information found.
Poison Schedule: No information found.

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.

16. Other Information

Label Hazard Warning:

WARNING! CAUSES IRRITATION.

Label Precautions:

Keep in tightly closed container. Wash thoroughly after handling.

Label First Aid:

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.

Product Use:

Laboratory Reagent. Research and Development Use Only.

Revision Information:

Pure. New 16 section MSDS format, all sections have been revised.

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: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

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MSDS Number: H3880 * * * * * Effective Date: 05/07/03 * * * * * Supercedes: 05/10/01

MSDS Material Safety Data Sheet

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



24 Hour Emergency Telephone: 800-850-2151
CHEMTREC: 1-800-424-4300

National Response in Canada
CANUTEC: 613-496-6666

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.

HYDROCHLORIC ACID, 33 - 40%

1. Product Identification

Synonyms: Muriatic acid; hydrogen chloride, aqueous

CAS No.: 7647-01-0

Molecular Weight: 36.46

Chemical Formula: HCl

Product Codes:

J.T. Baker: 5367, 5537, 5575, 5800, 5814, 5839, 5894, 5994, 6900, 7831, 9529, 9530, 9534, 9535, 9536, 9537, 9538, 9539, 9540, 9544, 9548

Mallinckrodt: 2062, 2612, 2624, 2626, 5587, H611, H613, H987, H992, H999, V078, V628

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Hydrogen Chloride	7647-01-0	33 - 40%	Yes
Water	7732-18-5	60 - 67%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG DAMAGE.

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

Health Rating: 3 - Severe (Poison)

Flammability Rating: 0 - None

Reactivity Rating: 2 - Moderate

Contact Rating: 3 - Severe (Corrosive)

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

Storage Color Code: White (Corrosive)

Potential Health Effects

Inhalation:

Corrosive! Inhalation of vapors can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract, and in severe cases, pulmonary edema, circulatory failure, and death.

Ingestion:

Corrosive! Swallowing hydrochloric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract. May cause nausea, vomiting, and diarrhea. Swallowing may be fatal.

Skin Contact:

Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and discolor skin.

Eye Contact:

Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.

Chronic Exposure:

Long-term exposure to concentrated vapors may cause erosion of teeth. Long term exposures seldom occur due to the corrosive properties of the acid.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or eye disease may be more susceptible to the effects of this substance.

4. First Aid Measures

Inhalation:

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

Ingestion:

DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never

give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Eye Contact:

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

5. Fire Fighting Measures

Fire:

Extreme heat or contact with metals can release flammable hydrogen gas.

Explosion:

Not considered to be an explosion hazard.

Fire Extinguishing Media:

If involved in a fire, use water spray. Neutralize with soda ash or slaked lime.

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. Structural firefighter's protective clothing is ineffective for fires involving hydrochloric acid. Stay away from ends of tanks. Cool tanks with water spray until well after fire is out.

6. Accidental Release Measures

Ventilate area of leak or spill. 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. Neutralize with alkaline material (soda ash, lime), then 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.

J. T. Baker NEUTRASORB® or TEAM® 'Low Na+' acid neutralizers are recommended for spills of this product.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and

incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. When opening metal containers, use non-sparking tools because of the possibility of hydrogen gas being present. 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.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

For Hydrochloric acid:

- OSHA Permissible Exposure Limit (PEL):

5 ppm (Ceiling)

- ACGIH Threshold Limit Value (TLV):

2 ppm (Ceiling), 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, a full facepiece respirator with an acid gas cartridge 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-facepiece positive-pressure, air-supplied respirator. **WARNING:** Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure 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.

9. Physical and Chemical Properties

Appearance:

Colorless, fuming liquid.

Odor:

Pungent odor of hydrogen chloride.

Solubility:

Infinite in water with slight evolution of heat.

Density:

1.18

pH:

For HCL solutions: 0.1 (1.0 N), 1.1 (0.1 N), 2.02 (0.01 N)

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

100

Boiling Point:

53C (127F) Azeotrope (20.2%) boils at 109C (228F)

Melting Point:

-74C (-101F)

Vapor Density (Air=1):

No information found.

Vapor Pressure (mm Hg):

190 @ 25C (77F)

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage. Containers may burst when heated.

Hazardous Decomposition Products:

When heated to decomposition, emits toxic hydrogen chloride fumes and will react with water or steam to produce heat and toxic and corrosive fumes. Thermal oxidative decomposition produces toxic chlorine fumes and explosive hydrogen gas.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

A strong mineral acid, concentrated hydrochloric acid is incompatible with many substances and highly reactive with strong bases, metals, metal oxides, hydroxides, amines, carbonates and other alkaline materials. Incompatible with materials such as cyanides, sulfides, sulfites, and formaldehyde.

Conditions to Avoid:

Heat, direct sunlight.

11. Toxicological Information

Inhalation rat LC50: 3124 ppm/1H; oral rabbit LD50: 900 mg/kg (Hydrochloric acid concentrated); investigated as a tumorigen, mutagen, reproductive effector.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Hydrogen Chloride (7647 -01-0)	No	No	3
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:

When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater.

Environmental Toxicity:

This material is expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to 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.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: HYDROCHLORIC ACID

Hazard Class: 8

UN/NA: UN1789

Packing Group: II

Information reported for product/size: 475LB

International (Water, I.M.O.)

Proper Shipping Name: HYDROCHLORIC ACID

Hazard Class: 8

UN/NA: UN1789

Packing Group: II

Information reported for product/size: 475LB

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\----- Ingredient	TSCA	EC	Japan	Australia
Hydrogen Chloride (7647 -01-0)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

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

Ingredient	Korea	DSL	NDSL	Phil.
Hydrogen Chloride (7647 -01-0)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----				
Ingredient	-SARA 302-		----- SARA 313-----	
	RQ	TPQ	List	Chemical Catg.
Hydrogen Chloride (7647 -01-0)	5000	500*	Yes	No
Water (7732-18-5)	No	No	No	No

-----\Federal, State & International Regulations - Part 2\-----			
Ingredient	CERCLA	-RCRA-	-TSCA-
		261.33	8 (d)
Hydrogen Chloride (7647 -01-0)	5000	No	No
Water (7732-18-5)	No	No	No

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

Australian Hazchem Code: 2R
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.

16. Other Information

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

Label Hazard Warning:

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG DAMAGE.

Label Precautions:

Do not get in eyes, on skin, or on clothing.
 Do not breathe vapor or mist.
 Use only with adequate ventilation.
 Wash thoroughly after handling.
 Store in a tightly closed container.
 Remove and wash contaminated clothing promptly.

Label First Aid:

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. 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 all cases get

medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 8.

Disclaimer:

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

LIQUID AIR -- 100 PPM ISOBUTYLENE IN AIR
MATERIAL SAFETY DATA SHEET
NSN: 683000N074507
Manufacturer's CAGE: 18260
Part No. Indicator: A
Part Number/Trade Name: 100 PPM ISOBUTYLENE IN AIR

=====
General Information
=====

Company's Name: LIQUID AIR CORP
Company's Street: 2121 NORTH CALIFORNIA BLVD
Company's City: WALNUT CREEK
Company's State: CA
Company's Country: US
Company's Zip Code: 94596
Company's Emerg Ph #: 800-231-1366;800-424-9300 (CHEMTREC)
Company's Info Ph #: 800-231-1366
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 04JUN90
Safety Data Review Date: 25FEB97
MSDS Serial Number: CDMVG

=====
Ingredients/Identity Information
=====

Proprietary: NO
Ingredient: PROPENE, 2-METHYL-, (ISOBUTYLENE)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: UD0890000
CAS Number: 115-11-7
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: AIR
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 1005486AI
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: SUP DAT: DO NOT ALLOW TEMP WHERE CYLS ARE STORED TO EXCEED
130F (54C). CYLS SHOULD BE STORED UPRIGHT & FIRMLY (ING 4)
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 3: SECURED TO PVNT FALLING/BEING KNOCKED OVER. FULL &
EMPTY CYLS SHOULD BE SEGREGATED. USE A "FIRST IN-FIRST (ING 5)
Ingredient Sequence Number: 04
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 4: OUT" INVENTORY SYS TO PVNT FULL CYLS BEING STORED FOR
EXCESS PERIODS OF TIME. IF THIS MIX IS DRY IT IS (ING 6)
Ingredient Sequence Number: 05
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 5: NON-CORR & MAY BE USED W/ALL MATLS OF CONSTRUCTION.
MOISTURE CAUSES METAL OXIDES WHICH ARE FORMED W/AIR (ING 7)

Ingredient Sequence Number: 06
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 6: TO BE HYDRATED SO THAT THEY INCREASE IN VOL & LOSE
THEIR PROT ROLE (RUST FORM). CONCS OF SO*2, CL*2, (ING 8)

Ingredient Sequence Number: 07
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 7: SALT, ETC, IN THE MOISTURE ENHANCES THE RUSTING OF
METALS IN THIS MIX. COMPRESSED GAS CYLS SHOULD NOT BE (ING 9)

Ingredient Sequence Number: 08
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 8: REFILLED EXCEPT BY QUALIFIED PRODUCERS OF COMPRESSED
GASES. SHIPMENT OF A COMPRESSED GAS CYL WHICH HAS (ING 10)

Ingredient Sequence Number: 09
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 9: NOT BEEN FILLED BY THE OWNER/WITH HIS (WRITTEN) CONSENT
IS A VIOLATION OF FED LAW (49 CFR). ALWAYS (ING 11)

Ingredient Sequence Number: 10
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 10: SECURE CYLS IN AN UPRIGHT POSITION BEFORE TRANSPORTING
THEM. NEVER TRANSPORT CYLS IN TRUNKS OF (ING 12)

Ingredient Sequence Number: 11
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 11: VEHICLES, ENCLOSED VANS, TRUCK CABS/IN PASSENGER
COMPARTMENTS. TRANSPORT CYLINDERS SECURED IN OPEN (ING 13)

Ingredient Sequence Number: 12
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 12: FLATBED OR IN OPEN PICK-UP TYPE VEHICLES.

Ingredient Sequence Number: 13
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS GAS WITH POSSIBLE VERY SLIGHT OLEFINIC ODOR
Boiling Point: -318F, -194C
Solubility In Water: SUP DAT

Fire and Explosion Hazard Data

Flash Point: N/A
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: NON-FLAMMABLE GAS. USE MEDIA SUITABLE FOR SURROUNDING FIRE (FP N).
Special Fire Fighting Proc: WEAR NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: COMPRESSED AIR AT HIGH PRESSURES WILL ACCELERATE THE BURNING OF MATERIALS TO A GREATER RATE THAN THEY BURN AT ATMOSPHERIC PRESSURE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: NONE.
Hazardous Decomp Products: NONE.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE: THE AMT OF ISO-BUTYLENE IN THIS MIX SHOULD NOT PRESENT ANY SYMPS OF TOX IF THIS MIX IS BREATHED. AIR IS NON-TOX & NEC TO SUPPORT LIFE. INHAL OF AIR IN A HIGH PRESS ENVIRON SUCH AS UNDERWATER DIVING, CAISSONS/HYPERBARIC CHAMBERS CAN RSLT IN SYMPS SIMILAR TO OVEREXP TO PURE OXYGEN. THESE INCL (EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT.
Signs/Symptoms Of Overexp: HLTH HAZ: TINGLING OF FINGERS & TOES, ABNORMAL SENSATIONS, IMPAIRED COORD & CONFUSION. DECOMPRESSION SICKNESS PAINS OR "BENDS" ARE POSS FOLLOWING RAPID DECOMPRESSION. TOX PROPERTIES: HIGH PRESS EFTS (GREATER THAN 2 ATM OF OXYGEN) ARE ON CNS. IMPROPER DECOMPRESSION RESULTS IN THE ACCUMULATION OF NITROGEN IN THE BLOOD.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: FACILITIES/PRACT AT WHICH AIR IS BREATHED IN HIGH PRESS ENVIRON SHOULD BE PREPARED TO DEAL W/ILLNESSES ASSOC W/ DECOMPRESSION (BENDS/CAISSON DISEASE). DECOMPRESSION EQUIP MAY BE REQUIRED. EYE: FLUSH W/POTABLE WATER FOR AT LEAST 15 MIN. SEE MD (FP N). SKIN: FLUSH W/ COPIOUS AMTS OF WATER. SEE MD (FP N). INHAL: REMOVE TO FRESH AIR. SUPPORT BRTHG (GIVE OXYGEN/ARTF RESP) (FP N). INGEST: CALL MD IMMED (FP N).

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: NONE SPECIFIED BY MANUFACTURER.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS (FP N).
Precautions-Handling/Storing: VALVE PROT CAPS MUST REMAIN IN PLACE UNLESS

CONTR IS SECURED W/VALVE OUTLET PIPED TO USE POINT. DO NOT DRAG, SLIDE/ROLL CYLINDERS.

Other Precautions: USE SUITABLE HAND TRUCK FOR CYL MOVEMENT. USE PRESS REDUCING REGULATOR WHEN CONNECTING CYL TO LOWER PRESS (<3,000 PSIG) PIPING/SYS. DO NOT HEAT CYL BY ANY MEANS TO INCR DISCHARGE RATE OF PROD FROM CYL. USE CHECK VALVE/TRAP IN THE (SUP DAT)

=====
Control Measures
=====

Respiratory Protection: USE NIOSH APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).
Ventilation: NONE SPECIFIED BY MANUFACTURER.
Protective Gloves: ANY MATERIAL.
Eye Protection: ANSI APPRVD CHEM WORKERS GOGGLES (FP N).
Other Protective Equipment: EMERGENCY EYEWASH AND DELUGE SHOWER MEETING ANSI DESIGN CRITERIA (FP N). SAFETY SHOES.
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: SOL IN H*2O: BUNSEN COEFFICIENT: 0.0183.
OTHER PREC: DISCHARGE LINE TO PVNT HAZ BACK FLOW INTO CYL. DO NOT TAMPER W/ (VALVE) SFTY DEVICE. CLOSE VALVE AFTER EACH USE & WHEN EMPTY. PROTECT CYLS FROM PHYSICAL DMG. STORE IN COOL, DRY, WELL-VENTILATED AREA AWAY FROM HEAVILY TRAFFICKED AREAS & EMER EXITS. (ING 3)

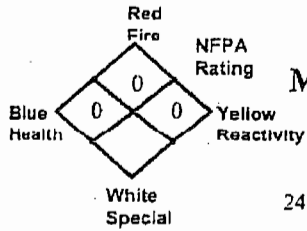
=====
Transportation Data
=====

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Disposal Data
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Label Data
=====

Label Required: YES
Technical Review Date: 25FEB97
Label Date: 25FEB97
Label Status: G
Common Name: 100 PPM ISOBUTYLENE IN AIR
Chronic Hazard: NO
Signal Word: CAUTION!
Acute Health Hazard-Slight: X
Contact Hazard-Slight: X
Fire Hazard-Slight: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE: THE AMOUNT OF ISO-BUTYLENE IN THIS MIXTURE SHOULD NOT PRESENT ANY SYMPTOMS OF TOXICITY IF THIS MIXTURE IS BREATHED. AIR IS NON-TOXIC AND NECESSARY TO SUPPORT LIFE. INHALATION OF AIR IN A HIGH PRESSURE ENVIRONMENT SUCH AS UNDERWATER DIVING, CAISSONS OR HYPERBARIC CHAMBERS CAN RESULT IN SYMPTOMS SIMILAR TO OVEREXPOSURE TO PURE OXYGEN. THESE INCLUDE TINGLING OF FINGERS AND TOES, ABNORMAL SENSATIONS, IMPAIRED COORDINATION AND CONFUSION. DECOMPRESSION SICKNESS PAINS OR "BENDS" ARE POSSIBLE FOLLOWING RAPID DECOMPRESSION WHICH RESULTS IN ACCUMULATION OF NITROGEN IN THE BLOOD. CHRONIC: NONE SPECIFIED BY MANUFACTURER.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: LIQUID AIR CORP
Label Street: 2121 NORTH CALIFORNIA BLVD
Label City: WALNUT CREEK
Label State: CA
Label Zip Code: 94596
Label Country: US
Label Emergency Number: 800-231-1366;800-424-9300 (CHEMTREC)

Liqui-Nox®



MATERIAL SAFETY DATA SHEET

Alconox, Inc.
30 Glenn Street, Suite 309
White Plains, NY 10603
24 Hour Emergency Number - Chem-Tel (800) 255-3924

I. IDENTIFICATION

Product Name (as appears on label)	LIQUI-NOX
CAS Registry Number:	Not Applicable
Effective Date:	January 1, 1999
Chemical Family:	Anionic Liquid Detergent
Manufacturer Catalog Numbers for sizes	1232, 1201, 1215 and 1255

II. HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

There are no hazardous ingredients in LIQUI-NOX™ as defined by the OSHA Standard and Hazardous Substance List 29 CFR 1910 Subpart Z.

III. PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point (F):	214°F
Vapor Pressure (mm Hg):	No Data
Vapor Density (AIR=1):	No Data
Specific Gravity (Water=1):	1.075
Melting Point:	Not Applicable
Evaporation Rate (Butyl Acetate=1):	Slower
Solubility in Water:	Completely soluble in all proportions.
Appearance:	Yellow liquid, nearly odorless

IV. FIRE AND EXPLOSION DATA

Flash Point:	None (Cleveland Open Cup)
Flammable Limits:	LEL: No Data UEL: No Data
Extinguishing Media:	Water, dry chemical, CO ₂ , foam
Special Fire fighting Procedures:	Self-contained positive pressure breathing apparatus and protective clothing should be worn when fighting fires involving chemicals.
Unusual Fire and Explosion Hazards:	None

V. REACTIVITY DATA

Stability:	Stable
Conditions To Avoid:	None
Incompatibility (Materials To Avoid):	Oxidizing agents.
Hazardous Decomposition or Byproducts:	May release SO ₂ on burning

VI. HEALTH HAZARD DATA

Route(s) of Entry:	Inhalation? No Skin? Yes Ingestion? Yes
Health Hazards (Acute and Chronic):	Skin contact may prove locally irritating, causing drying and/or chapping. Ingestion may cause discomfort and/or diarrhea.
Carcinogenicity:	NTP? No IARC Monographs? No OSHA Regulated? No
Signs and Symptoms of Exposure:	Prolonged skin contact may cause drying and/or chapping.
Medical Conditions Generally Aggravated by Exposure:	Not established. Unnecessary exposure to this product or any industrial chemical should be avoided.
Emergency and First Aid Procedures:	Eyes: Immediately flush eyes with water for at least 15 minutes. Call a physician. Skin: Flush with plenty of water. Ingestion: Drink large quantities of water or milk. Do not induce vomiting. If vomiting occurs administer fluids. See a physician for discomfort.

VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken if Material is Released or Spilled:	Material foams profusely. For small spills recover as much as possible with absorbent material and flush remainder to sewer. Material is biodegradable.
Waste Disposal Method:	Small quantities may be disposed of in sewer. Large quantities should be disposed of in accordance with local ordinances for detergent products.
Precautions to be Taken in Storing and Handling:	No special precautions in storing. Use protective equipment when handling undiluted material.
Other Precautions:	No special requirements other than the good industrial hygiene and safety practices employed with any industrial chemical.

VIII. CONTROL MEASURES

Respiratory Protection (Specify Type):	Not Required
Ventilation:	Local Exhaust-Normal Special-Not Required Mechanical-Not Required Other-Not Required
Protective Gloves:	Impervious gloves are recommended.
Eye Protection:	Goggles and/or splash shields are recommended.
Other Protective Clothing or Equipment:	Not required
Work/Hygienic Practices:	No special practices required

THE INFORMATION HEREIN IS GIVEN IN GOOD FAITH BUT NO WARRANTY IS EXPRESSED OR IMPLIED.

Please reduce your browser font size for better viewing and printing.

MSDS

Material Safety Data Sheet

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

MALLINCKRODT



24 Hour Emergency Telephone: 800-853-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-895-8886

Outside U.S. and Canada
Chemtrec: 202-483-7616

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: (1-800-562-2537) for assistance.

METHYL ALCOHOL

MSDS Number: M2015 --- Effective Date: 08/15/98

1. Product Identification

Synonyms: Wood alcohol; methanol; carbinol

CAS No.: 67-56-1

Molecular Weight: 32.04

Chemical Formula: CH₃OH

Product Codes:

J.T. Baker: 5217, 5370, 5794, 5807, 5811, 5842, 5869, 9049, 9063, 9066, 9067, 9069, 9070, 9071, 9073, 9075, 9076, 9077, 9091, 9093, 9096, 9097, 9098, 9263, 9893

Mallinckrodt: 3004, 3006, 3016, 3017, 3018, 3024, 3041, 3701, 4295, 5160, 8814, H080, H488, H603, V079, V571

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methyl Alcohol	67-56-1	100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! VAPOR HARMFUL. MAY BE FATAL OR CAUSE BLINDNESS IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED

THROUGH SKIN. CANNOT BE MADE NONPOISONOUS. FLAMMABLE LIQUID AND VAPOR. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM AND LIVER.

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

Health Rating: 3 - Severe (Poison)

Flammability Rating: 4 - Extreme (Flammable)

Reactivity Rating: 1 - Slight

Contact Rating: 1 - Slight

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

Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:

A slight irritant to the mucous membranes. Toxic effects exerted upon nervous system, particularly the optic nerve. Once absorbed into the body, it is very slowly eliminated. Symptoms of overexposure may include headache, drowsiness, nausea, vomiting, blurred vision, blindness, coma, and death. A person may get better but then worse again up to 30 hours later.

Ingestion:

Toxic. Symptoms parallel inhalation. Can intoxicate and cause blindness. Usual fatal dose: 100-125 milliliters.

Skin Contact:

Methyl alcohol is a defatting agent and may cause skin to become dry and cracked. Skin absorption can occur; symptoms may parallel inhalation exposure.

Eye Contact:

Irritant. Continued exposure may cause eye lesions.

Chronic Exposure:

Marked impairment of vision and enlargement of the liver has been reported. Repeated or prolonged exposure may cause skin irritation.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:

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

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

Immediately flush skin with plenty of 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.

5. Fire Fighting Measures

Fire:

Flash point: 11C (52F) CC

Autoignition temperature: 464C (867F)

Flammable limits in air % by volume:

lcl: 6.0; ucl: 36

Flammable Liquid and Vapor!

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Moderate explosion hazard and dangerous fire hazard when exposed to heat, sparks or flames. Sensitive to static discharge.

Fire Extinguishing Media:

Use alcohol foam, dry chemical or carbon dioxide. (Water may be ineffective.)

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. Use water spray to blanket fire, cool fire exposed containers, and to flush non-ignited spills or vapors away from fire. Vapors can flow along surfaces to distant ignition source and flash back.

6. 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(tm) solvent adsorbent is recommended for spills of this product.

7. 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. Do Not attempt to clean empty containers since residue is difficult to remove. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, sparks, flame, static electricity or other sources of ignition: they may explode and cause injury or death.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

For Methyl Alcohol:

- OSHA Permissible Exposure Limit (PEL):

200 ppm (TWA)

- ACGIH Threshold Limit Value (TLV):

200 ppm (TWA), 250 ppm (STEL) skin

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. Use explosion-proof equipment.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. This substance has poor warning properties.

Skin Protection:

Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure.

Eye Protection:

Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Clear, colorless liquid.

Odor:

Characteristic odor.

Solubility:

Miscible in water.

Specific Gravity:

0.8

pH:

No information found.

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

100

Boiling Point:

64.5C (147F)

Melting Point:

-98C (-144F)

Vapor Density (Air=1):

1.1

Vapor Pressure (mm Hg):

97 @ 20C (68F)

Evaporation Rate (BuAc=1):

5.9

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

May form carbon dioxide, carbon monoxide, and formaldehyde when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Strong oxidizing agents such as nitrates, perchlorates or sulfuric acid. Will attack some forms of plastics, rubber, and coatings. May react with metallic aluminum and generate hydrogen gas.

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Methyl Alcohol (Methanol) Oral rat LD50: 5628 mg/kg; inhalation rat LC50: 64000 ppm/4H; skin rabbit LD50: 15800 mg/kg; Irritation data-standard Draize test: skin, rabbit: 20mg/24 hr. Moderate; eye, rabbit: 100 mg/24 hr. Moderate. Investigated as a mutagen, reproductive effector.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	

12. 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 the water, this material is expected to have a half-life between 1 and 10 days. When released into water, this material is expected to readily biodegrade. When released into the air, this material is expected to exist in the aerosol phase with a short half-life. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into air, this material is expected to have a half-life between 10 and 30 days. When released into the air, this material is expected to be readily removed from the atmosphere by wet deposition.

Environmental Toxicity:

This material is expected to be slightly toxic to aquatic life.

13. 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.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: METHANOL

Hazard Class: 3

UN/NA: UN1230

Packing Group: II

Information reported for product/size: 350LB

International (Water, I.M.O.)

Proper Shipping Name: METHANOL

Hazard Class: 3.2, 6.1

UN/NA: UN1230

Packing Group: II

Information reported for product/size: 350LB

15. Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Methyl Alcohol (67-56-1)	Yes	Yes	Yes	Yes

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

Ingredient	Korea	--Canada--		Phil.
		DSL	NDSL	
Methyl Alcohol (67-56-1)	Yes	Yes	No	Yes

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

Ingredient	-SARA 302-		-SARA 313-	
	RQ	TPQ	List	Chemical Catg.
Methyl Alcohol (67-56-1)	No	No	Yes	No

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

Ingredient	CERCLA	-RCRA-	-TSCA-
		261.33	8 (d)
Methyl Alcohol (67-56-1)	5000	U154	No

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

Australian Hazchem Code: 2PE
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.

16. Other Information

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

Label Hazard Warning:

POISON! DANGER! VAPOR HARMFUL. MAY BE FATAL OR CAUSE BLINDNESS IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. CANNOT BE MADE NONPOISONOUS. FLAMMABLE LIQUID AND VAPOR. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM AND LIVER.

Label Precautions:

Avoid breathing vapor.
 Avoid contact with eyes, skin and clothing.

Wash thoroughly after handling.
Keep container closed.
Use only with adequate ventilation.
Keep away from heat, sparks and flame.

Label First Aid:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. 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 get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 3, 4, 5, 6, 7, 8, 11, 16.

Disclaimer:

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Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

MSDS Material Safety Data Sheet

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



24 Hour Emergency Telephone: 800-859-2151
CHEMTREC: 1-800-424-6300

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.

NITRIC ACID, 50-70%

MSDS Number: N3660 --- Effective Date: 07/13/00

1. Product Identification

Synonyms: Aqua Fortis; Azotic Acid; Nitric Acid 50%; Nitric Acid 65%; nitric acid 69-70%

CAS No.: 7697-37-2

Molecular Weight: 63.01

Chemical Formula: HNO3

Product Codes:

J.T. Baker: 411D, 412D, 5371, 5555, 5801, 5826, 5876, 9597, 9598, 9600, 9601, 9602, 9603, 9604, 9606, 9607, 9616, 9617

Mallinckrodt: 1409, 2703, 2704, 412D, 6623, H988, H993, H998, V069, V077, V336, V561, V633, V650

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Nitric Acid	7697-37-2	50 - 70%	Yes
Water	7732-18-5	30 - 50%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER

MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

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

Health Rating: 3 - Severe (Poison)

Flammability Rating: 0 - None

Reactivity Rating: 3 - Severe (Oxidizer)

Contact Rating: 4 - Extreme (Corrosive)

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

Storage Color Code: Yellow (Reactive)

Potential Health Effects

Nitric acid is extremely hazardous; it is corrosive, reactive, an oxidizer, and a poison.

Inhalation:

Corrosive! Inhalation of vapors can cause breathing difficulties and lead to pneumonia and pulmonary edema, which may be fatal. Other symptoms may include coughing, choking, and irritation of the nose, throat, and respiratory tract.

Ingestion:

Corrosive! Swallowing nitric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract.

Skin Contact:

Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.

Eye Contact:

Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.

Chronic Exposure:

Long-term exposure to concentrated vapors may cause erosion of teeth and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders, eye disease, or cardiopulmonary diseases may be more susceptible to the effects of this substance.

4. First Aid Measures

Immediate first aid treatment reduces the health effects of this substance.

Inhalation:

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

Ingestion:

DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Eye Contact:

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

5. Fire Fighting Measures

Fire:

Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Can react with metals to release flammable hydrogen gas.

Explosion:

Reacts explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc. Reacts with most metals to release hydrogen gas which can form explosive mixtures with air.

Fire Extinguishing Media:

Water spray may be used to keep fire exposed containers cool. Do not get water inside container.

Special Information:

Increases the flammability of combustible, organic and readily oxidizable materials. 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.

6. Accidental Release Measures

Ventilate area of leak or spill. 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. Neutralize with alkaline material (soda ash, lime), then 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.

J. T. Baker NEUTRASORB(R) or TEAM(R) 'Low Na+' acid neutralizers are recommended for spills of this product.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. 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.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL):

2 ppm (TWA), 4 ppm (STEL)

-ACGIH Threshold Limit Value (TLV):

2 ppm (TWA); 4 ppm (STEL)

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, wear a supplied air, full-facepiece respirator, airtight hood, or full-facepiece self-contained breathing apparatus. Nitric acid is an oxidizer and should not come in contact with cartridges and canisters that contain oxidizable materials, such as activated charcoal. Canister-type respirators using sorbents are ineffective.

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.

9. Physical and Chemical Properties

Appearance:

Colorless to yellowish liquid.

Odor:

Suffocating, acrid.

Solubility:

Infinitely soluble.

Specific Gravity:

1.41

pH:

1.0 (0.1M solution)

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

100 (as water and acid)

Boiling Point:

122C (252F)

Melting Point:

-42C (-44F)

Vapor Density (Air=1):

2-3

Vapor Pressure (mm Hg):

48 @ 20C (68F)

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage. Containers may burst when heated.

Hazardous Decomposition Products:

When heated to decomposition, emits toxic nitrogen oxides fumes and hydrogen nitrate.

Will react with water or steam to produce heat and toxic and corrosive fumes.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

A dangerously powerful oxidizing agent, concentrated nitric acid is incompatible with most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics.

Conditions to Avoid:

Light and heat.

11. Toxicological Information

Nitric acid: Inhalation rat LC50: 244 ppm (NO₂)/30M; Investigated as a mutagen, reproductive effector. Oral (human) LDLo: 430 mg/kg.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Nitric Acid (7697-37-2)	No	No	None

12. Ecological Information

Environmental Fate:

No information found.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. 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.

14. Transport Information

Domestic (Land, D.O.T.)
-----**Proper Shipping Name:** NITRIC ACID (WITH NOT MORE THAN 70% NITRIC ACID)**Hazard Class:** 8**UN/NA:** UN2031**Packing Group:** II**Information reported for product/size:** 150LB**International (Water, I.M.O.)**
-----**Proper Shipping Name:** NITRIC ACID (WITH NOT MORE THAN 70% NITRIC ACID)**Hazard Class:** 8**UN/NA:** UN2031**Packing Group:** II**Information reported for product/size:** 150LB**International (Air, I.C.A.O.)**
-----**Proper Shipping Name:** NITRIC ACID (WITH NOT MORE THAN 70% NITRIC ACID)**Hazard Class:** 8

UN/NA: UN2031

Packing Group: II

Information reported for product/size: 150LB

15. Regulatory Information

```

-----\Chemical Inventory Status - Part 1\-----
Ingredient                                     TSCA   EC     Japan  Australia
-----
Nitric Acid (7697-37-2)                       Yes   Yes   Yes    Yes
Water (7732-18-5)                             Yes   Yes   Yes    Yes
  
```

```

-----\Chemical Inventory Status - Part 2\-----
Ingredient                                     Korea  --Canada--  NDSL  Phil.
-----
Nitric Acid (7697-37-2)                       Yes   Yes         No    Yes
Water (7732-18-5)                             Yes   Yes         No    Yes
  
```

```

-----\Federal, State & International Regulations - Part 1\-----
Ingredient                                     -SARA 302-  -SARA 313-
RQ      TPQ      List  Chemical Catg.
-----
Nitric Acid (7697-37-2)                       1000  1000      Yes    No
Water (7732-18-5)                             No     No        No     No
  
```

```

-----\Federal, State & International Regulations - Part 2\-----
Ingredient                                     CERCLA  -RCRA-  -TSCA-
261.33  8(d)
-----
Nitric Acid (7697-37-2)                       1000    No       No
Water (7732-18-5)                             No      No       No
  
```

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

Australian Hazchem Code: 2PE

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.

16. Other Information

NFPA Ratings: Health: 3 Flammability: 0 Reactivity: 0 Other: **Oxidizer**

Label Hazard Warning:

POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL
 MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS
 TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED.

INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

Label Precautions:

- Do not get in eyes, on skin, or on clothing.
- Do not breathe vapor or mist.
- Use only with adequate ventilation.
- Wash thoroughly after handling.
- Keep from contact with clothing and other combustible materials.
- Do not store near combustible materials.
- Store in a tightly closed container.
- Remove and wash contaminated clothing promptly.

Label First Aid:

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. 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 all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 1.

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



Mallinckrodt
CHEMICALS



24 Hour Emergency Telephone: 800-850-2151
CHEMTREC: 1-800-424-6300

National Response in Canada
CANUTEC: 813-698-6666

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.

SODIUM HYDROXIDE SOLUTIONS (MORE THAN 10% NaOH)

MSDS Number: S4037 — Effective Date: 08/20/98

1. Product Identification

Synonyms: Caustic soda solution; lye solution; sodium hydroxide liquid; sodium hydrate solution, Sodium Hydroxide Concentrate Solution StandARd(R), Sodium Hydroxide, DILUT-IT(R) Analytical Concentrates, sodium hydroxide volumetric solutions

CAS No.: 1310-73-2

Molecular Weight: 40.00

Chemical Formula: NaOH in water

Product Codes:

J.T. Baker: 0337, 3719, 3725, 3727, 3729, 4689, 4690, 5000, 5661, 5666, 5668, 5669, 5671, 5672, 5674, 5676

Mallinckrodt: 6290, 7701, 7703, 7705, 7706, 7775, H369, H382, H385, V038, V039, V264

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sodium Hydroxide	1310-73-2	10 - 60%	Yes
Water	7732-18-5	40 - 90%	No

3. Hazards Identification

Emergency Overview

**POISON! DANGER! CORROSIVE. MAY BE FATAL IF SWALLOWED.
HARMFUL IF INHALED. CAUSES BURNS TO ANY AREA OF CONTACT.
REACTS WITH WATER, ACIDS AND OTHER MATERIALS.**

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

Health Rating: 3 - Severe (Poison)

Flammability Rating: 0 - None

Reactivity Rating: 2 - Moderate

Contact Rating: 4 - Extreme (Corrosive)

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

Storage Color Code: White Stripe (Store Separately)

Potential Health Effects

Inhalation:

Severe irritant. Effects from inhalation of mist vary from mild irritation to serious damage of the upper respiratory tract, depending on severity of exposure. Symptoms may include sneezing, sore throat or runny nose. Severe pneumonitis may occur.

Ingestion:

Corrosive! Swallowing may cause severe burns of mouth, throat, and stomach. Severe scarring of tissue and death may result. Symptoms may include bleeding, vomiting, diarrhea, fall in blood pressure. Damage may appear days after exposure.

Skin Contact:

Corrosive! Contact with skin can cause irritation or severe burns and scarring with greater exposures.

Eye Contact:

Corrosive! Causes irritation of eyes, and with greater exposures it can cause burns that may result in permanent impairment of vision, even blindness.

Chronic Exposure:

Prolonged contact with dilute solutions or dust has a destructive effect upon tissue.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:

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

Ingestion:

DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician, immediately. Wash clothing 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:

Perform endoscopy in all cases of suspected sodium hydroxide ingestion. In cases of severe esophageal corrosion, the use of therapeutic doses of steroids should be considered. General supportive measures with continual monitoring of gas exchange, acid-base balance, electrolytes, and fluid intake are also required.

5. Fire Fighting Measures

Fire:

Not considered to be a fire hazard. Hot or molten material can react violently with water. Can react with certain metals, such as aluminum, to generate flammable hydrogen gas.

Explosion:

May cause fire and explosions when in contact with incompatible materials.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire. Adding water to caustic solution generates large amounts of heat.

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.

6. Accidental Release Measures

Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment as specified in Section 8. Contain and recover liquid when possible. Do not flush caustic residues to the sewer. Residues from spills can be diluted with water, neutralized with dilute acid such as acetic, hydrochloric or sulfuric. Absorb neutralized caustic residue on clay, vermiculite or other inert substance and package in a suitable container for disposal. 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 NEUTRACIT(R)-2 or BuCAIM(R) caustic neutralizers are recommended for spills of this product.

7. Handling and Storage

Keep in a tightly closed container. Protect from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture and incompatibilities. Store above 16C (60F) to prevent freezing. Always add the caustic to water while stirring; never the reverse. 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 store with aluminum or magnesium. Do not mix with acids or organic materials.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

- OSHA Permissible Exposure Limit (PEL):

2 mg/m³ Ceiling

- ACGIH Threshold Limit Value (TLV):

2 mg/m³ Ceiling

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, a half-face dust/mist 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 dust/mist 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-facepiece 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.

9. Physical and Chemical Properties

Physical data is displayed for 10%, 30% and 50% aqueous sodium hydroxide solutions. (Merck Index).

Appearance:

Clear, colorless solution.

Odor:

Odorless.

Solubility:

Completely miscible with water.

Density:

10% solution - 1.11; 30% solution - 1.33; 50% solution - 1.53

pH:

14.0 (10%, 30% and 50% solutions)

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

No information found.

Boiling Point:

For 10% solution = 105C (221F); for 30% solution = 115C (239F); for 50% solution = 140C (284F).

Melting Point:

For 10% solution = -10C (14 F); for 30% solution = 1C (34F); for 50% solution = 12C (53.6F).

Vapor Density (Air=1):

No information found.

Vapor Pressure (mm Hg):

13 @ 60C (140F) (50% solution)

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Sodium oxide. Decomposition by reaction with certain metals releases flammable and explosive hydrogen gas.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Sodium hydroxide in contact with acids and organic halogen compounds, especially trichloroethylene, may causes violent reactions. Contact with nitromethane and other similar nitro compounds causes formation of shock-sensitive salts. Contact with metals such as aluminum, magnesium, tin, and zinc cause formation of flammable hydrogen gas. Sodium hydroxide, even in fairly dilute solution, reacts readily with various sugars to produce carbon monoxide. Precautions should be taken including monitoring the tank atmosphere for carbon monoxide to ensure safety of personnel before vessel entry.

Conditions to Avoid:

Heat, moisture, incompatibles.

11. Toxicological Information

Sodium hydroxide: irritation data: skin, rabbit: 500 mg/24H severe; eye rabbit: 50 ug/24H severe. Investigated as a mutagen.

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

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Sodium Hydroxide (1310-73-2)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.

Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. 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.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: SODIUM HYDROXIDE SOLUTION
Hazard Class: 8
UN/NA: UN1824
Packing Group: II
Information reported for product/size: 360LB

International (Water, I.M.O.)

Proper Shipping Name: SODIUM HYDROXIDE, SOLUTION**Hazard Class:** 8**UN/NA:** UN1824**Packing Group:** II**Information reported for product/size:** 360LB

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----				
Ingredient	TSCA	EC	Japan	Australia
Sodium Hydroxide (1310-73-2)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

-----\Chemical Inventory Status - Part 2\-----				
Ingredient	Korea	DSL	---Canada--- NDSL	Phil.
Sodium Hydroxide (1310-73-2)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----				
Ingredient	-SARA 302-		-----SARA 313-----	
	RQ	TPQ	List	Chemical Catg.
Sodium Hydroxide (1310-73-2)	No	No	No	No
Water (7732-18-5)	No	No	No	No

-----\Federal, State & International Regulations - Part 2\-----			
Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8 (d)
Sodium Hydroxide (1310-73-2)	1000	No	No
Water (7732-18-5)	No	No	No

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

Australian Hazchem Code: 2R**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.

16. Other Information

NFPA Ratings: Health: 3 Flammability: 0 Reactivity: 1**Label Hazard Warning:**

POISON! DANGER! CORROSIVE. MAY BE FATAL IF SWALLOWED. HARMFUL

IF INHALED. CAUSES BURNS TO ANY AREA OF CONTACT. REACTS WITH WATER, ACIDS AND OTHER MATERIALS.

Label Precautions:

- Do not get in eyes, on skin, or on clothing.
- Do not breathe mist.
- Keep container closed.
- Use only with adequate ventilation.
- Wash thoroughly after handling.

Label First Aid:

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. 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. If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 10.

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 Number: S5236 * * * * * Effective Date: 10/31/00 * * * * * Supercedes: 11/06/97

MSDS**Material Safety Data Sheet**

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



Mallinckrodt
CHEMICALS



24 Hour Emergency Telephone: 908-650-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-496-6666

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.

SODIUM THIOSULFATE 0.01 TO 1.0 NORMAL VOLUMETRIC SOLUTIONS

1. Product Identification

Synonyms: Sodium thiosulfate 0.01 to 1.0 Normal volumetric solutions

CAS No.: 7772-98-7

Molecular Weight: 158.11

Chemical Formula: Na₂S₂O₃ in aqueous solution

Product Codes:

J.T. Baker: 5637, 5654

Mallinckrodt: 4682, 5531, 6840, 8097, H362, H371

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sodium Thiosulfate	7772-98-7	0.02 - 25%	Yes
Water	7732-18-5	75 - 99%	No

3. Hazards Identification

Emergency Overview

CAUTION! MAY BE HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO

SKIN, EYES, AND RESPIRATORY TRACT.

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

Health Rating: 0 - None
Flammability Rating: 0 - None
Reactivity Rating: 0 - None
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:

May cause mild irritation to the respiratory tract.

Ingestion:

May cause mild irritation to the gastrointestinal tract.

Skin Contact:

May cause mild irritation and redness.

Eye Contact:

May cause mild irritation, possible reddening.

Chronic Exposure:

Chronic exposure may cause skin effects.

Aggravation of Pre-existing Conditions:

No information found.

4. First Aid Measures

Inhalation:

Not expected to require first aid measures.

Ingestion:

Give several glasses of water to drink to dilute. If large amounts were swallowed, get medical advice.

Skin Contact:

Wash exposed area with soap and water. Get medical advice if irritation develops.

Eye Contact:

Wash thoroughly with running water. Get medical advice if irritation develops.

5. Fire Fighting Measures

Fire:

Not considered to be a fire hazard.

Explosion:

Not considered to be an explosion hazard.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire.

Special Information:

Use protective clothing and breathing equipment appropriate for the surrounding fire.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Contain and recover liquid when possible. 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.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. 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.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

None established.

Ventilation System:

Not expected to require any special ventilation.

Personal Respirators (NIOSH Approved):

Not expected to require personal respirator usage.

Skin Protection:

Wear protective gloves and clean body-covering clothing.

Eye Protection:

Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Clear, colorless solution.

Odor:

Odorless.

Solubility:

Infinitely miscible.

Specific Gravity:

ca. 1.01-1.14

pH:

Aqueous solution is neutral.

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

> 60

Boiling Point:

ca. 100C (ca. 212F)

Melting Point:

ca. 0C (ca. 32F)

Vapor Density (Air=1):

No information found.

Vapor Pressure (mm Hg):

No information found.

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Burning may produce sulfur oxides.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Metal nitrates, sodium nitrite, iodine, acids, lead, mercury, and silver salts.

Conditions to Avoid:

Incompatibles.

11. Toxicological Information

No LD50/LC50 information found relating to normal routes of occupational exposure.

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

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Sodium Thiosulfate (7772-98-7)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:

No information found.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Dilute with water and flush to sewer if local ordinances allow, otherwise, whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal 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.

14. Transport Information

Not regulated.

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----				
Ingredient	TSCA	EC	Japan	Australia
Sodium Thiosulfate (7772-98-7)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

-----\Chemical Inventory Status - Part 2\-----				
Ingredient	Korea	--Canada--		Phil.
		DSL	NDSL	
Sodium Thiosulfate (7772-98-7)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----				
Ingredient	-SARA 302-		-----SARA 313-----	
	RQ	TPQ	List	Chemical Catg.
Sodium Thiosulfate (7772-98-7)	No	No	No	No
Water (7732-18-5)	No	No	No	No

-----\Federal, State & International Regulations - Part 2\-----			
Ingredient	CERCLA	-RCRA-	-TSCA-
		261.33	8(d)
Sodium Thiosulfate (7772-98-7)	No	No	No
Water (7732-18-5)	No	No	No

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

Australian Hazchem Code: None allocated.

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.

16. Other Information

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

Label Hazard Warning:

CAUTION! MAY BE HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT.

Label Precautions:

Avoid contact with eyes, skin and clothing.

Wash thoroughly after handling.

Avoid breathing mist.

Keep container closed.

Use with adequate ventilation.

Label First Aid:

If inhaled, remove to fresh air. Get medical attention for any breathing difficulty. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Get medical attention if irritation

develops or persists. If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.

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

Mallinckrodt
CHEMICALS



24 Hour Emergency Telephone: 800-859-2151
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.

SULFURIC ACID, 52 - 100 %

MSDS Number: S8234 --- Effective Date: 09/14/00

1. Product Identification

Synonyms: Oil of vitriol; Babcock acid; sulphuric acid

CAS No.: 7664-93-9

Molecular Weight: 98.08

Chemical Formula: H₂SO₄ in H₂O

Product Codes:

J.T. Baker: 5030, 5137, 5374, 5802, 5815, 5889, 5960, 5961, 5971, 6902, 9673, 9674, 9675, 9676, 9679, 9680, 9681, 9682, 9684, 9687, 9691, 9693, 9694

Mallinckrodt: 2468, 2876, 2878, 2900, 2904, 3780, 4222, 5524, 5557, H644, H976, H996, V344, V651

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sulfuric Acid	7664-93-9	52 - 100%	Yes
Water	7732-18-5	0 - 48%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR

CONTACTED WITH SKIN. HARMFUL IF INHALED. AFFECTS TEETH. WATER REACTIVE. CANCER HAZARD. STRONG INORGANIC ACID MISTS CONTAINING SULFURIC ACID CAN CAUSE CANCER. 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 (Poison)

Flammability Rating: 0 - None

Reactivity Rating: 3 - Severe (Water Reactive)

Contact Rating: 4 - Extreme (Corrosive)

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

Storage Color Code: White (Corrosive)

Potential Health Effects

Inhalation:

Inhalation produces damaging effects on the mucous membranes and upper respiratory tract. Symptoms may include irritation of the nose and throat, and labored breathing. May cause lung edema, a medical emergency.

Ingestion:

Corrosive. Swallowing can cause severe burns of the mouth, throat, and stomach, leading to death. Can cause sore throat, vomiting, diarrhea. Circulatory collapse with clammy skin, weak and rapid pulse, shallow respirations, and scanty urine may follow ingestion or skin contact. Circulatory shock is often the immediate cause of death.

Skin Contact:

Corrosive. Symptoms of redness, pain, and severe burn can occur. Circulatory collapse with clammy skin, weak and rapid pulse, shallow respirations, and scanty urine may follow skin contact or ingestion. Circulatory shock is often the immediate cause of death.

Eye Contact:

Corrosive. Contact can cause blurred vision, redness, pain and severe tissue burns. Can cause blindness.

Chronic Exposure:

Long-term exposure to mist or vapors may cause damage to teeth. Chronic exposure to mists containing sulfuric acid is a cancer hazard.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:

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

give oxygen. Call a physician immediately.

Ingestion:

DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Call a physician immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Excess acid on skin can be neutralized with a 2% solution of bicarbonate of soda. Call a physician immediately.

Eye Contact:

Immediately flush eyes with gentle but large stream of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Call a physician immediately.

5. Fire Fighting Measures

Fire:

Concentrated material is a strong dehydrating agent. Reacts with organic materials and may cause ignition of finely divided materials on contact.

Explosion:

Contact with most metals causes formation of flammable and explosive hydrogen gas.

Fire Extinguishing Media:

Dry chemical, foam or carbon dioxide. Do not use water on material. However, water spray may be used to keep fire exposed containers cool.

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. Structural firefighter's protective clothing is ineffective for fires involving this material. Stay away from sealed containers.

6. Accidental Release Measures

Ventilate area of leak or spill. 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. Neutralize with alkaline material (soda ash, lime), then 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.

J. T. Baker NEUTRASORB(R) or TEAM(R) 'Low Na+' acid neutralizers are recommended for spills of this product.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, always add the acid to water; never add water to the acid. When opening metal containers, use non-sparking tools because of the possibility of hydrogen gas being present. 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.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

For Sulfuric Acid:

- OSHA Permissible Exposure Limit (PEL) -

1 mg/m³ (TWA)

- ACGIH Threshold Limit Value (TLV) -

1 mg/m³(TWA), 3 mg/m³ (STEL), A2 - suspected human carcinogen for sulfuric acid contained in strong inorganic acid mists.

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 full facepiece respirator with an acid gas cartridge and particulate filter (NIOSH type N100 filter) 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. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P particulate filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. **WARNING:** Air purifying respirators do not protect workers in oxygen-deficient atmospheres. 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.

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.

9. Physical and Chemical Properties

Appearance:

Clear oily liquid.

Odor:

Odorless.

Solubility:

Miscible with water, liberates much heat.

Specific Gravity:

1.84 (98%), 1.40 (50%), 1.07 (10%)

pH:

1 N solution (ca. 5% w/w) = 0.3; 0.1 N solution (ca. 0.5% w/w) = 1.2; 0.01 N solution (ca. 0.05% w/w) = 2.1.

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

No information found.

Boiling Point:

ca. 290C (ca. 554F) (decomposes at 340C)

Melting Point:

3C (100%), -32C (93%), -38C (78%), -64C (65%).

Vapor Density (Air=1):

3.4

Vapor Pressure (mm Hg):

1 @ 145.8C (295F)

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage. Concentrated solutions react violently with water, spattering and liberating heat.

Hazardous Decomposition Products:

Toxic fumes of oxides of sulfur when heated to decomposition. Will react with water or steam to produce toxic and corrosive fumes. Reacts with carbonates to generate carbon dioxide gas, and with cyanides and sulfides to form poisonous hydrogen cyanide and hydrogen sulfide respectively.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Water, potassium chlorate, potassium perchlorate, potassium permanganate, sodium, lithium, bases, organic material, halogens, metal acetylides, oxides and hydrides, metals (yields hydrogen gas), strong oxidizing and reducing agents and many other reactive substances.

Conditions to Avoid:

Heat, moisture, incompatibles.

11. Toxicological Information

Toxicological Data:

Oral rat LD50: 2140 mg/kg; inhalation rat LC50: 510 mg/m³/2H; standard Draize, eye rabbit, 250 ug (severe); investigated as a tumorigen, mutagen, reproductive effector.

Carcinogenicity:

Cancer Status: The International Agency for Research on Cancer (IARC) has classified "strong inorganic acid mists containing sulfuric acid" as a known human carcinogen, (IARC category 1). This classification applies only to mists containing sulfuric acid and not to sulfuric acid or sulfuric acid solutions.

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

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Sulfuric Acid (7664-93-9)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:

When released into the soil, this material may leach into groundwater. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition. When released into the air, this material may be removed from the atmosphere to a moderate extent by dry deposition.

Environmental Toxicity:

LC50 Flounder 100 to 330 mg/l/48 hr aerated water/Conditions of bioassay not specified;
LC50 Shrimp 80 to 90 mg/l/48 hr aerated water /Conditions of bioassay not specified;
LC50 Prawn 42.5 ppm/48 hr salt water /Conditions of bioassay not specified.
This material may be toxic to aquatic life.

13. 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.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: SULFURIC ACID (WITH MORE THAN 51% ACID)**Hazard Class:** 8**UN/NA:** UN1830**Packing Group:** II**Information reported for product/size:** 440LB**International (Water, I.M.O.)****Proper Shipping Name:** SULPHURIC ACID (WITH MORE THAN 51% ACID)**Hazard Class:** 8**UN/NA:** UN1830**Packing Group:** II**Information reported for product/size:** 440LB

15. Regulatory Information

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-----\Chemical Inventory Status - Part 1\-----
Ingredient                                     TSCA  EC   Japan  Australia
-----
Sulfuric Acid (7664-93-9)                     Yes  Yes  Yes    Yes
Water (7732-18-5)                             Yes  Yes  Yes    Yes

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```

-----\Chemical Inventory Status - Part 2\-----
Ingredient                                     Korea  --Canada--  Phil.
                                     DSL  NDSL
-----
Sulfuric Acid (7664-93-9)                     Yes  Yes  No     Yes
Water (7732-18-5)                             Yes  Yes  No     Yes

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-----\Federal, State & International Regulations - Part 1\-----
Ingredient                                     -SARA 302-  -SARA 313-
                                     RQ   TPQ   List  Chemical Catg.
-----
Sulfuric Acid (7664-93-9)                     1000  1000  Yes    No
Water (7732-18-5)                             No    No    No     No

```

```

-----\Federal, State & International Regulations - Part 2\-----
Ingredient                                     CERCLA  -RCRA-  -TSCA-
                                     261.33  8(d)
-----
Sulfuric Acid (7664-93-9)                     1000    No     No
Water (7732-18-5)                             No      No     No

```

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

Australian Hazchem Code: 2P**Poison Schedule:** No information found.**WHMIS:**

This MSDS has been prepared according to the hazard criteria of the Controlled Products

16. Other Information

NFPA Ratings: Health: 3 Flammability: 0 Reactivity: 2 Other: Water reactive

Label Hazard Warning:

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR CONTACTED WITH SKIN. HARMFUL IF INHALED. AFFECTS TEETH. WATER REACTIVE. CANCER HAZARD. STRONG INORGANIC ACID MISTS CONTAINING SULFURIC ACID CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure.

Label Precautions:

Do not get in eyes, on skin, or on clothing.

Do not breathe mist.

Keep container closed.

Use only with adequate ventilation.

Wash thoroughly after handling.

Do not contact with water.

Label First Aid:

In all cases call a physician immediately. 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 re-use. Excess acid on skin can be neutralized with a 2% bicarbonate of soda solution. 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.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 8.

Disclaimer:

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MSDS Material Safety Data Sheet

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

Mallinckrodt
CHEMICALS



24 Hour Emergency Telephone: 800-850-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-696-6666

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 (1-800-552-2537) for assistance.

ZINC ACETATE

MSDS Number: Z1140 --- Effective Date: 11/17/99

1. Product Identification

Synonyms: Acetic acid, zinc salt, dihydrate; zinc diacetate; zinc acetate dihydrate

CAS No.: 557-34-6 (Anhydrous)

Molecular Weight: 219.50

Chemical Formula: (CH₃COO)₂Zn 2H₂O

Product Codes:

J.T. Baker: 4296, 4297, 4304, 5658

Mallinckrodt: 8740

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Zinc Acetate	557-34-6	98 - 100%	Yes

3. Hazards Identification**Emergency Overview**

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

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

Health Rating: 1 - Slight
Flammability Rating: 1 - Slight
Reactivity Rating: 0 - None
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:

Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath.

Ingestion:

Irritation of the mucous membranes due to hydrolysis and formation of acid in the stomach can occur. Large amounts can produce stomach cramps, stricture of the esophagus, nausea, and vomiting.

Skin Contact:

Causes irritation to skin. Symptoms include redness, itching, and pain.

Eye Contact:

Causes irritation, redness, and pain.

Chronic Exposure:

No information found.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or impaired respiratory function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:

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

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.

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 lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Not considered to be a fire hazard.

Explosion:

Not considered to be an explosion hazard.

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.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. 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.

7. Handling and Storage

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

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

None established.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. 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):

For conditions of use where exposure to the dust or mist is apparent, a half-face dust/mist respirator may be worn. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. **WARNING:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear protective gloves and clean body-covering clothing.

Eye Protection:

Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

White crystals or powder.

Odor:

Slight acetic acid (vinegar) odor.

Solubility:

43g in 100g water.

Density:

1.74

pH:

No information found.

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

0

Boiling Point:

Decomposes.

Melting Point:

237C (459F)

Vapor Density (Air=1):

No information found.

Vapor Pressure (mm Hg):

No information found.

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Loses water of hydration above 100C.

Hazardous Decomposition Products:

Freshly-formed zinc oxide or zinc oxide fumes at high temperatures (over 800C).

Hazardous Polymerization:

Will not occur.

Incompatibilities:

No incompatibility data found. Oxidizing agents, zinc salts in general, alkalis and their carbonates, oxalates, phosphates, sulfides.

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat: LD50: 2510 mg/kg. Reproductive effects cited. Mutation references cited.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Zinc Acetate (557-34-6)	No	No	None

12. Ecological Information

Environmental Fate:

No information found.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal 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.

14. Transport Information

Not regulated.

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----				
Ingredient	TSCA	EC	Japan	Australia
Zinc Acetate (557-34-6)	Yes	Yes	Yes	Yes

-----\Chemical Inventory Status - Part 2\-----				
Ingredient	Korea	--Canada--		Phil.
		DSL	NDSL	
Zinc Acetate (557-34-6)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----	
-SARA 302-	-----SARA 313-----

Ingredient	RQ	TPQ	List	Chemical Catg.
Zinc Acetate (557-34-6)	No	No	No	Zinc compoun

-----\Federal, State & International Regulations - Part 2\-----				
Ingredient	CERCLA	-RCRA-	-TSCA-	
Zinc Acetate (557-34-6)	1000	261.33	8 (d)	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
 SARA 311/312: Acute: Yes Chronic: No Fire: No Pressure: No
 Reactivity: No (Mixture / Solid)

Australian Hazchem Code: No information found.

Poison Schedule: No information found.

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.

16. Other Information

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

Label Hazard Warning:

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

Label Precautions:

Avoid contact with eyes, skin and clothing.

Avoid breathing dust.

Keep container closed.

Use only with adequate ventilation.

Wash thoroughly after handling.

Label First Aid:

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. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

No changes.

Disclaimer:

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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: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)



APPENDIX C
HEALTH AND SAFETY FORMS



Daily Health and Safety Meeting Form

Date: _____

Time Start: _____

Time End: _____

Location: _____

Weather Conditions: _____

Meeting Type: _____

Personnel Present: _____

Visitors Present: _____

Visitor Training: _____

PPE Required: _____

Possible risks, injuries, concerns: _____

Anticipated Releases to Environment (if so, describe and detail response action/control measures implemented): _____



Daily Health and Safety Meeting Form (Page 2)

Property Damage: _____

Description (include sequence of events describing step by step how incident happened):

Analysis for, and Implementation of Corrective/Preventative Procedure to Prevent Future Occurrences (to be formulated by SSHO and FOM, approved by PM, and implemented by SSHO):

Report made by (Name): _____

SSHP Organization Title: _____

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Daily Health and Safety Inspection Form

Date: _____

Time: _____

Location: _____

Personnel Present: _____

Visitors Present: _____

Behavior, approach or practice that was found unacceptable: _____

Possible risks, injuries, concerns, deviations from H&S Plan: _____

Anticipated releases to environment or anticipated future Health and Safety risks: _____

Analysis for, and Implementation of Corrective/Preventative Procedure to Prevent Future Occurrences (to be formulated by SSHO and FOM, approved by PM, and implemented by SSHO): _____

Report made by (Name): _____

SSHP Organization Title: _____

—

—

—

Emergency Response Action Form

Date: _____

Time of Emergency: _____

Time End: _____

Location: _____

Weather Conditions: _____

Incident Type: _____

Personnel Present: _____

Injuries (if so, describe injury, personnel, and response taken): _____

Release to Environment (if so, describe and detail response action/control measures implemented): _____

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1. ACCIDENT CLASSIFICATION				
PERSONNEL CLASSIFICATION	INJURY/ILLNESS/FATAL	PROPERTY DAMAGE	MOTOR VEHICLE INVOLVED	DIVING
GOVERNMENT <input type="checkbox"/> CIVILIAN <input type="checkbox"/> MILITARY	<input type="checkbox"/>	<input type="checkbox"/> FIRE INVOLVED <input type="checkbox"/> OTHER	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> CONTRACTOR	<input type="checkbox"/>	<input type="checkbox"/> FIRE INVOLVED <input type="checkbox"/> OTHER	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> PUBLIC	<input type="checkbox"/> FATAL <input type="checkbox"/> OTHER	XXXXXXXXXX	<input type="checkbox"/>	XXXXXXXXXX

2. PERSONAL DATA				
a. Name <i>(Last, First, MI)</i>	b. AGE	c. SEX <input type="checkbox"/> MALE <input type="checkbox"/> FEMALE	d. SOCIAL SECURITY NUMBER	e. GRADE
f. JOB SERIES/TITLE	g. DUTY STATUS AT TIME OF ACCIDENT <input type="checkbox"/> ON DUTY <input type="checkbox"/> TDY <input type="checkbox"/> OFF DUTY		h. EMPLOYMENT STATUS AT TIME OF ACCIDENT <input type="checkbox"/> ARMY ACTIVE <input type="checkbox"/> ARMY RESERVE <input type="checkbox"/> VOLUNTEER <input type="checkbox"/> PERMANENT <input type="checkbox"/> FOREIGN NATIONAL <input type="checkbox"/> SEASONAL <input type="checkbox"/> TEMPORARY <input type="checkbox"/> STUDENT <input type="checkbox"/> OTHER <i>(Specify)</i> _____	

3. GENERAL INFORMATION			
a. DATE OF ACCIDENT <i>(month/day/year)</i>	b. TIME OF ACCIDENT <i>(Military time)</i> hrs	c. EXACT LOCATION OF ACCIDENT	d. CONTRACTOR'S NAME (1) PRIME: (2) SUBCONTRACTOR:
e. CONTRACT NUMBER <input type="checkbox"/> CIVIL WORKS <input type="checkbox"/> MILITARY <input type="checkbox"/> OTHER <i>(Specify)</i> _____	f. TYPE OF CONTRACT <input type="checkbox"/> CONSTRUCTION <input type="checkbox"/> SERVICE <input type="checkbox"/> A/E <input type="checkbox"/> DREDGE <input type="checkbox"/> OTHER <i>(Specify)</i> _____	g. HAZARDOUS/TOXIC WASTE ACTIVITY <input type="checkbox"/> SUPERFUND <input type="checkbox"/> DERP <input type="checkbox"/> IRP <input type="checkbox"/> OTHER <i>(Specify)</i> _____	

4. CONSTRUCTION ACTIVITIES ONLY <i>(Fill in line and corresponding code number in box from list - see help menu)</i>	
a. CONSTRUCTION ACTIVITY # <input style="width:50px;" type="text"/>	b. TYPE OF CONSTRUCTION EQUIPMENT # <input style="width:50px;" type="text"/>

5. INJURY/ILLNESS INFORMATION <i>(Include name on line and corresponding code number in box for items e, f & g - see help menu)</i>			
a. NATURE OF ILLNESS/INJURY # <input style="width:50px;" type="text"/>	b. ESTIMATED DAYS LOST # <input style="width:50px;" type="text"/>	c. ESTIMATED DAYS HOSPITALIZED # <input style="width:50px;" type="text"/>	d. ESTIMATED DAYS RESTRICTED DUTY # <input style="width:50px;" type="text"/>
e. BODY PART AFFECTED PRIMARY _____ # <input style="width:50px;" type="text"/> SECONDARY _____ # <input style="width:50px;" type="text"/>	g. TYPE AND SOURCE OF INJURY/ILLNESS TYPE _____ # <input style="width:50px;" type="text"/> SOURCE _____ # <input style="width:50px;" type="text"/>		
f. NATURE OF ILLNESS / INJURY # <input style="width:50px;" type="text"/>			

6. PUBLIC FATALITY <i>(Fill in line and correspondence code number in box - see help menu)</i>	
a. ACTIVITY AT TIME OF ACCIDENT # <input style="width:50px;" type="text"/>	b. PERSONAL FLOATATION DEVICE USED? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A

7. MOTOR VEHICLE ACCIDENT					
a. TYPE OF VEHICLE		b. TYPE OF COLLISION		c. SEAT BELTS	
<input type="checkbox"/> PICKUP/VAN <input type="checkbox"/> AUTOMOBILE	<input type="checkbox"/> TRUCK <input type="checkbox"/> OTHER <i>(Specify)</i> _____	<input type="checkbox"/> SIDE SWIPE <input type="checkbox"/> HEAD ON <input type="checkbox"/> REAR END	<input type="checkbox"/> BROADSIDE <input type="checkbox"/> ROLL OVER <input type="checkbox"/> BACKING	<input type="checkbox"/> USED	<input type="checkbox"/> NOT USED
		<input type="checkbox"/> OTHER <i>(Specify)</i> _____		(1) FRONT SEAT	
				(2) REAR SEAT	

8. PROPERTY/MATERIAL INVOLVED		
a. NAME OF ITEM	b. OWNERSHIP	c. \$ AMOUNT OF DAMAGE
(1)		
(2)		
(3)		

9. VESSEL/FLOATING PLANT ACCIDENT <i>(Fill in line and correspondence code number in box from list - see help menu)</i>	
a. TYPE OF VESSEL/FLOATING PLANT # <input style="width:50px;" type="text"/>	b. TYPE OF COLLISION/MISHAP # <input style="width:50px;" type="text"/>

ACCIDENT DESCRIPTION *(Use additional paper, if necessary)*

See attached page.

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11. CAUSAL FACTOR(S) (Read Instruction Before Completing)					
a. (Explain YES answers in item 13) DESIGN: Was design of facility, workplace or equipment a factor? <input type="checkbox"/> YES <input type="checkbox"/> NO PECTION/MAINTENANCE: Were inspection & maintenance procedures a factor? <input type="checkbox"/> YES <input type="checkbox"/> NO PERSON'S PHYSICAL CONDITION: In your opinion, was the physical condition of the person a factor? <input type="checkbox"/> YES <input type="checkbox"/> NO OPERATING PROCEDURES: Were operating procedures a factor? <input type="checkbox"/> YES <input type="checkbox"/> NO JOB PRACTICES: Were any job safety/health practices not followed when the accident occurred? <input type="checkbox"/> YES <input type="checkbox"/> NO HUMAN FACTORS: Did any human factors such as, size or strength of person, etc., contribute to accident? <input type="checkbox"/> YES <input type="checkbox"/> NO ENVIRONMENTAL FACTORS: Did heat, cold, dust, sun, glare, etc., contribute to the accident? <input type="checkbox"/> YES <input type="checkbox"/> NO			a. (CONTINUED) CHEMICAL AND PHYSICAL AGENT FACTORS: Did exposure to chemical agents, such as dust, fumes, mists, vapors or physical agents, such as, noise, radiation, etc., contribute to accident? <input type="checkbox"/> YES <input type="checkbox"/> NO OFFICE FACTORS: Did office setting such as, lifting office furniture, carrying, stooping, etc., contribute to the accident? <input type="checkbox"/> YES <input type="checkbox"/> NO SUPPORT FACTORS: Were inappropriate tools/resources provided to properly perform the activity/task? <input type="checkbox"/> YES <input type="checkbox"/> NO PERSONAL PROTECTIVE EQUIPMENT: Did the improper selection, use or maintenance of personal protective equipment contribute to the accident? <input type="checkbox"/> YES <input type="checkbox"/> NO DRUGS/ALCOHOL: In your opinion, was drugs or alcohol a factor to the accident? <input type="checkbox"/> YES <input type="checkbox"/> NO		
b. WAS A WRITTEN JOB/ACTIVITY HAZARD ANALYSIS COMPLETED FOR TASK BEING PERFORMED AT TIME OF ACCIDENT? <input type="checkbox"/> YES (If yes, attach a copy.) <input type="checkbox"/> NO					

12. TRAINING		
a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK? <input type="checkbox"/> YES <input type="checkbox"/> NO	b. TYPE OF TRAINING. <input type="checkbox"/> CLASSROOM <input type="checkbox"/> ON JOB	c. DATE OF MOST RECENT FORMAL TRAINING. (Month) (Day) (Year)

13. FULLY EXPLAIN WHAT ALLOWED OR CAUSED THE ACCIDENT; INCLUDE DIRECT AND INDIRECT CAUSES (See instruction for definition of direct and indirect causes.) (Use additional paper, if necessary)

a. DIRECT CAUSE See attached page.

b. INDIRECT CAUSE(S) See attached page.

14. ACTION(S) TAKEN, ANTICIPATED OR RECOMMENDED TO ELIMINATE CAUSE(S).

DESCRIBE FULLY:

See attached page.

DATES FOR ACTIONS IDENTIFIED IN BLOCK 14.					
a. BEGINNING (Month/Day/Year)			b. ANTICIPATED COMPLETION (Month/Day/Year)		
c. SIGNATURE AND TITLE OF SUPERVISOR COMPLETING REPORT		d. DATE (Mo/Da/Yr)	e. ORGANIZATION IDENTIFIER (Div, Br, Sect)	f. OFFICE SYMBOL	
CORPS _____					
CONTRACTOR _____					

16. MANAGEMENT REVIEW (1st)

a. CONCUR **b.** NON CONCUR **c.** COMMENTS _____

SIGNATURE _____	TITLE _____	DATE _____
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17. MANAGEMENT REVIEW (2nd - Chief Operations, Construction, Engineering, etc.)

a. CONCUR **b.** NON CONCUR **c.** COMMENTS _____

SIGNATURE _____	TITLE _____	DATE _____
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18. SAFETY AND OCCUPATIONAL HEALTH OFFICE REVIEW

a. CONCUR **b.** NON CONCUR **c.** ADDITIONAL ACTIONS/COMMENTS _____

SIGNATURE _____	TITLE _____	DATE _____
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19. COMMAND APPROVAL

MENTS _____

COMMANDER SIGNATURE _____	DATE _____
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10.

ACCIDENT DESCRIPTION *(Continuation)*

DIRECT CAUSE *(Continuation)*



13b.

INDIRECT CAUSES *(Continuation)*

14.

ACTION(S) TAKEN, ANTICIPATED, OR RECOMMENDED TO ELIMINATE CAUSE(S) *(Continuation)*

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