earthtech

environmental services & remediation transportation engineering & construction total water management

Site-Specific Health and Safety Plan

Site:
Meadowlands Plating Site
890 Paterson Plank Road
East Rutherford, New Jersey

Submitted to:
U.S. Environmental Protection Agency, Region II
290 Broadway
New York, New York 10007-1866

Prepared for:
U.S. Environmental Protection Agency, Region II
290 Broadway
New York, New York 10007-1866

Prepared by:
Earth Tech, Inc.
2229 Tomlynn Street
Richmond, Virginia 23230

December 7, 1998

Earth Tech Project No. 29076

443115

Site-Specific Health and Safety Plan

Site:
Meadowlands Plating Site
890 Paterson Plank Road
East Rutherford, New Jersey

Submitted to:
U.S. Environmental Protection Agency, Region II
290 Broadway
New York, New York 10007-1866

Prepared for:
U.S. Environmental Protection Agency, Region II
290 Broadway
New York, New York 10007-1866

Prepared by:
Earth Tech, Inc.
2229 Tomlynn Street
Richmond, Virginia 23230

December 7, 1998

Earth Tech Project No. 29076

Client: U.S. EPA Region II
Project Name: Meadowlands Plating Site
Earth Tech Job No.: 29076

This document has been reviewed for technical content and quality, clarity, and style in accordance with the internal QA/QC procedures of Earth Tech.

Acknowledgements:

Technical Review:

Scott Gawel	I.H	12/7/98
(Name)	(Title)	(Date)

Style Review:

Mary Ruffin Hart	Editor	12/7/98
(Name)	(Title)	(Date)

Final Review:

[illegible]	I. H.	12-7-98
(Author)	(Title)	(Date)

approved:

Paul J Keh	OSC	12-15-98

I:\Publications\29076\meadow-hasp.doc

Table of Contents

1.0 INTRODUCTION 1

1.1 Site History 1
1.2 Site Description 1
1.3 Scope of Work 1

2.0 SPECIFIC SITE HAZARDS 2

2.1 Chemical Hazards 2
2.2 Physical Hazards 2
2.3 Environmental Hazards 3
2.4 Task Risk Analysis 3
2.5 Task-Specific Risk Analysis 5

3.0 TRAINING/MEDICAL SURVEILLANCE REQUIREMENTS 5

4.0 SITE SECURITY AND CONTROL 6

4.1 Exclusion Zone 6
4.2 Contamination Reduction Zone 6
4.3 Support Zone 6

5.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)/LEVEL OF PROTECTION 6

5.1 Site Operations 6
5.2 Breathing Air Quality 7
5.3 Inspection and CleaningError! Bookmark not defined. 7
5.4 Facial Hair 8
5.5 Corrective LensesError! Reference source not found. 8
5.6 Contact Lenses 8
5.7 Medical Certification 8
5.8 Site-Specific Respiratory Protection Program 8

6.0 EMERGENCY PROCEDURES 8

6.1 Emergency Notification 8
6.2 Emergency Equipment 9
6.3 Emergency Signals 9
6.4 Buddy System 9
6.5 Contingency Plan 9
6.5.1 Purpose 9
6.5.2 Emergency/Spill Response Procedures 10
6.5.2.1 Emergency Services 10
6.5.2.2 Communication 10
6.5.3 Emergency Evacuation from EZ and CRZ 10
6.5.4 First Aid 11
6.5.5 Emergency Actions 11
6.5.6 General Evacuation Plan 11
6.5.7 Handling of Hazardous Chemicals 11
6.5.7.1 Responsibility 11

6.5.7.2 Definitions 12
6.5.7.3 Flammable/Combustible Liquid Spill Cleanup 12
6.5.7.4 Flammable Solids Cleanup 14
6.5.7.5 Oxidizer Cleanup 14
6.5.7.6 Corrosive Cleanup 15
6.5.7.7 Miscellaneous Hazardous Materials 16

7.0 MONITORING PROGRAM 16

7.1 Air Monitoring 17
7.2 Personal Monitoring 18

8.0 DECONTAMINATION PROCEDURES 18

8.1 Personal Decontamination 18
8.1.1 Suspected Contamination 18
8.1.2 Personal Hygiene 19
8.2 Equipment Decontamination 19
8.3 Disposal 19

9.0 GENERAL SAFETY 19

9.1 Safety Official 19
9.2 Daily Site Safety Meeting 19
9.3 Hazardous Substances 19
9.4 Drugs/Alcoholic Substances 20

10.0 PERSONNEL ACKNOWLEDGEMENT 20

Tables

Table 1 Task Risk Analysis 4
Table 2 Toxicity Levels 16
Table 3 Lower Explosive Limit (LEL) 17
Table 4 Volatile Organics 17
Table 5 Carbon Monoxide 17
Table 6 Hydrogen Cyanide 17
Table 7 Oxygen 17
Table 8 Dusts – Chromium 6^+ Hexavalent 18

Appendices

Appendix A	Health Hazard Information (MSDS)
Appendix B	General Safety Rules
Appendix C	Vehicle and Equipment Operations
Appendix D	Hearing Conservation
Appendix E	Accident/Injury Investigation
Appendix F	Air Monitoring
Appendix G	Self-Contained Breathing Apparatus
Appendix H	Excavation
Appendix I	Tank Removal
Appendix J	Tank Cleaning
Appendix K	Drum Sampling
Appendix L	High Pressure Washer
Appendix M	Forklifts and Tow Motors
Appendix N	Electrical Safety
Appendix O	Solvents, Flammables, and Compressed Gases
Appendix P	Confined Space Entry
Appendix Q	Task-Specific Risk Analysis
Appendix R	Hospital Map
Appendix S	First Aid/Eyewash/Fire Extinguisher Requirements
Appendix T	Sign-Off Sheet

1.0 INTRODUCTION

This plan has been prepared to conform with Occupational Safety and Health Administration (OSHA) 1910.120 and the OSHA/National Institute of Safety and Health (NIOSH)/Environmental Protection Agency (EPA)/United States Coast Guard (USCG) Occupational Health and Safety Guidelines. Earth Tech considers health and safety the highest priority during work at a site which contains potentially hazardous materials. All persons working on this site will read and sign this plan acknowledging its contents. All project activities will conform with Earth Tech's health and safety policies and procedures, and applicable OSHA regulations, and must be conducted in a manner that minimizes the probability of injury, accident, or incident occurrence. However, as conditions or requirements change, this plan will be amended accordingly and discussed at the daily safety meeting with acknowledgement and signature of personnel. Compliance with this Health and Safety Plan (HASP) is required of all persons and third parties who enter this site. Any significant changes proposed must be reviewed and approved by the On-Scene Coordinator (OSC) prior to implementation.

1.1 Site History

The subject site was originally operated by a company called Top Notch Metals, which went out of business. The facility was then leased to Meadowlands Plating and Finishing, which was evicted from the facility sometime in 1996 for failure to remit rent payments. At that time, the facility and equipment were leased to MPF, Inc., which abandoned the facility in December 1997. The facility has been vacant since that time.

Top Notch Metals Realty (Top Notch) is in the process of selling the tanks and equipment located at the facility to an unknown buyer in Michigan in order to recover some lost revenue. The New Jersey Department of Environmental Protection (NJDEP) has been allowing Top Notch to transfer materials between tanks, decontaminate the empty tank, and ship it to the buyer. In addition, some unused plating solution was given to an operating plating facility in Newark, New Jersey.

1.2 Site Description

Located in an industrial/commercial area in East Rutherford, New Jersey (Bergen County), the site is approximately 3 acres in size and consists of a single multisectional building of unknown size. The building includes an office area, a large bay area, and a chemical laboratory. The primary building materials are cinderblock and steel beam construction, which is in very good condition. The flooring is concrete, with four very large catch basins in the main bay. Two large process lines, composed of multiple vats, remain in place over these basins.

The nearest residence is located approximately 0.25-mile from the site. A restaurant and a gas company are immediately adjacent to the site. A landfill, which is in the process of being capped, is located behind the site.

1.3 Scope of Work

The tasks to be performed at the Meadowlands Plating site include:

- Mobilize and set up site
- Repackage and stage drums
- Sample drums and vats
- Drain and clean vats and basins

- Remove vats from process line and stage
- Clean and remove underground storage tanks (USTs) if necessary
- Perform labpacking
- Transport and dispose of wastes
- Coordinate facility decontamination
- Collect and treat wastewater
- Provide security services
- Provide support services
- Demobilize

2.0 SPECIFIC SITE HAZARDS

Potential hazards to personnel are directly related to the site operations. This section addresses the existing chemical, physical, and environmental hazards of concern that may be encountered during on-site activities.

2.1 Chemical Hazards

Chemical substances that present health hazards, and may be encountered on site by personnel, consist of, but are not limited to:

- heavy metals
- metal powders
- possible shock-sensitive items
- oxidizers
- compressed gases
- flammables
- corrosives
- reactive cyanides
- nitrated organics
- unknowns in drums and laboratory

Appendix A contains health hazard information in the form of Material Safety Data Sheets (MSDSs) for some of the chemicals to be remediated on site. Additional MSDSs and/or health hazard information will be inserted as compounds are identified. These sheets outline the chemical/physical properties and hazardous characteristics of each substance. With this information at hand, proper personal protective equipment (PPE), work practices, and engineering controls can be implemented to minimize employee exposure.

2.2 Physical Hazards

Physical/safety conditions presenting potential hazards to Earth Tech personnel include:

- Slip/trip/fall
- Pinch points
- Back strain/heavy lifting
- Noise
- Cuts and lacerations
- Overhead hazards
- Splash hazards
- Drum sampling
- Equipment operations
- Hazcatting
- Illumination
- Pressure washing
- Elevated work
- Confined space entry

Appendices B through P present standard operating procedures (SOPs) to be observed when dealing with these specific conditions and activities in order to ensure safe and healthy work conditions. The Response Manager (RM) and foreman will observe the general work practices of each crew member and equipment operator, and enforce safe procedures to minimize physical hazards. Also, hard hats, safety glasses, and steel-toed safety boots (Level D PPE) are required as a minimum once personnel arrive at the site.

Once on site, all crew members will follow these requirements as a minimum:

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of contamination is prohibited in the exclusion zone (EZ) and contamination reduction zone (CRZ).
- Hands and face must be washed upon leaving the EZ and before eating, drinking, chewing gum or tobacco, smoking, or other activities which may result in ingestion of contamination.
- A buddy system will be used. Hand signals have been established to maintain communication.
- During site operations, each worker will act as a safety backup to his/her partner. Off-site personnel will also provide emergency assistance.
- Visual contact will be maintained between buddies on site when performing hazardous duties.
- No personnel will be admitted to the site without the proper safety equipment, training, and medical surveillance certification.
- All personnel must comply with established safety procedures. Any staff member who does not comply with safety policy, as established by the Earth Tech Certified Industrial Hygienist (CIH), Health and Safety Officer (HSO), or OSC, will be immediately dismissed from the site.
- Proper decontamination procedures must be followed before leaving the site.
- All employees and visitors must sign in and out of the site at the Earth Tech trailer.

Earth Tech will adhere to all applicable current OSHA health and safety rules and provisions as outlined in the General Industry Standard 29 CFR 1910 and Construction Standard 29 CFR 1926.

2.3 Environmental Hazards

Environmental factors on site that have the potential to adversely affect human health include: insects, arachnids, rodents, and stray animals. Heat/cold stress are not anticipated to be hazards at this site because the building in which work will be conducted is climate-controlled.

2.4 Task Risk Analysis

Table 1 summarizes the identified tasks, associated hazards, and recommended control measure(s) to minimize risk.

Table 1 Task Risk Analysis

Task	Hazard(s)	Control Measures
• Mobilize/set up decontamination area and utilities	• slip/trip/falls • puncture • back strain/lifting • cuts/lacerations • pinch points • overhead	• Level D PPE • heavy work gloves • proper work practices to include lifting techniques/operation of tools • buddy system
• Repackage/stage drums	• slip/trip/falls • confined space entry • puncture • back strain/lifting • cuts/lacerations • pinch points • chemical • equipment operations • inadequate illumination	• Level B PPE • heavy work gloves • proper work practices to include lifting techniques/operation of tools • buddy system • provide lighting (intrinsically safe) • use mechanical lifting devices for loads over 50 pounds
• Sample drums, vats, and basins	• slip/trip/falls • confined space entry • puncture • back strain/lifting • cuts/lacerations • pinch points • chemical • splash • inadequate illumination	• Level B PPE • heavy canvas gloves • proper work practices to include lifting techniques/operation of tools • buddy system • provide lighting (intrinsically safe)
• Lab packing	• slip/trip/falls • puncture • back strain/lifting • cuts/lacerations • pinch points • chemical • inadequate illumination	• Level B PPE • heavy canvas gloves • proper work practices to include lifting techniques/operation of tools • provide lighting (intrinsically safe)
• Perform T&D of wastes	• slip/trip/falls • cuts/lacerations • pinch points • heavy lifting	• Level D • buddy system • use mechanical lifting devices for loads over 50 pounds
• Facility decontamination	• slip/trip/falls • cuts/lacerations • pressure washer • dust • back strain	• Level C PPE (Saranex or rain suit) • proper work practices to include lifting techniques • buddy system • Pressure Washer SOP- Appendix L

Task	Hazard(s)	Control Measures
• Provide support service	• slip/trip/falls • cuts/lacerations • back strain • puncture	• Level of PPE determined by RM or SSO per task • proper work practices to include lifting techniques • buddy system
• Cleaning vats and basins	• slip/trip/falls • puncture • back strain • cuts/lacerations • pinch points • chemical • splash • overhead • inadequate illumination • egress • confined space entry	• Level B PPE • proper hand protection • proper work practices • buddy system • workers trained in confined space entry (see SOP in Appendix P)
• Cleaning/removal of USTs	• slip/trip/falls • puncture • back strain • confined space entry • pressure washer • chemical • equipment operations • splash • inadequate illumination	• Level B or C, depending on product • heavy leather gloves • proper work practices • buddy system • provide lighting (intrinsically safe) • workers trained in confined space entry (see SOP in Appendix P)

2.5 Task-Specific Risk Analysis

As more information regarding site conditions and chemical hazards becomes identified, additional specific task risk analysis will be developed. The task risk analysis will be discussed at the daily safety meeting prior to the performance of the new task. Written procedures will be completed prior to the start of any new tasks and incorporated into this HASP. Appendix Q contains a copy of the Task-Specific Risk Analysis Form.

3.0 TRAINING/MEDICAL SURVEILLANCE REQUIREMENTS

Prior to initiating field work, all Earth Tech personnel will have completed an OSHA 40-hour and annual 8-hour refresher course in the Hazardous Worker Training Program to comply with 29 CFR 1910.120(e). They will also have current medical clearance for work fitness from an examining physician, which includes fitness for respirator work and successfully passing a qualitative fit test. Earth Tech personnel will be aware of the safe work practices specified in the HASP. Medical and training records are available at Earth Tech's corporate office in Richmond, Virginia, and will be available at the site.

SECTION III - KEY PERSONNEL AND RESPONSIBILITIES

The following personnel have prinicipal responsibility for the implementation and maintenance of health and safety measures during site remediation activities.

3.0 U.S. EPA On-Scene Coordinator

The EPA On-Scene Coordinator (OSC) is responsible for overall sight management at MPF. He will be responsible for ensuring that all contractors follow their approved Work Plan and site specific Health and Safety Plan.

3.1 ETRS Response Manager

The Response Manager (RM) is responsible for health and safety "performance" in the field. The Site RM can temporaarily halt work at any time if, in his/her opinion, it is necessary to protect the health and well being of site workers or the general public. Specific responsibilities of the RM include:

- Directing site activities in accordance with the HASP;
- Being aware of and complying with all applicable federal, state, and local occupational health and safety regulatory requirements;
- Ensuring that resources call for in the HASP and Work Plan are on site and operational;
- Verifying that all permits, supporting documentation and clearances for a given task
- Informing the appropriate site managment and safety personnel of the activities to be performed each day;
- Providing technical advice during routine operations and emergencies;
- Handling field emergency response situations that may arise;
- Correcting unsafe acts and conditions; and
- Participating in pre-job and daily safety meetings

3.2 ETRS Site Health and Safety Officer

The Site Health and Safety Officer (SHSO) has responsibility for ensuring that provisions of each HASP are implemented in the field by all employees and subcontractor employees. The SHSO must be trained to implement the requirements in the site specific HASP, including the correct use of monitoring instruments, health and safety criteria for the site, documentation of monitoring results, and actions to take if site conditions change.

The designated SHSO shall continuously evaluate the adequacy of prescribed health and safety procedures and levels of protection against the actual conditions encountered in the field. If an obvious discrepancy exists between the realized hazard(s) and the level of personal protective equipment (either too much or too little), a review of the procedures shall be made and all parties shall come to an agreement concerning any changes that need to be made to the HASP.

Additional responsibilities of the SHSO include:

- Monitoring site activities for unsafe acts and conditions and initiating their correction;
- Monitoring project and site activities for conformance to the site specific HASP;
- Overseeing confined space entries and ensuring that all confined space entries are done in accordance with the requirements found in the SOP for confined space entry;
- Performing on-site air monitoring and personal sampling as specified in the site specific HASP;
- Calibrating instruments;
- Maintaining health and safety equipment and supplies;
- Ensuring that all work-related injuries and illnesses are properly treated and investigated;
- Conducting safety briefings and daily safety meetings;
- Maintaining documentation in support of the HASP; and
- Participating in a pre-job safety briefing with project personnel to discuss anticipated hazards and their control measures.

3.3 Coast Guard Atlantic Strike Team

The Coast Guard shall be responsible for evaluating the contractors on site and the adequacy of prescribed health and safety procedures and levels of protection against the actual conditions encountered in the field. Additional responsibilities include:

- Monitoring site activities for unsafe acts and conditions and initiating their correction;
- Monitoirng project and site activities for conformance to the site specific HASP;
- Performing on-site air monitoring;
- Calibrating instruments; and
- Participating in a pre-job safety briefing with project personnel to discuss anticipated hazards and their control measures.

3.4 Region II START

Region II START will provide the EPA OSC with technical and health and safety support as needed. Additional responsibilities include:

- Monitoring site activities for unsafe acts and conditions and initiating their correction;
- Monitoring project and site activities for conformance to the site specific HASP;
- Performing on-site air monitoring;
- Calibrating instruments; and
- Participating in a pre-job safety briefing with project personnel to discuss anticipated hazards and their control measures.

3.5 Foreman, Operators and Technicians

All site personnel share responsibility for health and safety. Specific duties include:

- Conducting work in accordance with the HASP;
- Participating in daily safety meetings/planning; and
- Prompt reporting of all incidents and potential health and safety-related problems.

4.0 SITE SECURITY AND CONTROL

- To prevent migration of contamination caused through tracking by personnel or equipment, work areas and PPE will be clearly specified prior to beginning operations. Earth Tech has designed work areas and zones as suggested by the NIOSH/OSHA/OSCG/EPA's document titled *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*. Each work area will be divided into three zones as follows (a map of the work areas and zones will be posted in the Command Post):

- An exclusion or "hot" zone (EZ);
- A contamination reduction zone (CRZ); and
- A support zone (SZ).

4.1 Exclusion Zone

The EZ will include the entire warehouse area. This designated area excludes personnel lacking proper training, medical clearance, and PPE. It will be situated so that no anticipated contamination will escape beyond its borders. Personnel and equipment in the EZ will be kept to a minimum, consistent with effective site operations. Visitors will not be allowed into the EZ without proper documentation.

4.2 Contamination Reduction Zone

The CRZ will be established in the large room and hallway adjacent to the bay area and leading into the Command Post. This area will be used to don PPE before entering the EZ, and to remove it after leaving the EZ. It will also be used as an area to decontaminate equipment before entering the support zone. The EZ entry and exit log will be located in the CRZ.

4.3 Support Zone

The SZ is where outside observers must remain. This zone will consist of all areas outside of the locked doors and barricade tape used to set up the CRZ. Any additional support personnel not required to be in the EZ must stay in this area.

The RM is responsible for knowing which workers or other authorized personnel are on site, and controlling the entry of personnel into the hazardous areas to prevent additional injury and exposure. Checkpoint systems implemented for this purpose will be discussed at the site safety meeting.

5.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)/LEVEL OF PROTECTION

5.1 Site Operations

Earth Tech personnel involved with the site operations discussed in Section 1.2 will be required to use PPE when inside the EZ. The primary level of protection to be used at the Meadowlands Plating site will be Level C; however, drum sampling and waste consolidation operations will be conducted in Level B protection.

Level C
• Full-face air-purifying respirator with MSA GMC-H cartridge • Hooded Saranex coveralls • Tyvek inner suit • Nitrile sampling gloves (2 pair) • Working gloves (leather/cotton) as appropriate • Nitrile over boots • Steel-toed boots • Hard hat • Proper taping around wrist, top of boots, and respirator to create encapsulating effect

Level B
• Self contained breathing apparatus. (SCBA) and/or inline air • Hooded Saranex coveralls • Tyvek inner suit • Nitrile sampling gloves (2 pair) • Neoprene overboots • Steel-toed boots • Hard hat • Working gloves as appropriate (leather/cotton) • Proper taping around wrist, top of boots, and respirator to create encapsulating effect

All Earth Tech personnel are responsible for monitoring the condition of their PPE. The On-Site Field Supervisor or Response Manager will be notified immediately of any damage to or malfunction in the equipment.

5.2 Breathing Air Quality

Code of Federal Regulations 29 1910.134 states breathing air will meet the requirement of the specification for Grade D breathing air as described in the Compressed Gas Association Specification G7.-1966. Earth Tech requires a certificate of analysis from vendors of breathing air showing that the air meets this standard. Personnel operating the booster pump used for filling air cylinders must receive a check-out prior to using this equipment.

5.3 Inspection and Cleaning

Respirators will be checked periodically by the foremen and inspected by the wearer before each use. All respirators and associated equipment will be decontaminated and hygienically cleaned after use. Air-purifying respirators (APRs) must be washed daily in the wash pans placed before the decontamination shed.

5.4 Facial Hair

No personnel who have facial hair which interferes with the respirator's sealing surface (typically no more than one day's beard growth) will be permitted to wear a respirator or to work in areas requiring respirator use.

5.5 Corrective Lenses

Normal eyeglasses cannot be worn under full-face respirators because the temple bars interfere with the respirator's sealing surfaces. For workers requiring corrective lenses, special spectacles designed for use with respirators will be provided.

5.6 Contact Lenses

Contact lenses may not be worn with any type of respirator.

5.7 Medical Certification

Only workers who have been certified by a physician as being physically capable of respirator usage will be issued a respirator. Personnel unable to pass a respiratory fit test or without medical clearance for respirator use will not be permitted to enter or work in areas on site that require respiratory protection. Employees will receive a written physician's opinion that they are fit for general hazardous waste operations as per 29 CFR 1910.120(f)(7).

5.8 Site-Specific Respiratory Protection Program

The Earth Tech Respiratory Protection Program complies with 29 CFR 1910.134. The primary objective of respiratory protection is to prevent employee exposure to airborne health hazard agents. When engineering measures to control contamination are not feasible, or while they are being implemented, personal respiratory protective devices will be used. All respirator users are OSHA-trained in proper respirator use and maintenance. The Earth Tech foremen will observe workers during respirator use for signs of stress to ensure that respiratory protection is sufficient. The RM and CIH will also evaluate this HASP to determine its continued effectiveness.

6.0 EMERGENCY PROCEDURES

6.1 Emergency Notification

At the job site, the following local phone numbers will be provided:

- Fire Department 911
- Hospital (map included - Appendix R) Will be posted in crew trailer.
- Police Department 911
- Ambulance Service 911
- Poison Control Center [redacted] 1-800-764-7661

Mike Solecki 1 800 759-8888 PIN 1356740

- Client Contact Paul Kahn Page 1 800 SKY-Page PIN 1350746
- Earth Tech Response Manager Kevin Shaver (Pager # 1-877-831-4009)
- Earth Tech Foreman Jim Shaw Pager 1-877-831-4002

If a fire, medical, or security emergency occurs, provide first aid, if applicable, and then call for help providing the following information:

- Your name,
- Phone number from which you are calling,
- Location of incident,
- Nature of incident, and
- Request instructions for course of action.

6.2 Emergency Equipment

In addition to the PPE used by or available to Earth Tech personnel, emergency equipment on site will include an emergency shower, eyewash, first-aid kits, fire extinguishers, and any additional site-specific equipment as dictated by site conditions and operations. Appendix S contains the Earth Tech requirements for this equipment.

6.3 Emergency Signals

A combination of visual and audio signals will be used to notify personnel in the case of an emergency. This may involve voice communication and/or hand signals. These emergency signals will be discussed at the site safety meeting:

- Hand gripping throat—Out of air, cannot breathe;
- Hands on top of head—Need assistance;
- Thumbs up—OK, I'm alright, I understand;
- Thumbs down—No, negative; and
- Gripping partner's wrist, or gripping both hands on wrist—leave area immediately.

6.4 Buddy System

All field personnel will operate on the buddy system. No one will enter the exclusion zone alone. Buddies will be assigned before beginning work each day and must remain within voice or eye contact of each other at all times.

6.5 Contingency Plan

Personnel assigned to emergency response/spill operations will be appropriately trained. Equipment and supplies dedicated to emergency response will not be utilized for day-to-day operations.

6.5.1 Purpose

This procedure describes minimum requirements for emergency response operations involving hazardous materials and spill cleanup procedures.

6.5.2 Emergency/Spill Response Procedures

Prior to field activities, the RM will plan emergency egress routes and discuss them with all field personnel. The RM will be responsible for establishing an Incident Command System (ICS). All emergency responders and their communications will be coordinated and controlled through the individual in charge of the ICS.

6.5.2.1 Emergency Services

A tested system will exist for rapid and clear distress communication. All personnel will be provided concise and clear directions and accessible transportation to local emergency services. A map outlining directions to the nearest hospital will be posted on site.

The following emergency equipment will be present on the site:

- Fire extinguishers;
- Industrial first-aid kit;
- Eye-wash;
- Emergency shower; and
- Source of breathing air.

6.5.2.2 Communication

Each member of the site entry team will be able to communicate with another entry team member at all times. Communications may be by way of the following methods:

- Sound (air horn);
- Electronic (radio, bull horn); and
- Visual (hand signals).

The standard hand signals described in Section 6.3 will be mandatory for all employees regardless of other means of communication.

6.5.3 Emergency Evacuation from EZ and CRZ

Any personnel requiring emergency medical attention will be evacuated immediately from the EZ and the CRZ. Personnel will not enter the area to attempt rescue if their own lives would be threatened. The RM and the SSO will make the decision whether or not to decontaminate a victim prior to evacuation, based on the type and severity of the injury and the nature of the contaminant.

If decontamination cannot be performed because it may aggravate the injury or delay life-saving treatment, the emergency response personnel will:

- Wrap the victim in blankets or plastic to reduce contamination of other personnel and emergency vehicles;
- Alert emergency and medical personnel to potential contamination, instructing them about specific decontamination procedures; and
- Send site personnel familiar with the incident to the hospital with the victim.

6.5.4 First Aid

Qualified personnel only will give first aid and stabilize an individual needing assistance. Professional medical assistance will be obtained at the earliest possible opportunity.

To provide first-line assistance to field personnel in the case of illness or injury, the following items will be made immediately available:

- First-aid kit;
- Portable emergency eye-wash; and
- Supply of clean water.

6.5.5 Emergency Actions

If actual or suspected serious injury occurs, these steps will be followed:

- Remove the exposed or injured person(s) from immediate danger;
- Administer first aid if necessary, and decontaminate affected personnel after critical first aid is given;
- Obtain paramedic services or ambulance transport to local hospital (this procedure will be followed even if there is no visible injury);
- Evacuate other personnel in the work area to a safe distance until the site supervisor determines that it is safe for work to resume (if there is any doubt regarding the condition of the area, work will not commence until all hazard-control issues are resolved); and
- Notify client of incident.

6.5.6 General Evacuation Plan

In the general case of a large fire, explosion, or toxic vapor release, a site evacuation will be ordered and will follow these steps:

- Sound the applicable alarm and advise client representative.
- Evaluate the immediate situation and downwind direction. All personnel will evacuate in the upwind direction.
- All personnel will assemble in an upwind area. When the situation permits, a head count will be taken.
- Determine the extent of the problem. Dispatch a response team in protective clothing and SCBAs on site to evacuate any missing personnel or to correct the problem.

6.5.7 Handling of Hazardous Chemicals

The purpose of this section is to establish the proper procedures to follow during the handling and use of chemicals by employees during spill cleanup operations.

6.5.7.1 Responsibility

Earth Tech will provide adequate PPE to employees who come in contact with chemicals. Earth Tech will ensure that containers, drums, etc., are properly labeled. Also, Earth Tech will train employees on proper handling techniques when cleaning spilled or leaking chemicals.

SECTION VI - CHEMICAL CONTAMINANTS DATA

6.0 Introduction

This section outlines the potential chemical hazards which workers may be exposed to during work on this project. This is a representative list of known and suspected hazardous substances at this site. Other chemicals may be present at the site which have not yet been identified. Unless a material is identified by a valid label, it shall be considered as unknown, and handled as such.

A visual assessment of the premises revealed the following:

- Approximately 300 various sized, unsecured drums of chemicals.
- Approximately 80,000 gallons on free-flowing corrosive plating liquids in subfloor concrete troughs.
- Approximately 50,000 gallons of corrosive plating liquids inside various plating/holding/dipping tanks.
- Approximately 1,400 pounds of metallic cyanide compounds contained in six partially filled drums stored in a bin near open tanks containing acids.
- Approximately 400 small chemical containers in a laboratory area.
- Thirty-five over-packed 55-gallon drums containing metallic plating wastes.
- Approximately 20 cylinders of compressed propane, hydrogen and other flammable gases inside and outside the building.
- An unlocked box trailer containing 68 drums of unknown plating chemicals or plating wastes outside the building.
- Three 25-cubic yard roll-off containers of dried metallic plating wastes, one of which has allegedly been mixed with waste perchlorethylene and an unknown amount of metalic mercury, located in an area in the rear parking lot.
- Two semi-buried fiberglass tanks of liquid nickel plating wastes, each containing approximately 1,000 gallons and located outside the building.
- A waste treatment facility containing unknown but visible amounts of liquid wastes and partially treated solid plating wastes, and exhibiting visible signs of leaks and spills.
- Approximately 400 gallons of waste oil contained in a leaking open tank, located inside the building.
- An outside underground #2 fuel oil storage tank with an unknown amount of fuel stored within.
- An underground gasoline storage tank with an unknown amount of gasoline stored within.
- Abandoned plating tanks containing approximately 1 ton of precipitated metallic crystals.
- An undetermined amount of contaminated wood, metal, and concrete from plating liquids.
- A polypropylene open-top mixing tank containing nitric acid, located within 10 feet of the cyanide storage bin.
- An old plating tank filled with a dark colored liquid, staged in the rear parking lot.

The employee will wear the PPE provided and follow the proper precautions when handling chemicals.

6.5.7.2 Definitions

Flammable Liquid - any liquid having a flashpoint below 100°F.

Combustible Liquid - any liquid having a flashpoint between 100°F and 200°F.

Flammable Solid - material likely to cause fires through friction or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. Included in this group are spontaneously combustible and water-reactive materials.

Compressed Gas - any material or mixture having in the container absolute pressure exceeding 40 psi. This includes flammable, nonflammable, and poisonous gases.

Explosive - any material that can detonate when exposed to fire or impact.

Oxidizer - substance (i.e., chloride, permanganite, inorganic peroxide, nitrate, etc.) that yields oxygen readily to stimulate the combustion of organic matter.

Corrosive - liquid or solid that causes visible destruction or irreversible alterations in human tissue at the site of contact.

Pesticide (herbicide, slimicide, insecticide, rodenticide, etc.) - any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest.

Further health and safety information can be determined by using the Threshold Limit Values (TLVs) assigned by the American Conference of Governmental Industrial Hygienists (ACGIH), and *Dangerous Properties of Hazardous Materials*, by Sax and Lewis.

6.5.7.3 Flammable/Combustible Liquid Spill Cleanup

Personal Protective Equipment (PPE)

- Avoid repeated or prolonged skin contact, wash skin immediately if becomes wet;
- Wear gloves if exposed skin is not protected by barrier cream;
- Wear goggles/face shield;
- Immediately remove any clothing that becomes wet to avoid flammability hazard;
- Remove non-impervious clothing that becomes contaminated; and
- Provide eyewash or source of quick drenching water and fire extinguishing equipment.

Respiratory Protection

Use of respiratory protection is dependent on the type and quantity of spill. As stated earlier, an SCBA in the positive pressure mode will be used initially at a spill cleanup site. Once air monitoring (OVA, HNu, Draeger, etc.) documents levels are below the OSHA permissible exposure levels (PELs), the respiratory

Some of the drums and containers appear to be in good condition, but essentially all are being stored without regard to chemical compatibility or other environmental controls.

6.1 Chemical Data Information

Contaminant/ Source (conc.)	PEL/TLV/IDLH/ Routes of Exposure	Symptoms of Exposure	First Aid Procedures
Hydrogen Cyanide	OSHA PEL - 10 ppm ACGIH STEL - C 5 mg/m^3 (Skin) IDLH - 50 ppm Routes of Exposure - Inhalation, Absorption, Ingestion, Contact	Asphyxiation, weakness, headache, confusion, nausea, vomiting	Eye: irrigate immediately Skin: water flush immediately Breathing: respiratory support Swallow: medical attention immediately
Sodium Cyanide	OSHA PEL - 5 mg/m^3 ACGIH STEL - C 5 mg/m3 IDLH - 25 mg/m3 Routes of Exposure - Inhalation, Absorption, Ingestion, Contact	Eye & skin irritation, asphyxiation, weakness, confusion, nausea	Eye: irrigate immediately Skin: soap wash immediately Breathing: respiratory support Swallow: medical attention immediately
Sulfuric Acid	OSHA PEL - 1 mg/m3 ACGIH TLV - 1 mg/m3 IDLH - 15 mg/m3 Routes of Exposure - Inhalation, Ingestion, Contact	Irritation to the eyes, skin, nose and throat, pulmonary edema, bronchitis, eye and skin burns	Eye: irrigate immediately Skin: water flush immediately Breathing: respiratory support Swallow: medical attention immediately

Nitric Acid	OSHA - 2ppm ACGIH TLV - IDLH - 25 ppm Routes of Exposure - Inhalation, Ingestion, Contact	Irritated eyes, skin, mucous membranes	Eye: Irriate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Hydrochloric Acid	OSHA PEL - CC 5 ppm ACHIG TLV - IDLH - 50 ppm Routes of Exposure - Inhalation, Ingestion (solution), Contact	Irritated nose, throat, larynx, cough, choking, dermatitis	Eye: Irrigate immediately (solution)/frostbite Skin: Water flush immediately (solution)/frostbite Breathing: Respiratory support Swallow: Medical attention immediately (solution)
Tetrachloro-ethylene	OSHA PEL - 100 ppm ACGIH TLV - 25 ppm ACGIH STEL - 100 ppm IDLH - 150 ppm CARCINOGEN Routes of Exposure - Inhalation, Absorption, Ingestion, Contact	Irritated eyes, nose, throat; nausea, flushed face and neck, dizziness, headache	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
Propane	OSAH PEL - 1000 ppm ACGIH TLV - 2500 ppm IDLH - 2100 ppm (10% LEL) Routes of Exposure - Inhalation, Contact (liquid)	Dizziness, confusion, excitation, asphyxiation, frostbite (liquid)	Eye: Frostbite Skin: Frostbite

Hydrogen Peroxide	OSHA PEL - 1 ppm ACGIH TLV - 1 ppm IDLH - 75 ppm Routes of Exposure - Inhalation, Ingestion, Contact	Irritated eyes, nose and throat, corneal ulcer, skin redness	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Gasoline	OSHA PEL - none ACGIH TLV - 300 ppm IDLH - CARCINOGEN Routes of Exposure - Inhalation, Absorption, Ingestion, Contact	Irritated eyes, skin, mucuous membranes, dermatitis, headache, fatigue, blurred vision	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Chromium	OSHA PEL - 1 mg/m^3 ACGIH TLV - o.5 mg/m^3 IDLH - 250 mg/m^3 Routes of Exposure - Inhalation, Ingestion, Contact	Irritated eyes, skin	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
Copper	OSHA PEL - 1 mg/m^3 ACGIH - 1 mg/m^3 IDLH - 100 mg/m^3 Routes of Exposure - Inhalation, Ingestion, Contact	Irritated eyes, nose, metallic tast, dermatitis	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Resiratory support Swallow: Medical attention immediately

Nickel	OSHA PEL - 1 mg/m^3 ACHIG TLV - 1.5 mg/m^3 IDLH - 10 mg/m^3 CARCINOGEN Routes of Exposure - Inhalation, Ingestion, Contact	Dermatitis, allergic asthma	Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediatley
Cadmium	OSHA PEL - 0.005 mg/mg^3 ACHIG TLV - 0.01 mg/m^3 IDLH - 9 mg/m^3 CARCINOGEN Routes of Exposure - Inhalation	Breathing difficulty,cough, chest tightness, headache, chills,muscle aches	Breathing: Respiratory support

7.1 Air Monitoring

Personnel will conduct air monitoring using an organic vapor analyzer (OVA) and/or a photoionization detector (PID), and a lower explosive limit (LEL) meter. Sampling will be performed prior, during, and after entry into the EZ. The instrument will be pre- and post-calibrated and calibration data will be recorded in a separate log book. The action levels shown in Tables 3 through 8 will dictate additional action(s) to be taken to ensure Earth Tech personnel health:

Table 3 Lower Explosive Limit (LEL)

Reading	Action
0 - 10%	Continue work, evaluate
> 10%	Terminate any cutting and/or potential spark generating activities, ventilate

Table 4 Volatile Organics

Reading	Level of Protection/Action
0 - 1 ppm	Level D
1 – 5 ppm	Level C
5 – 50 ppm	Level B, review operations
>50 ppm	Stop work

Table 5 Carbon Monoxide

Reading	Level of Protection/Action
0 – 10 ppm	Continue monitoring
10 – 25 ppm	Review work operations
>25 ppm	Stop work until engineering controls reduce levels

Table 6 Hydrogen Cyanide

Reading	Level of Protection/Action
0 – 2.5 ppm	Level C
>2.5 ppm	Level B; engineering controls

Table 7 Oxygen

Reading	Level of Protection/Action
19.5% - 22.5%	Continue work, evaluate
19.5%	Level B

Ambient corrosive vapor monitoring will be performed by the SSO. This will be done using personal pumps to perform area samples, which are to be sent off and analyzed in a lab. The analysis will consist of an inorganic corrosive profile, chromic acid, and chromium levels. The action levels for the acids which are most present and of the greatest concern are as follows:

Hydrochloric Acid

Readings (ppm)	Levels O f Protection
0 - .5	Level D
.5 - 5	Level C
> 5	Level B

Sulfuric Acid

Readings (mg/m3)	Levels Of Protection
0 - .1	Level D
.1 - 1	Level C
> 1	Level B

Nitric Acid

Readings (ppm)	Levels Of Protection
0 - .2	Level D
.2 - 2	Level C
> 2	Level B

Chromic Acid

Reading (mg/m3)	Level Of Protection
0 - .01	Level D
.01 - .1	Level C
> .1	Level B

Sodium Hydroxide

Readings (mg/m3)	Levels Of Protection
0 - .2	Level D
.2 - 2	Level C
> 2	Level B

Table 8 Dusts – Chromium 6^+ Hexavalent

Reading	Level of Protection/Action
0 – 0.005 mg/m^3	Level D
>0.005 – 0.01 mg/m^3	Level C
>0.01 mg/m^3	Level B, engineering controls

Direct-reading air monitoring will be conducted throughout all operations to ensure that PELs are not exceeded, and for CO, cyanides, LEL, and O_2 during confined space entry.

7.2 Personal Monitoring

Personal air monitoring is not anticipated during Level B operations. Air sampling will be performed, however, at the beginning of building decontamination activities when all liquids and drums have been removed and PPE can be reduced to Level C. Sampling will be conducted for cyanide and heavy metals.

8.0 DECONTAMINATION PROCEDURES

This section describes the procedures necessary to ensure that both personnel and equipment are free from contamination when they leave the site.

8.1 Personal Decontamination

Decontamination procedures will ensure that material which workers may have contacted in the EZ does not result in personal exposure and is not spread to clean areas of the site. This sequence describes the general decontamination procedure at its original implementation. The specific steps will vary depending on the site, the task, the protection level, etc.

1. Go to the end of EZ
2. Tool/equipment drop
3. Cross into CRZ
4. Remove booties and discard
5. Remove outer Saranex Tyvek
6. Remove first set of sample gloves and discard
7. Remove and wash respirator facepiece in decon area
8. Rinse respirator and hand dry
9. Remove inner Tyvek and discard in decon area
10. Remove second set of sample gloves and discard
11. Wash hands and arms

These procedures will be modified for different levels of protection. Contaminated PPE will be disposed of by accepted methods.

8.1.1 Suspected Contamination

Any employee suspected of sustaining skin contact with chemical materials will first use the emergency shower or the site shower. Following a thorough drenching, the worker will proceed to remove clothing, shower, don clean clothing, and immediately be taken to the first-aid station.

Contact with contaminated or suspected contaminated surfaces will be avoided. Personnel will not walk through puddles, leachate, or discolored surfaces; kneel on the ground; or lean, sit, or place equipment on any potentially contaminated surface or the ground. Whenever possible, sites will be approached and all work conducted from an upwind direction.

8.1.2 Personal Hygiene

Before any eating, smoking, or drinking, personnel will wash hands, arms, neck, and face. Showering will not be mandatory prior to leaving the site. Showers, soap, and towels will be available for use at personal discretion. However, the RM may require showering if it is necessary based on work activity, documentation of contamination on PPE, etc.

8.2 Equipment Decontamination

All equipment removed from the EZ will be considered contaminated and therefore will be thoroughly deconned prior to leaving the site. Decontamination procedures will vary depending upon the contaminant involved, but may include sweeping, wiping, scraping, hosing, or steaming the exterior of the equipment. Personnel performing this task will wear the proper PPE as prescribed by the CIH.

8.3 Disposal

Liquids and disposable clothing will be treated as contaminated waste and disposed of properly. Water generated from equipment decontamination will be retained for disposal. A dumpster for "CLEAN TRASH ONLY" will be located beside the office trailers.

9.0 GENERAL SAFETY

9.1 Safety Official

The designated SSO is Christopher Rhodes. The alternate SSO is the Response Manager, Kevin Shaver.

9.2 Daily Site Safety Meeting

A brief site safety meeting will be conducted on a routine basis to highlight key issues of concern (e.g., work practices, hazards encountered, proper use of equipment, emergency procedures, and environmental stresses). A log will be maintained to document safety activities and will include signatures of attendees.

9.3 Hazardous Substances

Earth Tech will list hazardous materials brought on site, the adverse health effects, the location, and the correct handling and storage requirements per the requirements of the Hazard Communication Standard 29 CFR 1910.1200. MSDSs containing this information will be located on site for periodic review. Personnel will follow requirements as outlined in the "Chemical Hazards" section of Earth Tech's Health and Safety Manual.

9.4 Drugs/Alcoholic Substances

Medicine and alcohol can potentiate or exaggerate the effects from exposure to toxic chemicals. Personnel who must take prescribed drugs will inform a qualified physician of the type of work to be performed, the potential for exposure to specific hazardous materials, and then shall follow the advice of the physician. Alcoholic beverage intake will be avoided. For additional information, Earth Tech personnel are to refer to the corporate SOPs concerning drugs and alcoholic substances.

10.0 PERSONNEL ACKNOWLEDGEMENT

All site personnel will read this HASP and emergency procedures and understand the contents (see Appendix T).

SECTION XV - EMERGENCY PLAN

15.0 Emergency Response/Contingency Plan

This section describes contingencies and emergency planning procedures to be implemented at the site. This plan is compatible with local, state and federal disaster and emergency management plans as appropriate.

15.1 Pre-Emergency Planning

During the site briefings held prior to field work, all employees will be trained in and reminded of provisions of the emergency response plan, communication systems, and evacuation routes. Section 7.1 identifies the hazardous conditions associated with specific site activities. The plan will be reviewed by the START HSO and revised if necessary. This will ensure that the plan is adequate and consistent with prevailing site conditions.

15.2 Personnel Roles and Lines of Authority

The Site Supervisor has primary responsibility for responding to and correcting emergency situations. This includes taking appropriate measure to ensure the safety of site personnel and the public. Possible actions may involve evacuation of personnel from the site area, and evacuation of adjacent residents. He/she is additionally responsible for ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed. The HSO may be called upon to act on the behalf of the site supervisor, and will direct responses to any medical emergency. The individual contractor organizations are responsible for assisting the project manager in his/her mission within the parameters of their scope of work.

15.3 Site Security

During any emergency situation it is important that site security and control are maintained. The emergency coordinator will be responsible for ensuring that no individuals are allowed to enter the site or be put in any danger due to the nature of the emergency situation on the site.

15.4 Emergency Recognition/Prevention

Personnel will be familiar with techniques of hazard recognition from pre-assignment training and site-specific briefings. The HSO is responsible for ensuring that prevention devices or equipment are available to personnel. The following presents a list of potential hazards and prevention/control measures:

HAZARD	PREVENTION/CONTROL	LOCATION
Fire/Explosion	Fire Extinguisher Alarm System Fire Inspections	CRZ
Spill	Sorbent Materials	CRZ
Air Release	Alarm System Evacuation Routes	CRZ

The location and of the equipment will be discussed during the site specific briefing and periodically during the project.

15.5 Evacuation Routes/Procedures

In the event of an emergency which necessitates an evacuation of the site, the following alarm procedures will be implemented:

Evacuation alarm notification should be made using three short blasts on the air horn, supplemented by the use of hand-held radios. All personnel should evacuate to a location upwind of any activities. Ensure that a predetermined location is identified off site in case of an emergency, so that all personnel can be accounted for. The predetermined location will be identified during the daily safety meeting.

Personnel will be expected to proceed to the closest exit with your buddy, and mobilize to the safe distance area associated with the evacuation route. Personnel will remain at that area until the re-entry alarm is sounded or an authorized individual provides further instructions.

15.6 Safe Distances and Places of Refuge

No single recommendation can be made for evacuation or safe distances because of the wide variety of emergencies which could occur. Safe distances can only be determined at the time of an emergency based on a combination of site and incident-specific criteria. However, the following measures are established to serve as general guidelines.

In the event of minor hazardous materials releases (small spills of low toxicity), workers in the affected area will report initially to the contamination reduction zone. Small spills or leaks (generally less than 55 gallons) will require initial evacuation of at least 50 feet in all directions to allow for cleanup and to prevent exposure. After initial assessment of the extent of the release and potential hazards, the emergency coordinator or his designee will determine the specific boundaries for evacuation. Appropriate steps such as caution

or leaks (generally less than 55 gallons) will require initial evacuation of at least 50 feet in all directions to allow for cleanup and to prevent exposure. After initial assessment of the extent of the release and potential hazards, the emergency coordinator or his designee will determine the specific boundaries for evacuation. Appropriate steps such as caution tape, rope, traffic cones, barricades, or personal monitors will be used to delineate and secure the boundaries.

In the event of a major hazardous material release (large spills of high toxicity/greater than 55 gallons), workers will be evacuated from the building/site. Workers will assemble at the entrance to the site for a head count by emergency coordinator and to await further instruction.

If an incident may threaten the health or safety of the surrounding community, the public will be informed and, if necessary, evacuated from the area. The emergency coordinator, or his designee will inform the proper agencies in the event that this is necessary.

Places of refuge will be established prior to the commencement of activities. These areas must be identified for the following incident:

- Chemical release
- Fire/explosion
- Power loss
- Medical emergency
- Hazardous weather

In general, evacuation will be made to the command post, unless the emergency coordinator determines otherwise. It is the responsibility of the emergency coordinator to determine when it is necessary to evacuate personnel to off-site locations.

In the event of an emergency evacuation, all the employees will gather at the entrance to the site until a head count establishes that all are present and accounted for. No one is to leave the site without notifying the emergency coordinator.

15.7 Emergency Contact/Notification System

The following list provides names and telephone numbers for emergency contact personnel. In the event of a medical emergency, personnel will take direction from the HSO and notify the appropriate emergency organization. In the event of a fire or spill, the site supervisor will notify the appropriate local, state, and federal agencies. Section 15.7.1 presents a Route To Hospital Map.

15.8 Emergency Medical Treatment Procedures

Any person who becomes ill or injured in the exclusion zone must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed (i.e., complete disrobing of the victim and redressing in clean coveralls or wrapping in a blanket). First aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must immediately be reported to the PM.

Any person being transported to a clinic or hospital for treatment should take with them information on the chemical(s) they have been exposed to at the site. This information is included in Table 3.1.

Any vehicle used to transport contaminated personnel will be treated and cleaned as necessary.

15.9 Fire or Explosion

In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival, the PM or designated alternate will advise the fire commander of the location, nature, and identification of the hazardous materials on site.

If it is safe to do so, site personnel may:

- Use fire fighting equipment available on site to control or extinguish the fire; and,
- Remove or isolate flammable or other hazardous materials which may contribute to the fire.

15.10 Spill or Leak

In the event of a spill or a leak, site personnel will:

- Inform their supervisor immediately;
- Locate the source of the spillage and stop the flow if it can be done safely; and,
- Begin containment and recovery of the spilled materials.

15.11 Emergency Equipment/Facilities

The following is a list of potentially available emergency equipment on site:

- First aid kit
- Fire extinguisher
- Site telephone
- Spill kits
- Emergency SCBAs
- Eye wash
- Two-way radio
- Sorbent material

15.12 Site Topography, Layout and Weather Conditions

Prior to work beginning at a site it is important to note particulars about that site that might be important during an emergency situation. In particular, it is important to note specifics about the site topography, the layout of the site and any special weather conditions that are known or are expected to occur. This information should then be used to ensure that emergency response planning has taken into account site-specific requirements.

Site Topography - The site is located on a relatively flat piece of property approximately 1.5 acres in size. The single story block and metal building encompasses most of the property. The building has a paved parking lot on one side and in the rear, and a narrow grassy area on the other side and in front.

Layout - The building contains office areas in the front, and the industrial area is located throughout the rest of the building.

Weather Conditions - The work at MPF is taking place during the months of December, January, February,March and April. The weather is excepted to be cold for most of the duration of the removal activities. However, most of the work will be taking place indoors, so the impact of severe weather should be somewhat minimized.

15.13 Accident Report

For all occupational injuries, accidents, and/or illnesses (or near misses) that occur on site, an Employee Incident Report should be filed.

Appendix A

Health Hazard Information (MSDS)

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: SODIUM BICARBONATE
FORMULA: NAHCO3
FORMULA WT: 84.01
CAS NO.: 00144-55-8
NIOSH/RTECS NO.: VZ0950000
COMMON SYNONYMS: BAKING SODA; SODIUM ACID CARBONATE
PRODUCT CODES: 3509,3508,3506
EFFECTIVE: 03/20/86
REVISION #01

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	0	NONE
FLAMMABILITY	-	0	NONE
REACTIVITY	-	1	SLIGHT
CONTACT	-	1	SLIGHT

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT

PRECAUTIONARY LABEL STATEMENTS

CAUTION
MAY CAUSE IRRITATION

DURING USE AVOID CONTACT WITH EYES, SKIN, CLOTHING. WASH THOROUGHLY AFTER HANDLING. WHEN NOT IN USE KEEP IN TIGHTLY CLOSED CONTAINER.

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
NOT APPLICABLE		

3 - PHYSICAL DATA

BOILING POINT: N/A

MELTING POINT: 50 C (122 F)

SPECIFIC GRAVITY: 2.16
(H2O=1)

VAPOR PRESSURE(MM HG): N/A

VAPOR DENSITY(AIR=1): N/A

EVAPORATION RATE: N/A
(BUTYL ACETATE=1)

SOLUBILITY(H2O): MODERATE (1 TO 10 %)

% VOLATILES BY VOLUME: 0

APPEARANCE & ODOR: ODORLESS WHITE CRYSTALLINE POWDER.

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP N/A

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE.

TOXIC GASES PRODUCED
CARBON MONOXIDE, CARBON DIOXIDE

5 - HEALTH HAZARD DATA

TOXICITY: LD50 (ORAL-RAT)(MG/KG) - 4220

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
DUST MAY IRRITATE SKIN OR EYES.

TARGET ORGANS
NONE IDENTIFIED

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
NONE INDICATED

EMERGENCY AND FIRST AID PROCEDURES

INGESTION: IF SWALLOWED AND THE PERSON IS CONSCIOUS, IMMEDIATELY GIVE LARGE AMOUNTS OF WATER. GET MEDICAL ATTENTION.

INHALATION: IF A PERSON BREATHES IN LARGE AMOUNTS, MOVE THE EXPOSED PERSON TO FRESH AIR. GET MEDICAL ATTENTION.

EYE CONTACT: IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION.

SKIN CONTACT: IMMEDIATELY WASH WITH PLENTY OF SOAP AND WATER FOR AT LEAST 15 MINUTES.

6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, HUMIDITY

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SUITABLE PROTECTIVE CLOTHING. CAREFULLY SWEEP UP AND REMOVE.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

8 - PROTECTIVE EQUIPMENT

VENTILATION:	USE ADEQUATE GENERAL OR LOCAL EXHAUST VENTILATION TO KEEP FUME OR DUST LEVELS AS LOW AS POSSIBLE.
RESPIRATORY PROTECTION:	NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION IS HIGH, USE AN APPROPRIATE RESPIRATOR OR DUST MASK.
EYE/SKIN PROTECTION:	SAFETY GLASSES WITH SIDESHIELDS, PROPER GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

SPECIAL PRECAUTIONS
KEEP CONTAINER TIGHTLY CLOSED. SUITABLE FOR ANY GENERAL CHEMICAL STORAGE AREA.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME CHEMICALS, N.O.S. (NON-REGULATED)

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME CHEMICALS, N.O.S. (NON-REGULATED)

SYNS:
AMMONIUM PENTADECAFLUOROOCTANATE
AMMONIUM PERFLUOROCAPRILATE
AMMONIUM PERFLUOROCAPRYLATE
APFO
FC-143
PERFLUOROAMMONIUM OCTANOATE

TOXICITY DATA:	CODEN:
skn-rbt 500 mg MOD	TXAPA9 81,348,85
eye-rbt 500 mg/24H MOD	AIHAAP 41,576,80
ihl-rat TCLo:25 mg/m^3/6H (6-15D preg):REP	FAATDF 4,429,84
orl-rat LD50:430 mg/kg	AIHAAP 41,576,80
ihl-rat LCLo:80 mg/m^3/4H	FAATDF 4,429,84
skn-rat LD50:7 g/kg	TXAPA9 81,348,85
skn-rbt LD50:4300 mg/kg	TXAPA9 81,348,85

THR: Poison by inhalation. Moderately toxic by ingestion. An eye and skin irritant. Experimental reproductive effects. When heated to decomposition it emits toxic fumes of F^- and NH_3.

ANP750 *HR: 3*
AMMONIUM-m-PERIODATE
mf: NH_4IO_4 mw: 209

PROP: Colorless crystals. Mp: explodes; d: 3.056.
THR: A contact explosive. See also IODATES; and IODIDES. When heated to decomposition it can emit toxic fumes of NH_3, NO_x and I^-. Heat, impact, and touch as from a scoop or an abrasive impact.

ANQ000 *HR: 3*
AMMONIUM PERMANGANATE
mf: NH_4MnO_4 mw: 137.0

PROP: Crystalline solid. Mp: explodes; d: 2.208 @ 10°.

Manganese compounds are on the Community Right To Know List.

THR: See MANGANESE COMPOUNDS. A powerful oxidizer. Moderately flammable by chemical reaction with reducing agents. Explosive when shocked or warmed to 60°. Can be exploded by percussion. When heated to decomposition it emits toxic fumes of NO_x and NH_3. Incompatible with reducing material; friction.

ANQ500 *HR: 2*
AMMONIUM PEROXO DISULFATE
mf: $H_8N_2O_8S_2$ mw: 228.2

THR: See also SULFATES. An unstable compound. Detonated via heat, friction or impact. A powerful oxidizer. Incompatible with Al; H_2O; powdered metal; Ag salts; Fe; Na_2O_2; zinc; NH_3. When heated to decomposition it emits very toxic fumes of SO_x, NO_x and NH_3.

ANQ750 *HR: 3*
AMMONIUM PEROXY CHROMATE
mf: $(NH_4)_3CrO_2$ mw: 234.1

PROP: Red-brown crystals. Mp: decomp @ 40°, bp: explodes @ 50°.

Chromium and its compounds are on the Community Right To Know List.

THR: A poison. See also CHROMIUM COMPOUNDS. Moderately flammable by chemical reaction with reducing agents. A powerful oxidizer. Moderately explosive when heated. When heated to decomposition it emits toxic NO_x, NH_3.

ANR000 *HR: 3*
AMMONIUM PERSULFATE
CAS: 7727-54-0 NIOSH: SE 0350000
DOT: 1444
mf: $O_8S_2 \cdot 2H_4N$ mw: 228.22

$$H_4NOSO_2OOSO_2ONH_4$$

PROP: White crystals. Mp: decomp @ 120°, d: 1.982.

SYNS:
AMMONIUM PEROXYDISULFATE
AMMONIUM PERSULFATE (ACGIH, DOT)
PERSULFATE D'AMMONIUM (FRENCH)

TOXICITY DATA:	CODEN:
ipr-rat LD50:226 mg/kg	DTLVS* 4,327,80
ivn-rbt LD50:178 mg/kg	DTLVS* 4,327,80
orl-rat LD50:820 mg/kg	AIHAAP 30,470,69

Reported in EPA TSCA Inventory.

ACGIH TLV: TWA 5 mg(S_2O_8)/m^3

DOT Classification: IMO: Oxidizer; Label: Oxidizer

THR: Poison by intravenous and intraperitoneal routes. Moderately toxic by ingestion. A powerful oxidizer which can react vigorously with reducing agents. Releases oxygen when heated. Mixtures with sodium peroxide are explosives sensitive to friction, heating above 75°C, or contact with CO_2 or water. Mixtures with (powdered aluminum + water) or (zinc + ammonia) are explosive. Violent reaction with iron or solutions of ammonia + silver salts. Solution with sulfuric acid is a strong oxidizing cleaning solution. When heated to decomposition it emits toxic fumes of SO_x, NH_3 and NO_x. For further information, see Ammonium Peroxydisulfate, Vol. 2, No. 3 of *DPIM Report*.

ANR250 *HR: 3*
AMMONIUM PHENYLDITHIOCARBAMATE
CAS: 1074-52-8 NIOSH: FD 0470000
mf: $C_7H_6NS_2 \cdot H_4N$ mw: 186.31

SYN: PHENYLDITHIOCARBAMIC ACID, AMMONIUM SALT

Chromium and its compounds are on the Community Right To Know List.

THR: Chromate salts are carcinogens. An oxidizer. Very unstable. It explodes above 0°C. Upon decomposition it emits toxic fumes of K_2O. See also CHROMIUM COMPOUNDS.

PLO500 ***HR: 3***
POTASSIUM PERCHLORATE
CAS: 7778-74-7 NIOSH: SC 9700000
DOT: 1489
mf: $ClO_4 \cdot K$ mw: 138.55

PROP: Colorless crystals or white powder. Decomp @ 400° and with organic matter. D: 2.52, mp: 610° ± 10°. Insol in alc.

SYNS:
PERIODIN
POTASSIUM HYPERCHLORIDE

TOXICITY DATA:	CODEN:
orl-rbt TDLo:2100 mg/kg (1-21D preg):REP	AMASA4 23,223,67

Reported in EPA TSCA Inventory.

DOT Classification: Label: Oxidizer

THR: Experimental reproductive effects. A powerful oxidizer. Severe irritant to skin, eyes, and mucous membranes. Has been implicated in aplastic anemia. Absorption can cause methemoglobinemia and kidney injury.

It has been involved in many industrial explosions. Explodes on contact with aluminum + barium nitrate + potassium nitrate + water. Forms explosive mixtures with aluminum powder + titanium dioxide; ethylene glycol (240°C); cotton lint (245°C); furfural (270°C); lactose; metal powders (e.g., aluminum; iron; magnesium; molybdenum; nickel; tantalum; titanium); sulfur; titanium hydride. Reaction with ethanol + heat forms the explosive ethyl perchlorate. Violent reaction or ignition under the proper conditions with aluminum + aluminum fluoride; barium chromate + tungsten or titanium; boron + magnesium + silicone rubber; ferrocenium diamminetetrakis(thiocyanato-N) chromate(1−); potassium hexacyanocobaltate(3−); Al + Mg; charcoal; F_2; Ni + Ti; reducing agents. When heated to decomposition it emits very toxic fumes of K_2O and Cl^-. See also PERCHLORATES.

PLO750 ***HR: 2***
POTASSIUM PERIODATE
CAS: 7790-21-8
mf: IKO_4 mw: 230.01

PROP: Colorless crystals. Mp: 582° (decomp), d: 3.618 @ 15°, loses O_2 @ 300°.

THR: Powerful oxidizer and irritating to skin, eyes and mucous membranes. Flammable when exposed to heat or flame. Traces of the periodate increase the impact sensitivity of with ammonium perchlorate. When heated to decomposition it emits very toxic fumes of K_2O and I^-. See also IODATES.

PLP000 ***HR: 3***
POTASSIUM PERMANGANATE
CAS: 7722-64-7 NIOSH: SD 6475000
DOT: 1490
mf: $MnO_4 \cdot K$ mw: 158.04

PROP: Dark purple crystals with a blue metallic sheen; sweetish astringent taste. Mp: decomp @ <240°, d: 2.703

SYNS:
CAIROX
CHAMELEON MINERAL
C.I. 77755
CONDY'S CRYSTALS
KALIUMPERMANGANAAT (DUTCH)
KALIUMPERMANGANAT (GERMAN)
PERMANGANATE de POTASSIUM (FRENCH)
PERMANGANATE OF POTASH (DOT)
POTASSIO (PERMANGANATO di) (ITALIAN)
POTASSIUM (PERMANGANATE de) (FRENCH)
POTASSIUM PERMANGANATE (DOT)

TOXICITY DATA:	CODEN:
dnd-esc 200 μmol/L	MUREAV 89,95,81
dnr-bcs 17 mg/L	WATRAG 14,1613,80
mmo-omi 10 ppm	JOBAAY 54,767,47
cyt-mus:mmr 1 mmol/L/48H	MUREAV 67,221,79
itt-rat TDLo:400 mg/kg (1D male):REP	FESTAS 24,884,73
itt-grb TDLo:25 mg/kg (1D male):REP	IJEBA6 14,617,76
orl-wmn TDLo:2400 μg/kg/D:GIT	AIPTAK 44,446,33
orl-hmn LDLo:143 mg/kg:PUL,GIT	34ZIAG -,493,69
orl-rat LD50:1090 mg/kg	AIHAAP 30,470,69
scu-mus LD50:500 mg/kg	27ZWAY 3.2,1346,-
orl-dog LDLo:400 mg/kg	YKYUA6 31,855,80
orl-rbt LDLo:600 mg/kg	YKYUA6 31,855,80
ivn-rbt LDLo:70 mg/kg	EQSSDX 1,1,75

Manganese and its compounds are on the Community Right To Know List. Reported in EPA TSCA Inventory. EPA Genetic Toxicology Program.

ACGIH TLV: CL 5 mg(Mn)/m^3

DOT Classification: Oxidizer; Label: Oxidizer

THR: A human poison by ingestion. Poison experimentally by ingestion and intravenous routes. Moderately toxic by subcutaneous route. Human systemic effects by ingestion: dyspnea, nausea, other gastrointestinal effects. Experimental reproductive effects. Mutagenic data. A strong irritant due to its oxidizing properties. Used as a topical antibacterial agent, a chemical reagent.

Flammable by chemical reaction. A powerful oxidizer. A dangerous explosion hazard; handle with care. Explosions may occur in contact with organic or readily oxidizable

materials, either when dry or in solution. Dangerous; keep away from combustible materials.

Explodes on contact with acetic acid; acetic anhydride; ammonium nitrate; dimethylformamide; formaldehyde; concentrated hydrochloric acid; potassium chloride + sulfuric acid; sulfuric acid + water. Forms sensitive explosive mixtures with aluminum powder + ammonium nitrate + glyceryl nitrate + nitrocellulose; ammonium perchlorate; arsenic; phosphorus; sulfur; slag wool; titanium.

Ignites on contact with Al_4C_3; dimethyl sulfoxide; ethylene glycol; H_2S_3; HCl; H_2SO_4; (H_2SO_4 + organic matter); (H_2SO_4 + KCl); NH_4ClO_4; NH_3; NH_4; NO_3; NH_2OH; organic matter; wood; oxygenated organic compounds (e.g., ethylene glycol; propane-1,2-diol; erythritol; mannitol; triethanolamine; 3-chloropropane-1,2-diol; acetaldehyde; isobutyraldehyde; benzaldehyde; acetylacetone; esters of ethylene glycol; lactic acid; acetic acid; oxalic acid).

Violent reaction or ignition under the proper conditions with acetone + tert-butylamine; alcohols + nitric acid; aluminum carbide; ammonia + sulfuric acid; antimony; coal + peroxomonosulfuric acid; dichloromethylsilane; dimethyl sulfoxide; ethanol + sulfuric acid; glycerol; concentrated hydrofluoric acid; hydrogen peroxide; hydrogen trisulfide; hydroxylamine; carbon; organic nitro compounds; polypropylene; 3,4,4′-trimethyldiphenyl sulfone.

When heated to decomposition it emits toxic fumes of K_2O. See also PERMANGANATES.

PLP250 ***HR: 3***

POTASSIUM PEROXIDE

CAS: 17014-71-0 NIOSH: TT 4450000

DOT: 1491

mf: KO_2 mw: 71.1

PROP: Yellow, amorphous mass (white crystals). Mp: 490°.

Reported in EPA TSCA Inventory.

DOT Classification: Label: Oxidizer

THR: Dangerous fire hazard by spontaneous chemical reaction. It is a very powerful oxidizer. Fires of this material should be handled like sodium peroxide fires. Moderate explosion hazard by spontaneous chemical reaction. Explodes on contact with water. Violent reactions with air; Sb; As; O_2; K. Vigorous reaction on contact with reducing materials. On contact with acid or acid fumes, it can emit toxic fumes. Incompatible with carbon; diselenium dichloride; ethanol; hydrocarbons; metals. When heated to decomposition it emits toxic fumes of K_2O. See also PEROXIDES, INORGANIC.

PLP500 ***HR: 3***

POTASSIUM PEROXYFERRATE

mf: FeK_2O_5 mw: 214.06

SYN: POTASSIUM PEROXOFERRATE(2−)

THR: A heat- and impact-sensitive explosive. Explodes on contact with charcoal; phosphorus; sulfur; sulfuric acid. When heated to decomposition it emits toxic fumes of K_2O.

PLP750 ***HR: 2***

POTASSIUM PEROXYSULFATE

CAS: 10361-76-9 NIOSH: SE 1000000

mf: $HO_5S{\bullet}K$ mw: 152.17

SYNS:

PEROXYSULFURIC ACID, POTASSIUM SALT

POTASSIUM MONOPERSULFATE

TOXICITY DATA:	CODEN:
skn-gpg 25% SEV	27ZTAP 3,118,69

THR: Very toxic and irritating to skin, eyes and mucous membranes. When heated to decomposition it emits toxic fumes of SO_x and K_2O. Used in laundry bleaches, scouring powders, denture cleaners, in general oxidizing reactions.

PLQ000 ***HR: 2***

POTASSIUM PERRHENATE

CAS: 10466-65-6 NIOSH: TT 4550000

mf: KO_4Re mw: 289.30

PROP: White crystals. Mp: 350°, d: 4.887.

TOXICITY DATA:	CODEN:
ipr-mus LD50:692 mg/kg	20PKA3 -,45,67

Reported in EPA TSCA Inventory.

THR: Moderately toxic by intraperitoneal route. A powerful oxidizer. May undergo hazardous reactions with flammable materials. When heated to decomposition it can emit K_2O. See also RHENIUM.

PLQ275 ***HR: 3***

POTASSIUM PHENYL DINITROMETHANIDE

CAS: 2918-51-8

mf: $C_7H_5KN_2O_4$ mw: 220.22

THR: An explosive. When heated to decomposition it emits toxic fumes of NO_x and K_2O. See also NITRO COMPOUNDS.

PLQ500 ***HR: 2***

POTASSIUM PHOSPHIDE

CAS: 20770-41-6 NIOSH: TT 4890000

mf: K_3P mw: 148.27

PROP: A solid.

SYN: PHOSPHURE de POTASSIUM (FRENCH)

TOXICITY DATA:	CODEN:
ihl-rat LCLo:580 ppm/1H	ZGSHAM 25,279,33
ihl-cat LCLo:173 ppm/2H	ZGSHAM 25,279,33
ihl-gpg LCLo:288 ppm/2H	ZGSHAM 25,279,33

Reported in EPA TSCA Inventory.

HACH -- CHROMIC ACID CLEANING SOLUTION
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 00F023608
Manufacturer's CAGE: 91224
Part No. Indicator: A
Part Number/Trade Name: CHROMIC ACID CLEANING SOLUTION

==========

General Information

==========

Company's Name: HACH CO
Company's Street: 5600 LINDBERGH DR
Company's P. O. Box: 389
Company's City: LOVELAND
Company's State: CO
Company's Country: US
Company's Zip Code: 80539
Company's Emerg Ph #: (303) 669-3050
Company's Info Ph #: (303) 669-3050
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 29AUG90
Safety Data Review Date: 23JUN92
Preparer's Company: HACH CO
Preparer's St Or P. O. Box: 5600 LINDBERGH DR
Preparer's City: LOVELAND
Preparer's State: CO
Preparer's Zip Code: 80539
MSDS Serial Number: BNJBK

==========

Ingredients/Identity Information

==========

Proprietary: NO
Ingredient: SULFURIC ACID IC=INTENDED CHANGES
Ingredient Sequence Number: 01
Percent: <40%
NIOSH (RTECS) Number: WS5600000
CAS Number: 7664-93-9
OSHA PEL: 1 MG/CUM
ACGIH TLV: 1 MG/CUM=IC

Proprietary: NO
Ingredient: CHROMIC ACID *92-2*
Ingredient Sequence Number: 02
Percent: <10%
NIOSH (RTECS) Number: 1003815CA
CAS Number: 13530-68-2

Proprietary: NO
Ingredient: SODIUM SULFATE ANHYDROUS, SODIUM SULFATE
Ingredient Sequence Number: 03
Percent: <5%
NIOSH (RTECS) Number: WE1650000
CAS Number: 7757-82-6

Proprietary: NO
Ingredient: WATER
Ingredient Sequence Number: 04
Percent: BALANCE
NIOSH (RTECS) Number: ZC0110000
CAS Number: 7732-18-5

==========

Physical/Chemical Characteristics

Appearance And Odor: DARK RED W/ORANGE PRECIPITATE
Boiling Point: 219.2F
Specific Gravity: 1.620
Solubility In Water: MISCIBLE
pH: <0.5

Fire and Explosion Hazard Data

Extinguishing Media: DRY CHEMICAL. DON'T USE WATER.
Unusual Fire And Expl Hazrds: SULFURIC ACID & CHROMIC ACID ARE POWERFUL, ACIDIC OXIDIZERS. MAY EMIT VERY TOXIC FUMES OF SULFUR OXIDES, CHROMIUM COMPOUNDS IN FIRE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HEAT
Materials To Avoid: OXIDIZABLE MATERIALS, REDUCERS, ORGANICS, & COMBUSTIBLES
Hazardous Decomp Products: TOXIC FUMES OF SULFUR OXIDES, CHROMIUM COMPOUNDS IN FIRE
Hazardous Poly Occur: NO

Health Hazard Data

Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: EYES: CORROSIVE. SKIN: CORROSIVE, & BURNS. INHALATION: CORROSIVE TO RESPIRATORY TRACT, EROSION TO TEETH, CHRONIC IRRITATION OR INFLAMMATION, BURNS ANY TISSUE, MOUTH SORENESS, & DIFFICULTY BREATHING.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
Signs/Symptoms Of Overexp: EYES: CORROSIVE. SKIN: CORROSIVE, & BURNS. INHALATION: CORROSIVE TO RESPIRATORY TRACT, EROSION OF TEETH, CHRONIC IRRITATION OR INFLAMMATION, BURNS ANY TISSUE, MOUTH SORENESS, & DIFFICULTY BREATHING.
Med Cond Aggravated By Exp: RESPIRATORY CONDITIONS, ASTHMA, ALLERGIES OR SENSITIVITY TO CHROMIC ACID OR CHROMATES
DON'T INDUCE VOMITING. GIVE LARGE QUANTITIES OF WATER. GIVE AT LEAST 1 OUNCE OF MILK OF MAGNESIA IN AN EQUAL AMOUNT OF WATER OR THE WHITES OF 3 REMOVE TO FRESH AIR. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: COVER CONTAMINATED SURFACE W/SODIUM BICARBONATE OR SODA ASH-SLAKED LIME MIXTURE (50-50). MIX/ADD WATER TO FORM SLURRY. SCOOP UP SLURRY & WASH W/SODA ASH SOLUTION.
Waste Disposal Method: NEUTRALIZED SLURRY MAY CONTAIN SUFFICIENT HEAVY METAL CONCENTRATION TO REQUIRE LANDFILLING OR TREATMENT AT AN EPA APPROVED SITE. DISPOSE OF IN ACCORDANCE W/FEDERAL, STATE, & LOCAL REGULATIONS. CORROSIVE MATERIAL UN1830.
Other Precautions: AVOID CONTACT W/EYES, SKIN, & CLOTHING. DON'T BREATH MIST OR VAPOR.

Control Measures

Ventilation: ADEQUATE
Protective Gloves: DISPOSABLE

Eye Protection: SAFETY GLASSES
Other Protective Equipment: LAB COAT
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.

==========

Transportation Data

==========

==========

Disposal Data

==========

==========

Label Data

==========

Label Required: YES
Technical Review Date: 23JUN92
Label Date: 27MAY92
Label Status: F
Common Name: CHROMIC ACID CLEANING SOLUTION
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Moderate: X
Fire Hazard-Slight: X
Reactivity Hazard-Slight: X
Special Hazard Precautions: EYES: CORROSIVE. SKIN: CORROSIVE, & BURNS. INHALATION: CORROSIVE TO RESPIRATORY TRACT, EROSION TO TEETH,CHRONIC IRRITATION OR INFLAMMATION, BURNS ANY TISSUE, MOUTH SORENESS, & DIFFICULTY BREATHING. TARGET ORGANS: TEETH, LUNGS, NASAL CAVITY, & PARANASAL SINUS.
Protect Eye: Y
Protect Skin: Y
Label Name: HACH CO
Label Street: 5600 LINDBERGH DR
Label P.O. Box: 389
Label City: LOVELAND
Label State: CO
Label Zip Code: 80539
Label Country: US
Label Emergency Number: (303) 669-3050
Year Procured: UNK

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

MALLINCKRODT -- MURIATIC ACID
MATERIAL SAFETY DATA SHEET
FSC: 6850
NIIN: 00F001553
Manufacturer's CAGE: 62910
Part No. Indicator: A
Part Number/Trade Name: MURIATIC ACID

==========

General Information

==========

Company's Name: MALLINCKRODT, INC.
Company's Emerg Ph #: (606) 987-7000
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 20JUN85
MSDS Serial Number: BBJNK

==========

Ingredients/Identity Information

==========

Proprietary: YES
Ingredient: PROPRIETARY
Ingredient Sequence Number: 01

==========

Physical/Chemical Characteristics

==========

Appearance And Odor: COLORLESS, PUNGENT ODOR OF HYDROGEN CHLORIDE.
Vapor Density (Air=1): 1.3
Specific Gravity: 1.18
Evaporation Rate And Ref: WATER = 1
Solubility In Water: INFINITELY
Percent Volatiles By Volume: 100%

==========

Fire and Explosion Hazard Data

==========

Extinguishing Media: ANY MEDIUM SUITABLE FOR EXTINGUISHNG THE SUPPORTING FIRE.
Special Fire Fighting Proc: FULL PROTECTIVE CLOTHING/SELF-CONTAINED BREATHING APPARATUS.
Unusual Fire And Expl Hazrds: CONTACT WITH METALS PRODUCES HYDROGEN WHICH FORMS EXPLOSIVE MIXTURES WITH AIR. STRONGLY CORROSIVE.

==========

Reactivity Data

==========

Stability: YES
Materials To Avoid: ALKALIS/METALS/ACETIC ANHYDRIDE/ETHYLENEDIAMINE/NH4OH/ETCS
Hazardous Decomp Products: FUMES OF HYDROGEN CHLORIDE/HYDROGEN IN W/METALS; CHLORINE
Hazardous Poly Occur: NO

==========

Health Hazard Data

==========

COUGH/CHOKING/INFLAM. RESP. TR. INGEST: NAUS/VOMIT
Emergency/First Aid Proc: SKIN/EYE: FLUSH WITH WATER FOR 15 MINUTES; CALL DOCTOR. INHALATION: GIVE ARTIFICIAL RESPIRATION IF BREATHING HAS STOPPED; CALL DOCTOR. INGESTION: CALL DOCTOR; IF PATIENT IS CONSCIOUS, GIVE WATER. DO NOT INDUCE VOMITING.

==========

Precautions for Safe Handling and Use

==========

Steps If Matl Released/Spill: COVER CONTAMINATED SURFACE WITH SODIUM BICARBONATE OR A SODA ASH, SLAKE LIME MIXTURE0-50). MIX & ADD WATER IF

NECESSARY TO FORM A SLURRY. SCOOP UP SLURRY & SH DOWN DRAIN WITH EXCESS WATER. WASH SITE WITH SODA ASH SOLUTIONS.
Waste Disposal Method: NEUTRALIZE AND DILUTE IN LARGE AMOUNT OF WATER. WASH TO SEWER WITH EXCESS WATER.
Precautions-Handling/Storing: PROTECT AGAINST PHYSICAL DAMAGE. STORE IN A COOL, WELL-VENTILATED PLACE, SEPARATE FROM ALL OXIZING AGENTS.

Control Measures

Respiratory Protection: GAS MASK WITH ACID VAPOR CANISTER OR SELF-BREATHING APPARATUS.
Ventilation: MECHANICAL
Protective Gloves: RUBBER
Eye Protection: GOGGLES
Other Protective Equipment: RUBBER SUIT OR LAB COAT.
Suppl. Safety & Health Data: P.O. BOX M/PARIS, KENTUCKY 40361.

Transportation Data

Disposal Data

Disposal Data Review Date: 89108
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 001
Landfill Ban Item: YES
Disposal Supplemental Data: P.O. BOX M/PARIS, KENTUCKY 40361. IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Code New: D002
1st EPA Haz Wst Name New: CORROSIVE
1st EPA Haz Wst Char New: CORROSIVITY
1st EPA Acute Hazard New: NO

Label Data

Label Required: YES
Label Status: G
Common Name: MURIATIC ACID
COUGH/CHOKING/INFLAM. RESP. TR. INGEST: NAUS/VOMIT
Label Name: MALLINCKRODT, INC.
Label Emergency Number: (606) 987-7000

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

SPEX INDUSTRIES -- CUSTOM PLASMA STANDARD EP-8 - 100 PPM BA; 10 PPM AS, CR, PB, AG;
MATERIAL SAFETY DATA SHEET
FSC: 6850
NIIN: 00F009722
Manufacturer's CAGE: 07977
Part No. Indicator: A
Part Number/Trade Name: CUSTOM PLASMA STANDARD EP-8

General Information

Item Name: 100 PPM BA; 10 PPM AS, CR, PB, AG; 5 PPM CD, SE
Company's Name: SPEX INDUSTRIES, INC
Company's Street: 3880 PARK AVE
Company's City: EDISON
Company's State: NJ
Company's Zip Code: 08820
Company's Emerg Ph #: (201) 549-7144
Company's Info Ph #: (201) 549-7144
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Date MSDS Prepared: 11DEC87
Safety Data Review Date: 23FEB90
MSDS Preparer's Name: LINDA P.
Preparer's Company: SPEX INDUSTRIES, INC
Preparer's St Or P. O. Box: 3880 PARK AVE
Preparer's City: EDISON
Preparer's State: NJ
Preparer's Zip Code: 08820
MSDS Serial Number: BHLMG

Ingredients/Identity Information

Proprietary: NO
Ingredient: NITRIC ACID (SARA III)
Ingredient Sequence Number: 01
Percent: 2%
NIOSH (RTECS) Number: QU5775000
CAS Number: 7697-37-2
OSHA PEL: 2 PPM/4 STEL
ACGIH TLV: 2 PPM/4 STEL; 9192

Physical/Chemical Characteristics

Appearance And Odor: TRANSPARENT WITH AN ACRID ODOR.
Specific Gravity: 1
Solubility In Water: SOLUBLE

Fire and Explosion Hazard Data

Extinguishing Media: APPROPRIATE TO SURROUNDING FIRE CONDITIONS.
Special Fire Fighting Proc: CONCENTRATE HNO3 REACTS EXPLOSIVELY W/ COMBUSTIBLE ORGANIC OR READILY OXIDIZABLE MATERIALS SUCH AS: ALCOHOL, WOOD, TURPENTINE, METAL POWDERS, HYDROGEN SULFIDE.
Unusual Fire And Expl Hazrds: TEMPERATURES MAY CAUSE CONTAINERS TO BURST & LIBERATE TOXIC OXIDES OF NITROGEN.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): UNDER NORMAL STORAGE & USE.
Materials To Avoid: CONTACT W/STRONG BASES WILL CAUSE VIOLENT SPLATTERING.
Hazardous Decomp Products: TOXIC NITROGEN OXIDE FUMES & VAPORS, HYDROGEN GAS. YDROGEN GAS.

Hazardous Poly Occur: NO
Conditions To Avoid (Poly): ITS HEAT OF REACTION W/REDUCING AGENTS OR COMBUSTIBLES MAY CAUSE IGNITION.

Health Hazard Data

LD50-LC50 Mixture: OR-HMN LDLO: 430 MG/KG (NITRIC ACID)
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: INHALATION: BURNING SENSATION, COUGHING, DEEP ULCERS/STAIN BRIGHT YELLOW OR YELLOWISH BROWN COLOR. INGESTION: PAIN/ BURNS OF THE MOUTH/ESOPHAGUS/GASTROINTESTINAL TRACT.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
Signs/Symptoms Of Overexp: IRRITANT OF THE EYES, MUCOUS MEMBRANES/SKIN. THE VAPOR/MIST MAY ERODE THE EXPOSED TEETH WITH PROLONGED EXPOSURE. INHALATION: MAY BE FATAL CAUSING SPASM, INFLAMMATION & EDEMA OF THE LARYNX & BRONCHI, CHEMICAL PNEUMONITIS & PULMONARY EDEMA. HAZARDS ARE FOR CONCENTRATED NITRIC ACID, PRODUCT IS DILUTE - 2% NITRIC ACID.
Emergency/First Aid Proc: EYES/SKIN: FLUSH W/WATER FOR AT LEAST 15 MINS. REMOVE/WASH CONTAMINATED CLOTHING THOROUGHLY BEFORE REUSE. INHALATION: MOVE TO FRESH AIR. IF IRRITATION CONTINUES, GET MED ATTN.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: VENTILATE AREA. DILUTE SPILL W/WATER/ NEUTRALIZE W/SODA ASH, LIMESTONE. WIPE UP & PUT INTO A SEALED CONTAINER FOR PROPER DISPOSAL. WASH SPILL SITE OFF W/WATER AFTER MATERIAL PICK UP IS COMPLETE.
Neutralizing Agent: SODA ASH, LIMESTONE
Waste Disposal Method: CONTACT LOCAL HAZARDOUS OR CHEMICAL WASTE DISPOSAL AGENCY FOR REGULATIONS.
Precautions-Handling/Storing: CONCENTRATE NITRIC ACID WILL ATTACK SOME FORMS OF PLASTICS, RUBBER, & COATINGS. STORE AT ROOM TEMPERATURE. KEEP TIGHTLY SEALED WHEN NOT IN USE.
Other Precautions: CORROSIVE. AVOID CONTACT W/EYES & SKIN. WASH CAREFULLY AFTER USE.

Control Measures

Respiratory Protection: WEAR OSHA/NIOSH APPROVED RESPIRATOR.
Ventilation: USE IN A CHEMICAL FUME HOOD
Protective Gloves: CHEMICAL RESISTANT
Eye Protection: GLASSES
Other Protective Equipment: LAB COAT
Work Hygienic Practices: REMOVE/WASH CONTAMINATED CLOTHING THOROUGHLY BEFORE REUSE.
Suppl. Safety & Health Data: SYMPTOMS & HEALTH HAZARDS FOR DILUTE NITRIC ACID ARE LESS SEVERE THAN EXPOSURE TO CONCENTRATED NITRIC ACID. THE HEALTH HAZARDS FOR CONENTRATED NITRIC ACID ARE GIVEN. CONTAINS: 100 PPM BARIUM; 10 PPM ARSENIC, CHROMIUM, LEAD, SILVER; 5 PPM CADMIUM & SELENIUM.

Transportation Data

Disposal Data

Label Data

Label Required: YES

Label Status: G
Common Name: CUSTOM PLASMA STANDARD EP-8
Special Hazard Precautions: INHALATION: BURNING SENSATION, COUGHING, DEEP ULCERS/STAIN BRIGHT YELLOW OR YELLOWISH BROWN COLOR. INGESTION: PAIN/ BURNS OF THE MOUTH/ESOPHAGUS/GASTROINTESTINAL TRACT. IRRITANT OF THE EYES, MUCOUS MEMBRANES/SKIN. THE VAPOR/MIST MAY ERODE THE EXPOSED TEETH WITH PROLONGED EXPOSURE. INHALATION: MAY BE FATAL CAUSING SPASM, INFLAMMATION & EDEMA OF THE LARYNX & BRONCHI, CHEMICAL PNEUMONITIS & PULMONARY EDEMA. HAZARDS ARE FOR CONCENTRATED NITRIC ACID, PRODUCT IS DILUTE - 2% NITRIC ACID.
Label Name: SPEX INDUSTRIES, INC
Label Street: 3880 PARK AVE
Label City: EDISON
Label State: NJ
Label Zip Code: 08820
Label Emergency Number: (201) 549-7144

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

EXIDE HORSHAM PA 19044 -- BATTERY ELECTROLYTE - SULFURIC ACID
MATERIAL SAFETY DATA SHEET
FSC: 6140
NIIN: 00F007231
Manufacturer's CAGE: 20038
Part No. Indicator: A
Part Number/Trade Name: BATTERY ELECTROLYTE

General Information

Item Name: SULFURIC ACID
Company's Name: EXIDE CORP/HORSHAM, PA 19044
Company's Emerg Ph #: (215) 441-7453
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 002
Date MSDS Prepared: 01JAN87
Safety Data Review Date: 29SEP88
MSDS Serial Number: BBXMT

Ingredients/Identity Information

Proprietary: NO
Ingredient: SULFURIC ACID (SARA III)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: WS5600000
CAS Number: 7664-93-9
OSHA PEL: 1 MG/M3
ACGIH TLV: 1 MG/M3; 9192

Physical/Chemical Characteristics

Appearance And Odor: CLEAR OR SLIGHTLY CLOUDY
Boiling Point: 530F
Specific Gravity: 1.250
Solubility In Water: COMPLETE
Percent Volatiles By Volume: NIL

Fire and Explosion Hazard Data

Flash Point: NON-FLAMMABLE
Unusual Fire And Expl Hazrds: STRONG OXIDIZING AGENT, WILL ATTACK SOME METALS AND RELEASE EXPLOSIVE HYDROGEN GAS.

Reactivity Data

Stability: YES
Hazardous Poly Occur: NO

Health Hazard Data

Signs/Symptoms Of Overexp: SKIN OR MUCOUS MEMBRANE IRRITATION, DENTAL EROSION.
Emergency/First Aid Proc: WASH FROM SKIN AND EYES WITH WATER, CALL PHYSICIAN.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: DILUTE WITH WATER OR NEUTRALIZE WITH ALKALI.
Waste Disposal Method: NEUTRALIZE AND DISCHARGE INTO SEWER SYSTEM.
Precautions-Handling/Storing: AVOID BREATHING MIST, AVOID CONTACT WITH SKIN AND EYES.
Other Precautions: N/K

Control Measures

Respiratory Protection: DUST/MIST FILTER
Ventilation: LOCAL: ENCLOSE PT OF MIST. MECH: 3-4 AIR CHANGES/HR
Protective Gloves: RUBBER/PLASTIC
Eye Protection: CHEMICAL GOGGLES
Other Protective Equipment: APRON
Suppl. Safety & Health Data: MSDS DATE: 5/31/86

Transportation Data

Disposal Data

Label Data

Label Required: YES
Label Status: G
Common Name: BATTERY ELECTROLYTE
Special Hazard Precautions: SKIN OR MUCOUS MEMBRANE IRRITATION, DENTAL EROSION.
Label Name: EXIDE CORP/HORSHAM, PA 19044
Label Emergency Number: (215) 441-7453

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

HELLIGE -- R-1190C HYDROCHLORIC ACID
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 00N006779
Manufacturer's CAGE: 90767
Part No. Indicator: A
Part Number/Trade Name: R-1190C HYDROCHLORIC ACID

General Information

Company's Name: HELLIGE,INC.
Company's Street: 185 MARINE ST
Company's City: FARMINGDALE
Company's State: NY
Company's Country: US
Company's Zip Code: 11735
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Date MSDS Prepared: 01JAN87
Safety Data Review Date: 20MAR86
MSDS Serial Number: BCNPC
NRC/State License Number: N/A
Net Propellant Weight-Ammo: N/A

Ingredients/Identity Information

Proprietary: NO
Ingredient: HYDROGEN CHLORIDE (HYDROCHLORIC ACID) (SARA III)
Ingredient Sequence Number: 01
Percent: 85
NIOSH (RTECS) Number: MW4025000
CAS Number: 7647-01-0
OSHA PEL: C 5 PPM
ACGIH TLV: C 5 PPM; 9192

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS SOLUTION,STRONG HYDROCHLORIC ACID ODOR.
Boiling Point: 55F
Vapor Density (Air=1): 1.3
Specific Gravity: 1.18
Solubility In Water: COMPLETE
Percent Volatiles By Volume: 100

Fire and Explosion Hazard Data

Flash Point: N/A
Extinguishing Media: H*2O FOG,CO*2,DRY CHEMICAL
Special Fire Fighting Proc: N/A
Unusual Fire And Expl Hazrds: N/A

Reactivity Data

Stability: YES
Materials To Avoid: ALKALIS AMMONIA,KEEP CNTNR CLOSED.
Hazardous Decomp Products: HYDROCHLORIC ACID VAPORS WHEN HEATED.
Hazardous Poly Occur: NO

Health Hazard Data

Signs/Symptoms Of Overexp: CAUSES SEVERE BURNS,PERMANENT VISUAL DAMAGE
POSS.IF INGEST,CORROSION OF MUCUS MEMBRANES(SEE SUPP DAT
Emergency/First Aid Proc: EYES:IMMED FLUSH W/PLENTY OF H*2O FOR @ LEAST 15

MIN. SKIN: FLUSH W/PLENTY OF H*2O WHILE REMOVING CONTAMINATED CLOTHING & SHOES. INGEST: DO NOT GIVE EMETICS. GIVE TAP H*2O,LIME H*2O/MILK OF MAGNESIA.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: FLUSH SPILLED MATERIAL W/LARGE AMOUNTS OF H*2O.THEN NEUTRALIZE W/BAKING SODA/SODIUM CARBONATE.WASH WITH PLENTY OF H*2O DOWN THE DRAIN.
Waste Disposal Method: ADD SLOWLY TO LARGE VOLUME OF AGITATED SOLUTION OF SODA ASH & SLAKED LIME. ADD NEUTRALIZED SOLUTION TO EXCESS RUNNING H*2O DOWN THE DRAIN. DISPOSE IAW FEDERAL,STATE & LOCAL REGULATIONS.
Precautions-Handling/Storing: AVOID CONTACT W/SKIN,EYES, CLOTHING. DO NOT TAKE INTERNALLY. AVOID BREATHING VAPORS. WORK UNDER HOOL. STORE @ ROOM TEMPERATURE.

Control Measures

Respiratory Protection: NIOSH/MSHA APPRVD RESP PROT DEPENDING ON CONDITION OF USE.
Ventilation: USE MECHANICAL HOOD VENTILATION.
Protective Gloves: PLASTIC GLOVES
Eye Protection: COVERALL GOGGLES
Other Protective Equipment: IMPERVIOUS APRON,EYE BATH
Suppl. Safety & Health Data: EFTS OF OVEREXP;,ESOPHAGUS,STOMACH VOMITING, CIRCULATORY COLLAPSE & DEATH MAY OCCUR.

Transportation Data

Trans Data Review Date: 86141
DOT PSN Code: HJG
DOT Proper Shipping Name: HYDROCHLORIC ACID, SOLUTION
DOT Class: 8
DOT ID Number: UN1789
DOT Pack Group: II
DOT Label: CORROSIVE
IMO PSN Code: IEX
IMO Proper Shipping Name: HYDROCHLORIC ACID,SOLUTION
IMO Regulations Page Number: 8183
IMO UN Number: 1789
IMO UN Class: 8
IMO Subsidiary Risk Label: -
IATA PSN Code: NPG
IATA UN ID Number: 1789
IATA Proper Shipping Name: HYDROCHLORIC ACID SOLUTION
IATA UN Class: 8
IATA Label: CORROSIVE
AFI PSN Code: NPG
AFI Symbols: T
AFI Prop. Shipping Name: HYDROCHLORIC ACID, SOLUTION
AFI Class: 8
AFI ID Number: UN1789
AFI Pack Group: II
AFI Label: CORROSIVE
AFI Special Prov: A3,A6,N41
AFI Basic Pac Ref: 12-5

Disposal Data

Disposal Data Review Date: 89046
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 001
Landfill Ban Item: YES
Disposal Supplemental Data: EFTS OF OVEREXP;,ESOPHAGUS,STOMACH VOMITING,

CIRCULATORY COLLAPSE & DEATH MAY OCCUR. IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Code New: D002
1st EPA Haz Wst Name New: CORROSIVE
1st EPA Haz Wst Char New: CORROSIVITY
1st EPA Acute Hazard New: NO

==========

Label Data

==========

Label Required: YES
Label Status: F
Special Hazard Precautions: CONTACT CAUSES BURNS TO SKIN AND EYES. IF INHALED, MAY BE HARMFUL. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.
Label Name: ORBECO ANALYTICAL SYSTEMS INC
Label Street: 185 MARINE ST
Label City: FARMINGDALE
Label State: NY
Label Zip Code: 11735
Label Country: US

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

FISHER SCIENTIFIC -- SODIUM HYDROXIDE, SOLID
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 00F000326
Manufacturer's CAGE: 1B464
Part No. Indicator: A
Part Number/Trade Name: SODIUM HYDROXIDE, SOLID

General Information

Company's Name: FISHER SCIENTIFIC COMPANY
Company's Emerg Ph #: 201/796-7100
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 10JAN85
MSDS Serial Number: BBGKB

Ingredients/Identity Information

Proprietary: YES
Ingredient: PROPRIETARY
Ingredient Sequence Number: 01

Physical/Chemical Characteristics

Appearance And Odor: WHITE PELLETS, FLAKES, OR BEADS
Boiling Point: 1390C
Specific Gravity: 2.13
Solubility In Water: 50%

Fire and Explosion Hazard Data

Extinguishing Media: NA
Special Fire Fighting Proc: NA
Unusual Fire And Expl Hazrds: MOLTEN ANHYDROUS CAUSTIC SODA CAN CAUSE CHARRING AND SUBSEQUENT IGNITION OF COMBUSTIBLE MATERIALS.

Reactivity Data

Stability: YES
Materials To Avoid: STRONG ACIDS, ALUMINUM, REACTS VIOLENTLY W/ MANY ORGANICS
Hazardous Poly Occur: NO

Health Hazard Data

Signs/Symptoms Of Overexp: CAUSES SEVERE BURNS TO SKIN & EYES. INHALATION OF DUST CAUSES RESPIRATORY INJURY.
Emergency/First Aid Proc: SKIN & EYES: FLUSH WITH WATER FOR 15 MINUTES. EYES: CONSULT PHYSICIAN. INGESTION: DO NOT INDUCE VOMITING. GIVE SEVERAL GLASSES OF WATER OR MILK. CALL A PHYSICIAN.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: SWEEP UP, AND PUT IN A SUITABLE CONTAINER.
Waste Disposal Method: DISPOSE OF BY MEANS AS TO COMPLY WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS OR CONTACT AN APPROVED AND LICENSED DISPOSAL AGENCY.

Control Measures

Respiratory Protection: APPROVED RESPIRATOR

Ventilation: LOCAL EXHAUST ACCEPTABLE, MECHANICAL ACCEPTABLE
Protective Gloves: RUBBER
Eye Protection: SAFETY GOGGLES/FACE SHIEL
Other Protective Equipment: RUBBER APRON, EYE WASH
Suppl. Safety & Health Data: P.O. BOX 375, 1 REAGENT LANE/ FAIR LAWN, NJ 07410

==========

Transportation Data

==========

==========

Disposal Data

==========

==========

Label Data

==========

Label Required: YES
Label Status: G
Common Name: SODIUM HYDROXIDE, SOLID
Special Hazard Precautions: CAUSES SEVERE BURNS TO SKIN & EYES. INHALATION OF DUST CAUSES RESPIRATORY INJURY.
Label Name: FISHER SCIENTIFIC COMPANY
Label Emergency Number: 201/796-7100

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

HENRY SCHEIN -- SODIUM HYPOCHLORITE - BLEACH
MATERIAL SAFETY DATA SHEET
FSC: 6850
NIIN: 00F012205
Manufacturer's CAGE: 64682
Part No. Indicator: A
Part Number/Trade Name: SODIUM HYPOCHLORITE - BLEACH

General Information

Company's Name: HENRY SCHEIN INC.
Company's Street: 5 HARBOR PARK DRIVE
Company's City: PORT WASHINGTON
Company's State: NY
Company's Zip Code: 11050
Company's Emerg Ph #: (516) 621-4300
Company's Info Ph #: (516) 621-4300
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Date MSDS Prepared: 01JAN87
Safety Data Review Date: 17AUG90
Preparer's Company: HENRY SCHEIN INC.
Preparer's St Or P. O. Box: 5 HARBOR PARK DRIVE
Preparer's City: PORT WASHINGTON
Preparer's State: NY
Preparer's Zip Code: 11050
MSDS Serial Number: BJBXD

Ingredients/Identity Information

Proprietary: NO
Ingredient: SODIUM HYPOCHLORITE (SARA III)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: NH3486300
CAS Number: 7681-52-9
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

Physical/Chemical Characteristics

Appearance And Odor: LIGHT YELLOW WITH CHLORINE ODOR.
Boiling Point: 220F
Specific Gravity: 1.210

Fire and Explosion Hazard Data

Special Fire Fighting Proc: NON-FLAMMABLE
Unusual Fire And Expl Hazrds: CONTACT WITH WOOL CAN CAUSE HEAT BUILD-UP & RESULTANT BURN.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HEAT, SUNLIGHT
Materials To Avoid: HEAVY METALS, ACIDS, REDUCING AGENTS, PEROXIDE, AMMONIA, & ORGANIC COMPOUNDS.
Hazardous Decomp Products: CHLORINE & HYPOCHLOROUS ACID
Hazardous Poly Occur: NO

Health Hazard Data

Route Of Entry - Inhalation: NO
Route Of Entry - Skin: YES

Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: SKIN: PROLONGED CONTACT CAN CAUSE CHEMICAL BURN.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
Signs/Symptoms Of Overexp: SKIN: PROLONGED CONTACT CAN CAUSE CHEMICAL BURN.
Emergency/First Aid Proc: SKIN: REMOVE CONTAMINATED CLOTHING. FLUSH W/ WATER. IF BURNED CONSULT PHYSICIAN.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: FLUSH W/WATER. WEAR PROTECTIVE CLOTHING & RESPIRATOR.
Waste Disposal Method: DILUTE W/WATER.
Precautions-Handling/Storing: STORE IN COOL, COVERED CONTAINER OF APPROVED MATERIALS. AVOID SPILLAGE & CONTAMINANTS.

Control Measures

Protective Gloves: RUBBER, VINYL
Eye Protection: GOGGLES
Other Protective Equipment: PROTECTIVE CLOTHING, RUBBER BOOTS
Work Hygienic Practices: REMOVE CONTAMINATED CLOTHING.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Label Status: G
Common Name: SODIUM HYPOCHLORITE - BLEACH
Special Hazard Precautions: SKIN: PROLONGED CONTACT CAN CAUSE CHEMICAL BURN. SKIN: PROLONGED CONTACT CAN CAUSE CHEMICAL BURN.
Label Name: HENRY SCHEIN INC.
Label Street: 5 HARBOR PARK DRIVE
Label City: PORT WASHINGTON
Label State: NY
Label Zip Code: 11050
Label Emergency Number: (516) 621-4300

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

ALLIED CHEMICAL -- METHANOL - METHANOL, ACS
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 001958663
Manufacturer's CAGE: 1L164
Part No. Indicator: A
Part Number/Trade Name: METHANOL

==========

General Information

==========

Item Name: METHANOL, ACS
Company's Name: ALLIED CHEMICAL CORP
Company's Street: COLUMBIA RD & PARK AVE
Company's P. O. Box: 1087R
Company's City: MORRISTOWN
Company's State: NJ
Company's Country: US
Company's Zip Code: 07960
Record No. For Safety Entry: 002
Tot Safety Entries This Stk#: 003
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 17JUL85
Supply Item Manager: CX
MSDS Serial Number: BDJCG
Specification Number: O-C-265
Unit Of Issue: BT
Unit Of Issue Container Qty: 1 LB

==========

Ingredients/Identity Information

==========

Proprietary: NO
Ingredient: METHYL ALCOHOL (METHANOL) (SARA III)
Ingredient Sequence Number: 01
Percent: 99.5
NIOSH (RTECS) Number: PC1400000
CAS Number: 67-56-1
OSHA PEL: S,200PPM/250STEL
ACGIH TLV: S,200PPM/250STEL; 93

==========

Physical/Chemical Characteristics

==========

Appearance And Odor: COLORLESS LIQUID,MILD ALCOHOL ODOR.
Boiling Point: 148F,64C
Vapor Pressure (MM Hg/70 F): 92
Vapor Density (Air=1): 1.1
Specific Gravity: 0.79
Evaporation Rate And Ref: 6.3(ETHER=1)
Solubility In Water: COMPLETE
Percent Volatiles By Volume: 100
Autoignition Temperature: 725F

==========

Fire and Explosion Hazard Data

==========

Flash Point: 54F,12C (CC)
Lower Explosive Limit: 6.0
Upper Explosive Limit: 36.5
Extinguishing Media: ALCOHOL FOAM,CO*2,DRY CHEMICAL
Special Fire Fighting Proc: USE H*2O TO COOL CONT.WEAR NIOSH APPROVD SELF-CNTND BRTHG AP
Unusual Fire And Expl Hazrds: STATIC EXPLOSIONS REPORTED FOR AS LITTLE AS 30%. VAPOR IS EXPLOSV HAZARD.

==========

Reactivity Data

==========
Stability: YES
Cond To Avoid (Stability): HEAT,IGNITION SOURCES.
Materials To Avoid: STRONG OXIDANTS,ACTIVE METALS,ISOCYANATES
Hazardous Decomp Products: COMBUSTION REPORTED TO YIELD CO*2 & CO
Hazardous Poly Occur: NO
==========

Health Hazard Data

==========
Signs/Symptoms Of Overexp: EYE:IRRIT. SKI:DEFATTING. INH:HDCH,DIZZ, WEAK,GASTROINT &/OR SIGHT PROBLEMS. ING:DROWS,DRUNK,BLINDNES
Emergency/First Aid Proc: SKIN:WASH W/WATER.EYES:FLUSH W/WATER. INHALED:GIVE CPR/OXYGEN IF NECESSARY.INGEST:IMMED.INDUCE VOMITING BY HAVING VICTIM DRINK SOAPY WATER.FOR ALL ROUTES KEEP PATIENT WARM/COVER EYESSEEK MEDICAL ATTN.
==========

Precautions for Safe Handling and Use

==========
Steps If Matl Released/Spill: ELIMINATE IGNITION SOURCES.REMOVE UNPROTECTED PERSONS.STOP LEAK IF POSSIBLE W/O RISK.SM SPILL:FLUSH AREA W LG AMT OF H*2O.LG SPILL:DIKE FOR LATER DISPOSAL AND DILUTE W LG AMTS H*2O.KEEP OUT OF SEWERS.RUNOFF MAY POLLUTE.
Waste Disposal Method: ELIMINATE IGNITION SOURCES.NOTIFY AUTHORITIES. PACKAGE AND DISPOSE IN ACCORDANCE WITH LOCAL,STSTE AND FEDERAL REGULATIONS.
Precautions-Handling/Storing: AVOID HEAT,IGNITION SOURCES.GROUND CONT FOR POURING/TRANSFER.STORE IN COOL WELL-VENTILATED AREAS.USE NON-SPARKING TOOLS
Other Precautions: REGULARLY INSPECT ALL ELECTRICAL,MECHANICAL,INCLUDING AUTOMOTIVE,EQUIPMENT NEAR METHANOL.
==========

Control Measures

==========
Respiratory Protection: FOR HIGH CONCENTRATIONS,AIR SUPPLIED RESPIRATOR.
Ventilation: DOWN-DRAFT TYPE LOCAL EXHAUST.50 PPM HOOD FACE VELOCITY
Protective Gloves: RUBBER/NEOPRENE
Eye Protection: CHEMICAL GOGGLES
Other Protective Equipment: STATIC FREE PROTECTV CLOTHING,BOOTS
==========

Transportation Data

==========
Trans Data Review Date: 82270
DOT PSN Code: JEZ
DOT Proper Shipping Name: METHANOL, OR METHYL ALCOHOL
DOT Class: 3
DOT ID Number: UN1230
DOT Pack Group: II
DOT Label: FLAMMABLE LIQUID, POISON
IMO PSN Code: JPB
IMO Proper Shipping Name: METHANOL
IMO Regulations Page Number: 3251
IMO UN Number: 1230
IMO UN Class: 3.2
IMO Subsidiary Risk Label: TOXIC *
IATA PSN Code: QHQ
IATA UN ID Number: 1230
IATA Proper Shipping Name: METHANOL *
IATA UN Class: 3
IATA Subsidiary Risk Class: 6.1
IATA Label: FLAMMABLE LIQUID & TOXIC *
AFI PSN Code: QHQ
AFI Prop. Shipping Name: METHANOL OR METHYL ALCOHOL
AFI Class: 3
AFI ID Number: UN1230
AFI Pack Group: II
AFI Label: FLAMMABLE LIQUID, POISON

protection will be downgraded to Level C protection with use of full-facepiece APRs with organic vapor cartridges.

Incompatibilities

- Strong oxidizers
- Strong acids
- Oxidative decomposition by flame or source of heat may produce additional hazardous substances (phosgene, hydrogen chloride, chlorine, hydrochloric acid).

First Aid

- Eyes or skin: flush with water immediately for 15 minutes.
- Inhalation: remove to fresh air, provide artificial respiration if breathing has stopped.

Handling

- Flammable/combustible liquids may be drawn from or transferred into vessels, containers, or portable tanks after a spill only:
  - from original labeled shipping containers;
  - through a closed piping system;
  - from a portable tank or container by means of a device drawing through an opening in the top of the tank or containers, or by gravity through listed self-closing valve or self-closing faucet.

- Transferring liquids by means of pressurizing the container with air is prohibited. Transferring liquids by pressure of inert gas is permitted only if controls, including pressure relief devices, are provided to limit the pressure so it cannot exceed the design pressure of the vessel, tank, or container.

- Flammable liquids shall not be dispensed into metal containers unless the nozzle of the fill pipe is in electric contact with the containers. This can be accomplished by maintaining metallic contact during filling by a bond wire between them, or by other conductive paths having an electrical resistance not greater than 6 ohms.

- Portable fire extinguishers (carbon dioxide, dry foam) shall be provided as needed for the particular hazard involved.

- "No smoking" signs will be posted in a conspicuous place near work activity.

- For cleanup operations employing flammable/combustible solvents, only approved Flammable Material-Underwrite Laboratories (FM-UL) recognized applicating and dispensing devices, such as parts, washers, or bench cans, will be used.

- Rags and waste containing flammable/combustible solvents used during cleanup will be placed in FM- or UL-recognized metal disposal barrels. The cans will be emptied and properly disposed of as waste.

6.5.7.4 Flammable Solids Cleanup

PPE

- Wear nitrile gloves and protective clothing when handling irritants (i.e., epoxy, resins).
- Wear goggles/face shield
- Wash promptly when skin becomes contaminated.
- Remove contaminated clothes or non-impervious wet clothing immediately.
- Provide eyewash/source of water, and fire extinguishing equipment.

Respiratory Protection

In the event of fire, toxic fumes may be generated that will require the use of SCBAs for employees designated to fight the fire.

Incompatibilities

Source of ignition (welding, burning, heating/spark-producing devices).

First Aid

- Eye: irrigate immediately.
- Skin: wash with soap and water immediately.
- Inhalation: remove to fresh air, or provide artificial respiration.

Handling

- Spilled flammable material shall be isolated and removed to an approved storage location prior to disposal.

6.5.7.5 Oxidizer Cleanup

PPE

- Wear full protective clothing and gloves.
- Wear goggles/ face shield.
- Wash immediately when skin becomes contaminated.
- Immediately remove non-impervious clothing that becomes contaminated.
- Provide eyewash or source of quick drenching water.

Respiratory Protection

SCBAs are required when cleaning up oxidizers from large containers (i.e., 55-gallon drum) or if a large quantity is used in a confined space or a location with restricted ventilation. (Full-face respirator with cartridges to protect against exposure to acid gases will be used on minor spills once the site supervisor has determined the potential health hazard(s) is minimal.)

Incompatibilities

- Combustible substances or other readily oxidizable materials.
- Finely divided metals.

First Aid

- Eye: wash eyes immediately with large amounts of water.
- Skin: flush contaminated skin with water/soap solution.
- Inhalation: remove to fresh air. If breathing has stopped, perform artificial respiration.

Handling

- Special care should be exercised when cleaning oxidizer spills due to these properties:
  - potential to cause a fire when in contact with combustible materials;
  - reacts violently with water; and
  - when involved in a fire may react violently.

Other Precautions to Note

- Smoking is prohibited.
- Do not come in contact with reducing agents.
- Avoid sources of ignition from any cause including static electricity or friction.
- Provide suitable means for extinguishing fires (dry powder or sand).

6.5.7.6 Corrosive Cleanup

PPE

- Wear full protective clothing with gloves
- Wear goggles/face shield
- Wash skin immediately upon contact
- Immediately remove any wet clothing
- Provide eyewash or quick drenching facilities.

Respiratory Protection

- See oxidizers

Incompatibilities

- Oxidizers
- Strong acids

First Aid

- Eye: irrigate for 15 minutes
- Skin: flush with water immediately
- Inhalation: remove to fresh air

Handling

- Prevent contact between corrosive substance and skin, mucous membrane, and eyes due to their producing chemical burns/ulcerations.

- Spill containers, pipes, etc., must be of a material resistant to corrosive substances or be protected by suitable coatings impervious to and unaffected by corrosives.

- All spill cleanup containers should be clearly labeled and marked with the danger symbol for corrosives.

- Strong corrosives may, on contact with organic matter or other chemicals, cause fire. Therefore, appropriate measures (fire extinguishers) should be provided to prevent this potential hazard.

- Avoid the use of neutralizing solutions - the heat produced by neutralizing may often produce a greater hazard.

6.5.7.7 Miscellaneous Hazardous Materials

Carcinogens

All contact with carcinogens should be avoided. Personal protective methods are to be used to supplement engineering controls and to prevent all skin or respiratory contact. Full body protective clothing and gloves should be used in addition to a full-facepiece, positive pressure respirator. On exit from the work place, employees should shower and change into street clothes, placing their protective clothing and equipment in impervious containers for disposal.

Note:

In the event that a chemical does not fall into one of the aforementioned categories, its toxicity reaction will be based on its threshold limit value (TLV). This is an average concentration for a normal 8-hour work day and a 40-hour work week to which nearly all workers may be repeatedly exposed without adverse effect. As a general guide to follow, current research has established the levels and degrees of toxicity shown in Table 2:

Table 2 Toxicity Levels

Toxicity	TLV
Slightly Toxic	500 ppm
Moderately Toxic	100 - 500 ppm
Highly Toxic	< 100 ppm

ppm = parts per million

The TLV will be noted on the chemical(s)' MSDS. Contact the Health and Safety Department for appropriate PPE and correct work practices while handling the chemical.

7.0 MONITORING PROGRAM

The goals of the monitoring program are to provide real-time data on potential short-term employee exposure while working on site, and to ensure the designated PPE is appropriate. Employees will be immediately informed of any results indicating possible overexposure, or the need to upgrade the level of PPE.

AFI Special Prov: N74,N75
AFI Basic Pac Ref: 10-11

==========

Disposal Data

==========

Disposal Data Review Date: 88270
Rec # For This Disp Entry: 04
Tot Disp Entries Per NSN: 004
Landfill Ban Item: YES
Disposal Supplemental Data: ITEM IS 96% MINIMUM ASSAY. IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Code New: P106
1st EPA Haz Wst Name New: SODIUM CYANIDE
1st EPA Haz Wst Char New: ACUTELY TOXIC (H)
1st EPA Acute Hazard New: YES
2nd EPA Haz Wst Code New: D003
2nd EPA Haz Wst Name New: REACTIVE
2nd EPA Haz Wst Char New: REACTIVITY
2nd EPA Acute Hazard New: NO

==========

Label Data

==========

Label Required: YES
Label Status: F
Special Hazard Precautions: POISONOUS; MAY BE FATAL IF INHALED, SWALLOWED OR ABSORBED THROUGH SKIN. CONTACT MAY CAUSE BURNS TO SKIN AND EYES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY GIVE OFF POISONOUS GASES AND CAUSE WATER POLLUTION. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES.
Label Name: CHEMICAL COMMODITIES AGENCY
Label Street: 27447 PACIFIC STREET
Label City: HIGHLAND
Label State: CA
Label Zip Code: 92346-2640
Label Country: US
Label Emergency Number: 714-864-2310

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

OCTAGON PROCESS -- HYDROGEN PEROXIDE - HYDROGEN PEROXIDE,ACS
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 002331711
Manufacturer's CAGE: 82925
Part No. Indicator: A
Part Number/Trade Name: HYDROGEN PEROXIDE

General Information

Item Name: HYDROGEN PEROXIDE,ACS
Company's Name: OCTAGON PROCESS,INC
Company's Street: 596 RIVER ROAD
Company's City: EDGEWATER
Company's State: NJ
Company's Country: US
Company's Zip Code: 07020-1105
Company's Emerg Ph #: 201-945-9400
Company's Info Ph #: 201-945-9400
Record No. For Safety Entry: 018
Tot Safety Entries This Stk#: 018
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 13NOV78
MSDS Serial Number: BDLGM
Specification Number: O-C-265
Hazard Characteristic Code: D4
Unit Of Issue: BT
Unit Of Issue Container Qty: 16 OZ

Ingredients/Identity Information

Proprietary: NO
Ingredient: HYDROGEN PEROXIDE (SARA III)
Ingredient Sequence Number: 01
Percent: 29
NIOSH (RTECS) Number: MX0900000
CAS Number: 7722-84-1
OSHA PEL: 1 PPM
ACGIH TLV: 1 PPM; 9192

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS,HEAVY LIQUID,SLIGHTLY SHARP ODOR
Boiling Point: 225
Vapor Pressure (MM Hg/70 F): 24
Vapor Density (Air=1): 1.11
Specific Gravity: 1.39
Solubility In Water: COMPLETE

Fire and Explosion Hazard Data

Flash Point: N/A
Extinguishing Media: WATER ONLY
Special Fire Fighting Proc: WEAR FULL PROTECTIVE CLOTHING
Unusual Fire And Expl Hazrds: HIGHLY DANGEROUS WHEN HEATED,SHOCKED OR CONTAMINATED-MATERIAL CAN EXPLODE OR START FIRES

Reactivity Data

Stability: YES
Cond To Avoid (Stability): KEEP FROM HEAT,KEEP FROM BECOMING CONTAMINATED
Materials To Avoid: ORGANICS OR EASILY OXIDIZABLE SUBSTANCES
Hazardous Poly Occur: NO

Conditions To Avoid (Poly): KEEP FROM HEAT,KEE FROM BECOMING CONTAMINATED

Health Hazard Data

Emergency/First Aid Proc: EYES-FLUSH EYES WITH WATER GOR AT LEAST 15 MIN.CALL DOCTOR. SKIN-FLUSH WITH WATER,REMOVE CONTAMINATED CLOTHING & WASH THOROUGHLY.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: FLUSH WITH LOTS OF WATER VERY QUICKLY
Waste Disposal Method: FLUSH WITH WATER - QUICK USE OF WATER CANNOT BE OVEREMPHASIZED.
Precautions-Handling/Storing: STORE IN COOL DRY PLACE,AWAY FROM FLAMMABLES OR OXIDIZERS
Other Precautions: KEEP CONTAINER OUT OF SUN AND AWAY FROM HEAT

Control Measures

Respiratory Protection: SELF CONTAINED BREATHING APPARATUS WITH FACE SHIELD
Ventilation: LOCAL-USE VENTING FAN
Protective Gloves: SEE SUPP DATA
Eye Protection: GOGGLES
Other Protective Equipment: NEOPRENE OR PLASTIC BOOTS & APRON
Suppl. Safety & Health Data: ITEM COMPOSITION IS IN PERCENT BY VOLUME. PROTECTIVE GLOVES - NEOPRENE, BUTYL RUBBER OR VINYL

Transportation Data

Trans Data Review Date: 78317
DOT PSN Code: HMM
DOT Proper Shipping Name: HYDROGEN PEROXIDE, AQUEOUS SOLUTIONS
DOT Class: 5.1
DOT ID Number: UN2014
DOT Pack Group: II
DOT Label: OXIDIZER, CORROSIVE
IMO PSN Code: IIL
IMO Proper Shipping Name: HYDROGEN PEROXIDE, AQUEOUS SOLUTION, *
IMO Regulations Page Number: 5151
IMO UN Number: 2014
IMO UN Class: 5.1
IMO Subsidiary Risk Label: CORROSIVE
IATA UN ID Number: 929
IATA Proper Shipping Name: HYDROGEN PEROXIDE SOLUTION CONTAINING MORE THAN 8% BUT NOT MORE THAN 40% HYDROGEN PEROXIDE BY WEIGHT
IATA Label: OXIDIZER
AFI PSN Code: NUB
AFI Prop. Shipping Name: HYDROGEN PEROXIDE, AQUEOUS SOLUTIONS
AFI Class: 5.1
AFI ID Number: UN2014
AFI Pack Group: II
AFI Label: OXIDIZER,CORROSIVE
AFI Special Prov: A2,A3,A6
AFI Basic Pac Ref: 9-8

Disposal Data

Disposal Data Review Date: 88036
Rec # For This Disp Entry: 09
Tot Disp Entries Per NSN: 009
Landfill Ban Item: YES
Disposal Supplemental Data: ITEM COMPOSITION IS IN PERCENT BY VOLUME. PROTECTIVE GLOVES - NEOPRENE, BUTYL RUBBER OR VINYL IN CASE OF ACCIDENTAL

EXPOSURE OR DISCHARGE, CONSULT MANUFACTURER FOR HEALTH AND SAFETY INFORMATION.
1st EPA Haz Wst Code New: D001
1st EPA Haz Wst Name New: IGNITIBLE
1st EPA Haz Wst Char New: IGNITABILITY
1st EPA Acute Hazard New: NO
2nd EPA Haz Wst Code New: D003
2nd EPA Haz Wst Name New: REACTIVE
2nd EPA Haz Wst Char New: REACTIVITY

==========

Label Data

==========

Label Required: YES
Label Status: F
Special Hazard Precautions: IF INHALED, MAY BE HARMFUL. CONTACT MAY CAUSE BURNS TO SKIN AND EYES. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.
Label Name: OCTAGON PROCESS INC.
Label Street: 596 RIVER ROAD
Label City: EDGEWATER
Label State: NJ
Label Zip Code: 07020-1105
Label Country: US
Label Emergency Number: 201-945-9400

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

CHEMTECH ST LOUIS MO 63131 -- LIQUID NICKEL CHLORIDE, #7003
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 00F004805
Manufacturer's CAGE: 56894
Part No. Indicator: A
Part Number/Trade Name: LIQUID NICKEL CHLORIDE, #7003

General Information

Company's Name: CHEMTECH/ST. LOUIS, MO 63131
Company's Emerg Ph #: (314) 966-9900
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Date MSDS Prepared: 01JAN87
Safety Data Review Date: 04MAY87
MSDS Serial Number: BBRBD

Ingredients/Identity Information

Proprietary: NO
Ingredient: NICKEL CHLORIDE (SARA III)
Ingredient Sequence Number: 01
Percent: 53.5
NIOSH (RTECS) Number: QR6475000
CAS Number: 7718-54-9
OSHA PEL: 1 MG NI/M3
ACGIH TLV: 0.1 MG NI/M3; 9293

Physical/Chemical Characteristics

Appearance And Odor: CLEAR GREEN LIQUID ODOR: ODORLESS.
Specific Gravity: 1.34
Solubility In Water: COMPLETE
Percent Volatiles By Volume: 46.5

Fire and Explosion Hazard Data

Extinguishing Media: DOESN'T BURN OR SUPPORT COMBUSTION.
Special Fire Fighting Proc: APPROPRIATE PROTECTIVE APPAREL WHERE PRODUCT MAY BE LEAKING.
Unusual Fire And Expl Hazrds: NONE

Reactivity Data

Stability: YES
Materials To Avoid: NONE
Hazardous Decomp Products: NONE
Hazardous Poly Occur: NO

Health Hazard Data

Signs/Symptoms Of Overexp: MAY IRRITATE SKIN OR CAUSE BURNS TO EYES. PRODUCT IS TOXIC BY INGESTION.
Emergency/First Aid Proc: EYE CONTACT: FLUSH W/WATER FOR 15 MINUTES. GET REMOVE TO FRESH AIR. INGESTION: DRINK 2 GLASSES OF WATER AND INDUCE VOMITING. CALL A PHYSICIAN IMMEDIATELY.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: ISOLATE SPILL. ABSORB ON INERT MEDIA AND CONTAINERIZE OR FLUSH TO WASTE DISPOSAL. USAPPROPRIATE PROTECTIVE EQUIPMENT TO PREVENT CONTACT.

AFI Basic Pac Ref: 7-7

==========

Disposal Data

==========

Disposal Data Review Date: 88084
Rec # For This Disp Entry: 02
Tot Disp Entries Per NSN: 003
Landfill Ban Item: YES
Disposal Supplemental Data: IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Code New: U154
1st EPA Haz Wst Name New: METHANOL; METHYL ALCOHOL
1st EPA Haz Wst Char New: IGNITABLE (I)
1st EPA Acute Hazard New: NO

==========

Label Data

==========

Label Required: YES
Label Status: F
Special Hazard Precautions: POISONOUS; MAY BE FATAL IF INHALED, SWALLOWED OR ABSORBED THROUGH SKIN. CONTACT MAY CAUSE BURNS TO SKIN AND EYES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.
Label Name: ALLIED CORP., ALLIED CHEMICAL,CSS DEPT.
Label Street: COLUMBIA RD & PARK AVE
Label P.O. Box: 1087R
Label City: MORRISTOWN
Label State: NJ
Label Zip Code: 07960
Label Country: US

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

CITY CHEMICAL -- SILVER NITRATE - SILVER NITRATE,ACS
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 002330126
Manufacturer's CAGE: 83628
Part No. Indicator: A
Part Number/Trade Name: SILVER NITRATE

General Information

Item Name: SILVER NITRATE,ACS
Company's Name: CITY CHEMICAL CORP
Company's Street: 132 WEST 22ND ST
Company's City: NEW YORK
Company's State: NY
Company's Country: US
Company's Zip Code: 10011
Record No. For Safety Entry: 006
Tot Safety Entries This Stk#: 006
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 13NOV78
MSDS Serial Number: BDLFX
Specification Number: O-C-265
Unit Of Issue: BT
Net Unit Weight: 4 OZ

Ingredients/Identity Information

Proprietary: NO
Ingredient: SILVER NITRATE (SARA III)
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: VW4725000
CAS Number: 7761-88-8
OSHA PEL: 0.01 MG AG/M3
ACGIH TLV: 0.01 MG AG/M3; 9192

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS CRYSTALS
Solubility In Water: APPRECIABLE

Fire and Explosion Hazard Data

Flash Point: N/A
Extinguishing Media: WATER
Special Fire Fighting Proc: AVOID BREATHING FUMES OR DUST
Unusual Fire And Expl Hazrds: EMITS POISONOUS FUMES WHEN HEATED

Reactivity Data

Materials To Avoid: FLAMMABLES & EASILY OXIDIZABLE SOURCES, ACIDS

Health Hazard Data

Signs/Symptoms Of Overexp: TOXIC-DANGEROUS TO EYES AND RESPIRATORY TRACT IN DUST FORM - IRRITATES THEM
Emergency/First Aid Proc: REMOVE TO FRESH AIR - CALL PHYSICIAN

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: FLOOD WITH ABUNDANCE OF WATER
Waste Disposal Method: OVERPACK IN CONTAINER SUITABLE FOR SHIPPING

OXIDIZERS
Precautions-Handling/Storing: STORE IN COOL DRY PLACE AWAY FROM ACIDS, FLAMMABLES & EASILY OXIDIZABLE SUBSTANCES
Other Precautions: PROTECT FROM PHYSICAL DAMAGE AND SHOCK

Control Measures

Respiratory Protection: USBM MASK
Ventilation: LOCAL-AS NEEDED,GENERAL-AS NEEDED
Protective Gloves: RUBBER
Eye Protection: GOGGLES

Transportation Data

Trans Data Review Date: 87209
DOT PSN Code: NBI
DOT Proper Shipping Name: SILVER NITRATE
DOT Class: 5.1
DOT ID Number: UN1493
DOT Pack Group: II
DOT Label: OXIDIZER
IMO PSN Code: NMD
IMO Proper Shipping Name: SILVER NITRATE
IMO Regulations Page Number: 5177
IMO UN Number: 1493
IMO UN Class: 5.1
IMO Subsidiary Risk Label: -
IATA PSN Code: WHU
IATA UN ID Number: 1493
IATA Proper Shipping Name: SILVER NITRATE
IATA UN Class: 5.1
IATA Label: OXIDIZER
AFI PSN Code: WHU
AFI Prop. Shipping Name: SILVER NITRATE
AFI Class: 5.1
AFI ID Number: UN1493
AFI Pack Group: II
AFI Label: OXIDIZER
AFI Basic Pac Ref: 9-10

Disposal Data

Disposal Data Review Date: 88077
Rec # For This Disp Entry: 05
Tot Disp Entries Per NSN: 005
Landfill Ban Item: YES
Disposal Supplemental Data: IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Code New: D001
1st EPA Haz Wst Name New: IGNITIBLE
1st EPA Haz Wst Char New: IGNITABILITY
1st EPA Acute Hazard New: NO
2nd EPA Haz Wst Code New: D011
2nd EPA Haz Wst Name New: EP TOXIC (>5.0 MG/L SILVER)
2nd EPA Haz Wst Char New: EP TOXICITY
2nd EPA Acute Hazard New: NO

Label Data

Label Required: YES
Label Status: F
Special Hazard Precautions: IF INHALED, MAY BE HARMFUL. CONTACT MAY CAUSE BURNS TO SKIN AND EYES. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.

Label Name: CITY CHEMICAL CORP
Label Street: 132 WEST 22ND ST
Label City: NEW YORK
Label State: NY
Label Zip Code: 10011
Label Country: US

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

EM SCIENCE -- ZINC CYANIDE,ZX0075
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 00N008652
Manufacturer's CAGE: 63612
Part No. Indicator: A
Part Number/Trade Name: ZINC CYANIDE,ZX0075

General Information

Company's Name: EM SCIENCE, (EM INDUSTRIES, INC.)
Company's Street: 111 WOODCREST DRIVE
Company's City: CHERRY HILL
Company's State: NJ
Company's Zip Code: 08034
Company's Emerg Ph #: 609-354-9200
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Date MSDS Prepared: 21JUL86
Safety Data Review Date: 05AUG88
MSDS Serial Number: BCQSX
Unit Of Issue: NK

Ingredients/Identity Information

Proprietary: NO
Ingredient: ZINC CYANIDE (SARA III)
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: ZH1575000
CAS Number: 557-21-1
OSHA PEL: 5 MG CN/M3
ACGIH TLV: 5 MG CN/M3; 9192
Other Recommended Limit: 5 MG/CUM TWA

Physical/Chemical Characteristics

Appearance And Odor: GRAY-WHITE TO WHITE POWDER.
Boiling Point: N/A
Melting Point: 800C,1472F
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Specific Gravity: 1.85 (WATER=1)
Decomposition Temperature: N/K (FP N)
Evaporation Rate And Ref: N/A
Solubility In Water: INSOLUBLE
Percent Volatiles By Volume: N/A

Fire and Explosion Hazard Data

Flash Point: N/A
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: DRY CHEMICAL,FOAM,CARBON DIOXIDE.
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: CONTACT WITH ACIDS RELEASES TOXIC AND FLAMMABLE GAS,HYDROGEN CYANIDE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): UNKNOWN

Materials To Avoid: ACIDS,OXIDIZERS.
Hazardous Decomp Products: HYDROGEN CYANIDE.
Conditions To Avoid (Poly): N/K (FP N/ORNL)

Health Hazard Data

LD50-LC50 Mixture: LDLO 100 MG/KG IPR RAT
Health Haz Acute And Chronic: SEE SIGNS & SYMPTOMS OF OVEREXPOSURE.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
Signs/Symptoms Of Overexp: INHAL:POISON.MAY CAUSE HEADACHE,LACK OF APPETITE,DIZZINESS,RAPID RESPIRATION,RAPID PULSE AND NAUSEA,CONVULSIONS AND DEATH.SKIN:MAY BE ABSORBED THROUGH SKIN TO CAUSE SYMPTOMS SAME AS THOSE FOR INHAL.EYES:N/K (FP N/ORNL).INGEST:SAME AS THOSE FOR INHAL.
Med Cond Aggravated By Exp: N/K (FP N/ORNL)
Emergency/First Aid Proc: INHAL:REMOVE TO FRESH AIR.USE ARTF RESP IF REMOVE CONTAM CLTHG.FLUSH W/ H*2O FOR AT LEAST 15 MINUTES.EYES:FLUSH W/ H*2O FOR AT LEAST 15 MINUTES.GET MD ATTN.INGEST:GIVE 2 GLASSES H*2O & INDUCE VOMITING.NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.CALL A PHYSICIAN.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: AVOID DUST.SWEEP UP MATERIAL USING DUST PREVENTING MATERIAL.
Neutralizing Agent: N/K (FP N/ORNL)
Waste Disposal Method: DISPOSAL MUST BE IN ACCORDANCE WITH FEDERAL,STATE AND LOCAL REGULATIONS (FP N).
Precautions-Handling/Storing: STORE IN COOL,DRY PLACE.ALWAYS KEEP CNTNR TIGHTLY CLSD.DO NOT STORE NEAR ACIDS OR WITH FOOD STUFFS.CONTAINERS HAZARDOUS WHEN EMPTY.DO (SEE SUPP DATA)
Other Precautions: N/K (FP N/ORNL)

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N). USE APPROVED ORGANIC VAPOR/DUST MASK RESPIRATOR OR WITHIN APPROVED FUME HOOD.(MFR)
Ventilation: USE NECESSARY VENTILATION TO KEEP CONCENTRATION BELOW TLV;CAN USE WITHIN APPROVED FUME HOOD.
Protective Gloves: PROTECTIVE GLOVES NECESSARY.
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).
Other Protective Equipment: N/K (FP N)
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.
Suppl. Safety & Health Data: HANDLING/STORAGE PREC:NOT GET IN EYES,ON SKIN,OR ON CLOTHING.

Transportation Data

Trans Data Review Date: 88242
DOT PSN Code: PZR
DOT Proper Shipping Name: ZINC CYANIDE
DOT Class: 6.1
DOT ID Number: UN1713
DOT Pack Group: I
DOT Label: POISON
IMO PSN Code: PRV
IMO Proper Shipping Name: ZINC CYANIDE
IMO Regulations Page Number: 6282
IMO UN Number: 1713
IMO UN Class: 6.1
IMO Subsidiary Risk Label: -

IATA PSN Code: ZRW
IATA UN ID Number: 1713
IATA Proper Shipping Name: ZINC CYANIDE
IATA UN Class: 6.1
IATA Label: TOXIC *
AFI PSN Code: ZRW
AFI Prop. Shipping Name: ZINC CYANIDE
AFI Class: 6.1
AFI ID Number: UN1713
AFI Pack Group: I
AFI Label: POISON
AFI Basic Pac Ref: 10-11

==========

Disposal Data

==========

==========

Label Data

==========

Label Required: YES
Label Status: F
Special Hazard Precautions: POISONOUS IF SWALLOWED. INHALATION OF DUST POISONOUS. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.
Label Name: E M SCIENCE DIV OF E M INDUSTRIES INC
Label Street: 111 WOODCREST RD
Label City: CHERRY HILL
Label State: NJ
Label Zip Code: 08034-0395
Label Country: US

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

ASHLAND CHEMICAL -- COPPER CYANIDE
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 00K000307
Manufacturer's CAGE: 5A188
Part No. Indicator: A
Part Number/Trade Name: COPPER CYANIDE

General Information

Company's Name: ASHLAND CHEMICAL CO
Company's P. O. Box: 2219
Company's City: COLUMBUS
Company's State: OH
Company's Country: US
Company's Zip Code: 43216
Company's Emerg Ph #: 606-324-1133
Company's Info Ph #: 614-889-3333
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Date MSDS Prepared: 01JAN87
Safety Data Review Date: 02SEP87
MSDS Serial Number: BBZSX
Hazard Characteristic Code: T2

Ingredients/Identity Information

Proprietary: NO
Ingredient: COPPER CYANIDE CAS 544-92-3 *NOTE: NIOSH RECOMMENDS A 10 MIN MAX AT 5MG/CUM AS CN*
Ingredient Sequence Number: 01
Percent: >95
NIOSH (RTECS) Number: GL7175000
CAS Number: 4367-08-2
ACGIH TLV: 5 MG/CUM

Physical/Chemical Characteristics

Appearance And Odor: GREEN POWDER
Boiling Point: N/A
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Specific Gravity: 2.920
Evaporation Rate And Ref: N/A
Solubility In Water: NEGLIGIBLE
Percent Volatiles By Volume: N/A

Fire and Explosion Hazard Data

Flash Point: N/A
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Special Fire Fighting Proc: SELF-CONTAINED BREATHING DEV. IN POSTVE PRESS MODE,FULL CLOT
Unusual Fire And Expl Hazrds: N/A

Reactivity Data

Stability: YES
Cond To Avoid (Stability): AVOID CONTACT W/STRONG MINERAL & ORGANIC ACIDS
Materials To Avoid: CORROSIVE ACIDS
Hazardous Decomp Products: HYDROGEN CYANIDE
Hazardous Poly Occur: NO

Conditions To Avoid (Poly): AVOID CONTACT W/STRONG MINERAL ACIDS & STRONG ORGANICS.

Health Hazard Data

WEAKNES,DIZZY,HEADACHE,VOMIT,COMA,CONVULSIONS,DEATH.SKIN IRR
Emergency/First Aid Proc: SKIN:FLUSH W/WATER AT LEAST 15 MIN.EYE:FLUSH W/WATER.INGEST:GIVE 2 GLASSES OF WATER,INDUCE VOMIT.INHALE:REMOVE TO FRESH AIR,CPR OR OXYGEN IF NEEDED.KEEP PERSON WARM,QUIET.OBTAIN PROMPT MEDICAL ATTEN.HAVE A CYANIDE FIRST AID KIT ON HAND.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: SMALL SPILL:VENTILATE AREA.SWEEP MATL.ONTO PAPER.LARGE SPILL:SHOVEL INTO CONTAINERS.SWEEP AREA OF SPILL TO CLEAN UP ANY RESIDUAL MATERIAL.
Waste Disposal Method: SM SPILL:PACK MATL.IN PAPER & DEPOSIT IN LANDFILL IN ACCORD W.LOCAL,STATE,FEDERAL REGS.LARGE SPILL:DEPOSIT IN A LANDFILL IN ACCORDANCE WITH LOCAL,STATE & FED. REGULATIONS.ADD EXCESS CALCIUM HYPOCHLORITE,AFTER 24 HOURS FLUSHDWN DRAIN W/WATER.
Precautions-Handling/Storing: CONTAINRS MAY BE HAZARD EMPTIED(RETAIN PRODUCT RESIDUES).OBSERVE ALL HAZARD PRECAUTIONS.
Other Precautions: ON CONTACT W/ACID,ACID FUMES,WATER STEAM, WILL PRODUCE HYDROGEN CYANIDE WHICH IS A DEADLY GAS.

Control Measures

Respiratory Protection: IF TLV>5 MG/CUM,APPROVED AIR SUPPLIED RESPRATOR IS ADVISD.
Ventilation: PROVIDE MECHANICAL(GENERAL/LOCAL EXHAUST)TO MAINTN BELOW TLV
Protective Gloves: NEOPRENE
Eye Protection: CHEM GOGGLES/FACE SHIELD
Other Protective Equipment: IMPERVIOUS CLOTHING TO PREVENT SKIN CONTACT.
Suppl. Safety & Health Data: MSDS 06/86-86115 ** CYANIDE FIRST AID KIT AND INDIVIDUAL TRAINED IN ITS USE MUST BE AVAILABLE WHEN HANDLING THIS PRODUCT

Transportation Data

Trans Data Review Date: 87245
DOT PSN Code: DUX
DOT Proper Shipping Name: COPPER CYANIDE
DOT Class: 6.1
DOT ID Number: UN1587
DOT Pack Group: II
DOT Label: POISON
IMO PSN Code: ERF
IMO Proper Shipping Name: COPPER CYANIDE
IMO Regulations Page Number: 6113
IMO UN Number: 1587
IMO UN Class: 6.1
IMO Subsidiary Risk Label: -
IATA PSN Code: HHF
IATA UN ID Number: 1587
IATA Proper Shipping Name: COPPER CYANIDE
IATA UN Class: 6.1
IATA Label: TOXIC *
AFI PSN Code: HHF
AFI Prop. Shipping Name: COPPER CYANIDE
AFI Class: 6.1
AFI ID Number: UN1587
AFI Pack Group: II
AFI Label: POISON
AFI Basic Pac Ref: 10-12

Disposal Data

==========

Disposal Data Review Date: 88025
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 001
Landfill Ban Item: YES
Disposal Supplemental Data: MSDS 06/86-86115 ** CYANIDE FIRST AID KIT AND INDIVIDUAL TRAINED IN ITS USE MUST BE AVAILABLE WHEN HANDLING THIS PRODUCT IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Code New: P029
1st EPA Haz Wst Name New: COPPER CYANIDES
1st EPA Haz Wst Char New: ACUTELY TOXIC (H)
1st EPA Acute Hazard New: YES

==========

Label Data

==========

Label Required: YES
Label Status: F
Special Hazard Precautions: POISONOUS IF SWALLOWED. INHALATION OF DUST POISONOUS. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.
Label Name: ASHLAND CHEMICAL CO.
Label P.O. Box: 2219
Label City: COLUMBUS
Label State: OH
Label Zip Code: 43216
Label Country: US
Label Emergency Number: 606-324-1133

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

CHEMICAL COMMODITIES E I DUPONT DE NEMOUR(MF -- CYANOBRIK-CYANOGRAN SODIUM CYANIDE
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 002426336
Manufacturer's CAGE: 60777
Part No. Indicator: A
Part Number/Trade Name: CYANOBRIK/CYANOGRAN SODIUM CYANIDE

General Information

Item Name: SODIUM CYANIDE, TECHNICAL
Company's Name: CHEMICAL COMMODITIES(DIST),E I DUPONT DE NEMOUR(MF
Company's Street: 27447 PACIFIC STREET
Company's City: HIGHLAND
Company's State: CA
Company's Country: US
Company's Zip Code: 92346-2640
Company's Emerg Ph #: 714-864-2310
Company's Info Ph #: 714-864-2310
Record No. For Safety Entry: 007
Tot Safety Entries This Stk#: 007
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 12JUN80
MSDS Serial Number: BDMVP
Hazard Characteristic Code: T2
Unit Of Issue: DR
Unit Of Issue Container Qty: 200 LBS

Ingredients/Identity Information

Proprietary: NO
Ingredient: SODIUM CYANIDE (SARA III)
Ingredient Sequence Number: 01
Percent: 96.0
NIOSH (RTECS) Number: VZ7525000
CAS Number: 143-33-9
OSHA PEL: 5 MG/M3 (CN)
ACGIH TLV: S; 5 MG/M3 (CN);9192

Physical/Chemical Characteristics

Appearance And Odor: WHITE GRANULAR OR BRIQUETTE FORM MATERIAL W/NO ODR
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Specific Gravity: 1.60
Evaporation Rate And Ref: N/A
Solubility In Water: APPRECIABLE
Percent Volatiles By Volume: N/A

Fire and Explosion Hazard Data

Flash Point: N/A
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: N/A
Special Fire Fighting Proc: N/A
Unusual Fire And Expl Hazrds: CONTACT WITH ACIDS OR ACID SALTS LIBERATES HIGHLY TOXIC & FLAMMABLE HYDROCYANIC ACID GAS.

Reactivity Data

Stability: YES
Materials To Avoid: CONTACT WITH ACIDS LIBERATES POISONOUS GAS.

Hazardous Decomp Products: HYDROGEN CYANIDE
Hazardous Poly Occur: NO

Health Hazard Data

Signs/Symptoms Of Overexp: MAY BE FATAL IF SWALLOWED OR INHALED.CAUSES EYE BURNS & MAY IRRITATE SKIN;HEADACHE,DIZZINESS,VOMIT.
Emergency/First Aid Proc: IMMEDIATELY FLUSH SKIN OR EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES;FOR EYES CALL A DOCTOR.ALWAYS HAVE ON HAND A CYANIDE FIRST AID KIT.CARRY PERSON TO FRESH AIR;HAVE HIM LIE DOWN.REMOVE CONTAMINATED CLOTHING,KEEP PERSON WARM.START TREAT.IMMED

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: DO NOT BREATHE DUST OR GAS. DO NOT GET IN EYES. AVOID SKIN CONTACT.
Waste Disposal Method: SWEEP UP SPILLED MATERIAL & RETURN TO CONTAINER.DO NOT FLUSH SOLUTIONS OF SODIUM CYANIDE TO SEWER WHICH MAY CONTAIN AN ACID,OR ADD BY STIRRING EXCESSIVE,STRONG ALKALINE SOLUTION OF CALCIUM HYPOCHLORITE. AFTER 24 HRS,DRAIN INTO AN APPROVED DISP.AREA.
Precautions-Handling/Storing: WASH THOROUGHLY AFTER HANDLING. KEEP CONTAINER CLOSED AND AWAY FROM ACIDS. STORE IN A DRY PLACE. WASH CONTAMINATED CLOTHING BEFORE REUSE.
Other Precautions: FOOD,FEEDSTUFFS,GUM,BEVERAGES & TOBACCO SHOULD NOT BE STORED OR CARRIED INTO WORK AREAS WHERE CONTAMINATION WITH SODIUM CYANIDE IS POSSIBLE.STORE IN DRY AREA AWAY FROM ACIDS,NITRATES,CHLORATES

Control Measures

Respiratory Protection: USE RESPIRATOR(U.S.BUREAU OF MINES) IF THERE IS DANGER OF INHAL.DUST
Ventilation: LOCAL EXHAUST FOR MAINT OF ADEQUATE VENTIL.AIR OR O*2 MASK.
Protective Gloves: RUBBER OR COTTN
Eye Protection: CHEMICAL SAFETY GOGGLES
Other Protective Equipment: HARD HATS OR BRIMMED FELT HATS;LEATHER OR RUBBER SAFETY SHOE
Suppl. Safety & Health Data: ITEM IS 96% MINIMUM ASSAY.

Transportation Data

Trans Data Review Date: 81240
DOT PSN Code: NEP
DOT Proper Shipping Name: SODIUM CYANIDE
DOT Class: 6.1
DOT ID Number: UN1689
DOT Pack Group: I
DOT Label: POISON
IMO PSN Code: NQT
IMO Proper Shipping Name: SODIUM CYANIDE, SOLID
IMO Regulations Page Number: 6257
IMO UN Number: 1689
IMO UN Class: 6.1
IMO Subsidiary Risk Label: -
IATA PSN Code: WOX
IATA UN ID Number: 1689
IATA Proper Shipping Name: SODIUM CYANIDE
IATA UN Class: 6.1
IATA Label: TOXIC *
AFI PSN Code: WOX
AFI Prop. Shipping Name: SODIUM CYANIDE
AFI Class: 6.1
AFI ID Number: UN1689
AFI Pack Group: I
AFI Label: POISON

Waste Disposal Method: NEUTRALIZE AND DISPOSE OF PER LOCAL, STATE AND FEDERAL REGULATIONS.
Precautions-Handling/Storing: STORE AT MODERATE TEMPERATURES IN A CLOSED CONTAINERS. PRODUCT IS TOXIC BY INGESTION.
Other Precautions: NONE

Control Measures

Respiratory Protection: USE NIOSH APPROVED RESP IF DUST FROM DRIED RESIDUE IS EXPECTED
Ventilation: LOCAL EXHAUST: GENERALLY ACCEPTABLE
Protective Gloves: RUBBER/NEOPRENE
Eye Protection: SAFETY GOGGLES/FACESHIELD
Other Protective Equipment: RUBBER APRON
Suppl. Safety & Health Data: MSDS DATE: 2/06/86

Transportation Data

Disposal Data

Disposal Data Review Date: 89024
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 001
Landfill Ban Item: YES
Disposal Supplemental Data: MSDS DATE: 2/06/86 IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Name New: NOT REGULATED
1st EPA Haz Wst Char New: NOT REGULATED BY RCRA
1st EPA Acute Hazard New: NO

Label Data

Label Required: YES
Label Status: G
Common Name: LIQUID NICKEL CHLORIDE, #7003
Special Hazard Precautions: MAY IRRITATE SKIN OR CAUSE BURNS TO EYES. PRODUCT IS TOXIC BY INGESTION.
Label Name: CHEMTECH/ST. LOUIS, MO 63131
Label Emergency Number: (314) 966-9900

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

LAGUNA CLAY CO -- NICKEL SULFATE - NICKEL SULFATE,ACS
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 002097459
Manufacturer's CAGE: 40894
Part No. Indicator: A
Part Number/Trade Name: NICKEL SULFATE

General Information

Item Name: NICKEL SULFATE,ACS
Company's Name: LAGUNA CLAY CO(DIST)ANACHEMIA CHEMICALS INC.(MFR)
Company's Emerg Ph #: 518-298-4444
Record No. For Safety Entry: 003
Tot Safety Entries This Stk#: 003
Date MSDS Prepared: 01JAN87
Safety Data Review Date: 10JAN87
Supply Item Manager: CX
MSDS Serial Number: BDJQR
Specification Number: MIL-STD-1218
Hazard Characteristic Code: N1
Unit Of Issue: LB
Unit Of Issue Container Qty: 1.0 LB
Type Of Container: BOTTLE
Net Unit Weight: 1.0 LB

Ingredients/Identity Information

Proprietary: NO
Ingredient: NICKEL SULFATE,CAS#7786-81-4
Ingredient Sequence Number: 01
Percent: >98
NIOSH (RTECS) Number: QR9400000
ACGIH TLV: 0.1MG/CUM(NI)

Physical/Chemical Characteristics

Appearance And Odor: GREEN CRYSTALS
Boiling Point: 217F/103C
Specific Gravity: 2.07
Solubility In Water: 100%COMPLET

Fire and Explosion Hazard Data

Extinguishing Media: USE ANY MEDIA FOR SURROUNDING FIRES.
Special Fire Fighting Proc: USE NIOSH APPROVED SCBA WITH FULL PROTECTION IF NEEDED
Unusual Fire And Expl Hazrds: WHEN HEATED TO DECOMPOSITION,EMITS TOXIC FUMES OF SO*X

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HEAT
Materials To Avoid: NONE NOTED
Hazardous Decomp Products: WHEN HEATED TO DECOMPOSITION,EMITS TOXIC FUMES OR SO*X.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NONE NOTED

Health Hazard Data

Signs/Symptoms Of Overexp: IRRITATES EYES AND RESPIRATORY TRACT. INTENSIVE

CONTACT WITH SKIN MAY CAUSE ELLERGIC ECZEMA.
Emergency/First Aid Proc: INHALE:REMOVE TO FRESH AIR, GIVE CPR/O*2 IF NEED;EYES/SKIN:FLUSH W LG AMTS H*2O FOR 15 MIN;INGEST:RINSE MOUTH; GET MEDICAL ATTENTION FOR EYES, BREATHING DIFFICULTY, OR OTHER SYMPTOMS OF OVEREXPOSURE.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: USE PROPER PERSONAL PROTECTION;SCOOP UP & PLACE IN A SUITABLE CONTAINER FOR PROPER DISPOSAL.
Waste Disposal Method: DISPOSE OF COLLECTED MATERIAL IN ACCORDANCE WITH LOCAL,STATE AND FEDERAL REGULATIONS.
Precautions-Handling/Storing: NO SPECIAL PROCEDURES FOR STORAGE AND HANDLING.KEEP CONTAINER CLOSED WHEN NOT IN USE.
Other Precautions: AVOID CONTACT WITH SKIN AND EYES;DO NOT INHALE DUST/ MIST.

Control Measures

Respiratory Protection: USE NIOSH/MSHA APPROVED RESPIRATOR FOR DUST.
Ventilation: PROVIDE MECHAN(GEN/LOCAL EXHAUST)VENT TO MAINTN <TLV
Protective Gloves: TYPE AS REQD
Eye Protection: SAFETY GLASSES
Other Protective Equipment: AS REQUIRED TO PREVENT PROLONGED CONTACT.
Suppl. Safety & Health Data: MSDS DATED JUNE1,1984

Transportation Data

Trans Data Review Date: 87010
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION

Disposal Data

Disposal Data Review Date: 89177
Rec # For This Disp Entry: 02
Tot Disp Entries Per NSN: 002
Landfill Ban Item: YES
Disposal Supplemental Data: MSDS DATED JUNE1,1984 IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Name New: NOT REGULATED
1st EPA Haz Wst Char New: NOT REGULATED BY RCRA
1st EPA Acute Hazard New: NO

Label Data

Label Required: YES
Label Status: G
Common Name: NICKEL SULFATE
Special Hazard Precautions: IRRITATES EYES AND RESPIRATORY TRACT.INTENSIVE CONTACT WITH SKIN MAY CAUSE ELLERGIC ECZEMA.
Label Name: LAGUNA CLAY CO(DIST)ANACHEMIA CHEMICALS INC.
(MFR)
Label Emergency Number: 518-298-4444

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

CHEMICAL COMMODITIES J T BAKER CHEMICAL (MFR -- BARIUM NITRATE,ACS - BARIUM NITRATE
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 002470604
Manufacturer's CAGE: 60777
Part No. Indicator: A
Part Number/Trade Name: BARIUM NITRATE,ACS

General Information

Item Name: BARIUM NITRATE,ACS
Company's Name: CHEMICAL COMMODITIES(DIST),J.T.BAKER CHEMICAL (MFR
Company's Street: 27447 PACIFIC STREET
Company's City: HIGHLAND
Company's State: CA
Company's Country: US
Company's Zip Code: 92346-2640
Company's Emerg Ph #: 714-864-2310
Company's Info Ph #: 714-864-2310
Record No. For Safety Entry: 002
Tot Safety Entries This Stk#: 005
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 03APR79
MSDS Serial Number: BDNLF
Hazard Characteristic Code: J3
Unit Of Issue: BT
Unit Of Issue Container Qty: 1/4 LB

Ingredients/Identity Information

Proprietary: NO
Ingredient: BARIUM NITRATE
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: CQ9625000
CAS Number: 10022-31-8
OSHA PEL: 0.5 MG/M3 (BA)
ACGIH TLV: 0.5 MG/M3 (BA); 8990

Physical/Chemical Characteristics

Appearance And Odor: WHITE CRYSTALS.
Specific Gravity: 2.8
Solubility In Water: APPRECIABLE

Fire and Explosion Hazard Data

Flash Point: N.A.
Extinguishing Media: WATER,DRY CHEMICAL,OR CARBON DIOXIDE
Unusual Fire And Expl Hazrds: STRONG OXIDIZER.CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE.

Reactivity Data

Stability: YES
Materials To Avoid: BARIUM DIOXIDE;MAGNESIUM; & ZINC,FLAMMABLES,OXIDIZABLE MATLS
Hazardous Decomp Products: TOXIC GAS OF NITROGEN OXIDE.
Hazardous Poly Occur: NO

Health Hazard Data

Signs/Symptoms Of Overexp: MAY BE FATAL IF SWALLOWED

Emergency/First Aid Proc: IF SWALLOWED,IF CONSCIOUS,INDUCE VOMITING & REPEAT UNTIL VOMIT FLUID IS CLEAR.CALL A PHYSICIAN.RINSE EYES THOROUGHLY WITH WATER;CONTAMINATED SKIN SHOULD BE WASHED WITH SOAP.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: SWEEP UP & CAREFULLY REMOVE ANY SPILLED MATERIAL.DISSOLVE WASTE IN 6M-HCL & FILTER.NEUTRALIZE WITH 6M-NH*4OH(USE LITMUS) AND PRECIPITATE WITH EXCESS SODIUM CARBONATE.STORE IN APPROVED STORAGE CONTAINERS FOR OXIDIZERS.
Waste Disposal Method: DISSOLVE IN A MINIMUM AMOUNT OF 6M-HCL & FILTER. ADD THE FILTER TO SLIGHT AMOUNT OF 6M-NH*4OH BY USE OF THE LITMUS TEST. PRECIPITATE WITH SUFFICIENT SODIUM CARBONATE.AFTER FILTRATION,WASH & DRY THE PRECIPITATE.PACKAGE & RETURN TO THE SUPPLIERS.
Precautions-Handling/Storing: KEEP AWAY ALL FIRE SOURCES;REMOVE INFLAMMABLES & OXIDIZABLE SUBSTANCES;STORE IN FIRE-PROOF STORAGE AREA.WEAR SELF CONTAINED BREATHING APPARATUS.

Control Measures

Respiratory Protection: SELF CONTAINED BREATHING APPARATUS
Ventilation: AS REQUIRED TO CONTROL TLV IN AIR
Protective Gloves: RUBBER
Eye Protection: SAFETY GLASSES

Transportation Data

Trans Data Review Date: 79093
DOT PSN Code: BPS
DOT Proper Shipping Name: BARIUM NITRATE
DOT Class: 5.1
DOT ID Number: UN1446
DOT Pack Group: II
DOT Label: OXIDIZER, POISON
IMO PSN Code: BVB
IMO Proper Shipping Name: BARIUM NITRATE
IMO Regulations Page Number: 5128
IMO UN Number: 1446
IMO UN Class: 5.1
IMO Subsidiary Risk Label: TOXIC *
IATA PSN Code: CXO
IATA UN ID Number: 1446
IATA Proper Shipping Name: BARIUM NITRATE
IATA UN Class: 5.1
IATA Subsidiary Risk Class: 6.1
IATA Label: OXIDIZER & TOXIC *
AFI PSN Code: CXO
AFI Prop. Shipping Name: BARIUM NITRATE
AFI Class: 5.1
AFI ID Number: UN1446
AFI Pack Group: II
AFI Label: OXIDIZER & POISON
AFI Basic Pac Ref: 9-10

Disposal Data

Disposal Data Review Date: 88270
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 002
Landfill Ban Item: YES
Disposal Supplemental Data: IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Code New: D001
1st EPA Haz Wst Name New: IGNITIBLE

1st EPA Haz Wst Char New: IGNITABILITY
1st EPA Acute Hazard New: NO
2nd EPA Haz Wst Code New: D005
2nd EPA Haz Wst Name New: EP TOXIC (>100 MG/L BARIUM)
2nd EPA Haz Wst Char New: EP TOXICITY
2nd EPA Acute Hazard New: NO

==========

Label Data

==========

Label Required: YES
Label Status: F
Special Hazard Precautions: POISONOUS IF SWALLOWED. INHALATION OF DUST POISONOUS. CONTACT MAY CAUSE BURNS TO SKIN AND EYES. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.
Label Name: CHEMICAL COMMODITIES AGENCY
Label Street: 27447 PACIFIC STREET
Label City: HIGHLAND
Label State: CA
Label Zip Code: 92346-2640
Label Country: US
Label Emergency Number: 714-864-2310

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

AMERICAN REAGENT LABS-LUITPOLD PHARMACEUTICAL -- SODIUM CHLORIDE INJECTION
MATERIAL SAFETY DATA SHEET
FSC: 6505
NIIN: 00F040080
Manufacturer's CAGE: 32288
Part No. Indicator: A
Part Number/Trade Name: SODIUM CHLORIDE INJECTION

General Information

Company's Name: AMERICAN REAGENT LABS-LUITPOLD PHARMACEUTICALS INC
Company's Street: 1 LUTTPOLD DR
Company's City: SHIRLEY
Company's State: NY
Company's Country: US
Company's Zip Code: 11967-5000
Company's Emerg Ph #: 516-924-4000/800-645-1706
Company's Info Ph #: 516-924-4000/800-645-1706
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 22JUN92
Safety Data Review Date: 26MAY95
MSDS Preparer's Name: JOHN PURPURA
Preparer's Company: AMERICAN REAGENT LABS-LUTTPOLD PHARMACEU
Preparer's St Or P. O. Box: 1 LUTTPOLD DR
Preparer's City: SHIRLEY
Preparer's State: NY
Preparer's Zip Code: 11967-5000
MSDS Serial Number: BXKXR

Ingredients/Identity Information

Proprietary: NO
Ingredient: SODIUM CHLORIDE
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: VZ4725000
CAS Number: 7647-14-5

Proprietary: NO
Ingredient: WATER
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: ZC0110000
CAS Number: 7732-18-5

Physical/Chemical Characteristics

Appearance And Odor: CLEAR COLORLESS SOLUTION W/NO ODOR
Solubility In Water: COMPLETE
pH: 4.5-7

Fire and Explosion Hazard Data

Extinguishing Media: WATER SPRAY, CO2, DRY CHEMICAL/FOAM AS APPROPRIATE FOR SURROUNDING FIRE & MATERIALS
Special Fire Fighting Proc: USE SELF CONTAINED BREATHING APPARATUS & PROTECTIVE CLOTHING.
Unusual Fire And Expl Hazrds: EMITS TOXIC FUMES.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): EXCESSIVE HEAT

Materials To Avoid: MIXING W/OTHER DRUGS
Hazardous Decomp Products: TOXIC FUMES
Hazardous Poly Occur: NO

Health Hazard Data

LD50-LC50 Mixture: ORAL LD50(MOUSE): 4000 MG/KG
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
FLUSH MOUTH OUT W/WATER. SKIN/EYES: FLUSH W/WATER. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR PERSONAL PROTECTIVE EQUIPMENT. VACUUM W/A VACUUM CLEANER HAVING A HIGH EFFICIENCY PARTICULATE (HEPA) FILTER/ ABSORB LIQUID W/PAPER TOWELS. WIPE WORKING SURFACES TO DRYNESS, THEN WASH W/SOAP & WATER.
Waste Disposal Method: WASTE SHOULD BE DISPOSED OF IN ACCORDANCE W/LOCAL, STATE & FEDERAL REGULATIONS. DON'T MIX W/OTHER SUBSTANCES.
Precautions-Handling/Storing: DON'T MIX W/OTHER DRUGS.

Control Measures

Respiratory Protection: NIOSH APPROVED RESPIRATOR
Ventilation: LOCAL EXHAUST
Protective Gloves: DISPOSABLE SURGICAL LATEX
Eye Protection: SAFETY GOGGLES
Other Protective Equipment: DISPOSABLE PROTECTIVE APPAREL
Work Hygienic Practices: REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.
Suppl. Safety & Health Data: SODIUM CHLORIDE INJECTION IS A STERILE, NONPYROGENIC SOLUTION OF SODIUM CHLORIDE IN WATER FOR INJECTION.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Label Status: G
Common Name: SODIUM CHLORIDE INJECTION
Special Hazard Precautions: N/K N/K
Label Name: AMERICAN REAGENT LABS-LUITPOLD PHARMACEUTICALS INC
Label Street: 1 LUTTPOLD DR
Label City: SHIRLEY
Label State: NY
Label Zip Code: 11967-5000
Label Country: US
Label Emergency Number: 516-924-4000/800-645-1706

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

MALLINCRODT MORGAN SCIENT DIST -- SODIUM ACETATE - SODIUM ACETATE
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 002222724
Manufacturer's CAGE: 9A714
Part No. Indicator: A
Part Number/Trade Name: SODIUM ACETATE

General Information

Item Name: SODIUM ACETATE
Company's Name: MALLINCRODT INC - MORGAN SCIENT CORP, DIST
Company's Emerg Ph #: 606-987-7000
Record No. For Safety Entry: 007
Tot Safety Entries This Stk#: 007
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 16OCT80
MSDS Serial Number: BDJZB
Hazard Characteristic Code: N1
Unit Of Issue: BT
Unit Of Issue Container Qty: 5 LB

Ingredients/Identity Information

Proprietary: NO
Ingredient: SODIUM ACETATE
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: AJ4375000
CAS Number: 126-96-5

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS GRANULAR SALT, SLIGHT ACETIC ACID ODOR
Boiling Point: 615DEGF MLT
Specific Gravity: 1.53
Solubility In Water: VERY

Fire and Explosion Hazard Data

Flash Point: N/A
Extinguishing Media: ANY MEDIA SUITABLE FOR EXTINGUISHING SUPPORTING FIRE
Special Fire Fighting Proc: N/A
Unusual Fire And Expl Hazrds: ANHYDROUS AT 248DEGF, DECOMPOSES AT HIGHER TEMPS

Reactivity Data

Stability: YES
Cond To Avoid (Stability): BECOMES ANHYDROUS AT 248DEGF. DECOMP AT HIGHER TEMP
Materials To Avoid: F*2, KNO*3, SAX
Hazardous Poly Occur: NO

Health Hazard Data

Signs/Symptoms Of Overexp: MILD SKIN/EYE IRRIT. MODERATELY TOXIC BY ORAL INGEST.
Emergency/First Aid Proc: EYE: WASH W/FLOWING WATER 15 MIN. CONSULT MD. INGEST: IF PATIENT IS CONSCIOUS, GIVE LG AMTS OF WATER. INDUCE VOMIT, CALL MD. SKIN: WASH WELL W/WATER. INH: REMOVE PATIENT FROM AREA OF EXPOSURE.

Precautions for Safe Handling and Use

==========

Steps If Matl Released/Spill: SWEEP UP AREA & DISSOLVE MATL IN LG AMT OF WATER. WASH DOWN W/LG AMT OF WATER.
Waste Disposal Method: LANDFILL. DISSOLVE IN LG AMTS OF WATER. OBSERVE FED, STATE, LOCAL EFFLUENT DISPOSAL REG
Precautions-Handling/Storing: STORE AT NORM AMBIENT TEMP

==========

Control Measures

==========

Ventilation: LOCAL EXH, REC
Protective Gloves: RUBBER
Eye Protection: GOGGLES
Other Protective Equipment: LAB COAT OR COVERALLS
Suppl. Safety & Health Data: ORAL RAT LD50-353MG/KG

==========

Transportation Data

==========

Trans Data Review Date: 80290
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
Additional Trans Data: ITEM NOT REGULATED AS HAZ FOR TRANSP

==========

Disposal Data

==========

Disposal Data Review Date: 88078
Rec # For This Disp Entry: 05
Tot Disp Entries Per NSN: 005
Landfill Ban Item: YES
Disposal Supplemental Data: ORAL RAT LD50-353MG/KG ITEM NOT REGULATED AS A HAZARDOUS WASTE BY THE FEDERAL EPA.
1st EPA Haz Wst Name New: NOT REGULATED
1st EPA Haz Wst Char New: NOT REGULATED BY RCRA
1st EPA Acute Hazard New: NO

==========

Label Data

==========

Label Required: YES
Label Status: G
Common Name: SODIUM ACETATE
Special Hazard Precautions: MILD SKIN/EYE IRRIT. MODERATELY TOXIC BY ORAL INGEST.
Label Name: MALLINCRODT INC - MORGAN SCIENT CORP, DIST
Label Emergency Number: 606-987-7000

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

EASTMAN KODAK -- 118 3367 TETRAACETIC ACID TETRASODIUM SALT
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 00F019598
Manufacturer's CAGE: 19139
Part No. Indicator: A
Part Number/Trade Name: 118 3367 TETRAACETIC ACID TETRASODIUM SALT

General Information

Company's Name: EASTMAN KODAK COMPANY
Company's Street: 343 STATE STREET
Company's City: ROCHESTER
Company's State: NY
Company's Zip Code: 14650
Company's Emerg Ph #: (716) 722-5151
Company's Info Ph #: (800) 225-5352
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Date MSDS Prepared: 01APR87
Safety Data Review Date: 18NOV91
Preparer's Company: EASTMAN KODAK COMPANY
Preparer's St Or P. O. Box: 343 STATE STREET
Preparer's City: ROCHESTER
Preparer's State: NY
Preparer's Zip Code: 14650
MSDS Serial Number: BLQNV

Ingredients/Identity Information

Proprietary: NO
Ingredient: TETRASODIUM SALT OF ETHYLENEDIAMINETETRAACETIC ACID SODIUM EDTA, SODIUM (DI) ETHYLENEDIAMINE TETRAACETATE
Ingredient Sequence Number: 01
Percent: 100%
NIOSH (RTECS) Number: AH5075000
CAS Number: 64-02-8

Physical/Chemical Characteristics

Appearance And Odor: WHITE CRYSTALLINE SOLID
Vapor Pressure (MM Hg/70 F): NEGLIGIBLE
Specific Gravity: 6.9
Evaporation Rate And Ref: (N-BUTYL ACETATE= 1) NEGL
Solubility In Water: APPRECIABLE
Percent Volatiles By Volume: NEGL

Fire and Explosion Hazard Data

Extinguishing Media: WATER SPRAY, DRY CHEMICAL & CO2
Special Fire Fighting Proc: WEAR SELF-CONTAINED BREATHING APPARATUS & FULL PROTECTIVE CLOTHING.
Unusual Fire And Expl Hazrds: FIRE OR EXCESSIVE HEAT. THIS MATERIAL IN SUFFICIENT QUANTITY & REDUCED PARTICLE SIZE IS CAPABLE OF CREATING A DUST EXPLOSION.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HEAT OR FIRE
Materials To Avoid: STRONG OXIDIZERS
Hazardous Decomp Products: CO2,CO & OXIDES OF NITROGEN
Hazardous Poly Occur: NO

Health Hazard Data

Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
IRRITATION.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
IRRITATION.
REMOVE TO FRESH AIR. INGESTION: DRINK 1-2 GLASSES OF WATER. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: SWEEP UP MATERIAL & PACKAGE FOR SAFE FEED TO AN INCINERATOR.
Waste Disposal Method: DISPOSE BY INCINERATION OR CONTRACT W/LICENSED CHEMICAL WASTE DISPOSAL AGENCY. DISCHARGE, TREATMENT OR DISPOSAL MAY BE SUBJECT TO FEDERAL, STATE & LOCAL LAWS.

Control Measures

Respiratory Protection: AS REQUIRED.
Ventilation: RECOMMENDED
Protective Gloves: RECOMMENDED
Eye Protection: SAFETY GLASSES

Transportation Data

Disposal Data

Label Data

Label Required: YES
Label Status: G
Common Name: 118 3367 TETRAACETIC ACID TETRASODIUM SALT
IRRITATION. SKIN/INHALATION/INGESTION: LOW HAZARD. EYES: IRRITATION.
Label Name: EASTMAN KODAK COMPANY
Label Street: 343 STATE STREET
Label City: ROCHESTER
Label State: NY
Label Zip Code: 14650
Label Emergency Number: (716) 722-5151

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

HEICO DIV OF WHITTAKER -- POTASSIUM CHLORIDE - POTASSIUM CHLORIDE,ACS
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 001361004
Manufacturer's CAGE: 11434
Part No. Indicator: A
Part Number/Trade Name: POTASSIUM CHLORIDE

==========

General Information

==========

Item Name: POTASSIUM CHLORIDE,ACS
Company's Name: HEICO DIV OF WHITTAKER CORP
Company's Street: RT 611
Company's City: DELAWARE WATER GAP
Company's State: PA
Company's Country: US
Company's Zip Code: 18327-0160
Company's Emerg Ph #: 717-420-3900
Company's Info Ph #: 717-420-3900 / FAX 717-421-9012
Distributor/Vendor # 1: ROSE & COMPANY, INC. (203-645-6400)
Distributor/Vendor # 1 Cage: 9Z435
Record No. For Safety Entry: 002
Tot Safety Entries This Stk#: 003
Status: SE
Date MSDS Prepared: 15NOV85
Safety Data Review Date: 20APR93
Supply Item Manager: KX
MSDS Preparer's Name: S. COCCIA, JR.
MSDS Serial Number: BQLZF
Specification Number: O-C-265
Hazard Characteristic Code: N1
Unit Of Issue: BT
Unit Of Issue Container Qty: 4 OZ
Type Of Container: BOTTLE
Net Unit Weight: 4 OZ

==========

Ingredients/Identity Information

==========

Proprietary: NO
Ingredient: POTASSIUM CHLORIDE
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: TS8050000
CAS Number: 7447-40-7
OSHA PEL: 15 MG/M3 TOTAL DUST
ACGIH TLV: 10 MG/M3 TOTAL DUST
Other Recommended Limit: NONE RECOMMENDED

==========

Physical/Chemical Characteristics

==========

Appearance And Odor: WHITE CRYSTALS. ODORLESS.
Boiling Point: SUBLIMES
Melting Point: 1423F,773C
Specific Gravity: 1.984
Decomposition Temperature: UNKNOWN
Solubility In Water: 35%
Corrosion Rate (IPY): UNKNOWN

==========

Fire and Explosion Hazard Data

==========

Flash Point: NONE
Extinguishing Media: NON-FLAMMABLE. USE EXTINGUISHING MEDIA APPROPIATE FOR SURROUNDING FIRE.

Special Fire Fighting Proc: WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING. USE WATER SPRAY TO COOL FIRE EXPOSED CONTAINERS.
Unusual Fire And Expl Hazrds: HEAT OF FIRE MAY PRODUCE HAZARDOUS DECOMPOSITION PRODUCTS SUCH AS TOXIC CHLORIDES.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: REACTS VIOLENTLY WITH BRF3 AND SULFURIC ACID PLUS POTASSIUM PERMANGANATE.
Hazardous Decomp Products: WHEN HEATED TO DECOMPOSITION IT EMIT TOXIC CHLORIDE FUMES.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT APPLICABLE

Health Hazard Data

LD50-LC50 Mixture: UNKNOWN
Route Of Entry - Inhalation: NO
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: MANUFACTURER STATES POTASSIUM CHLORIDE PRESENTS NO SERIOUS HEALTH EFFECTS IN NORMAL INDUSTRIAL USAGE. ACUTE: MAY CAUSE EYE IRRITATION. CHRONIC: NONE SPECIFIED BY MANUFACTURER.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT APPLICABLE
Signs/Symptoms Of Overexp: EYES: IRRITATION.
Med Cond Aggravated By Exp: NONE NOTED.
Emergency/First Aid Proc: EYES: FLUSH WITH PLENTY OF WATER. SEE DOCTOR. DRINK LARGE AMOUNT OF WATER, INDUCE VOMITING. SEE DOCTOR. NOTHING BY MOUTH IF UNCONSCIOUS.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: SWEEP UP INTO APPROPIATE DISPOSAL CONTAINER. WASH AREA WITH PLENTY OF WATER.
Neutralizing Agent: NOT APPLICABLE
Waste Disposal Method: DISPOSE OF IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS.
Precautions-Handling/Storing: NO SPECIAL REQUIREMENT.
Other Precautions: NONE.

Control Measures

Respiratory Protection: NONE NORMALLY REQUIRED. USE NIOSH/MSHA-APPROVED RESPIRATOR WITH DUST CARTRIDGE IF TLV IS EXCEEDED.
Ventilation: NO SPECIAL REQUIREMENT.
Protective Gloves: RUBBER.
Eye Protection: SAFETY GLASSES.
Other Protective Equipment: NONE.
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.
Suppl. Safety & Health Data: NONE.

Transportation Data

Trans Data Review Date: 93110
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ

IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION

==========

Disposal Data

==========

==========

Label Data

==========

Label Required: YES
Label Status: G
Common Name: POTASSIUM CHLORIDE
Special Hazard Precautions: MANUFACTURER STATES POTASSIUM CHLORIDE PRESENTS NO SERIOUS HEALTH EFFECTS IN NORMAL INDUSTRIAL USAGE. ACUTE: MAY IRRITATION.
Label Name: HEICO DIV OF WHITTAKER CORP
Label Street: RT 611
Label City: DELAWARE WATER GAP
Label State: PA
Label Zip Code: 18327-0160
Label Country: US
Label Emergency Number: 717-420-3900

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

CONTINENTAL CHEMICAL -- AMMONIUM HYDROXIDE SOLUTION - AMMONIUM HYDROXIDE, TECHNICAL
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 005272476
Manufacturer's CAGE: 23894
Part No. Indicator: A
Part Number/Trade Name: AMMONIUM HYDROXIDE SOLUTION

General Information

Item Name: AMMONIUM HYDROXIDE, TECHNICAL
Company's Name: CONTINENTAL CHEMICAL CORP
Company's Emerg Ph #: 812-235-8035
Record No. For Safety Entry: 003
Tot Safety Entries This Stk#: 010
Date MSDS Prepared: 01JAN87
Safety Data Review Date: 10OCT86
Supply Item Manager: GSA
MSDS Serial Number: BFCRW
Specification Number: O-A-451
Hazard Characteristic Code: J6
Unit Of Issue: QT
Unit Of Issue Container Qty: 1 QT BT
Type Of Container: GLASS BOTTLE

Ingredients/Identity Information

Proprietary: NO
Ingredient: AMMONIUM HYDROXIDE (SARA III)
Ingredient Sequence Number: 01
Percent: 10
NIOSH (RTECS) Number: BQ9625000
CAS Number: 1336-21-6
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

Proprietary: NO
Ingredient: AMMONIUM HYDROXIDE (SARA III)
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: BQ9625000
CAS Number: 1336-21-6
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS LIQUID, PUNGENT ODOR
Boiling Point: 212 F 100 C
Vapor Pressure (MM Hg/70 F): 584
Vapor Density (Air=1): <1
Specific Gravity: .960
Evaporation Rate And Ref: ETHER <1
Percent Volatiles By Volume: 10%

Fire and Explosion Hazard Data

Flash Point: NONE
Extinguishing Media: THIS PRODUCT NON-COMBUSTIBLE
Special Fire Fighting Proc: NONE
Unusual Fire And Expl Hazrds: AMMONIUM HYDROXIDE NON-COMBUST & NON-EXPLOS, BUT AMMONIAVAP RELEAS FORM SOLUT CAN FORM EXPLOS MIXTURE

Reactivity Data

==========

Stability: YES
Materials To Avoid: STRONG ACIDS
Hazardous Poly Occur: NO

==========

Health Hazard Data

==========

Signs/Symptoms Of Overexp: SKIN IRRIT CAUSING GRAY SPLOTCHES,BURNING OF THROAT,COUGHING,DIFFICUTY BREATHING,PULMONARY CONGEST(S
Emergency/First Aid Proc: SKIN:FLUSH W/SOAP & WATER.REMOV CONTAM CLOTHING & SHOES.GET MEDICAL ATTN.EYES:FLUSH W/PLENTY OF WATER F/AT LEAST 15 MIN.GET MED ATTN.INHAL:REMOV TO FRESH AIR.IF NOT BREATHINGGIVE ARTIF RESPIR,GIVE OXYG,GET MEDICAL ATTN:INGEST:DO NOT INDUC VOMIT (SUP)

==========

Precautions for Safe Handling and Use

==========

Steps If Matl Released/Spill: AVOID PHYSICAL CONTACT AND INHALATION OF VAPORS. DILUTE W/ LARGE QUANTITIES OF WATER.
Waste Disposal Method: DILUTED SOLUTION CAN BE DISPOSED OF AS WASTE WATER UNLESS PROHIBITED BY LAW.
Precautions-Handling/Storing: KEEP AWAY FROM STRONG ACIDS;STORE IN COOL AREA W/ADEQUATE VENTILATION. HAVE FLUSHING WATER AVAILABLE.

==========

Control Measures

==========

Respiratory Protection: SELF-CONTAINED ALKALINE GAS CANISTER
Ventilation: SUFFICENT TO KEEP NH*3 CONCENTRATION AT LESS.THAN 50 PPM.
Protective Gloves: RUBBER GLOVES
Eye Protection: GAS-TIGHT GOGGLES
Suppl. Safety & Health Data: EFF/OVEREXPOS:ASPHYXIA.EXTREMELY CORROSIVE TO EYES.INGEST OF AQUA AMMONIA IS EXTREME HAZ & MAY CAUSE DEATH. EMERG: DRINK COLD MILK(WATER IF MILK MOT AVAIL W/O CAUSING VOMIT.GET MEDICAL ATTN.

==========

Transportation Data

==========

Trans Data Review Date: 83224
DOT Proper Shipping Name: UNDER REVIEW
Additional Trans Data: DOT 173.510 APPLIES

==========

Disposal Data

==========

Disposal Data Review Date: 89048
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 002
Landfill Ban Item: YES
Disposal Supplemental Data: EFF/OVEREXPOS:ASPHYXIA.EXTREMELY CORROSIVE TO EYES.INGEST OF AQUA AMMONIA IS EXTREME HAZ & MAY CAUSE DEATH. EMERG:DRINK COLD MILK(WATER IF MILK MOT AVAIL W/O CAUSING VOMIT.GET MEDICAL ATTN. IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Name New: NOT REGULATED
1st EPA Haz Wst Char New: NOT REGULATED BY RCRA
1st EPA Acute Hazard New: NO

==========

Label Data

==========

Label Required: YES
Label Status: G
Common Name: AMMONIUM HYDROXIDE SOLUTION
Special Hazard Precautions: SKIN IRRIT CAUSING GRAY SPLOTCHES,BURNING OF THROAT,COUGHING,DIFFICUTY BREATHING,PULMONARY CONGEST(S
Label Name: CONTINENTAL CHEMICAL CORP
Label Emergency Number: 812-235-8035

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

COULTON CHEMICAL -- SULFURIC ACID, CONCENTRATED - SULFURIC ACID, TECHNICAL
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 009750907
Manufacturer's CAGE: COULT
Part No. Indicator: A
Part Number/Trade Name: SULFURIC ACID, CONCENTRATED

General Information

Item Name: SULFURIC ACID, TECHNICAL
Company's Name: COULTON CHEMICAL CORPORATION
Company's Street: 6600 SYLVANIA AVE
Company's City: SYLVANIA
Company's State: OH
Company's Country: US
Company's Zip Code: 43560
Company's Emerg Ph #: 419-885-4661
Company's Info Ph #: 419-885-4661
Distributor/Vendor # 1: MAYS CHEMICAL CO INC (317-842-8722)
Distributor/Vendor # 1 Cage: 6T060
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 25SEP91
Safety Data Review Date: 27JUN95
Supply Item Manager: CX
MSDS Serial Number: BXCPC
Hazard Characteristic Code: C1
Unit Of Issue: DR
Unit Of Issue Container Qty: 13 GALLONS
Type Of Container: DRUM

Ingredients/Identity Information

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS, OILY LIQUID
Boiling Point: 518F,270C
Melting Point: -30F,-34C
Vapor Pressure (MM Hg/70 F): NOT GIVEN
Vapor Density (Air=1): NOT GIVEN
Specific Gravity: 1.84
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: NOT GIVEN
Solubility In Water: COMPLETE
Corrosion Rate (IPY): UNKNOWN

Fire and Explosion Hazard Data

Flash Point: NONFLAMMABLE
Lower Explosive Limit: NOT GIVEN
Upper Explosive Limit: NOT GIVEN
Extinguishing Media: DO NOT USE WATER. IF WATER IS ADDED TO CONCENTRATED ACID A SEVERE ERUPTION MAY RESULT. USE CARBON DIOXIDE, DRY CHEMICAL
Special Fire Fighting Proc: FIRE FIGHTERS SHOULD WEAR SELF CONTAINED BREATHING APPARATUS. COOL TANKS AND CONTAINERS EXPOSED TO FIRE WITH WATER.
Unusual Fire And Expl Hazrds: DILUTE SULFURIC ACID WILL REACT WITH MOST METALS TO LIBERATE HYDROGEN GAS WHICH CAN REACH FLAMMABLE OR EXPLOSIVE LIMITS IF ALLOWED TO COLLECT.

Reactivity Data

==========
Stability: YES
Cond To Avoid (Stability): WATER
Materials To Avoid: BASES, ORGANIC MATERIALS, METALS
Hazardous Decomp Products: HYDROGEN GAS
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NONE. WILL NOT OCCUR.
==========

Health Hazard Data

==========
LD50-LC50 Mixture: NOT GIVEN
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: CONCENTRATED SULFURIC ACID IS A STRONG DEHYDRATING AGENT THAT WILL QUICKLY DAMAGE HUMAN TISSUE, ESPECIALLY IF HEATED. INHALATION OF MISTS CAN DAMAGE RESPIRATORY TRACT AND LUNGS. EYE INJURIES CAN BE SEVERE AND PERMANENT.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: THIS COMPOUND CONTAINS NO INGREDIENTS AT CONCENTRATIONS OF 0.1% OR GREATER THAT ARE CARCINOGENS OR SUSPECT CARCINOGENS.
Signs/Symptoms Of Overexp: TISSUE DAMAGE, RESPIRATORY TRACT DAMAGE, SEVERE EYE DAMAGE, BLINDNESS.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYES: IMMEDIATELY FLUSH WITH WATER FOR AT LEAST 15 MINUTES. FLUSH UNDER LIDS BY LIFTING THEM OR ROLLING EYES. SEE DOCTOR ASAP. SKIN: FLUSH WITH WATER. REMOVE CLOTHING AND CONTINUE FLUSHING. INHALATION: REMOVE TO FRESH AIR AND RESTORE BREATHING. GET MEDICAL HELP. INGESTION: DO NOT INDUCE VOMITING. DILUTE STOMACH CONTENTS BY GIVING WATER OR MILK TOGETHER WITH MILK OF MAGNESIA. GET PHYSICIAN.
==========

Precautions for Safe Handling and Use

==========
Steps If Matl Released/Spill: MINOR SPILLS CAN BE DILUTED AND NEUTRALIZED WITH SODA ASH, LIME OR CAUSTIC. LARGE SPILLS SHOULD BE CONTAINED.
Neutralizing Agent: SODA ASH, LIME, CAUSTIC
Waste Disposal Method: PREVENT WASTE FROM CONTAMINATING SURROUNDING ENVIRONMENT. DISCARD ANY PRODUCT, RESIDUE, DISPOSAL CONTAINER OR LINER IN ACCORDANCE WITH ALL FEDERAL, STATE AND LOCAL REGULATIONS.
Precautions-Handling/Storing: STORE IN SHADED, WELL DRAINED STORAGE AREA. DO NOT ADD WATER TO CONCENTRATED SULFURIC ACID. DO NOT ALLOW DILUTE ACID TO CONTACT METALS.
Other Precautions: MOST METALS ARE RAPIDLY CORRODED IN WEAK SULFURIC ACID AND EXPLOSIVE HYDROGEN IS GENERATED. BE SURE SAFETY SHOWER OR OTHER SOURCE OF WATER IS QUICKLY AVAILABLE IN AREAS WHERE PERSONNEL EXPOSURE TO SULFURIC ACID IS POSSIBLE.
==========

Control Measures

==========
Respiratory Protection: WEAR SELF-CONTAINED BREATHING APPARATUS IF TLV IS EXCEEDED. IF VENTILATION IS GOOD, VAPOR FROM SULFURIC ACID AT AMBIENT TEMPERATURES SHOULD NOT EXCEED THE TLV.
Ventilation: LOCAL EXHAUST AND MECHANICAL (GENERAL) VENTILATION AS REQUIRED TO MAINTAIN EXPOSURE LEVELS.
Protective Gloves: REQUIRED
Eye Protection: SAFETY GOGGLES
Other Protective Equipment: CHEMICAL RESISTANT CLOTHING AS NECESSARY TO PREVENT SKIN CONTACT. AN EMERGENCY EYEWASH AND SHOWER SHOULD BE AVAILABLE.
Work Hygienic Practices: WASH HANDS THOROUGHLY WITH SOAP AND WATER BEFORE EATING, DRINKING, SMOKING OR USING TOILET FACILITIES.
Suppl. Safety & Health Data: AGITATION, SPRAY FROM LEAKS, ADDING WATER TO

SPILLS, ETC, CAN GENERATE MIST LEVELS THAT WILL GREATLY EXCEED THE TLV.
PROPER PERSONAL PROTECTIVE EQUIPMENT SHOULD BE WORN IN SUCH CIRCUMSTANCES.

Transportation Data

Trans Data Review Date: 95178
DOT PSN Code: NUC
DOT Proper Shipping Name: SULFURIC ACID
DOT Class: 8
DOT ID Number: UN1830
DOT Pack Group: II
DOT Label: CORROSIVE
IMO PSN Code: OFJ
IMO Proper Shipping Name: SULPHURIC ACID
IMO Regulations Page Number: 8230 *
IMO UN Number: 1830
IMO UN Class: 8
IMO Subsidiary Risk Label: -
IATA PSN Code: XIX
IATA UN ID Number: 1830
IATA Proper Shipping Name: SULPHURIC ACID
IATA UN Class: 8
IATA Label: CORROSIVE
AFI PSN Code: XIX
AFI Prop. Shipping Name: SULPHURIC ACID
AFI Class: 8
AFI ID Number: UN1830
AFI Pack Group: II
AFI Label: CORROSIVE
AFI Special Prov: 2,A3,A7,N34
AFI Basic Pac Ref: 12-5

Disposal Data

Label Data

Label Required: YES
Label Status: G
Common Name: SULFURIC ACID, CONCENTRATED
Special Hazard Precautions: CONCENTRATED SULFURIC ACID IS A STRONG DEHYDRATING AGENT THAT WILL QUICKLY DAMAGE HUMAN TISSUE, ESPECIALLY IF HEATED. INHALATION OF MISTS CAN DAMAGE RESPIRATORY TRACT AND LUNGS. EYE INJURIES CAN BE SEVERE AND PERMANENT. TISSUE DAMAGE, RESPIRATORY TRACT DAMAGE, SEVERE EYE DAMAGE, BLINDNESS.
Label Name: COULTON CHEMICAL CORPORATION
Label Street: 6600 SYLVANIA AVE
Label City: SYLVANIA
Label State: OH
Label Zip Code: 43560
Label Country: US
Label Emergency Number: 419-885-4661

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

FISHER SCIENTIFIC -- POTASSIUM IODIDE SOLUTION
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 00F000205
Manufacturer's CAGE: 1B464
Part No. Indicator: A
Part Number/Trade Name: POTASSIUM IODIDE SOLUTION

General Information

Item Name: /
Company's Name: FISHER SCIENTIFIC COMPANY
Company's Emerg Ph #: 201/796-7100
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 27APR84
MSDS Serial Number: BBGCP

Ingredients/Identity Information

Proprietary: NO
Ingredient: POTASSIUM IODIDE SOLUTION
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: TT2975000
CAS Number: 7681-11-0
ACGIH TLV: NONE LISTED

Physical/Chemical Characteristics

Appearance And Odor: CLEAR COLORLESS LIQUID
Boiling Point: UNKNOWN
Vapor Pressure (MM Hg/70 F): 14
Vapor Density (Air=1): 0.7
Specific Gravity: 1.03
Evaporation Rate And Ref: >1 ETHER=1
Solubility In Water: COMPLETE
Percent Volatiles By Volume: 95

Fire and Explosion Hazard Data

Reactivity Data

Stability: NO
Hazardous Poly Occur: NO

Health Hazard Data

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: ABSORB ON VERMICULITE. SCOOP UP AND PLACE IN A SUITABLE CONTAINER.
Waste Disposal Method: DISPOSE OF BY MEANS AS TO COMPLY WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS OR CONTACT AN APPROVED AND LICENSED DISPOSAL AGENCY.

Control Measures

Respiratory Protection: NONE
Ventilation: NONE REQUIRED

Protective Gloves: NONE
Eye Protection: SAFETY GLASSES
Suppl. Safety & Health Data: CHEMICAL MANUFACTURING DIVISION P.O. BOX 375, 1 REAGENT LANE FAIR LAWN, N.J. 07410.

==========

Transportation Data

==========

==========

Disposal Data

==========

Disposal Data Review Date: 87020
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 001
Landfill Ban Item: YES
Disposal Supplemental Data: CHEMICAL MANUFACTURING DIVISION P.O. BOX 375, 1 REAGENT LANE FAIR LAWN, N.J. 07410. ITEM NOT REGULATED AS A RCRA HAZARDOUS WASTE BY THE FEDERAL EPA, BUT MAY BE REGULATED IN CERTAIN STATES.
1st EPA Haz Wst Name New: NOT REGULATED
1st EPA Haz Wst Char New: NOT REGULATED BY RCRA
1st EPA Acute Hazard New: NO

==========

Label Data

==========

Label Required: YES
Label Status: G
Common Name: POTASSIUM IODIDE SOLUTION
Label Name: FISHER SCIENTIFIC COMPANY
Label Emergency Number: 201/796-7100

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

SHAPE PRODUCTS -- POTASSIUM CHROMATE,TECHNICAL - POTASSIUM CHROMATE,TECHNICAL
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 005142262
Manufacturer's CAGE: 3D869
Part No. Indicator: A
Part Number/Trade Name: POTASSIUM CHROMATE,TECHNICAL

General Information

Item Name: POTASSIUM CHROMATE,TECHNICAL
Company's Name: SHAPE PRODUCTS
Company's Emerg Ph #: 415-893-0313
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 27APR83
Supply Item Manager: CX
MSDS Serial Number: BFBYY
Hazard Characteristic Code: N1
Unit Of Issue: JR
Unit Of Issue Container Qty: 5 LBS.

Ingredients/Identity Information

Proprietary: NO
Ingredient: POTASSIUM CHROMATE (SARA III)
Ingredient Sequence Number: 01
Percent: UNK
NIOSH (RTECS) Number: GB2940000
CAS Number: 7789-00-6
OSHA PEL: C,0.1 MG/M3 CRO3
ACGIH TLV: 0.5 MG CR/M3; 9293

Physical/Chemical Characteristics

Appearance And Odor: YELLOW CRYSTALS,ODORLESS
Boiling Point: DECOMPOSES
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Specific Gravity: 2.73
Evaporation Rate And Ref: N/A
Solubility In Water: APPRECIABLE

Fire and Explosion Hazard Data

Flash Point: N/A
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: N/A
Special Fire Fighting Proc: USE SELF-CONTAINED BREATHING,APPARATUS.COOL CONTS W/H*2O.
Unusual Fire And Expl Hazrds: WHEN HEATED,GIVES OFF O*2,INCREASES FIRE HAZARD,REACTS VIOLENTLY WITH COMBUSTIBLE SUBSTANCES

Reactivity Data

Stability: YES
Cond To Avoid (Stability): COMBUSTIBLES & REDUCING MATERIALS
Materials To Avoid: SOLIDS,DUST,COMBUSTIBLES & REDUCING MATLS.
Hazardous Decomp Products: WHEN HEATED GIVES OFF OXYGEN.
Hazardous Poly Occur: NO

Health Hazard Data

Signs/Symptoms Of Overexp: SORE THROAT,COUGHING,LABORED BREATHING, SERIOUS SKIN BURNS,CORROSIVE TO EYES,ABDOM.PAIN,DIARRHEA,VOMT
Emergency/First Aid Proc: INHALATION:FRESH AIR,REST,& CALL DOCTOR.
SKIN:REMOVE CONTAMINATED CLOTHING,RINSE SKIN W/PLENTY OF H*2O & SEE DOCTOR.
EYES:FLUSH W/H*2O FOR AT LEAST 15 MINS,SEE DR;INGESTION:RINSE MOUTH,GIVE PLENTY OF WATER TO DRINK & TAKE TO HOSPITAL.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: EVACUATE UNPROTECTED PEOPLE.ELIM.IGNITION SOURCES.STOP LEAK H*2O SPRAY COOL CONT/DIVERT SPILL FROM FIRE/HEAT PROVIDE DIKE W/COMML ABSORBENT,PUMP INTO COVERED DRUMS.
Waste Disposal Method: PACKAGE LOTS.PLACE IN A SEPARATE LABELLED CONTAINER FOR DISPOSAL.SMALL QUANTITIES:ADD TO A LARGE VOL OF CONC.SOLN OF SODIUM THIOSULFATE,SODIUM BISULFITE OR A FERROUS SALT & ACIDIFY W/3M H*2SO*4.RED.IS COMPLETE,ADD NA*2CO*3 TO NEUTRAL FE,ALL W/FED REG
Precautions-Handling/Storing: SEPARATE FROM COMBUSTIBLE SUBSTANCES & REDUCING AGENTS.PROTECT CONTAINERS FROM PHYSICAL DAMAGE.STORE IN COOL,DRY, WELL VENTILATED,LOW FIRE RISK AREA.
Other Precautions: AVOID ANY PHYSICAL CONTACT.KEEP CONTAINERS TIGHTLY CLOSED.DO NOT ALLOW MATERIAL TO ENTER WATER INTAKES,HARMFUL TO AQUATIC LIFE.USE STRICT HYGIENE.PREVENT DISPERSION OF DUST.WASH CONTD CLOTHES.

Control Measures

Respiratory Protection: BUMINES APPD FILTER TYPE RESPIRATOR.
Ventilation: LOCAL EXHAUST IS PREFERRED.
Protective Gloves: RUBBER
Eye Protection: CLOSE FTG SAFETY GOGGLES
Other Protective Equipment: RUBBER BOOTS,APRONS,SAFETY HAT,FACE SHIELD

Transportation Data

Trans Data Review Date: 83117
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION

Disposal Data

Label Data

Label Required: YES
Label Status: G
Common Name: POTASSIUM CHROMATE,TECHNICAL
Special Hazard Precautions: SORE THROAT,COUGHING,LABORED BREATHING,SERIOUS SKIN BURNS,CORROSIVE TO EYES,ABDOM.PAIN,DIARRHEA,VOMT
Label Name: SHAPE PRODUCTS
Label Emergency Number: 415-893-0313

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

ALLIED CHEM CHEMICAL COMMODITIES-DISTR -- SODIUM CHROMATE - SODIUM CHROMATE,ANHYDR
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 002402119
Manufacturer's CAGE: 1L164
Part No. Indicator: A
Part Number/Trade Name: SODIUM CHROMATE

General Information

Item Name: SODIUM CHROMATE,ANHYDROUS,TECHNICAL.
Company's Name: ALLIED CHEM. INC.(MFR) CHEMICAL COMMODITIES-DISTR
Company's Emerg Ph #: 201-455-2000
Record No. For Safety Entry: 003
Tot Safety Entries This Stk#: 005
Date MSDS Prepared: 01JAN87
Safety Data Review Date: 28OCT86
Supply Item Manager: CX
MSDS Serial Number: BDMGG
Specification Number: O-S-588
Hazard Characteristic Code: N1
Unit Of Issue: BT
Unit Of Issue Container Qty: 1. LB
Net Unit Weight: 1 LB

Ingredients/Identity Information

Proprietary: NO
Ingredient: SODIUM CHROMATE (SARA III)
Ingredient Sequence Number: 01
Percent: >98
NIOSH (RTECS) Number: GB2955000
CAS Number: 7775-11-3
OSHA PEL: 0.1 PPM CRO3;CEILING
ACGIH TLV: 0.05 MG CR/M3; 9192

Physical/Chemical Characteristics

Appearance And Odor: YELLOW CRYSTALS OR POWDER, NO ODOR
Boiling Point: N/A
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Specific Gravity: 2.723
Evaporation Rate And Ref: N/A
Solubility In Water: APPRECIABLE

Fire and Explosion Hazard Data

Flash Point: NONE
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: WATER
Special Fire Fighting Proc: WEAR FULL PROTECTV CLOTHES,DUST RESPIRATOR TO PREVENT CONTAC
Unusual Fire And Expl Hazrds: MFR. REPORTS "N/A"

Reactivity Data

Stability: YES
Cond To Avoid (Stability): WILL PICK UP MOISTURE FROM AIR
Materials To Avoid: REDUCING AGENTS
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): WILL NOT POLYMERIZE

Health Hazard Data

Signs/Symptoms Of Overexp: WILL SEVERELY IRRITATE EYES & SKIN, & RESPIRATORY TRACT. INGESTION CAN BE FATAL
Emergency/First Aid Proc: IN CASE OF CONTACT IMMEDIATELY FLUSH SKIN & EYES WITH WATER 15 MIN. FOR IRRITATION OF SKIN & EYES SEE PHYSICIAN. FOR INHALATION OR INGESTION GET IMMEDIATE MEDICAL ATTENTION.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: SWEEP UP THOROUGHLY, SHOVEL UP - PLACE IN AUTHORIZED CONTAINER. FOR RESIDUE:COVER W/REDUCER(HYPO,A BISULFITE, OR FERROUS SALT BUT NOT CARBON,SULFUR, OR STRONG REDUCING AGENTS). MIX WELL & SPRAY W/WATER. SULFITE OR FERROUS SALT REQUIRE 3M-H*2SO*4
Waste Disposal Method: CHROMATES CANNOT BE DISCHARGED DIRECTLY TO STREAMS. TREATMENT METHODS OUTLINED IN MCA SAFETY DATA SHEET SD-46. DISPOSAL BY CONTACTOR MAY BE NECESSARY.
Precautions-Handling/Storing: STORE IN DRY AREA.KEEP CONTAINERS CLOSED TO MINIMIZE CAKING DUE TO MOISTURE ADSORBING TO PRODUCT
Other Precautions: WASH CLOTHING BEFORE RE-USE. WORKERS SHOULD TAKE HOT SHOWER AFTER USE, USING PLENTY OF WATER

Control Measures

Respiratory Protection: RESPIRATOR APPROVED BY NIOSH FOR SODIUM CHROMATE SERVICE
Ventilation: SUFFICIENT TO ELIMINATE DUSTS.
Protective Gloves: RUBBER
Eye Protection: SAFETY GOGGLES
Other Protective Equipment: APRON, FACE SHIELD & RUBBER SHOES IF NECESSARY
Suppl. Safety & Health Data: MSDS DATE:1/16/86

Transportation Data

Trans Data Review Date: 86301
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION

Disposal Data

Label Data

Label Required: YES
Label Status: G
Common Name: SODIUM CHROMATE
Special Hazard Precautions: WILL SEVERELY IRRITATE EYES & SKIN, & RESPIRATORY TRACT. INGESTION CAN BE FATAL
Label Name: ALLIED CHEM. INC.(MFR) CHEMICAL COMMODITIES-DISTR
Label Emergency Number: 201-455-2000

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

FIDELITY CHEMICAL PRODUCTS -- ELECTROLESS NICKEL SOLUTION, 4855A
MATERIAL SAFETY DATA SHEET
FSC: 6850
NIIN: 00N027105
Manufacturer's CAGE: 07653
Part No. Indicator: A
Part Number/Trade Name: ELECTROLESS NICKEL SOLUTION, 4855A

General Information

Company's Name: FIDELITY CHEMICAL PRODUCTS CORP
Company's Street: 470 FRELINGHUYSEN AVE
Company's City: NEWARK
Company's State: NJ
Company's Country: US
Company's Zip Code: 07114
Company's Emerg Ph #: 800-424-9300 (CHEMTREC)
Company's Info Ph #: 201-242-4110
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 003
Status: KMJ
Date MSDS Prepared: 14APR91
Safety Data Review Date: 02MAR92
MSDS Preparer's Name: PETER F. DOWNING
Preparer's Company: SAME
MSDS Serial Number: BNLLS
Hazard Characteristic Code: N1

Ingredients/Identity Information

Proprietary: NO
Ingredient: NICKEL SULFATE (SARA III) CONTAINING INGREDIENT 2
Ingredient Sequence Number: 01
Percent: <36
NIOSH (RTECS) Number: QR9350000
CAS Number: 7786-81-4
OSHA PEL: 1 MG NI/M3
ACGIH TLV: 0.1 MG NI/M3; 9293

Proprietary: NO
Ingredient: NICKEL AS NICKEL SULFATE (SARA III)
Ingredient Sequence Number: 02
Percent: <8
NIOSH (RTECS) Number: QR5950000
CAS Number: 7440-02-0
OSHA PEL: 0.1 MG/M3
ACGIH TLV: 0.1 MG/M3

Proprietary: NO
Ingredient: NON HAZARDOUS INGREDIENTS
Ingredient Sequence Number: 03
Percent: BALANCE
NIOSH (RTECS) Number: 1000314NH
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance And Odor: CLEAR, DARK GREEN LIQUID W/NO ODOR.
Boiling Point: >212F,>100C
Melting Point: 58.0F,14.4C
Vapor Pressure (MM Hg/70 F): N/A
Specific Gravity: 1.26 (H2O=1)

Evaporation Rate And Ref: NOT APPLICABLE.
Solubility In Water: COMPLETE.

Fire and Explosion Hazard Data

Flash Point: NOT FLAMMABLE
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: SAME AS FOR SURROUNDING MATERIAL.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: CORROSIVE FUMES & VAPORS MAY DEVELOP IF PRODUCT IS EXPOSED TO ELEVATED TEMPERATURE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): EXCESS HEAT.
Materials To Avoid: UNKNOWN.
Hazardous Decomp Products: OXIDES OF SULFUR MAY EVOLVE UPON HEATING.
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: INHALATION OF MIST/VAPOR CAN CAUSE IRRIT OF THE UPPER RESPIRATORY TRACT. SKIN CONTACT MAY BE IRRITATING & CAUSE ALLERGIC DERMATITIS ("NICKEL ITCH") CHARACTERIZED BY ITCHING & SKIN ERUPTIONS. EYE CONTACT W/SOLUTION MAY CAUSE IRRIT. INGESTION CAN CAUSE GIDDINESS, NAUSEA, VOMITING & DAMAGE TO GI TRACT. CHRONIC: UNKNOWN.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT
Signs/Symptoms Of Overexp: SEE HEALTH HAZARDS.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYE:FLUSH THOROUGHLY W/RUNNING WATER FOR AT LEAST 15 MINS, INCLUDING UNDER EYELIDS. CONTACT MD IMMEDIATELY. SKIN:FLUSH AFFECTED AREA W/PLENTY OF WATER. REMOVE CONTAMINATED CLOTHING UNDER SHOWER. CONTACT MD IMMEDIATELY. INHAL:REMOVE TO FRESH AIR. RESTORE &/OR SUPPORT BREATHING AS NEEDED. CONTACT MD IMMEDIATELY. INGEST:GIVE VICTIM A LARGE QUANTITY OF WATER OR MILK TO DRINK. CONTACT MD IMMEDIATELY.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: NEUTRALIZE W/SLAKED LIME, CRUSHED LIMESTONE OR SODIUM BICARBONATE. ABSORB THE SPILL W/ANY NON-COMBUSTIBLE SORBENT SUCH AS FLYASH OR CEMENT POWDER.
Neutralizing Agent: SLAKED LIME, CRUSHED LIMESTONE OR SODIUM BICARBONATE.
Waste Disposal Method: PUT THE MATERIAL IN A POLYLINED DRUM. FOLLOW FEDERAL, STATE & LOCAL REGULATIONS FOR DISPOSAL.
Precautions-Handling/Storing: KEEP CONTR CLOSED AT ALL TIMES WHEN NOT IN USE. KEEP AWAY FROM WATER SOURCES & SEWERS. BEFORE MOVING DRUM, BE SURE CLOSURES ARE SECURELY FASTENED.
Other Precautions: NONE.

Control Measures

Respiratory Protection: USE NIOSH/MSHA APPROVED CHEMICAL RESPIRATOR.
Ventilation: LOCAL EXHAUST SHOULD BE USED. MAINTAIN A MINIMUM AIR FLOW OF

100 LPM.
Protective Gloves: RUBBER, NEOPRENE OR PVC GLOVES.
Eye Protection: CHEM WORK GOGGS/FULL LENGTH FSHLD (FP N)
Other Protective Equipment: NEOPRENE OR PVC APRON & RUBBER BOOTS.
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: NONE SPECIFIED BY MANUFACTURER.

==========

Transportation Data

==========

Trans Data Review Date: 92217
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
Additional Trans Data: NOT REGULATED FOR TRANSPORTATION

==========

Disposal Data

==========

==========

Label Data

==========

Label Required: YES
Technical Review Date: 24FEB92
Label Status: G
Common Name: ELECTROLESS NICKEL SOLUTION, 4855A
Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: AVOID EXCESS HEAT. ACUTE: INHALATION OF MIST OR VAPORS MAY IRRITATE UPPER RESPIRATORY TRACT. CONTACT WITH SKIN MAY CAUSE IRRITATION AND ALLERGIC DERMATITIS ("NICKEL ITCH") WITH ITCHING AND SKIN ERUPTIONS. CONTACT WITH EYES MAY CAUSE IRRITATION. INGESTION MAY CAUSE GIDDINESS, NAUSEA, VOMITING AND DAMAGE TO THE GASTROINTESTINAL TRACT. CHRONIC: CONTAINS NICKEL, A SUSPECTED CARCINOGEN.(MFR).CARCINOGENICITY OF NICKEL SULFATE IS NOT SUPPORTED IN CURRENT DATA AS OF 7/27/91 (FP N).
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: FIDELITY CHEMICAL PRODUCTS CORP
Label Street: 470 FRELINGHUYSEN AVE
Label City: NEWARK
Label State: NJ
Label Zip Code: 07114
Label Country: US
Label Emergency Number: 800-424-9300 (CHEMTREC)

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

BOUGHT ACCORDING TO SPECIFICATION -- O-C-265 - CHLOROFORM,ACS
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 002646609
Manufacturer's CAGE: 81348
Part No. Indicator: A
Part Number/Trade Name: O-C-265

==========

General Information

==========

Item Name: CHLOROFORM,ACS
Company's Name: BOUGHT ACCORDING TO SPECIFICATION
Record No. For Safety Entry: 008
Tot Safety Entries This Stk#: 010
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 21DEC82
Supply Item Manager: CX
MSDS Serial Number: BDQSM
Specification Number: O-C-265
Hazard Characteristic Code: T3
Unit Of Issue: PT
Unit Of Issue Container Qty: 16 FL OUNCES
Type Of Container: BOTTLE
Net Unit Weight: UNKNOWN

==========

Ingredients/Identity Information

==========

Proprietary: NO
Ingredient: CHLOROFORM (SARA III)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: FS9100000
CAS Number: 67-66-3
OSHA PEL: (C) 50 PPM
ACGIH TLV: 10 PPM; A2; 9293

==========

Physical/Chemical Characteristics

==========

Appearance And Odor: NOT SPECIFIED BY MANUFACTURER.
Boiling Point: UNKNOWN
Melting Point: UNKNOWN
Vapor Pressure (MM Hg/70 F): UNKNOWN
Vapor Density (Air=1): UNKNOWN
Specific Gravity: UNKNOWN
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: UNKNOWN
Solubility In Water: UNKNOWN
Viscosity: UNKNOWN
Corrosion Rate (IPY): UNKNOWN

==========

Fire and Explosion Hazard Data

==========

==========

Reactivity Data

==========

==========

Health Hazard Data

==========

Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: CHLOROFORM IS SUSPECTED BY NTP AND IARC TO BE CARCINOGENIC.

==========

Precautions for Safe Handling and Use

==========

==========

Control Measures

==========

Suppl. Safety & Health Data: ITEM IS SUSPECTED CARCINOGEN IN MAN PER ACGIH.

==========

Transportation Data

==========

Trans Data Review Date: 82355
DOT PSN Code: DHF
DOT Proper Shipping Name: CHLOROFORM
DOT Class: 6.1
DOT ID Number: UN1888
DOT Pack Group: II
DOT Label: KEEP AWAY FROM FOOD *
IMO PSN Code: EEH
IMO Proper Shipping Name: CHLOROFORM
IMO Regulations Page Number: 6103
IMO UN Number: 1888
IMO UN Class: 6.1
IMO Subsidiary Risk Label: -
IATA PSN Code: GJO
IATA UN ID Number: 1888
IATA Proper Shipping Name: CHLOROFORM
IATA UN Class: 6.1
IATA Label: TOXIC *
AFI PSN Code: GJO
AFI Prop. Shipping Name: CHLOROFORM
AFI Class: 6.1
AFI ID Number: UN1888
AFI Pack Group: II
AFI Label: POISON
AFI Special Prov: N36
AFI Basic Pac Ref: 10-9

==========

Disposal Data

==========

==========

Label Data

==========

Label Required: YES
Label Status: G
Common Name: O-C-265
Label Name: BOUGHT ACCORDING TO SPECIFICATION

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

SPECIALTY PRODUCTS GROUP -- ZINC CHLORIDE,GRANULAR - ZINC CHLORIDE,TECHNICAL
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 002470610
Manufacturer's CAGE: 7X274
Part No. Indicator: A
Part Number/Trade Name: ZINC CHLORIDE,GRANULAR

General Information

Item Name: ZINC CHLORIDE,TECHNICAL
Company's Name: SPECIALTY PRODUCTS GROUP
Company's Street: 1734 HAYES AVE
Company's City: LONG BEACH
Company's State: CA
Company's Country: US
Company's Zip Code: 90813-1145
Record No. For Safety Entry: 004
Tot Safety Entries This Stk#: 005
Date MSDS Prepared: 01JAN87
Safety Data Review Date: 19JAN87
Supply Item Manager: CX
MSDS Serial Number: BDNLQ
Hazard Characteristic Code: J6
Unit Of Issue: BT
Unit Of Issue Container Qty: 5 LBS
Net Unit Weight: 5 LBS

Ingredients/Identity Information

Proprietary: NO
Ingredient: ZINC CHLORIDE (SARA III)
Ingredient Sequence Number: 01
Percent: >94
NIOSH (RTECS) Number: ZH1400000
CAS Number: 7646-85-7
OSHA PEL: 1 MG/M3/2 STEL
ACGIH TLV: 1 MG/M3/2STEL FUME93

Physical/Chemical Characteristics

Appearance And Odor: WHITE,ODORLESS CRYSTALS
Boiling Point: 1350F/732C
Specific Gravity: 2.905
Solubility In Water: APPRECIABLE

Fire and Explosion Hazard Data

Flash Point: NONE
Unusual Fire And Expl Hazrds: MAY RELEASE TOXIC FUMES IF INVOLVED IN A FIRE.

Reactivity Data

Stability: YES
Hazardous Poly Occur: NO

Health Hazard Data

Signs/Symptoms Of Overexp: CAUSES BURNS TO SKIN,EYES,MEMBRANES,ETC.
Emergency/First Aid Proc: EYES-FLUSH W/WATER 15 MIN. TAKE OFF CONTAM CLOTHING

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: COLLECT IN A PLASTIC CONTAINERS. NEUTRALIZE FLOOR W/LIME. AVOID CONTACT W/SKIN & EYES.
Waste Disposal Method: FLUSH W/WATER IN CHEMICAL SEWER.
Precautions-Handling/Storing: KEEP CONTAINER TIGHTLY CLOSED. AVOID CONTACT W/MOISTURE.

Control Measures

Respiratory Protection: CARTRIDG OR FILTER RESPIRATOR ADVISABLE FOR FUMES.
Ventilation: ADEQUATE TO KEEP VAP CONC BELOW TLV. SCRUB AIR BEOFRE RECIRC
Protective Gloves: RUBBER/PLASTIC
Eye Protection: GOGGLES/SAFETY GLASSES
Other Protective Equipment: DEPENDS ON SPECIFIC USAGE

Transportation Data

Trans Data Review Date: 87019
DOT PSN Code: PZH
DOT Proper Shipping Name: ZINC CHLORIDE, ANHYDROUS *
DOT Class: 8
DOT ID Number: UN2331
DOT Pack Group: III
DOT Label: CORROSIVE
IMO PSN Code: PRP
IMO Proper Shipping Name: ZINC CHLORIDE, ANHYDROUS
IMO Regulations Page Number: 8247
IMO UN Number: 2331
IMO UN Class: 8
IMO Subsidiary Risk Label: -
IATA PSN Code: ZRM
IATA UN ID Number: 2331
IATA Proper Shipping Name: ZINC CHLORIDE, ANHYDROUS
IATA UN Class: 8
IATA Label: CORROSIVE
AFI PSN Code: ZRM
AFI Prop. Shipping Name: ZINC CHLORIDE, ANHYDROUS
AFI Class: 8
AFI ID Number: UN2331
AFI Pack Group: III
AFI Label: CORROSIVE
AFI Basic Pac Ref: 12-7

Disposal Data

Disposal Data Review Date: 88270
Rec # For This Disp Entry: 02
Tot Disp Entries Per NSN: 002
Landfill Ban Item: YES
Disposal Supplemental Data: IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Name New: NOT REGULATED
1st EPA Haz Wst Char New: NOT REGULATED BY RCRA
1st EPA Acute Hazard New: NO

Label Data

Label Required: YES
Label Status: F
Special Hazard Precautions: CONTACT CAUSES BURNS TO SKIN AND EYES. IF INHALED, MAY BE HARMFUL. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.
Label Name: MMM SUPPLY INC

Label Street: 1734 HAYES AVE
Label City: LONG BEACH
Label State: CA
Label Zip Code: 90813-1145
Label Country: US
==========
URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

SHAPE PRODUCTS -- SODIUM THIOSULFATE, SOLUTION REAGENT - SODIUM THIOSULFATE SOLUTIC
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 001746602
Manufacturer's CAGE: 3D869
Part No. Indicator: A
Part Number/Trade Name: SODIUM THIOSULFATE, SOLUTION REAGENT

General Information

Item Name: SODIUM THIOSULFATE SOLUTION,REAGENT
Company's Name: SHAPE PRODUCTS
Company's Emerg Ph #: 415-893-0313
Record No. For Safety Entry: 002
Tot Safety Entries This Stk#: 003
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 11MAR81
MSDS Serial Number: BDFRJ
Hazard Characteristic Code: N1
Unit Of Issue: BT
Unit Of Issue Container Qty: 4 OZ

Ingredients/Identity Information

Proprietary: NO
Ingredient: SODIUM THIOSULFATE
Ingredient Sequence Number: 01
Percent: 19.8
NIOSH (RTECS) Number: XN6476000
CAS Number: 7772-98-7

Proprietary: NO
Ingredient: WATER
Ingredient Sequence Number: 02
Percent: 71.2
NIOSH (RTECS) Number: ZC0110000
CAS Number: 7732-18-5

Physical/Chemical Characteristics

Appearance And Odor: WHITE ODORLESS CRYSTALS DISSOLVED IN WATER.
Boiling Point: >212F
Specific Gravity: 1.729
Evaporation Rate And Ref: N/A
Solubility In Water: COMPLETE

Fire and Explosion Hazard Data

Flash Point: N/A
Extinguishing Media: NONE
Special Fire Fighting Proc: NONE
Unusual Fire And Expl Hazrds: NONE

Reactivity Data

Stability: YES
Hazardous Poly Occur: NO

Health Hazard Data

Signs/Symptoms Of Overexp: LARGE DOSES OF SOLID INGESTED ACTS AS CATHARTIC.EYE/SKIN CONTACT:IRRITANT
Emergency/First Aid Proc: EYE/SKIN:FLUSH WITH COPIOUS AMOUNTS OF WATER.

CALL PHYSICIAN IF EYE CONTACT.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: ABSORB WITH APPROPRIATE MATERIAL AND PLACE IN APPROVED CONTAINER.
Waste Disposal Method: DISPOSE OF ABSORB MATERIAL AS SOLID WASTE IN ACCORDANCE WITH FEDERAL,STATE, AND LOCAL REGULATIONS.
Precautions-Handling/Storing: NONE
Other Precautions: NONE

Control Measures

Respiratory Protection: NONE REQUIRED.
Ventilation: AS NEEDED.
Protective Gloves: RECOMMENDED
Eye Protection: SAFETY GLASSES.
Other Protective Equipment: AS NEEDED.

Transportation Data

Trans Data Review Date: 81070
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
Additional Trans Data: ITEM IS NOT REGULATED FOR TRANSPORTATION

Disposal Data

Disposal Data Review Date: 89207
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 002
Landfill Ban Item: YES
Disposal Supplemental Data: IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Name New: NOT REGULATED
1st EPA Haz Wst Char New: NOT REGULATED BY RCRA
1st EPA Acute Hazard New: NO

Label Data

Label Required: YES
Label Status: G
Common Name: SODIUM THIOSULFATE, SOLUTION REAGENT
Special Hazard Precautions: LARGE DOSES OF SOLID INGESTED ACTS AS CATHARTIC.EYE/SKIN CONTACT:IRRITANT
Label Name: SHAPE PRODUCTS
Label Emergency Number: 415-893-0313

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

CHEMICAL COMMODITIES AGENCY -- PHENOLPHTHALEIN SOLUTION - PHENOLPHTHALEIN SOLUTION
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 004450449
Manufacturer's CAGE: 60777
Part No. Indicator: A
Part Number/Trade Name: PHENOLPHTHALEIN SOLUTION

General Information

Item Name: PHENOLPHTHALEIN SOLUTION
Company's Name: CHEMICAL COMMODITIES AGENCY
Company's Emerg Ph #: 714-864-2310.
Record No. For Safety Entry: 002
Tot Safety Entries This Stk#: 003
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 21OCT81
MSDS Serial Number: BDZBK
Hazard Characteristic Code: N1
Unit Of Issue: BT
Unit Of Issue Container Qty: 1OZ.

Ingredients/Identity Information

Proprietary: NO
Ingredient: PHENOLPHTHALEIN,ACS
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: SM8380000
CAS Number: 77-09-8
ACGIH TLV: UNK

Physical/Chemical Characteristics

Appearance And Odor: -----
Boiling Point: N/A
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Specific Gravity: N/A
Evaporation Rate And Ref: N/A
Solubility In Water: N/A
Percent Volatiles By Volume: N/A

Fire and Explosion Hazard Data

Flash Point: N/A
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: N/A
Special Fire Fighting Proc: N/A
Unusual Fire And Expl Hazrds: N/A

Reactivity Data

Stability: YES
Materials To Avoid: N/A
Hazardous Decomp Products: N/A
Hazardous Poly Occur: NO

Health Hazard Data

Signs/Symptoms Of Overexp: DO NOT TAKE INTERNALLY

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: FLUSH DOWN INTO AN APPROVED STORAGE CONTAINERS.
Waste Disposal Method: FLUSH DOWN INTO AN APPROVED DISPOSAL AREA.
Precautions-Handling/Storing: STORE IN A COOL,DRY AREA.

Control Measures

Respiratory Protection: N/A

Transportation Data

Trans Data Review Date: 81294
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION

Disposal Data

Disposal Data Review Date: 88235
Rec # For This Disp Entry: 02
Tot Disp Entries Per NSN: 002
Landfill Ban Item: YES
Disposal Supplemental Data: DISPOSAL VIA DISCHARGE TO SANITARY SEWER IS REGULATED BY THE RECEIVING AUTHORITY.
1st EPA Haz Wst Name New: NOT REGULATED
1st EPA Haz Wst Char New: NOT REGULATED BY RCRA
1st EPA Acute Hazard New: NO

Label Data

Label Required: YES
Label Status: G
Common Name: PHENOLPHTHALEIN SOLUTION
Special Hazard Precautions: DO NOT TAKE INTERNALLY
Label Name: CHEMICAL COMMODITIES AGENCY
Label Emergency Number: 714-864-2310.

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

J T BAKER CHEMICAL -- POTASSIUM BROMIDE
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 00F002353
Manufacturer's CAGE: 70829
Part No. Indicator: A
Part Number/Trade Name: POTASSIUM BROMIDE

General Information

Company's Name: J.T. BAKER CHEMICAL CO.
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Date MSDS Prepared: 01JAN87
Safety Data Review Date: 03DEC85
MSDS Serial Number: BBKTN

Ingredients/Identity Information

Proprietary: YES
Ingredient: PROPRIETARY
Ingredient Sequence Number: 01

Physical/Chemical Characteristics

Boiling Point: 1380F
Vapor Pressure (MM Hg/70 F): 1
Specific Gravity: 2.75
Solubility In Water: 1.5

Fire and Explosion Hazard Data

Reactivity Data

Stability: YES
Materials To Avoid: BROMINE TRIFLUORIDE
Hazardous Poly Occur: NO

Health Hazard Data

Signs/Symptoms Of Overexp: HARMFUL IF SWALLOWED.
Emergency/First Aid Proc: IF SWALLOWED, IF CONSCIOUS, INDUCE VOMITING. CALL A PHYSICIAN.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: SWEEP UP AND CAREFULLY REMOVE ANY SPILLED MATERIAL.
Waste Disposal Method: DISPOSE IN ACCORDANCE WITH LOCAL ENVIRONMENTAL REGULATIONS.
Precautions-Handling/Storing: KEEP CONTAINER TIGHTLY CLOSED. WASH THOROUGHLY AFTER HANDLING.
Other Precautions: AVOID BREATHING DUST.

Control Measures

Ventilation: LOCAL EXHAUST AND MECHANICAL
Protective Gloves: RUBBER
Eye Protection: GLASSES
Other Protective Equipment: APPROVED WORKING CLOTHES.
Suppl. Safety & Health Data: 222 RED SCHOOL LANE/PHILLIPSBURG, N.J. 08865.

Transportation Data

==========

==========

Disposal Data

==========

Disposal Data Review Date: 88293
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 001
Landfill Ban Item: YES
Disposal Supplemental Data: 222 RED SCHOOL LANE/PHILLIPSBURG, N.J. 08865.
IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Name New: NOT REGULATED
1st EPA Haz Wst Char New: NOT REGULATED BY RCRA
1st EPA Acute Hazard New: NO

==========

Label Data

==========

Label Required: YES
Label Status: G
Common Name: POTASSIUM BROMIDE
Special Hazard Precautions: HARMFUL IF SWALLOWED.
Label Name: J.T. BAKER CHEMICAL CO.

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

SHAPE PRODUCTS -- BROMOCRESOL GREEN-BROMOCRESOL PURPLE IDICAT - BROMOCRESOL GREEN-E
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 002271294
Manufacturer's CAGE: 3D869
Part No. Indicator: A
Part Number/Trade Name: BROMOCRESOL GREEN-BROMOCRESOL PURPLE IDICAT

General Information

Item Name: BROMOCRESOL GREEN-BROMOCRESOL PURPLE SOLUTION
Company's Name: SHAPE PRODUCTS
Company's Emerg Ph #: (415)893-0313
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 002
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 08JUL85
Supply Item Manager: CX
MSDS Serial Number: BDKSL
Specification Number: MIL-I-536
Hazard Characteristic Code: N1
Unit Of Issue: BT
Unit Of Issue Container Qty: 4OZ.

Ingredients/Identity Information

Proprietary: NO
Ingredient: BROMOCRESOL GREEN(TETRABROMOMETA CRESOLSULFONPHTHALEIN)-0.210 GRAMS
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: SJ7456000
CAS Number: 76-60-8

Proprietary: NO
Ingredient: BROMOCRESOL PURPLE(DIBROMO-ORTHO-CRESOLSULFONPHTHALEIN-0.14 GRAMS
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 1000782BP

Proprietary: NO
Ingredient: WATER
Ingredient Sequence Number: 03
Percent: 90.
NIOSH (RTECS) Number: 1000000WA

Proprietary: NO
Ingredient: METHYL ALCOHOL (METHANOL) (SARA III)
Ingredient Sequence Number: 04
Percent: 10.
NIOSH (RTECS) Number: PC1400000
CAS Number: 67-56-1
OSHA PEL: S,200PPM/250STEL
ACGIH TLV: S,200PPM/250STEL; 93

Physical/Chemical Characteristics

Appearance And Odor: GREEN LIQUID AT PH=7
Boiling Point: N/A
Specific Gravity: 1.27
Evaporation Rate And Ref: N/A
Solubility In Water: COMPLETE

Fire and Explosion Hazard Data

==========

Flash Point: N/A
Extinguishing Media: NOT APPLICABLE
Special Fire Fighting Proc: NOT APPLICABLE
Unusual Fire And Expl Hazrds: NOT APPLICABLE

==========

Reactivity Data

==========

Stability: YES
Materials To Avoid: NONE
Hazardous Decomp Products: NONE
Hazardous Poly Occur: NO

==========

Health Hazard Data

==========

Signs/Symptoms Of Overexp: NONE
Emergency/First Aid Proc: NONE

==========

Precautions for Safe Handling and Use

==========

Steps If Matl Released/Spill: ABSORB AND DISPOSE AS SOLID WASTE
Waste Disposal Method: OBSERVE APPROPRIATE,FEDERAL,STATE, AND LOCAL REGULATIONS.
Precautions-Handling/Storing: NONE

==========

Control Measures

==========

Respiratory Protection: N/A
Ventilation: N/A
Protective Gloves: N/A
Eye Protection: N/A
Other Protective Equipment: N/A
Suppl. Safety & Health Data: MSDS UNDATED.

==========

Transportation Data

==========

Trans Data Review Date: 81070
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
Additional Trans Data: ITEM IS NOT REGULATED FOR TRANSPORTATION

==========

Disposal Data

==========

==========

Label Data

==========

Label Required: YES
Label Status: G
Common Name: BROMOCRESOL GREEN-BROMOCRESOL PURPLE IDICAT
Special Hazard Precautions: NONE
Label Name: SHAPE PRODUCTS
Label Emergency Number: (415)893-0313

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

BECTON-DICKINSON MICROBIOLOGY SYS -- 12308 12406 12405 GRAM IODINE SOLUTION
MATERIAL SAFETY DATA SHEET
FSC: 6550
NIIN: 00F041232
Manufacturer's CAGE: 05545
Part No. Indicator: B
Part Number/Trade Name: 12308 12406 12405 GRAM IODINE SOLUTION

General Information

Company's Name: BECTON-DICKINSON MICROBIOLOGY SYS INC (FORMER BBL)
Company's Street: 250 SCHILLING CIRCLE
Company's P. O. Box: 243
Company's City: COCKEYSVILLE
Company's State: MD
Company's Country: US
Company's Zip Code: 21030-5000
Company's Emerg Ph #: 301-771-0100/301-584-7169
Company's Info Ph #: 301-771-0100/301-584-7169
Record No. For Safety Entry: 002
Tot Safety Entries This Stk#: 002
Status: KE
Date MSDS Prepared: 21JAN91
Safety Data Review Date: 26JUL95
Preparer's Company: BECTON-DICKINSON MICROBIOLOGY SYS INC (F
Preparer's St Or P. O. Box: 250 SCHILLING CIRCLE
Preparer's City: COCKEYSVILLE
Preparer's State: MD
Preparer's Zip Code: 21030-5000
MSDS Serial Number: BXNHM

Ingredients/Identity Information

Proprietary: NO
Ingredient: IODINE
Ingredient Sequence Number: 01
Percent: 3
NIOSH (RTECS) Number: NN1575000
CAS Number: 7553-56-2
OSHA PEL: 1 MG/CUM
ACGIH TLV: C 1.0 MG/CUM
Other Recommended Limit: 0.1 PPM

Physical/Chemical Characteristics

Appearance And Odor: DARK BROWN LIQUID W/CHARACTERISTIC ODOR OF IODINE
Boiling Point: 212F
Solubility In Water: COMPLETE

Fire and Explosion Hazard Data

Extinguishing Media: WATER SPRAY. USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.
Special Fire Fighting Proc: WEAR SCBA.
Unusual Fire And Expl Hazrds: EMITS TOXIC IODINE FUMES WHEN HEATED.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HEAT
Materials To Avoid: IODINE: AMMONIA, POWDERED METALS, ALKALI METALS.
Hazardous Decomp Products: IODINE: AMMONIA HYDROXIDE.
Hazardous Poly Occur: NO

Health Hazard Data

Route Of Entry - Inhalation: NO
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: IODINE-EYES/SKIN: IRRITATION. INGESTION: MAY CAUSE BURNING SENSATION/ABDOMINAL PAIN.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
Signs/Symptoms Of Overexp: IRRITATION, BURNING, PAIN.
Emergency/First Aid Proc: EYES: FLUSH W/WATER FOR 15 MINS. SKIN: WASH AREA W/SOAP & WATER. INGESTION: GIVE 3 GLASSES OF WATER TO DRINK. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: ALLOW LIQUID TO ABSORB ONTO PAPER TOWELS & DISPOSE OF W/LAB TRASH.
Waste Disposal Method: WASTE MATERIAL MAY BE DISPOSED OF W/NORMAL LAB TRASH IAW/FEDERAL, STATE & LOCAL REGULATIONS.

Control Measures

Respiratory Protection: NOT REQUIRED UNDER NORMAL PRODUCT USAGE.
Ventilation: GENERAL/LOCAL TO MEET TLV REQUIREMENTS.
Protective Gloves: NOT REQUIRED UNDER NORMAL PRODUCT USAGE.
Eye Protection: SAFETY GLASSES
Other Protective Equipment: EYEWASH STATION.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Label Status: G
Common Name: 12308 12406 12405 GRAM IODINE SOLUTION
Special Hazard Precautions: IODINE-EYES/SKIN: IRRITATION. INGESTION: MAY CAUSE BURNING SENSATION/ABDOMINAL PAIN. IRRITATION, BURNING, PAIN.
Label Name: BECTON-DICKINSON MICROBIOLOGY SYS INC
(FORMER BBL)
Label Street: 250 SCHILLING CIRCLE
Label P.O. Box: 243
Label City: COCKEYSVILLE
Label State: MD
Label Zip Code: 21030-5000
Label Country: US
Label Emergency Number: 301-771-0100/301-584-7169

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

PROCESS SUPPLY -- SAL AMMONIAC (AMMONIUM CHLORIDE) - AMMONIUM CHLORIDE,ACS
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 009513072
Manufacturer's CAGE: 63479
Part No. Indicator: A
Part Number/Trade Name: SAL AMMONIAC (AMMONIUM CHLORIDE)

General Information

Item Name: AMMONIUM CHLORIDE,ACS
Company's Name: PROCESS SUPPLY,INCORPORATED
Company's Emerg Ph #: 516-654-0651
Record No. For Safety Entry: 004
Tot Safety Entries This Stk#: 006
Date MSDS Prepared: 01JAN87
Safety Data Review Date: 07AUG87
Supply Item Manager: CX
MSDS Serial Number: BFYXM
Specification Number: O-C-265
Hazard Characteristic Code: N1
Unit Of Issue: BT
Unit Of Issue Container Qty: 5.0 LBS
Type Of Container: BOTTLE
Net Unit Weight: 5.0 LBS

Ingredients/Identity Information

Proprietary: NO
Ingredient: AMMONIUM CHLORIDE (SARA III)
Ingredient Sequence Number: 01
Percent: >98.
NIOSH (RTECS) Number: BP4550000
CAS Number: 12125-02-9
OSHA PEL: 10 MG/M3/20 STEL
ACGIH TLV: 10 MG/M3 FUME; 9192

Physical/Chemical Characteristics

Appearance And Odor: WHITE,ODORLESS GRANULES.
Specific Gravity: 1.53
Solubility In Water: APPRECIABLE

Fire and Explosion Hazard Data

Flash Point: NONE
Extinguishing Media: WATERFOG OR SPRAY
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA WITH FULL PROTECTION IN CONFINE
Unusual Fire And Expl Hazrds: THERMAL DECOMPOSITION PRODUCES HIGHLY TOXIC FUMES.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): EXTREME HEAT
Materials To Avoid: ACIDS,OXIDIZERS;STRONG ALKALIES,SILVER SALTS,CYANIDES, BRF*3
Hazardous Decomp Products: HYDROGEN CHLORIDE AND AMMONIA GAS.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NONE NOTED

Health Hazard Data

Signs/Symptoms Of Overexp: HARMFUL IF SWALLOWED,IRRITATING TO SKIN,EYE & REPS.TRACT;EYE IRRITATION CAN BE SEVERE;MAIN HAZ FUME
Emergency/First Aid Proc: INHALE:REMOVE TO FRESH AIR, GIVE CPR/O*2 IF NEED;EYES/SKIN:FLUSH W LG AMTS H*2O FOR 15 MIN;INGEST:RINSE MOUTH; GET MEDICAL ATTENTION FOR EYES, BREATHING DIFFICULTY, OR OTHER SYMPTOMS OF OVEREXPOSURE.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: USE PROPER PERSONAL PROTECTION:SWEEP UP AND CONTAINERIZE FOR PROPER DISPOSAL.
Waste Disposal Method: DISPOSE OF COLLECTED MATERIAL IN ACCORDANCE WITH LOCAL STATE AND FEDERAL REGULATIONS.
Precautions-Handling/Storing: STORE IN COOL DRY AREA;KEEP CONTAINER TIGHTLY CLOSED WHEN NOT IN USE.
Other Precautions: AVOID CONTACT WITH SKIN AND EYES. DO NOT BREATHE DUST. DO NOT TAKE INTERNALLY.WASH THOROUGHLY AFTER EACH USE.

Control Measures

Ventilation: PROVIDE MECHAN(GEN/LOCAL EXHAUST)VENT TO MAINTN <TLV
Protective Gloves: NEOPRENE
Eye Protection: SAFETY/CHEM GOGGLES
Other Protective Equipment: FULL WORK CLOTHING TO PREVENT REPEATED OR PROLONGED CONTACT.
Suppl. Safety & Health Data: MSDS DATED:01/08/87;

Transportation Data

Trans Data Review Date: 87219
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION

Disposal Data

Disposal Data Review Date: 88315
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 002
Landfill Ban Item: YES
Disposal Supplemental Data: MSDS DATED:01/08/87; ITEM NOT REGULATED AS A RCRA HAZARDOUS WASTE BY THE FEDERAL EPA, BUT MAY BE REGULATED IN CERTAIN STATES.
1st EPA Haz Wst Name New: NOT REGULATED
1st EPA Haz Wst Char New: NOT REGULATED BY RCRA
1st EPA Acute Hazard New: NO

Label Data

Label Required: YES
Label Status: G
Common Name: SAL AMMONIAC (AMMONIUM CHLORIDE)
Special Hazard Precautions: HARMFUL IF SWALLOWED, IRRITATING TO SKIN,EYE & REPS.TRACT;EYE IRRITATION CAN BE SEVERE;MAIN HAZ FUME
Label Name: PROCESS SUPPLY,INCORPORATED
Label Emergency Number: 516-654-0651

URL for this msds http://hazard.com. If you wish to change, add to, or

delete information in this archive please sent updates to dan@hazard.com.

CHEMICAL COMMODITIES AGENCY -- SODIUM PEROXIDE - SODIUM PEROXIDE,ANHYDROUS,ACS
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 002411159
Manufacturer's CAGE: 60777
Part No. Indicator: A
Part Number/Trade Name: SODIUM PEROXIDE

General Information

Item Name: SODIUM PEROXIDE,ANHYDROUS,ACS
Company's Name: CHEMICAL COMMODITIES AGENCY INC
Company's Street: 27447 PACIFIC STREET
Company's City: HIGHLAND
Company's State: CA
Company's Country: US
Company's Zip Code: 92346-2640
Company's Emerg Ph #: 714-864-2310
Company's Info Ph #: 714-864-2310
Record No. For Safety Entry: 003
Tot Safety Entries This Stk#: 003
Date MSDS Prepared: 01JAN87
Safety Data Review Date: 03DEC86
Supply Item Manager: CX
MSDS Serial Number: BDMKQ
Specification Number: 0-C-265
Hazard Characteristic Code: J3
Unit Of Issue: BT
Unit Of Issue Container Qty: 4 OZ
Type Of Container: BOTTLE
Net Unit Weight: 4 OZ

Ingredients/Identity Information

Proprietary: NO
Ingredient: SODIUM PEROXIDE
Ingredient Sequence Number: 01
Percent: 96.9
NIOSH (RTECS) Number: WD3450000
CAS Number: 1313-60-6

Physical/Chemical Characteristics

Appearance And Odor: YELLOWISH WHITE POWDER
Specific Gravity: 2.81
Solubility In Water: SOLUBLE

Fire and Explosion Hazard Data

Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: DO NOT USE WATER. USE DRY SAND,SALT,SODA ASH OR LINE
Unusual Fire And Expl Hazrds: STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE.

Reactivity Data

Stability: YES
Materials To Avoid: ORGANIC MATTER,READILY OXIDIZABLE SUBSTANCE
Hazardous Poly Occur: NO

Health Hazard Data

Signs/Symptoms Of Overexp: CAUSES SEVERE BURNS
Emergency/First Aid Proc: CALL A PHYSICIAN. IN CASE OF CONTACT,IMMED FLUSH EYES OR SKIN 15 MIN. REMOVE CONTAMINATED CLOTHING & SHOES. INGEST- GIVE LGE QTY WATER,FOLLOWED BY CITRIC FRUIT JUICES DILUTED WITH WATER. THEN GIVE MILK,OLIVE OIL IN LIBERAL AMTS.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: COVER SPILL WITH SAND OR EARTH
Waste Disposal Method: DISPOSE OF IAW LOCAL ENVIRONMENTAL REGS
Precautions-Handling/Storing: KEEP IN TIGHTLY CLOSED CONTAINER. DO NOT GET IN EYES,ON SKIN,ON CLOTHING. WASH THOROUGHLY AFTER HANDLING.REMOVE & WASH CONTAMINATED CLOTHING PROMPTLY
Other Precautions: WHEN MAKING SOLUTION,DISSOLVE CAREFULLY-ALWAYS ADD SODIUM PEROXIDE TO WATER. AVOID BREATHING DUST

Control Measures

Ventilation: LOCAL & MECHANICAL EXHAUST
Protective Gloves: NEOPRENE
Eye Protection: LARGE FACE SHIELD
Other Protective Equipment: APPROVED WORKING CLOTHES (HAVE BODY SHIELD AVAILABLE
Suppl. Safety & Health Data: KEEP PRODUCT DRY. GIVES OFF O*2 WHEN HEATED; STRONG OXIDANT & REACTS VIOLENTLY W COMBUSTIBLE & REDUCING MATERIALS, & LIGHT METALS, CAUSING FIRE & EXPLOSION HAZARDS.

Transportation Data

Trans Data Review Date: 86337
DOT PSN Code: NIT
DOT Proper Shipping Name: SODIUM PEROXIDE
DOT Class: 5.1
DOT ID Number: UN1504
DOT Pack Group: I
DOT Label: OXIDIZER
IMO PSN Code: NVV
IMO Proper Shipping Name: SODIUM PEROXIDE
IMO Regulations Page Number: 5184
IMO UN Number: 1504
IMO UN Class: 5.1
IMO Subsidiary Risk Label: -
IATA PSN Code: WVL
IATA UN ID Number: 1504
IATA Proper Shipping Name: SODIUM PEROXIDE
IATA UN Class: 5.1
IATA Label: OXIDIZER
AFI PSN Code: WVL
AFI Symbols: 0
AFI Prop. Shipping Name: SODIUM PEROXIDE
AFI Class: 5.1
AFI ID Number: UN1504
AFI Pack Group: I
AFI Label: OXIDIZER
AFI Special Prov: A20,N34
AFI Basic Pac Ref: 9-9
N.O.S. Shipping Name: LTD QTY-PASSENGER;FORBIDDEN; CARGO-100 LG
SEE 49CFR.

Disposal Data

Disposal Data Review Date: 88270
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 001

Landfill Ban Item: YES
Disposal Supplemental Data: KEEP PRODUCT DRY. GIVES OFF O*2 WHEN HEATED; STRONG OXIDANT & REACTS VIOLENTLY W COMBUSTIBLE & REDUCING MATERIALS, & LIGHT METALS, CAUSING FIRE & EXPLOSION HAZARDS. IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Code New: D001
1st EPA Haz Wst Name New: IGNITIBLE
1st EPA Haz Wst Char New: IGNITABILITY
1st EPA Acute Hazard New: NO

==========

Label Data

==========

Label Required: YES
Label Status: F
Special Hazard Precautions: IF INHALED, MAY BE HARMFUL. CONTACT CAUSES SEVERE BURNS TO SKIN AND EYES. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.
Label Name: CHEMICAL COMMODITIES AGENCY
Label Street: 27447 PACIFIC STREET
Label City: HIGHLAND
Label State: CA
Label Zip Code: 92346-2640
Label Country: US
Label Emergency Number: 714-864-2310

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

J T BAKER CHEMICAL -- POTASSIUM FERROCYANIDE TRIHYDRATE - POTASSIUM FERROCYANIDE, A
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 002411145
Manufacturer's CAGE: 70829
Part No. Indicator: A
Part Number/Trade Name: POTASSIUM FERROCYANIDE TRIHYDRATE

==========

General Information

==========

Item Name: POTASSIUM FERROCYANIDE, ACS
Company's Name: J.T.BAKER CHEMICAL CO.
Company's Street: 222 RED SCHOOL LANE
Company's City: PHILLIPSBURG
Company's State: NJ
Company's Country: US
Company's Zip Code: 08865-2219
Company's Emerg Ph #: 201-859-2151
Company's Info Ph #: 201-859-2151
Record No. For Safety Entry: 003
Tot Safety Entries This Stk#: 003
Status: SE
Date MSDS Prepared: 01MAY89
Safety Data Review Date: 05MAR92
Supply Item Manager: CX
MSDS Serial Number: BMBTV
Specification Number: 0-C-265
Hazard Characteristic Code: T6
Unit Of Issue: LB
Unit Of Issue Container Qty: 1
Type Of Container: BOTTLE
Net Unit Weight: 1 POUND

==========

Ingredients/Identity Information

==========

Proprietary: NO
Ingredient: POTASSIUM FERROCYANIDE
Ingredient Sequence Number: 01
Percent: >98
NIOSH (RTECS) Number: LJ8219000
CAS Number: 13943-58-3
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: 5 MG/M3
Other Recommended Limit: NONE SPECIFIED

==========

Physical/Chemical Characteristics

==========

Appearance And Odor: YELLOW , ODORLESS CRYSTALS
Boiling Point: UNKNOWN
Melting Point: UNKNOWN
Vapor Pressure (MM Hg/70 F): UNKNOWN
Vapor Density (Air=1): UNKNOWN
Specific Gravity: 1.85
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: UNKNOWN
Solubility In Water: APPRECIABLE
Percent Volatiles By Volume: 0
Corrosion Rate (IPY): UNKNOWN

==========

Fire and Explosion Hazard Data

==========

Flash Point: NONE
Extinguishing Media: USE EXTINQUISHING MEDIA APPROPRIATE FOR SURROUNDING

FIRE.
Special Fire Fighting Proc: WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE GEAR.
Unusual Fire And Expl Hazrds: NONE

Reactivity Data

Stability: YES
Cond To Avoid (Stability): AIR, HEAT
Materials To Avoid: STRONG MINERAL ACIDS
Hazardous Decomp Products: CYANIDES AND OXIDES OF NITROGEN
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NONE

Health Hazard Data

LD50-LC50 Mixture: ORAL LD50 (RAT) IS 1600 MG/KG
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE: INHALATION- IRRITATION OF MUCOUS MEMBRANES. EYES- IRRITATION. SKIN- IRRITATION. INGESTION- DEATH THROUGH CYANIDE POISONING. CHRONIC: INHALATION- IRRITATION OF UPPER RESPIRATORY TRACT. EYES- IRRITATION. SKIN- SKIN ERUPTIONS, DERMATITIS-LIKE CONDITIONS.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
Signs/Symptoms Of Overexp: LOSS OF APPETITE, SALIVATION, NAUSEA, CONFUSION, GIDDINES, VERTIGO. ITCHING OF SKIN AND EYES, RASH ON SKIN, REDNESS OF EYES. BURNING TASTE, TASTE OF ALMONDS.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: INHALATION: REMOVE TO FRESH AIR. EYES: FLUSH WITH LOTS OF WATER FOR AT LEAST 15 MINUTES. SEE DOCTOR. SKIN: WASH SKIN FOR AT LEAST 15 MINUTES WITH SOAP AND WATER. INGESTION: IMMEDIATELY INDUCE VOMITING. GET IMMEDIATE MEDICAL ATTENTION. IF ANY SYMPTOMS PERSIST, SEE DOCTOR.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: ISOLATE AREA. WEAR SUITABLE PROTECTIVE CLOTHING. CAREFULLY SWEEP UP AREA AND SCOOP INTO CONTAINER FOR LATER DISPOSAL. CONTACT LOCAL ENVIRONMENTAL MANAGER.
Neutralizing Agent: NONE
Waste Disposal Method: NONE SPECIFIED BY MANUFACTURER. CONTACT LOCAL ENVIRONMENTAL MANAGER. DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.
Precautions-Handling/Storing: NONE SPECIFIED BY MANUFACTURER. DO NOT STORE IN VICINITY OF STRONG ACIDS.
Other Precautions: NONE SPECIFIED BY MANUFACTURER.

Control Measures

Respiratory Protection: NONE REQUIRED UNDER NORMAL CONDITIONS. IF AIRBORN CONCENTRATION EXCEEDS REGULATORY LIMITS, WEAR NIOSH/MSHA APPROVED RESPIRATOR.
Ventilation: USE ADEQUATE MECHANICAL VENTILATION.
Protective Gloves: NATURAL RUBBER, NEOPRENE
Eye Protection: SAFETY GLASSES/CHEMICAL SPLASH GOGGLES
Other Protective Equipment: PROTECTIVE CLOTHING TO PREVENT FREQUENT OR PROLONGED CONTACT. EYE WASH STATION & SAFETY SHOWER ARE RECOMMENDED.
Work Hygienic Practices: PRACTICE GOOD PERSONAL HYGENE AFTER USE. DO NOT SMOKE, EAT, OR DRINK IN WORK AREA.
Suppl. Safety & Health Data: LAUNDER CLOTHING BEFORE REUSE. HEALTH

EFFECTS/DATA WERE DERIVED FROM "SAX" FOR CYANIDE.

==========

Transportation Data

==========

Trans Data Review Date: 92065
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION

==========

Disposal Data

==========

==========

Label Data

==========

Label Required: YES
Technical Review Date: 05MAR92
Label Status: F
Common Name: POTASSIUM FERROCYANIDE TRIHYDRATE
Chronic Hazard: YES
Signal Word: CAUTION!
Acute Health Hazard-Slight: X
Contact Hazard-Slight: X
Fire Hazard-Slight: X
Reactivity Hazard-Slight: X
INHALATION- IRRITATION OF MUCOUS MEMBRANES. EYES- IRRITATION. SKIN-
INHALATION- IRRITATION OF UPPER RESPIRATORY TRACT. EYES- IRRITATION. SKIN-
SKIN ERUPTIONS, DERMATITIS-LIKE CONDITIONS. DO NOT STORE IN VICINITY OF
STRONG ACIDS. FIRST AID: INHALATION: REMOVE TO FRESH AIR. EYES: FLUSH WITH
LOTS OF WATER FOR AT LEAST 15 MINUTES. SEE DOCTOR. SKIN: WASH SKIN FOR AT
LEAST 15 MINUTES WITH SOAP AND WATER. INGESTION: IMMEDIATELY INDUCE
VOMITING. GET IMMEDIATE MEDICAL ATTENTION. IF ANY SYMPTOMS PERSIST, SEE
DOCTOR.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: J.T.BAKER CHEMICAL CO.
Label Street: 222 RED SCHOOL LANE
Label City: PHILLIPSBURG
Label State: NJ
Label Zip Code: 08865-2219
Label Country: US
Label Emergency Number: 201-859-2151
Year Procured: 1991

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

CHEMICAL COMMODITIES AGY -- METHYL ORANGE, ACS - METHYL ORANGE,ACS
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 002271260
Manufacturer's CAGE: 60777
Part No. Indicator: A
Part Number/Trade Name: METHYL ORANGE, ACS

General Information

Item Name: METHYL ORANGE,ACS
Company's Name: CHEMICAL COMMODITIES AGY (FM: J T BAKER CHEM CO)
Company's Emerg Ph #: 201-859-2151
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 002
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 13DEC84
Supply Item Manager: CX
MSDS Serial Number: BDKSD
Specification Number: ACS
Hazard Characteristic Code: N1
Unit Of Issue: BT
Unit Of Issue Container Qty: 1 LB

Ingredients/Identity Information

Proprietary: NO
Ingredient: METHYL ORANGE; CAS #547-58-0
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: DB6327000
CAS Number: 547-58-0
ACGIH TLV: UNKNOWN

Physical/Chemical Characteristics

Appearance And Odor: ORANGE-YELLOW POWDER
Boiling Point: N/A
Evaporation Rate And Ref: N/A
Solubility In Water: APPRECIABLE

Fire and Explosion Hazard Data

Flash Point: N/A
Extinguishing Media: WATER, CARBON DIOXIDE

Reactivity Data

Stability: YES
Hazardous Poly Occur: NO

Health Hazard Data

Signs/Symptoms Of Overexp: N/A
Emergency/First Aid Proc: N/A

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: SWEEP UP & SEND TO DUMP
Other Precautions: DO NOT TAKE INTERNALLY

Control Measures

==========

Transportation Data

==========

Trans Data Review Date: 84348
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
Additional Trans Data: ITEM NOT REGULATED FOR TRANSPORTATION

==========

Disposal Data

==========

Disposal Data Review Date: 88266
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 001
Landfill Ban Item: YES
Disposal Supplemental Data: ITEM NOT REGULATED AS A HAZARDOUS WASTE.DISPOSE VIA SANITARY LANDFILL PER STATE/ LOCAL AUTHORITY.
1st EPA Haz Wst Name New: NOT REGULATED
1st EPA Haz Wst Char New: NOT REGULATED BY RCRA
1st EPA Acute Hazard New: NO

==========

Label Data

==========

Label Required: YES
Label Status: G
Common Name: METHYL ORANGE, ACS
Special Hazard Precautions: N/A
Label Name: CHEMICAL COMMODITIES AGY (FM: J T BAKER CHEM CO)
Label Emergency Number: 201-859-2151

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

CHEMICAL COMMODITIES -- COPPER SULFATE, BLE VITROL - CUPRIC SULFATE, PENTAHYDRATE,
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 002411203
Manufacturer's CAGE: 60777
Part No. Indicator: A
Part Number/Trade Name: COPPER SULFATE, BLE VITROL

General Information

Item Name: CUPRIC SULFATE, PENTAHYDRATE, ACS
Company's Name: CHEMICAL COMMODITIES(DIST),J T BAKER CHEMICAL(MFR)
Company's Emerg Ph #: 201-859-2151
Record No. For Safety Entry: 007
Tot Safety Entries This Stk#: 015
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 16JUN80
MSDS Serial Number: BDMML
Hazard Characteristic Code: N1
Unit Of Issue: BT
Unit Of Issue Container Qty: 1 LB

Ingredients/Identity Information

Proprietary: NO
Ingredient: COPPER SULFATE PENTAHYDRATE, ACS.
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: GL8900000
CAS Number: 7758-99-8

Physical/Chemical Characteristics

Appearance And Odor: BLUE CRYSTALS, NO ODOR.
Boiling Point: N/A
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Specific Gravity: 2.29
Evaporation Rate And Ref: N/A
Solubility In Water: APPRECIABLE

Fire and Explosion Hazard Data

Flash Point: N/A
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: N/A
Special Fire Fighting Proc: N/A
Unusual Fire And Expl Hazrds: N/A

Reactivity Data

Stability: YES
Materials To Avoid: N/A
Hazardous Decomp Products: N/A
Hazardous Poly Occur: NO

Health Hazard Data

Signs/Symptoms Of Overexp: STRONG IRRITANT TO SKIN AND MUCOUS MEMBRANES.
Emergency/First Aid Proc: IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. CALL A DOCTOR.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: CAREFULLY SWEEP UP AND REMOVE. FLUSH SPILL AREA WITH PLENTY OF WATER.
Waste Disposal Method: TREAT WITH LIME TO PRECIPITATE BASIC COPPER SALTS INSOLUBLE IN WATER. DISPOSE IN ACCORDANCE WITH LOCAL ENVIRONMENTAL REGULATIONS.
Precautions-Handling/Storing: KEEP IN TIGHTLY CLOSED CONTAINER.
Other Precautions: AVOID CONTACT WITH EYES, SKIN, OR CLOTHING.

Control Measures

Respiratory Protection: N/A
Ventilation: LOCAL EXHAUST & MECHANICAL IS PREFERRED.
Protective Gloves: RUBBER
Eye Protection: SAFETY GOGGLES
Other Protective Equipment: APPROVED WORKING CLOTHES
Suppl. Safety & Health Data: ITEM HAS A EPA #7758-99-8.

Transportation Data

Trans Data Review Date: 80168
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION

Disposal Data

Disposal Data Review Date: 88270
Rec # For This Disp Entry: 02
Tot Disp Entries Per NSN: 004
Landfill Ban Item: YES
Disposal Supplemental Data: ITEM HAS A EPA #7758-99-8. IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Name New: NOT REGULATED
1st EPA Haz Wst Char New: NOT REGULATED BY RCRA
1st EPA Acute Hazard New: NO

Label Data

Label Required: YES
Label Status: G
Common Name: COPPER SULFATE, BLE VITROL
Special Hazard Precautions: STRONG IRRITANT TO SKIN AND MUCOUS MEMBRANES.
Label Name: CHEMICAL COMMODITIES(DIST),J T BAKER CHEMICAL(MFR)
Label Emergency Number: 201-859-2151

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

FISHER SCIENTIFIC CHEMICAL DIV -- MERCURY (IC) CHLORIDE
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 004772943
Manufacturer's CAGE: 1B464
Part No. Indicator: A
Part Number/Trade Name: MERCURY (IC) CHLORIDE

General Information

Company's Name: FISHER SCIENTIFIC CHEMICAL DIV
Company's Street: 1 REAGENT LN
Company's City: FAIR LAWN
Company's State: NJ
Company's Country: US
Company's Zip Code: 07410-2802
Company's Emerg Ph #: 201-796-7100/201-796-7523
Company's Info Ph #: 201-796-7100/201-796-7523
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 01MAY85
Safety Data Review Date: 20APR93
Preparer's Company: FISHER SCIENTIFIC CHEMICAL DIV
Preparer's St Or P. O. Box: 1 REAGENT LN
Preparer's City: FAIR LAWN
Preparer's State: NJ
Preparer's Zip Code: 07410-2802
MSDS Serial Number: BRCBH

Ingredients/Identity Information

Proprietary: NO
Ingredient: MERCURY(II) CHLORIDE, MERCURIC CHLORIDE
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: OV9100000
CAS Number: 7487-94-7
ACGIH TLV: 0.1 MG/CUM HG
Other Recommended Limit: 0.05 MG/CUM HG MSHA

Physical/Chemical Characteristics

Appearance And Odor: WHITE CRYSTALS OR POWDER, ODORLESS
Boiling Point: 576F/302C
Melting Point: 529F/276C
Specific Gravity: 5
Solubility In Water: 6.9%
pH: 4.7

Fire and Explosion Hazard Data

Flash Point: NON-FLAMMABLE
Extinguishing Media: DRY CHEMICAL, CO2, WATER SPRAY, FOG, ALCOHOL FOAM
Special Fire Fighting Proc: WEAR SELF-CONTAINED BREATHING APPARATUS W/ FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSTIVE PRESSURE MODE. MOVE CONTAINERS FROM AREA IF POSSIBLE.
Unusual Fire And Expl Hazrds: USE WATER IN FLOODING AMOUNTS AS FOG. AVOID BREATHING POISONOUS DUSTS & FUMES FROM BURNING MATERIAL.

Reactivity Data

Stability: YES

Cond To Avoid (Stability): EXTREME TEMPERATURES & PRESSURES
Materials To Avoid: POTASSIUM, SODIUM
Hazardous Decomp Products: BOILS AWAY UNCHANGED AT 302C
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES & PRESSURES.

Health Hazard Data

LD50-LC50 Mixture: ORAL LD50 (RAT): 1 MG/KG
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
SORT THROAT, COUGH, FEVER, NAUSEA, VOMITING, MOUTH INFLAMMATION, SALIVATION, METALLIC TASTE. SKIN: REDNESS, IRRITATION, SENSITIZATION DERMATITIS. EYES: BURNS INGESTION: MOUTH NECROSIS, THROAT, ESOPHAGUS & STOMACH, VIOLENT PAIN, VOMITING, PURGING & GASTROINTESTINAL DISTRESS.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
Signs/Symptoms Of Overexp: INHALATION: MERCURIALISM, MOUTH INFLAMMATION, TEETH LOOSENING, BLUE LINE ON GUMS, PAIN & NUMBNESS IN EXTREMITIES, MENTAL DEPRESSION, INSOMNIA, HALLUCINATIONS. SKIN: ABSORPTION, PSYCHIC DISTURBANCES, PERIPHERAL NEUROPATHY & LIVER/KIDNEY DAMAGE. INGESTION: RENAL FAILURE LEADING TO DEATH, PERIPHERAL VASCULAR COLLAPSE.
Emergency/First Aid Proc: INHALATION: REMOVE TO FRESH AIR. IF BREATHING STOPS, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY & BLOOD PRESSURE. ADMINISTER OXYGEN IF AVAILABLE. KEEP WARM & AT REST. SKIN: WASH W/SOAP OR MILD DETERGENT & FLUSH W/WATER. EYES: FLUSH W/PLENTY OF WATER FOR 10-20 MINS. INGESTION: IF CONSCIOUS, GIVE 2-4 GLASSES OF WATER & INDUCE VOMITING BY TOUCHING FINGER TO BACK OF THROAT. OBTAIN MEDICAL ATTENTION.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: DON'T TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. TAKE UP W/SAND OR OTHER ABSORBENT MATERIAL & PLACE INTO CONTAINERS. MOVE CONTAINERS FROM SPILL AREA. DIKE FAR AHEAD OF SPILL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE AREA.
Waste Disposal Method: DISPOSE OF IN ACCORDANCE W/LOCAL, STATE, & FEDERAL REGULATIONS.

Control Measures

Respiratory Protection: USE APPROPRIATE RESPIRATOR: SUPPLIED-AIR RESPIRATOR, SELF-CONTAINED BREATHING APPARATUS, SUPPLIED-AIR RESPIRATOR W/ FULL FACEPIECE, HELMET, HOOD, OR TYPE-C OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN CONTINUOUS-FLOW MODE.
Ventilation: LOCAL EXHAUST TO MEET EXPOSURE LIMITS
Protective Gloves: RECOMMENDED
Eye Protection: SPLASH/DUST RESISTANT SAFETY GOGGLES
Other Protective Equipment: FACESHIELD, IMPERVIOUS CLOTHING, EYE-WASH FOUNTAIN
Work Hygienic Practices: REMOVE/LAUNDER CONTAMINATED CLOTHING & SHOES BEFORE REUSE.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 20APR93
Label Date: 12APR93
Label Status: F
Common Name: MERCURY (IC) CHLORIDE
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Moderate: X
Fire Hazard-None: X
Reactivity Hazard-None: X
SORT THROAT, COUGH, FEVER, NAUSEA, VOMITING, MOUTH INFLAMMATION, SALIVATION, METALLIC TASTE. SKIN: REDNESS, IRRITATION, SENSITIZATION DERMATITIS. EYES: BURNS INGESTION: MOUTH NECROSIS, THROAT, ESOPHAGUS & STOMACH, VIOLENT PAIN, VOMITING, PURGING & GASTROINTESTINAL DISTRESS. TARGET ORGANS: SKIN, EYES, RESPIRATORY SYSTEM, LIVER, KIDNEYS. LLY INFECTIOUS HUMAN SERUM OR BLOOD SPECIMEN.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: FISHER SCIENTIFIC CHEMICAL DIV
Label Street: 1 REAGENT LN
Label City: FAIR LAWN
Label State: NJ
Label Zip Code: 07410-2802
Label Country: US
Label Emergency Number: 201-796-7100/201-796-7523
Year Procured: UNK

==========

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

FUJISAWA USA -- MAGNESIUM SULFATE - MAGNESIUM SULFATE INJECTION,USP
MATERIAL SAFETY DATA SHEET
FSC: 6505
NIIN: 012198593
Manufacturer's CAGE: 39832
Part No. Indicator: A
Part Number/Trade Name: MAGNESIUM SULFATE

==========

General Information

==========

Item Name: MAGNESIUM SULFATE INJECTION,USP
Company's Name: FUJISAWA USA, INC(CORP HEADQTERS FOR LYPHOMED INC)
Company's Street: 3 PARKWAY NORTH(FRMLY:ROSEMONT,IL)
Company's City: DEERFIELD
Company's State: IL
Company's Country: US
Company's Zip Code: 60015-2548
Company's Emerg Ph #: 708-317-8800, 800-727-7003
Company's Info Ph #: 708-317-8800 (MEDICAL 317-8202)
Distributor/Vendor # 1: FUJISAWA USA, INC (LYPHOMED, INC)
Distributor/Vendor # 1 Cage: 39832
Distributor/Vendor # 2: LYPHOMED INC (312-345-6170)
Distributor/Vendor # 2 Cage: 60567
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 19FEB88
Safety Data Review Date: 03MAR95
Supply Item Manager: KX
MSDS Preparer's Name: JANET L. JAKSCKI
MSDS Serial Number: BWMSV
Specification Number: UNKNOWN
Hazard Characteristic Code: N1
Unit Of Issue: PG
Unit Of Issue Container Qty: 25 X 50 MIL
Type Of Container: VIALS
Net Unit Weight: UNKNOWN

==========

Ingredients/Identity Information

==========

Proprietary: NO
Ingredient: MAGNESIUM SULFATE (PER MSDS UNDER HAZ INGRED/ACTIVE REAGENTS)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: OM4500000
CAS Number: 7487-88-9
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: MAGNESIUM SULFATE HEPTAHYDRATE (PER MSDS UNDER DESCRIPTION)
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: OM4508000
CAS Number: 10034-99-8
OSHA PEL: UNKNOWN
ACGIH TLV: UNKNOWN
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: WATER
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: ZC0110000
CAS Number: 7732-18-5

OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED
Other Recommended Limit: NONE RECOMMENDED

Physical/Chemical Characteristics

Appearance And Odor: CLEAR, COLORLESS SOLUTION, ODORLESS.
Boiling Point: N/A
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Solubility In Water: VERY SOLUBLE
pH: 5.5-7
Autoignition Temperature: N/A

Fire and Explosion Hazard Data

Flash Point: N/A
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: WATER SPRAY, DRY CHEMICAL, CARBON DIOXIDE, OR FOAM AS APPROPRIATE FOR SURROUNDING FIRE AND MATERIALS.
Special Fire Fighting Proc: FIREFIGHTERS SHOULD USE SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING.
Unusual Fire And Expl Hazrds: EMITS TOXIC FUMES.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE.
Materials To Avoid: NONE.
Hazardous Decomp Products: MAGNESIUM SULFATE EMITS TOXIC FUMES WHEN HEATED TO DECOMPOSITION.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT APPLICABLE

Health Hazard Data

LD50-LC50 Mixture: LD50 980 MG/KG SUBCUTANEOUSE, MOUSE
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: MAY CASUE EXCESSIVE BOWEL MOVEMENT IF SWALLOWED.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Signs/Symptoms Of Overexp: EXCESSIVE BOWEL MOVEMENT.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MFG.
Emergency/First Aid Proc: INHAL:REMOVE TO FRESH AIR. REMOVE CONTAMINATED CLOTHING. SEEK MED ATTN. INGEST:FLUSH MOUTH OUT W/WATER. SEEK MED ATTN. SKIN:REMOVE CONTAMINATED CLOTHING. FLUSH AREA W/WATER. SEEK MED ATTN. EYE:FLUSH W/WATER. SEEK MED ATTN.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR RECOMMENDED PERSONAL PROTECTIVE EQPMT. VACUUM SPILLAGE W/VACUUM CLEANER HAVING HIGH EFFICIENCY PARTICULATE(HEPA) FILTER OR ABSORB LIQ W/PAPER TOWELS.WIPE WORKING SURFACES TO DRYNESS THEN WASH W/SOAP/WATER.
Neutralizing Agent: NOT APPLICABLE
Waste Disposal Method: THOUGH NOT EPA REGULATED, WASTE SHOULD BE DISPOSED OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.
Precautions-Handling/Storing: AS A GENERAL RULE WHEN HANDLING PHARMACEUTICAL PRODUCTS AVOID ALL CONTACT & INHAL OF DUST/FUMES/MISTS/VAP

ASSOCIATED WITH THE PRODUCT.
Other Precautions: MAGNESIUM SULFATE INJECTION,USP IS A STERILE, NONPYROGENIC SOLUTION OF MAGNESIUM SULFATE HEPTAHYDRATE IN WATER FOR INJECTION INTENDED FOR INTRAVENOUS OR INTRAMUSCULAR ADMINISTRATION. (PH 5.5-7.0).

Control Measures

Respiratory Protection: NIOSH APPROVED RESPIRATOR.
Ventilation: LOCAL EXHAUST RECOMMENDED.
Protective Gloves: DISPOSABLE SURGICAL LATEX GLOVES.
Eye Protection: SAFETY GOGGLES.
Other Protective Equipment: DISPOSABLE PROTECTIVE APPAREL (PROTECT EXPOSED SKIN).
Work Hygienic Practices: WASH HANDS AFTER HANDLING. LAUNDER CONTAMINATED CLOTHING PRIOR TO REUSE.

Transportation Data

Trans Data Review Date: 94062
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 03MAR94
Label Status: F
Common Name: MAGNESIUM SULFATE
Chronic Hazard: NO
Signal Word: CAUTION!
Acute Health Hazard-Slight: X
Contact Hazard-Slight: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: MAY CASUE EXCESSIVE BOWEL MOVEMENT IF SWALLOWED. AS A GENERAL RULE WHEN HANDLING PHARMACEUTICAL PRODUCTS AVOID ALL CONTACT & INHAL OF DUST/FUMES/MISTS/VAP ASSOCIATED WITH THE PRODUCT. FIRST AID: INHAL:REMOVE TO FRESH AIR. REMOVE CONTAMINATED CLOTHING. SEEK MED ATTN. INGEST:FLUSH MOUTH OUT W/WATER. SEEK MED ATTN. SKIN:REMOVE CONTAMINATED CLOTHING. FLUSH AREA W/WATER. SEEK MED ATTN. EYE:FLUSH W/ WATER. SEEK MED ATTN.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: FUJISAWA USA, INC(CORP HEADQTERS FOR LYPHOMED INC)
Label Street: 3 PARKWAY NORTH(FRMLY:ROSEMONT,IL)
Label City: DEERFIELD
Label State: IL
Label Zip Code: 60015-2548
Label Country: US
Label Emergency Number: 708-317-8800, 800-727-7003

URL for this msds http://hazard.com. If you wish to change, add to, or

delete information in this archive please sent updates to dan@hazard.com.

SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MG INDUSTRIES
3 GREAT VALLEY PARKWAY
MALVERN, PENNSYLVANIA 19355
PHONE: 610-695-7400
FAX: 610-695-7596

EMERGENCY CONTACT:
CHEMTREC
1-800-424-9300

SUBSTANCE: OXYGEN, COMPRESSED GAS

TRADE NAMES/SYNONYMS:
OXYGEN; DIOXYGEN; MOLECULAR OXYGEN; OXYGEN MOLECULE; PURE OXYGEN; STCC 4904350; UN 1072; O2; MGI12831; RS2060000

CHEMICAL FAMILY: inorganic, gas

CREATION DATE: May 07 1990
REVISION DATE: Jun 30 1997

SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: OXYGEN, COMPRESSED GAS
CAS NUMBER: 7782-44-7
EC NUMBER (EINECS): 231-956-9
EC INDEX NUMBER: 008-001-00-8
PERCENTAGE: 100.0

SECTION 3 HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=0 REACTIVITY=0

EC CLASSIFICATION (ASSIGNED):
O Oxidizing
C Corrosive

R 8-34

EC Classification may be inconsistent with independently-researched data.

EMERGENCY OVERVIEW:
PHYSICAL DESCRIPTION: Odorless, colorless, tasteless, gas.
MAJOR HEALTH HAZARDS: No significant target effects reported.
PHYSICAL HAZARDS: Containers may rupture or explode if exposed to heat. May ignite combustibles.

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: irritation, nausea, asthma, irregular heartbeat, dizziness, tingling sensation, dilated pupils, blindness, lung congestion, blood disorders, convulsions.
LONG TERM EXPOSURE: chest pain, lung damage.
SKIN CONTACT:

SHORT TERM EXPOSURE: blisters, frostbite.
LONG TERM EXPOSURE: no information on significant adverse effects.
EYE CONTACT:
SHORT TERM EXPOSURE: irritation, blurred vision.
LONG TERM EXPOSURE: no information on significant adverse effects.
INGESTION:
SHORT TERM EXPOSURE: frostbite.
LONG TERM EXPOSURE: no information is available.

CARCINOGEN STATUS:
OSHA: N
NTP: N
IARC: N

SECTION 4 FIRST AID MEASURES

INHALATION: Remove from exposure immediately. Use a bag valve mask or similar device to perform artificial respiration (rescue breathing) if needed. Get medical attention.

SKIN CONTACT: Wash if needed. If frostbite, freezing, or cryogenic burns occur, warm affected area in warm water. If this is not available, gently wrap affected parts in blankets. Allow circulation to return naturally. Get medical attention immediately.

EYE CONTACT: Wash eyes immediately with large amounts of water, occasionally lifting upper and lower lids, until no evidence of chemical remains. Get medical attention immediately.

INGESTION: It is unlikely that emergency treatment will be required. Get medical attention, if needed.

SECTION 5 FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire hazard. Oxidizer. May ignite or explode on contact with combustible materials. Containers may rupture or explode if exposed to heat.

EXTINGUISHING MEDIA: carbon dioxide, regular dry chemical

Large fires: Use regular foam or flood with fine water spray.

FIREFIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Use extinguishing agents appropriate for surrounding fire. Cool containers with water. Apply water from a protected location or from a safe distance.

FIREFIGHTING PROTECTIVE EQUIPMENT: Full firefighting turn-out gear (bunker gear). Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a

CYCLOHEXANE-1,2-DIONE BIS(PHENYLHYDRAZONE): Forms explosive compound.
CYCLOOCTATETRAENE: May form explosive peroxides.
DIBORANE: Explosive mixture on heating.
DIBORON TETRAFLUORIDE: Explosive mixture.
DIMETHYLKETENE: Forms explosive peroxide.
DIMETHYL SULFIDE: Explosive reaction above 210 C.
DIOXANE: May form explosive peroxides.
ETHERS: May form explosive peroxides.
FLAMMABLE MATERIALS: The flammability of materials greatly increases as the oxygen concentration increases; some compounds may become spontaneously combustible or explosive. Contact with liquid oxygen is likely to result in dangerous explosions.
FLUORINE + HYDROGEN: Explosive mixture.
HALOGENATED HYDROCARBONS: Many halogenated hydrocarbons ignite or explode with the gas under pressure; contact with the liquid may result in a dangerous explosion.
HYDRAZINE: Forms explosive mixtures.
HYDROCARBONS: Mixtures with the gas may ignite or explode particularly under pressure or when heated; contact with the liquid is likely to result in a dangerous explosion.
HYDROGEN: Explosive mixture, particularly in the presence of a catalyst.
HYDROGEN SULFIDE: Explosive mixture.
LITHIATED DIALKYLNITROSAMINES: May form explosive compounds.
LITHIUM HYDRIDE (POWDER): Very powerful explosive with the liquid.
METALS: Many metals ignite or explode in the gas, particularly if heated or in powder form. Contact of metal powders with the liquid is likely to result in a dangerous explosion.
METAL HALIDES: Ignition.
METAL HYDRIDES: Ignition or explosion.
METHANE (LIQUID): Forms explosive mixture with the liquid.
METHOXYCYCLOOCTATETRAENE: Forms explosive compound.
NICKEL CARBONYL: Ignites or explodes at low pressure.
NITROGEN (LIQUID): Explosive if subjected to radiation.
NON-METAL HYDRIDES: May ignite or explode.
OXYGEN DIFLUORIDE: Explosive mixture.
PHENYLDICHLOROAMINE: Explosive reaction.
PHOSPHINE: Forms explosive mixture.
PHOSPHOROUS: Vigorous reaction.
PHOSPHORUS TRIBROMIDE: Explosive reaction.
PHOSPHOROUS TRIFLUORIDE: Explosive reaction.
PHOSPHOROUS TRIOXIDE: Ignition.
POLY(CYANOETHYLSILOXANE): Forms impact sensitive mixture with the liquid.
POLY(DIMETHYLSILOXANE): Forms impact sensitive mixture with the liquid.
POLYSTYRENE: Forms impact-sensitive mixture with the liquid.
POLYMERS: Contact with the liquid may result in rapid, hazardous oxidation with possible explosions.
POTASSIUM CARBONYL: Violent reaction.
POTASSIUM PEROXIDE: Violent reaction.
PROPYLENE OXIDE: Explosive mixture.
SILANE + CHLORINE: Explosive mixture.

SILANES: Ignition or explosion.
STYRENE: Forms explosive peroxide.
TEFLON (POLYTETRAFLUOROETHYLENE): Ignites at high temperature and reduced pressure.
TETRABORON DECAHYDRIDE: Explosive mixture.
TETRAFLUOROETHYLENE: Forms explosive peroxides.
TETRAFLUOROHYDRAZINE: Explosion in the presence of organic matter.
TETRAHYDROFURAN: Forms explosive peroxides.
TETRAPHOSPHORUS HEXAOXIDE: Ignition.
TRIRHENIUM CHLORIDE: May form explosive chlorine oxides on heating.
VINYL COMPOUNDS: May form explosive peroxides.

POLYMERIZATION: Will not polymerize.

SECTION 11 TOXICOLOGICAL INFORMATION

OXYGEN, COMPRESSED GAS:
TOXICITY DATA:
100 ppm/14 hour(s) inhalation-human TCLo.
MUTAGENIC DATA:
cytogenetic analysis - human lymphocyte 40 ppm 4 day(s); cytogenetic analysis - hamster ovary 20 ppm 3 day(s)-continuous; cytogenetic analysis - hamster lung 80 ppm; sister chromatid exchange - hamster ovary 20 ppm; mutation in mammalian somatic cells - hamster lung 95 ppm 24 hour(s); cytogenetic analysis - chicken embryo 80 ppm.
REPRODUCTIVE EFFECTS DATA:
12 ppm inhalation-woman TCLo/10 minute(s) 26-39 week(s) pregnant female continuous; 10 ppm inhalation-rat TCLo/12 hour(s) 22 day(s) pregnant female continuous; 10 ppm inhalation-rat TCLo/9 hour(s) 22 day(s) pregnant female continuous; 10 ppm inhalation-mouse TCLo/24 hour(s) 8 day(s) pregnant female continuous.
ADDITIONAL DATA: Toxic action is greatly enhanced by exercise or by presence of moderate amounts of carbon dioxide.

HEALTH EFFECTS:
INHALATION:
ACUTE EXPOSURE:
OXYGEN: Pure oxygen, especially if not properly humidified, may cause mucous membrane irritation and pulmonary edema after 24 hours. Air normally contains 20-21% oxygen. As exposure to higher concentrations and/or greater than atmospheric pressure continues symptoms of toxicity may develop and increase in severity. Respiratory system effects may include a progressive decrease in vital capacity, tightness in the chest and discomfort, coughing, congestion, tracheobronchitis, pneumonia, edema, atelectasis and increased depth of respiration, rapid panting or asthma-like attacks, apnea in inspiratory position, fibroblastic proliferation, and hyperplasia of alveolar cells. Cardiovascular system effects may include bradycardia, hyperthermia or hypothermia and peripheral vasoconstriction. The nervous system may be affected with mood changes, nausea, dizziness, slowing of mental processes, malaise, hilarity, apprehension, paresthesias including tingling of fingers and toes, fasciculation of the lips and face, muscular twitching, visual and auditory hallucinations, general convulsions and epileptic seizures, loss of consciousness and collapse. At increased atmospheric pressures, vision may be affected. Symptoms may include photophobia, amblyopia, mydriasis, bilateral progressive constriction of visual field, impaired

SECTION 16 OTHER INFORMATION

MSDS SUMMARY OF CHANGES

SECTION 1	CHEMICAL PRODUCT AND COMPANY IDENTIFICATION
SECTION 2	COMPOSITION, INFORMATION ON INGREDIENTS
SECTION 3	HAZARDS IDENTIFICATION
SECTION 5	FIRE FIGHTING MEASURES
SECTION 6	ACCIDENTAL RELEASE MEASURES
SECTION 8	EXPOSURE CONTROLS, PERSONAL PROTECTION
SECTION 9	PHYSICAL AND CHEMICAL PROPERTIES
SECTION 10	STABILITY AND REACTIVITY
SECTION 11	TOXICOLOGICAL INFORMATION
SECTION 12	ECOLOGICAL INFORMATION
SECTION 15	REGULATORY INFORMATION

COPYRIGHT 1984-1997 MDL INFORMATION SYSTEMS, INC. ALL RIGHTS RESERVED.

THIS MSDS IS SUPPLIED PURSUANT TO OSHA REGULATIONS. OTHER GOVERNMENT REGULATIONS MUST BE REVIEWED FOR APPLICABILITY TO THIS PRODUCT. WE BELIEVE THE INFORMATION SOURCE IS RELIABLE AND THE INFORMATION IS ACCURATE AS OF THE DATE HEREOF. HOWEVER, ACCURACY OR COMPLETENESS IS NOT GUARANTEED AND NO WARRANTY OF ANY TYPE IS GRANTED. THE INFORMATION RELATES ONLY TO THIS SPECIFIC PRODUCT. IF COMBINED WITH OTHER MATERIALS, ALL COMPONENT PROPERTIES MUST BE CONSIDERED.

MATERIAL SAFETY DATA SHEET

PRAXAIR

An explanation of the terms used herein may be found in OSHA 29 CFR 1910.1200, available from OSHA regional or area offices.
(Essentially similar to US Department of Labor Form OMB No. 1218-0072)
Do Not Duplicate This Form. Request an Original.

I. PRODUCT IDENTIFICATION

PRODUCT	Oxygen		
CHEMICAL NAME	Oxygen	SYNONYMS	Not applicable
FORMULA	O_2	CHEMICAL FAMILY	Not applicable
		MOLECULAR WEIGHT	32.00
TRADE NAME	Oxygen		

II. HAZARDOUS INGREDIENTS

For mixtures of this product request the respective component Material Safety Data sheets. See Section IX.

MATERIAL (CAS NO.)	Wt (%)	1992-1993 ACGIH TLV-TWA (OSHA-PEL)
Oxygen (7782-44-7)	100	None currently established (None currently established)

III. PHYSICAL DATA

BOILING POINT, 760 mm. Hg	−183°C (−297.4°F)	FREEZING POINT	−218.4°C (−361.1°F)
SPECIFIC GRAVITY (H_2O = 1)	Gas	VAPOR PRESSURE AT 20°C.	Gas
VAPOR DENSITY (air = 1)	1.105 @ 25°C	SOLUBILITY IN WATER, % by wt.	Negligible
PERCENT VOLATILES BY VOLUME	100	EVAPORATION RATE (Butyl acetate = 1)	Not applicable

APPEARANCE AND ODOR Colorless, odorless gas at normal temperature and pressure.

EMERGENCY PHONE NUMBER

IN CASE OF EMERGENCIES involving this material, further information is available at all times:

Call CHEMTREC 800-424-9300 only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals. For routine information contact your supplier.

This product is subject to the Pennsylvania Worker and Community Right-To-Know Act (35 P.S. Sections 7301-7320).

Praxair requests the users of this product to study this Material Safety Data Sheet (MSDS) and become aware of product hazards and safety information. To promote safe use of this product a user should (1) notify its employees, agents and contractors of the information on this MSDS and any product hazards and safety information, (2) furnish this same information to each of its customers for the product, and (3) request such customers to notify their employees and customers for the product of the same product hazards and safety information.

PRAXAIR, INC. Printed on recycled paper.

Copyright © 1992 Praxair Technology, Inc.

L-4638-C

IV. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: None currently established.

EFFECTS OF SINGLE (ACUTE) OVEREXPOSURE:

SWALLOWING—No evidence of adverse effects from available information.

SKIN ABSORPTION—No evidence of adverse effects from available information.

INHALATION—Breathing 80% or more oxygen at atmospheric pressure for more than a few hours may cause nasal stuffiness, cough, sore throat, chest pain and breathing difficulty. Breathing oxygen at higher pressure increases the likelihood of adverse effects within a shorter time period. Breathing pure oxygen under pressure may cause lung damage and also central nervous system effects resulting in dizziness, poor coordination, tingling sensation, visual and hearing disturbances, muscular twitching, unconsciousness and convulsions. Breathing oxygen under pressure may cause prolongation of adaptation to darkness and reduced peripheral vision.

SKIN CONTACT—No evidence of adverse effects from available information.

EYE CONTACT—No evidence of adverse effects from available information.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE: No evidence of adverse effects from available information.

OTHER EFFECTS OF OVEREXPOSURE: See "Notes to Physician."

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: See "Notes to Physician."

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARD EVALUATION: None currently known.

EMERGENCY AND FIRST AID PROCEDURES:

SWALLOWING—This product is a gas at normal temperature and pressure.

SKIN—No emergency care anticipated.

INHALATION—Remove to fresh air. Give artificial respiration if not breathing. Keep victim warm and at rest. Call a physician.

EYES—No emergency care anticipated.

NOTES TO PHYSICIAN: *Supportive treatment should include immediate sedation, anti-convulsive therapy if needed, and rest. Animal studies suggest that the administration of certain drugs, including phenothiazine drugs and chloroquine, increases the susceptibility to toxicity from oxygen at high concentrations or pressures. Animal studies also indicate that vitamin E deficiency may increase susceptibility to oxygen toxicity.*

Airway obstruction during high oxygen tension may cause alveolar collapse following absorption of the oxygen. Similarly, occlusion of the eustachian tubes may cause retraction of the eardrum and obstruction of the paranasal sinuses may produce "vacuum-type" headache.

Newborn premature infants exposed to high oxygen concentrations may suffer delayed retinal damage which can progress to retinal detachment and blindness (retrolental fibroplasia). Retinal damage can also occur in adults exposed to 100% oxygen under greater than atmospheric pressure, particularly in individuals whose retinal circulation has been previously compromised.

All individuals exposed for long periods to oxygen at high pressure and all who exhibit overt oxygen toxicity should have ophthalmologic examinations.

WHEN USED IN WELDING AND CUTTING: Read and understand the manufacturer's instructions and the precautionary label on the product. See American Standard Z49.1 "Safety In Welding and Cutting" published by the American Welding Society, PO Box 351040, Miami, Florida 33135 and OSHA Publication 2206 (29CFR1910), US Government Printing Office, Washington, DC 20402 for more detail. For further SAFETY AND HEALTH information, refer to Praxair's free publication, L-52-529, "Precautions and Safe Practices for Electric Welding and Cutting," as well as L-2035, "Precautions and Safe Practices for Gas Welding, Cutting, and Heating." You may obtain copies from your local supplier.

NOTE: *Suitability for use as a component in underwater breathing gas mixtures is to be determined by or under the supervision of personnel experienced in the use of underwater breathing gas mixtures and familiar with the effects, methods, frequency and duration of use, hazards, side effects and precautions to be taken.*

VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type): None required under normal use. However, air-supplied respirators are required while working in confined spaces with this product. The respiratory protection use must conform with OSHA rules as specified in 29 CFR 1910.134.

VENTILATION	LOCAL EXHAUST—Use local exhaust system, if necessary, to prevent the build up of oxygen concentration.
	MECHANICAL (general)—Acceptable
	SPECIAL—Not applicable
	OTHER—Not applicable

PROTECTIVE GLOVES: Preferred for cylinder handling.

EYE PROTECTION: Select in accordance with OSHA 29 CFR 1910.133.

OTHER PROTECTIVE EQUIPMENT: Metatarsal shoes for cylinder handling. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133.

IX. SPECIAL PRECAUTIONS

WARNING: High pressure gas. Vigorously accelerates combustion. Avoid contact with oils, greases and other flammable materials. Never use manifolds for oxygen cylinders unless specifically designed for such use. Use only with equipment conditioned for oxygen service. Use piping and equipment adequately designed to withstand pressures to be encountered. Protect container against physical damage. Isolate from combustible gas installations and combustible materials by adequate distance or by gas-tight, fire-resistive barriers. Protect against over-heating. Never use an oxygen jet for cleaning purposes of any sort, especially clothing, as it increases the likelihood of an engulfing fire. Note: Reverse flow into cylinder may cause rupture. Use a check valve or other protective apparatus in any line or piping from the cylinder to prevent reverse flow.

MIXTURES: When two or more gases, or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist, or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death. Be sure to read and understand all labels and other instructions supplied with all containers of this product.

NOTE: Compatibility with plastics should be confirmed prior to use. For safety information on general handling of compressed gas cylinders, obtain a copy of pamphlet P-1, "Safe Handling of Compressed Gas in Containers" from the Compressed Gas Association, Inc., 1725 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202.

OTHER HANDLING AND STORAGE CONDITIONS: Never work on a pressurized system. If there is a leak, close the cylinder valve, blow down the system by venting to a safe place, then repair the leak. Never lubricate oxygen valves, regulators, etc., with any combustible substance.

The opinions expressed herein are those of qualified experts within Praxair, Inc. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and these opinions and the conditions of use of the product are not within the control of Praxair, Inc., it is the user's obligation to determine the conditions of safe use of the product.

PRAXAIR

GENERAL OFFICES
Praxair, Inc.
39 Old Ridgebury Road
Danbury, CT 06810-5113

Holox, Lt.
1500 Indian Trail Road
Norcross, Georgia 30093
(770) 925-4640

MATERIAL SAFETY DATA SHEET

OXYGEN

Telephone Number: (770) 925-4640
Emergency Contact: CHEMTREC
Emergency Phone Number: (800) 424-9300

SECTION #1 - IDENTIFICATION

Product: OXYGEN

CAS Number: 7782-44-7
Product Code: MSDS CODE G-1
Chemical Family: Oxidizer
Chemical Formula: O2

Synonyms: G-1

NFPA Hazard Rating:
- Health: 3 High
- Fire: 0 Negligible
- Reactivity: 0 Negligible
- Special: Oxy

SECTION #2 - CHEMICAL COMPONENTS

Component: OXYGEN
CAS Number: 7782-44-7
Percent of Mixture: 99.6000 to 100.0000

SECTION #3 - PHYSICAL DATA

Boiling Point: – 297.3°F – 182.9°C
Melting Point: – 361.8°F – 218.8°C
Vapor Pressure: Above critical temp.
Specific Gravity: 1.11 (gas, air = 1.0)
Solubility (H2O): Slightly soluble

APPEARANCE

Colorless gas.

ODOR

Odorless.

SECTION #4 - FIRE FIGHTING & EXPLOSION DATA

Flash Point: N/A
Lower Explosive Limit (%): N/A
Upper Explosive Limit (%): N/A

FIRE AND EXPLOSION HAZARDS

Electrical Classification: Nonhazardous.
Vigorously accelerates combustion.

EXTINGUISHING MEDIA

Copious quantities of water (or suitable extinguishing agent for the combustible material) for fires with oxygen as the oxidizer.

SPECIAL FIRE FIGHTING INSTRUCTIONS

If possible, stop the flow of oxygen which is supporting the fire.

SECTION #5 - EXPOSURE AND EFFECTS - INHALATION

ROUTES OF EXPOSURE - INHALATION

High concentrations (greater than 75%) causes symptoms of hyperoxia which included cramps, nausea, dizziness, hypothermia, ambylopia, respiration difficulties, bradycardia, fainting spells and convulsions capable of leading to death. The property is that of hyperoxia which leads to pneumonia. Concentrations between 25 and 75 percent present a risk of inflammation of organic matter in body.

FIRST AID - INHALATION

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO OXYGEN. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS.

Victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moded to an uncontaminated area, and if breathing has stopped, administer artificial resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive. The physician should be informed that the victim could be experiencing hyperoxia.

SECTION #5 - EXPOSURE AND EFFECTS - SKIN

ROUTES OF EXPOSURE - SKIN

Contact with liquid product may cause tissue freezing.

FIRST AID - SKIN

For dermal contact or frostbite: Remove contaminated clothing and flush affected areas with lukewarm water. DO NOT USE HOT WATER. A physician should see the patient promptly if the cryogenic "burn" has resulted in blistering of the dermal surface or deep tissue freezing.

SECTION #5 - EXPOSURE AND EFFECTS - EYES

ROUTES OF EXPOSURE - EYES

Contact with liquid product may cause tissue freezing.

FIRST AID - EYES

Never introduce ointment or oil into the eyes without medical advice! In case of freezing or cryogenic "burns" caused by rapidly evaporating liquid, DO NOT WASH THE EYES WITH HOT OR EVEN TEPID WATER! Remove victim from the source of contamination. Open eyelids wide to allow liquid to evaporate. If pain is present, refer the victim to an ophthalmologist for treatment and follow up. If the victim cannot tolerate light, protect the eyes with a light bandage.

SECTION #5 - MISCELLANEOUS TOXICOLOGICAL INFORMATION

Carcinogenicity — NTP: No IARC: No OSHA: No

SECTION #6 - REACTIVITY & POLYMERIZATION

Stability: Unstable

CONDITIONS TO AVOID (STABILITY)

Contact with all flammable materials.

INCOMPATIBLE MATERIALS

All flammable materials.

Hazardous Polymerization: Will Not Occur.

Acetylene Material Safety Data Sheet

Industrial Gas Division
Air Products and Chemicals, Inc.
Allentown, PA 18195
Tel. (215) 481-4911 · TWX 510-651-3686
Cable-AIRPROD · Telex 847416
Fax (215) 481-5900

AIR PRODUCTS

EMERGENCY PHONE: 800—523-9374	IN PENNSYLVANIA: 800—322-9092		
ISSUE DATE	Issued: 31 January 1978	TRADE NAME AND SYNONYMS Acetylene, Ethyne, Ethine	CHEMICAL NAME AND SYNONYMS Acetylene, Ethyne, Ethine
REVISIONS	Rev: 1 June 1990	FORMULA C_2H_2 MW: 26.04	CHEMICAL FAMILY Alkynes CAS#74-86-2

HEALTH HAZARD DATA

EXPOSURE LIMITS
OSHA: None established. ACGIH: Simple Asphyxiant. Acetylene is not listed as a carcinogen by NTP, IARC or OSHA.

SYMPTOMS IF INGESTED, CONTACTED WITH SKIN, OR VAPOR INHALED
Symptoms such as headaches, dizziness, shortness of breath, and loss of consciousness may occur if the gas is present in quantities sufficient to dilute the oxygen concentration in air. Symptoms of anoxia occur only when the gas concentrations are within the flammable range and the mixture has not ignited. (DO NOT ENTER AREAS WITHIN THE FLAMMABLE RANGE DUE TO THE IMMEDIATE FIRE AND EXPLOSION HAZARD.) Use a suitable flammable gas meter (explosimeter) calibrated for acetylene to measure concentrations of gas in the air.

TOXICOLOGICAL PROPERTIES
Acetylene is a simple asphyxiant, irritant, and anesthetic. About 100 mg per liter may be tolerated for 0.5–1.0 hour. There is no experimental evidence of chronic harmful effects.

RECOMMENDED FIRST AID TREATMENT
First degree and minor second degree thermal burns from fires should be immersed in cool water for 30 minutes. Major second and third degree burns should be covered in the cleanest material available. Seek immediate aid of a physician. Persons suffering from lack of oxygen should be moved to areas with normal atmosphere. Assisted respiration and supplemental oxygen should be given if the victim is not breathing.

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	AUTO IGNITION TEMP	FLAMMABLE LIMITS	LEL	UEL
0F (−18C) (CC)	581F (305C)	In air @ 1 atm	2.5%	100%

EXTINGUISHING MEDIA	ELECTRICAL CLASSIFICATION
Carbon dioxide, dry chemical, Halon	GROUP Class I, Group A

SPECIAL FIRE FIGHTING PROCEDURES
Stop gas flow and fight fire conventionally. Use water spray to keep cylinders or other containers cool if exposed to fire. Keep personnel well away since containers can rupture violently when exposed to fire. For additional information, see Compressed Gas Association Safety Bulletin SB-4.

UNUSUAL FIRE AND EXPLOSION HAZARDS
ACETYLENE IS EXTREMELY FLAMMABLE AND EXPLOSIVE. IT MAY DECOMPOSE VIOLENTLY IN ITS FREE STATE UNDER PRESSURE IN EXCESS OF 15 PSIG. It burns with an intensely hot flame. Potential explosion hazard exists from reignition if fire is extinguished without shutting off acetylene source. Ignites very easily due to low minimum ignition energy; very wide flammable limits. Acetylene gas has an approximate specific gravity of 1.0 and tends to stay in pockets rather than dissipate.

PHYSICAL DATA

BOILING POINT (°F.)	FREEZING POINT (°F)
@ 1 atm −119.2F (−84.0C)	@ 1 atm −113.4F (−80.8C)
VAPOR PRESSURE (psia)	SOLUBILITY IN WATER
@ 62.2F (16.8C) 590 psia (40 atm)	@ 64F (18C), 1 atm 1.0 CuFt/CuFtH_2O

VAPOR DENSITY (lb/cu ft)	SPECIFIC GRAVITY (AIR = 1)	LIQUID DENSITY (lb/cu ft)	SPECIFIC GRAVITY (H_2O = 1)
@ 68F (20C), 1 atm 0.0681	@ 68F (20C), 1 atm 0.906	@ −116F (−82C), 1 atm 38.76	@ −116F (−82C), 1 atm 0.621

APPEARANCE AND ODOR
Pure acetylene is colorless and odorless. Impurities in carbide generated acetylene impart a characteristic garlic-like odor.

©Air Products and Chemicals, Inc. 1979

Printed in U.S.A. 310-813 (Rev. 6/90)

SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MG INDUSTRIES
3 GREAT VALLEY PARKWAY
MALVERN, PENNSYLVANIA 19355
PHONE: 610-695-7400
FAX: 610-695-7596

EMERGENCY CONTACT:
CHEMTREC
1-800-424-9300

SUBSTANCE: ACETYLENE

TRADE NAMES/SYNONYMS:
ETHYNE; WELDING GAS; ACETYLEN; ETHINE; NARCYLEN; VINYLENE; STCC 4905701; UN 1001; C2H2; MGI00280; A09600000

CHEMICAL FAMILY: hydrocarbons, aliphatic

CREATION DATE: May 04 1990
REVISION DATE: Jun 30 1997

SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: ACETYLENE
CAS NUMBER: 74-86-2
EC NUMBER (EINECS): 200-816-9
EC INDEX NUMBER: 601-015-00-0
PERCENTAGE: >99

OTHER CONTAMINANTS:
TRACES OF AIR, PHOSPHINE, ARSINE, HYDROGEN SULFIDE.

SECTION 3 HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=4 REACTIVITY=3

EC CLASSIFICATION (ASSIGNED):
F+ Extremely Flammable

R 5-6-12

EC Classification may be inconsistent with independently-researched data.

EMERGENCY OVERVIEW:
PHYSICAL DESCRIPTION: Colorless gas with ethereal odor when pure, garlic-like odor if impure.
MAJOR HEALTH HAZARDS: central nervous system depression, difficulty breathing.
PHYSICAL HAZARDS: May explode when heated. Flammable gas. May cause flash fire.

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: nausea, vomiting, chest pain, wheezing, headache,

symptoms of drunkenness, bluish skin color, suffocation, lung congestion, coma.
LONG TERM EXPOSURE: no information on significant adverse effects.
SKIN CONTACT:
SHORT TERM EXPOSURE: rash.
LONG TERM EXPOSURE: no information is available.
EYE CONTACT:
SHORT TERM EXPOSURE: no information on significant adverse effects.
LONG TERM EXPOSURE: no information is available.
INGESTION:
SHORT TERM EXPOSURE: no information on significant adverse effects.
LONG TERM EXPOSURE: no information is available.

CARCINOGEN STATUS:
OSHA: N
NTP: N
IARC: N

SECTION 4 FIRST AID MEASURES

INHALATION: When safe to enter area, remove from exposure. Use a bag valve mask or similar device to perform artificial respiration (rescue breathing) if needed. Keep warm and at rest. Get medical attention immediately.

SKIN CONTACT: It is unlikely that emergency treatment will be required. If adverse effects occur, wash with soap or mild detergent and large amounts of water. Get medical attention, if needed.

EYE CONTACT: It is unlikely that emergency treatment will be required. Wash with large amounts of water or normal saline until no evidence of chemical remains (at least 15-20 minutes). Get medical attention immediately.

INGESTION: It is unlikely that emergency treatment will be required. Get medical attention, if needed.

NOTE TO PHYSICIAN: For inhalation, consider oxygen.

SECTION 5 FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Severe explosion hazard. Vapor/air mixtures are explosive. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.

EXTINGUISHING MEDIA: carbon dioxide, regular dry chemical

Large fires: Use regular foam or flood with fine water spray.

FIREFIGHTING: Move container from fire area if it can be done without risk. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck:

CALCIUM HYPOCHLORITE: May form explosive chloroacetylides.
CESIUM HYDRIDE: Vigorous reaction in the presence of moisture or above 42 C.
CHLORINE: Explosive reaction.
COBALT: Incandescent decomposition reaction.
COPPER + SALTS: Forms explosive acetylides.
CUPROUS CARBIDE: Explodes if preheated.
FLUORINE: Violent reaction.
IODINE: Explosive reaction.
MERCURIC NITRATE: Forms shock-sensitive acetylide.
MERCURY + SALTS: Forms explosive acetylides.
NITRIC ACID (CONCENTRATED): Forms explosive trinitromethane.
NITROGEN OXIDE: May ignite above 30 C.
OXIDIZERS: Violent or explosive reaction.
OXYGEN: Dangerous explosive reaction.
OZONE: May violently explode.
POTASSIUM (MOLTEN): Ignites, then explodes.
RUBIDIUM HYDRIDE: Vigorous reaction in the presence of moisture.
SILVER + SALTS: Forms explosive acetylides.
SILVER NITRATE: Forms explosive acetylide in ammonia solutions.
SODIUM HYDRIDE: Vigorous reaction in the presence of moisture.
TRIFLUOROMETHYL HYPOFLUORITE: Explosive reaction.

HAZARDOUS DECOMPOSITION: Thermal decomposition products: oxides of carbon.

POLYMERIZATION: Polymerizes with evolution of heat. Avoid contact with curing agents, accelerators, and/or initiators.

SECTION 11 TOXICOLOGICAL INFORMATION

ACETYLENE:
TOXICITY DATA:
20 pph inhalation-human TCLo; 50 pph/5 minute(s) inhalation-human LCLo; 50 pph/5 minute(s) inhalation-mammal LCLo.
ACUTE TOXICITY LEVEL: Insufficient Data.
TARGET ORGANS: central nervous system
ADDITIONAL DATA: Stimulants such as epinephrine may induce ventricular fibrillation.

HEALTH EFFECTS:
INHALATION:
ACUTE EXPOSURE:
ACETYLENE: Pure acetylene at a level of 2.5% in air is reported to be nontoxic. Slight intoxication with reversible narcosis may occur at 10%; marked intoxication with dyspnea, headache, and staggering gait at 20%; loss of coordination at 30%; and loss of consciousness at 33-35% for 5-7 minutes. Complete anesthesia, increased blood pressure, narcosis, and stimulated respiration may occur at concentrations up to 80%. Other reported effects may include mild gastric symptoms, dizziness, mental confusion, emotional instability, hypercapnia, and myocardial sensitization. Asphyxiation may occur by reducing the oxygen concentration in respirable air to low levels. Commercial acetylene often contains impurities which may be responsible for symptoms before the asphyxiant level is reached. Symptoms may include rapid respiration, air hunger, impaired mental alertness, cyanosis, weak and irregular pulse, rapid fatigue, nausea, vomiting, prostration, metabolic acidosis,

hyperglycemia, ketonuria, elevated creatinine levels, impairment of judgement and sensation, pulmonary edema, loss of consciousness, coma, and death. A worker who inhaled acetylene gas from a leaking torch developed severe respiratory distress, including diaphragmatic breathing, rhonchi and wheezing, and chest pain. Examination revealed extensive pulmonary edema, bronchopneumonia, and pleural effusion in both lungs. Symptoms were thought to be due to impurities.

CHRONIC EXPOSURE:
ACETYLENE: Exposure during the manufacture of acetylene from calcium carbide produced bronchitis and a stomach ulcer in a worker. Symptoms are believed to have originated from chronic phosphine poisoning. Intermittent exposure for 93 hours to 25% pure acetylene caused slight capillary hyperemia in experimental animals.

SKIN CONTACT:
ACUTE EXPOSURE:
ACETYLENE: No adverse effects have been reported from the pure gas. One case of urticaria has been reported following the use of an oxyacetylene torch in welding. It subsided within 6 hours after cessation of work. Symptoms were believed to result from impurities or combustion products in the gas.

CHRONIC EXPOSURE:
ACETYLENE: No data available.

EYE CONTACT:
ACUTE EXPOSURE:
ACETYLENE: No adverse effects have been reported from the gas.

CHRONIC EXPOSURE:
ACETYLENE: No data available.

INGESTION:
ACUTE EXPOSURE:
ACETYLENE: Ingestion of a gas is not likely.

CHRONIC EXPOSURE:
ACETYLENE: No data available.

SECTION 12 ECOLOGICAL INFORMATION

Not available.

SECTION 13 DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations.

SECTION 14 TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101 SHIPPING NAME-UN NUMBER:
Acetylene, dissolved-UN1001

Holox, Lt.
1500 Indian Trail Road
Norcross, Georgia 30093
(770) 925-4640

MATERIAL SAFETY DATA SHEET

ACETYLENE

Telephone Number: (770) 925-4640
Emergency Contact: CHEMTREC
Emergency Phone Number: (800) 424-9300

SECTION #1 - IDENTIFICATION

Product: ACETYLENE

CAS Number: 74-86-2
Product Code: MSDS CODE G-2
Chemical Family: Alkyne
Chemical Formula: C2H2

Synonyms: ETHENE
G-2

NFPA Hazard Rating: - Health: 1 Slight
- Fire: 4 Extreme
- Reactivity: 3 High

SECTION #2 - CHEMICAL COMPONENTS

Component: ACETYLENE
CAS Number: 74-86-2 Percent of Mixture: 100.0000
ACGIH TLV-TWA: D, simple asphyxiant

SECTION #3 - PHYSICAL DATA

Boiling Point: – 118.8°F – 83.8°C
Melting Point: – 113°F – 80.6°C
Vapor Pressure: 645 psia
Specific Gravity: 0.906
Solubility (H2O): Soluble

APPEARANCE

A colorless gas.

ODOR

Pure acetylene has an etheral odor. Commercial (carbide) acetylene has a distinctive garlic-like odor.

SECTION #4 - FIRE FIGHTING & EXPLOSION DATA

Flash Point: Gas
Autoignition: 565°F 296°C
Lower Explosive Limit (%): 2.2
Upper Explosive Limit (%): 80 - 85*

FIRE AND EXPLOSION HAZARDS

*Pure acetylene can ignite by decomposition above 15 psi; therefore, the UEL is 100% if the ignition source is of sufficient intensity.

Electrical Classification: Class 1, Group A.

GASEOUS ACETYLENE IS SPONTANEOUSLY COMBUSTIBLE IN AIR AT PRESSURES ABOVE 15 PSI (207 kPa). It requires a very low ignition energy so that fires which have been extinguished without stopping the flow of gas can easily reignite with possible explosive force. Acetylene has a density very similar to that of air so when leaking it does not readily dissipate.

EXTINGUISHING MEDIA

Carbon dioxide, dry chemical.

SPECIAL FIRE FIGHTING INSTRUCTIONS

If possible, stop the flow of gas supply and allow fuel to consume itself. Use water spray to cool adjacent areas. Keep personnel away since heated or burning cylinders can rupture violently.

SECTION #5 - EXPOSURE AND EFFECTS - INHALATION

ROUTES OF EXPOSURE - INHALATION

Acetylene is a simple asphyxiant. Oxygen levels should be maintained at greater than 18 molar percent at normal atmospheric pressure which is equivalent to a partial pressure of 135 mm Hg. High concentrations of acetylene so as to exclude an adequate supply of oxygen to the lungs causes dizziness, deeper breathing due to air hunger, possible nausea and eventual unconsciousness.

Acetylene is relatively inactive biologically and essentially nontoxic; therefore, the major hazard is the exclusion of an adequate supply of oxygen to the lungs. Low concentrations (10–20% in air) cause symptoms similar to that of being intoxicated. As a narcotic gas or intoxicant, it causes hypercapnia (an excessive amount of carbon dioxide in the blood). Repeated exposures to tolerable levels has not shown deleterious effects.

Exposure to the acetone component is unlikely unless cylinder is leaking on its side. Acetone is primarily a central nervous system toxin causing headache, nausea, dizziness, vomiting and fatigue.

FIRST AID - INHALATION

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS.

Victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. If breathing has stopped administer artificial resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive. Keep victim warm and quiet.

SECTION #5 - EXPOSURE AND EFFECTS - SKIN

ROUTES OF EXPOSURE - SKIN

Skin effects are not likely. Contact with liquid acetone may cause irritation and dermatitis upon repeated exposures.

FIRST AID - SKIN

Wash affected areas with soap and warm water. If irritation persists, seek medical attention.

SECTION #5 - MISCELLANEOUS TOXICOLOGICAL INFORMATION

Carcinogenicity — NTP: No IARC: No OSHA: No

EYE CONTACT – Vapor may cause irritation. Liquid may cause irritation and frostbite.

EYES – In case of splash contamination, immediately flush eyes thoroughly with water for at least 15 minutes. Seek the advice of a physician, preferably an ophthalmologist, urgently.

GENERAL INFORMATION

Airgas
Five Radnor Corporate Center
Suite 550, 100 Matsonford Road
Radnor, PA 19087-4579
(610) 687-5253
Emergency Contact: Chemtrec 1-800-424-9300
Filename: 00002.msd
Authorized: Airgas; No distribution except as required by law.
Creation date: 01/01/95
Revision date: 02/16/95

Additional Information
Airgas makes no warranties, guarantees or representations of any kind or nature with respect to the product or this data, either expressed or implied, and whether arising by law or otherwise, including but not limited to any implied warranty of personal injury, property or other damages of any nature whatsoever, whether special, indirect, consequential or compensatory, directly or indirectly resulting from the publication, use or reliance upon this data.

SUBSTANCE IDENTIFICATION

CAS-number:	74-86-2
Substance:	Acetylene
Trade Names/Synonyms:	Ethyne; Welding Gas; Acetylen; Ethine; Narcylen; Vinylene; UN 1001
Chemical Family:	Hydrocarbon, Alkyne
Molecular Formula:	C_2H_2
Molecular Weight:	26.04

NFPA Ratings (Scale 0-4):
Health = 1 Fire = 4 Reactivity = 3

COMPONENTS AND CONTAMINANTS

Component:	Acetylene	Percent: >99
Other Contaminants:	Traces of Air, Phosphine, Arsine, Hydrogen Sulfide.	
Exposure Limits:	Acetylene:	2500 PPM NIOSH Recommended Ceiling

PHYSICAL DATA

Description:	Colorless gas with ethereal odor when pure, garlic-like odor, if impure.
Melting Point:	-119 F (-84 C) (Sublimes)
Density (gas):	1.1747 g/l @ 0 deg. C, 1 ATM
Vapor Pressure:	760 MMHG @ -84 C
Solubility in Water:	0.94 @ 25 C
Solvent Solubility:	Soluble in Acetone, Benzene, Chloroform, Ether.
Specific Gravity (liquid):	0.610 @ -81 deg. C

FIRE AND EXPLOSION DATA

Fire and Explosion Hazard:
Dangerous explosion hazard when exposed to heat or flame.

Vapor-air mixtures are explosive.

Due to low electroconductivity of the substance, flow or agitation may generate electrostatic charges resulting in sparks with possible ignition.

Upper Explosive Limit: 100%
Lower Explosive Limit: 2.5%

Autoignition Temperature: 581 F (305 C)

Firefighting Media:
Dry chemical, carbon dioxide or halon
(1993 Emergency Response Guidebook, DOT-RSPA P 5800.6).

For larger fires, use water spray, fog or standard foam
(1993 Emergency Response Guidebook, DOT-RSPA P 5800.6).

Firefighting:
Move container from fire area if possible. Stay away from storage tank ends. For massive fire in storage area, use unmanned hose holder or monitor nozzles, else withdraw from area and let fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of storage tank from fire. Let storage vessel burn unless leak can be stopped; for smaller tanks or cylinders, extinguish/isolate from other flammable materials (1993 Emergency Response Guidebook, DOT-RSPA P 5800.6, Guide Number 17).

Extinguish only if flow can be stopped; use water in flooding amounts as

FIRE AND EXPLOSION DATA (Cont.)

a fog. Cool containers with flooding amounts of water. Avoid breathing toxic vapors, keep upwind. Evacuate to a radius of 1500 feet for uncontrollable fires. Consider evacuation of downwind area if material is leaking.

Stop flow of gas (NFPA 325m, Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids, 1984).

TRANSPORTATION DATA

Department of Transportation Hazard Classification 49 CFR 172.101:
Flammable Gas

Department of Transportation Labeling Requirements 49 CFR 172.101 and Subpart e:
Flammable Gas

Department of Transportation Packaging Requirements:
49 CFR 173.303

Exceptions:
None

TOXICITY

Acetylene:
Toxicity Data:
As a narcotic gas or intoxicant causes hypercapnia (an excessive amount of carbon dioxide in the blood). Repeated exposures to tolerable levels has not shown deleterious effects. The major property is the exclusion of an adequate supply of oxygen to the lungs.

Persons in ill health where such illness would be aggravated by exposure to acetylene should not be allowed to work with or handle this product.

Carcinogen Status:	None.
Acute Toxicity Level:	Insufficient Data Available.
Target Effects:	Simple Asphyxiant; Central Nervous System Depressant.
Additional Data:	Stimulants such as epinephrine or ephedrine may induce ventricular fibrillation.

HEALTH EFFECTS AND FIRST AID

Inhalation:
Simple Asphyxiant/Narcotic.

Acute Exposure -
Pure acetylene at a level of 2.5% in air is reported to be nontoxic. Slight intoxication with reversible narcosis may occur at 10%; marked intoxication with dyspnea, headache, and staggering gait at 20%; loss of coordination at 30%; and loss of consciousness at 33-35% for 5-7 minutes. Complete anesthesia, increased blood pressure, narcosis, and stimulated respiration may occur at concentrations up to 80%.

Other reported effects may include mild gastric symptoms, dizziness, mental confusion, emotional instability, hypercapnia, and myocardial sensitization. Asphyxiation may occur by reducing the oxygen concentration in respirable air to low levels. Commercial acetylene often contains impurities which may be responsible for symptoms before the asphyxiant level is reached. Symptoms may include rapid respiration, air hunger, impaired mental alertness, cyanosis, weak and irregular pulse, rapid fatigue, nausea, vomiting, prostration, metabolic acidosis, hyperglycemia, ketonuria, elevated creatinine levels, impairment of judgment and sensation, pulmonary edema, loss of consciousness, coma, and death. A worker who inhaled acetylene gas from a leaking torch developed severe respiratory distress, including diaphragmatic breathing, rhonchi and wheezing, and chest pain. Examination revealed extensive pulmonary edema, bronchopneumonia, and pleural effusion in both lungs. Symptoms were thought to be due to impurities.

Chronic Exposure -
Exposure during the manufacture of acetylene from calcium carbide produced bronchitis and a stomach ulcer in a worker. Symptoms are believed to have originated from chronic phosphine poisoning.
Intermittent exposure for 93 hours to 25% pure acetylene caused slight capillary hyperemia in experimental animals.

First Aid -
Remove from exposure area to fresh air immediately. If breathing has stopped, give artificial respiration. Maintain airway and blood pressure and administer oxygen if available. Keep affected person warm and at rest. Threat symptomatically and supportively. Administration of oxygen should be performed by qualified personnel. Get medical attention immediately.

Skin Contact:

Acute Exposure -
No adverse effects have been reported from the pure gas. One case of urticaria has been reported following the use of an oxyacetylene torch in welding. It subsided within 6 hours after cessation of work. Symptoms were believed to result from impurities or combustion products in the gas.

HEALTH EFFECTS AND FIRST AID (Cont.)

Chronic Exposure -
No Data Available.

First Aid -
It is unlikely that emergency treatment will be required. If adverse effects occur, wash with large amounts of water and soap and get medical attention.

Eye Contact:

Acute Exposure -
No adverse effects have been reported from the gas.

Chronic Exposure -
No Data Available.

First Aid -
It is unlikely that emergency treatment will be required. If adverse effects occur, wash with water or normal saline and get medical attention.

Ingestion:

Acute Exposure -
Ingestion of a gas is not likely.

Chronic Exposure -
No Data Available.

First Aid -
It is unlikely that emergency treatment will be required. If adverse effects occur, treat symptomatically and supportively and get medical attention.

Antidote:
No specific antidote. Treat symptomatically and supportively.

REACTIVITY

Reactivity:
May decompose explosively at elevated temperatures and pressures.

Products which are known to be incompatible with acetylene:

Brass with > 65% Copper
Forms explosive acetylides.
Bromine
Explosive reaction.
Calcium Hypochlorite
May form explosive chloroacetylides.

REACTIVITY (Cont.)

Cesium Hydride
Vigorous reaction in the presence of moisture or above 42 C.
Chlorine
Explosive reaction.
Cobalt
Incandescent decomposition reaction.
Copper and Salts
Forms explosive acetylides.
Cuprous Carbide
Explodes if preheated.
Fluorine
Violent reaction.
Iodine
Explosive reaction.
Mercuric Nitrate
Forms shock-sensitive acetylide.
Mercury and Salts
Forms explosive acetylides.
Nitric Acid (concentrated)
Forms explosive trinitromethane.
Nitrogen Oxide
May ignite above 30 C.
Oxidizers
Violent or explosive reaction.
Oxygen
Dangerous explosive reaction.
Ozone
May violently explode.
Potassium (molten)
Ignites, then explodes.
Rubidium Hydride
Vigorous reaction in the presence of moisture.
Silver and Salts
Forms explosive acetylides.
Silver Nitrate
Forms explosive acetylide in ammonia solutions.
Sodium Hydride
Vigorous reaction in the presence of moisture.
Trifluoromethyl Hypofluorite
Explosive reaction.

Decomposition:
Thermal decomposition products may include toxic oxides of carbon.

Polymerization:
May polymerize exothermically on contact with appropriate catalysts.

STORAGE AND DISPOSAL

Observe all federal, state and local regulations when storing or disposing of this substance. For assistance, contact the District Director of the Environmental Protection Agency.

STORAGE
Store in accordance with 29 CFR 1910.102.

Protect against physical damage. Outside or detached storage is preferred. Isolate from oxidizing gases, especially chlorine. Store in cool, well-ventilated, noncombustible place, away from all possible sources of ignition and combustible materials. Protect against lightning and static electricity. Store cylinders upright (NFPA 49, Hazardous Chemicals Data, 1975).

Bonding and grounding: Substances with low electroconductivity, which may be ignited by electrostatic sparks, should be stored in containers which meet the bonding and grounding guidelines specified in NFPA 77-1983, Recommended Practice on Static Electricity.

Store away from incompatible substances.

CONDITIONS TO AVOID

Material is extremely flammable; avoid contact with heat, sparks, flames or other sources of ignition. Contents are under pressure; containers may rupture violently and travel a considerable distance.

Avoid line or system pressures greater than 15 psig unless specialized equipment is used to prevent flame propagation should ignition occur.

SPILL AND LEAK PROCEDURES

Occupational Spill:
Shut off ignition sources. Stop leak if you can do it without risk. Use water spray to reduce vapors. Isolate area until gas has dispersed. No smoking, flames or flares in hazard area! Keep unnecessary people away; isolate hazard area and deny entry. Ventilate closed spaces before entering.

PROTECTIVE EQUIPMENT

Ventilation:
Provide local exhaust or general dilution ventilation. Ventilation equipment must be explosion-proof.

Respirator:
The following respirators are recommended based on information found in the

PROTECTIVE EQUIPMENT (Cont.)

Physical Data, Toxicity and Health Effects sections. They are ranked in order from minimum to maximum respiratory protection. The specific respirator selected must be based on contamination levels found in the work place, must not exceed the working limits of the respirator and be jointly approved by the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration (NIOSH-MSHA).

Type `C' supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode or with a full facepiece, helmet or hood operated in continuous-flow mode.

Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.

For firefighting and other immediately dangerous to life or health conditions:

Self-contained breathing apparatus with full facepiece operated in pressure-demand or other positive pressure mode.

Supplied-air respirator with full facepiece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.

Clothing:
Impervious clothing is not required.

Gloves:
Protective gloves are not required but recommended.

Eye protection:
Safety glasses or goggles are advisable because of acetylene being packaged in pressurized containers.

3.7 A daily safety meeting will be held at hazardous materials sites to review site hazards, changes in levels of personal protective equipment, special safety precautions, and emergency response per Health and Safety Procedure No. 10.

3.8 Every accident is to be reported to the Site Supervisor immediately, whether or not anyone is injured.

3.9 Employees may not alter or attempt to repair any item of safety equipment unless specifically authorized and qualified.

3.10 An employee must not attempt to move or lift heavy or bulky objects beyond his capacity.

3.11 Possession or use of intoxicants or drugs on company premises or job sites is prohibited. Employees may not report for work or perform duties while under the influence of intoxicants or drugs. Prescription drugs are to be reported to the Site Supervisor and shall not impair the ability of the worker to work safely.

3.12 Walking under or working under a suspended load is not permitted.

3.13 Legible and understandable precautionary labels will be prominently affixed to containers or raw materials, intermediates, products, by-products, mixtures, scrap, waste, debris, and contaminated clothing, per DOT, EPA, OSHA, or other applicable regulations.

3.14 A sufficient number of fire extinguishers, as determined on site with a minimum rating of 10B:C, will be strategically located throughout the areas where active work is progressing so as to limit the travel distance by personnel to less than 75 linear feet.

3.15 All personnel will avoid contact with potentially contaminated substances. Walking through puddles or mud, kneeling on the ground, or leaning against drums is to be avoided.

3.16 Monitoring equipment will not be placed on potentially contaminated surfaces.

3.17 Personnel on site will use the "buddy" system (pairs). Buddies should prearrange hand signals for communication in case of lack of radios or radio breakdown. Communication or visual contact will be maintained between crew members at all time.

3.18 Contaminated protective equipment will not be removed from the regulated area until it has been cleaned or properly packaged and labeled.

3.19 Employees will not be permitted to exit the contamination reduction zone until contaminated clothing and equipment have been removed and employees have washed their hands and face with soap and water. The only exception is in an emergency situation.

3.20 Removal of materials from protective clothing equipment by blowing, shaking, or any other means which may disperse materials into the air is prohibited.

3.21 Portable or fixed emergency shower/eyewash stations may be required by the site safety plan for the regulated area.

3.22 A deluge shower or hose and nozzle will be available in the contamination reduction zone to wash down heavily contaminated personnel before doffing protection clothing.

3.23 As appropriate, equipment on site will be bonded and grounded spark proof, and explosion resistant. Ground fault interrupters will be utilized. See Health and Safety Procedure No. 27.

3.24 Guard rails and toe boards will be in place for all work on elevated platforms exceeding 6 feet in height.

3.25 Accidents and injuries can and do occur in office environments. Attention and safety awareness are important in offices as well as job sites. Some commonly violated office safety rules include:

- Aisles, passageways or corridors are not to be blocked at any time;
- Desk drawers, cabinet doors and file cabinet drawers are to be kept closed when not in use;
- Use a proper platform, not a swivel chair for reaching in places; and
- Fire extinguishers are to be readily available in each office and an emergency evacuation plan implemented.

I:\WP\FORMS\H&S\PROCEDUR\GSR.5

Appendix C

Vehicle and Equipment Operations

1.0 POLICY

Concern for safe operation of vehicles cannot be overemphasized. Vehicle operations represent perhaps one of the greatest potentials for serious loss because the public is involved and court awards to injured parties can be staggering. It is essential, therefore, that EARTH TECH have an effective, well-organized Vehicle Safety Plan.

2.0 PURPOSE

This procedure establishes requirements for safe operation of vehicles and equipment.

3.0 REQUIREMENT - VEHICLES

3.1 All vehicles operated in interstate transportation are subject to the Interstate Commerce Commission and Bureau of Motor Carrier Safety Regulations. Measures shall be established to assure that drivers and equipment meet those regulatory requirements.

3.2 The EARTH TECH Shop Manager is responsible for the following:

3.2.1 Providing interface with the Corporate Health and Safety Officer.

3.2.2 Assuring that all vehicle accident reports from all jobs are processed and the required number of copies submitted to local, state, and Federal agencies, to the Corporate Health and Safety Officer, and to the insurance carrier.

3.2.3 Assuring that Corporate Health and Safety Officer is notified by telephone of accidents that involve fatalities or multiple serious injuries.

3.2.4 Selection of only highly qualified drivers.

3.2.5 Establishing and conducting a training program, if required.

3.2.6 Investigation of all accidents to establish the when, where, and why the accident occurred and for assuring action to prevent recurrence.

3.3 All accidents shall be documented and investigated by supervisory personnel. The investigation should be of sufficient depth to determine the cause and action required to prevent recurrence. Copies of all motor vehicle accident reports shall be forwarded to health and safety and the insurance carrier.

4.0 REQUIREMENTS - EQUIPMENT

4.1 General - The following safety rules apply to all types of operators.

4.1.1 Air Hose and Couplings - Periodically check air compressor hoses for worn or damaged parts. Do not crimp air hose to disconnect couplings; shut off air at the valve.

4.1.2 Backing Up - Never start or back up equipment or vehicles until you are sure the way is clear. If necessary, have another person guide you safely. Back up alarms, when required, must be working and audible over the surrounding noise.

4.1.3 Boots and Shoes - Wear sturdy work shoes or boots. Hobnailed boots or shoes should not be worn due to the slipping and snagging hazard they present.

4.1.4 Cranking - When crank starting a motor, place thumbs next to the index fingers and not around the crank handle. Pull up on the crank - never push down. This method avoids injury in case of engine kickback.

4.1.5 Ear Protection - Ear plugs or other approved ear protection shall be worn when necessary.

4.1.6 Emergency Vehicles - Give ambulances, fire fighting equipment and other vehicles the right-of-way during emergencies and lend assistance if required.

4.1.7 Fueling and Repair - No fueling or repair shall be made to equipment while it is in operation. The motor shall be turned off and the bucket, blade, gate or boom shall be lowered to the ground or blocks.

4.1.8 Gasoline - Gasoline and other combustible liquids shall not be carried in or on vehicles other than in permanent gas tanks or in approved safety cans.

4.1.9 Gloves - Heavy gloves should be worn when handling wire rope and other rough materials.

4.1.10 Housekeeping - Operators should keep deck plates, steps, rung and hand rails on equipment free of grease, oil, ice, and mud. The inside of the cabs shall also be kept clean and free of flammable items.

4.1.11 Inspections - Inspect the unit to which you are assigned to make sure it is in safe operating condition. These inspections shall be made at least at the start of each shift and defects or discrepancies shall be reported to the supervisor immediately. Equipment forms are available to record this data (EQ Form 505). Equipment and vehicles shall not be used until defects or discrepancies are repaired unless they do not affect the safe operation of the equipment or vehicle.

4.1.12 Jumping - Jumping on or off equipment is prohibited. When climbing on or off equipment or vehicles, face the unit and use secure hand and foot holds to prevent slips and falls. Always look where you are stepping.

4.1.13 Know Your Equipment or Vehicle - It is your responsibility to be thoroughly familiar with all feature plates and manuals and, if you are in doubt as to correct operating techniques or safety features, ask your supervisor at once.

4.1.14 Laws and Regulations - Learn and obey all local, state, and Federal laws and the client's stipulations.

4.1.15 Moving Equipment - Do not attempt to get off or on any equipment or vehicle while it is in motion.

4.1.16 Overloading - Avoid overloading vehicle beds and equipment buckets and beds. Excessive material can damage the unit and falling material can cause serious injury.

4.1.17 Parking - Equipment and vehicles shall be parked off roads and highways whenever possible. When it is not possible, the unit shall be marked by red lights or flares at night and red flags during the day. Wheels should be blocked.

4.1.18 Passing - Do not pass when visibility is restricted for any reason.

4.1.19 Pedestrians - Be constantly alert for pedestrians. Remember they have the right-of-way.

4.1.20 Power Lines - When operating high trucks, cranes, shovels or other units, always use caution around power lines and maintain a safe clearance of 10 feet or more depending upon the voltage.

4.1.21 Qualifications - Only fully qualified and authorized personnel shall operate construction equipment or vehicles.

4.1.22 Riders - Only authorized persons will be permitted to ride in equipment or vehicles.

4.1.23 Seat Belts - If unit is equipped with seat belts, operator and passengers must keep seat belts fastened at all times during operations.

4.1.24 Equipment and Vehicle Security -

- All units shall be secured so that they cannot be started or moved by any unauthorized person during off-work hours.
- All mobile units shall be secured in some way whereby they cannot move freely after they are parked.
- They key should be removed after securing equipment or vehicle and turned over to an authorized supervisor.

4.1.25 Shoulders and Ditches - Do not operate too closely to the edge of shoulders, cuts, fills, or ditches.

4.1.26 Slow Down - Slow down and use caution at blind intersections and crossings when visibility is limited or when passing work crews.

4.1.27 Smoking - Do not smoke during refueling or servicing operations. Do not throw lighted material from vehicles or equipment.

4.1.28 Speeding - Speeding is dangerous and is strictly prohibited.

4.1.29 Thumbs Up - Keep thumbs up when driving. Do not grasp the steering wheel with thumbs inside the spokes.

4.1.30 Visibility - Make sure all windshields, side and rear windows, mirrors and lights are clean before moving the unit.

4.1.31 Warning Signs and Traffic Signals - Be alert for and strictly obey all directional and warning signs and signals.

4.2 Trucks, Pickups, and Other Vehicle Operators

4.2.1 Blind Curves - Slow down and sound horn when approaching a blind curve.

4.2.2 Driver's License - Always carry your driver's license with you when operating a vehicle and make sure it is current.

4.2.3 Heavy Rock and Other Material - Do not remain in an open cab truck while it is being loaded with heavy rock or other material presenting a falling hazard. Dismount and move to a safe distance and observe the loading.

4.2.4 Hooks - Hooks or calipers on the "A" frame of trucks should be securely fastened to prevent swinging when not in use. Stand clear of the "A" frame.

4.2.5 Loading - Materials and equipment shall be properly loaded and secured to prevent shifting of loads or loss of material during transit.

4.2.6 Long Hauls - On long hauls, binders should be checked periodically (at least during each rest or service stop) to make sure they are still secure and tight.

4.2.7 Overhanging and Oversize Loads - When it is necessary to transport overhanging or oversize loads, the appropriate signs, red flags and red lights will be used. When necessary, use flag cars.

4.2.8 Safety Chains - Safety chains of sufficient size and strength shall be installed on all trailers being towed.

4.2.9 Safety Hooks - Use safety hooks on all winch truck cables.

4.2.10 School Buses - Obey school bus laws. Slow down and prepare to stop when approaching school, buses, children on foot or on bicycles.

4.2.11 Side Roads and Railroad Tracks - Stop and look both ways before crossing railroad tracks or before driving onto a highway from a side road.

4.2.12 Stopping - Do not stop vehicles in the middle of the road to talk to occupants in another vehicle. Always pull to the side or off the road to maintain a clear, safe road.

4.2.13 Turn Signals - Always use turn signals, emergency and other signals as appropriate when turning, stopping, passing, or performing other vehicle operations.

4.2.14 Vehicle Maintenance - It is the driver's responsibility to see that his or her vehicle is in good mechanical condition before and during operation. Special emphasis should be placed on ensuring the brakes, lights, horn, windshield wipers, tires and steering assembly are in good order. Defects must be reported and corrected immediately.

4.3 Building Hoist Operators

4.3.1 Communications - Learn and abide by the approved signal system. Have proper communications with all floors as necessary and the ground before operating hoist.

4.3.2 Hoist Platform - Never move the hoist platform unless you understand the proper signal and you are sure the way is clear.

4.3.3 Riders - Do not haul riders on material hoist and do not haul riders and material together on a personnel hoist.

4.4 Crane, Shovel and Dragline Operators

4.4.1 Boom Deflection - Keep the boom free of all objects and structures. If boom is allowed to rest against structures, it can cause deflection under load.

4.4.2 Capacity - Do not make lifts exceeding the carrying capacity of crane cables, ropes, and slings.

4.4.3 Control - Make sure you have the load under control when raising and lowering. Use slow, uniform and steady movements for safe, efficient operation.

4.4.4 Drums - Do not lower blocks below the point where less than two full wraps of cable remain on the drum.

4.4.5 Fire Extinguishers - Each cab-type crane, shovel, or dragline will be provided with a company approved fire extinguisher. Operators are responsible to check these extinguishers daily and to obtain a replacement if defective or after being used.

4.4.6 Flammable Liquids - Do not keep gasoline or flammable solvents in crane, shovel, or dragline cabs.

4.4.7 Hand Signals - Only the standard hand signals recommended by the International Union of Operating Engineers will be used. These should be posted on the equipment.

4.4.8 Hoisting - Start hoisting load slowly and smoothly. Avoid jerking the load as this may throw the crane or shovel off balance. Follow the same procedure when stopping the load.

4.4.9 Housekeeping - Keep all deck plates, ladders and walkways on machine clear of oil and grease. Keep walkways and passageways clear of tools and materials.

4.4.10 Inclement Weather - Check brakes and hoisting equipment in wet or icy weather before raising a load. Wet frictions frequently cause load slippage. Loads should not be lifted during strong or gusty winds.

4.4.11 Level Surface - Keep the rig on a firm, level surface. When the ground is uneven, muddy or soft, mats or timbers will be used to level the rig and to provide a firm foundation from which to work.

4.4.12 Loads -

- Do not leave a load hanging or a bucket or clam full of material during lunch or after quitting.
- Loads should not be held for extensive lengths of time by the brake. "Dog" it off where possible or secure by blocking. Operators must not leave the controls while load is suspended.
- Make certain the unit and its rigging are capable of handling the intended load at the anticipated radius. Check capacity charts.
- Raise heavy loads slightly off the ground level and hold long enough to test the rig.
- Be sure that the slings are attached to the load properly and that all loose material has been secured or removed before starting to lift.

4.4.13 Maintenance - It is the operator's responsibility to see that his or her equipment is in safe working condition prior to and during each shift. Special attention should be paid to brakes, sheaves, cables, hooks, cramps, boom, boom stops, and outriggers. Defects which affect the safe operation of the equipment must be corrected prior to operating the equipment.

4.4.14 Operating Boom -

- Use caution when swinging booms. Be constantly alert for other workers in the vicinity of your equipment.
- Place the load boom directly over the load before starting the hoist to avoid swinging the load.

4.4.15 Oilers and Mechanics - Watch out for the oiler or mechanics. They may be green and your instructions or advice may be needed to ensure for their safety.

4.4.16 Outriggers - Use outriggers according to the manufacturer's operating recommendation and at all times when the stability of the crane is unknown or questionable.

4.4.17 Overhang - Use extreme caution when working close to overhanging material and make sure there is no danger of cave-ins.

4.4.18 Power Lines - State and other regulations forbid the operation of booms or other parts of a crane or shovel within specified distances from electric power lines. Know the standard before operating crane or shovel. At no time shall boom or cables be worked within 10 feet of energized power line. Warning decals should be mounted in the cab.

4.4.19 Riding - Workers shall not be permitted to ride headache balls, buckets, hooks, or skip boxes except in emergencies or for the purpose of inspection and maintenance and then only under the specific direction of the supervisor.

4.4.20 Signalmen - Take signals only from the one person supervising the lift or designated as signalman. Obey a stop signal at all times regardless of who gives it.

4.4.21 Suspended Bucket and Boom - Always leave bucket and/or boom in a safe position or lower to a spoil pile. Always place it in a position to avoid a hazard in the work area.

4.4.22 Trenches - Avoid placing rigs in close proximity to trenches or embankments where the ground is likely to give way or shift.

4.4.23 Wire Lines - Inspect all cables periodically for wear or fraying. When spooling or reeling cable, never guide moving cable with the hands.

4.5 Front End Loader Operators

4.5.1 Brakes - All loaders will have operable brakes. Faulty brakes shall be reported to your supervisor at once.

4.5.2 Loader Bucket - Loader bucket shall be lowered to the ground when not in use.

4.5.3 Loading - When loading trucks, know what is on the other side of the truck.

4.5.4 Raised Bucket - When traveling with bucket raised, bucket should not be above the top of radiator of the machine where it would obstruct the operator's view.

4.6 Scrapers, Dozers, Tractors, and Other Heavy Equipment Operators -

4.6.1 Clothing - Operators must be careful not to wear loose or torn clothing which can get caught in tracks or other moving parts of the machinery.

4.6.2 Coasting - Never coast with any type of equipment. Always keep the power on and the equipment in gear.

4.6.3 Dozer Blade - Do not use the dozer blade as a brake when coming down a slope or hill, except in case of brake failure.

4.6.4 Hydraulic or Winch Driven Equipment - Dozer and grader blades, ripper teeth, scraper gates and equipment must always be lowered to the ground or blocks when equipment stops or is secured for the shift.

4.6.5 Inclined Surface - Never leave equipment on an inclined surface or on loose material with the motor idling as the vibration may put the machine in motion.

4.6.6 Riders - Operators will not allow riders to ride draw bar, clutch housing, boom or boom winch. Only specifically authorized persons will be allowed to ride jump seats, if equipment is so equipped.

4.6.7 Running Wire - Inspect all cables periodically for wear. When spooling or reeling cable, never guide moving cable with the hands.

4.6.8 Safety Equipment - Check and ensure all guards, canopies, safety bars and other safety equipment are installed and in good order prior to operating equipment.

4.6.9 Traveling - When moving equipment, keep dozer blade and scraper bowl close to the ground but high enough to avoid rocks and other obstacles.

4.6.10 Winches - Inspect winch brakes, cables and pins periodically. When indicated, have repairs made before using.

I:\forms\sop\vehicle.33

Appendix D

Hearing Conservation

1.0 POLICY

Preventing hearing loss due to excessive workplace noise exposure is a primary objective of EARTH TECH. To achieve this objective, the following policy on hearing conservation has been instituted to comply with 29 CFR 1910.95.

2.0 REQUIREMENTS

All employees exposed to 85 dBA time-weighted average (TWA) for eight hours will be included in a Hearing Conservation Program. All employees exposed to 90 dBA (TWA) for eight hours will be required to wear hearing protectors.

3.0 AUDIOMETRIC HEARING TESTS

1. Qualified medical personnel will conduct a baseline audiogram on all EARTH TECH personnel who meet the criteria of noise exposure as stated in this policy. Thereafter, annual audiograms will be compared with the baseline exam. All field personnel will receive a baseline audiogram prior to employment.

2. The frequencies tested will be 250, 500, 1,000, 2,000, 3,000, 4,000, 6,000, and 8,000 Hz. When not feasible, due to equipment incapability or background ambient noise, 250 Hz and 8,000 Hz may be excluded.

3. When a Standard Threshold Shift (STS) is noted between the last valid baseline and the annual audiogram, the following steps will be taken:

   a. A retest will be conducted within 30 days to confirm the STS. The employee will not be exposed to workplace/hobby noise for 14 hours and/or will be provided with adequate hearing protection prior to testing.

   b. If the STS persists, ear protection will be upgraded to one with a greater Noise Reduction Rating (NRR).

   c. The employee will be counseled, and EARTH TECH will obtain information regarding the employee's possible noise exposure away from the workplace or existing ear pathology.

   d. Qualified medical personnel will review the audiograms. This group will determine the need for a medical referral.

   e. The employee will be notified in writing by the Industrial Hygiene Department of the STS, within 21 days of determination, as required by OSHA.

   f. The employee's supervisor will be notified of the shift in hearing threshold.

   g. If the employee who has experienced an STS is exposed to 85 dBA for 8 hours or 80 dBA for 12 hours, mandatory use of ear protection is required.

h. Temporary employees will receive audiograms during their exit physicals.

4.0 MONITORING OF NOISE LEVELS

The Health and Safety Officer will monitor personal and environmental noise levels using noise dosimetry to determine the need for employees to be enrolled in the Hearing Conservation Program. EARTH TECH will periodically monitor noise levels during site operations to document personnel exposure levels. EARTH TECH will implement engineering controls will be implemented if boundary noise levels exceed 10 dBA above background levels.

5.0 HEARING PROTECTORS

A. Hearing protection will be mandatory for all employees exposed to 90 dBA for 8 hours and 85 dBA for 12 hours.

B. Hearing protectors will be made available to all employees exposed to 85 dBA for 8 hours or greater.

C. Hearing protection will be mandatory for all employees exposed to 85 dBA for 8 hours and who have experienced an STS.

D. The Industrial Hygiene Department will fit and initially issue all hearing protection. All employees issued hearing protection will be trained in the proper use, care, and maintenance of the protectors.

E. EARTH TECH will offer at least three hearing protector devices.

F. All hearing protection will carry a NRR of at least 26 dBAs and be approved by the Industrial Hygiene Department prior to use in the field.

6.0 RETENTION OF RECORDS

A. Noise exposure measurement records will be retained for three years.

B. Audiometric test records will be retained for the duration of employment, plus 40 years.

C. Annual employee training session documentation will be retained for the duration of employment.

7.0 TRAINING PROGRAM

A. All employees exposed to noise at or above 85 dBA (TWA) for 8 hours, or 80 dBA (TWA) for 12 hours, will participate in an annual training program.

B. The training program will focus on:

- The effects of noise;

- The purpose of hearing protectors, their advantages and disadvantages, and use and care; and
- The purpose and procedure of audiometric testing.

I:\WP\FORMS\H&S\PROCEDUR\HEARING.42

Appendix E

Accident/Injury Investigation

1.0 POLICY

All injuries and accidents will be reported promptly to the site supervisor and documented.

2.0 PURPOSE

This procedure provides for reporting and documenting accidents, injuries, and work-related illnesses.

3.0 PROCEDURE

3.1 Reportable incidents include, but are not limited to:

- Injuries to personnel of any magnitude;
- Tool or equipment failure which results or could result in serious injury;
- Fire or explosion of any magnitude;
- Exposure of unprotected personnel to toxic agents;
- Vehicle accidents; and
- Any damage to client or private property.

3.2 All injuries/illnesses, no matter how minor they appear, are to be reported to the employee's immediate supervisor. The supervisor should then see to it that the incident is logged and properly reported.

3.3 Under no circumstances should an injured employee drive himself/herself to the hospital, clinic, etc. An employee with minor injury may be transported by car after first aid treatment is given. The employee who transports the injured person should be trained in first aid and CPR whenever possible. Any injury that is not minor, or when in doubt of severity of injury, should be transported by ambulance.

3.4 Injured employees who require medical treatment or in which the employee was taken to a doctor, hospital, clinic, etc., should not be allowed to resume work without a written return to work and/or any work limitations letter. Should a statement, such as "light duty" be given, corporate Health and Safety will call the treating physician to determine the exact restriction that is needed. It is essential the treating physician understands the type of work the employee normally performs and that alternate work is available to meet work restrictions.

3.5 The CEO of HazWaste, President of the company, division Vice President, and corporate Health and Safety Department are to be notified immediately of any lost time accident. Notice is to be made by telephone or other available means.

3.6 All bills and receipts for medications and pharmacy supplies pertaining to work related injuries should be sent to the employees assigned division to the attention of the person who handles worker's compensation claims. The employee should write on the bill or receipt the date of injury and diagnosis.

4.0 FORMS AND REPORTING PROCEDURES

4.1 Injury/Illness Log

- Injury/Illness Log is to be kept at the location where first aid treatment is given at all EARTH TECH project sites. All injuries, no matter how minor they appear, are to be logged. Minor injuries such as small cuts, scrapes, small first degree burns, and splinters that require only first aid treatment, are entered on this log only. Any incident that requires the completion of the Incident Investigation Report, as described below must also be logged. Maintaining this log will help in meeting OSHA recordkeeping requirements and in responding to minor incidents before they become major. An example of a properly completed log is attached. On the last work day of each week, a copy of the log is to be faxed to:

  - Corporate Health and Safety Manager

  (If a fax is not available, notify the home office by the same method time card information is sent or telephone the corporate Safety Manager.)

  The original log should be retained in site records.

4.2 Accident Report

- Incident Investigation Report (Accident Report) to be completed in the following work-related circumstances: (this report is required by OSHA).

  - Any work-related back injuries;
  - All work-related chemical exposures;
  - Any work-related injury/illness which involves medical treatment (treatment by doctor, hospital, clinic, chiropractor, dentist);
  - Any work-related accident that results in death of an employee;
  - Any incident that involves property damage but not necessarily employee injury; and
  - Any work-related incident (near miss) in which an injury could have occurred and that attention is needed to prevent similar incidents from occurring and preventing an injury/accident.

Note: Minor injuries such as scrapes, small cuts, small splinters that require first aid treatment only, do not require completion of the Incident Investigation Report. However, should condition of injury change and require medical treatment, then a report must be completed. If in doubt as to how to classify an injury (first aid or medical), complete the Incident Investigation Report.

The Incident Investigation Report is to be completed the day of the injury/incident.

The Site Supervisor shall:

- Notify the corporate Health and Safety Manager by telephone;
- Complete the report within 24 hours of the occurrence;
- Have involved employee(s) review and sign the report;
- Send original report to the corporate Safety Manager; and
- Retain a copy of the report for site records.

The Project Manager or supervisor shall:

- Notify the injured employee's divisional vice president and company president of the injury incident;
- Obtain additional information as needed for investigation of the occurrence (photographs, diagrams, witness statements, doctor slips, etc.);
- Send a copy of the report to the division secretary handling worker's compensation of the injured employee;
- Forward all original reports to corporate Health and Safety for retention in the employee's medical file; and
- Retain a copy for his/her file.

For Lost Time Injury

The Project Manager or supervisor shall:

- Complete the Notice of Lost Time Injury and fax a copy to Divisional vice president and company president and corporate Health and Safety within 24 hours of the incident.

The Project Manager shall:

- Conduct a joint site inspection with the Safety Manager and submit a brief report to his division vice president and corporate health and safety manager detailing the major cause(s) of the accident and corrective action implemented within five days of the incident.

4.3 Return to Work/Authorization for Release of Medical Records

The following two forms are to be completed whenever and injured/ill employee is given treatment at a hospital, clinic, doctor's office, etc. These forms are necessary for obtaining additional information to be used in determining OSHA recordability and filing of worker's compensation claims. Both original forms are to be attached to and submitted together with the Incident Investigation Report.

- Return to Work form is to be completed by the treating physician. The employee shall return the original form to his supervisor prior to returning to work or within 24 hours of a lost time incident. No employee is to be allowed to return to work following treatment of an injury/illness without this completed form. Restrictions given by the physician are to be followed. The supervisor shall contact the treating physician or Corporate Health and Safety should there be any question regarding an employee's ability to return to work.

- Authorization for Release of Medical Records is to be completed by the supervisor or treating agency and signed by the employee. This form is required to obtain doctor's reports, emergency room records, x-ray reports, lab reports, etc., pertaining to the work-related incident. The original form is to be attached to the Incident Investigation Report.

By following these guidelines and procedures, we hope to ensure accurate recording or work related injuries and illnesses and improve filing of workers compensation claims.

"Job Hindrances Interrupt or Interfere with the Orderly Progress of the Job."

SUPERVISOR'S INVESTIGATION REPORT

Employee Name	Age	Time	Date
Department-Shift	Job	How long on this job?	

WHAT HAPPENED? (Describe what took place or what caused you to make this investigation.)

WHY DID IT HAPPEN? (Get all the facts by studying the job and situation involved. Question by use of WHY-WHAT-WHERE-WHEN-WHO-HOW.)

WHAT SHOULD BE DONE? (Determine which of the 12 items under EMP require additional attention.*)

WHAT HAVE YOU DONE THIS FAR? (Take or recommend action, depending on your authority. Follow up - was action effective?)

HOW WILL THIS IMPROVE OPERATIONS? (Objective: Eliminate job hindrances.)

INVESTIGATED BY	DATE	REVIEWED BY	DATE

*

EQUIPMENT	MATERIAL	PEOPLE
Select	Select	Select
Arrange	Place	Place
Use	Handle	Train
Maintain	Process	Lead

EARTH TECH

INCIDENT INVESTIGATION REPORT

_____ ACCIDENT*
_____ INJURY/ILLNESS*

_____ UNUSUAL OCCURRENCE
_____ NEAR MISS

1) Project no.: _____ Project phone no.: _____

Project location: _____

2) Employee's full name: _____ Number: _____

If subcontractor, give name/address: _____

3) Home address - Street: _____

City/State/Zip: _____

Phone number: _____

4) Date of birth (m/d/y): _____ / _____ / _____ 5) SSN: _____

6) Job title: _____ 7) Assigned division: _____

8) Date and time of occurrence: _____

9) Date and time reported to company: _____

10) Date employee began to lose work time: _____

11) Estimated/actual date of return to work: _____

12) Describe the apparent extent of injury or illness and parts of body affected (laceration, burn, fracture—right lower leg, left index finger):

13) Describe treatment given (x-ray, stitches, etc.). If hospital or doctor, give name, address, and phone number and attach return-to-work slip:

14) Did a chemical exposure occur? If yes, what known contaminants were present? What type of exposure occurred? (Inhalation, ingestion, skin contact, etc.):

INCIDENT INVESTIGATION REPORT (continued)

15) Describe fully how accident happened, give causes and results. Attach another sheet if necessary: _____

16) Exact location where incident occurred: _____

17) Names and addresses of witnesses to the incident: _____

18) Were emergency procedures adequate? _____

19) Who was directly supervising the work? _____

20) Work schedule at time of incident: ___ Hours per day ___ Days per week

21) Level of personal protective equipment utilized at time of incident: (circle) A B C D

22) What direction or training had been given on the task? _____

23) How can you or the company prevent similar incidents from happening again? _____

24) Did personal protective equipment fail (Tyvek torn, glove ripped, respirator failed, etc.) Describe: _____

25) What action has or will be taken to prevent similar occurrences? _____

26) Additional comments: _____

Signature: _____ Date: _____
(Employee)

Signature: _____ Date: _____
(Site Supervisor)

Signature: _____ Date: _____
(Safety Supervisor)

* Fill out form completely and accurately. Within 48 hours, send a copy of the completed form to the manager, and send original report to Corporate Health and Safety. Retain a copy at the job site. Attach to report any related information (photographs, doctor slops, witness statements, etc.) The injured employee shall contact their home division office for further instruction and forms to be completed on work-related injuries/illnesses.

RETURN TO WORK

Physicians Please complete and return the original form to the employee.

Employee's Name: _____

is able to:

_____ Return to regular work

_____ Return to work with the following restrictions;

Lifting to _____ Standing _____ Sitting _____

Clean office work only _____ Other _____

Restriction is effective until _____

_____ Unable to work, estimate return to work date _____

Signature: _____ M.D.

Address: _____

* Employee must present this form to his supervisor prior to returning to work.

AUTHORIZATION FOR RELEASE OF MEDICAL RECORDS

I, (print full name) _____,

hereby authorize (individual or organization holding records) _____

_____

to release to EARTH TECH a copy of all medical records pertaining to my injury/illness of _____

_____.

Pertaining to (nature of injury/illness) _____

_____

Please send records to:

(Signature) _____

(Date) _____

Distribution:

1) Original to Corporate Health and Safety
2) Copy to Site File

NOTICE OF LOST TIME INJURY

Please Type or Print

Employee Name: _____ Employee No.: _____

Supervisor's Name: _____

Project No. and Location: _____

Date of injury: _____ Time: _____

Brief Description of Incident and Injury: _____

_____

_____

_____

Immediate Corrective Action: _____

_____

Tentative Follow-up Corrective Action: _____

_____

Signature: _____ Safety Manager

Date: _____

pc: 1)

2)

3)

I:\W\FORMS\H&S\PROCEDUR\AII.6

Appendix F

Air Monitoring

HEALTH AND SAFETY PROCEDURES

SUBJECT:	NUMBER: 8	PAGE: 1 OF: 1
AIR MONITORING	DATE PUBLISHED: October 2, 1992	
	DATE REVISED: May 3, 1994	

1.0 POLICY

Air monitoring will be conducted on all projects involving hazardous materials in order to determine the appropriate level of protection and document potential employee exposure.

2.0 PURPOSE

The purpose of this procedure is to describe air monitoring requirements for hazardous materials projects.

3.0 REQUIREMENTS

3.1 Direct reading instruments will be used on sites involving hazardous materials. The instrument to be utilized will be specified in the site-safety plan.

3.2 Instruments available include portable gas chromatographs (OVA), photoionization detectors (HNU or TIP). Explosimeters, hydrogen sulfide monitors, hydrogen cyanide monitors, carbon monoxide monitors, oxygen monitors, and Dr=eger tubes will also be utilized depending on the potential health hazards.

3.3 An action level will be established in the Site Safety Plan for each suspected airborne contaminant. A chart discussing the action levels will be included in every Site Safety Plan involving hazardous materials.

3.4 Instruments will be calibrated daily.

3.5 Records of all direct readings will be kept on the form provided.

3.6 Personal samples will be collected to determine individual exposures per the Site Safety Plan or per guidance by the Health and Safety Manager. Samples will be logged on a sample log and will follow chain-of-custody requirements.

3.7 Results will be posted on site.

DIRECT READING INSTRUMENT LOG

Project: _____ Job No.: _____

Date: _____ Operator: _____

Instrument: _____ Calibration: _____

Amt, Component, Date

Sampling Technique: _____

_____

Sample Interval: _____

Background Reading: _____

Action Level/Response: _____

Time	Location	Reading (units)	Detection Limits (Scale)

I:\FORMS\SOP\AIRMONIT.8

PERSONAL SAMPLING DATA SHEET

Client: _____ Material: _____

Site Location: _____ Job No.: _____ Sampling Media: _____

Item No.	Name of EARTH TECH Personnel	SS Number	Sample Number	Date	Start Time	Stop Time	Total Time	Air Flow Vm		Total Air Flow (l)	Sampler's Initials	Amount (mg)	Conc. ppm, mg/m³	Remarks
								Pre	Post					

Appendix G

Self-Contained Breathing Apparatus

1.0 POLICY

A Self-Contained Breathing Apparatus (SCBA) is approved for IDLH or oxygen deficient (less than 20.8 percent) situations.

2.0 PURPOSE

This procedure provides project managers and employees with the requirements in the use, care, and limitations of SCBAs.

3.0 SCOPE

This procedure applies only to use of SCBAs.

4.0 PROCEDURE

4.1 SCBAs are to be used whenever level A or B protection is required, whenever the site health and safety officer requires their use, or whenever the hazards of a situation cannot be assessed prior to entry.

4.1.1 Exceptions based upon site conditions may be granted where an airline respirator with escape pack system has been approved by the site safety officer.

4.2 Only SCBAs operating in the positive pressure (pressure demand) mode will be used.

4.3 No individual will use an SCBA until training on the use, care and limitations of the SCBA has been received. Such training will be received at least annually.

4.4 SCBAs are to be inspected by the user prior to use to ensure the cylinder is fully charged, the regulator and warning devices operate properly, and that the harness, facepiece, hoses, and head straps are in good condition.

4.5 SCBAs are not to be used if the tank is not fully charged or if any other condition exists which could cause failure of the unit during use.

4.6 When using an SCBA, users will leave the work area promptly when the low air pressure alarm signal sounds.

4.7 Individuals are not to make repairs or modifications to an SCBA unless specifically authorized by the manufacturer of the unit and the site safety officer.

4.8 The Site Safety Officer is responsible for maintaining the SCBAs ready for use at all times. This includes performing the monthly inspections and inspecting, sanitizing, and refilling or replacing the air tanks after each use.

PROPIONIC ACID

CAS: 79-09-4

Methylacetic acid; Ethylformic acid

CH_3CH_2COOH

TLV-TWA, 10 ppm (≈ 30 mg/m³)*

Propionic acid is a colorless, oily liquid with a pungent odor. Its physiochemical properties include:

Molecular weight: 74.08
Specific gravity: 0.99336 at 20°C
Melting point: −20.8°C
Boiling point: 141°C
Flash points: 130°F (54.4°C), closed cup; 136°F (58°C), open cup

It is soluble in water, alcohol, chloroform and ether.

Propionic acid and propionates are used as mold inhibitors, fungicides, herbicides, and preservatives for grain and wood chips; as emulsifying agents, in flavors and perfumes, drugs, electroplating solutions, and in making cellulose propionate plastics.

* In 1985 the STEL was placed on the Notice of Intended Changes as a deletion with the TWA value retained.

The oral LD_{50} for rats is 4.3 g/kg;[1] intravenous LD_{50} for mice is 625 mg/kg, and skin absorption LD_{50} for rabbits is 500 mg/kg.[2] An 8-hour inhalation of a saturated atmosphere caused no deaths in rats.

Medical reports of acute exposures of workers show mild to moderate skin burns, mild eye redness, and one case of mild cough and asthmatic response. An industrial hygiene survey indicated 8-hour TWA levels below 0.25 ppm, with excursions to 2.1 ppm.[3] No irritation was noted at these concentrations.

A time-weighted average TLV of 10 ppm is based largely on analogy with acetic acid, and is designed to prevent significant irritation of eyes or respiratory passages. At this time, the Committee recommends the elimination of the STEL until additional toxicological data and industrial hygiene experience become available to provide a better base for quantifying on a toxicological basis what the STEL should be. The reader is encouraged to review the section on *Excursion Limits* in the Introduction to the Chemical Substances of the current TLV booklet for guidance and control of excursions above the TLV-TWA, even when the 8-hour TWA is within the recommended limits.

The Soviet limit (1976) is 2 mg/m³, or about 0.7 ppm.

References

1. **Smyth, H.F., Jr. et al.:** *Am. Ind. Hyg. Assoc. J. 23*:95 (1962).
2. **NIOSH:** *Registry of Toxic Effects of Chemical Substances* (1977).
3. Dow Chemical Company Communication to Committee (1977).

Appendix B

General Safety Rules

1.0 POLICY

The following rules generally apply in all areas of safety.

2.0 PURPOSE

This procedure provides project managers and personnel with a list of fundamental safety rules not specifically covered in other health and safety procedures.

3.0 GENERAL HEALTH AND SAFETY RULES

3.1 Each office/project site will have the appropriate OSHA poster (state or Federal) posted prominently.

3.2 Each employee, as a condition of employment, is required to comply with the health and safety procedures and the site safety plan governing in each area the employee is required to work.

3.3 Project managers are to review records of each employee to be assigned to work on projects involving hazardous materials and assure that all requirements pertaining to health and safety such as medical surveillance and training are in compliance.

3.4 No one will initiate work on a project involving hazardous materials until appropriate training as required by regulation, contract and/or health and safety procedures have been implemented.

3.5 All employees are directed to immediately bring to the attention of the Site Supervisor or site safety officer any unsafe condition, practice or circumstance.

3.6 The following practices are expressly forbidden during operations on hazardous materials sites:

- Smoking, eating, or drinking while on site except in designated areas;
- Ignition of flammable or reactive materials;
- Entry on site without proper safety equipment;
- Conduct of operations on site without backup personnel as described in the site safety plan;
- Wearing of facial hair which may interfere with a respiratory seal on a job site which may require respiratory protection; and
- Wearing of contact lenses on a hazardous materials site.

4.9 Monthly inspections are to include checks on tightness of connections and the condition of the headbands, valves, and connecting tubes. Rubber parts are to be inspected for pliability and deterioration. The air tank must be fully charged and the hydrotest certification must be correct. Regulator and warning devices must function properly. A record of inspection dates is to be maintained on the SCBA or in its storage container and must include the inspector's name, date of inspection, and identification number of the SCBA. The inspection checklists are to be kept with the SCBA for reference. The checklist is shown following this procedure.

4.10 Any deficiency noted during inspection requires removing the SCBA from service until the condition is corrected. The SCBA and the storage case must be clearly marked or tagged "OUT OF SERVICE."

4.11 SCBAs are not to be worn if conditions prevent a gas tight face to facepiece seal. Employees may not wear facial hair that interferes with a gas tight face seal. Other conditions which could interfere with a face seal include wearing of glasses, absent teeth or dentures, or unusual face configurations.

4.12 Contact lenses are not to be worn in an atmosphere requiring an SCBA. Eyeglass kits for prescription lenses are provided by EARTH TECH.

4.13 Persons will not be assigned tasks requiring the use of an SCBA unless it has been determined that they are physically able to perform the work while wearing the SCBA. A physician with sufficient knowledge of respiratory protection will determine what health and physical conditions are pertinent. The medical status of persons assigned to use SCBAs will be reviewed annually.

Appendix H

Excavation

HEALTH AND SAFETY PROCEDURES

SUBJECT:	NUMBER: 22	PAGE: 1 OF: 2
EXCAVATION	DATE PUBLISHED: April 23, 1991	
	DATE REVISED: May 5, 1994	

1.0 POLICY

Employees are not to work in or around excavations unless excavations are properly shored or sloped.

2.0 PURPOSE

This procedure outlines requirements for excavating soil and is intended to protect personnel from the hazards of excavation collapse.

3.0 GENERAL REQUIREMENTS

Safety operations while working in and around excavations involve many factors. Factors to be evaluated and discussed at daily safety meetings before starting work include:

3.1 Soil Structure: Excavations in wet soil, sandy soil, or areas that have been backfilled are relatively unstable and must be supported or sloped if employees are to enter the excavation.

3.2 Weather Conditions: Changing weather conditions greatly affect the safety of working in and around excavations. Excess water from rain or snow loosens the soil, increasing the chance of the soil caving in. Excavation should be diked, pumped, or covered, to prevent an excessive amount of water from accumulating.

3.3 Superimposed Loads: Superimposed loads in the vicinity of excavation walls increase the probability of a cave-in. Heavy equipment and materials should be kept back as far as possible. Heavy equipment should be placed on wooden mats or planking to spread the weight more evenly. Considerations must also be taken when buildings, curbs, trees, utility poles, and other structures are around the excavation. Soil excavated must be stored away from the edge and be barricaded or retained in an effective manner.

4.0 SPECIFIC REQUIREMENTS

Specific requirements in this safety plan are minimum regulations which are contained in 29 CFR Subpart P 1926.65, 1926.651, and 1926.652 OSHA Safety and Health for Construction.

4.1 Walkways and sidewalks shall be kept clear of excavated materials. Sidewalks which must be undermined must be shored to carry a load of 125 pounds per square foot.

4.2 Planks used for walkways shall be laid parallel to the length of the walkway and fastened together.

4.3 Employees subjected to vehicle traffic in excavating operations shall don reflective clothing.

4.4 Excavations shall be inspected; if the possibility of cave-in or slide exists, employees shall exit the space until proper precautions have been taken.

4.5 Prior to opening an excavation, all efforts shall be made to locate all underground utilities. The utilities shall be marked.

4.6 Excavations deeper than 5 feet which are entered by employees shall be sloped, shored, or protected by some other equivalent means.

4.7 Excavations below the level of the base of footings of a subsurface structure shall not be permitted, unless the wall is underpinned.

4.8 When employees are required to work in an excavation 4 feet or deeper, a ladder shall be provided. The maximum horizontal travel distance to the ladder shall be 25 feet. The ladder shall extend a minimum of 3 feet above the excavation and be secured. This ladder shall not be removed until all employees have exited the excavation.

4.9 Guardrail or fences shall be placed at all excavations which are close to sidewalks, drives, or other thoroughfares. Adequate protection shall also exist at remote excavations where workers are not present.

4.10 Excavated soil must be kept at least 2 feet from the edge of the excavation.

5.0 ANGLE OF REPOSE

5.1 OSHA requires that all excavations more than 5 feet deep which will be entered by employees shall be shored, sheeted, braced, or supported.

5.2 The preferred method is to slope the sides of the excavation to the angle of repose, or the angle of control at which the soil will remain at rest. The angle of repose varies with different kinds of soil; this angle must be determined on each individual excavation.

5.3 The second method of support is shoring, sheeting, tightly placed timber shores, bracing, trench jacks, piles, or other materials installed in manner strong enough to resist the pressures surrounding the excavations.

5.4 The third method is to use a trench box, which is a prefabricated movable trench shield made of steel plates, welded to a steel frame.

6.0 APPROVAL

The Site Safety Officer or Corporate Health and Safety Manger is to approve all shoring or sloping prior to personnel entry.

Appendix I

Tank Removal

1.0 POLICY

All underground tank removal projects will be conducted according to this procedure. A site safety plan will be prepared which addresses the points discussed in this procedure.

2.0 PURPOSE

This procedure outlines the steps necessary to ensure the safe removal of underground tanks.

3.0 SITE ASSESSMENT

3.1 Visually inspect the site to ensure that the work can be safely done. Special attention must be given to safe work surfaces for equipment, the presence of overhead lines which may hinder equipment operation, and local traffic which may be affected.

3.2 Call the local utility companies to locate telephone, power, water, and sewer lines which may be in the way of excavation. Ensure they are well marked before excavation.

3.3 Locate the tank, together with piping, vents, and manways.

3.4 Sample the tank to verify that the tank contains the product which was indicated. Note liquid levels. Check for the presence of water an other contaminants.

3.5 Sample the tank vapor space with 02/LEL meter to verify safe/unsafe conditions.

4.0 TANK EXCAVATION

4.1 Establish the boundaries of the exclusion zone so that unprotected personnel will not accidentally come in contact with any possible liquid splashes or vapors arising from the excavation.

4.2 Ensure that all walking/working surfaces and area are in a safe condition. A firm footing for equipment and personnel must be established on the overburden. If not, the areas need to be stabilized. If it is possible for excavation of hoisting equipment to contact overhead power lines, then these will need to be de-energized prior to beginning operations. Note that for tracked vehicles, the proper alignment with an excavation is to have the tracks perpendicular to the excavation.

4.3 While the overburden is being removed, if free product or saturated soil is likely to be contacted, then a proper storage area for this spoil material must be designated. This area may need to be lined and diked. If free product or saturated soils are found, both toxic and flammable readings shall be taken at the work site and perimeter.

4.4 The excavation wall may have to be sloped or shored to ensure that the walls do not collapse. Remember that an excavation above shoulder level is considered a confined space. These are

definite OSHA standards for both excavations and confined space entry which we addressed in EARTH TECH Health and Safety Procedures.

4.5 If personnel enter the excavation, they shall use the proper protective equipment, and follow confined space entry procedures, as appropriate.

4.6 If open excavations are left unattended, proper barricades and warning signals shall be set up to actively warn all personnel of the open pit hazard. In certain areas, additional security measures may need to be instituted in the form of fences or security guards.

5.0 TANK REMOVAL

5.1 All products will be removed by pumping (if possible).

5.2 If the tank atmosphere is flammable, the tank shall be inserted prior to removal. This can be done by introducing nitrogen or dry ice (CO_2) until the oxygen content is 8% or less, or "foamed" with fire fighting or vapor suppression foam to suppress vaporization, along with ventilation to below 10% LEL. Depending on the situation and product, one method may be preferred to the other (a description of each method is given under the Safety Certification).

5.3 If possible, all lines will be removed by disconnecting joints rather than cutting or burning. No hot work will be performed without a hot work permit issued after LEL testing.

5.4 The tank will then be carefully lifted and moved to the decontamination area for decontamination. Note that the shears should not be used for lifting, but only for cutting the tank since the weight of the shears approach the maximum lifting capacity of the Caterpillar 215/225.

6.0 TANK DECONTAMINATION

6.1 Decontamination is required to remove residue from the tank, so the tank can be disposed of as a clean material, or shipped safely.

6.2 The decontamination area will be marked as an exclusion zone. Proper personnel, protective equipment, medical emergency equipment, splash shower, and eye wash, should be available.

6.3 Before opening the tank to permit entry for water blasting, foaming, or other cleaning methods are used, the tank will again be checked for the presence of flammables and appropriate actions taken to reduce flammable levels. Confined space entry procedures apply.

6.4 Personnel will wear PVC splash suits with respiratory protection appropriate to the hazards.

6.5 A method for rinse water containment and proper disposal procedures will be established.

7.0 SAFETY CERTIFICATION BEFORE CUTTING TANKS

7.1 The preferred method of cutting (rendering) tanks is to use the power shears attached to a boom vehicle. The less preferred method is to use a cutting torch. A power metal chisel may also be used. The primary hazard when cutting tanks, using either the shears, cutting torch, or chisel is the possibility of catapulting metal pieces must also be considered. Whenever tanks are cut, all unnecessary personnel should be removed from the area. The possibility of explosion of flammable vapors should always be considered.

7.2 Sample the tank atmosphere for flammables and oxygen. Before a tank can be cut with either shears, cutting torch, or chisel, the tank atmosphere must be less than 10% LEL or less than 8% O_2. If the tank atmosphere contains flammable vapors in excess of 10% LEL, then some action must be taken to reduce the flammable vapor concentration or reduce the oxygen concentration to less than 8% O_2.

Air monitoring equipment should respond to the specific gas encountered. Never use non-intrinsically safe equipment such as a photoionization detector (PID) in a potentially explosive environment.

7.3 If the tank atmosphere is greater than 10% LEL, one of these actions can be taken to make the tank safe for cutting.

Ventilate the Tank: This procedure only will work with fairly clean products. (The tank will re-gas rapidly if not a clean product). Readings should be taken at the location of the tank exhaust to check for flammables. Note that exhausted vapors may be flammable, toxic, or require respiratory protection.

Clean and Ventilate the Tank: Use a cleaning method such as butterworthing with hot water, pump out liquids, and then ventilate as above.

Inert the Tank: Nitrogen from a liquid nitrogen tank, or carbon dioxide from dry ice can be used to inert the atmosphere in the tank to below the oxygen concentration necessary for combustion. Note that flammable vapors will still be present; and once the tank is cut or opened, the inert gas can be lost. The atmosphere must be diluted to less than 8% O_2 by volume to be completely safe for normal petroleum products. A LEL meter must be used to verify the O_2 concentration. Measurements must be made continuously. The quantity of inert gas which must be used depends on how the gas is presented to the tank. In practice, about 6 to 8 and perhaps as many as 10 tank volumes would be required, depending on how the material is administered. If dry ice is used approximately , 11.5 pounds of dry ice per 100 cubic feet (15 pounds per 1,000 gallons) of tank volume is required to reduce the oxygen to 8%. There are several precautions which must be observed when using dry ice. The material is extremely cold - 109.3° F. Also, the CO_2 produced will be absorbed into any water present, thus effectively increasing the oxygen concentration.

7.4 Foam the Tank: If product cannot be totally removed a method which has proven successful is to "foam" the surface of the remaining liquid with a fire fighting or vapor suppression foam. This foam blend should be 3 inches or 4 inches thick and will have the effect of suppressing vaporization of the volatile material.

The foam must be applied through a tank opening and thus the tank must be opened. After laying the foam blanket, the tank may have to be ventilated so that the vapor flammable concentration is reduced to less than 10% of the LEL on the combustible gas indicator. In extreme cases, high expansion foam can be used to completely fill the tank. Obviously, no ventilation will be necessary in this case.

7.5 The general rule of thumb for cutting tanks with a cutting torch is that cutting slag should never be allowed to fall into free product.

7.6 Naturally when cutting tanks by any method, appropriate fire protection should be available.

8.0 OTHER SITUATIONS

Under certain situations, the tank may need to be opened and cleaned before removal. In this case, a reordering of steps is appropriate. These are previously discussed:

- Remove pumpable product
- Test tank interior for flammables
- If flammable, inert and purge
- Retest atmosphere and repeat until safe
- Open tank
- Retest atmosphere for flammables and toxics
- Clean as much as possible remotely with equipment
- Allow properly protected personnel to enter for final steps

I:\forms\sop\utr.23

Appendix J

Tank Cleaning

1.0 POLICY

Each EARTH TECH work site will be identified, categorized, and follow a work procedures program to assure the health and safety of employees who are required to participate in or work around tank excavation and removal. This document will review the associated hazards and safety procedures.

2.0 DEFINITION OF ACTIVITIES

A. Properly dispose of any liquids or gases remaining in the tank.

B. Sample and analyze the contents, if any, of the tanks.

C. Render the atmosphere within the tank inert (atmosphere <10% lower explosive limit and/or oxygen content <5%).

3.0 HAZARDS OF TANK CLEANING

A. Hazardous atmospheres in and around tanks.

B. Direct inhalation or dermal exposure to hazardous materials.

4.0 SAFETY PROCEDURES

A. Removal of Liquid and Sludge from Tanks

1. Disconnect or remove sources of ignition from the vicinity of the tank before venting or removal operations start.

2. Personnel conducting the removal operations shall be appropriately protected from harmful exposure to toxic or corrosive vapors or gases.

3. Empty the tank of all liquids, including the removal of liquids from any internal piping.

4. Liquid or residue shall be removed as completely as possible using vacuum systems or pumps prior to tank excavation and removal.

5. Blank or disconnect all piping to the tank.

6. Site personnel shall remain upwind of operations whenever feasible.

B. Removal of Flammable Vapors

1. Inerting of vapor space shall be performed by a qualified individual thoroughly familiar with the limitations and characteristics of the inerting gas being used.

2. Close all openings in the tank with the exception of the filling connection and vent.

3. Introduce inerting gas at a point near the bottom of the tank.

4. A combustible gas/oxygen meter shall be used to remotely monitor the atmosphere within the tank.

C. Miscellaneous Toxics

Potential health hazards generated during the cleaning process (e.g., solvents) will be monitored with appropriate sampling media.

Appendix K

Drum Sampling

1.0 POLICY

Drums and other containers will be sampled to characterize their contents.

2.0 PURPOSE

This procedure provides technical guidance on implementing safe and cost-effective response actions applicable to hazardous waste sites containing drums. Container contents are sampled and characterized for disposal, bulking, recycling, grouping, and/or classification purposes.

3.0 REQUIREMENTS

Prior to sampling, drums must be inventoried, staged, and opened. Inventory entails recording visual qualities of each drum and any characteristic pertinent to the contents' classification. Staging involves the organization, and sometimes consolidation of drums that have similar wastes or characteristics. Closed drums can be opened manually or remotely. Remote drum opening is recommended for worker safety. The most common method of sampling a drum involves the use of a glass thief. This method is quick, simple, relatively inexpensive, and requires no decontamination.

4.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

- No preservatives shall be added to the sample.
- Place sample container in two Ziplock® plastic bags.
- Place each bagged container in a one-gallon, covered can containing absorbent packaging material. Place lid on can.
- Mark the sample identification number on the outside of the can.
- Place marked cans in a cooler, and fill remaining space with absorbent packing material.
- Fill out chain of custody record for each cooler, place in plastic, and affix to the inside of the cooler lid.
- Secure and custody seal the cooler lid.
- Arrange for the appropriate transportation mode consistent with the type of hazardous waste involved.

5.0 INTERFERENCES AND POTENTIAL PROBLEMS

The practice of tapping drums to determine their contents is neither safe nor effective and should not be used if the drums are visually over pressurized or if shock-sensitive materials are suspected.

Do not move drums that have been overpressurized to the extent that the head is swollen several inches above the level of the chime. A number of devices have been developed for venting critically swollen drums. One

proven method is a tube and spear device. A light aluminum tube (3 meters long) is positioned at the vapor space of the drum. A rigid, hooking device attached to the tube goes over the chime and holds the tube securely in place. The spear is inserted in the tube and positioned against the drum wall. A sharp blow on the end of the spear drives the sharpened tip through the drum and the gas vents along the grooves. Venting should be done from behind a wall or barricade. This device can be cheaply and easily designed and constructed. Once the pressure has been relieved, the bung can be removed and the drum sampled.

6.0 EQUIPMENT/APPARATUS

The following are standard programs, plans and materials and equipment required for sampling:

- Health and Safety Plan
- Personal Protective Equipment (PPE)
- Wide-month glass jars with Teflon® cap liner and approximately 500-ml volume.
- Uniquely numbered sample identification labels with corresponding data sheets.
- One-gallon covered cans half-filled with absorbent.
- Chain-of-custody sheets.
- Decontamination plan and materials.
- Glass thieving tubes and materials.
- Drum opening devices.

Bung Wrench

A universal bung wrench is commonly used to manually open drums. These wrenches have fittings to remove nearly all bung types. Wrenches are usually constructed of cast iron, brass, or a bronze-beryllium, nonsparking alloy formulated to reduce the likelihood of sparks.

The use of a "NONSPARKING" wrench does not completely eliminate the possibility of a spark being produced.

Drum Deheader

If a drum cannot be opened manually with a bung wrench, another alternative is a drum deheader. Constructed of forged steel with an alloy steel blade, this tool is designed to completely or partially cut the lid of a drum with scissor-like cutting action. A limitation of this device is that it can be attached only to closed-head drums. Drums with removable heads must be opened by other means.

Hand Pick, Pickaxe, and Hand Spike

These tools are usually constructed of brass or a nonsparking alloy with a sharpened point that can penetrate a drum lid or head when the tool is swung. Hand picks or pickaxes are commonly used and commercially available; spikes are generally uniquely fabricated four-feet poles with a pointed end.

Backhoe Spike

The most common tool for remotely opening drums for sampling is a metal spike attached or welded to a backhoe bucket. This is an efficient opening method that greatly reduces the likelihood of personnel exposure.

Hydraulic Drum Opener

Currently, there are fabricated hydraulic devices that can effectively open drums remotely to minimize exposure. This device uses hydraulic pressure to pierce through the wall of a drum. It consists of a manually operated pump which pressurize soil through a length of hydraulic line.

Pneumatic Devices

A pneumatic bung remover consists of a compressed air supply that is controlled by a heavy-duty, two-stage regulator. A high-pressure air line of desired length delivers compressed air to a pneumatic drill, which turns a sized fitting to remove the bung. An adjustable bracketing system has been designed to position and align the pneumatic drill over the bung. This bracketing system must be attached to the drum before the drill can be operated. Once the bung has been loosened, the bracketing system must be removed before the drum can be sampled. This remote bung opener does not permit the slow venting of the container, therefore appropriate precautions must be taken. It also requires the container to be upright and relatively level. Bungs that are rusted shut cannot be removed with this device.

7.0 REAGENTS

Decontamination of sampling equipment should follow the site specific health and safety plan.

8.0 PROCEDURE

8.1 Drum Staging

Prior to sampling, the drums should be staged to allow easy access. Ideally, the staging area should be located just far enough from the drum opening area to prevent a chain reaction if a drum explodes or ignites when opened.

During staging, the drums should be physically separated into the following categories: those containing liquids, those containing solids, lab packs, gas cylinders, and those which are empty. The strategy for sampling and handling drums/containers in each of these categories will be different.

Drum segregation strategy entails:

- Visual inspection of the drum and its labels, codes, etc. Solids and sludges are typically disposed of in open-top drums. Closed-head drums with a bung opening generally contain liquid.
- Visual inspection of the contents of the drum during sampling, followed by restaging, is needed.

Once a drum has been excavated and any immediate hazard has been eliminated by overpacking or transferring the drum's contents, the drum is affixed with a numbered tag and transferred to a staging area. Color-coded tags, labels or bands should be used to mark similar waste types. A description of each drum, its condition, any

unusual marking, and the location where it was buried or stored are recorded on a drum data sheet. This data sheet becomes the principal record-keeping tool for tracking the drum on site.

Drums suspected to contain radioactive, explosive, and shock-sensitive materials should be staged in a separate, isolated area. Placement of explosives and shock-sensitive materials in diked and fenced areas will minimize the hazard and the adverse effect of any premature detonation of explosives.

If space allows, the drum-opening area should be physically separated from the drum-removal and drum-staging operations. Drums are moved from the staging area to the drum-opening area one at a time using forklift trucks equipped with drum grabbers or a barrel grappler. In a large-scale drum handling operation, drums may be conveyed to the drum opening area using a roller conveyer.

8.2 Drum Opening

There are three basic techniques available for opening drums at hazardous waste site:

- manual opening with nonsparking bung wrenches,
- drum deheading, and
- remote drum puncturing or bung removal.

The choice of drum-opening techniques and accessories depends on the number of drums to be opened, their waste contents, and physical condition. Remote drum-opening equipment should always be considered to protect workers. Under OSHA 1910.120, manual drum opening with bung wrenches or deheaders should be performed ONLY with structurally sound drums and waste contents that are not shock sensitive, nonreactive, nonexplosive, and nonflammable.

8.2.1 Manual Drum Opening

8.2.1.1 Bung Wrench

Bung wrenches should not be used to manually open drums unless the drums are structurally sound (no evidence of bulging or deformation) and their contents are known to be nonexplosive. If opening the drum with bung wrenches is deemed to be reasonably cost-effective and safe, then the following procedures should be implemented to minimize the hazard:

- Field personnel should be fully outfitted with protective gear.
- Drums should be positioned upright with the bung up, or, for drums with bungs on the side, lain on their sides with the bung plugs up.
- The wrenching motion should be a slow, steady pull across the drum. If the length of the bung wrench handle provides inadequate leverage for unscrewing the plug, a "cheater bar" can be attached to the handle to improve leverage.

8.2.1.2 Drum Deheading

Drums are opened with a drum deheader by first positioning the cutting edge just inside the top chime and then tightening the adjustment screw to hold the deheader against the side of the drum. Moving the handle of the deheader up and down while sliding the deheader along the chime will enable the entire top to be rapidly cut off if so desired. If the top chime of a drum has been damaged or badly dented, it may not be possible to cut the entire top off. Because there is always the possibility that a drum may be under pressure, the initial cut should be made very slowly to allow for the gradual release of any built-up pressure. A safer technique would be to employ a remote opening method prior to using a deheader. Self-propelled drum openers that are either electrically or pneumatically driven are available and can be used for quick and efficient deheading.

8.2.1.3 Hand Pick or Spike

When a drum must be opened for sampling and neither a bung or wrench nor a drum deheader is suitable, use a hand pick, pickaxe, or spike. Often the drum lid or head must be hit with force to penetrate it. Because the potential for splash or spraying is greater than with other opening methods, this method of drum opening is not recommended, particularly when opening drums containing liquids. Some spikes used for this procedure have been modified by the addition of a circular splash plate near the penetrating end. This plate acts as a shield to reduce the amount of splash in the direction of the person using the spike. Even with this shield, good splash gear is essential.

Spray from drums is common and appropriate safety measures must be taken since some may be under pressure and will open quickly with these tools. The pick or spike should be decontaminated after each drum is opened to avoid cross contamination and/or adverse chemical reaction from incompatible materials.

8.2.2 Remote Opening

Remotely operated drum opening tools are the safest available means of drum opening. Remote drum opening is slow, but provides a high degree of safety compared to manual opening methods.

8.2.2.1 Backhoe Spike

Drums should be "staged" or placed in rows with adequate aisle space to allow ease in backhoe maneuvering. Once staged, the drums can be quickly opened by punching a hole in the drum head with the spike.

The spike should be decontaminated after each drum is opened to prevent cross contamination. Even though some splash or spray may occur when this method is used, the backhoe operator can be protected by mounting a large shatter-resistant shield in front of the operator's cage. This should be sufficient to protect the operator.

Additional respiratory protection can be afforded by providing the operator with an air line system on the equipment.

8.2.2.2 Hydraulic Devices

A piercing device with a metal point is attached to the end of a hydraulic line and is pushed into the drum by hydraulic pressure. The piercing device can be attached so that a hole for sampling can be made in either the side or the head of the drum.

Some metal piercers are hollow or tube-like so that they can be left in place if desired and serve as a permanent tap or sampling port.

The piercer is designed to establish a tight seal after penetrating the container.

8.3 Drum Sampling

After the drum has been opened, preliminary monitoring of headspace gases should be performed using an explosimeter and organic vapor analyzer. In most cases, it is impossible to observe the contents of these sealed or partially sealed vessels. Since some layering or stratification is likely in any solution left undisturbed over time, a sample must be taken that represents the entire depth of the vessel.

When sampling a previously sealed vessel, check for the presence of a bottom sludge. This is easily accomplished by measuring the depth to apparent bottom, then comparing it to the known interior depth of the drum.

8.3.1 Glass Thief Sampler

The most widely used instrument for sampling is a glass tube (glass thief, 6 mm to 16 mm I.D.X. 48 inch length). This tool is simple, cost effective, quick, and collects a sample without having to decontaminate.

<u>Specific Sampling Procedure Using a Glass Thief</u>

1. Remove cover from sample container.
2. Insert glass tubing almost to the bottom of the drum or until a solid layer is encountered. About 1 foot of tubing should extend above the drum.
3. Allow the waste in the drum to reach its natural level in the tube.
4. Cap the top of the sampling tube with a tapered stopper or thumb, ensuring the liquid remains within the stopper.
5. Carefully remove the capped tube from the drum and insert the uncapped end in the sample container. Do not spill liquid on the outside of the sample container.
6. Release stopper and allow the glass thief to drain completely into the sample container. Fill the container to about δl of capacity.
7. Remove tube from the sample container, break it into pieces, and place the pieces in the drum.
8. Cap the sample container tightly and place pre-labeled sample container in a carrier.
9. Replace the bung or place the pieces in the drum.
10. Transport sample to decontamination zone for preparation for transport to analytical laboratory.

In many instances, a drum containing waste material will have a sludge layer on the bottom. Slow insertion of the sample tube down into this layer and then a gradual withdrawal will allow the sludge to act as a bottom plug to maintain the fluid in the tube. The plug can be gently removed and placed into the sample container by using a stainless-steel lab spoon.

It should be noted that in some instances disposal of the tube by breaking it into the drum may interfere with eventual plans for the removal of its contents. The use of this technique should be cleared with the project officer or other disposal techniques evaluated.

8.3.2 COLIWASA Sampler

Designs exist for equipment that will collect a sample from the full depth of a drum and maintain it in the transfer tube until delivery to the sample bottle. These designs include primarily the Composite Liquid Waste Sampler (COLIWASA) and modification thereof. The COLIWASA is a much-cited sampler designed to permit representative sampling of multiphase wastes from drums and other containerized wastes. One configuration consists of a 152 cm by 4 cm I.D. section of tubing with a neoprene stopper at one end attached by a rod running the length of the tube to a locking mechanism which opens and closes the sampler by raising and lowering the neoprene stopper.

The major drawbacks associated with using a COLIWASA concern decontamination and costs. The sampler is difficult if not impossible to decontaminate in the field and its high cost in relation to alternative procedures (glass tubes) make it an impractical throwaway item. It still has applications, however, especially in instances where a true representation of a multiphase waste is absolutely necessary.

<u>Procedures for Use</u>

1. Put the sampler in the open position by placing the stopper rod handle in the T-position and pushing the rod down until the handle sits against the sampler's locking block.

2. Slowly lower the sampler into the liquid waste. (Lower the sampler at a rate that permits the levels of the liquid inside and outside the sampler tube to be about the same. If the level of the liquid in the sample tube is lower than that outside the sampler, the sampling rate is too fast and will result in a nonrepresentative sample.)

3. When the sampler stopper hits the bottom of the waste container, push the sampler tube downward against the stopper to close the sampler. Lock the sampler in the closed position by turning the T-handle until it is upright and one end rests tightly on the locking block.

4. Slowly withdraw the sample from the waste container with one hand, while wiping the sampler tube with a disposable cloth or rag with the other hand.

5. Carefully discharge the sample into a suitable sample container by slowly pulling the lower end of the T-handle away from the locking block while the lower end of the sampler is positioned in a sample container.

6. Cap the sample container with a Teflon®-lined cap; attach label and seal; and record on sample data sheet.

7. Unscrew the T-handle of the sampler and disengage the locking block. Clean sampler.

9.0 QUALITY ASSURANCE/QUALITY CONTROL

The following general quality-assurance procedures apply:

1. All data must be documented on standard chain-of-custody forms, field data sheets, or within field/site log books.

2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

3. All deliverables will receive peer review prior to release.

The following specific quality assurance activity will apply:

Generally, one duplicate sample is collected for every 10 samples collected. Other duplicates and spikes may be required depending on the particular analytical parameter requested. See the site-specific sampling plan for further QA/QC considerations.

10.0 DATA VALIDATION

The data generated will be reviewed according to the QA/QC considerations included in Section 9.0.

11.0 HEALTH AND SAFETY

The opening of closed containers is one of the most hazardous site activities. Maximum efforts should be made to ensure the safety of the sampling team. Proper protective equipment and a general awareness of the possible dangers will minimize the risk inherent to sampling operations. Employing proper drum-opening techniques and equipment will also safeguard personnel. The use of remote sampling equipment whenever feasible is highly recommended.

Most drum sampling activities are performed in level B with additional splash protection. This includes:

- Protective coverall (Saran Tyvek® PVC, acid suit, etc.)
- Hard hat
- SCBA
- Steel toe, steel shank boot (and latex booties covering steel-toe work boots)
- Surgical gloves
- Solvent/acid-resistant gloves
- Splash apron
- Face splash shield

For detailed descriptions of required levels of protection, see EPA/REAC Standard Operating Procedure No. 3012, "Hazardous Waste Site Investigations," and the site-specific safety plan.

12.0 REFERENCES

Guidance Document for Cleanup of Surface Tank and Drum Sites, OSHA Directive 9830.0-3

Drum Handling Practices at Hazardous Waste Sites, EPA-600/2-86-013

I:\FORMS\SOPDRUMSAMP.40

Appendix L

High Pressure Washer

1.0 POLICY

All users of high-pressure washers (Lasers) will comply with this procedure. The Laser is a very effective but potentially dangerous piece of equipment. Only trained, authorized personnel will operate the high-pressure washer.

2.0 PURPOSE

This procedure describes requirements for the safe operation of the high-pressure washer.

3.0 PERSONAL PROTECTIVE EQUIPMENT

The following equipment will be worn by operators and assistants:

- Safety shoes or boots;
- Metal foot and shin guards;
- Hearing protection;
- Eye protection (goggles and face shield);
- Hard hat with faceshield;
- PVC rain suit or PVC acid suit;
- Heavy gloves such as monkey grips; AND
- Chemical protective equipment may also be required.

4.0 PROCEDURE

4.1 Only trained, authorized personnel will operate the high-pressure washer.

4.2 The lance must always be pointed at the work area.

4.3 The operator must maintain good footing.

4.4 The operator must have an assistant to aid in moving the hose to different areas and backing up the operator. The assistant must remain in back of the operator.

4.5 Non-operators must remain a minimum of 25 feet from the operator.

4.6 The operating pressure should never exceed that which is necessary to complete the job.

4.7 No unauthorized attachment may be made to the unit. (The trigger should never be tied down.)

4.8 Operators should be changed at frequent intervals to avoid fatigue (at least hourly).

4.9 Equipment should be cleaned often to avoid dirt buildup, especially around the trigger and guard area.

4.10 An assistant should always be standing by at the pressure generator.

4.11 All users must be trained in emergency shut down procedures and general equipment maintenance.

I:\FORMS\SOPHPWASHER.24

Appendix M

Forklifts and Tow Motors

1.0 POLICY

Only trained and authorized operators shall be permitted to operate industrial forklifts and tow motors.

2.0 PURPOSE

This procedure establishes minimum standards for the safe and efficient operation of forklifts and tow motors.

3.0 REQUIREMENTS

3.1 Operators of forklifts and tow motors must be trained and authorized.

3.1.1 To qualify for a new license, the employee must:

- View both training videos;
- Complete field training; and
- Successfully pass a road test.

3.1.2 An annual retraining consisting of viewing the videos is necessary for recertification.

3.1.3 All operators of forklifts and tow motors will receive an Industrial Lift Truck Card authorizing their use of such equipment. This card is to be in the operator's possession whenever using this equipment.

3.2 Each driver is to check his vehicle at least once per shift. If it is found to be unsafe, the matter shall be reported immediately to his supervisor, and the vehicle not put in service again until it is repaired. Attention is to be given to the proper functioning of tires, horn, lights, battery, brakes, steering mechanism, and the lift system of forklifts.

3.2.1 The Forklift and Tow Tractor Checklist, reproduced following this procedure, is to be used to satisfy the requirements of this paragraph. Checklists should be kept with the vehicle or in the supervisor's office and maintained for a period of six months by the supervisor.

3.3 The authorized or safe speed is not to be exceeded. Each driver is to maintain a safe distance from other vehicles, keeping his vehicle under positive control at all times. All established traffic regulations are to be observed. For forklifts travelling in the same direction, a safe distance may be considered to be approximately 3 lengths, or preferably a time lapse - three seconds - passing the same point.

3.4 Stunt driving and horseplay are prohibited.

3.5 Loaded vehicles are not to be moved until the load is safe and secure.

3.6 When a driver leaves a vehicle unattended, the power must be shut off, brakes set, the mast brought to the vertical position, and forks left in the down position. When left on an incline, the wheels must be blocked. Keys are to be removed from vehicles parked in isolated areas.

Note: Do not depend on a seat brake unless that is the only parking brake on the equipment. Always use hand brake, if available.

3.6.1 A powered industrial forklift is unattended when the operator is 25 feet or more away from the vehicle which remains in his view, or whenever the operator leaves the vehicle and it is not in view.

3.6.2 When the operator of an industrial forklift has dismounted and is within 25 feet of the vehicle still in his view, the load-engaging means must be fully lowered, controls neutralized, and the brakes set to prevent movement.

3.7 Forklifts are not to be driven up to anyone standing in front of a fixed object of such size that the person could be caught between the vehicle and object.

3.8 Operators are to look or face in the direction of travel and not move a vehicle until certain that all persons are in the clear.

3.9 Vehicles are not to be operated on floors or platforms that will not safely support the loaded vehicle.

3.10 Riding on the forks of lift trucks is prohibited.

3.11 Forks must always be carried as low as possible, consistent with safe operation (normally, approximately four inches above the running surface).

3.12 Extreme care is to be used when tilting loads.

3.13 Forklifts are not to be driven in and out of highway trucks and trailers at unloading docks until such trucks are securely blocked and brakes set.

3.14 Employees must not place any part of their body outside the running lines of the forklift or between mast uprights or other parts where shear or crushing hazards exist.

3.15 Employees are not allowed to stand, pass, or work under the elevated portion of any forklift, loaded or empty, unless it is effectively blocked to prevent it from falling.

3.15.1 The forks of a forklift are never to be used to elevate a person to a higher level, unless a proper platform with guardrails is provided and the platform is fastened to the mast.

3.16 Railroad tracks are to be crossed diagonally, wherever possible. Parking closer than 8-[illegible] feet from the center line of the railroad track is prohibited.

3.17 The width of one tire on the forklift is the minimum distance from the edge to be maintained while it is on any elevated dock, platform, or freight car.

3.18 When forklifts are used to open and close freight car doors, the following provisions must be observed:

3.18.1 A device specifically designed for opening or closing freight car doors is to be attached to the forklift.

3.18.2 The force applied by the device to the freight car door is to be applied parallel to the direction of travel of the freight car door.

3.18.3 The entire door opening operation must be in full view of the operator.

3.18.4 The forklift operator and other dock employees must be clear of the area where the door might fall while being opened.

3.19 Prior to driving onto trucks, trailers, and railroad cars, their flooring must be checked for breaks and other structural weaknesses.

3.20 Other forklifts travelling in the same direction are not to be passed at intersections, blind spots, or dangerous locations.

3.21 Drivers are to slow down and sound the horn at cross aisles and other locations where vision is obstructed.

3.22 If the load being carried obstructs forward view, the drivers are to travel with the load trailing.

3.23 Grades must be ascended or descended slowly.

3.23.1 When ascending or descending grades in excess of 10 percent, loaded forklifts must be driven with the load upgrade.

3.23.2 On all grades, the load and load-engaging means are to be tilted back if applicable, and raised only as far as necessary to clear the road surface.

3.24 Forklifts must not be loaded in excess of their rated capacity.

3.25 Forklifts are not to be operated with a leak in the fuel system.

3.26 Extreme care is to be taken when tilting loads. Tilting forward with the load engaging means elevated is prohibited except when picking up a load. Elevated loads are not to be tilted forward except when the load is being deposited onto a storage rack or equivalent. When stacking or tiering, backward tilt is limited to that necessary to stabilize the load.

3.27 The load-engaging device must be placed in such a manner that the load will be securely held or supported.

3.28 Special precautions are to be taken in the securing and handling of loads by forklifts equipped with attachments, and during the operation of these vehicles after the loads have been removed.

3.29 The wearing of seat belts is mandatory when operating any type of industrial tractor equipped with roll-over protective structure (ROPS).

3.30 "Operating Rules for Industrial Trucks" (Forklift and Tow Tractors) shall be posted where such equipment is used. "Employee Operating Instructions" for Industrial Tractors are included.

DAILY INSPECTION FORKLIFTS AND TOW MOTORS

Week of: _____

Inspectors Must Sign In

Item Inspected	M	T	W	Th	F	S	S
Tires							
Steering							
Foot Brake							
Hydraulic System							
Oil							
Horn							
Chains							
Mast							
Carriage							
Fork Adjusting Slides							
Name Plate							
General Condition							
Fire Extinguisher							
Fuel Connection							
Clear of Extraneous Materials							
Lights							
Control							

Monday _____

Tuesday _____

Wednesday _____

Thursday _____

Friday _____

Saturday _____

Sunday _____

Operators Must Sign In

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Any discrepancies must be reported to maintenance!

Keep all body parts inside the Cage!

Drive carefully!

E:\WP\FORMS\H&S\PROCEDUR\FORKLIFT.26

FORKLIFT TRAINING/QUALIFICATIONS

Employee Name:_____

Department:_____

Previously Licensed: ☐ Yes ☐ No Date_____

Video Training (Operation) Viewed On: Date_____

Video Training (Inspection) Viewed On: Date_____

Field Training: Date_____

Road Test Given By:_____ Date_____

☐ Pass ☐ Fail

License Issued By:_____ Date_____

To Qualify For a New License Employee Must:

- View Both Training Videos; or
- Complete Field Training; and
- Successfully Pass Road Test.

To Requalify For a License (Annually):

- Employee Must View both Training Videos.

I:\WP\FORMS\H&S\PROCEDUR\FORKLIFT.26

Appendix N

Electrical Safety

1.0 POLICY

EARTH TECH will follow standards set by the National Electrical Code and OSHA in selection of materials and methods of installation and maintenance. Only qualified personnel will work on electrical equipment.

2.0 PURPOSE

This procedure specifies the requirements for electrical equipment.

3.0 GENERAL REQUIREMENTS

3.1 No electrical work should be done "hot" if it can be done "cold."

3.2 Hot line work will be done only under specific authorization and direction from the site supervisor.

3.3 Approved rubber protection and "hotsticks" will be used as specified by the site supervisor.

3.4 Use proper clearance and grounding procedures and, when possible, all electrical circuits and equipment shall be de-energized before maintenance and repair work are started.

3.5 Single-phase electric hand tools and other single-phase, portable electrical equipment must be approved by Underwriters Laboratories, or another recognized testing agency, and all exposed non-current-carrying metal parts must be grounded or be double insulated.

3.6 Before each use, portable electrical appliances are to be examined for obvious deficiencies in the appliance, cord, or plug. If any deficiency is noted, the appliance is not to be used.

3.7 Extension cords are to be kept clean, dry and free of kinks, and protected from oil, hot or sharp surfaces, and chemicals. Extension cords are not to be placed across aisles, through doors, through holes in a wall, or in areas where the cord may be damaged or become a tripping hazard.

4.0 PORTABLE ELECTRICAL EQUIPMENT

4.1 Double insulated portable industrial type electrical tools meeting the requirements of the National Electrical Code are authorized for use (ground wire not required). Where such a system is employed, the equipment must be distinctly marked.

4.2 Portable electrical tools <u>not</u> provided with special insulating or grounding protection are not intended for use in damp, wet, or conductive locations (persons standing on the ground or on metal floors).

4.3 All portable electrical appliances and equipment where the non-current-carrying metal parts are exposed to contact by personnel shall be grounded by continuous conductor of adequate

capacity from the device to a grounded receptacle. The Site Safety Officer shall resolve any question which arises as to whether or not a particular appliance should be grounded.

4.4 Grounding of receptacles shall be accomplished in one of two ways:

4.4.1 A built-in ground wire of green color may be attached to the ground pole of the receptacle.

4.4.2 The conduit system, if installed in an approved manner, may be relied upon for grounding of a receptacle serving single-phase appliances with ratings up to 230 volts.

4.5 At outside construction sites all single-phase 15 and 20 ampere receptacle outlets operating at 230 volts or less which are not a part of the permanent wiring of the building or structure must have ground-fault circuit interrupters for personnel protection.

4.6 The outlet box for portable extension cords for outdoor use shall be of weatherproof type maintained in good condition.

5.0 ELECTRICAL GUARDING

5.1 Suitable access and working space shall be provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment.

5.2 The dimension of the working space in the direction of access to energized parts in switchboards, control panels, fused switches, circuit breakers, panel boards, motor controllers, and similar equipment which require examination, adjustment, servicing, or maintenance while energized, shall not be less than 36" in depth (30" for installations built prior to 1981) and the width being 30" or the width of the equipment, whichever is greater.

5.2.1 The working space shall not be used for storage purposes. The "keep clear" area may be identified with suitable floor markings and/or posting of signs or decals on the equipment.

5.3 Energized parts of electrical equipment operating at 50 volts or more shall be guarded against accidental contact by the use of approved cabinets or enclosures.

5.3.1 Entrance to rooms and other guarded locations containing exposed energized parts shall be marked with a conspicuous warning sign forbidding unqualified persons to enter.

5.3.2 Temporary covers, warning signs, and/or barricades are to be used when it is necessary to remove covers of electrical panels during construction, major refurbishment, or for the purpose of providing temporary power to an area.

5.4 All openings in boxes, enclosures, or fitting shall be effectively guarded or closed to afford protection substantially equivalent to that of the wall of the box, enclosure, or fitting.

Appendix O

Solvents, Flammables, and Compressed Gases

1.0 POLICY

EARTH TECH policy is to protect employees against exposures to concentrations above the TLV. All employees must be familiar with and comply with the provisions of this procedure.

2.0 PURPOSE

This procedure outlines general precautions that are to be taken by personnel when handling solvents, compressed gases, and/or flammable liquids. Precautions and required protective equipment for specific chemicals or gases are included in Material Safety Data Sheets and Site Safety Plans.

3.0 DEFINITIONS

3.1 Hydrocarbon solvents are compounds consisting solely of hydrogen and carbon atoms. They are flammable in varying degrees and may leave a combustible residue or oily film.

3.2 Alcohols are hydrocarbon derivatives in which one or more hydrogen atoms have been replaced by a hydroxyl group (oxygen-hydrogen). They are flammable, water soluble, and leave no film.

3.3 Ketones are hydrocarbon derivatives containing oxygen atoms. They are flammable, water soluble, and dissolve some materials not affected by hydrocarbons or alcohols.

3.4 Halogenated hydrocarbons are organic compounds containing chlorine, fluorine, and/or other halogens. They are primarily non-flammable and leave no oily residue. Depending on their boiling point, they are used cold or in heated vapor degreasers. When exposed to flames, hot surfaces, or welding arcs, vapors of these materials decompose into highly toxic and corrosive vapors, such as phosgene or hydrogen chloride.

3.5 Flammable solvents are classified according to flash points and boiling points (see Section 6 of this procedure).

3.6 TLV is the abbreviation for "threshold limit value." Atmospheric contaminants are generally expressed as parts per million (ppm) denoting parts of the material in 1,000,000 parts of air. Threshold limit values are the ppm limits set by the American Conference of Governmental Industrial Hygienists which most employees may be continuously exposed during their 8-hour working days without any adverse effect on their health.

3.7 Boiling point is that temperature at which a liquid boils and is an indicator of the relative vapor concentrations present over liquids at any given temperature. (The higher the boiling point, the lower the vapor concentration.)

3.8 Flash point is that temperature at which sufficient flammable vapors are evolved from a liquid to enable ignition. (The lower the flash point, the more flammable the solvent.)

3.9 Flammability limits denote the range, in percentage mixtures, of the material which will burn with air, or, if confined and ignited, will explode.

3.10 Positive ventilation is venting provided by ducting and fans or blowers as opposed to "comfort," or natural ventilation.

3.11 Safety containers are of welded seam construction with excess pressure relieving closure and wire mesh screens to prevent the propagation of flame into the container. Safety containers are painted red (some have one yellow stripe). The container must be plainly labeled as to contents.

4.0 SOLVENTS

4.1 All solvents remove protective oils from the skin on contact, increasing the possibility of dermatitis and infection. Some solvents may be absorbed through the skin to produce systemic effects.

4.1.1 Repeated skin contact can cause a person to become sensitized to a given solvent.

4.2 All solvents have varying adverse effects if ingested. Hydrocarbon liquids produce respiratory complications if allowed to enter the lungs.

4.3 Vapor concentrations above a given solvent are highly difficult to predict, depending on the method of dispensing, agitation, temperature, air movement, and confinement. In any case, the concentration will be directly proportional to the area of the surface wetted under a given set of conditions.

4.4 Some of the solvent vapors may be detected by odor before the TLV is reached. However, this is not a reliable method for protection against overexposure, since some solvents paralyze the sense of smell.

4.5 Miscellaneous solvent supplies in work areas shall be reduced to the minimum amount necessary for daily operation.

4.6 Solvent containers for bench use shall be of smallest practical size and shall provide a method of dispensing without pouring (by wetting cloth, squeeze bottle, or plunger type safety container).

4.7 All wiping cloths used for solvents shall be placed in a closed container immediately after use.

4.8 Disposition of all solvent wastes must be by an environmentally approved method.

4.9 Spills shall be cleaned up immediately using respiratory protection. Clear the area of other persons as necessary.

4.10 No solvent shall be used in a fashion to permit skin contact with the liquid. In most instances this means that gloves must be worn.

4.10.1 Solvent-contaminated clothing must be removed at once.

4.11 All use of solvent not in positively vented equipment or in an outside area shall require the use of respiratory protection.

4.11.1 When using solvents inside a pit or confined area, regardless of quantity, personnel must wear level B protection and comply with confined space entry procedures.

4.12 Containers of solvents shall be labeled with an appropriate warning label.

4.13 The following precautions must be observed when opening full drums of solvents or chemicals:

4.13.1 When opening full drums, all personnel in the immediate area must wear chemical goggles or a face shield.

4.13.2 When removing the bung, the barrel must be in an upright position and a proper bung wrench used. The bung is to be loosened one turn, internal drum pressure allowed to reach atmospheric pressure, and then the bung may be removed. Never place head or face above a bung when opening.

5.0 FLAMMABLE

5.1 General Information

5.1.1 Definitions

- Class I Flammable: Includes those having a "flash point" below 100°F.
- Class II Combustible Liquids: Includes those having a "flash point" at or above 100°F, but below 140°F.
- Class III Combustible Liquids: Includes those having a "flash point" above 140°F, but below 200°F.

5.1.2 Handling and storing of flammable liquids in closed or approved safety containers and avoiding exposure of the liquid surface to air are of fundamental importance.

5.1.3 Placards for flammable or combustible liquids are as follows:

- "Flash point" of 20°F or below: "DANGER! EXTREMELY FLAMMABLE."

- "Flash point" from 20°F to 100°F: "WARNING! FLAMMABLE."
- "Flash point" from 100°F to 200°F: "CAUTION! COMBUSTIBLE."

5.2 HANDLING AND DISPENSING

5.2.1 Drums in storage racks are to be minimum of 50 feet from the nearest structure. All drums are to be electrically grounded. Drip trays are to be provided under drum spigots.

5.2.2 A bond (metal-to-metal) is to be established between the container and drum prior to filling a container from the storage drum. Drums are to be equipped with an approved type safety faucet and flexible metal hose. A pressure-vacuum relief vent is required for drums of flammable liquids. Metal-to-metal contact may also be established by using a grounding strap.

5.2.3 Except in unusual cases as approved by the Regional Health and Safety Manager, the maximum amount of flammable solvent (used for cleaning purposes) at any work station is limited to one quart.

5.3 Maximum use must be made of fireproof metal cabinets to store flammable liquids inside any maintenance shop or area.

5.4 Rags, kinwipes, etc., that are contaminated with flammable liquids are to be placed in a safety container equipped with a fusible link lid.

5.5 All containers of flammable liquids must be properly identified as to contents.

5.6 Spill containment is required for all drum (solvent) dispensing areas. The secondary containment dike will be designed for 110 percent of the aboveground storage tank (AST) volume with the ability for 24-hour holding time.

5.7 All manually handled flammable liquids shall be handled in approved safety containers. The exception is pint-sized squirt bottles.

5.7.1 Where flammable solvents must be used in wash containers, such as for paint sprayer cleaning, the container must be provided with self-closing or fusible like closure.

5.8 Flammable liquid in portable containers in excess of the daily supply must be stored in approved flammable liquid storage cabinets maintained closed with the door latched each time after use.

5.9 Containers of flammable liquids shall be labeled with an appropriate warning label.

5.10 "NO SMOKING" signs are to be posted in areas where flammable liquids are stored, dispensed, or used.

5.11 Additional information and requirements for handling and storage of specific flammable liquids are included in the Material Safety Data Sheets or Site Safety Plans.

6.0 USE OF COMPRESSED AIR OR GASES

6.1 Compressed air or other compressed gases in excess of 10 psi are not to be used to blow dirt, chips, or dust from clothing while it is being worn.

6.2 Compressed air or gases are not to be used to empty containers of liquids where the pressure can exceed the safe working pressure of the container.

6.3 The use of compressed air is to be controlled, and proper personal protective equipment or safeguards utilized, as to protect against the possibility of eye injury to the operator or other persons.

- Compressed air used for cleaning (except clothing) is to be limited to 30 psi.

6.4 Compressed gases are not to be used to elevate or otherwise transfer any hazardous substance from one container to another unless the containers are designed to withstand the pressure with a safety factor of at least four.

7.0 COMPRESSED GASES (CYLINDERS)

7.1 Cylinders must never be dropped, struck, or permitted to strike each other violently. Cylinders may be moved by tilting and rolling them on their bottom edges.

7.2 Valve protection caps must always be kept on cylinders when they are being moved, stored, or until ready for use.

7.3 Cylinder valves are to be kept closed except when gas is being used or when connected to a permanent manifold. Valves of empty cylinders must be closed.

7.4 Cylinders must never be used as rollers or supports, or for any purpose other than carrying gas.

7.5 Cylinders of compressed gas shall be stored in areas where they are protected from external heat sources such as flame impingement, intense radiant heat, electric arc, or high temperature steam lines.

7.6 Cylinders are to be stored in an assigned area with full and empty cylinders separated. Stored fuel gases and oxygen cylinders are to be separated by 20 feet, or by a fire wall at least 5 feet high having a fire-resistance rating of at least one-half hour.

7.7 Oxygen, nitrogen, helium, or freon cylinders may be stored or transported either in an upright or horizonal position. Acetylene cylinders must always be kept in an upright position. All horizontally placed cylinders are to be secured by chocks or ties to prevent rolling.

7.8 Cylinders are to be secured to a fixed object by chain or equivalent fastening device whenever they are placed in an upright position. The protective cap is not to be removed or the cylinder valve opened until the cylinder is secured.

7.9 Repair of leaks must never be attempted on a pressurized system. System pressure should be reduced to atmospheric pressure as rapidly as possible, and the supervisor notified immediately.

7.10 Compressed gas (in cylinders) must never be used to clean clothing or work surfaces.

7.11 Identification of the gas to be used must always be ensured before connecting cylinders for use. All cylinders are to be labeled as to contents in addition to proper color coding.

7.12 Compressed gas cylinders in portable service are to be conveyed by suitable trucks to which they are securely fastened. All gas cylinders in service must be securely held in substantial racks or secured to other rigid structures so that they will not fall or be knocked over.

7.13 Gas cylinders moved by hoist must be handled in suitable cradles or skip boxes. The use of slings must be designed for that purpose.

7.14 Cylinders must not be placed where they might form part of an electrical circuit.

7.15 Transfer of acetylene from one cylinder to another, or mixing of gases in a cylinder, is prohibited.

7.16 Oxygen cylinders are never to be stored near:

- Highly combustible materials, especially oil and grease;
- Reserve stocks of acetylene or other fuel gas cylinders; and/or
- Any other substance likely to cause or accelerate fire.

7.17 Cylinders are not to be used unless they bear D.O.T. markings showing that they have been tested as required by D.O.T. regulations.

7.18 Compressed gas cylinders must be legibly marked for the purpose of identifying the gas content with either the chemical or the trade name of the gas. Such marking is to be by means of stenciling, stamping or labeling, and must not be readily removable. Whenever practical, the marking is to be located on the shoulder of the cylinder.

7.19 Compressed oxygen is never to be used:

- as breathing air;
- to purge pipelines, tanks, or any confined area;
- to supply a head-pressure tank;
- in pneumatic tools;
- in oil preheating burners;
- to start internal combustion engines;
- for ventilation;
- for cleaning clothing; and/or
- in any other way as a substitute for compressed air.

7.20 Use of a cylinder's contents for purposes other than those intended by the supplier is prohibited.

I:\forms\sop\solvents.29

Appendix P

Confined Space Entry

1.0 POLICY

No employee is to enter a confined space until atmospheric testing has been conducted and a confined space entry permit has been completed. Confined space permits are valid for a single work shift only, unless conditions do not change on a daily basis. Employees will be trained per the requirements of the OSHA Confined Space Standard 29 CFR 1910.146 prior to entry.

2.0 PURPOSE

This procedure provides personnel with requirements for working safely in confined spaces.

3.0 DEFINITIONS

3.1 Confined Space - Any enclosed area having a limited means of egress where ventilation is not adequate to remove a toxic or flammable atmosphere or oxygen deficiency which may exist. Examples of confined spaces include, but are not limited to: tanks, vessels, bins, boilers, ducts, skewers, underground utility vaults, manholes, tunnels, pipelines, or any open top space more than 4 feet in depth such as pits, tubes, vaults, or vessels.

3.2 Oxygen Deficiency - Atmospheres which contain less than 19.5 percent oxygen.

3.3 Flammable Atmosphere - Atmospheres in excess of 10 percent of the lower flammable limit of the material in question. These are often toxic as well as flammable.

3.4 Toxic Atmosphere - Atmospheres having concentrations of airborne chemicals in excess of permissible exposure limits as defined by Federal or state regulations or Threshold Limit Values (TLVs).

3.5 IDLH - Immediately Dangerous to Life or Health conditions (e.g., oxygen deficiency, unknowns, elevated toxics, etc.)

4.0 PROCEDURE

4.1 A confined space entry permit containing the applicable elements of this section will be written and approved prior to any entry into a confined space.

4.2 The confined space is to be emptied, flushed, or otherwise purged of hazardous substances.

4.3 Pipes or lines which convey any kind of substance to the confined space are to be disconnected, blinded, or have the valve locked off to prevent such substances from entering the confined space while work is in progress.

4.4 Electrical circuits to fixed mechanical equipment which may cause injury if accidentally energized must be de-energized and locked out.

4.5 The air in the confined space is to be tested for oxygen deficiency, flammable atmosphere, and any toxic contaminants likely to be present. All tests of the atmosphere are to be made by trained, competent personnel using calibrated equipment.

4.6 Electrical equipment and lighting are to be explosion proof when used in confined spaces subject to flammable or explosive gases, vapors, or dusts. Extreme care must be taken in dusty atmospheres because there may be no indication of problems on atmospheric test equipment, yet hazards may exist. Power tools should be pneumatic when possible.

4.7 All work will stop and the confined space evacuated if any indication of ill effect such as dizziness, irritation, or excessive odors are noted.

4.8 Welding and/or cutting in a confined space shall require the use of a hot-work permit. Cutting gas cylinders and welding machines will not be taken into confined spaces.

4.9 All employees entering a confined space shall wear and/or have available an approved safety harness and/or rope. When the confined space is entered through a manhole or is deeper than the employee's shoulders, an approved life line should be attached. When the nature of the space entered involves more than one employee and the fouling of life lines could occur, the Safety Department should be consulted.

4.10 Rescue equipment must be at the project site prior to commencing work. Rescue equipment will include extra rope, safety harnesses, stretchers, and emergency SCBA and/or source of oxygen. No one should enter a confined space until adequate safety equipment is present to remove an unconscious person.

4.11 A ladder is required in all confined spaces deeper than the employees' shoulders. The ladder shall be secured and not removed until all employees have exited the space.

4.12 The project supervisor is responsible for evaluating general safety hazards including permits, locking out of equipment, adequate lighting, tools, etc., and is responsible for assuring the confined space entry permit is completed.

4.13 Confined space entry permits will be maintained in the project file.

4.14 A copy of the confined space entry permit follows this procedure.

5.0 CONFINED SPACE ENTRY PROCEDURES FOR SAFETY OBSERVER

Employees entering a confined space must be under the constant surveillance of a safety observer. It is the safety observer's responsibility to follow this procedure:

- A valid confined space entry permit must be at the site.
- Rescue equipment must be available at the site.

- The safety observer must know the location of the nearest telephone and emergency numbers, safety shower, and fire extinguishers.

- When welding or cutting is done in a confined space, the safety observer must know how to shut down the equipment.

- The safety observer must remain in constant contact with the employees in the confined space. The observer is not to leave his/her assigned station space except to report an emergency.

EARTH TECH
CONFINED SPACE ENTRY PERMIT

Permit No. _____

Good on this date only: _____ From: _____ AM/PM To: _____ AM/PM

Location: _____ Project No.: _____

Workers Authorized Entry: _____ _____ _____

Work Monitors: _____ _____ _____

Work Monitors: _____ _____ _____

Description of job or special procedures: _____

_____

Employee Training and Pre-Entry Briefing

1. Safe Entry and Rescue Training conducted on: _____ (Date)
2. Mandatory Pre-Entry Briefing conducted on: _____ (Date)
3. Does this job require special training? _____ Yes _____ No

Contractor Notification

Contractor notified of: Permit Conditions _____ Potential Hazards _____ N/A _____

Lighting Requirements _____ _____ _____

Special Tools/Equipment _____ _____ _____

Communication Devices _____ _____ _____

1. Are all electrical devices intrinsically safe? _____ Yes _____ No
2. Have all power cords and tools been visually inspected? _____ Yes _____ No

Vessel Preparation

1. Work area isolated with signs/barriers? _____ Yes _____ No
2. All energy sources locked/tagged out? _____ Yes _____ No
3. All input lines capped/blinded? _____ Yes _____ No
4. Vessel contents drained/flushed/neutralized? _____ Yes _____ No
5. Vessel cleaned/purged? _____ Yes _____ No
6. Ventilation provided 30 minutes before entry? _____ Yes _____ No

Pre-Entry Atmospheric Testing

	Reading:	Time:	Initials:
1. Test for oxygen content:	_____ % O_2	_____	_____
2. Test for flammable concentration:	_____ % LEL	_____	_____
3. Test for toxic concentration:	_____ ppm of _ (TLV=_)	_____	_____
4. Test for heat stress hazard:	_____ °F ____ °C ____ WBGT	_____	_____

Emergency/Rescue Procedures

1. Location of written emergency/rescue plan: _____
2. Type of emergency/rescue team required: On-site _____ Off-site _____ Phone No. _____

Safety Equipment

Personal Protective Equipment Required: _____ _____ _____

Area Safety Equipment Required: _____ _____ _____

1. Self-Contained Breathing Apparatus required? _____ Yes _____ No Type: _____
2. Portable Atmospheric Monitor required? _____ Yes _____ No Type: _____

Permit Authorization

I certify that I have inspected the work area for safety and reviewed all safety precautions recorded on this permit.

Permit authorized by (Signature): _____

Appendix Q

Task-Specific Risk Analysis

EARTH TECH

TASK SPECIFIC RISK ANALYSIS

SITE: _____

JOB #: _____

RESPONSE MANAGER: _____

FOREMAN: _____

DESCRIPTION OF TASK: _____

_____

_____

CHEMICAL HAZARDS: _____

_____

_____

PHYSICAL HAZARDS: _____

_____

_____

ENVIRONMENTAL HAZARDS: _____

_____

_____

LEVEL OF PROTECTION REQUIRED: _____

_____

_____

REQUIRED OPERATING PROCEDURES: _____

_____

_____

CERTIFIED INDUSTRIAL HYGIENIST: _____

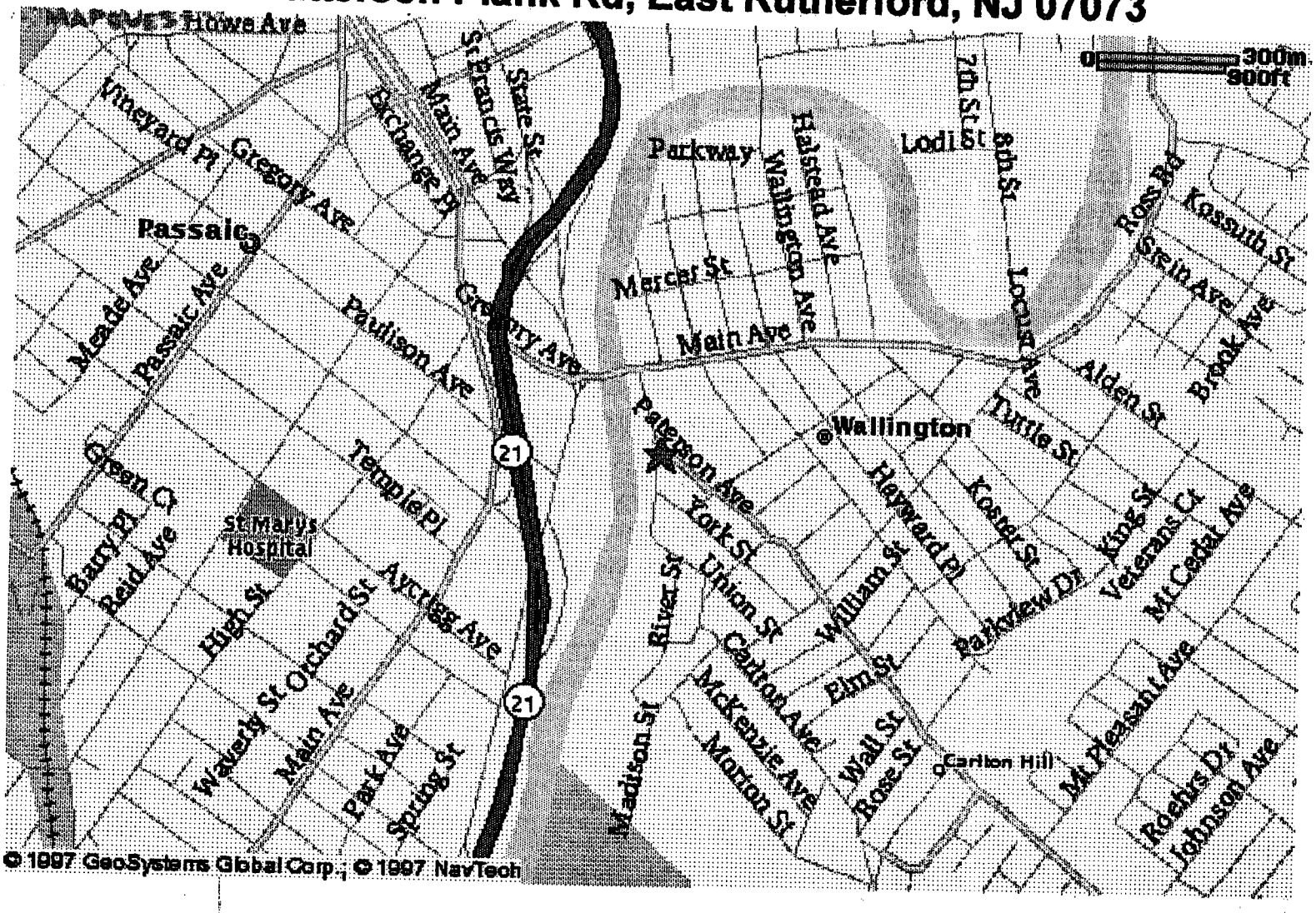
_____

(Signature)

Appendix R

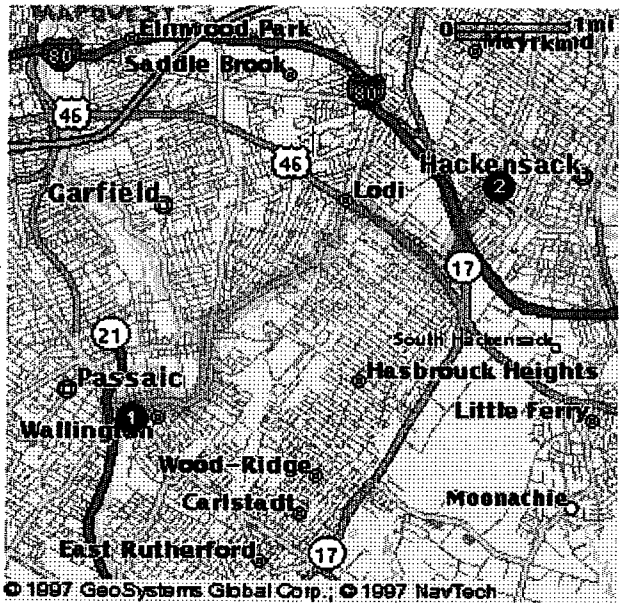
Hospital Map

890 Patterson Plank Rd, East Rutherford, NJ 07073

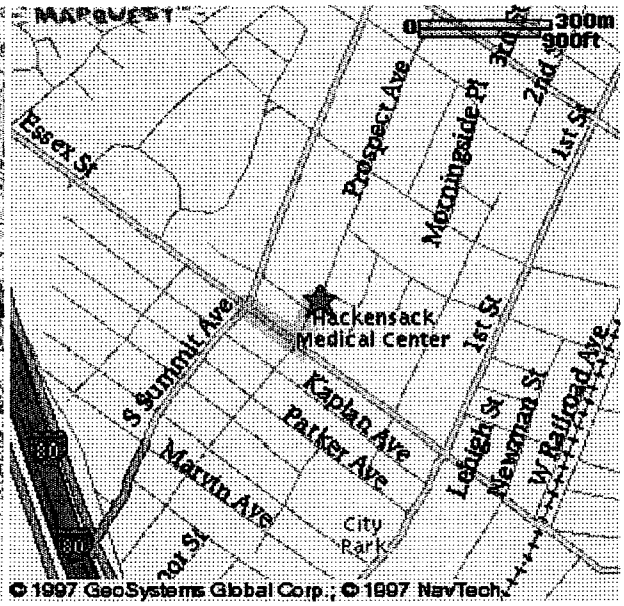


Organization	Contact	Telephone
Ambulance:		911
Police:		911
Fire:		911
Hospital: Hackensack University Medical Center 30 Prospect Ave Hackensack, NJ		201-996-2000

Directions to Hospital: Turn right onto Paterson Plank Road (East); go to first light and make U-turn and head West on Paterson Plank Road. Get on Rt 17 North to Polifly Road (also sign for 80 East). Turn left on Essex Street; right on Second Street; left on Atlantic; take second entrance on left into Emergency Trauma Center. Approximately 4.5 miles.



Full Route



Destination

1) Enter a starting address : 2) and a destination address:

890 Patterson Plank Rd
Street Address or Airport Code
East Rutherford, NJ 07073
City, State Zip or a ZIP

30 Prospect Ave
Street Address or Airport Code
Hackensack, NJ
City, State Zip or a ZIP

Get Directions

(Like any driving directions/map, you should always do a reality check and make sure the road still exists, watch out for construction, and follow all traffic safety precautions. This is only to be used as an aid in planning.)

Need Help? See the FAQ Or report map problems.

Copyright © 1994-98 Yahoo! All Rights Reserved

Appendix S

First Aid/Eyewash/Fire Extinguisher Requirements

American National Standard

minimum requirements for industrial unit-type first aid kits

american national standards institute, inc.
1430 broadway, new york, new york 10018

ANSI®
Z308.1-1978

American National Standard Minimum Requirements for Industrial Unit-Type First Aid Kits

Sponsor

Industrial Safety Equipment Association

Approved March 16, 1978

American National Standards Institute, Inc

Contents

SECTION PAGE

1. Scope and Purpose 7

2. Definitions. 7
   2.1 First Aid 7
   2.2 Unit-Type First Aid 7
   2.3 Unit 7
   2.4 Unit-Type First Aid Kit 7
   2.5 Compress. 7
   2.6 Adhesive Bandage Compress 7
   2.7 Bandage Compress. 7
   2.8 Antiseptic Swab 7
   2.9 Consulting Physician 7
   2.10 Dust and Moisture Resistant 7

3. General Requirements 7
   3.1 First Aid Case Sizes 7
   3.2 Metal Cases 8
   3.3 Instructions 8
   3.4 Unit Container Specifications 8
   3.5 Individual Units 8
   3.6 Quality Control. 8

4. Special-Purpose Unit Cases 8

5. Requirements for Basic Units 9
   5.1 Adhesive Bandage Compress (16 per Unit) 9
   5.2 Bandage Compress (4 per Unit) 9
   5.3 Bandage Compress (2 per Unit) 9
   5.4 Bandage Compress (1 per Unit) 9
   5.5 Triangular Bandage (1 per Unit) 10
   5.6 Absorbent Gauze Compress (1 per Unit) 10
   5.7 Gauze Roller Bandage (1 per Unit) 10
   5.8 Gauze Roller Bandage (2 per Unit) 10
   5.9 Compress (4 per Unit) 10
   5.10 Adhesive Tape (2 per Unit) 10
   5.11 Adhesive Tape (2 per Unit) 10
   5.12 Metal Splints 10
   5.13 Tourniquet (1 per Unit) 10
   5.14 Tourniquet and Forceps (1 Each per Unit) 10
   5.15 Tourniquet, Forceps, and Scissors (1 Each per Unit) 11
   5.16 Eye Dressing Packet. 11
   5.17 Eye Dressing Packet (4 per Unit) 11
   5.18 Eye Wash Solution (1 Oz (30 ml) per Unit) 11
   5.19 Ammonia Inhalants (10 per Unit). 11
   5.20 Antiseptic Swabs (10 per Unit) 11
   5.21 Burn Treatments. 11

6. Requirements for Optional Units 11

Appendix Recommendations and Precautions Concerning Unit-Type First Aid Kit Use and Maintenance 12

Foreword

(This Foreword is not part of American National Standard Minimum Requirements for Industrial Unit-Type First Aid Kits, ANSI Z308.1-1978.)

Unit-type first aid kits have been manufactured and used in industry, federal, state, county, and city governments for over forty years. At the present time there are ten or more companies manufacturing and distributing unit-type first aid kits on a national basis. The contents of the unit-type first aid kits are interchangeable with products from any of the companies manufacturing in accordance with industrial and government specifications. Prior to this standard, the primary specification was General Services GGK-391a, dated October 19, 1954.

The committee that worked on this standard for over four years is the First Aid Group of the Industrial Safety Equipment Association, representing ten different companies with experience of up to forty years in manufacturing unit-type first aid kits and contents.

The concept of unit-type first aid is to provide bandages, antiseptics, burn treatments, and other products in standardized carton sizes known as "units." Each unit carton (see 3.5) contains one or more single-use items for the immediate, emergency treatment of victims of trauma. The standardization of sizes of unit containers in single, double, or triple size provides for kits that stack like "books on a shelf" and allows quick access, easy identification, rapid inventory of contents, and economy of space.

The contents of the units are designed for single use to assure sterility of bandages, stability, and extended shelf life of chemical components and elimination of wasted material. It also prevents the replacement of nonsterile or contaminated material that has been partially used.

This standard includes design specifications for the commonly used items in a first aid kit. There are a large number of special-purpose items packaged in the unit system. The assortment of contents of a first aid kit are approved by the consulting physicians, as required by the Occupational Safety and Health Act. The committee developing this standard did not choose to establish or recommend specific assortments. Individual company representatives work directly with consulting physicians to determine the contents best suited for the hazards to which the workers are exposed. The committee also recognizes that first aid practices and recommendations can and do vary among industries, companies, geographical areas, and consulting physicians. The unit-type first aid kit concept accommodates these differences by establishing standard and interchangeable components (units), while leaving the assortment choice open to the qualified medical personnel.

Suggestions for improvement of this standard will be welcome. They should be sent to the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

This standard was prepared by the Industrial First Aid Group of the Industrial Safety Equipment Association. The Chairman of the Industrial First Aid Group is Roland R. Clark, and the ISEA Executive Director is Frank E. Wilcher, Jr. The standard was processed and approved for submittal to ANSI by the Canvass Method. The following interested organizations were contacted prior to the approval of this standard. Inclusion in this list does not necessarily imply that the organization concurred with the submittal of the proposed standard to ANSI.

American Academy of Orthopaedic Surgeons, Inc
American Institute of Steel Construction
American Insurance Association
American Petroleum Institute
Army Corps of Engineers
Association of American Railroads
Edison Electric Institute
International Association of Chiefs of Police
International Association of Fire Chiefs, Inc
Mining Enforcement Safety Administration
National Asphalt Pavement Association
National Association of Manufacturers
National Electrical Contractors Association, Inc
National Roofing Contractors Association
National Rural Electric Cooperative Association
National Safety Council

American National Standard Minimum Requirements for Industrial Unit-Type First Aid Kits

1. Scope and Purpose

1.1 This standard lists and establishes a minimum assortment of first aid treatment packages made available by various manufacturers, from which a consulting physician may select the assortment to be contained in kits to best treat injuries peculiar to a given working condition.

1.2 The purpose of this standard is:

(1) To provide standardized sizes of cases and unit packaging

(2) To provide minimum specifications for the manufacture of the more commonly used items

(3) To allow complete flexibility in the selection of items supplied in the cases, such selection to be made by the consulting physician required by the Occupational Safety and Health Act, Subpart K, paragraph 1910.151 (a) and (b)

2. Definitions

2.1 **First Aid.** The immediate care given to a person who has been injured or suddenly taken ill. It includes self-help and home care if medical assistance is not available or is delayed.

2.2 **Unit-Type First Aid.** A system of packaging single-use first aid materials in compact, uniform sized cartons. This system provides a comprehensive selection of products easily used, inventoried, and replaced in a standard selection of unit-type first aid kits.

2.3 **Unit.** A uniform sized package that contains one or more complete dressings or applications of first aid material.

2.4 **Unit-Type First Aid Kit.** A portable, compact, dust and moisture resistant container that holds a specific quantity of unit-type first aid packages. The units are uniformly arranged in rows for ease of identification, removal, and replacement.

2.5 **Compress.** A sterile absorbent wound and burn dressing of folded gauze or nonwoven material.

2.6 **Adhesive Bandage Compress.** A sterile dressing-bandage combination consisting of an absorbent wound dressing (compress) attached to a strip of adhesive material (bandage) used to hold the dressing in place.

2.7 **Bandage Compress.** A sterile dressing-bandage combination consisting of an absorbent wound dressing (compress) attached to a strip of material (bandage) used to hold the dressing in place.

2.8 **Antiseptic Swab.** A single-use, crushable, hermetically sealed ampule with an applicator tip used to clean and apply an antiseptic to a wound.

2.9 **Consulting Physician.** A person properly licensed under the law to practice medicine who is employed or retained by an organization to advise on matters pertaining to the health of its employees.

2.10 **Dust and Moisture Resistant.** As used in this standard, the term dust and moisture resistant with reference to a first aid kit is intended to be interpreted as follows: The case shall be designed and produced to protect the contents against dust and moisture without damage or loss of function to the contents.

3. General Requirements

3.1 **First Aid Case Sizes.** All cases shall not exceed the following outside dimensions:

Unit Size	*Dimension*	
	Inches	*Centimeters*
6	5-1/4 X 5-1/4 X 3-1/4	13.5 X 13.5 X 8.3
10	8-5/8 X 5-7/8 X 3-1/4	22 X 15 X 8.3
16	10 X 7-3/8 X 3-1/4	25.5 X 19 X 8.3
24	10 X 10-1/2 X 3-1/4	25.5 X 27 X 8.3
36	14-1/8 X 10-1/2 X 3-1/4	36 X 27 X 8.3

3.2 Metal Cases. All standard cases shall:

(1) Be dust and moisture resistant.

(2) Have seamless or welded seams and joints.

(3) Have rounded corners.

(4) Have no sharp edges.

(5) Have a cover attached by a continuous piano hinge incorporating a 90° (± 5°) stop, welded or riveted in place.

(6) Have a steel wire handle.

(7) Have two or more pulldown type fasteners, welded in place, except for the 6-unit kit, which shall have at least one.

(8) Have hinged hanger brackets of keyhole type welded in place.

(9) Have a rubber or synthetic gasket mounted in the cover or body of the kit to provide a dust and moisture resistant seal.

(10) Have a baked enamel or equivalent finish.

(11) Be constructed of a minimum 20 gage steel.

(12) Pass the following rain precipitation test: For simulated rain precipitation test, set a shower head 6 ft ± 6 in (185 cm ± 15 cm) above the cases to be tested, with the cover or lid in a horizontal plane. Provide as a support for sample cases a horizontal platform directly below the shower head, and adjust the rate of flow to deliver a minimum of 2-½ gallons (9.46 liters) of tap water per hour. The diameter of the shower spray hitting the platform shall not be greater than 30 in (72.2 cm). Position the bottoms of sample cases on the platform in such a manner that there is a minimum distance of 2 in (5.1 cm) between cases on all sides. All cases under test at any one time shall be entirely within the perimeter of the shower streams.

Sample cases shall be subjected to a continuous water spray under the aforementioned conditions for a period of 15 minutes. The exterior surfaces of the cases shall then be carefully blotted dry, the cases opened, and the interiors examined for water. Evidence of water shall be cause for rejection.

3.3 Instructions. A label containing general first aid instructions shall be made a permanent part of each kit. The label shall include a statement that the kit and contents are in accordance with ANSI Z308.1-1978.

A first aid instruction booklet providing proper and efficient instructions for use of unit first aid material may be included in each first aid kit.

3.4 Unit Container Specifications. The unit container shall be made of bleached sulphite paperboard, 0.016 in ± 0.002 in (0.04 mm ± 0.005 mm) thick, or material of equivalent strength.

Unit Size (Note 1)	*Dimension*	
	Inches	*Centimeters*
1	4 X 2-1/4 X 5/8	10 X 5.7 X 1.6
2	4 X 2-1/4 X 3/4	10 X 5.7 X 1.9
3	4 X 2-1/4 X 1-1/4	10 X 5.7 X 3.2
4	4 X 2-1/4 X (Note 2)	10 X 5.7 X (Note 2)

NOTE 1: All sizes shall have a tolerance of 1/8 in (0.3 cm).

NOTE 2: The thickness may be of such dimensions as will accommodate special contents.

3.5 Individual Units. Each individual unit shall be overwrapped and sealed in see-through protective wrappings. All unit packages shall bear instructions for proper use of contents.

All unit packages shall be labeled as follows:

(1) Name of item and quantity contained and other information as may be required by state and federal laws shall appear.

(2) Instructions or illustrations, or both, shall appear on back panel.

(3) Name of item shall appear on top panel and one end panel.

(4) Name of manufacturer, packer, or distributor, or any of these, and place of business shall appear conspicuously.

3.6 Quality Control. The contents of all unit containers shall be manufactured in accordance with requirements of the Federal Food, Drug and Cosmetic Act, and all other applicable state and federal regulations.

4. Special-Purpose Unit Cases

This standard recognizes the fact that there are certain conditions that require the use of special-purpose first aid cases. Such exceptions might be a corrosive environment, weight consideration, or nonsparking, nonmagnetic, and dielectric properties.

All cases shall:

(1) Be dust and moisture resistant.

(2) Have rounded corners.

(3) Have no sharp edges.

(4) Have a cover that acts as a shelf when opened.

(5) Have a carrying handle.

(6) Have a positive closure.

(7) Have a hanger bracket of the keyhole type.

(8) Have a rubber or synthetic gasket mounted in the cover or body of the kit to provide a dust and moisture resistant seal.

(9) Have no corrosive parts.

(10) Shall pass the following drop test (a) and rain precipitation test (b):

(a) A 5-lb (25-kg) weight shall be cushioned in the case bottom and the case secured by its latches. The case shall then be conditioned at room temperature for 3 hours and dropped once on a bottom corner, onto a concrete floor, from a height of 48 in (120 cm). The case shall be examined, both inside and outside, for evidence of cracking. Cracks shall be cause for rejection.

(b) Set a shower head 6 ft ± 6 in (185 cm ± 15 cm) above the cases to be tested, with the cover or lid in a horizontal plane. Provide as a support for sample cases a horizontal platform directly below the shower head, and adjust the rate of flow to deliver a minimum of 2-1/2 gallons (9.46 liters) of tap water per hour. The diameter of the shower spray hitting the platform shall not be greater than 30 in (72.2 cm). Position the bottoms of sample cases on the platform in such a manner that there is a minimum distance of 2 in (5.1 cm) between cases on all sides. All cases under test at any one time shall be entirely within the perimeter of the shower streams. Sample cases shall be subjected to a continuous water spray under the aforementioned conditions for a period of 15 minutes. The exterior surfaces of the cases shall then be carefully blotted dry, the cases opened, and the interiors examined for water. Evidence of water shall be cause for rejection.

5. Requirements for Basic Units

5.1 Adhesive Bandage Compress (16 per Unit). Each bandage shall consist of an absorbent pad 1 in ± 1/8 in (2.5 cm ± 0.3 cm) long and not less than 13/16 in (2 cm) wide. The pad shall be attached to the center of a 3 to 3-1/2 in (7.5 cm to 9 cm) by 1 in ± 1/32 in (2.5 cm ± 0.1 cm) strip of adhesive tape made with a backing of plastic film. The adhesive tape shall be perforated over its entire area to permit proper ventilation. Two strips of polyethylene film or other protective material shall overlap in such a manner as to prevent contamination of the pad. The protective facing material shall be such that it will not impair the adhesiveness of the tape and can be easily removed. Each bandage shall be wrapped, sealed, and sterilized. Sixteen such adhesive bandages shall be packed in a unit size 1 or 2 container.

5.2 Bandage Compress (4 per Unit). Each compress shall consist of either a 2 in X 2 in (5 cm X 5 cm) gauze pad, substantially free from loose ends and ravelings, composed of the equivalent of not less than 16 thicknesses of Type III (28/24) gauze, or a 2 in X 2 in (5 cm X 5 cm) nonadherent pad. The compress shall be securely attached to a continuous bandage 2 in (5 cm) wide and 36 in (90 cm) long, substantially free from loose threads and ravelings, made from Type I (44/36) gauze. The compress shall be constructed so that it may be opened to a 2 in X 4 in (5 cm X 10 cm) size; all dimensions shall be ± 1/8 in (± 0.3 cm). The bandage shall be pleated or rolled to provide easy opening and application. A marker shall be placed at the back of the pad so the pad can be located and applied without contamination. Each bandage compress shall be suitably wrapped, sealed, and sterilized. Four such individually wrapped bandage compresses shall be packed in a unit size 1 or 2 container.

5.3 Bandage Compress (2 per Unit). Each compress shall consist of a 3 in X 3 in (7.5 cm X 7.5 cm) pad free from loose ends and ravelings composed of the equivalent of not less than 16 thicknesses of Type III (28/24) gauze or a 3 in X 3 in (7.5 cm X 7.5 cm) nonadherent pad securely attached to a continuous bandage 3 in (7.5 cm) wide and 60 in (150 cm) long, substantially free from loose threads and ravelings made from Type I (44/36) gauze. The pad shall be constructed so that it may be opened to form a pad 3 in X 6 in (7.5 cm X 15 cm); all dimensions shall be ± 1/8 in (± 0.3 cm). The bandage shall be pleated or rolled to provide easy opening and application. A marker shall be placed at the back of the pad so the pad can be located and applied without contamination. Each bandage shall be suitably wrapped, sealed, and sterilized. Two such bandages shall be packed in a unit size 1 or 2 container.

5.4 Bandage Compress (1 per Unit). Each compress shall consist of a 4 in X 4 in (10 cm X 10 cm) gauze pad free from loose ends and ravelings composed of the equivalent of not less than 16 thicknesses of Type III (28/24) gauze, or a 4 in X 4 in (10 cm X 10 cm) nonadherent pad securely attached to a continuous bandage 4 in (10 cm) wide by 72 in (180 cm) long made from Type I (44/36) gauze. The pad shall be constructed so that it may be opened to form a pad 8 in X 4 in (20 cm X 10 cm); all dimensions shall be ± 1/8 in (± 0.3 cm). The bandage shall be pleated or rolled to provide easy opening and application. A marker shall be placed at the back of the pad so the pad can be located and applied without contamination. Each bandage shall be suitably wrapped, sealed, and sterilized. One such bandage shall be packed in a unit size 1 container.

5.5 Triangular Bandage (1 per Unit). The bandage shall be made from muslin of not less than 60/48 weave or material of equal mechanical strength. The sides of the bandage shall be 40 in X 40 in X 56 in ± 1 in (100 cm X 100 cm X 140 cm ± 3 cm). The bandage shall be folded in cravat form. Each bandage shall be compressed and wrapped. One such bandage shall be packed together with two No. 3 safety pins in a unit size 1 or 2 container.

5.6 Absorbent Gauze Compress (1 per Unit). The compress shall be made from Type III gauze (28/24), size 24 in X 72 in (60 cm X 180 cm). The compress shall be folded in such a manner that it may be unfolded, without danger of contamination, successively into the following sizes: 4 in X 4 in (10 cm X 10 cm), 4 in X 8 in (10 cm X 20 cm), and 8 in X 8 in (20 cm X 20 cm). The compress shall be free from loose threads and raveled edges. The compress shall be wrapped, sealed, and sterilized. One such compress shall be packed in a unit size 1 container.

5.7 Gauze Roller Bandage (1 per Unit). One gauze roller bandage 4 in ± 1/8 in (10 cm ± 0.3 cm) by 6 yards (550 cm) long made from Type I (44/36) gauze substantially free from loose threads and ravelings, compressed, wrapped, sealed, and sterilized. One such bandage shall be packed with No. 3 safety pins in a unit size 1 container.

5.8 Gauze Roller Bandage (2 per Unit). Two gauze roller bandages 2 in, + 0, – 1/16 in (5 cm, + 0, – 0.2 cm) wide and 6 yards (550 cm) long made from Type I (44/36) gauze substantially free from loose threads and ravelings, compressed, wrapped, sealed, and sterilized. Two such bandages shall be packed in a unit size 1 container.

5.9 Compress (4 per Unit). Each compress shall be 3 in X 3 in (7.5 cm X 7.5 cm) 12-ply weave, and individually wrapped, sealed, and sterilized. Four such compresses shall be packed in a unit size 1 container.

5.10 Adhesive Tape (2 per Unit). The adhesive tape shall be 1/2 in (1.3 cm) wide and 2-1/2 yards (230 cm) long. Two such adhesive tape rolls shall be packaged in a unit size 1 container.

5.11 Adhesive Tape (2 per Unit). The adhesive tape shall be 1 in (2.5 cm) wide and 2-1/2 yards (230 cm) long. Two such adhesive tape rolls shall be packaged in a unit size 3 container.

5.12 Metal Splints

5.12.1 Wire Splint (1 per Unit). Each splint shall be constructed of woven wire and in finished form shall measure approximately 3-3/4 in ± 1/8 in X 30 in ± 1/4 in (9.5 cm ± 0.3 cm X 76 cm ± 0.6 cm). The splint shall be woven from not less than 0.24 in (0.6 cm) diameter steel wire 4 mesh. The woven wire shall be galvanized by the hot dip process. Each splint shall be rolled and pressed. A strip of colored paper shall be placed under the outer edge of the splint so that the outer end may be easily located. The processing shall be done in such a manner as not to injure the splint, and on being unrolled, shall be free from broken wires. One such splint shall be packaged in a unit size 1 container.

5.12.2 Aluminum Splint (1 per Unit). Each splint shall be constructed of expanded aluminum metal and in finished form shall measure 3-3/4 in ± 1/8 in (9.5 cm ± 0.3 cm) measured parallel with the short way of the diamond by 30 in ± 1/4 (76 cm ± 0.6 cm) measured parallel with the long way of the diamond. The splint shall be expanded from 0.03 in (0.07 cm) thick 30003-H 14 aluminum, or the equivalent. Nominal dimensions of the diamond are: strand width 0.03 in (0.07 cm); long way of the diamond 0.40 in (1 cm); and short way of the diamond 0.23 in (0.5 cm). The 3-3/4 in (9.5 cm) dimensions shall have closed meshes and the 30 in (76 cm) dimensions shall be bond sheared. There shall be no sharp edges. Each splint shall be rolled and pressed. A strip of colored paper shall be placed under the outer edge of the splint so that the outer end may be easily located. The processing shall be done in such a manner as not to injure the splint and on being unrolled, shall be free from broken wires. One such splint shall be contained in a unit size 1 container.

5.13 Tourniquet (1 per Unit). The tourniquet shall be made from loosely woven cotton or synthetic webbing 3/4 in (2 cm) wide and 30 in (75 cm) long. One end shall be fitted with a metal clip, or otherwise treated to prevent fraying, and the other end shall be equipped with a self-locking buckle. The underside of the buckle shall be fitted with a felt pad approximately 1/4 in (0.6 cm) thick. The webbing shall be printed or permanently labeled as follows:

CAUTION: Place tourniquet above wound, leaving unbroken skin between tourniquet and wound. Once applied, it should not be released no matter how long it has been in place except on the advice of a physician. Make note of the time tourniquet was applied.

The unit box shall contain the following printed wording:

To be used only as a last resort in life-threatening hemorrhage that cannot be stopped by any other means.

One tourniquet shall be packed in a unit size 1, 2, or 3 container.

5.14 Tourniquet and Forceps (1 Each per Unit). One tourniquet complying with the specifications listed in

paragraph 5.13 of this standard shall be packaged, along with one forceps, 3 in (7.5 cm) long with jaws approximately 3/16 in (0.5 cm) wide. These two items shall be packaged in a unit size 1, 2, or 3 container.

5.15 **Tourniquet, Forceps, and Scissors (1 Each per Unit).** One each of tourniquet and forceps complying with 5.13 and 5.14, respectively, of this standard shall be packaged, along with one pair of scissors, round end, minimum size 3-1/2 in (9 cm) long. These three items shall be packaged in a unit size 3 container.

5.16 **Eye Dressing Packet.** The eye dressing packet shall consist of three cotton pads, six adhesive strips and three 0.11 oz (3.0 grams) sterile ophthalmic ointment packages. (Note: The quantity should be precisely indicated.) These sets shall be packaged in a unit size 1 or 2 container.

5.16.1 Each eye pad shall have a minimum height of 1-1/2 in (3.5 cm) and a minimum width of 1-15/16 in (4.8 cm) and cover a minimum surface area of 2.9 in^2 (19 cm^2). The bottom and top of the pad shall be covered with a Type I (44/36) gauze substantially free from loose threads and ravelings, or perforated nonwoven material. Between these coverings shall be cotton or equivalent material of a thickness no less than 1/4 in (0.6 cm) when noncompressed. Each pad shall be individually wrapped, sealed, and sterilized.

5.16.2 Adhesive tape shall be furnished in strips no less than 3/8 in × 5 in (1 cm × 12.7 cm). Two such strips shall be attached in parallel position to a single piece of material for easy removal.

5.16.3 The eye ointment shall be sterile and sealed in a tamperproof packaging having an ophthalmic elongated tip.

5.17 **Eye Dressing Packet (4 per Unit).** Four each of the eye pads as specified in 5.16.1, and eight adhesive tape strips as specified in 5.16.2 shall be packaged in a unit size 1 container.

5.18 **Eye Wash Solution, (1 Oz (30 ml) per Unit).** A sterile isotonic buffered solution shall be packed in a squeeze-type bottle, capable of delivering an irrigating stream of solution. The bottle shall be packed in a unit size 1, 2, or 3 container.

5.19 **Ammonia Inhalants (10 per Unit).** Each ammonia inhalant shall consist of a thin-walled sealed glass ampule containing not less than 1/3 ml solution of aromatic ammonia for inhalation purpose only. Each inhalant shall have a free ammonia content of not less than 15% and a minimum stated alcohol content of 35% ethyl alcohol. The solution shall contain a dye as a color agent to indicate leakage of ammonia. The glass ampule shall be enclosed in an absorbent covering. The covering shall prevent penetration of crushed glass. Each inhalant shall be labeled with instructions for use and contents. Ten such inhalants shall be packaged in a unit size 1 container.

5.20 **Antiseptic Swabs (10 per Unit).** An antiseptic solution acceptable to the consulting physician shall be packaged as follows: Each swab shall consist of a thin-walled sealed glass ampule containing not less than 0.5 cc (0.5 ml) of the specified antiseptic solution. The filled and sealed ampule shall be contained in a clear flexible sleeve. There shall be an absorbent applicator inserted in the open end of the sleeve. This tip shall be of sufficient size to extend at least 1/8 in (0.3 cm) beyond the end of the sleeve. The applicator end of the sleeve shall be covered by a labeled protective cap, or the entire swab shall be enclosed in a labeled and sealed blister pack. Ten such swabs shall be contained in a unit size 1 container.

5.21 **Burn Treatments.** A burn compound acceptable to the consulting physician shall be packaged in accordance with one of the methods given in 5.21.1 through 5.21.4.

5.21.1 Burn treatments (ointment type) shall be packaged in a blind end collapsible tube with a penetrating type cap, approximately 0.11 oz (3.0 grams) size. Six such tubes shall be held in place by a one-piece separator creating six individual spaces in a unit size 1 container.

5.21.2 Burn treatments (ointment type) shall be packaged in a blind end collapsible tube with a penetrating type cap, approximately 1/2 oz (14 grams) size. Two such tubes shall be packaged in a unit size 1 or 2 container.

5.21.3 Burn treatments (aerosol dispenser) shall be packed in a 2/3 fluid oz (20 ml) size dispenser. Two such dispensers shall be packaged in a unit size 2 or 3 container.

5.21.4 Burn treatment (ointment type) shall be packaged in individual collapsible applicators containing a minimum of 1.2 grams each. Six such individual applications shall be placed in a unit size 1 container.

6. Requirements for Optional Units

The intent of this standard is to provide the consulting physician with a wide variety of unit packaged first aid materials. In addition to materials listed in Section 5, Requirements for Basic Units, specialized materials packaged in containers complying with 3.5 and 3.6 will be considered to be in accordance with this standard.

Appendix

(This Appendix is not a part of American National Standard Minimum Requirements for Industrial Unit-Type First Aid Kits, Z308.1-1978, but is included for information purposes only.)

Recommendations and Precautions Concerning Unit-Type First Aid Kit Use and Maintenance

1. A consulting physician should approve the assortment of unit-type first aid materials best suited to the experience of a particular industry as required by the Occupational Safety and Health Act, Subpart K, paragraph 1910.151.

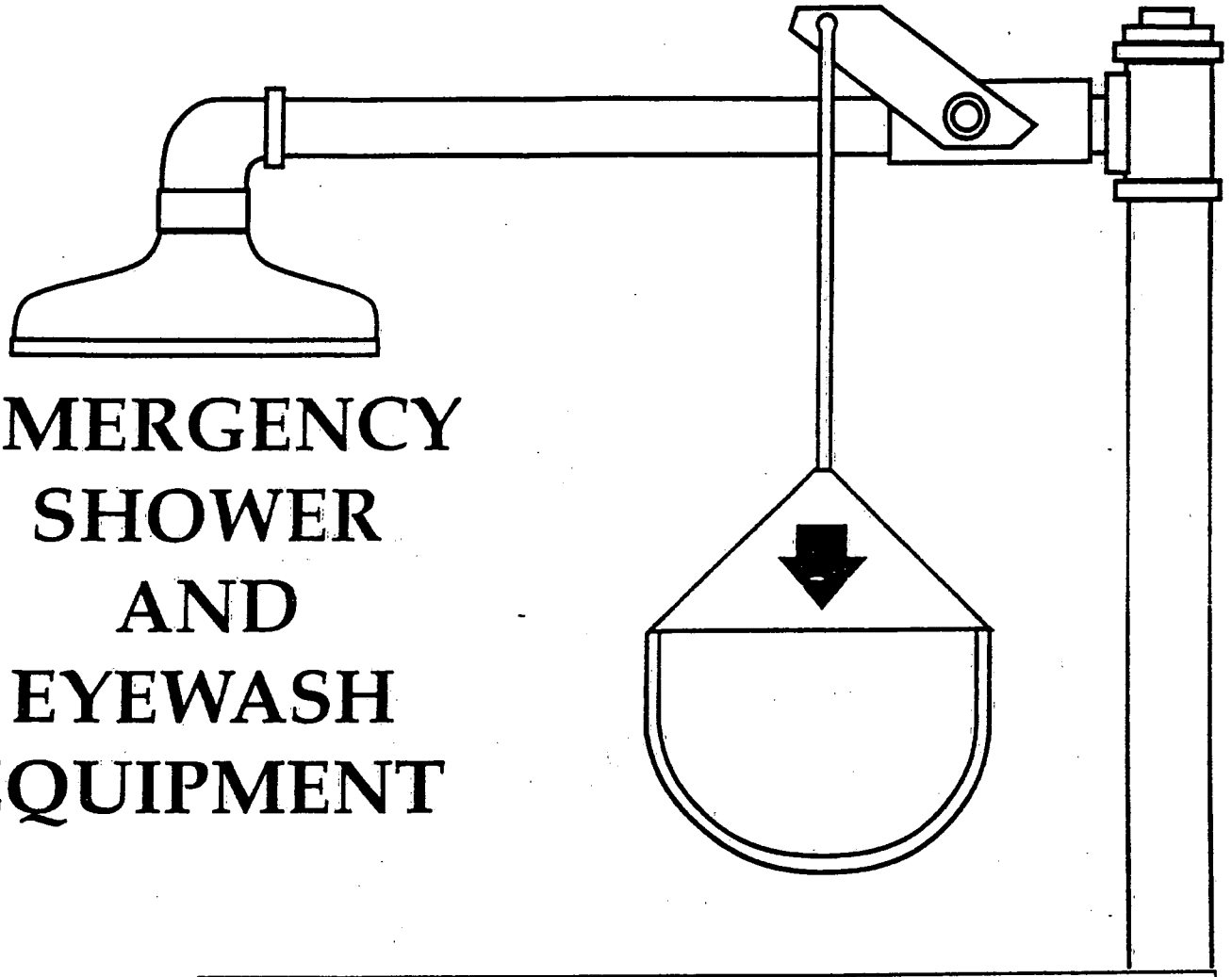
2. Unit-type first aid kits should be regularly inspected to ensure completeness and to check condition of contents.

3. In addition to a unit-type first aid kit, each work location should have at least one individual available who is trained in first aid.

4. Items other than the approved assortment should not be stored in the kit.

5. It is recommended that the company and the consulting physician periodically review the assortment of the unit kit contents for possible updating.

6. First aid is the immediate care for an injury or sudden illness and should be followed by professional medical attention.



EMERGENCY SHOWER AND EYEWASH EQUIPMENT

Equipment Selection, Inspection and Training Guide

Including

ANSI Z358.1-1990

Standard for emergency shower and eyewash equipment

Encon®
SAFETY PRODUCTS
A Vallen Company

RULES & REGULATIONS

OSHA rules pertaining to Drench Equipment, obtained from: Federal Register, Department of Labor, OSHA, Volume 36, Number 105, Part 11, May 29, 1971 and 31:3148.12, August 7, 1986.

Subpart K Section 1910.151 Paragraph C	**Medical and First Aid** "Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use."	(Fed. Reg. 10601)
Subpart G Section 1910.94 Paragraph (9) Sub-paragraph vii	**Occupational Health and Environmental Control** **Ventilation** **Personal Protection** "Near each tank containing a liquid which may burn, irritate or otherwise be harmful to the skin if splashed upon the worker's body there shall be a supply of clean cold water. The water pipe (carrying a pressure not exceeding 25 pounds) shall be provided with a quick opening valve and at least 48 inches of hose not smaller than three-fourths inch, so that no time may be lost in washing off liquids from the skin or clothing. ALTERNATELY, DELUGE SHOWERS AND EYE FLUSHES SHALL BE PROVIDED IN CASES WHERE HARMFUL CHEMICALS MAY BE SPLASHED ON PARTS OF THE BODY."	(Fed. Reg. 10517)
Subpart R Section 1910.261 Part (19) Paragraph (V) Sub-paragraph (6) Item (g) Paragraph 5	**Pulp, paper and paperboard mills** **Clothing** "Where lime slaking takes place, employees shall be provided with rubber boots, rubber gloves, protective aprons, and eye protection. A DELUGE SHOWER AND EYE FOUNTAIN SHALL BE PROVIDED TO FLUSH THE SKIN AND EYES TO COUNTERACT LIME OR ACID BURNS."	(Fed. Reg. 10672)
Item (g) Paragraph 18 Sub-paragraph (i)	**Miscellaneous** "QUICK OPERATING SHOWERS, BUBBLERS, ETC., SHALL BE AVAILABLE FOR EMERGENCY USE IN CASE OF CAUSTIC SODA BURNS."	(Fed. Reg. 10673)
Subpart H Section 1910.111 (10) Item (iii)	**Hazardous Materials** **Storage and Handling Anhydrous Ammonia** "Stationary storage installations shall have AN EASILY ACCESSIBLE SHOWER or a fifty(50) gallon drum of water."	(Fed. Reg. 10585)
Item (iv)	"Each vehicle transporting ammonia in bulk except for farm applicator vehicles shall carry a container of at least five (5) gallons of water and shall be equipped with a full face mask."	
Section 1926.441 Paragraph 6 (8-7-86)	**Safety and Health Regulations for Construction** **Electrical** **Battery rooms and battery changing** "Facilities for quick drenching of the eyes and body shall be provided within 25 feet of battery handling areas."	(Fed. Reg. 7371)
Subpart R Section 1910:252 Paragraph 37 Sub-paragraph PP	**Textiles** "First Aid: Wherever acids or caustics are used provisions shall be made for a copious and flowing supply of fresh clean water."	

EMERGENCY SHOWER AND EYEWASH EQUIPMENT SELECTION GUIDELINES

1. Determine the hazardous liquid, vapor or particulate matter in the area and its destructive capability to human tissue in reaction time

CHEMICAL NAME	CONCENTRATION%	TEMPERATURE	REACTION TIME
_____	_____ %	_____ °F	_____ SEC.
_____	_____ %	_____ °F	_____ SEC.
_____	_____ %	_____ °F	_____ SEC.

2. Evaluate existing emergency shower/eyewash equipment **Location** in relationship to hazard, with regard to access, egress paths from hazardous area. NOTE: Compromised vision of the emergency shower/eyewash user is likely and should be considered in location evaluation. (Travel time _____ sec. distance _____ ft.)

3. Determine the number of employees exposed to the possible hazard at a given time (worst case scenario) to determine number of emergency shower/eyewash stations and associated hydraulic conditions required (pipe size, pressure) to service the area.

4. Evaluate potable water system hydraulic conditions in terms of dynamic pressure (PSI), supply line size, pipe size, and volume output (GPM) at existing stations

STATION	LOCATION	DYNAMIC PRESSURE (PSI)	VOLUME OUTPUT (GPM)	PIPE SIZE
1	_____	_____	_____	_____
2	_____	_____	_____	_____
3	_____	_____	_____	_____

NOTE: Hydraulic system should be sized to permit simultaneous operation of emergency shower and eyewash stations in the same general vicinity. Most emergency shower/eyewash systems will require the following:

EYEWASH	30 PSI	3.0 GPM	$^1/_2$" SUPPLY
FACEWASH	30 PSI	8.0 GPM	$^3/_4$" SUPPLY
DRENCH HOSE	30 PSI	3.0 GPM	$^1/_2$" SUPPLY
SHOWER	30 PSI	30 GPM	1 $^1/_2$" SUPPLY
COMBINATION SHOWER/ EYE-FACEWASH	30 PSI	40 GPM	1 $^1/_2$" SUPPLY

NOTE: Excessive water pressure (>80 PSI) may damage sensitive tissue and should be limited via pressure reducing devices, if required.

5. Evaluate performance criteria and guidelines set forth in ANSI Z358.1-1990 standard with regard to existing equipment and new installations. See enclosed inspection form for unit survey.

6. Once all performance, operating and safety conditions are evaluated, determine the best type of emergency shower/eyewash equipment for the application.

AMERICAN NATIONAL STANDARD *Z358.1-1990*

FOR EMERGENCY EYEWASH AND SHOWER EQUIPMENT

STANDARD REQUIREMENTS

1. SCOPE

This standard establishes minimum performance requirements for eyewash and shower equipment for the emergency treatment of the eyes or body of a person who has been exposed to injurious materials. It covers the following types of equipment: emergency showers, eyewash equipment, eye/face wash equipment, hand-held drench hoses, and combination shower and eyewash or eye/face wash.

2. PURPOSE

This standard is intended to provide uniform minimum requirements for equipment performance, installation, test procedures, and maintenance and training in order to assure the worker of a minimum level of first aid.

3. DEFINITIONS

combination unit. A unit combining a shower with an eyewash or eye/face wash, or with a drench hose, or with both, into one common assembly.

drench hose. See *hand-held drench hose.*

emergency shower. A unit that enables a user to have water cascading over the entire body.

emergency shower head. A head specially designed for use on an emergency shower.

eye/face wash. A device used to irrigate and flush both the face and the eyes.

eyewash. A device used to irrigate and flush the eyes.

flow pressure. The gauge pressure measured at the pipe wall during flow.

EXPLANATORY INFORMATION (Not part of American National Standard for Emergency Eyewash and Shower Equipment ANSI Z358.1-1990.)

This material is reproduced with permission from American National Standard, copyright ANSI Z358.1-1990 by the American National Standards Institute. Copies of this standard may be purchased from the American National Standards Institute at 1430 Broadway, New York, N.Y. 10018.

flow regulator. A mechanical device to control the flow of water through pipes.

flushing fluid. Potable water or other medically acceptable solution.

freeze protected. Designed to operate under freezing conditions.

gallons per minute (GPM). A measure of water flow.

hand-held drench hose. A flexible hose connected to a water supply and used to irrigate and flush eyes, face, and body areas.

iron-pipe size (IPS). A plumbing industry term for the sizing and thread system of pipe (not limited to iron pipe).

multiple-spray shower. An emergency shower using more than one head and delivering water from more than one direction.

personal eyewash. A supplementary eyewash that supports plumbed units, self-contained units, or both, by delivering immediate flushing fluid.

plumbed eyewash. An eyewash unit permanently connected to a source of potable water.

potable water. Water that is suitable for drinking.

pounds per square inch (PSI). A measure of pressure, usually identified as pump pressure or nozzle pressure.

self-closing valve. A valve that closes automatically when released.

self-contained eyewash. An eyewash device that contains its own flushing fluid and must be refilled or replaced after use.

self-contained shower. A shower that contains its own flushing fluid, and must be refilled or replaced after use.

stay-open valve. A valve that must be closed manually.

This material is reproduced with permission from American National Standard, copyright ANSI Z358.1-1990 by the American National Standards Institute. Copies of this standard may be purchased from the American National Standards Institute at 1430 Broadway, New York, N.Y. 10018.

4. PLUMBED AND SELF-CONTAINED EMERGENCY SHOWERS

4.1 Performance of Shower Heads. Emergency shower heads shall be designed and located so that a water column is provided that is not less than 208.3 cm (82 inches) nor more than 243.8 cm (96 inches) in height from the surface on which the user stands. The spray pattern shall have a minimum diameter of 50.8 cm (20 inches) at 152.4 cm (60 inches) above the surface on which the user stands, and the center of the spray pattern shall be located at least 40.6 cm (16 inches) from any obstruction. Emergency shower heads should be capable of delivering a minimum of 113.6 liters per minute (30 gallons per minute) of water at a velocity low enough not to be injurious to the user. The water shall be substantially dispersed throughout the pattern.

4.2 Performance of Control Valve. The valve shall be designed so that the water flow remains on without requiring the use of the operator's hands. The valve shall be designed to remain activated until intentionally shut off. The valve shall be simple to operate and shall go from "off" to "on" in 1 second or less. The valve shall be resistant to corrosion from potable water.

4.3 Performance of Valve Actuator. Manual or automatic actuators shall be easy to locate and readily accessible to the user.

4.4 Shower Enclosures. Enclosures, if used, shall provide for a minimum unobstructed area of 86.4 cm (34 inches) in diameter.

4.5 Manufacturer's Performance Testing Procedures. The manufacturer shall test emergency shower heads as follows:

4.5.1 Plumbed Emergency Showers

(1) Connect a flowmeter to the shower to be tested, or provide other means of measuring water flow.

(2) Attach the shower to a water supply with a minimum iron pipe size (IPS) of 1 inch. The shower head's height shall be 213.4 cm (84 inches) from the surface on which the user

E4.1. All dimensions in this section are based on Woodson, W. E., and Conover, D. W., *Human Engineering Guide to Equipment Design.* Army, Navy, Air Force Steering Committee, United States Government, 1972; and on *Human Engineering Guide for Equipment Designers,* University of California Press, 1964, 2nd ed. In a combination unit, the eyewash is not considered an obstruction for the purpose of determining the distance of the center of the spray pattern. The water pressure required at the inlet shall be enough to achieve the spray pattern specified. Shower head designers usually use 113.6 liters per minute (30 gallons per minute) at 0.207 megapascal (30 pounds per square inch). A flow of 75.7 liters per minute (20 gallons per minute) can achieve the same spray pattern under the right conditions, in which case this flow is acceptable.

E4.2 In the interests of safety, the valve's remaining open is most desirable to allow the user the use of both hands for disrobing or holding the eyes open. A self-closing valve may be permitted in a school laboratory situation as a limited exception only where the enforcing authority is of the opinion that the hazard posed is not serious.

E4.3 Manual actuators should be located not more than 175.3 cm (69 inches) above the surface on which the user stands.

E4.4 The 86.4-cm (34-inch) dimension was chosen to accommodate the movement necessary in an emergency situation. A smaller enclosure could contribute to a further hazard.

E4.5.1 See explanatory note under E4. 1.

This material is reproduced with permission from American National Standard, copyright ANSI Z358.1-1990 by the American National Standards Institute. Copies of this standard may be purchased from the American National Standards Institute at 1430 Broadway, New York, N.Y. 10018.

stands. The water supply shall have a control valve or pump system that can be adjusted.

(3) Open the valve on the emergency shower and verify that it opens in one second and stays open.

(4) Adjust the control valve on the water supply to deliver a minimum of 113.6 liters per minute (30 gallons per minute), and determine that water is substantially dispersed throughout the pattern. Measure the diameter of the water pattern 152.4 cm (60 inches) above the surface on which the user stands. Visually record the diameter of the spread. This shall be a minimum of 50.8 cm (20 inches).

4.5.2 Self-Contained Emergency Showers.

The manufacturer shall test emergency showers as follows:

(1) Fill the unit with flushing solution.

(2) Connect a flowmeter or provide other means of measuring water flow. (A five- (5-) gallon pail would require 15 seconds or less to fill in order to meet the requirement of 75.7 liters per minute (20 gallons per minute) in (4).)

(3) Place the unit in operating position. The height of the shower head shall be 213.4 cm (84 inches) from the surface on which the user stands.

(4) The unit shall be capable of delivering a minimum of 75.7 liters per minute (20 gallons per minute) for 15 minutes. Determine that the water is substantially disbursed throughout the pattern. Measure the diameter of the water pattern 152.4 cm (60 inches) above the surface on which the user stands. Visually record the diameter of the spread. This shall be a minimum of 50.8 cm (20 inches).

E4.5.2(4) See explanatory note under E4. 1.

4.6 Installation

4.6.1 Emergency showers shall be in accessible locations that require no more than 10 seconds to reach and should be within a travel distance no greater than 30.5 meters (100 feet) from the hazard.

E4.6.1 The unit should be located as close to the hazard as possible without physically causing a hazard itself, such as protruding fittings. The maximum time required to reach

This material is reproduced with permission from American National Standard, copyright ANSI Z358.1-1990 by the American National Standards Institute. Copies of this standard may be purchased from the American National Standards Institute at 1430 Broadway, New York, N.Y. 10018.

the shower should be determined by the potential effect of the chemical. For example, exposure to a highly corrosive chemical might require showers to be installed within 3 to 6 meters (10 to 20 feet) from the hazard. It is recommended that the consulting physician or appropriate professional be contacted for advice on the proper distances. Precautions should also be taken to protect the user under frigid conditions, including provisions for proper disposal of the water. Installation procedures should be in accordance with proper plumbing practices, with supply piping sized adequately to meet flow requirements. (See Appendix Al.)

4.6.2 Each emergency shower location shall be identified with a highly visible sign. The area around the emergency shower shall be well-lighted and highly visible.

4.6.3 The emergency shower shall be assembled in accordance with the manufacturer's instructions.

4.6.4 The unit shall be connected to a supply of flushing fluid capable of delivering sufficient volume to produce the required spray pattern by the method shown in the manufacturer's instructions.

E4.6.4 If shutoff valves are installed in the shower line for maintenance purposes, provisions should be made to prevent unauthorized shutoff.

4.6.5 When the shower is installed, it shall be tested in accordance with the following procedures:

(1) With the unit correctly connected to the water source and the valve(s) closed, visually check the piping connections for leaks.

(2) Open the valve to the full open position. The valve shall remain open without requiring further use of the operator's hands.

(3) Measure the shower. The face of the shower head shall be not less than 208.3 cm (82 inches) nor more than 243.8 cm (96 inches) from the surface on which the user stands.

(4) With the valve in the "full on" position, measure the diameter of the spray pattern. It shall be a minimum of 50.8 cm (20 inches) at 152.4 cm (60 inches) above the standing surface. The center of the spray shall be at least 40.6 cm (16 inches) from any obstructions.

This material is reproduced with permission from American National Standard, copyright ANSI Z358.1-1990 by the American National Standards Institute. Copies of this standard may be purchased from the American National Standards Institute at 1430 Broadway, New York, N.Y. 10018.

4.7 Maintenance and Training

4.7.1 Showers shall be activated weekly to flush the line and to verify proper operation.

4.7.2 All employees who might be exposed to chemical splash shall be instructed in the proper use of emergency showers.

E4.7.1 **Procedures should be established to ensure compliance with 4.7.1.**
E4.7.2 **Medical and industrial experiences have shown that the initial first aid treatment for chemical splash should be to wash the body for 15 minutes prior to medical treatment, with the clothing removed during the showering period.**

5. PLUMBED AND SELF-CONTAINED EYEWASH EQUIPMENT

5.1 Performance of Plumbed and Self-Contained Eyewash Units

5.1.1 A means shall be provided to ensure that a controlled flow of flushing fluid is provided to both eyes simultaneously at a velocity low enough not to be injurious to the user. Where the possibility of freezing conditions exists, equipment shall be protected from freezing or freeze-protected equipment shall be installed.

E5.1 Self-contained units allow an option for the type of flushing solution selected for use in the unit. Any effective antibacterial agent, suitable for opthalmic use, added to tap water will help preserve the water and reduce the possibility of pathogens developing in the flushing solution. However, an isotonic saline solution (0.85% to 1.0% NaCl buffered to a pH of 7.3 to 7.4 and preserved with a suitable antibacterial agent is less irritating to the eye over a 15-minute flush.

5.1.2 There shall be no sharp projections anywhere in the operating area of the unit.

5.1.3 Nozzles shall be protected from airborne contaminants. Whatever means is used to afford such protection, its removal shall not require a separate motion by the operator when activating the unit.

5.1.4 Self-contained units shall be constructed of materials that will not corrode in the presence of the flushing fluid. The stored flushing fluid shall be protected against airborne contaminants.

5.1.5 Eyewash equipment shall be capable of delivering to the eyes not less than 1.5 liters per minute (0.4 gallon per minute) for 15 minutes.

E5.1.5 A wide range of materials can enter the eye and cause injury. The minimum water flow of 1.5 liters per minute (0.4 gallon per minute) for 15 minutes at a velocity low enough not to be injurious to the eye is based on medical consultation and industry experience. Specific hazardous materials may require greater flows for longer periods of time. The consulting physician should be contacted for advice.

5.1.6 The unit shall be designed to provide enough room to allow the eyelids to be held open with the hands while the eyes are in the stream of water.

This material is reproduced with permission from American National Standard, copyright ANSI Z358.1-1990 by the American National Standards Institute. Copies of this standard may be purchased from the American National Standards Institute at 1430 Broadway, New York, N.Y. 10018.

5.2 Performance of Control Valve. The valve shall be designed so that the water flow remains on without requiring the use of the operator's hands. The valve shall be designed to remain activated until intentionally shut off. The valve shall be simple to operate and shall go from "off" to "on" in 1 second or less. The valve shall be resistant to corrosion from potable water. The valve actuator shall be large enough to be easily located and operated by the user.

5.3 Manufacturer's Performance Testing Procedures

5.3.1 Plumbed Units. The manufacturer shall test plumbed eyewash units as follows:

(1) Connect a flowmeter to the eyewash to be tested, or provide other means of measuring water flow.

(2) Open the valve on the eyewash unit and verify that it opens in one second and stays open.

(3) Using the flowmeter or other means, determine that the rate of flow is at least 1.5 liters per minute (0.4 gallon per minute), that the flushing streams rise to approximately equal heights, and that the water will wash both eyes simultaneously at a velocity low enough not to be injurious to the user.

E5.3.1. Attach the plumbed unit to a 1.3-cm (1/2 inch) water supply line at 0.207 megapascal (30 pounds per square inch) flow pressure.

E5.3. 1(3) To determine that both streams are properly located for flushing simultaneously, refer to dimensions in Woodson, W. E., and Conover, D. W., *Human Engineering Guide to Equipment Design,* Army, Navy, Air Force Steering Committee, United States Government, 1972; and in *Human Engineering Guide for Equipment Designers,* University of California Press, 1964, 2nd ed.
A suitable gauge for making the determination is a strip of transparent material 10.16 cm (4 inches) wide marked with two sets of parallel lines equidistant from the center, one set 3.8 cm (1-1/4 inches) apart and the other 8.26 cm (3-1/4 inches) apart. Place this strip on top of the stream of the eyewash; the flushing should cover the areas between the lines 3.18 cm (1-1/4 inches) apart and the lines 8.26 cm (3-1/4 inches) apart when the gauge is lowered not more than 3.81 cm (1-1/2 inches) below the water's peak. The dimensions cover from the 5th percentile female to the 95th percentile male pupillary distance plus or minus approximately 1.3 cm (1/2 inch).

This material is reproduced with permission from American National Standard, copyright ANSI Z358.1-1990 by the American National Standards Institute.
Copies of this standard may be purchased from the American National Standards Institute at 1430 Broadway, New York, N.Y. 10018.

5.3.2 Self-Contained Units. The manufacturer shall test self-contained eyewash units as follows:

(1) Position the emergency eyewash unit in the operating position so that the discharged water can be collected. Fill the unit with flushing fluid.

(2) Using a 3.785-liter (1-gallon) container and a timing device, collect 3.785 liters (1 gallon) of water at the start of the flow. Record the time required to fill the container.

(3) Continue to operate the unit for 15 minutes. Using the same equipment, and with the discharge orifice maintained in the same position over the test period, collect 3.785 liters (1 gallon) of water beginning 12.5 minutes after the flow begins. Record the time required to fill the container.

(4) The elapsed time to collect 3.785 liters (1 gallon) of water shall be 2-1/2 minutes or less for each test.

5.4 Installation

5.4.1 The unit shall be positioned with the water nozzles 83.8 cm (33 inches) to 114.3 cm (45 inches) from the floor and 15.3 cm (6 inches) minimum from the wall or the nearest obstruction.

5.4.2 Eyewash units shall deliver flushing fluid. Where the possibility of freezing conditions exists, equipment shall be protected from freezing or freeze-protected equipment shall be installed. The supply line for plumbed units shall provide an uninterruptible supply of water at a minimum of 0.207 megapascal (30 pounds per square inch) of flow pressure. Units shall be installed in accordance with the manufacturer's instructions and acceptable plumbing practices.

E5.4 All dimensions in this section are based on Woodson, W. E., and Conover, D. W., *Human Engineering Guide to Equipment Design,* Army, Navy, Air Force Steering Committee, United States Government, 1972; and on *Human Engineering Guide for Equipment Designers,* University of California Press, 1964, 2nd ed.

E5.4.2 The minimum flow pressure has been established based on prevailing industry practice to provide adequate flushing fluid.

This material is reproduced with permission from American National Standard, copyright ANSI Z358.1-1990 by the American National Standards Institute. Copies of this standard may be purchased from the American National Standards Institute at 1430 Broadway, New York, N.Y. 10018.

5.4.3 When the unit is installed, the valve shall be operated to determine that both eyes will be washed simultaneously at a velocity low enough not to be injurious to the user.

5.4.4 Eyewash units shall be in accessible locations that require no more than 10 seconds to reach and should be within a travel distance no greater than 30.5 meters (100 feet) from the hazard.

E5.4.4 The unit should be located as close to the hazard as possible, and on the same level. The maximum time required to reach the eyewash should be determined by the potential effect of the chemical. For a strong acid or strong caustic, the eyewash should be immediately adjacent to or within 3 meters (10 feet) of the hazard. It is recommended that the consulting physician or appropriate professional be contacted for advice on the proper distance.

5.4.5 Each eyewash location shall be identified with a highly visible sign. The area around the eyewash shall be well-lighted and highly visible.

5.5 Maintenance and Training

5.5.1 Plumbed eyewash units shall be activated weekly to flush the line and to verify proper operation. Self-contained units shall be inspected and maintained in accordance with the manufacturer's instructions.

E5.5. 1 Procedures should be established to ensure compliance with 5.5.1. It is important to adhere to the manufacturer's instructions for changing flushing fluid to assure that a safe flushing fluid is available when needed.

5.5.2 All employees who might be exposed to chemical splash shall be instructed in the proper use of emergency eyewash units.

E5.5.2 Medical and industrial experiences have shown that the initial first aid treatment for chemical splash should be to wash the eyes for 15 minutes prior to medical treatment. It is important to hold the eyelids open and roll the eyeballs so water will flow on all surfaces and in the folds surrounding the eyeballs.

6. PERSONAL EYEWASH EQUIPMENT

6.1 Performance of Personal Eyewash Units

6.1.1. Personal eyewash units shall have the capacity to deliver immediate flushing to the eyes without being injurious to the user. Personal eyewash equipment does *not* meet the criteria of plumbed or self-contained eyewash equipment. Personal eyewash equipment (see Figure 8) supports plumbed and self-contained units but shall *not* replace them.

E6.1.1 The first few seconds following an eye injury are often critical to keeping eye injury to a minimum. A personal eyewash unit may be kept in the immediate vicinity of employees working in a potentially hazardous area. The main purpose of these units is to supply immediate flushing. With this accomplished, the injured individual may then proceed to a plumbed or self-contained eyewash and flush the eyes for the required 15-minute period.

6.1.2 Personal eyewash units shall deliver flushing fluid.

6.1.3 Instructions and expiration date, if applicable, shall be permanently affixed to the unit.

6.2 Maintenance and Training

6.2.1 Personal eyewash units shall be inspected and maintained in accordance with the manufacturer's instructions.

E6.2.1 It is important to adhere to the manufacturer's instructions for changing flushing fluid to assure that a safe flushing fluid is available when needed.

This material is reproduced with permission from American National Standard, copyright ANSI Z358.1-1990 by the American National Standards Institute. Copies of this standard may be purchased from the American National Standards Institute at 1430 Broadway, New York, N.Y. 10018.

6.2.2 All employees who might be exposed to chemical splash shall be instructed in the proper use of personal eyewash equipment.

7. EYE/FACE WASH EQUIPMENT

7.1 Performance of Eye/Face Wash Units

7.1.1 A means shall be provided to ensure that a controlled flow of flushing fluid is provided to both eyes simultaneously at a velocity low enough not to be injurious to the user, and to wash the face simultaneously.

7.1.2 There shall be no sharp projections anywhere in the operating area of the unit.

7.1.3 Nozzles shall be protected from airborne contaminants. Whatever means is used to afford such protection, its removal shall not require a separate motion by the operator when activating the unit.

7.1.4 Emergency eye/face wash equipment shall be capable of delivering flushing fluid to the eyes and face not less than 11.4 liters per minute (3.0 gallons per minute) for 15 minutes.

E7.1.4 A flow of 11.4 liters per minute (3.0 gallons per minute) of flushing fluid is required so that the entire surface of the face may be covered. In addition to having enough force to purge the contaminants, the stream will also target the face area.

7.1.5 The unit shall be designed to provide enough room to allow the eyelids to be held open with the hands while the eyes are in the stream of water.

7.2 *Performance of Control Valve.* The valve shall be designed in such a manner that the water now remains on without requiring the use of the operator's hands. The valve shall be designed to remain activated until intentionally shut off. The valve shall be simple to operate and shall go from "off" to "on" in one second or less. The valve shall be resistant to corrosion from flushing fluid. The valve actuator shall be large enough to be easily located and operated by the user.

7.3 ***Manufacturer's Performance Testing Procedures.*** The manufacturer shall test eye/face wash units as follows:

(I) Connect a flowmeter to the eye/face wash to be tested, or provide other means of measuring water flow.

E7.3 Attach the eye/face wash unit to a 1.3-cm (1/2-inch) water supply line at 0.207 megapascal (30 pounds per square inch) of flow pressure. All dimensions in this section are based on Woodson, W. E., and Conover, D. W., *Human Engineering Guide to Equipment*

This material is reproduced with permission from American National Standard, copyright ANSI Z358.1-1990 by the American National Standards Institute. Copies of this standard may be purchased from the American National Standards Institute at 1430 Broadway, New York, N.Y. 10018.

(2) Open the valve on the eye/face wash unit and verify that it opens in one second and stays open.

(3) Using the flowmeter or other means, determine that the rate of flow is at least 11.4 liters per minute (3.0 gallons per minute), that the flushing streams rise to approximately equal heights, and that the water will wash the eyes and face at a velocity low enough not be injurious to the user.

7.4 *Installation*

7.4.1 The unit shall be positioned with the water nozzles 83.8 cm (33 inches) to 114.3 cm (45 inches) from the floor and 15.3 cm (6 inches) minimum from the wall or nearest obstruction.

7.4.2 Eye/face wash units shall deliver flushing fluid. The supply line shall provide an uninterruptible supply of water at 0.207 megapascal (30 pounds per square inch) of flow pressure. Where the possibility of freezing conditions exists, equipment shall be protected from freezing or freeze-protected equipment shall be installed. Units shall be installed in accordance with manufacturer's instructions and acceptable plumbing practices.

7.4.3 When the unit is installed, the valve shall be operated to determine that both eyes will be washed simultaneously at a velocity low enough not to be injurious to the user.

7.4.4 Eye/face wash units shall be in accessible locations that require no more than 10 seconds to reach and should be within a travel distance no greater than 30.5 meters (100 feet) from the hazard.

7.4.5 Each eye/face wash location shall be identified with a highly visible sign. The area around the eye/face wash shall be well-lighted and highly visible.

7.5 Maintenance and Training

7.5.1 Eye/face wash units shall be activated weekly to flush the line and to verify proper operation.

Design, Army, Navy, Air Force Steering Committee, United States Government, 1972; and on *Human Engineering Guide for Equipment Designers*, University of California Press, 1964, 2nd ed.

E7.4.4 The unit should be located as close to the hazard as possible, and on the same level. The maximum time required to reach the eye/face wash should be determined by the potential effect of the chemical. For a strong acid or strong caustic, the eye/face wash should be immediately adjacent to or with 3 meters (10 feet) of the hazard. It is recommended that the consulting physician or appropriate professional be contacted for advice on the proper distance.

E7.5.1 Procedures should be established to ensure compliance with 7.5.1.

This material is reproduced with permission from American National Standard, copyright ANSI Z358.1-1990 by the American National Standards Institute. Copies of this standard may be purchased from the American National Standards Institute at 1430 Broadway, New York, N.Y. 10018.

7.5.2 All employees who might be exposed to chemical splash shall be instructed in the proper use of emergency eye/face wash units.

E7.5.2 Medical and industrial experiences have shown that the initial first aid treatment for chemical splash should be to wash the eyes and face for 15 minutes prior to medical treatment. It is important to hold the eyelids open and roll the eyeballs so water will flow on all surfaces and in the folds surrounding the eyeballs.

8. HAND-HELD DRENCH HOSES

8.1 Performance of Hand-Held Drench Hoses. Drench hoses shall be designed to provide a controlled flow of water to the eye(s) or to a portion of the body at a velocity low enough not to be injurious to the user. Drench hoses shall deliver a minimum of 11.4 liters per minute (3.0 gallons per minute) of water. Hand-held drench hoses may be used in conjunction with safety shower/eyewash stations except that a drench hose is *not* a substitute for safety shower/eyewash stations.

E8.1 Hand-held drench hoses can be used in cases where the user is in an awkward position physically, or to reach parts of the face or body that are inaccessible to the fixed stream of the shower or eyewash. Eyes are usually washed with a spent stream by turning the hose skyward and washing the eye at the point where the stream begins to fall. At this point the stream's velocity is near zero. A flow of 11.4 liters per minute (3.0 gallons per minute) is required if the drench hose is to be used as an auxiliary method of showering someone in a prone position.

Hand-held drench hoses support shower and eyewash units but shall *not* replace them.

8.2 Performance of Control Valve. The valve shall be simple to operate and shall go from "off" to "on" in one second or less. The valve shall be resistant to corrosion from flushing fluid. The valve actuator shall be easy to locate and operate.

8.3 Manufacturer's Performance Testing Procedures. The manufacturer shall test drench hoses as follows:

E.8.3 Attach the drench hose to a 1.3-cm (1/2-inch) water supply line at 0.207 megapascal (30 pounds per square inch) of flow pressure.

(1) Connect a flowmeter to the drench hose to be tested, or provide other means of measuring water flow.

(2) Open the valve on the drench hose and verify that it opens in one second.

(3) Using the flowmeter or other means, determine that the rate of flow is at least 11.4 liters per minute (3.0 gallons per minute) and that the flow of water is at a velocity low enough not to be injurious to the user.

This material is reproduced with permission from American National Standard, copyright ANSI Z358.1-1990 by the American National Standards Institute. Copies of this standard may be purchased from the American National Standards Institute at 1430 Broadway, New York, N.Y. 10018.

8.4 Installation

8.4.1 The unit shall be connected to a supply of flushing fluid. Where the possibility of freezing conditions exists, equipment shall be protected from freezing or freeze-protected equipment shall be installed.

8.4.2 Units shall be installed in accordance with the manufacturer's instructions and acceptable plumbing practices.

8.4.3 Each separate drench hose location shall be identified with a highly visible sign. The area around the drench hose shall be well-lighted and highly visible.

8.5 Maintenance and Training

8.5.1 Drench hoses shall be activated weekly to flush the line and to verify proper operation.

8.5.2 All employees who might be exposed to chemical splash shall be instructed in the proper use of drench hoses.

E8.5.1 Procedures should be established to ensure compliance with 8.5.1.

E8.5.2 Medical and industrial experiences have shown that the initial first aid treatment for chemical splash should be to wash the body for 15 minutes prior to medical treatment with the clothing removed during the showering period.

9. COMBINATION UNITS

9.1 Performance of Combination Units. Combination units shall be designed so all components can be operated individually.

9.1.1 Showers shall meet the performance requirements of Section 4.

9.1.2 Eyewash units shall meet the performance requirements of Section 5.

9.1.3 Eye/face wash units shall meet the performance requirements of Section 7.

9.1.4 Hand-held drench hoses shall meet the performance requirements of Section 8.

9.2 Performance of Control Valve. Each valve shall meet the applicable requirements of Sections 4, 5, 7, and 8, depending on which of the components listed in 9.1 are included.

This material is reproduced with permission from American National Standard, copyright ANSI Z358.1-1990 by the American National Standards Institute. Copies of this standard may be purchased from the American National Standards Institute at 1430 Broadway, New York, N.Y. 10018.

9.3 ***Manufacturer's Performance Testing Procedures.*** The manufacturer shall test each unit individually in accordance with the procedures outlined in Sections 4, 5, 7, and 8, depending on which of the components listed in 9.1 are included.

9.4 ***Installation***

9.4.1 Combination units shall be in accessible locations that require no more than 10 seconds to reach and should be within a travel distance no greater than 30.5 meters (100 feet) from the hazard.

E9.4.1 The unit should be located as close to the hazard as possible without physically causing a hazard itself, such as protruding fittings. The maximum time required to reach the combination unit should be determined by the potential effect of the chemical. For example, exposure to a highly corrosive chemical might require showers to be installed within 3 to 6 meters (10 to 20 feet) from the hazard. It is recommended that the consulting physician or appropriate professional be contacted for advice on the proper distance. Precautions should also be taken to protect the user under frigid conditions, including provisions for the proper disposal of the water. Installation procedures should be in accordance with proper plumbing practices, with supply piping sized adequately to meet flow requirements. (See Appendix A1.)

9.4.2 Each combination unit location shall be identified with a highly visible sign. The area around the combination unit shall be well-lighted and highly visible.

9.4.3 Combination units shall be assembled in accordance with the manufacturer's instructions (if shipped with the components separate).

9.4.4 The unit shall be connected to a system capable of supplying adequate flushing fluid to meet the requirements of each component as outlined in Sections 4, 5, 7, and 8. It is not necessary for all components to operate simultaneously (individual conditions will dictate this requirement).

9.5 ***Maintenance and Training***

9.5.1 Each combination unit shall be activated weekly to flush the line and to verify proper operation.

E9.5.1 Procedures should be established to ensure compliance with 9.5.1.

9.5.2 All employees who might be exposed to chemical splash shall be instructed in the proper use of combination units.

E9.5.2 Medical and industrial experiences have shown that the initial first aid treatment for chemical splash should be to wash the body or eyes, or both, for 15 minutes prior to medical treatment, with the clothing removed during the showering period.

This material is reproduced with permission from American National Standard, copyright ANSI Z358.1-1990 by the American National Standards Institute. Copies of this standard may be purchased from the American National Standards Institute at 1430 Broadway, New York, N.Y. 10018.

APPENDIX A

ADDITIONAL CONDITIONS FOR EMERGENCY EYEWASH AND SHOWER EQUIPMENT

A1. DELIVERED WATER TEMPERATURE

In the body of ANSI Z358. 1-1990, delivered water temperatures for emergency shower and eyewash units have not been specified. This is not to suggest that this important aspect should be ignored; however, a standard of this type cannot predict the atmospheric conditions of each area where units are installed. Each specifying authority has the responsibility to determine the delivered water temperature that will be required in an area, not only to provide the flow of water as required, but also to maintain it at a temperature that will be safe for the user.

Delivered water temperature should not be at extremes that might be expected to discourage the unit's effective use under emergency conditions. A comfortable range is 15°C-35°C (60°F 95°F). In circumstances where chemical reaction is accelerated by water temperature, a medical advisor should be consulted for the optimum temperature for each application.

A2. WATER CAPACITY

It will be noted that throughout ANSI Z358.1-1990 minimum water capacities are rated at an inlet supply pressure of 0.207 megapascal (30 pounds per square inch). This inlet pressure is below what is normally considered a proper level for design of plumbing systems (0.310 megapascal [45 pounds per square inch]), but it has been chosen because meeting the installation requirements may place units at unusual distances from and elevations higher than normal supply lines. In such cases, it is the designer's and specifier's responsibility to ensure proper flushing fluid delivery at possible points of lower pressure in the plumbing system. Excess pressure can deliver water to the equipment producing velocities that could injure the user or render the equipment inoperable. Caution should be exercised with pressure over 0.621 megapascal (90 pounds per square inch).

A3. PRIMARY PROTECTIVE DEVICES

Emergency eyewash, shower, drench hose, and combination units are not a substitute for proper primary protective devices. As a defense against flying solid particles and splashing injurious liquids, workers should wear eye and face protectors and protective clothing.

A4. ALARM DEVICES

In addition to the equipment identification required by ANSI Z358.1-1990, users may also want to use audible alarms or blinking lights to indicate that the unit is in operation. These are particularly important in remote areas. Many companies connect valves electrically to warning lights or buzzers in central dispatch areas to alert the appropriate authorities when the unit is used.

A5. WASTE DISPOSAL

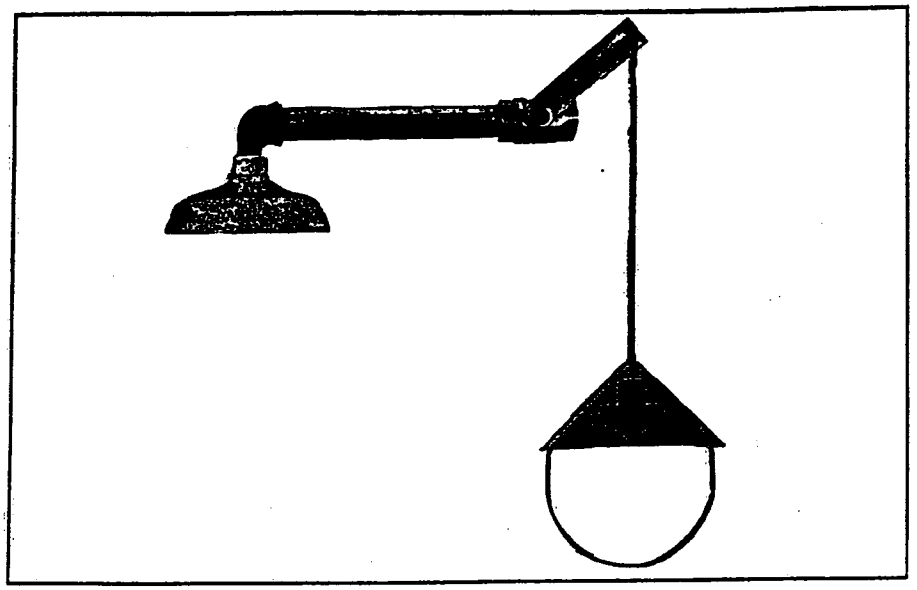
Consideration should be given to the proper disposal of waste flushing fluids from operating emergency eyewash and shower equipment. Freezing temperatures, drainage, elevated showers, and pollutants are some but not all of the considerations. Consult authorities for assistance with local, state, and federal regulations which may apply.

A6. FIRST AID PRACTICES

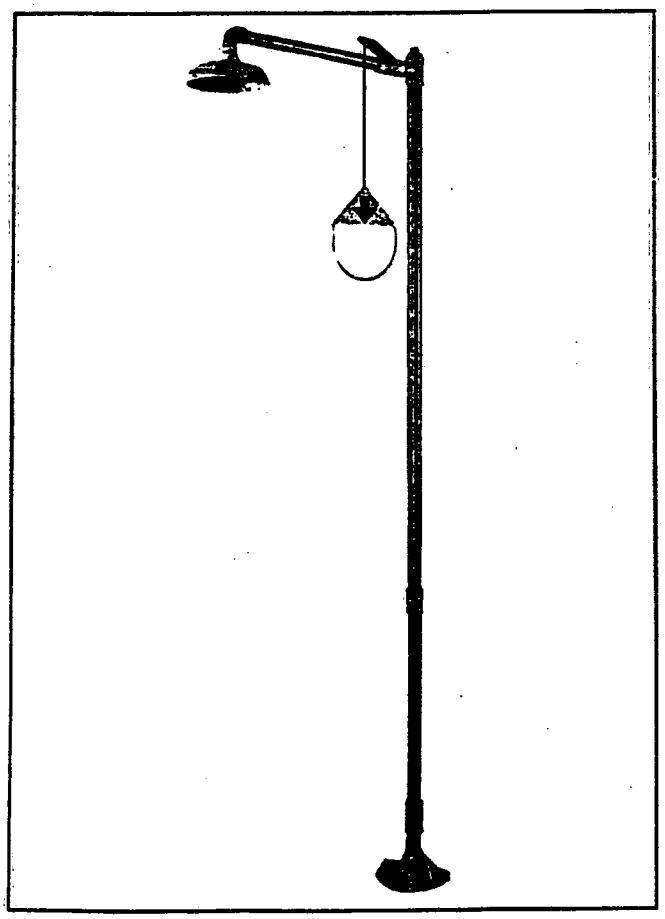
The consulting physician should provide proper first aid practices for use with emergency eyewash and shower equipment and specific workplace hazards.

This material is reproduced with permission from American National Standard, copyright ANSI Z358.1-1990 by the American National Standards Institute. Copies of this standard may be purchased from the American National Standards Institute at 1430 Broadway, New York, N.Y. 10018.

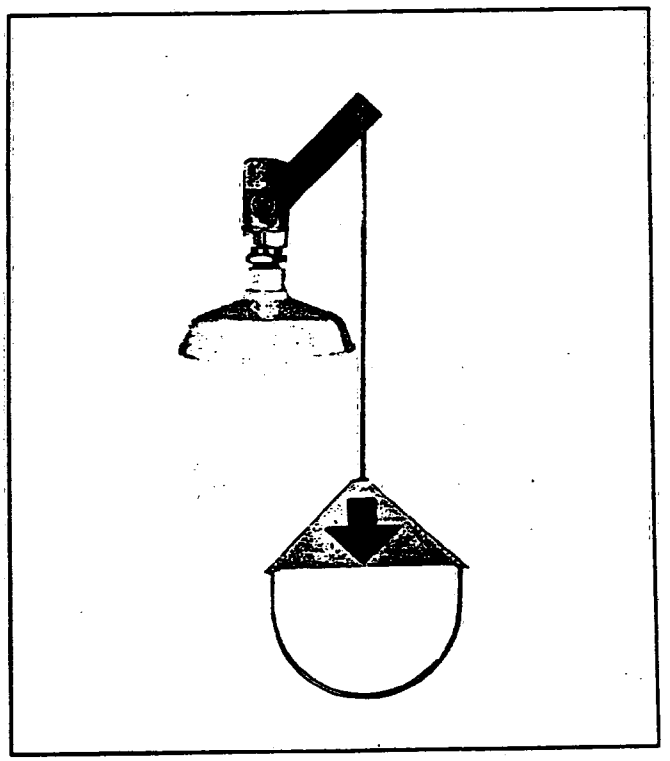
EMERGENCY SHOWER STATIONS



HORIZONTAL SHOWER
Reference Section 4

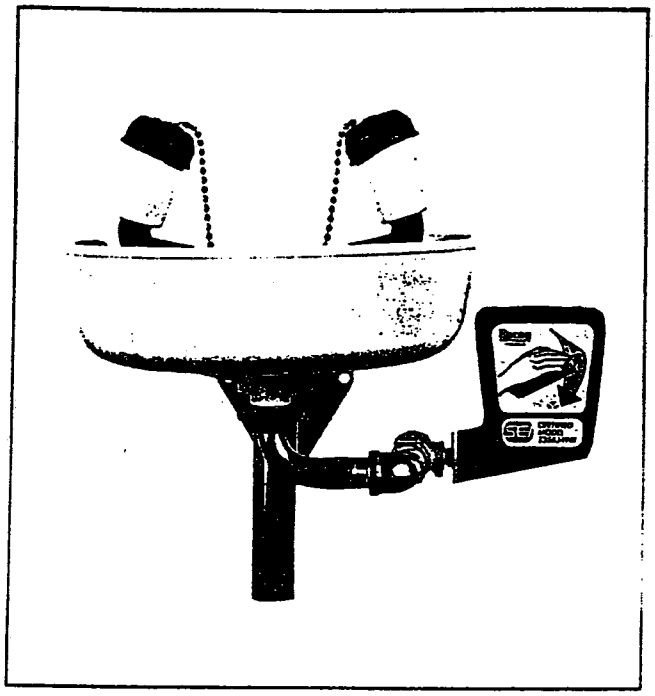


FLOOR MOUNTED SHOWER
Reference Section 4

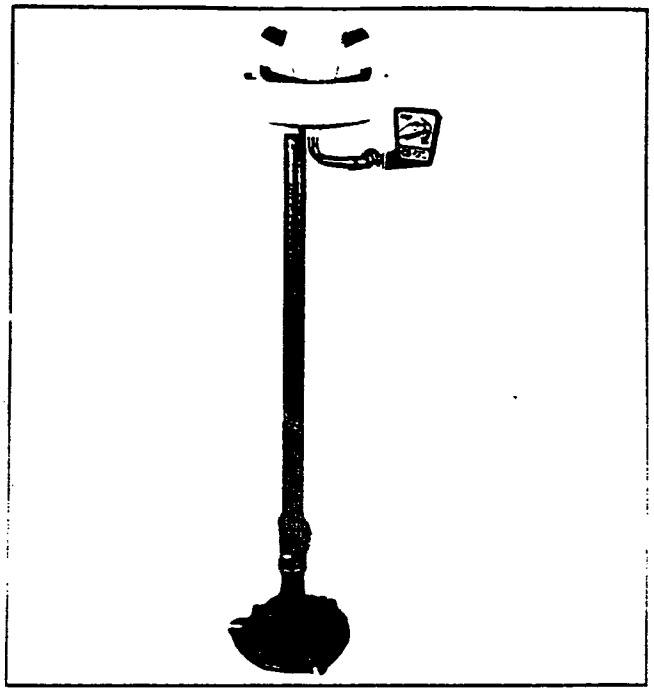


VERTICAL SHOWER
Reference Section 4

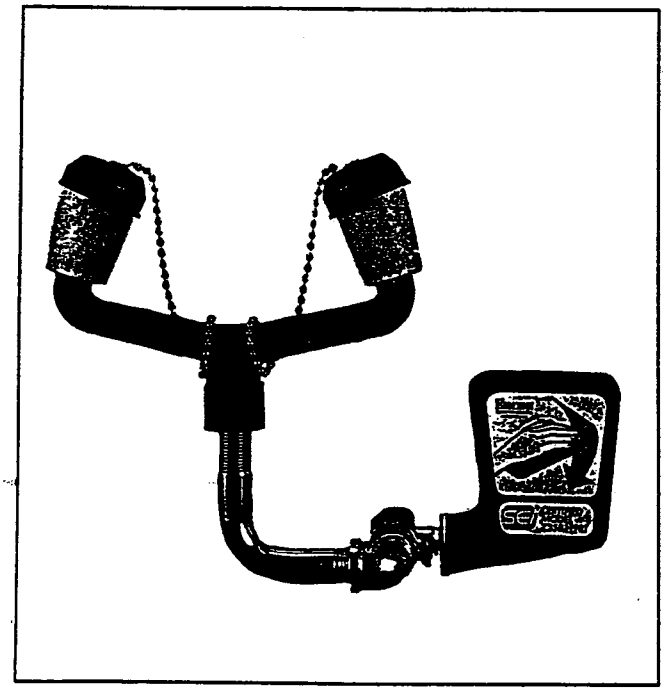
PLUMBED EYEWASH STATIONS



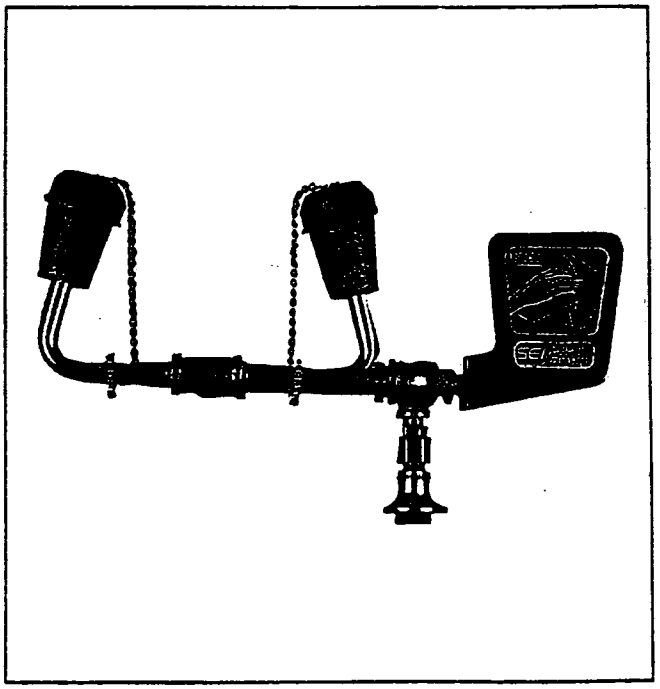
WALL MOUNT EYEWASH STATION
Reference Section 5



FLOOR MOUNT EYEWASH STATION
Reference Section 5

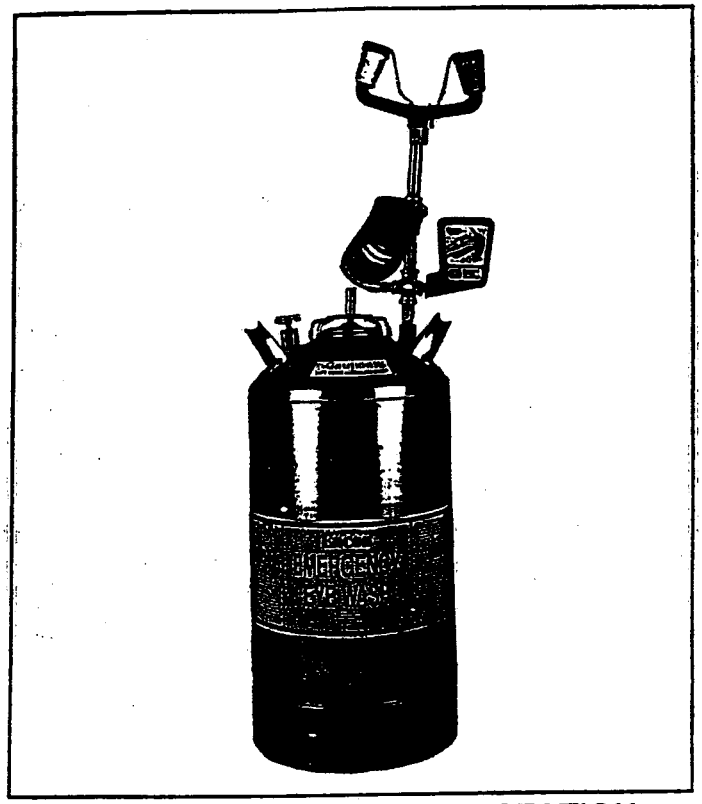


PIPE MOUNT EYEWASH STATION
Reference Section 5

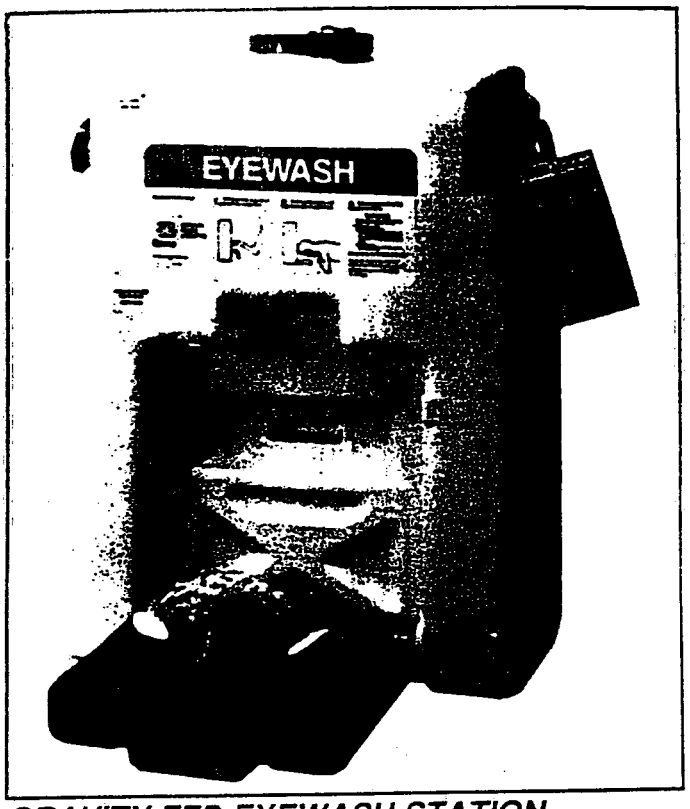


COUNTER TOP MOUNT EYEWASH STATION
Reference Section 5

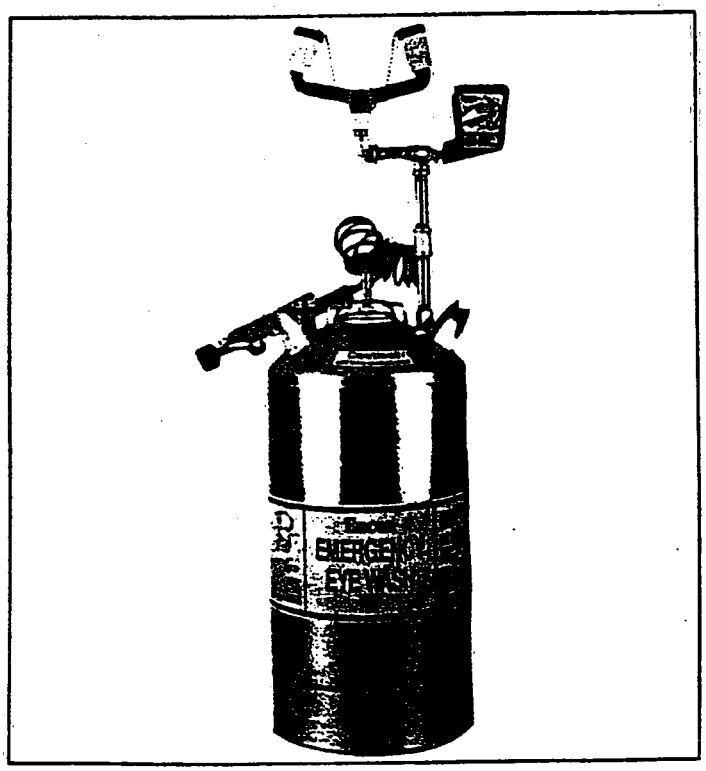
SELF CONTAINED EYEWASH STATIONS



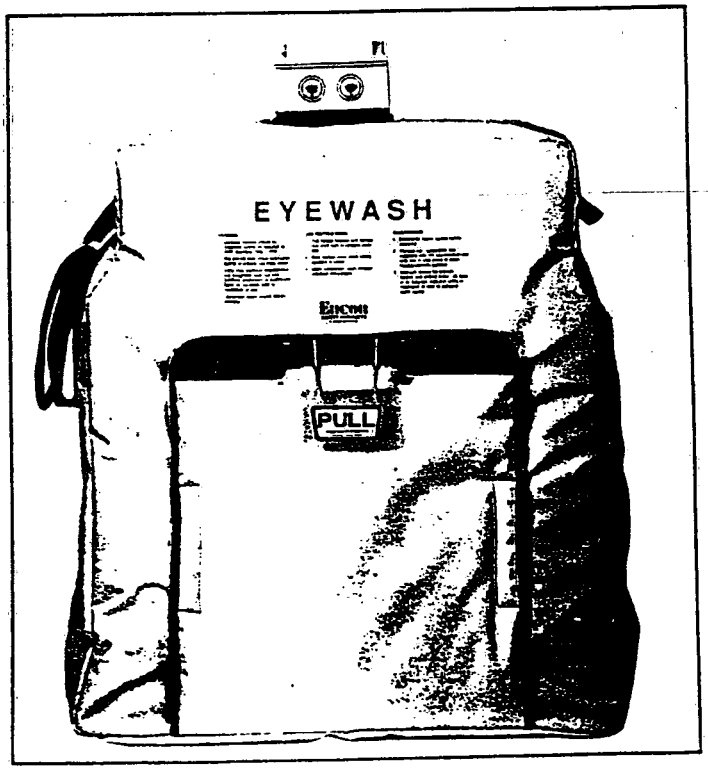
AIR PRESSURIZED EYEWASH STATION
Reference Section 5



GRAVITY FED EYEWASH STATION
Reference Section 5

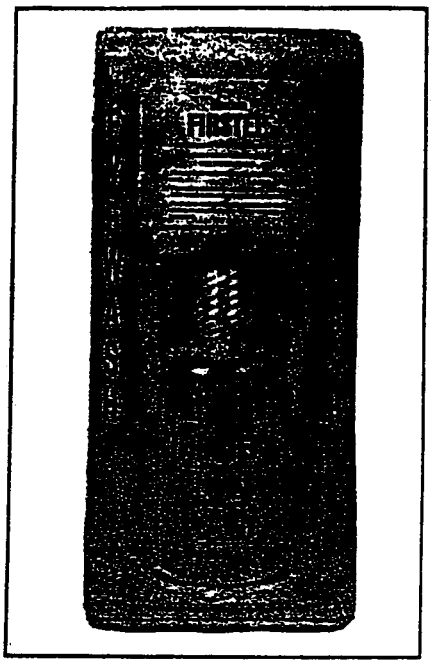


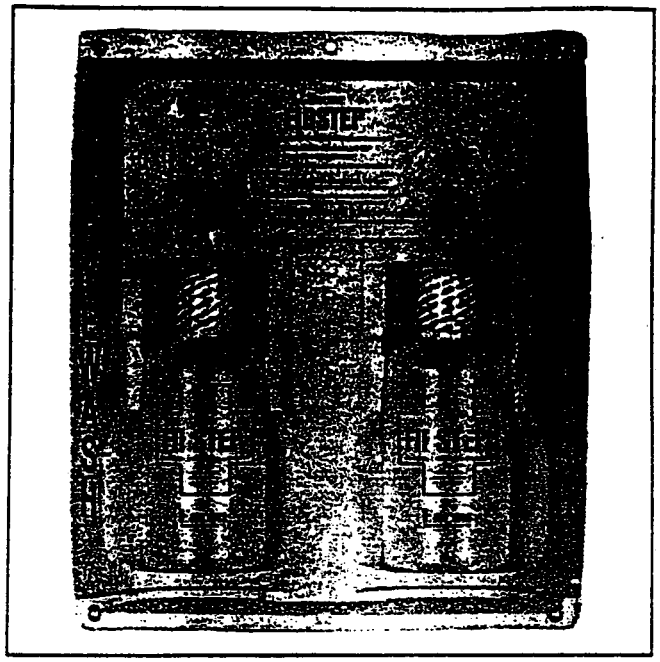
AIR PRESSURIZED EYEWASH / DRENCH HOSE STATION
Reference Section 5



FREEZE PROTECTED EYEWASH STATION
Reference Section 5

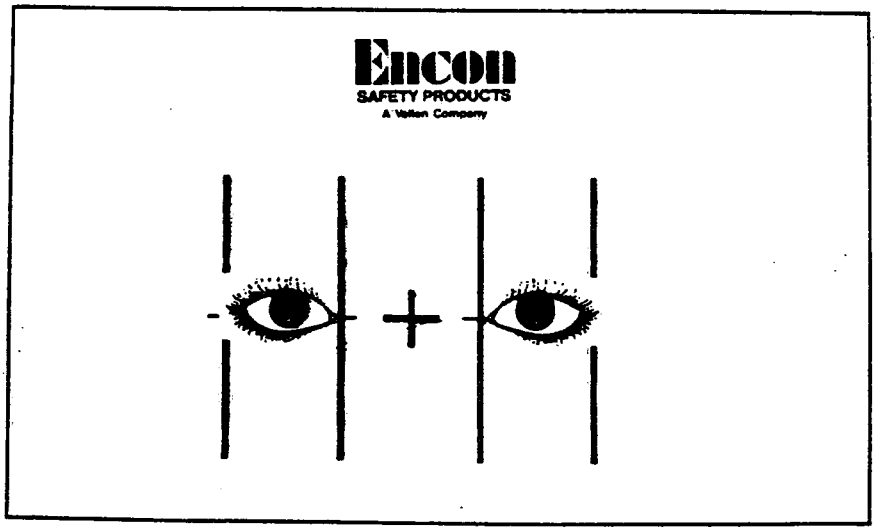
PERSONAL WASH STATIONS - *Reference Section 6*





SINGLE STREAM FIVE MINUTE SUPPLY STATION

BUFFERED SALINE SOLUTION STATIONS



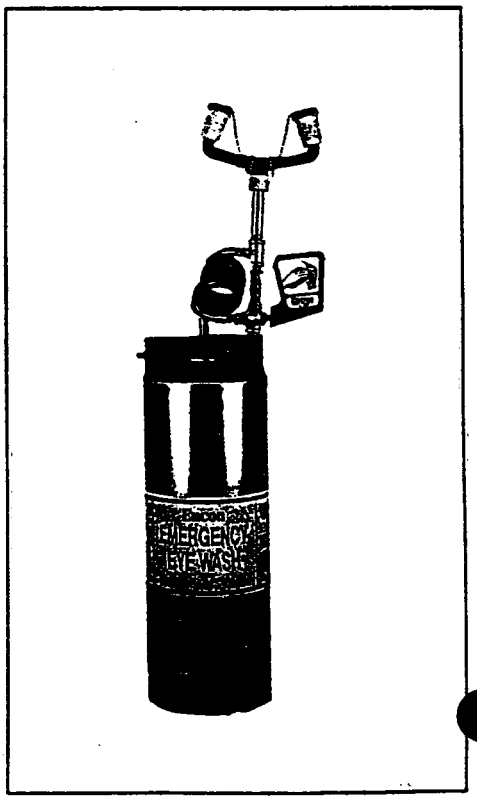
TO TEST EYE/FACE WASH STREAMS:
1) CENTER + OVER RISER STEM BETWEEN FLOW NOZZLES.
2) LOWER TESTER TO HIGHEST NOZZLE FLOW.
3) CONTINUE TO LOWER TESTER VERTICALLY UNTIL BOTH STREAMS MAKE CONTACT.

THE MAXIMUM DISTANCE ALLOWED TO MOVE TESTER VERTICALLY FROM HIGHEST STREAM LEVEL TO LOWEST STREAM LEVEL IS 1-1/2" (3.81cm). THE DISTANCE BETWEEN THE LINES REPRESENTS MAXIMUM AND MINIMUM EYE LOCATIONS PER ANSI STANDARD Z358.1-1990.

PRINTED IN USA

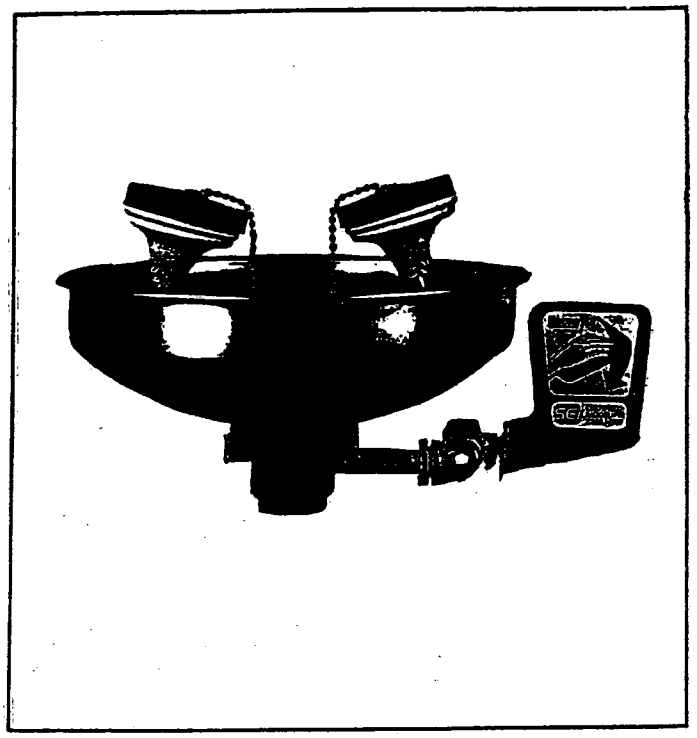
01-1104-69

EYEWASH PATTERN TEST GAGE

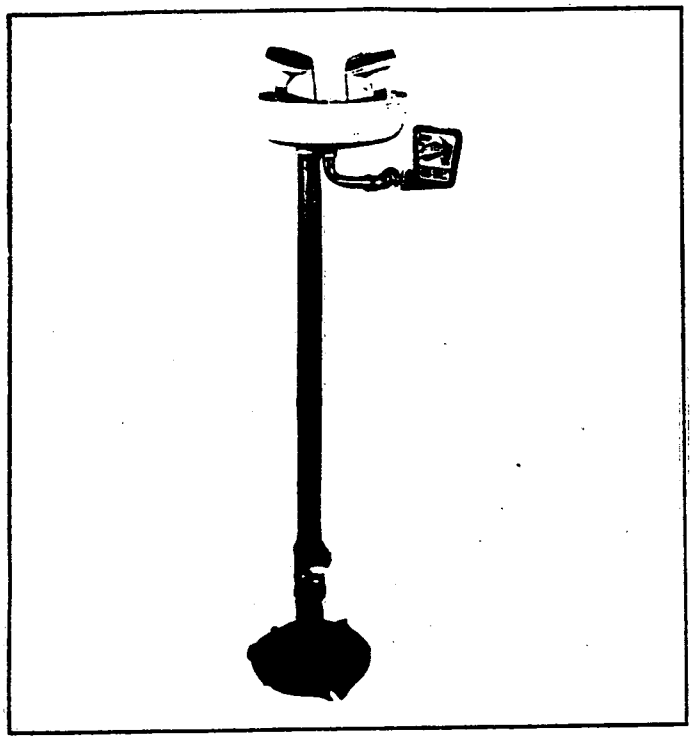


DUAL STREAM FIVE MINUTE SUPPLY

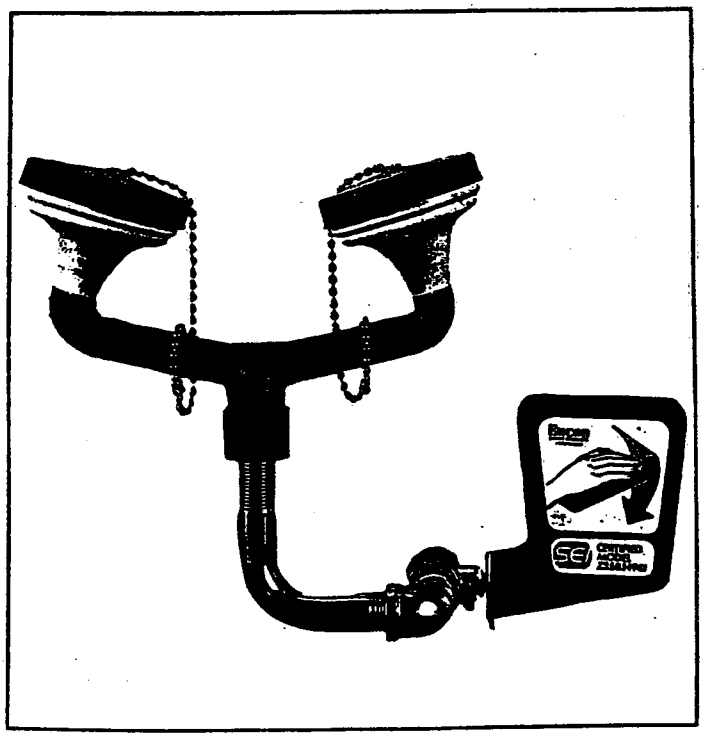
EYE - FACEWASH STATIONS



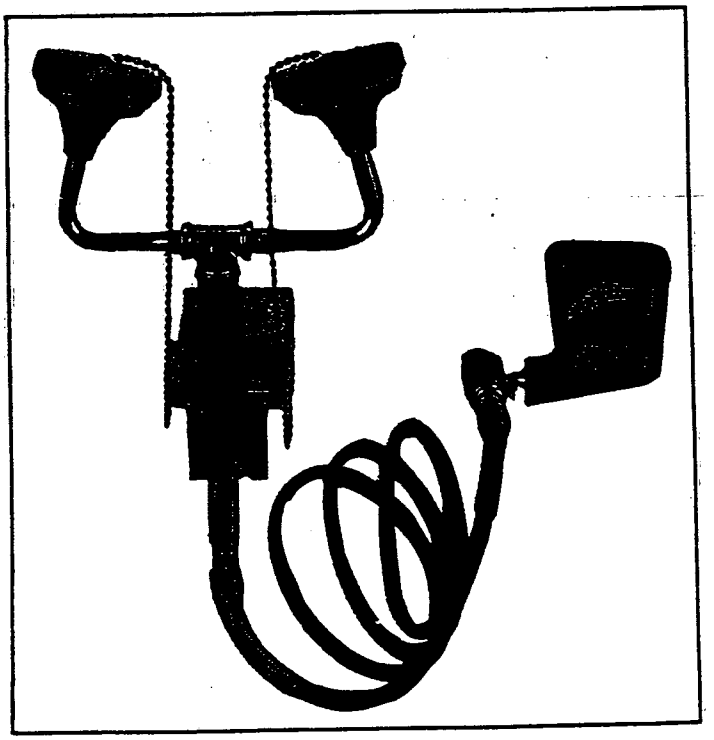
WALL MOUNT EYE-FACEWASH STATION
Reference Section 7



FLOOR MOUNT EYE-FACEWASH STATION
Reference Section 7

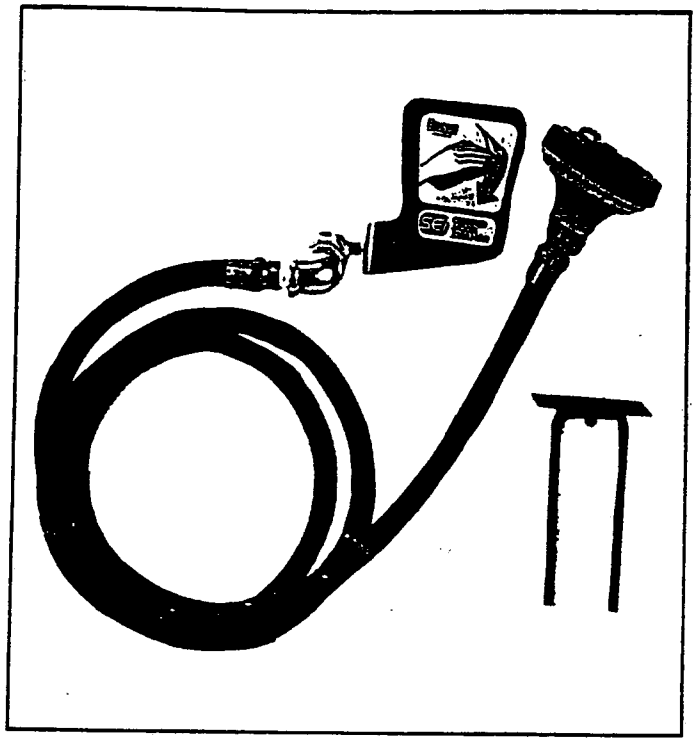


PIPE MOUNT EYE-FACEWASH STATION
Reference Section 7

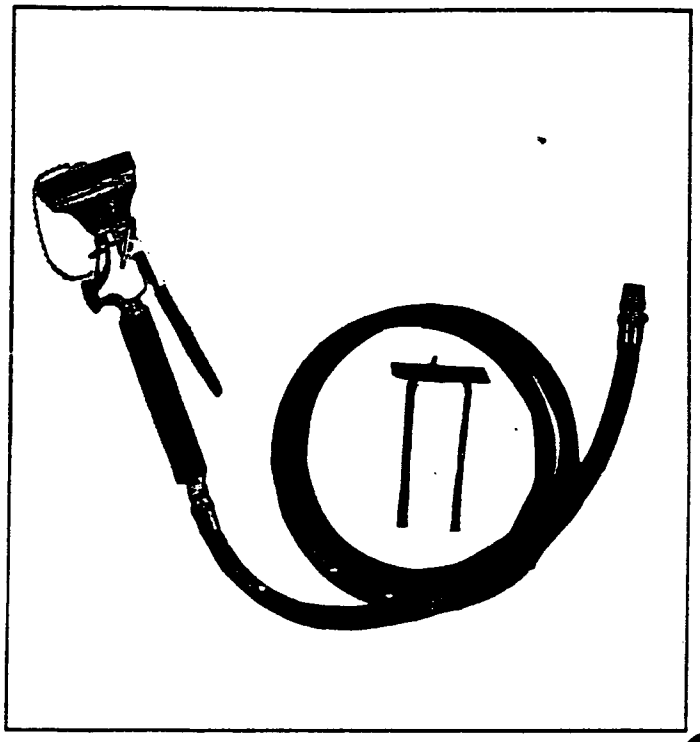


EYE-FACEWASH - DRENCH HOSE STATION

HAND HELD DRENCH HOSE STATIONS

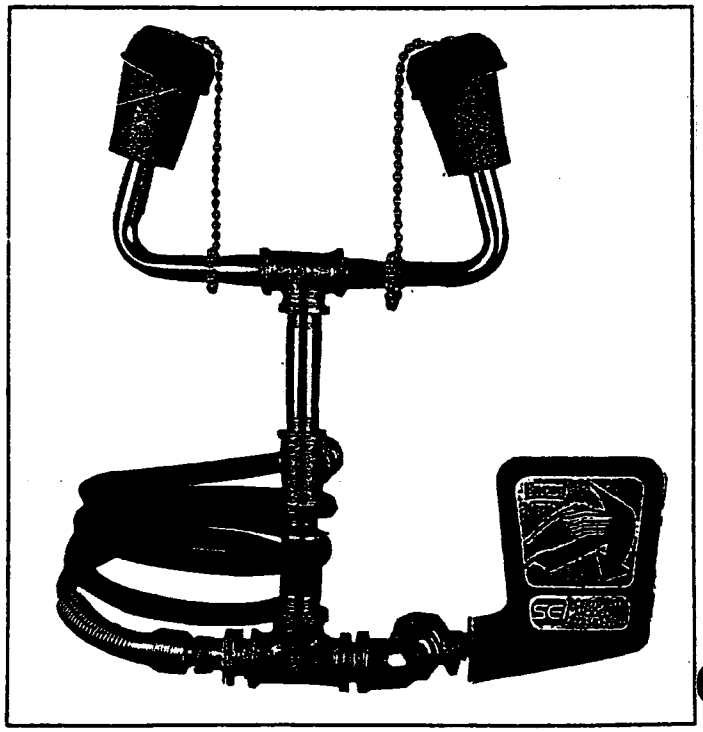


PUSH-PLATE ACTIVATED DRENCH HOSE STATION
Reference Section 8



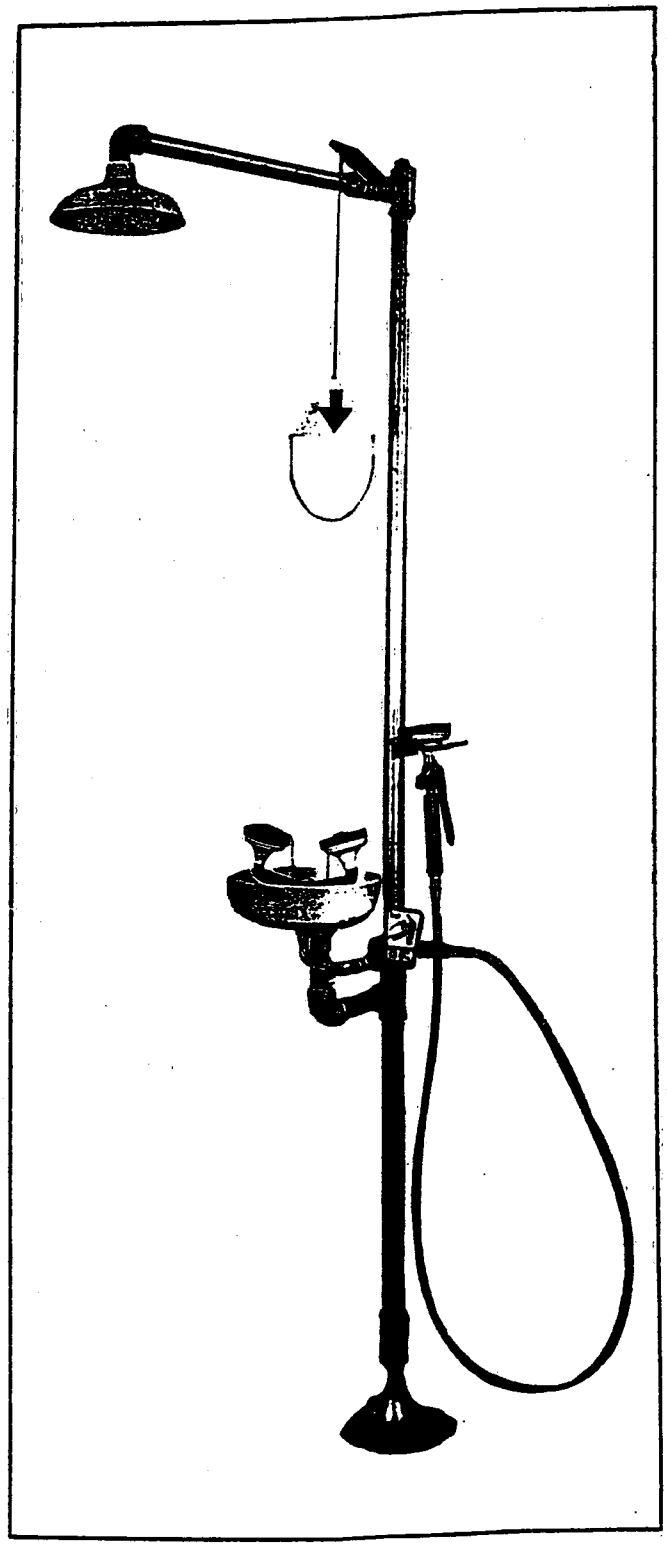
SQUEEZE VALVE ACTIVATED DRENCH HOSE STATION
Reference Section 8

SELF CONTAINED DRENCH HOSE STATION

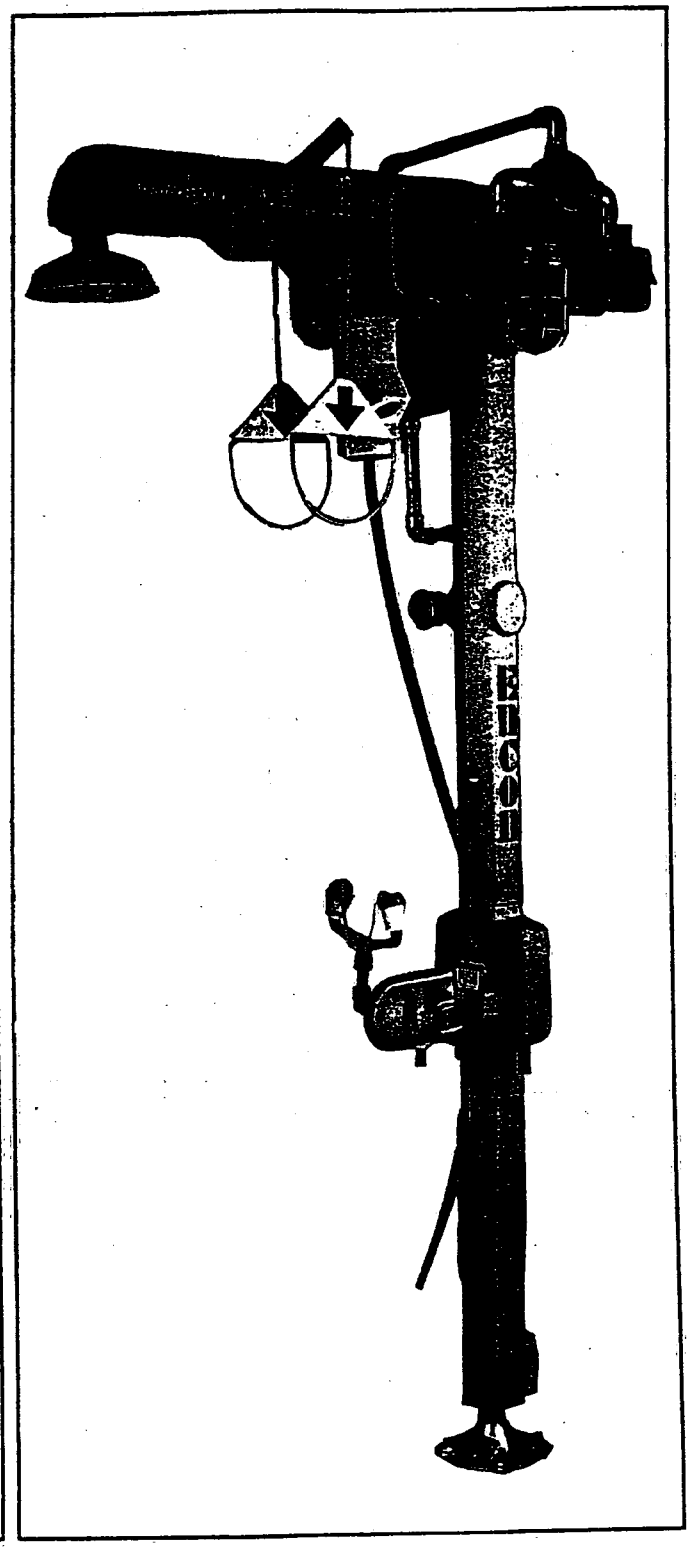


EYEWASH-DRENCH HOSE STATION

COMBINATION STATIONS



COMBINATION SHOWER/
EYE-FACEWASH / DRENCH HOSE
Reference Section 9



FREEZE PROTECTED COMBINATION
SHOWER / EYEWASH / DRENCH HOSE
Reference Section 9

INSPECTION AND TRAINING

TOOLS FOR INSPECTION - Emergency shower and eyewash equipment

1) Shower volume test equipment - water repellent test chute and five gallon (minimum) collection device.

2) Shower pattern tester - measuring device to determine if pattern meets 20" diameter requirement.

3) Eyewash tester - to determine if dual stream rinse is being accomplished.

4) Tape measure - to determine heights of shower heads, eyewash heads, and target area clearance.

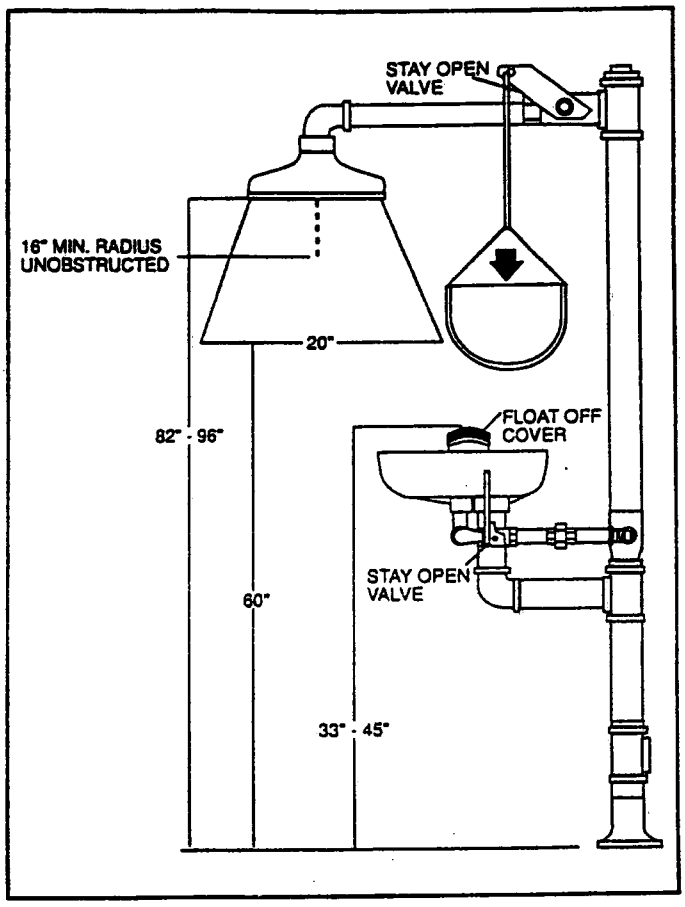
5) Watch - used in shower volume testing process.

6) Thermometer - to record water temperatures.

7) ANSI Z358.1 - 1990 checklist - to record findings of compliance, non compliance, observations and recommendations (see inside back cover).

8) Radio - to contact control room to confirm remote alarm and local alarm annunciation.

9) Towels, boots, rain gear, chemical splash goggles, safety glasses and other required safety equipment.



ANSI Z358.1-1990 Dimensional Requirements

TRAINING AND USE INSTRUCTIONS -

All employees that may be exposed to hazardous chemicals in the work place shall receive instruction in the proper use of emergency shower and eyewash equipment, per ANSI Z358.1 - 1990 standard.

Consult the staff medical and safety authorities for specific training instruction and requirements at each facility.

Important points to remember:

1) Remove protective equipment (gloves, glasses, goggles, clothing, hard hats) **after** the shower/ eyewash station has been activated, to rinse away any chemical that may remain on the equipment and potentailly contact the eyes or skin if removed prematurely.

2) Remove all affected clothing **during** the irrigation process to properly rinse the affected tissue.

3) For chemical splashes to the eyes, it is important to hold both eye lids open and roll the eyeballs so water will flow on all surfaces and in the folds surrounding the eyeballs.

4) From medical and industrial experiences, a **minimum** fifteen minute period is recommended for initial first-aid irrigation and dilution of a chemical splash to the eyes, face and body. It is important to consider all elements that may impede the time and volume requirements from being completed. These include water pressure, pipe sizing, water temperature, modesty concerns, accessibility of post-irrigation clothing, and alarm devices to alert personnel that assistance is required.

EMERGENCY EYEWASH AND SHOWER EQUIPMENT SURVEY AND INSPECTION FORM
ANSI Z358.1-1990

LOCATION			DESCRIPTION
UNIT	BLOCK	TAG NUMBER	TYPE OF EQUIPMENT
HAZARDS			

DESCRIPTION	SHOWER PERFORMANCE REQUIREMENTS	COMPLIES	DOES NOT COMPLY
Shower Height	Not less than 82" nor more than 96" from standing level		
Water Spray Pattern	20" minimum diameter - 60" from standing level		
Center of Water Spray	16" from any obstruction		
Water Delivery - Potable	Minimum of 20 GPM/meeting water spray pattern		
Control Valve & Actuator	Stay ON type - OFF to ON one second - easily located		
Location to Hazard	Maximum 10 seconds travel and within 100' of hazard		
Identification	Well lighted, sign, area highly visible		

DESCRIPTION	EYE/FACE WASH PERFORMANCE REQUIREMENTS	COMPLIES	DOES NOT COMPLY
Water Delivery - Potable	Minimum of 0.4 GPM - dual stream flushing		
Velocity	Soft Spent stream		
Location to Hazard	Maximum 10 seconds travel and within 100' of hazard		
Nozzles	Covers to protect from airborne contaminents		
Nozzle Height	Not less than 33" nor more than 45" from standing level		
Control Valve & Actuator	Stay-on type - OFF to ON one second - easily located		
Identification	Well lighted, sign, area highly visible		

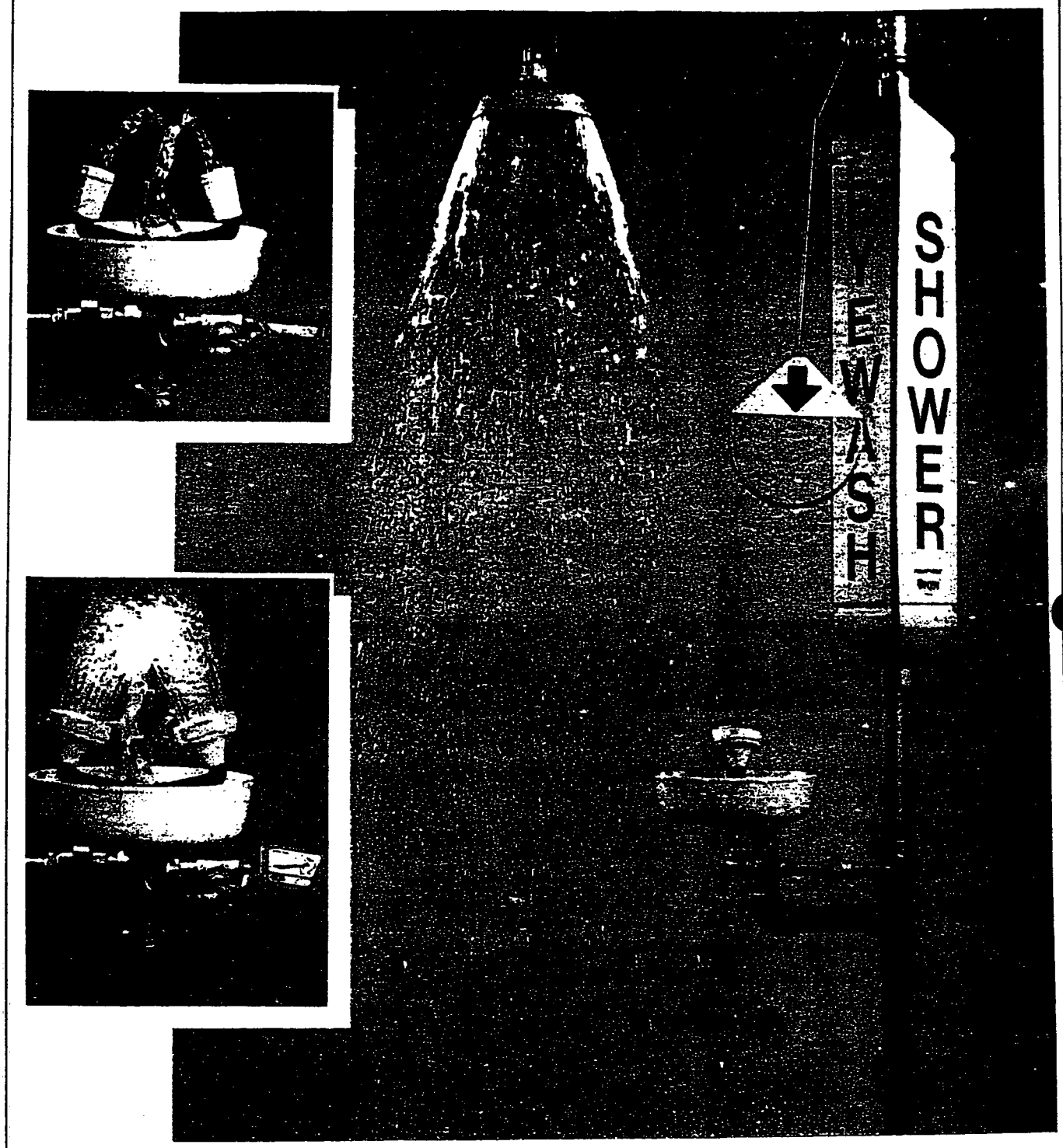
DESCRIPTION	DRENCH HOSE PERFORMANCE REQUIREMENTS	COMPLIES	DOES NOT COMPLY
Water Delivery - Potable	Minimum of 3 GPM - low velocity		
Location to Hazard	Maximum 10 seconds travel and within 100' of hazard		
Control Valve	Stay-on type - OFF to ON one second - easily located		

DESCRIPTION	OTHER REQUIREMENTS	COMPLIES	DOES NOT COMPLY
Inspection	Monthly record SHOULD be maintained		
Maintenance	Each unit activated weekly to flush line and verify flow		
Training	Instruct all employees on proper use of equipment		

OBSERVATIONS AND CORRECTIVE ACTION	
GENERAL OBSERVATION	ACTION TO BE TAKEN

DESCRIPTION	OTHER CONSIDERATIONS REQUIREMENTS	GENERAL COMMENTS
Delivered water temperature	60° to 95°F	
Freeze Protection Required	Mechanical vs. Electrical	
Protection from hostile environments	Enclosure - Heated/Non Heated	
Alarms required	Local and/or Remote	
Modesty Requirements	Not to discourage use of equipment	
Medical assistance	In plant vs. Outside	
Emergency vehicle	Internal vs. External	

EVALUATION PERFORMED BY _____ DATE _____



EMERGENCY SHOWER, EYEWASH AND EYE- FACEWASH FLOW PATTERNS

Encon®
SAFETY PRODUCTS
A Vallen Company
6825 W. Sam Houston Pkwy. N. [illegible]
P.O. Box 3826 • Houston, Texas [illegible]
Phone [illegible]
Fax (713) 466-1819 • Telex [illegible]

AMENDMENT 1
COLD WEATHER STRESS

2.4.6 Cold Stress - FLD06

Health and Safety Plan Operating Procedures

Field Operating Procedure - FLD06 - Cold Stress

Related SPOPSFLDS:

FLD02	Inclement Weather
FLD07	Wet Feet
FLD15	Remote Areas
FLD17	Diving
FLD18	Using Boats
FLD19	Working Over Water
FLD25	Working at Elevations

2.4.6.1 Hazard

Persons working outdoors in low temperatures (normally < 40 F), and especially at or below freezing, are subject to cold stress. Exposure to extreme cold for a short time can cause severe injury to the surface of the body, or result in profound generalized cooling, which, unchecked could ultimately cause death. Areas of the body that have high surface area-to-volume ratios such as fingers, toes, and ears, are the most susceptible.

Chemical protective clothing generally does not afford protection against cold stress. In many instances, it increases susceptibility. Chemical hazard site workers must learn to dress carefully to provide chemical protection and thermal insulation while not dressing so warmly that exercise or strenuous activity will result in cold stress.

Body heat is conserved through the constriction of surface blood vessels. This constriction reduces circulation at the skin layers and keeps blood nearer the body core.

Loss of body heat can occur through:

1. Respiration: In extreme cold, cover the mouth and nose with wool or fur to "pre-warm" the air you breath.

2. Evaporation: Wear layered clothing, remove outer layers prior to sweating to avoid soaking clothing. Replace layers prior to becoming chilled. Wear clothing that will "breath" or allow water vapor to escape to reduce cooling effect of evaporation.

3. Conduction: Sitting on snow, touching cold equipment and being rained on are examples of how heat can be lost by conduction. Extreme amounts of heat are lost rapidly when a person becomes wet. Deaths from hypothermia have occurred in immersion in water at temperatures of 40 degrees F or lower. Perspiration or rain should never be allowed to saturate clothing, such soaking will seriously reduce the insulative properties of the clothing in addition to increasing heat loss. Most clothing losses approximately 90 percent of their insulative properties when wet.

4. Radiation: The greatest amounts of body heat are lost from uncovered surfaces of the body, especially the head, neck and hands. Covering these areas is, therefore, extremely important.

5. Convection: The body continually heats a thin layer of air next to the skin. As long as this warm air is retained next to the body it will remain warm. If this warm air is removed by air currents (wind) then the body will be cooled attempting to rewarm the surface air. The primary function of clothing is to retain this warm surface layer of air while allowing water vapor to pass through. Ensure that clothing remains secure around the body especially the neck and waist. Wind Chill or Equivalent Chill Temperature Indices describe the chilling effect of moving air in combination with low temperature.

Two major factors which influence the potential of cold injury are: ambient temperature and wind velocity. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. Additionally, water conducts heat 240 times faster than air; thus, the body cools suddenly when protective equipment is removed if the clothing underneath is perspiration soaked.

Tables 1 and 2 should be consulted to adjust working schedules for wind chill conditions. These tables are meant as guides only; ambient temperatures and wind conditions should be monitored frequently and work schedules adjusted as required. Workers' physical symptoms or condition will also be an indicator to modify work schedule.

2.4.6.2 Recognition and Risk Assessment

In the planning stages of a project and safety plan, the potential for cold stress disorders must be considered as physical hazards in the site specific Health and Safety Plan (HASP). Risk assessment can be accomplished in the development stages of a project by listing in the HASP the most likely cold stress disorders which may occur. The true determination of risk must often be made on-site by the Site Health and Safety Coordinator (SHSC). It is important that the SHSC is alert to these hazards, does not take them simply as a matter of fact, and has time to notice them. Two common cold stress disorders and treatment methods are identified below.

Frostbite

Local injury resulting from cold is included in the generic term frostbite. By definition, frostbite is the freezing of tissue, however, typically several stages are recognized based upon the degree of injury. Frostbite most commonly affects the toes, fingers and face and occurs when an extremity loses heat faster than it can be replaced by the circulating blood. Frostbite may also result from direct exposure to extreme cold or high wind as happens with the nose, ears, and hands. Damp feet may freeze because of the conduction of heat away from the skin's surface.

Frostbite of the extremities can occur in three forms:

- Frost nip or incipient frostbite is characterized by sudden blanching or whitening of skin.
- Superficial frostbite is characterized by skin with a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- Deep frostbite is characterized by tissues that are cold, pale or darkened, and solid.

Treatment for frostbite:

- Move the victim indoors and/or away from additional exposure to cold, wet and wind.
- Superficially frostbitten areas are best warmed by placing them next to warm skin. The basic tenant to rewarming frostbitten areas is to not raise the temperature much above that of the body. The abdomen and the armpit are body areas which can be used to rewarm frostbitten areas. Water at 99 to 104 degrees F can be used. Avoid fires, hot water, external heaters.
- Give a warm drink - water or juices, not coffee, tea or alcohol. The victim must not smoke.
- If using water to rewarm the affected areas keep the frozen parts in warm water until all paleness has turned to pink or burgundy red but no longer. Remember, the tissue will be very painful as it thaws.
- After rewarming, elevate the injured area and protect it from injury.
- Do not allow blisters to be broken.
- Use sterile, soft, dry material to cover the injured areas.

- Keep victim warm and obtain medical care as necessary.
- Do **not** rub the frostbitten part (this may cause gangrene).
- Do **not** use ice, snow, gasoline or anything cold on the frostbitten area.
- Do **not** use heat lamps or hot water bottles to rewarm the part.
- Do **not** place the part near a hot stove.

Hypothermia

Systemic hypothermia occurs when body heat loss exceed body heat gain and the body core temperature falls below the normal 99 degrees. While many hypothermia cases are caused by extremely cold temperatures one must remember that most cases develop in air temperatures between 30 and 50 degrees F especially when compounded with water immersion, or soaking, and windy conditions.

Symptoms of hypothermia can include one or more of the following listings. Remember that the victim of hypothermia may not know, or refuse to admit, that he or she is undergoing signs of hypothermia. All personnel must be observant for these signs for themselves and for other team members.

- Uncontrolled fits of shivering.
- Vague, slow, slurred speech.
- Irrational actions.
- Memory lapses.
- Incoherence.
- Fumbling hands, frequent stumbling, lurching gait.
- Apathy, listlessness, and sleepiness, inability to get up after a rest.
- Unconsciousness, glassy stare, slow pulse and slow respiration.
- Death.

Below the critical body core temperature of 95 degrees F the victim cannot produce enough body heat by himself to recover. At this point emergency measures must be taken to reverse the drop in core temperature. The victim can slip into hypothermia in a matter of minutes and can die in less than 2 hours after the first signs of hypothermia are detected. Treatment and medical assistance are critical.

Treatment for hypothermia:

- Prevent further heat loss by moving the person to a warmer location out of the wind, wet and cold.
- Remove cold wet clothing. If necessary, based upon the victims condition, external sources of heat (e.g., warm blankets, warm water baths, or body contact) will be necessary to rewarm the victim.
- If the victim is conscious, provide warm liquids, candy or sweetened foods. Carbohydrates are the food most quickly transformed into heat and energy. No alcohol or caffeine.
- Keep the victim awake, monitor ABCs, perform first aid as appropriate and obtain medical assistance soon as possible.

2.4.6.3 Prevention and Protection Programs

Site workers must learn to recognize and treat the various forms of cold stress. The best approach is preventative cold stress management such as in the following:

- Wear loose, layered clothing, masks, woolen scarves and hats in extreme cold weather.
- Keep clothes dry by wearing water and wind resistant clothing and footwear.
- Eat well-balanced meals, ensure adequate intake of liquids and avoid alcoholic beverages. Dehydration will increase risk of cold stress.
- Have warm shelter available and implement work-rest schedules.
- Monitor yourself and others for changes in physical and mental conditions.
- If wearing face protector remove periodically to check for frostbite.
- Never touch cold metal with bare hands.

Work/Warming Regimen

If work is performed continuously in the cold at an equivalent chill temperature (ECT) or below -7°C (19.4°F), heated warming shelters, tents, cabins, rest rooms, etc., should be made available nearby. The workers should be encouraged to use these shelters at regular intervals, the frequency depending on the severity of the environmental exposure. The onset of heavy shivering, frostnip, the feeling of excessive fatigue, drowsiness, irritability, or euphoria are indications for immediate return to the shelter. When entering the heated shelter, the outer layer of clothing should be removed and the remainder of the clothing loosened to permit sweat evaporation or a change of dry work clothing provided. A change of dry work clothing should be provided as necessary to prevent workers from returning to work with wet clothing. Dehydration, or the loss of body fluids, occurs insidiously in the cold environment and may increase the susceptibility of the worker to cold injury due to a significant change in blood flow to the extremities. Warm sweet drinks and soups should be provided at the work site to provide caloric intake and fluid volume. The intake of coffee should be limited because of the diuretic and circulatory effects.

For work practices at or below -12°C (10.4°F) ECT, the following should apply:

- The worker should be under constant protective observation (buddy system or supervision).

- The work rate should not be so high as to cause heavy sweating that will result in wet clothing; if heavy work must be done, rest periods must be taken in heated shelters and opportunity for changing into dry clothing should be provided.

- New employees should not be required to work full-time in the cold during the first days of employment until they become accustomed to the working conditions and required protective clothing.

- The weight and bulkiness of clothing should be included in estimating the required work performance and weights to be lifted by the worker.

- The work should be arranged in such a way that sitting still or standing still for long periods is minimized. The worker should be protected from drafts to the greatest extent possible.

- The workers should be instructed in safety and health procedures. The training program should include, as a minimum, instruction in:

  - Proper rewarming procedures and appropriate first aid treatment.

  - Proper clothing practices.

- Proper eating and drinking habits.

- Recognition of signs and symptoms of impending hypothermia or excessive cooling of the body even when shivering does not occur.

- Safe work practices.

Table 1

Cooling Power of Wind on Exposed Flesh Expressed as Equivalent Temperature*

Estimated Wind Speed (mph)	Actual Temperature Reading (°F)								
	50	40	30	20	10	0	-10	-20	-30
	Equivalent Chill Temperature (°F)								
Calm	50	40	30	20	10	0	-10	-20	-30
5	48	37	27	16	6	-5	-15	-26	-36
10	40	28	16	4	-9	-24	-33	-46	-58
15	36	22	9	-5	-18	-32	-45	-58	-72
20	32	18	4	-10	-25	-39	-53	-67	-82
25	30	16	0	-15	-29	-44	-59	-74	-88
30	28	13	-2	-18	-33	-48	-63	-79	-94
35	27	11	-4	-20	-35	-51	-67	-82	-98
40	26	10	-6	-21	-37	-53	-69	-85	-100
(Wind speeds greater than 40 mph have little additional effect.)	**LITTLE DANGER** In < 1 hour with dry skin. Maximum danger of false sense of security.				**INCREASING DANGER** Danger from freezing of exposed flesh within 1 minute.			**GREAT** Flesh may fre	
	Trenchfoot and immersion foot may occur at any point on this								

* Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.

Table 2

Cold Work/Warmup Schedule for 4-Hour Shifts,

Equivalent Chill Temperature	Maximum Work Period	No. of Breaks
≥-24°F	Normal	1
-25° to -30°F	75 minutes	2
-31° to -35°F	55 minutes	3
-36° to -40°F	40 minutes	4
-41° to -45°F	30 minutes	5
≤-46°F	Stop work	Stop work

OSHA Fact Sheets
12/22/1998 - Protecting Workers in Cold Enviroments

OSHA Fact Sheets - Table of Contents

- **Record Type:** Fact Sheets
- **Subject:** Protecting Workers in Cold Enviroments
- **Information Date:** 12/22/1998
- **Fact Sheet:** 98-55

Fact Sheet: Protecting Workers in Cold Environments

U.S. Department of Labor
Occupational Safety and Health Administration

December 1998

As the weather becomes "frightful" during winter months, workers who must brave the outdoor conditions face the occupational hazard of exposure to the cold. Prolonged exposure to freezing temperatures can result in health problems as serious as trench foot, frostbite, and hypothermia. Workers in such industries as construction, commercial fishing and agriculture need to be especially mindful of the weather, its effects on the body, proper prevention techniques, and treatment of cold-related disorders.

The Cold Environment

An individual gains body heat from food and muscular activity and loses it through convection, conduction, radiation and sweating to maintain a constant body temperature. When body temperature drops even a few degrees below its normal temperature of 98.6°F (37°C), the blood vessels constrict, decreasing peripheral blood flow to reduce heat loss from the surface of the skin. Shivering generates heat by increasing the body's metabolic rate.

The four environmental conditions that cause cold-related stress are low temperatures, high/cool winds, dampness and cold water. Wind chill, a combination of temperature and velocity, is a crucial factor to evaluate when working outside. For example, when the actual air temperature of the wind is 40°F (4°C) and its velocity is 35 mph, the exposed skin receives conditions equivalent to the still-air temperature being 11°F (-11°C)! A dangerous situation of rapid heat loss may arise for any individual exposed to high winds and cold temperatures.

Major Risk Factors for Cold-Related Stresses

- Wearing inadequate or wet clothing increases the effects of cold on the body.

covered with dry, sterile gauze or soft, clean cloth bandages. Do not massage frostbitten tissue because this sometimes causes greater injury. Severe cases may require hospitalization and even amputation of affected tissue. Take measures to prevent further cold injury. If formal medical treatment will be delayed, consult with a licensed health care professional for training on rewarming techniques.

General Hypothermia occurs when body temperature falls to a level where normal muscular and cerebral functions are impaired. While hypothermia is generally associated with freezing temperatures, it may occur in any climate where a person's body temperature falls below normal. For instance, hypothermia is common among the elderly who live in cold houses.

Symptoms:

The first symptoms of hypothermia, shivering, an inability to do complex motor functions, lethargy, and mild confusion, occur as the core body temperature decreases to around 95°F (35°C).

As body temperature continue to fall, hypothermia becomes more severe. The individual falls into a state of dazed consciousness, failing to complete even simple motor functions. The victim's speech becomes slurred and his or her behavior may become irrational.

The most severe state of hypothermia occurs when body temperature falls below 90°F (32°C). As a result, the body moves into a state of hibernation, slowing the heart rate, blood flow, and breathing. Unconsciousness and full heart failure can occur in the severely hypothermic state.

Treatment:

Treatment of hypothermia involves conserving the victim's remaining body heat and providing additional heat sources. Specific measures will vary depending upon the severity and setting (field or hospital). Handle hypothermic people very carefully because of the increased irritability of the cold heart. Seek medical assistance for persons suspected of being moderately or severely hypothermic.

If the person is unresponsive and not shivering, assume he or she is suffering from severe hypothermia. Reduction of heat loss can be accomplished by various means: obtaining shelter, removal of wet clothing, adding layers of dry clothing, blankets, or using a pre-warmed sleeping bag.

For mildly hypothermic cases or those more severe cases where medical treatment will be significantly delayed, external rewarming techniques may be applied. This includes body-to-body contact (e.g., placing the person in a prewarmed sleeping bag with a person of normal body temperature), chemical heat packs, or insulated hot water bottles. Good areas to place these packs are the armpits, neck, chest, and groin. It is best to have the person lying down when applying external rewarming. You also may give mildly hypothermic people warm fluids orally, but avoid beverages containing alcohol or caffeine.

<u>Preventing Cold-Related Disorders</u>

Personal Protective Clothing is perhaps the most important step in fighting the elements is

providing adequate layers of insulation from them. Wear at least three layers of clothing:

-- An outer layer to break the wind and allow some ventilation (like Gortex® or nylon);

-- A middle layer of down or wool to absorb sweat and retain insulation when wet.

-- An inner layer of cotton or synthetic weave to allow ventilation.

Pay special attention to protecting feet, hands, face and head. Up to 40 percent of body heat can be lost when the head is exposed. Footgear should be insulated to protect against cold and dampness. Keep a change of clothing available in case work garments become wet.

Engineering Controls in the workplace through a variety of practices help reduce the risk of cold-related injuries.

- Use an on-site source of heat, such as air jets, radiant heaters, or contact warm plates.
- Shield work areas from drafty or windy conditions.
- Provide a heated shelter for employees who experience prolonged exposure to equivalent wind-chill temperatures of 20°F (-6°C) or less.
- Use thermal insulating material on equipment handles when temperatures drop below 30°F (-1°C).

Safe Work Practices, such as changes in work schedules and practices, are necessary to combat the effects of exceedingly cold weather.

- Allow a period of adjustment to the cold before embarking on a full work schedule.
- Always permit employees to set their own pace and take extra work breaks when needed.
- Reduce, as much as possible, the number of activities performed outdoors. When employees must brave the cold, select the warmest hours of the day and minimize activities that reduce circulation.
- Ensure that employees remain hydrated.
- Establish a buddy system for working outdoors.
- Educate employees to the symptoms of cold-related stresses -- heavy shivering, uncomfortable coldness, severe fatigue, drowsiness, or euphoria.

The quiet symptoms of potentially deadly cold-related ailments often go undetected until the victim's health is endangered. Knowing the facts on cold exposure and following a few simple guidelines can ensure that this season is a safe and healthy one.

- Taking certain drugs or medications such as alcohol, nicotine, caffeine, and medication that inhibits the body's response to the cold or impairs judgment.
- Having a cold or certain diseases, such as diabetes, heart, vascular, and thyroid problems, may make a person more susceptible to the winter elements.
- Being a male increases a person's risk to cold-related stresses. Sad, but true, men experience far greater death rates due to cold exposure than women, perhaps due to inherent risk-taking activities, body-fat composition or other physiological differences.
- Becoming exhausted or immobilized, especially due to injury or entrapment, may speed up the effects of cold weather.
- Aging -- the elderly are more vulnerable to the effects of harsh winter weather.

Harmful Effects of Cold

Trench Foot is caused by long, continuous exposure to a wet, cold environment, or actual immersion in water. Commercial fisherman, who experience these types of cold, wet environments daily, need to be especially cautious.

Symptoms:

Symptoms include a tingling and/or itching sensation, burning, pain, and swelling, sometimes forming blisters in more extreme cases.

Treatment:

Move individuals with trench foot to a warm, dry area, where the affected tissue can be treated with careful washing and drying, rewarming and slight elevation. Seek medical assistance as soon as possible.

Frostbite occurs when the skin tissue actually freezes, causing ice crystals to form between cells and draw water from them, which leads to cellular dehydration. Although this typically occurs at temperatures below 30°F (-1°C), wind chill effects can cause frostbite at above-freezing temperatures.

Symptoms:

Initial effects of frostbite include uncomfortable sensations of coldness; tingling, stinging or aching feeling of the exposed area followed by numbness. Ears, fingers, toes, cheeks, and noses are primarily affected. Frostbitten areas appear white and cold to the touch. The appearance of frostbite varies depending on whether rewarming has occurred.

Deeper frostbite involves freezing of deeper tissues (muscles, tendons, etc.) causing exposed areas to become numb, painless, hard to the touch.

Treatment:

If you suspect frostbite, you should seek medical assistance immediately. Any existing hypothermia should be treated first (See **Hypothermia** below). Frostbitten parts should be

HEALTH AND SAFETY PLAN SIGN-OFF SHEET
FOR MEADOWLANDS PLATING SITE

I have read and fully understand the contents of the Earth Tech Health and Safety Plan.

Printed Name and Company	Date	Signature
DAVID MITCHELL - EARTH TECH	8 Dec 98	
Jim Shaw - Earth Tech	9 Dec 98	
[illegible] ET	7 Dec 98	
John Higgins - USEPA	12/10/98	
Carl L. Lyles	11 Dec 98	
Louis Schley	12-11-98	
Robert Palardy USCG	12-11-98	
Bernard Tobolsky USCG	12-11-98	
Karen Shaver	12-11-98	
LORENZO THOMPSON	12-15-98	
Charles L. Bogker	12-15-98	
[illegible]	12-15-98	
Shelby C. Dyer ETRS	1-4-99	
John Hudnall ETRS	1-5-99	
Homer Roberts ETRS	01-05-99	
TERRY R. HANKINS ETRS	01-06-99	
Duane Harrington	01-06-99	
ANN-ALYSSA KING ET	06-Jan-98	
Dale M. Prokopchak	06-Jan-98	
Paul P. Koester	01 Jan 99	
Matthew Coppolecchia START	09 Jan 99	

HEALTH AND SAFETY PLAN SIGN-OFF SHEET
For Meadowlands Plating and Finishing Site

I have read and fully understand the contents of the Earth Tech Health and Safety Plan.

Printed Name and Company	Date	Signature
KEITH P. EDWARDS, USCG	01/13/99	
KIMBERLY A. McLOUD, USCG	01/13/99	
ROBERT MCKINNEY, ETRS	1/18/99	
LISA GUARNERI EPA	1/21/99	
Bobby DEASE	1/21/99	
Bill Magowan	1/21/99	
Joe West	1/21/99	
Kevin Green	1/21/99	
GARY E. BELAND	02/01/99	
Roy Cassidy	2-1-99	
Matt Kroms	2/3/99	
Jeremy Sawetz	2/5/99	
Brian M. ULRICH	2/15/99	
Don Mayer,	2/17/99	
EUGENE CINTRON	2/22/99	
ROY McKenzie	2/22/99	
Tom Carter	3-8-99	
Richard Cay	3-8-99	
Aldo Williams	3/8/99	
SAM WILLIAMS	3/8/99	
MICHAEL F. SOLECKI, OSC USEPA	3/24/99	
Roy Dillay	4/6/99	
Louis Wilson	5/11/99	

I:\29076\HASP.DOC

Appendix T

Sign-Off Sheet

Chemical Hygene Plan.

EARTH TECH
CORPORATE HEALTH AND SAFETY PROGRAM

1. **Health and Safety Manual**
2. **General Safety Rules for Contractors**
3. **Injury/Illness Prevention Plan**
4. **Laboratory Safety Manual**
5. ☞ **Chemical Hygiene Plan**

CHEMICAL HYGIENE PLAN

June 1991
Revised January 1998

EARTH TECH

TABLE OF CONTENTS

Section		Page
1.0	INTRODUCTION	1
2.0	POLICY STATEMENT	2
3.0	PERSONNEL DESIGNATION	3
3.1	CHEMICAL HYGIENE OFFICER	3
3.2	HEALTH AND SAFETY OFFICER	3
3.3	EMPLOYEES	4
4.0	HAZARD CONTROL MEASURES	5
5.0	STANDARD OPERATING PROCEDURES	7
6.0	EMPLOYEE EDUCATION	8
7.0	EQUIPMENT PERFORMANCE	9
8.0	SPECIAL PROCEDURES	11

1.0 INTRODUCTION

This Chemical Hygiene Plan (CHP) has been developed for Earth Tech facilities that use laboratory chemicals. In addition to fulfilling the requirements of the Occupational Safety and Health Administration (OSHA) standard "Occupational Exposures to Hazardous Chemicals in Laboratories" (29 CFR 1910.1450), this plan has been developed to complement existing safety procedures described in the Laboratory Safety Manual. Safe and healthy work practices are affirmative actions, based on awareness of personal responsibilities, knowledge of the hazardous properties of materials, and on a constructive attitude in the application of that awareness and knowledge.

There is a preferred way to perform all work with chemicals which can reduce the probability of an accident to a negligible level as well as reduce its consequences to minimum levels should an accident occur. This risk minimization depends upon safe and healthy work practices, appropriate engineering controls, the proper use of personal protective equipment (PPE), and, when possible, the substitution of a less hazardous chemical for a more hazardous one. Two basic questions to ask before beginning any laboratory operation or experiment are:

1. What material(s) am I working with?, and
2. What would happen if...?

Answers to these questions require an understanding of the hazards associated with both the chemicals and the equipment involved. The reactivity, flammability, corrosivity, and toxicity of chemicals used will dictate the precautions to be taken.

It is the purpose of this CHP to outline appropriate guidelines for achieving and maintaining healthy and safe work conditions in the Earth Tech laboratory.

A copy of the federal regulation cited above is included as Appendix A of this CHP. A copy of this CHP will be kept in the laboratory office and will be made available to any laboratory employee for referral and review during their normal hours of work.

2.0 POLICY STATEMENT

The health and safety of all laboratory personnel and visitors is a matter of top priority of Earth Tech. Management is strongly committed to providing employees with safe and healthful working conditions, effective information and training programs materials, and equipment to perform work safely, and additional guidance as necessary or upon request. All employees are required to adhere to laboratory health and safety rules and guidelines, and are encouraged to take an active and participatory role in the laboratory's health and safety program.

_____(signature)
Dale M. Prokopchak, CIH, CSP
Director, Health & Safety

_____(date)

3.0 PERSONNEL DESIGNATION

3.1 CHEMICAL HYGIENE OFFICER

The facility laboratory manager also serves as the laboratory's Chemical Hygiene Officer (CHO). The primary responsibility, in this role, is to implement the laboratory health and safety program. The CHO is required to:

a. Ensure that all work is conducted in accordance with the Chemical Hygiene Plan and the laboratory's safety manual;

b. Prepare procedures for dealing with accidents that may result in the unexpected exposure of either personnel or the environment to toxic substances;

c. Select appropriate control strategies, including engineering controls, administrative controls, and PPE, for handling hazardous substances;

d. Ensure that the inventory of hazardous substances is properly maintained; and

e. Provide guidance and assistance to the Health and Safety Officer in meeting his/her responsibilities.

3.2 HEALTH AND SAFETY OFFICER

The Chemical Hygiene Officer also serves as the laboratory's Health & Safety Officer (HSO). The primary responsibility, in this role, is to monitor all aspects of laboratory health and safety. The HSO is required to:

a. Serve as primary source for health and safety information;

b. Assist the CHO in defining hazardous operations, designating safe practices, and selecting PPE;

c. Obtain, review, and approve standard operating procedures, detailing aspects of proposed laboratory activities that involve hazardous agents;

d. Ensure that personnel obtain medical examinations and PPE necessary for the performance of their jobs;

e. Ensure that personnel receive instructions and training in safe work practices and procedures for dealing with accidents;

f. Monitor the safety performances of personnel to ensure that the required safety practices and techniques are being employed;

g. Conduct formal laboratory health and safety inspections at least quarterly to ensure compliance with existing laboratory policies and applicable governmental regulations;

h. Investigate and report in writing to the CHO any significant problems pertaining to the operation and implementation of control practices, equipment, or the laboratory facility itself;

i. Ensure that appropriate action is taken to correct work practices and conditions that may result in the release of toxic chemicals;

j. Maintain the material safety data sheet (MSDS) file;

k. Investigate all accidents and near-miss-incidents and promptly report them to the CHO.

3.3 EMPLOYEES

All employees are required to:

a. Gain an understanding of the health and safety requirements established by the laboratory management and act in accordance with these requirements;

b. Wear all designated PPE necessary to safely perform each task they are assigned; and

c. Report to the CHO or the HSO all facts and observations pertaining to every accident that results in exposure to toxic chemicals, injury to personnel, and/or release of toxic chemicals to the environment.

The CHO and HSO shall jointly review the CHP annually during the month of January and make any necessary revisions to address changing conditions and/or hazards.

4.0 HAZARD CONTROL MEASURES

The laboratory uses a variety of traditional occupational safety and health control measures including engineering controls, administrative controls, and PPE. In accordance with OSHA guidelines, the hierarchy of control measures is in the order presented above. It must be emphasized that safety and health hazards cannot be totally eliminated from the modern laboratory environment, and in fact, safety and health hazards will inherently be present from the very nature of laboratory work. The effective control of these hazards depends on an active and on-going hazard recognition and evaluation program. It is the responsibility of all employees to be on the alert for potentially hazardous conditions and/or situations, and to promptly notify the HSO or their immediate supervisor whenever previously unidentified hazards are encountered in order for effective control measures to be developed and implemented in a timely fashion.

Individual engineering controls, administrative controls, and PPE are addressed in later sections of the CHP. The following Safe Work Practices shall be followed in the performance of all laboratory operations:

a. Plan protective measures before beginning any operation

b. Do not use or handle any chemical until the MSDS and label for that chemical have been read and understood

c. Avoid direct contact with all hazardous chemicals

d. Smoking, eating, drinking, or applying cosmetics is forbidden in chemical work or storage areas

e. Eye protection is required at all times by both laboratory personnel and visitors, in the laboratory. Contact lenses should normally not be work

f. Personnel must thoroughly wash hands and other exposed body parts prior to leaving the work area

g. Do not smell or taste chemicals

h. Do not use mouth suction for pipeting of ANY material

i. When acids, corrosives, or reactive chemicals are handled use of a full face shield for eye protection is required

j. Use equipment only for its designed purpose - lab glassware must not be used for food or drink

k. Always use the designated fume hood for operations that might release toxic vapors or dusts

l. Fume hoods are to be used with the sash partially closed and are not to be used for the storage of hazardous chemicals

m. Do not conduct potentially hazardous procedures alone in the laboratory or perform unauthorized experiments at any time

n. Broken glassware must be flame polished or discarded

o. Access to the laboratory shall be restricted to authorized personnel only, through the required input of a six digit numerical code, which is changed periodically, on the keypads located on all laboratory access doors

p. Do not wear open-toed shoes or sandals in the laboratory

q. Horseplay, pranks, or other acts of mischief are strictly forbidden in laboratory work areas

r. Use all PPE designated for laboratory operations

s. All containers of hazardous materials must be clearly labeled

t. Work areas are to be clean and uncluttered to the extent possible during laboratory operations, and shall be cleaned after each operation and at the end of each day or work shift.

5.0 STANDARD OPERATING PROCEDURES

Numerous Standard Operating Procedures (SPO's), though not necessarily designated as such, have been developed for the Environmental Laboratory Division and are included in the Laboratory Safety Manual. SOP's are to be followed for all applicable laboratory operations. The following table indicated the subject matter covered by each SOP and its page location in the Laboratory Safety Manual, and all listed SOP's are incorporated, by reference, in this CHP.

	SOP Subject Matter	Page Location in Laboratory Safety Manual
1.	Use of Fume Hoods	Page 3
2.	Gas Cylinders	Pages 3-4
3.	Assembling Apparatus	Pages 4-6
4.	Insertion of Glass Tubing or Rods into Rubber Stopper and Hoses	Page 6
5.	Vacuum Operations	Page 7
6.	Handling Chemicals	Pages 7-9
7.	Reagents	Page 9
8.	Glassware	Page 9
9.	Halogens in Air	Page 9
10.	Separations	Pages 9-10
11.	Chemical Spills	Pages 10-11
12.	Eye Protection	Page 15
13.	Emergency Response/First Aid	Pages 16-17
14.	Fire Prevention and Control	Pages 18-19
15.	Chemical Waste Disposal	Pages 20-21
16.	Chemical Storage	Pages 22-23
17.	Select Chemical Hazards/Precautions	Pages 27-34
18.	Respiratory Protection	Page 35

6.0 EMPLOYEE EDUCATION

The employee education program includes two components, namely information and training. The main focus of the information program is to heighten employees awareness of the nature of both general and specific chemical hazards. The training program focuses on developing skills that allow employees to recognize the hazards posed by the chemicals that they use and to take appropriate protective measures to minimize any potential adverse effects related to their use.

The educational program includes a discussion of:

a. The existence and content of the OSHA laboratory standard

b. The location, contents, and availability of the written Chemical Hygiene Plan

c. Various exposure guidelines, including the OSHA's permissible exposure limits (PEL's), the American Conference of Governmental Industrial Hygienists' threshold limit values (TLV's), the National Institute for Occupational Safety and Health's recommended exposure levels (REL's), and the American Industrial Hygiene Association's workplace environmental exposure limits (WEEL's), as well as their applicability and limitations

d. Signs and symptoms associated with exposure to chemicals used in the laboratory

e. Reference materials available including the MSDS file, toxicology texts, industrial hygiene texts, and various other sources

f. The methods and observations that employees may use to detect the presence of hazardous chemicals released into the workplace

g. Safe work practices, emergency procedures, and equipment that employees can use to protect themselves from hazards.

All employees must receive initial training sufficient for the safe performance of their jobs, prior to beginning work with hazardous materials and/or operations. Training is the responsibility of the HSO and records of all training sessions will be maintained by the HSO. Refresher training will be conducted periodically based on the determination of need for such training by management, the HSO, and/or the CHO.

7.0 EQUIPMENT PERFORMANCE

Fume Hoods

Exhaust ventilation is used throughout the laboratory for primary control of personnel exposures to vapors and dusts of hazardous materials, and as such, regular checks of effective performance are required for all chemical hoods. The ELD's fume hood evaluation program includes daily visual inspections and quarterly inspections, as described below, plus user training.

Daily Visual Inspections Before Operation

Housekeeping - Hoods are not designed to be chemical storage cabinets. Clutter in a hood can be a major contributing factor to turbulence. Before beginning activities using a fume hood, the hood shall be inspected for clutter, and any material blocking the hood opening or exhaust ports shall be removed.

Airflow Check - When the fume hood is operating, a tissue paper check shall be performed to ensure that the exhaust is functional by taping a small piece of tissue paper at the hood opening and observing whether it reflects a directional airflow. If a directional airflow is not observed the cause must be determined and corrections made prior to further use of the hood.

Smoke Test - The smoke test is conducted by placing a smoke generator inside the enclosure and observing whether all the generated smoke is captured and exhausted. If smoke is observed to leak out of the enclosure, contaminated air could also leak out during planned operations, and the cause of leakage must be determined and corrections made prior to further use of the hood.

Any hood failing to pass either the airflow check or smoke test shall be clearly tagged and not used until the cause(s) of failure have been determined and corrective action has been taken.

Quarterly Inspections

Smoke Tube Tests - Quarterly smoke tube tests serve to evaluate irregular or turbulent airflow patterns. Generated smoke should move from several inches in front of the sash directly to the rear exhaust slot, with the sash in its normal operating position.

Face or Capture Velocity - Hood fact velocities shall be measured at least quarterly using a calibrated velometer. The average of the velocities in each of six equal rectangular sections at the hood fact will represent the overall face velocity (i.e., =V1+V2+V3+V4+V5+V6). The face velocity should be 120±20 fpm, with no individual point less than 100 or greater than 140 linear feet per minute.

The quarterly inspections shall be conducted by the HSO. All measurements shall be recorded and any anomalies shall promptly be brought to the attention of the CHO so that for corrective actions can be taken.

Safety Showers

Deluge safety showers are located in the wet lab area and the prep lab area, the two sections of the laboratory where contact with corrosive or reactive materials may occur. The safety showers are visually inspected daily and flow tested weekly by the HSO, and weekly inspection records are kept.

Eye Wash Stations/Fire Extinguishers

Eye wash stations and portable eye wash bottles, plus fire extinguishers are located throughout the laboratory facility, and their contents are checked at least weekly by the HSOI. In addition the fire extinguishers receive formal maintenance at least once a year.

The locations of all fire extinguishers, eye wash stations and bottles, fire blankets, hoods, and showers will be identified in the site-specific chemical hygiene program and displayed in a conspicuous location at the facility.

8.0 SPECIAL PROCEDURES

Earth Tech maintains updated reference volumes of approved analytical methodologies for environmental and non-environmental analyses. These sources are described in detail in the QA/QC Procedures Manual. As such, any procedure not routinely employed by the laboratory in its day-to-day operations will require prior approval by the CHO and Laboratory Director before its implementation. Examples of such procedures include, but are not necessarily limited to:

- Analyses of compressed gas cylinders of unknown contents
- Analyses of radioactive samples
- Analyses of human biological materials such as blood and urine.

include, as a minimum, a chest roentgenogram (posterior-anterior 14x17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(5) *Recent examinations.* No medical examination is required of any employee, if adequate records show that the employee has been examined in accordance with this paragraph within the past 1-year period.

(6) *Medical records*—(i) *Maintenance.* Employers of employees examined pursuant to this paragraph shall cause to be maintained complete and accurate records of all such medical examinations. Records shall be retained by employers for at least 20 years.

(ii) *Access.* Records of the medical examinations required by this paragraph shall provide upon request to employees, designated representatives, and the Assistant Secretary in accordance with 29 CFR 1910.20 (a)-(e) and (g)-(i). These records shall also be provided upon the request to the Director of NIOSH. Any physician who conducts a medical examination required by this paragraph shall furnish to the employer of the examined employee all the information specifically required by this paragraph, and any other medical information related to occupational exposure to asbestos fibers.

TABLE 1.—RESPIRATOR PROTECTION FOR AIRBORNE CONCENTRATIONS OF ASBESTOS

Airborne concentration of asbestos (TWA)	Required respirator [1]
Not in excess of 5 f/cc (10 x PEL).	Reusable or single use air purifying respirator.
Not in excess of 50 f/cc (100 x PEL).	Full facepiece air purifying respirator, or a powered air purifying respirator.
Greater than 50 f/cc	A type "C" continuous flow or pressure demand, supplied air respirator.

[1] Respirators specified for high concentrations may be used at lower concentrations of asbestos.

[1910.1101 amended by adding OMB control number 1218-0133]

[1910.1101 amended by 51 FR 37004, October 17, 1986; 52 FR 15723, April 30, 1987; corrected by 54 FR 24334, June 7, 1989]

§1910.1200 HAZARD COMMUNICATION

[See p. 31:9101]

§1910.1450 Occupational exposure to hazardous chemicals in laboratories.

(a) *Scope and application.* (1) This section shall apply to all employers engaged in the laboratory use of hazardous chemicals as defined below.

(2) Where this section applies, it shall supersede, for laboratories, the requirements of all other OSHA health standards in 29 CFR part 1910, subpart Z, except as follows:

(i) For any OSHA health standard, only the requirement to limit employee exposure to the specific permissible exposure limit shall apply for laboratories, unless that particular standard states otherwise or unless the conditions of paragraph (a)(2)(iii) of this section apply.

(ii) Prohibition of eye and skin contact where specified by any OSHA health standard shall be observed.

(iii) Where the action level (or in the absence of an action level, the permissible exposure limit) is routinely exceeded for an OSHA regulated substance with exposure monitoring and medical surveillance requirements, paragraphs (d) and (g)(1)(ii) of this section shall apply.

(3) This section shall not apply to:

(i) Uses of hazardous chemicals which do not meet the definition of laboratory use, and in such cases, the employer shall comply with the relevant standard in 29 CFR part 1910, subpart Z, even if such use occurs in a laboratory.

(ii) Laboratory uses of hazardous chemicals which provide no potential for employee exposure. Examples of such conditions might include:

(A) Procedures using chemically-impregnated test media such as Dip-and-Read tests where a reagent strip is dipped into the specimen to be tested and the results are interpreted by comparing the color reaction to a color chart supplied by the manufacturer of the test strip; and

(B) Commercially prepared kits such as those used in performing pregnancy tests in which all of the reagents needed to conduct the test are contained in the kit.

(b) *Definitions*—

"*Action level*" means a concentration designated in 29 CFR part 1910 for a specific substance, calculated as an eight (8)-hour time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.

"*Assistant Secretary*" means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

"*Carcinogen*" (see "select carcinogen").

"*Chemical Hygiene Officer*" means an employee who is designated by the employer, and who is qualified by training or experience, to provide technical guidance in the development and implementation of the provisions of the Chemical Hygiene Plan. This definition is not intended to place limitations on the position description or job classification that the designated indvidual shall hold within the employer's organizational structure.

"*Chemical Hygiene Plan*" means a written program developed and implemented by the employer which sets forth procedures, equipment, personal protective equipment and work practices that (i) are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular workplace and (ii) meets the requirements of paragraph (e) of this section.

"*Combustible liquid*" means any liquid having a flashpoint at or above 100 °F (37.8 °C), but below 200 °F (93.3 °C), except any mixture having components with flashpoints of 200 °F (93.3 °C), or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.

"*Compressed gas*" means:

(i) A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70 °F (21.1 °C); or

(ii) A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130 °F (54.4 °C) regardless of the pressure at 70 °F (21.1 °C); or

(iii) A liquid having a vapor pressure exceeding 40 psi at 100 °F (37.8 °C) as determined by ASTM D-323-72.

"*Designated area*" means an area which may be used for work with "select carcinogens," reproductive toxins or substances which have a high degree of acute toxicity. A designated

area may be the entire laboratory, an area of a laboratory or a device such as a laboratory hood.

"*Emergency*" means any occurrence such as, but not limited to, equipment failure, rupture of containers or failure of control equipment which results in an uncontrolled release of a hazardous chemical into the workplace.

"*Employee*" means an individual employed in a laboratory workplace who may be exposed to hazardous chemicals in the course of his or her assignments.

"*Explosive*" means a chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.

"*Flammable*" means a chemical that falls into one of the following categories:

(i) "*Aerosol, flammable*" means an aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame protection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening;

(ii) "*Gas, flammable*" means:

(A) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of 13 percent by volume or less; or

(B) A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than 12 percent by volume, regardless of the lower limit.

(iii) "*Liquid, flammable*" means any liquid having a flashpoint below 100 °F (37.8 °C), except any mixture having components with flashpoints of 100 °F (37.8 °C) or higher, the total of which make up 99 percent or more of the total volume of the mixture.

(iv) "*Solid, flammable*" means a solid, other than a blasting agent or explosive as defined in § 1910.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A chemical shall be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.

"*Flashpoint*" means the minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested as follows:

(i) Tagliabue Closed Tester (See American National Standard Method of Test for Flash Point by Tag Closed Tester, Z11.24–1979 (ASTM D 56–79))-for liquids with a viscosity of less than 45 Saybolt Universal Seconds (SUS) at 100 °F (37.8 °C), that do not contain suspended solids and do not have a tendency to form a surface film under test; or

(ii) Pensky-Martens Closed Tester (see American National Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, Z11.7–1979 (ASTM D 93–79))-for liquids with a viscosity equal to or greater than 45 SUS at 100 °F (37.8 °C), or that contain suspended solids, or that have a tendency to form a surface film under test; or

(iii) Setaflash Closed Tester (see American National Standard Method of Test for Flash Point by Setaflash Closed Tester (ASTM D 3278–78)).

Organic peroxides, which undergo autoaccelerating thermal decomposition, are excluded from any of the flashpoint determination methods specified above.

"*Hazardous chemical*" means a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic systems, and agents which damage the lungs, skin, eyes, or mucous membranes.

Appendices A and B of the Hazard Communication Standard (29 CFR 1910.1200) provide further guidance in defining the scope of health hazards and determining whether or not a chemical is to be considered hazardous for purposes of this standard.

"*Laboratory*" means a facility where the "laboratory use of hazardous chemicals" occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.

"*Laboratory scale*" means work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person. "Laboratory scale" excludes those workplaces whose function is to produce commercial quantities of materials.

"*Laboratory-type hood*" means a device located in a laboratory, enclosure on five sides with a moveable sash or fixed partial enclosed on the remaining side; constructed and maintained to draw air from the laboratory and to prevent or minimize the escape of air contaminants into the laboratory; and allows chemical manipulations to be conducted in the enclosure without insertion of any portion of the employee's body other than hands and arms.

Walk-in hoods with adjustable sashes meet the above definition provided that the sashes are adjusted during use so that the airflow and the exhaust of air contaminants are not compromised and employees do not work inside the enclosure during the release of airborne hazardous chemicals.

"*Laboratory use of hazardous chemicals*" means handling or use of such chemicals in which all of the following conditions are met:

(i) Chemical manipulations are carried out on a "laboratory scale;"

(ii) Multiple chemical procedures or chemicals are used;

(iii) The procedures involved are not part of a production process, nor in any way simulate a production process; and

(iv) "Protective laboratory practices and equipment" are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

"*Medical consultation*" means a consultation which takes place between an employee and a licensed physician for the purpose of determining what medical examinations or procedures, if any, are appropriate in cases where a significant exposure to a hazardous chemical may have taken place.

"*Organic peroxide*" means an organic compound that contains the bivalent —O—O— structure and which may be

considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms has been replaced by an organic radical.

"Oxidizer" means a chemical other than a blasting agent or explosive as defined in § 1910.109(a), that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

"Physical hazard" means a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

"Protective laboratory practices and equipment" means those laboratory procedures, practices and equipment accepted by laboratory health and safety experts as effective, or that the employer can show to be effective, in minimizing the potential for employee exposure to hazardous chemicals.

"Reproductive toxins" means chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis)

"Select carcinogen" means any substance which meets one of the following criteria:

(i) It is regulated by OSHA as a carcinogen; or

(ii) It is listed under the category, "known to be carcinogens," in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition); or

(iii) It is listed under Group 1 ("carcinogenic to humans") by the International Agency for Research on Cancer Monographs (IARC) (latest editions); or

(iv) It is listed in either Group 2A or 2B by IARC or under the category, "reasonably anticipated to be carcinogens" by NTP, and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria:

(A) After inhalation exposure of 6–7 hours per day, 5 days per week, for a significant portion of a lifetime to dosages of less than 10 mg/m^3;

(B) After repeated skin application of less than 300 (mg/kg of body weight) per week; or

(C) After oral dosages of less than 50 mg/kg of body weight per day.

"Unstable (reactive)" means a chemical which is the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure or temperature.

"Water-reactive" means a chemical that reacts with water to release a gas that is either flammable or presents a health hazard.

(c) *Permissible exposure limits.* For laboratory uses of OSHA regulated substances, the employer shall assure that laboratory employees' exposures to such substances do not exceed the permissible exposure limits specified in 29 CFR part 1910, subpart Z.

(d) *Employee exposure determination*—(1) *Initial monitoring.* The employer shall measure the employee's exposure to any substance regulated by a standard which requires monitoring if there is reason to believe that exposure levels for that substance routinely exceed the action level (or in the absence of an action level, the PEL).

(2) *Periodic monitoring.* If the initial monitoring prescribed by paragraph (d)(1) of this section discloses employee exposure over the action level (or in the absence of an action level, the PEL), the employer shall immediately comply with the exposure monitoring provisions of the relevant standard.

(3) *Termination of monitoring.* Monitoring may be terminated in accordance with the relevant standard.

(4) *Employee notification of monitoring results.* The employer shall, within 15 working days after the receipt of any monitoring results, notify the employee of these results in writing either individually or by posting results in an appropriate location that is accessible to employees.

(e) *Chemical hygiene plan—General.* (Appendix A of this section is non-mandatory but provides guidance to assist employers in the development of the Chemical Hygiene Plan.) (1) Where hazardous chemicals as defined by this standard are used in the workplace, the employer shall develop and carry out the provisions of a written Chemical Hygiene Plan which is:

(i) Capable of protecting employees from health hazards associated with hazardous chemicals in that laboratory and

(ii) Capable of keeping exposures below the limits specified in paragraph (c) of this section.

(2) The Chemical Hygiene Plan shall be readily available to employees, employee representatives and, upon request, to the Assistant Secretary.

(3) The Chemical Hygiene Plan shall include each of the following elements and shall indicate specific measures that the employer will take to ensure laboratory employee protection:

(i) Standard operating procedures relevant to safety and health considerations to be followed when laboratory work involves the use of hazardous chemicals;

(ii) Criteria that the employer will use to determine and implement control measures to reduce employee exposure to hazardous chemicals including engineering controls, the use of personal protective equipment and hygiene practices; particular attention shall be given to the selection of control measures for chemicals that are known to be extremely hazardous;

(iii) A requirement that fume hoods and other protective equipment are functioning properly and specific measures that shall be taken to ensure proper and adequate performance of such equipment;

(iv) Provisions for employee information and training as prescribed in paragraph (f) of this section;

(v) The circumstances under which a particular laboratory operation, procedure or activity shall require prior approval from the employer or the employer's designee before implementation;

(vi) Provisions for medical consultation and medical examinations in accordance with paragraph (g) of this section;

(vii) Designation of personnel responsible for implementation of the Chemical Hygiene Plan including the assignment of a Chemical Hygiene Officer and, if appropriate, establishment of a Chemical Hygiene Committee; and

(viii) Provisions for additional employee protection for work with particularly hazardous substances. These include "select carcinogens," reproductive toxins and substances

[Sec. 1910.1450(e)(3)(viii)]

which have a high degree of acute toxicity. Specific consideration shall be given to the following provisions which shall be included where appropriate:

(A) Establishment of a designated area:

(B) Use of containment devices such as fume hoods or glove boxes:

(C) Procedures for safe removal of contaminated waste: and

(D) Decontamination procedures.

(4) The employer shall review and evaluate the effectiveness of the Chemical Hygiene Plan at least annually and update it as necessary.

(f) *Employee information and training.* (1) The employer shall provide employees with information and training to ensure that they are apprised of the hazards of chemicals present in their work area.

(2) Such information shall be provided at the time of an employee's initial assignment to a work area where hazardous chemicals are present and prior to assignments involving new exposure situations. The frequency of refresher information and training shall be determined by the employer.

(3) *Information.* Employees shall be informed of:

(i) The contents of this standard and its appendices which shall be made available to employees:

(ii) The location and availability of the employer's Chemical Hygiene Plan:

(iii) The permissible exposure limits for OSHA regulated substances or recommended exposure limits for other hazardous chemicals where there is no applicable OSHA standard:

(iv) Signs and symptoms associated with exposures to hazardous chemicals used in the laboratory: and

(v) The location and availability of known reference material on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including, but not limited to, Material Safety Data Sheets received from the chemical supplier.

(4) *Training.* (i) Employee training shall include:

(A) Methods and observations that may be used to detect the presence or release of a hazardous chemical (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);

(B) The physical and health hazards of chemicals in the work area: and

(C) The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used.

(ii) The employee shall be trained on the applicable details of the employer's written Chemical Hygiene Plan.

(g) *Medical consultation and medical examinations.* (1) The employer shall provide all employees who work with hazardous chemicals an opportunity to receive medical attention, including any follow-up examinations which the examining physician determines to be necessary, under the following circumstances:

(i) Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory, the employee shall be provided an opportunity to receive an appropriate medical examination.

(ii) Where exposure monitoring reveals an exposure level routinely above the action level (or in the absence of an action level, the PEL) for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements, medical surveillance shall be established for the affected employee as prescribed by the particular standard.

(iii) Whenever an event takes place in the work area such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure, the affected employee shall be provided an opportunity for a medical consultation. Such consultation shall be for the purpose of determining the need for a medical examination.

(2) All medical examinations and consultations shall be performed by or under the direct supervision of a licensed physician and shall be provided without cost to the employee, without loss of pay and at a reasonable time and place.

(3) *Information provided to the physician.* The employer shall provide the following information to the physician:

(i) The identity of the hazardous chemical(s) to which the employee may have been exposed:

(ii) A description of the conditions under which the exposure occurred including quantitative exposure data, if available: and

(iii) A description of the signs and symptoms of exposure that the employee is experiencing, if any.

(4) *Physician's written opinion.* (i) For examination or consultation required under this standard, the employer shall obtain a written opinion from the examining physician which shall include the following:

(A) Any recommendation for further medical follow-up:

(B) The results of the medical examination and any associated tests:

(C) Any medical condition which may be revealed in the course of the examination which may place the employee at increased risk as a result of exposure to a hazardous chemical found in the workplace: and

(D) A statement that the employee has been informed by the physician of the results of the consultation or medical examination and any medical condition that may require further examination or treatment.

(ii) The written opinion shall not reveal specific findings of diagnoses unrelated to occupational exposure.

(h) *Hazard identification.* (1) With respect to labels and material safety data sheets:

(i) Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced.

(ii) Employers shall maintain any material safety data sheets that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible to laboratory employees.

(2) The following provisions shall apply to chemical substances developed in the laboratory:

(i) If the composition of the chemical substance which is produced exclusively for the laboratory's use is known, the employer shall determine if it is a hazardous chemical as defined in paragraph (b) of this section. If the chemical is determined to be hazardous, the employer shall provide appropriate training as required under paragraph (f) of this section.

[Sec. 1910.1450(h)(2)(i)]

(ii) If the chemical produced is a byproduct whose composition is not known, the employer shall assume that the substance is hazardous and shall implement paragraph (e) of this section.

(iii) If the chemical substance is produced for another user outside of the laboratory, the employer shall comply with the Hazard Communication Standard (29 CFR 1910.1200) including the requirements for preparation of material safety data sheets and labeling.

(i) *Use of respirators.* Where the use of respirators is necessary to maintain exposure below permissible exposure limits, the employer shall provide, at no cost to the employee, the proper respiratory equipment. Respirators shall be selected and used in accordance with the requirements of 29 CFR 1910.134.

(j) *Recordkeeping.* (1) The employer shall establish and maintain for each employee an accurate record of any measurements taken to monitor employee exposures and any medical consultation and examinations including tests or written opinions required by this standard.

(2) The employer shall assure that such records are kept, transferred, and made available in accordance with 29 CFR 1910.20.

(k) *Dates*—(1) *Effective date.* This section shall become effective May 1, 1990.

(2) *Start-up dates.* (i) Employers shall have developed and implemented a written Chemical Hygiene Plan no later than January 31, 1991.

(ii) Paragraph (a)(2) of this section shall not take effect until the employer has developed and implemented a written Chemical Hygiene Plan.

(l) *Appendices.* The information contained in the appendices is not intended, by itself, to create any additional obligations not otherwise imposed or to detract from any existing obligation.

Appendix A to § 1910.1450—National Research Council Recommendations Concerning Chemical Hygiene in Laboratories (Non-Mandatory)

Table of Contents

Foreword

Corresponding Sections of the Standard and This Appendix

A. General Principles

1. Minimize all Chemical Exposures
2. Avoid Underestimation of Risk
3. Provide Adequate Ventilation
4. Institute a Chemical Hygiene Program
5. Observe the PELs and TLVs

B. Responsibilities

1. Chief Executive Officer
2. Supervisor of Administrative Unit
3. Chemical Hygiene Officer
4. Laboratory Supervisor
5. Project Director
6. Laboratory Worker

C. The Laboratory Facility

1. Design
2. Maintenance
3. Usage
4. Ventilation

D. Components of the Chemical Hygiene Plan

1. Basic Rules and Procedures
2. Chemical Procurement, Distribution, and Storage
3. Environmental Monitoring
4. Housekeeping, Maintenance and Inspections
5. Medical Program
6. Personal Protective Apparel and Equipment
7. Records
8. Signs and Labels
9. Spills and Accidents
10. Training and Information
11. Waste Disposal

E. General Procedures for Working With Chemicals

1. General Rules for all Laboratory Work with Chemicals
2. Allergens and Embryotoxins
3. Chemicals of Moderate Chronic or High Acute Toxicity
4. Chemicals of High Chronic Toxicity
5. Animal Work with Chemicals of High Chronic Toxicity

F. Safety Recommendations

G. Material Safety Data Sheets

Foreword

As guidance for each employer's development of an appropriate laboratory Chemical Hygiene Plan, the following non-mandatory recommendations are provided. They were extracted from "Prudent Practices for Handling Hazardous Chemicals in Laboratories" (referred to below as "Prudent Practices"), which was published in 1981 by the National Research Council and is available from the National Academy Press, 2101 Constitution Ave., NW., Washington DC 20418.

"Prudent Practices" is cited because of its wide distribution and acceptance and because of its preparation by members of the laboratory community through the sponsorship of the National Research Council. However, none of the recommendations given here will modify any requirements of the laboratory standard. This Appendix merely presents pertinent recommendations from "Prudent Practices", organized into a form convenient for quick reference during operation of a laboratory facility and during development and application of a Chemical Hygiene Plan. Users of this appendix should consult "Prudent Practices" for a more extended presentation and justification for each recommendation.

"Prudent Practices" deals with both safety and chemical hazards while the laboratory standard is concerned primarily with chemical hazards. Therefore, only those recommendations directed primarily toward control of toxic exposures are cited in this appendix, with the term "chemical hygiene" being substituted for the word "safety". However, since conditions producing or threatening physical injury often pose toxic risks as well, page references concerning major categories of safety hazards in the laboratory are given in section F.

The recommendations from "Prudent Practices" have been paraphrased, combined, or otherwise reorganized, and headings have been added. However, their sense has not been changed.

Corresponding Sections of the Standard and this Appendix

The following table is given for the convenience of those who are developing a Chemical Hygiene Plan which will satisfy the requirements of paragraph (e) of the standard. It indicates those sections of this appendix which are most pertinent to each of the sections of paragraph (e) and related paragraphs.

Paragraph and topic in laboratory standard	Relevant appendix section
(e)(3)(i) Standard operating procedures for handling toxic chemicals.	C, D, E
(e)(3)(ii) Criteria to be used for implementation of measures to reduce exposures.	D
(e)(3)(iii) Fume hood performance	C4b
(e)(3)(iv) Employee information and training (including emergency procedures).	D10, D9
(e)(3)(v) Requirements for prior approval of laboratory activities.	E2b, E4b
(e)(3)(vi) Medical consultation and medical examinations.	D5, E4f
(e)(3)(vii) Chemical hygiene responsibilities.	B
(e)(3)(viii) Special precautions for work with particularly hazardous substances.	E2, E3, E4

In this appendix, those recommendations directed primarily at administrators and supervisors are given in sections A–D. Those recommendations of primary concern to employees who are actually handling laboratory chemicals are given in section E. (Reference to page numbers in "Prudent Practices" are given in parentheses.)

A. General Principles for Work with Laboratory Chemicals

In addition to the more detailed recommendations listed below in sections B–E, "Prudent Practices" expresses certain general principles, including the following:

1. *It is prudent to minimize all chemical exposures.* Because few laboratory chemicals are without hazards, general precautions for handling all laboratory chemicals should be adopted, rather than specific guidelines for particular chemicals (2, 10). Skin contact with chemicals should be avoided as a cardinal rule (198).

2. *Avoid underestimation of risk.* Even for substances of no known significant hazard, exposure should be minimized; for work with substances which present special hazards, special precautions should be taken (10, 37, 38). One should assume that any mixture will be more toxic than its most toxic component (30, 103) and that all substances of unknown toxicity are toxic (3, 34).

3. *Provide adequate ventilation.* The best way to prevent exposure to airborne substances is to prevent their escape into the working atmosphere by use of hoods and other ventilation devices (32, 198).

4. *Institute a chemical hygiene program.* A mandatory chemical hygiene program designed to minimize exposures is needed; it should be a regular, continuing effort, not merely a standby or short-term activity (8, 11). Its recommendations should be followed in academic teaching laboratories as well as by full-time laboratory workers (13).

5. *Observe the PELs, TLVs.* The Permissible Exposure Limits of OSHA and the Threshold Limit Values of the American Conference of Governmental Industrial Hygienists should not be exceeded (13).

B. Chemical Hygiene Responsibilities

Responsibility for chemical hygiene rests at all levels (8, 11, 21) including the:

1. *Chief executive officer,* who has ultimate responsibility for chemical hygiene within the institution and must, with other administrators, provide continuing support for institutional chemical hygiene (7, 11).

2. *Supervisor of the department or other administrative unit,* who is responsible for chemical hygiene in that unit (7).

3. *Chemical hygiene officer(s),* whose appointment is essential (7) and who must:

(a) Work with administrators and other employees to develop and implement appropriate chemical hygiene policies and practices (7);

(b) Monitor procurement, use, and disposal of chemicals used in the lab (8);

(c) See that appropriate audits are maintained (8);

(d) Help project directors develop precautions and adequate facilities (10);

(e) Know the current legal requirements concerning regulated substances (50); and

(f) Seek ways to improve the chemical hygiene program (8, 11).

4. *Laboratory supervisor,* who has overall responsibility for chemical hygiene in the laboratory (21) including responsibility to:

(a) Ensure that workers know and follow the chemical hygiene rules, that protective equipment is available and in working order, and that appropriate training has been provided (21, 22);

(b) Provide regular, formal chemical hygiene and housekeeping inspections including routine inspections of emergency equipment (21, 171);

(c) Know the current legal requirements concerning regulated substances (50, 231);

(d) Determine the required levels of protective apparel and equipment (156, 160, 162); and

(e) Ensure that facilities and training for use of any material being ordered are adequate (215).

5. *Project director or director of other specific operation,* who has primary responsibility for chemical hygiene procedures for that operation (7).

6. *Laboratory worker,* who is responsible for:

(a) Planning and conducting each operation in accordance with the institutional chemical hygiene procedures (7, 21, 22, 230); and

(b) Developing good personal chemical hygiene habits (22).

C. The Laboratory Facility

1. *Design.* The laboratory facility should have:

(a) An appropriate general ventilation system (see C4 below) with air intakes and exhausts located so as to avoid intake of contaminated air (194);

(b) Adequate, well-ventilated stockrooms/storerooms (218, 219);

(c) Laboratory hoods and sinks (12, 162);

(d) Other safety equipment including eyewash fountains and drench showers (162, 169); and

(e) Arrangements for waste disposal (12, 240).

2. *Maintenance.* Chemical-hygiene-related equipment (hoods, incinerator, etc.) should undergo continuing appraisal and be modified if inadequate (11, 12).

3. *Usage.* The work conducted (10) and its scale (12) must be appropriate to the physicial facilities available and, especially, to the quality of ventilation (13).

4. *Ventilation*—(a) *General laboratory ventilation.* This system should: Provide a source of air for breathing and for input to local ventilation devices (199); it should not be relied on for protection from toxic substances released into the laboratory (198); ensure that laboratory air is continually replaced, preventing increase of air concentrations of toxic substances during the working day (194); direct air flow into the laboratory from non-laboratory areas and out to the exterior of the building (194).

(b) *Hoods.* A laboratory hood with 2.5 linear feet of hood space per person should be provided for every 2 workers if they spend most of their time working with chemicals (199); each hood should have a continuous monitoring device to allow convenient confirmation of adequate hood performance before use (200, 209). If this is not possible, work with substances of unknown toxicity should be avoided (13) or other types of local ventilation devices should be provided (199). See pp. 201–206 for a discussion of hood design, construction, and evaluation.

(c) *Other local ventilation devices.* Ventilated storage cabinets, canopy hoods, snorkels, etc. should be provided as needed (199). Each canopy hood and snorkel should have a separate exhaust duct (207).

(d) *Special ventilation areas.* Exhaust air from glove boxes and isolation rooms should be passed through scrubbers or other treatment before release into the regular exhaust system (208). Cold rooms and warm rooms should have provisions for rapid escape and for escape in the event of electrical failure (209).

(e) *Modifications.* Any alteration of the ventilation system should be made only if thorough testing indicates that worker protection from airborne toxic substances will continue to be adequate (12, 193, 204).

(f) *Performance.* Rate: 4–12 room air changes/hour is normally adequate general ventilation if local exhaust systems such as hoods are used as the primary method of control (194).

(g) *Quality.* General air flow should not be turbulent and should be relatively uniform throughout the laboratory, with no high velocity or static areas (194, 195); airflow into and within the hood should not be excessively turbulent (200); hood face velocity should be adequate (typically 60–100 lfm) (200, 204).

(h) *Evaluation.* Quality and quantity of ventilation should be evaluated on installation (202), regularly monitored (at least every 3 months) (8, 12, 14, 195), and reevaluated whenever a change in local ventilation devices is made (12, 195, 207). See

pp. 195–198 for methods of evaluation and for calculation of estimated airborne contaminant concentrations.

D. Components of the Chemical Hygiene Plan

1. Basic Rules and Procedures (Recommendations for these are given in section E. below)

2. Chemical Procurement, Distribution, and Storage

(a) *Procurement.* Before a substance is received, information on proper handling, storage, and disposal should be known to those who will be involved (215, 216). No container should be accepted without an adequate identifying label (216). Preferably, all substances should be received in a central location (216).

(b) *Stockrooms/storerooms.* Toxic substances should be segregated in a well-identified area with local exhaust ventilation (221). Chemicals which are highly toxic (227) or other chemicals whose containers have been opened should be in unbreakable secondary containers (219). Stored chemicals should be examined periodically (at least annually) for replacement, deterioration, and container integrity (218–19).

Stockrooms/storerooms should not be used as preparation or repackaging areas, should be open during normal working hours, and should be controlled by one person (219).

(c) *Distribution.* When chemicals are hand carried, the container should be placed in an outside container or bucket. Freight-only elevators should be used if possible (223).

(d) *Laboratory storage.* Amounts permitted should be as small as practical. Storage on bench tops and in hoods is inadvisable. Exposure to heat or direct sunlight should be avoided. Periodic inventories should be conducted, with unneeded items being discarded or returned to the storeroom/stockroom (225–6, 229).

3. Environmental Monitoring

Regular instrumental monitoring of airborne concentrations is not usually justified or practical in laboratories but may be appropriate when testing or redesigning hoods or other ventilation devices (12) or when a highly toxic substance is stored or used regularly (e.g., 3 times/week) (13).

4. Housekeeping, Maintenance, and Inspections

(a) Cleaning. Floors should be cleaned regularly (24).

(b) Inspections. Formal housekeeping and chemical hygiene inspections should be held at least quarterly (6, 21) for units which have frequent personnel changes and semiannually for others: informal inspections should be continual (21).

(c) *Maintenance.* Eye wash fountains should be inspected at intervals of not less than 3 months (6). Respirators for routine use should be inspected periodically by the laboratory supervisor (169). Safety showers should be tested routinely (169). Other safety equipment should be inspected regularly. (*e.g.*, every 3–6 months) (6, 24, 171). Procedures to prevent restarting of out-of-service equipment should be established (25).

(d) *Passageways.* Stairways and hallways should not be used as storage areas (24). Access to exits, emergency equipment, and utility controls should never be blocked (24).

5. Medical Program

(a) *Compliance with regulations.* Regular medical surveillance should be established to the extent required by regulations (12).

(b) *Routine surveillance.* Anyone whose work involves regular and frequent handling of toxicologically significant quantities of a chemical should consult a qualified physician to determine on an individual basis whether a regular schedule of medical surveillance is desirable (11, 50).

(c) *First aid.* Personnel trained in first aid should be available during working hours and an emergency room with medical personnel should be nearby (173). See pp. 176–178 for description of some emergency first aid procedures.

6. Protective Apparel and Equipment

These should include for each laboratory:

(a) Protective apparel compatible with the required degree of protection for substances being handled (158–161);

(b) An easily accessible drench-type safety shower (162, 169);

(c) An eyewash fountain (162);

(d) A fire extinguisher (162–164);

(e) Respiratory protection (164–9), fire alarm and telephone for emergency use (162) should be available nearby; and

(f) Other items designated by the laboratory supervisor (156, 160).

7. Records

(a) Accident records should be written and retained (174).

(b) Chemical Hygiene Plan records should document that the facilities and precautions were compatible with current knowledge and regulations (7).

(c) Inventory and usage records for high-risk substances should be kept as specified in sections E3e below.

(d) Medical records should be retained by the institution in accordance with the requirements of state and federal regulations (12).

8. Signs and Labels

Prominent signs and labels of the following types should be posted:

(a) Emergency telephone numbers of emergency personnel/facilities, supervisors, and laboratory workers (28);

(b) Identity labels, showing contents of containers (including waste receptacles) and associated hazards (27, 48);

(c) Location signs for safety showers, eyewash stations, other safety and first aid equipment, exits (27) and areas where food and beverage consumption and storage are permitted (24); and

(d) Warnings at areas or equipment where special or unusual hazards exist (27).

9. Spills and Accidents

(a) A written emergency plan should be established and communicated to all personnel; it should include procedures for ventilation failure (200), evacuation, medical care, reporting, and drills (172).

(b) There should be an alarm system to alert people in all parts of the facility including isolation areas such as cold rooms (172).

(c) A spill control policy should be developed and should include consideration of prevention, containment, cleanup, and reporting (175).

(d) All accidents or near accidents should be carefully analyzed with the results distributed to all who might benefit (8, 28).

10. Information and Training Program

(a) Aim: To assure that all individuals at risk are adequately informed about the work in the laboratory, its risks, and what to do if an accident occurs (5, 15).

(b) Emergency and Personal Protection Training: Every laboratory worker should know the location and proper use of available protective apparel and equipment (154, 169).

Some of the full-time personnel of the laboratory should be trained in the proper use of emergency equipment and procedures (6).

Such training as well as first aid instruction should be available to (154) and encouraged for (176) everyone who might need it.

(c) Receiving and stockroom/storeroom personnel should know about hazards, handling equipment, protective apparel, and relevant regulations (217).

(d) Frequency of Training: The training and education program should be a regular, continuing activity—not simply an annual presentation (15).

(e) Literature/Consultation: Literature and consulting advice concerning chemical hygiene should be readily available to laboratory personnel, who should be encouraged to use these information resources (14).

11. *Waste Disposal Program.*

(a) Aim: To assure that minimal harm to people, other organisms, and the environment will result from the disposal of waste laboratory chemicals (5).

(b) Content (14, 232, 233, 240): The waste disposal program should specify how waste

is to be collected, segregated, stored, and transported and include consideration of what materials can be incinerated. Transport from the institution must be in accordance with DOT regulations (244).

(c) Discarding Chemical Stocks: Unlabeled containers of chemicals and solutions should undergo prompt disposal; if partially used, they should not be opened (24, 27).

Before a worker's employment in the laboratory ends, chemicals for which that person was responsible should be discarded or returned to storage (228).

(d) Frequency of Disposal: Waste should be removed from laboratories to a central waste storage area at least once per week and from the central waste storage area at regular intervals (14).

(e) Method of Disposal: Incineration in an environmentally acceptable manner is the most practical disposal method for combustible laboratory waste (14, 238, 241).

Indiscriminate disposal by pouring waste chemicals down the drain (14, 231, 242) or adding them to mixed refuse for landfill burial is unacceptable (14).

Hoods should not be used as a means of disposal for volatile chemicals (40, 200).

Disposal by recycling (233, 243) or chemical decontamination (40, 230) should be used when possible.

E. Basic Rules and Procedures for Working with Chemicals

The Chemical Hygiene Plan should require that laboratory workers know and follow its rules and procedures. In addition to the procedures of the sub programs mentioned above, these should include the rules listed below.

1. General Rules

The following should be used for essentially all laboratory work with chemicals:

(a) *Accidents and spills*—Eye Contact: Promptly flush eyes with water for a prolonged period (15 minutes) and seek medical attention (33, 172).

Ingestion: Encourage the victim to drink large amounts of water (178).

Skin Contact: Promptly flush the affected area with water (33, 172, 178) and remove any contaminated clothing (172, 178). If symptoms persist after washing, seek medical attention (33).

Clean-up. Promptly clean up spills, using appropriate protective apparel and equipment and proper disposal (24 33). See pp. 233–237 for specific clean-up recommendations.

(b) *Avoidance of "routine" exposure:* Develop and encourage safe habits (23); avoid unnecessary exposure to chemicals by any route (23);

Do not smell or taste chemicals (32). Vent apparatus which may discharge toxic chemicals (vacuum pumps, distillation columns, etc.) into local exhaust devices (199).

Inspect gloves (157) and test glove boxes (208) before use.

Do not allow release of toxic substances in cold rooms and warm rooms, since these have contained recirculated atmospheres (209).

(c) *Choice of chemicals:* Use only those chemicals for which the quality of the available ventilation system is appropriate (13).

(d) *Eating, smoking, etc.:* Avoid eating, drinking, smoking, gum chewing, or application of cosmetics in areas where laboratory chemicals are present (22, 24, 32, 40); wash hands before conducting these activities (23, 24).

Avoid storage, handling or consumption of food or beverages in storage areas, refrigerators, glassware or utensils which are also used for laboratory operations (23, 24, 229).

(e) *Equipment and glassware:* Handle and store laboratory glassware with care to avoid damage; do not use damaged glassware (25). Use extra care with Dewar flasks and other evacuated glass apparatus; shield or wrap them to contain chemicals and fragments should implosion occur (25). Use equipment only for its designed purpose (23, 28).

(f) *Exiting:* Wash areas of exposed skin well before leaving the laboratory (23).

(g) *Horseplay:* Avoid practical jokes or other behavior which might confuse, startle or distract another worker (23).

(h) *Mouth suction:* Do not use mouth suction for pipeting or starting a siphon (23, 32).

(i) *Personal apparel:* Confine long hair and loose clothing (23, 158). Wear shoes at all times in the laboratory but do not wear sandals, perforated shoes, or sneakers (158).

(j) *Personal housekeeping:* Keep the work area clean and uncluttered, with chemicals and equipment being properly labeled and stored; clean up the work area on completion of an operation or at the end of each day (24).

(k) *Personal protection:* Assure that appropriate eye protection (154–156) is worn by all persons, including visitors, where chemicals are stored or handled (22, 23, 33, 154).

Wear appropriate gloves when the potential for contact with toxic materials exists (157); inspect the gloves before each use, wash them before removal, and replace them periodically (157). (A table of resistance to chemicals of common glove materials is given p. 159).

Use appropriate (164–168) respiratory equipment when air contaminant concentrations are not sufficiently restricted by engineering controls (164–5), inspecting the respirator before use (169).

Use any other protective and emergency apparel and equipment as appropriate (22, 157–162).

Avoid use of contact lenses in the laboratory unless necessary; if they are used, inform supervisor so special precautions can be taken (155).

Remove laboratory coats immediately on significant contamination (161).

(l) *Planning:* Seek information and advice about hazards (7), plan appropriate protective procedures, and plan positioning of equipment before beginning any new operation (22, 23).

(m) *Unattended operations:* Leave lights on, place an appropriate sign on the door, and provide for containment of toxic substances in the event of failure of a utility service (such as cooling water) to an unattended operation (27, 128).

(n) *Use of hood:* Use the hood for operations which might result in release of toxic chemical vapors or dust (198–9).

As a rule of thumb, use a hood or other local ventilation device when working with any appreciably volatile substance with a TLV of less than 50 ppm (13).

Confirm adequate hood performance before use; keep hood closed at all times except when adjustments within the hood are being made (200); keep materials stored in hoods to a minimum and do not allow them to block vents or air flow (200).

Leave the hood "on" when it is not in active use if toxic substances are stored in it or if it is uncertain whether adequate general laboratory ventilation will be maintained when it is "off" (200).

(o) *Vigilance:* Be alert to unsafe conditions and see that they are corrected when detected (22).

(p) *Waste disposal:* Assure that the plan for each laboratory operation includes plans and training for waste disposal (230).

Deposit chemical waste in appropriately labeled receptacles and follow all other waste disposal procedures of the Chemical Hygiene Plan (22, 24).

Do not discharge to the sewer concentrated acids or bases (231); highly toxic, malodorous, or lachrymatory substances (231); or any substances which might interfere with the biological activity of waste water treatment plants, create fire or explosion hazards, cause structural damage or obstruct flow (242).

(q) *Working alone:* Avoid working alone in a building; do not work alone in a laboratory if the procedures being conducted are hazardous (28).

2. Working with Allergens and Embryotoxins

(a) *Allergens* (examples: diazomethane, isocyanates, bichromates): Wear suitable gloves to prevent hand contact with allergens or substances of unknown allergenic activity (35).

(b) *Embryotoxins* (34–5) (examples: organomercurials, lead compounds, formamide): If you are a woman of childbearing age, handle these substances only in a hood whose satisfactory

performance has been confirmed, using appropriate protective apparel (especially gloves) to prevent skin contact.

Review each use of these materials with the research supervisor and review continuing uses annually or whenever a procedural change is made.

Store these substances, properly labeled, in an adequately ventilated area in an unbreakable secondary container.

Notify supervisors of all incidents of exposure or spills; consult a qualified physician when appropriate.

3. Work with Chemicals of Moderate Chronic or High Acute Toxicity

Examples: diisopropylflurophosphate (41), hydrofluoric acid (43), hydrogen cyanide (45).

Supplemental rules to be followed in addition to those mentioned above (Procedure B of "Prudent Practices", pp. 39–41):

(a) *Aim:* To minimize exposure to these toxic substances by any route using all reasonable precautions (39).

(b) *Applicability:* These precautions are appropriate for substances with moderate chronic or high acute toxicity used in significant quantities (39).

(c) *Location:* Use and store these substances only in areas of restricted access with special warning signs (40, 229).

Always use a hood (previously evaluated to confirm adequate performance with a face velocity of at least 60 linear feet per minute) (40) or other containment device for procedures which may result in the generation of aerosols or vapors containing the substance (39); trap released vapors to prevent their discharge with the hood exhaust (40).

(d) *Personal protection:* Always avoid skin contact by use of gloves and long sleeves (and other protective apparel as appropriate) (39). Always wash hands and arms immediately after working with these materials (40).

(e) *Records:* Maintain records of the amounts of these materials on hand, amounts used, and the names of the workers involved (40, 229).

(f) *Prevention of spills and accidents:* Be prepared for accidents and spills (41).

Assure that at least 2 people are present at all times if a compound in use is highly toxic or of unknown toxicity (39).

Store breakable containers of these substances in chemically resistant trays; also work and mount apparatus above such trays or cover work and storage surfaces with removable, absorbent, plastic backed paper (40).

If a major spill occurs outside the hood, evacuate the area; assure that cleanup personnel wear suitable protective apparel and equipment (41).

(g) *Waste:* Thoroughly decontaminate or incinerate contaminated clothing or shoes (41). If possible, chemically decontaminate by chemical conversion (40).

Store contaminated waste in closed, suitably labeled, impervious containers (for liquids, in glass or plastic bottles half-filled with vermiculite) (40).

4. Work with Chemicals of High Chronic Toxicity

(Examples: dimethylmercury and nickel carbonyl (48), benzo-a-pyrene (51), N-nitrosodiethylamine (54), other human carcinogens or substances with high carcinogenic potency in animals (38).)

Further supplemental rules to be followed, in addition to all these mentioned above, for work with substances of known high chronic toxicity (in quantities above a few milligrams to a few grams, depending on the substance) (47). (Procedure A of "Prudent Practices" pp. 47–50).

(a) *Access:* Conduct all transfers and work with these substances in a "controlled area": a restricted access hood, glove box, or portion of a lab, designated for use of highly toxic substances, for which all people with access are aware of the substances being used and necessary precautions (48).

(b) *Approvals:* Prepare a plan for use and disposal of these materials and obtain the approval of the laboratory supervisor (48).

(c) *Non-contamination/Decontamination:* Protect vacuum pumps against contamination by scrubbers or HEPA filters and vent them into the hood (49). Decontaminate vacuum pumps or other contaminated equipment, including glassware, in the hood before removing them from the controlled area (49, 50).

Decontaminate the controlled area before normal work is resumed there (50).

(d) *Exiting:* On leaving a controlled area, remove any protective apparel (placing it in an appropriate, labeled container) and thoroughly wash hands, forearms, face, and neck (49).

(e) *Housekeeping:* Use a wet mop or a vacuum cleaner equipped with a HEPA filter instead of dry sweeping if the toxic substance was a dry powder (50).

(f) *Medical surveillance:* If using toxicologically significant quantities of such a substance on a regular basis (*e.g.*, 3 times per week), consult a qualified physician concerning desirability of regular medical surveillance (50).

(g) *Records:* Keep accurate records of the amounts of these substances stored (229) and used, the dates of use, and names of users (48).

(h) *Signs and labels:* Assure that the controlled area is conspicuously marked with warning and restricted access signs (49) and that all containers of these substances are appropriately labeled with identity and warning labels (48).

(i) *Spills:* Assure that contingency plans, equipment, and materials to minimize exposures of people and property in case of accident are available (233–4).

(j) *Storage:* Store containers of these chemicals only in a ventilated, limited access (48, 227, 229) area in appropriately labeled, unbreakable, chemically resistant, secondary containers (48, 229).

(k) *Glove boxes:* For a negative pressure glove box, ventilation rate must be at least 2 volume changes/hour and pressure at least 0.5 inches of water (48). For a positive pressure glove box, thoroughly check for leaks before each use (49). In either case, trap the exit gases or filter them through a HEPA filter and then release them into the hood (49).

(l) *Waste:* Use chemical decontamination whenever possible; ensure that containers of contaminated waste (including washings from contaminated flasks) are transferred from the controlled area in a secondary container under the supervision of authorized personnel (49, 50, 233).

5. Animal Work with Chemicals of High Chronic Toxicity

(a) *Access:* For large scale studies, special facilities with restricted access are preferable (56).

(b) *Administration of the toxic substance:* When possible, administer the substance by injection or gavage instead of in the diet. If administration is in the diet, use a caging system under negative pressure or under laminar air flow directed toward HEPA filters (56).

(c) *Aerosol suppression:* Devise procedures which minimize formation and dispersal of contaminated aerosols, including those from food, urine, and feces (e.g., use HEPA filtered vacuum equipment for cleaning, moisten contaminated bedding before removal from the cage, mix diets in closed containers in a hood) (55, 56).

(d) *Personal protection:* When working in the animal room, wear plastic or rubber gloves, fully buttoned laboratory coat or jumpsuit and, if needed because of incomplete suppression of aerosols, other apparel and equipment (shoe and head coverings, respirator) (56).

(e) *Waste disposal:* Dispose of contaminated animal tissues and excreta by incineration if the available incinerator can convert the contaminant to non-toxic products (238); otherwise, package the waste appropriately for burial in an EPA-approved site (239).

F. Safety Recommendations

The above recommendations from "Prudent Practices" do not include those which are directed primarily toward prevention of physical injury rather than toxic exposure. However, failure of precautions against injury will often have the secondary effect of causing toxic exposures. Therefore, we list

below page references for recommendations concerning some of the major categories of safety hazards which also have implications for chemical hygiene:

1. Corrosive agents: (35–6)
2. Electrically powered laboratory apparatus: (179–82)
3. Fires, explosions: (28, 57–74, 162–4, 174–5, 219–20, 226–7)
4. Low temperature procedures: (28, 88)
5. Pressurized and vacuum operations (including use of compressed gas cylinders): (27, 75–101)

G. Material Safety Data Sheets

Material safety data sheets are presented in "Prudent Practices" for the chemicals listed below. (Asterisks denote that comprehensive material safety data sheets are provided).

*Acetyl peroxide (105)
*Acrolein (106)
*Acrylonitrile (107)
Ammonia (anhydrous) (91)
*Aniline (109)
*Benzene (110)
*Benzo[a]pyrene (112)
*Bis(chloromethyl) ether (113)
Boron trichloride (91)
Boron trifluoride (92)
Bromine (114)
*Tert-butyl hydroperoxide (148)
*Carbon disulfide (116)
Carbon monoxide (92)
*Carbon tetrachloride (118)
*Chlorine (119)
Chlorine trifluoride (94)
*Chloroform (121)
Chloromethane (93)
*Diethyl ether (122)
Diisopropyl fluorophosphate (41)
*Dimethylformamide (123)
*Dimethyl sulfate (125)
*Dioxane (126)
*Ethylene dibromide (128)
*Fluorine (95)
*Formaldehyde (130)
*Hydrazine and salts (132)
Hydrofluoric acid (43)
Hydrogen bromide (98)
Hydrogen chloride (98)
*Hydrogen cyanide (133)
*Hydrogen sulfide (135)
Mercury and compounds (52)
*Methanol (137)
*Morpholine (138)
*Nickel carbonyl (99)
*Nitrobenzene (139)
Nitrogen dioxide (100)
N-nitrosodiethylamine (54)
*Peracetic acid (141)
*Phenol (142)
*Phosgene (143)
*Pyridine (144)
*Sodium azide (145)
*Sodium cyanide (147)
Sulfur dioxide (101)
*Trichloroethylene (149)
*Vinyl chloride (150)

Appendix B to § 1910.1450—References (Non-Mandatory)

The following references are provided to assist the employer in the development of a Chemical Hygiene Plan. The materials listed below are offered as non-mandatory guidance. References listed here do not imply specific endorsement of a book, opinion, technique, policy or a specific solution for a safety or health problem. Other references not listed here may better meet the needs of a specific laboratory. (a) Materials for the development of the Chemical Hygiene Plan:

1. American Chemical Society. Safety in Academic Chemistry Laboratories, 4th edition, 1985.
2. Fawcett, H.H. and W. S. Wood. Safety and Accident Prevention in Chemical Operations. 2nd edition. Wiley-Interscience, New York, 1982.
3. Flury, Patricia A., Environmental Health and Safety in the Hospital Laboratory, Charles C. Thomas Publisher, Springfield IL, 1978.
3. Green, Michael E. and Turk, Amos, Safety in Working with Chemicals, Macmillan Publishing Co., NY, 1978.
5. Kaufman, James A., Laboratory Safety Guidelines. Dow Chemical Co., Box 1713, Midland, MI 48640, 1977.
6. National Institutes of Health. NIH Guidelines for the Laboratory use of Chemical Carcinogens. NIH Pub. No. 81–2385, GPO, Washington, DC 20402, 1981.
7. National Research Council, Prudent Practices for Disposal of Chemicals from Laboratories, National Academy Press, Washington, DC, 1983.
8. National Research Council, Prudent Practices for Handling Hazardous Chemicals in Laboratories, National Academy Press, Washington, DC, 1981.
9. Renfrew, Malcolm, Ed., Safety in the Chemical Laboratory, Vol. IV, *J. Chem. Ed.*, American Chemical Society, Easton, PA, 1981.
10. Steere, Norman V., Ed., Safety in the Chemical Laboratory, *J. Chem. Ed.* American Chemical Society, Easton, PA, 18042, Vol. I, 1967, Vol. II, 1971, Vol. III 1974.
11. Steere, Norman V., Handbook of Laboratory Safety, the Chemical Rubber Company Cleveland, OH, 1971.
12. Young, Jay A., Ed., Improving Safety in the Chemical Laboratory, John Wiley & Sons, Inc. New York, 1987.

(b) Hazardous Substances Information:

1. American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment with Intended Changes, P.O. Box 1937 Cincinnati, OH 45201 (latest edition).
2. Annual Report on Carcinogens, National Toxicology Program U.S. Department of Health and Human Services, Public Health Service, U.S. Government Printing Office, Washington, DC, (latest edition).
3. Best Company, Best Safety Directory, Vols. I and II, Oldwick, N.J., 1981.
4. Bretherick, L., Handbook of Reactive Chemical Hazards, 2nd edition, Butterworths, London, 1979.
5. Bretherick, L., Hazards in the Chemical Laboratory, 3rd edition, Royal Society of Chemistry, London, 1988.
6. Code of Federal Regulations, 29 CFR part 1910 subpart Z, U.S. Govt. Printing Office, Washington, DC 20402 (latest edition).
7. IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, World Health Organization Publications Center, 49 Sheridan Avenue, Albany, New York 12210 (latest editions).
8. NIOSH/OSHA Pocket Guide to Chemical Hazards, NIOSH Pub. No. 85–114, U.S. Government Printing Office, Washington, DC, 1985 (or latest edition).
9. Occupational Health Guidelines, NIOSH/OSHA NIOSH Pub. No. 81–123 U.S. Government Printing Office, Washington, DC, 1981.
10. Patty, F.A., Industrial Hygiene and Toxicology, John Wiley & Sons, Inc., New York, NY (Five Volumes).
11. Registry of Toxic Effects of Chemical Substances, U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, Revised Annually, for sale from Superintendent of Documents U.S. Govt. Printing Office, Washington, DC 20402.
12. The Merck Index: An Encyclopedia of Chemicals and Drugs, Merck and Company Inc. Rahway, N.J., 1976 (or latest edition).
13. Sax, N.I. Dangerous Properties of Industrial Materials, 5th edition, Van Nostrand Reinhold, NY., 1979.
14. Sittig, Marshall, Handbook of Toxic and Hazardous Chemicals, Noyes Publications, Park Ridge, NJ, 1981.

(c) Information on Ventilation:

1. American Conference of Governmental Industrial Hygienists Industrial Ventilation, 16th edition Lansing, MI, 1980.
2. American National Standards Institute, Inc. American National Standards Fundamentals Governing the Design and Operation of Local Exhaust Systems ANSI Z 9.2–1979 American National Standards Institute, N.Y. 1979.
3. Imad, A.P. and Watson, C.L. Ventilation Index: An Easy Way to Decide about Hazardous Liquids, Professional Safety pp 15–18, April 1980.
4. National Fire Protection Association, Fire Protection for Laboratories Using Chemicals NFPA–45, 1982.

Safety Standard for Laboratories in Health Related Institutions, NFPA, 56c, 1980.

Fire Protection Guide on Hazardous Materials, 7th edition, 1978.

National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

5. Scientific Apparatus Makers Association (SAMA), Standard for Laboratory Fume Hoods, SAMA LF7-1980, 1101 16th Street, NW., Washington, DC 20036.

(d) Information on Availability of Referenced Material:

1. American National Standards Institute (ANSI), 1430 Broadway, New York, NY 10018.

2. American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, PA 19103.

(Approved by the Office of Management and Budget under control number 1218-0131)

Employers shall have completed an appropriate Chemical Hygiene Plan and commenced carrying out its provisions by Jan. 31, 1991. [1910.1045 added, effective May 1, 1990, by 55 FR 3327, Jan. 31, 1990]

§1910.1499 Source of standards.

Section 1910.1000	41 CFR 50-204.50, except for Table Z-2, the source of which is American National Standards Institute, Z37 series.

§ 1910.1500 Standards organizations.

Specific standards of the following organizations have been referred to in this subpart. Copies of the standards may be obtained from the issuing organization.

American Conference of Governmental Industrial Hygienists
1014 Broadway
Cincinnati, Ohio 45202

American National Standards Institute
1430 Broadway
New York, New York 10018

HEALTH AND SAFETY PLAN SIGN-OFF SHEET
For Meadowlands Plating and Finishing Site
Chemical Hygiene Plan

I have read and fully understand the contents of the Earth Tech Health and Safety Plan.

Printed Name and Company	Date	Signature
Carl L. Lyles ETRS	1-13-99	Carl L. Lyles
James M Shaw ETRS	1-13-99	[illegible]
Shelby C. Dyer ETRS	1-13-99	[illegible]
TERRY HANKINS	1-13-99	Terry Hankins
Homer Roberts - ETRS	01-14-99	[illegible]
John Hudnall ETRS	1-14-99	John Hudnall
ROBERT McKINNEY - ETRS	1-19-99	Robert McKinney
Bill Magowan	1/21/99	William J Magowan
Joe West	1/21/99	[illegible]
Jeremy Sweetz	2/5/99	Jeremy Sweetz
ROY McKENZIE ETRS	2/22/99	[illegible]
EUGENE CINTRON ETRS.	2/22/99	Eugene Cintron
Aldo Williams	3/8/99	[illegible]
Louis Wilson	5/11/99	[illegible]

I:\29076\HASP.DOC

HEALTH AND SAFETY PLAN SIGN-OFF SHEET
For Meadowlands Plating and Finishing Site
Chemical Hygiene Plan

I have read and fully understand the contents of the Earth Tech Health and Safety Plan.

Printed Name and Company	Date	Signature
Kimberly A McCloud USCG	01/13/99	[signature]
KEITH P. EDWARDS USCG AST	01/13/99	Keith P. Edwards
Jim Shaw ETRS	1/13/99	Jim Shaw
M.T. Leahy, USCG AST	1/27/99	[signature]
GARY BELAND	02/04/99	Gary E Beland
MARK KNOWLES	02/03/99	Mark Knowles
Don Mayer	2/17/99	Donald F [signature]
ANTHONY DEROSA EISCO-NJ	2/22/99	[signature]
CESAR DE LA CRUZ EISCO NJ	2-22-99	Cesar De La Cruz
FRED REVONO	2-22-99	[signature]
N. J. Vonnell EPA	3/29/99	[signature]
Roy Dilley ETRS	4/6/99	Roy Dilley

I:\29076\HASP.DOC

LAB SAFETY PLAN

LABORATORY SAFETY MANUAL

May 1991
Revised October 1991

EARTH TECH

TABLE OF CONTENTS

Section		Page
1.0	INTRODUCTION	1
2.0	GENERAL SAFETY RULES	2
3.0	GENERAL LAB HAZARDS AND WORK PRACTICES	3
3.1	USE OF FUME HOODS	3
3.2	GAS CYLINDERS	3
3.3	ASSEMBLING APPARATUS	4
3.4	INSERTION OF GLASS TUBING OR RODS INTO RUBBER STOPPER AND HOSES	6
3.5	VACUUM OPERATIONS IN THE LABORATORY	6
3.6	HANDING CHEMICALS	7
3.7	REAGENTS	9
3.8	GLASSWARE	9
3.9	HALOGENS IN THE AIR	9
3.10	SEPARATIONS	10
3.11	CHEMICAL SPILLS	11
4.0	RESPONSIBILITY FOR SAFETY	12
5.0	ACCIDENT REPORTING	14
6.0	EYE PROTECTION	15
7.0	LABORATORY FIRST AID	16
8.0	FIRE AND FIRE SAFETY	19
8.1	FIRE PRECAUTION	19
8.2	FIRE FIGHTING	19
8.3	CLASSES OF FIRES	19
9.0	WASTE DISPOSAL	21
10.0	CHEMICAL STORAGE	23
11.0	SHELF-LIFE CHEMICALS	25
12.0	ELECTRICAL HAZARDS	26

13.0 CHEMICAL HAZARDS 28
13.1 ORGANIC PEROXIDES 28
13.2 CYANIDES AND NITRILES 30
13.3 CORROSIVE LIQUIDS 30
13.4 FLAMMABLE LIQUIDS 34

14.0 TOXINS AND CARCINOGENS 36

15.0 RESPIRATORY PROTECTION 37

1.0 INTRODUCTION

There is a safe way to perform all jobs. A chemical laboratory uses many materials that possess one or more of the following characteristics:

1. Flammability
2. Toxicity
3. Reactivity

Two basic questions must serve as a starting point when beginning laboratory work:

1. What am I working with?
2. What would happen if...?

By knowing the chemical, physical and biological or health implications of chemicals, adequate planning and anticipation can lead to accident prevention.

The practice of safety in the chemical laboratory requires:

1. The willingness and desire of individuals to protect themselves and associates.
2. Adherence to a basic set of guidelines or rules.

It is the purpose of this document to outline a set of guidelines to achieve and maintain safe working conditions in the Earth Tech laboratory.

2.0 GENERAL SAFETY RULES

A. Eye protection is required at all times in the laboratory.

B. When acids or corrosives are handled, full face shield eye protection is mandatory.

C. Personal protective clothing such as lab coats and impermeable gloves should be used where appropriate to prevent skin exposure.

D. Mouth suction filling of pipettes is forbidden.

E. Volatile, flammable and toxic materials are to be handled in the laboratory hoods and/or glove box.

F. Lab workers must wash hands and/or other exposed body surface prior to leaving the work area.

G. Broken glassware is to be flame polished or discarded.

H. There will be no eating, drinking, smoking or applying cosmetics in the lab area where chemicals are in use - lab glassware must not be used for food or drink.

I. Hoods are to be used with the sash part way down.

J. Reactive or organic chemicals are not to be dumped down the sink's drain but must be segregated for waste disposal.

K. Contact lenses should not be worn in the laboratory.

L. Gas cylinders must be chained at all times.

M. Non-mercury thermometers are preferred and should be ordered whenever a thermometer is needed.

N. Asbestos materials are discouraged; Kelvor or Nomex hot gloves are preferred.

O. No one may work in the laboratory alone or at least without another person within easy call.

P. No open-toed shoes are allowed in the laboratory.

Q. All containers of chemicals must be clearly labeled.

3.0 GENERAL LAB HAZARDS AND WORK PRACTICES

3.1 USE OF FUME HOODS

1. Fume hoods should be sufficiently effective that substances with strong odors, such as ether and pyridine, are not detectable by the laboratory worker. The specification of flow of air through a fume hood is not an absolute and each hood should be monitored on the basis of the substances and amounts being used. Flow varies markedly near the surface. Increased flow can be achieved by use of a restriction in front of the hood, such as a window or safety shield. Vaneometers are located in each hood and low velocities (less than 60 fpm) should be reported immediately to the laboratory director.

2. Fume hoods should not be used as a planned means for removing or evaporating volatile substances, but rather as a preventative means to remove vapors from leaks, during transfer of toxic compound and as a means of protection against violent reactions.

3.2 GAS CYLINDERS

1. Cylinders of compressed gases should be handled as potential sources of high energy.

2. When storing or moving a cylinder, always have the cap in place to protect the valve stem from being accidentally broken off.

3. Do not expose cylinders to temperatures higher than about 100°F. Some rupture devices on cylinders will release at about 150°F. Some small cylinders are not fitted with rupture devices and may explode if exposed to high temperatures. This includes lecture bottles.

4. Never use a cylinder that cannot be positively identified.

5. Never force a cylinder valve.

6. Reactions for which cylinders of toxic, flammable or reactive gases are used should be run in fume hoods, and suitable racks should be provided to hold the cylinders at all times.

7. Compressed gas cylinders of all sizes must be supported by straps, chains, or a suitable stand to prevent them from falling over.

8. When moving large cylinders, they should be strapped to a properly designed wheeled cart to insure stability and to prevent the cylinders from becoming potential rockets in case they should fall.

9. Under no condition should one direct high pressure gas or air toward or onto another person.

10. A compressed gas or compressed air should not be used to blow away dust or dirt, since the resultant flying particles are dangerous.

11. Rapid release of a compressed gas will cause an unsecured gas hose to whip dangerously and also may build up a static charge which can ignite a combustible gas.

12. Do not extinguish a flame involving a highly combustible gas until the source of gas has been shut off, otherwise, it can re-ignite with an explosion.

13. When not in use, all cylinder and bench valves should be closed tightly.

14. Promptly remove regulator from empty cylinders and replace the protective cap at once; tear tag to the empty portion.

15. Never bleed a cylinder completely empty. Maintain a slight pressure to keep contaminants out.

16. Be sure to use the appropriate regulator on each gas cylinder. Adaptors or home-made modifications are prohibited.

17. Oil or grease on the high pressure side of an oxygen cylinder may cause an explosion.

18. Always use a trap to prevent back-siphonage of chemicals into the cylinder.

19. Acetylene lines to the AA must not be made of copper to prevent the formation of explosive copper (I) acetylides.

3.3 ASSEMBLING APPARATUS

1. Set up clean, dry, approved apparatus, firmly clamped and well back from the edge of the bench with due regard to positions of reagent bottles to burners, and to other persons and their equipment. Choose sizes which ca properly accommodate the experiment to be performed, allowing about 20% free space as the minimum.

2. Use only equipment which is free of flaws such as cracks, chips, frayed wire, and obvious defects. Examine glassware in a strong light and also in polarized light for stains.

3. Keep work space uncluttered. Only instructions, notebook, and pen should be present. Keep work space clear of chemicals and scraps of paper. Keep measuring equipment, such as glass cylinders, far back where they will not be easily knocked over.

4. A properly placed pan under a reaction vessel or container will confine spilled liquids in the event of glass breakage.

5. Addition and separatory funnels should be freshly lubricated, properly supported, and oriented so

that the stopcock will not be loosened by gravity. A retainer ring or spring should be used on the stopcock plug.

6. Condensers should be properly supported with securely positioned clamps. The attached water hoses should be secured with either wire, or similar clamping device.

7. Stirrer motors and vessels should be secured to maintain proper alignment. A magnetic stirrer is preferable. Only nonsparking motors should be furnished. Air motors are preferable if they can be used.

8. Apparatus attached to a ring stand should be positioned so that the center of gravity of the system is over the base and not to one side (the lower the better) but with adequate provision for removing burners or baths.

9. Prior to adding reagents and carrying out any reactions, the glassware assembly and auxiliary equipment should be thoroughly checked.

10. Provide a vent for chemicals that are to be heated. Prior to heating a liquid, place boiling stones in vessels (other than test tubes). If a burner is to be used, distribute the heat with an "asbestos" centered wire gauze. Use a thermometer in a boiling liquid if there is the possibility of a dangerous exothermic decomposition as in some distillations.

11. A hood is required where flammable vapors are evolved in a gaseous product, as in the distillation of ether. Most vapors have a molecular weight greater than 29 (i.e., their density is greater than that of air) and will settle on a bench top where they may diffuse to a distant burner or ignition source and may flash back. However, once diluted with significant amounts of air, vapors move in air essentially as air itself, since the "diluted" specific gravity is essentially one.

12. If noxious or flammable gases are likely to be evolved, the experiment must be confined to a hood. When working with flammable gases, do not use burners, hot plates, or sparking motors in the vicinity.

13. Use a face shield that is sufficiently large and strong to protect your neck when conducting a reaction which may result in a mild explosion or when using a vacuum system (which may implode).

14. Stoppers should fit so that between 1/3 and 1/2 is inserted. Corks should previously have been softened by rolling and kneading. Keeping the hands close together to minimize a cut in case the vessel breaks, gently but firmly twist the stopper in place. Avoid exerting any pressure on inserted glass tubes. When available, ground glassware is preferable.

15. When drilling a stopper, use only a sharp borer which is one size smaller than will just slip over the tube to be inserted. In case of a rubber stopper, lubricate with water or glycerol, preferably the latter. Holes should be bored by slicing through the stopper, twisting with moderate forward

pressure, grasping the stopper only with the fingers and keeping the hand away from the back of it. Keep the index finger of the drilling hand against the barrel of the borer and close to the stopper if a hole is irregular or does not fit the inserted tube snugly, if it is cracked, or if it leaks.

16. To cut glass tubing, hold the tubing against a firm notched support, make one quick firm stroke with a sharp file, rocking the file to extend the deep nick one-third around the circumference. The bottom of the nick should be a sharp V. Wetting the nick will help open the fracture. Hold the tubing in both hands, away from the body, with the nick centered between the hands and turned directly opposite the body. Place the thumbs on the tubing opposite the nick about an inch apart, and extended toward each other. Push out on the tubing with the thumbs, but do not deliberately bend the glass with your hands. If the tubing does not readily pull apart, the nick probably is too shallow or rounded; make a fresh sharp file scratch and repeat the operation. Be careful in cutting a short piece from a long piece of tubing, since the long end may whip and injure a nearby person.

17. All glass tubing and rods, including stirring rods, should be fire polished before use. Unpolished glass has a razor-like edge, which not only will lacerate the skin, but will cut into a stopper or rubber hose, making it difficult to insert the glass properly. After polishing or bending glass, allow ample time for it to cool, and then touch it carefully before grasping it, to be certain it is not too warm.

18. To remove a glass tube from a stopper, use a lubricated, dulled cork borer in the reverse technique described above for insertion. If a cork borer cannot be used, rotate the metal handle of a small file between the glass and stopper and lubricate as separation progresses. If one of these procedures is not readily successful, discard both the stopper and tube.

3.4 INSERTION OF GLASS TUBING OR RODS INTO RUBBER STOPPER AND HOSES

1. Be sure that the hole in the rubber is the proper size for the tubing or rod which is to be inserted.

2. Fire polish or file smooth the end of the glass to be inserted.

3. Lubricate the glass. Water may be sufficient; glycerine is a good lubricant.

4. Wrap a cloth around the glass. Protect the hand holding the stopper or hose with a cloth or glove.

5. Hold the wrapped glass not more than 5 cm from the end nearest the rubber stopper or hose.

6. Insert the glass into the stopper or hose, avoiding too much pressure and torque.

3.5 VACUUM OPERATIONS IN THE LABORATORY

1. Vacuum Desiccators should be enclosed in a box or approved shielding device for protection in case of an implosion. Only chemicals being dehydrated should be stored in a desiccator. When opening a desiccator that is under vacuum make sure that atmospheric pressure has been restored;

a "frozen" vacuum desiccator lid can be loosened by a single edge razor blade as a wedge which is then tapped with a wooden block to raise the lid.

2. Water Aspirators for Vacuum are used mainly for filtration purposes and only equipment that is approved for this purpose should be used. Never apply a vacuum to a flat bottom flask unless it is very small or it is a heavy walled filter flask designed for this purpose. Place a trap between the aspirator and the apparatus so that water cannot be sucked back into the system if the water pressure should fall unexpectedly while filtering. These recommendations hold true for rotary evaporation operations where water aspirators are being used for vacuum.

3.6 HANDING CHEMICALS

1. **KEEP YOUR HANDS AND FACE CLEAN**. Wash thoroughly with soap and warm water whenever a chemical contacts your skin and also wash face, hands, and arms before leaving the laboratory.

2. Most chemicals are harmful to some degree. Avoid direct contact with all chemicals. Some substances considered "safe" today may in the future be found to cause unsuspected long-term disorders. It is especially important to keep chemicals from hands, face, and clothing, including shoes or other foot-covering. Many substances are readily absorbed into your body through the skin and through inhalation. Chemicals may also enter your body through your mouth by contamination of the hands, and they often are transferred to the eyes from the hands.

3. A large number of common substances are acute respiratory hazards and should not be used in a confined area in large amounts. They should be dispensed and handled only where there is adequate ventilation, preferably in a hood. Examples of such substances are:

acetyl chloride
ammonium hydroxide
anhydrous ammonia
arsine
bromine
carbon monoxide
chlorine
chloroform
diborane
dimethyl sulfate
fluorine
hydriodic acid
hydrobromic acid
hydrochloric acid conc.
hydrofluoric acid
hydrogen selenide
hydrogen sulfide
hydrogen telluride
phosgene
phosphine
phosphorus chlorides
phosphorus oxchloride
stilbine
sulfur dioxide
sulfuryl chloride
thionyl chloride

Some of these (e.g., hydrogen halides, hydrogen sulfide, hydrogen selenide, and phosgene) are by-produces of certain reactions.

4. Some solvents, such as dimethyl sulfoxide, may serve as vehicles for the rapid transport of toxic substances dissolved in them through the skin into the body.

5. Label all containers of chemicals. Do not use any substance in an unlabeled or improperly labeled container. Printed labels which have been partly obliterated or scratched over and crudely labeled by hand should be disposed of promptly with care to avoid adverse reactions.

6. Carefully read the label before removing a reagent from its container. Read it again as you promptly recap the container and return it to its proper location. Names of distinctly different substances are sometimes nearly alike and using the wrong substances can lead to accidents or ruin an experiment.

7. Hold a bottle with its label toward your palm to protect the label and also the hand of the next user in case some reagent drains down on the bottle. Stoppers too small to stand upside down on the bench should be held at the base and outward between two fingers of the pouring hand. Do not pour toward you. When pouring liquids or powders, use the bottle to assist removal.

8. Do not use more material than directed. Remove from the container only approximately what is needed, discarding any excess. Never return a chemical to its original container. Dispose of unwanted solids in a solids waste container. Very reactive chemicals, such as sodium or phosphorus, should be disposed of in labeled, covered containers. Nonflammable water soluble liquids should be flushed down the drain in the laboratory sink, followed by at least two gallons of water or put in the appropriate waste container. Flammable wastes should be placed in designated containers.

9. Wear an apron and gloves whenever pouring bromine or hydrofluoric acid. Contact with either of these will lead to excruciatingly painful burns.

10. Always add a reagent slowly; never "dump" it in. Observe what takes place when the first small amount is added and wait a few moments before adding more.

11. Before pouring a liquid into an addition funnel, make sure the stopcock is closed. Use a stirring rod to direct the flow of the liquid being poured. Keep a beaker under the funnel in the event the stopcock comes open unexpectedly.

12. To avoid violent reaction and splattering while diluting solutions, always pour concentrated solutions slowly into water or into less concentrated solutions while stirring. The more concentrated solution usually is heavier and any heat evolved is better distributed. This procedure is particularly applicable in preparing dilute sulfuric acid. Always wear goggles and use the hood when diluting solutions.

13. Beakers should be supported by grasping them around the side with one hand. If the beaker is 500 ml or larger, support it from the bottom with the second hand. When setting the beaker down, first remove the hand from the base and deposit the beaker slowly on the clean surface of the bench. If the beaker is hot, use beaker forceps or tongs and place on an insulated gauze pad.

14. Flasks should be grasped by the center neck, never a side arm. If the flask is round bottom, it should rest on a proper sized cork ring when it contains some materials but is not assembled for reaction. Large flasks (3-liter) must be supported at the base during use.

3.7 REAGENTS

Larger containers of reagents should not be stored in the laboratory proper. Storage for them should be provided on a low shelf, preferably in a tray adequate to contain spills. Incompatible materials should not be stored nearby or together. Corrosive liquids should be dispensed in small containers no larger than one pint.

3.8 GLASSWARE

The only soft glass provided in the laboratory should be reagent bottles, measuring equipment, stirring rods, and tubing. Any glass which may be heated should be of Pyrex-type borosilicate. Any sizeable nonspherical glass equipment to be evacuated, such as suction flasks, should be specially designed with heavy walls. Dewar flasks and large vacuum vessels should be taped or otherwise screened or contained in a metal jacket protection to avoid flying glass from an implosion. Thermos bottles, with thin walls, are not adequate substitutes for Dewar flasks.

3.9 HALOGENS IN THE AIR

If the burner flame turns green (Beilstein test), this is an indication of halogen-containing compounds in the

air. If the cause cannot be found and corrected, evacuate the room. Extinguish all burners and stop all addition reactions.

3.10 SEPARATIONS

1. Do not attempt to extract a solution until it is cooler than the boiling point of the extractant. When a volatile solvent is used, the unstopped separatory funnel should first be swirled to allow some mixing. Close the funnel and invert it with the stopper held in place with a gloved hand and immediately open the stopcock. This should be done with the plug handle turned away from you with the hand encompassing the barrel to keep the plug securely seated.

2. Do not point the funnel drain toward anyone or toward a flame; preferably it should be directed toward a hood. Close the cock, shake with a swirl, and immediately open the cock with the funnel in the inverted position. Repeat until evident that there is no excessive pressure. Swirl again as the funnel is racked, immediately remove the stopper, and separate when appropriate. Always anticipate leakage by placing an adequate size beaker under the funnel.

3. Ethers must never be distilled unless known to be free of peroxides. Most ethers, including cyclic ethers, form dangerously explosive peroxides on exposure to air and light. The peroxides also may change the course of the planned reaction. Several acceptable colorimetric tests for peroxides in ether (e.g., Jorissen reagent[1] are available. If a test is "positive", filter the contaminated liquid through a column of chromatographic, basic grade, aluminum oxide until the test is negative. Promptly discard the contaminated alumina int he solids waste container.

4. Superheating and sudden boiling frequently occur when distilling under vacuum. Therefore, it is important that the assembly be secure and the heat be distributed more evenly than is possible with a flame. This can best be done with a mantle heater or with a nonflammable liquid bath which can be heated with a burner. Peanut oil or another suitable high-boiling oil can be used if heated on a hot plate. Hot water or steam should be used where practical. A standing shield should be in place in the event of an implosion. An additional thermometer should be inserted very near the center bottom of the distilling flask to warn of a dangerous exothermic decomposition. Avoid heating above the temperature directed. After finishing a vacuum distillation, cool the system before slowly bleeding in air, since air may induce an explosion in a hot system.

5. When carrying out a steam distillation, take care not to run the steam in at too great a rate for the condenser. Overfilling the flask should be avoided by trapping condensate in the entering steam line and by moderately heating the flask to prevent excessive condensation there.

---

[1]Dissolve 0.1 g of V205 in 2 ml of 96% H2SO4, add to 50 ml of water. Development of a red coloration is a positive test for peroxides.

3.11 CHEMICAL SPILLS

1. Immediately alert those in the laboratory.

2. If there is no fire hazard and the material is not particularly volatile or toxic, clean it up. To facilitate cleaning up liquids, use an absorbent material which will neutralize the liquids if possible (sodium bicarbonate solution or powder for acids, sodium thiosulfate solution for bromine). Commercial absorbents (Baker Spill Kits and spill pillows) or small particles (about 30 mesh) of other satisfactory clay absorbents are also recommended. (Dry sand can be used but is less effective.) A dustpan and brush should be used and rubber gloves should be worn. While wearing gloves, clean the contaminated area with soap and water and mop it dry. If the spill is on the floor, some absorbent should be sprinkled on the spot to prevent slipping. (Do not use vermiculite; this creates a slipping hazard when wet.)

3. If a volatile, flammable or toxic material is spilled, warn everyone to immediately extinguish flames and to turn off spark-producing equipment such as brush-type motors. Shut down all experiments and vacate the room until it is decontaminated. The lab director will be responsible for designating the proper cleanup procedure. The substances - aromatic amines and nitro compounds, bromine, carbon disulfide, cyanides, hydrazines, nitriles, ethers, and organic halides - are very hazardous and clean up should be handled carefully. Avoid skin contact, and prevent inhalation by wearing appropriate breathing apparatus.

4. Spilled mercury should be immediately and painstakingly cleaned up by using the Baker Mercury spill cleanup kit. Care should be used to clean up all mercury, especially any near a source of heat. Special care should be exercised to keep mercury from vacuum systems or vacuum pumps by proper trapping.

5. Most other small liquid spills (100 ml) can be absorbed with paper towels, sand, or absorbent. Most solid spills can be brushed up and disposed of in solids waste containers, but care must be exercised to avoid mixtures of reactive combinations.

6. All contaminated clothing must be removed immediately and the skin washed with soap and water. Clothes must be laundered before reuse. Contaminated clothing must not be brought home from the laboratory.

4.0 RESPONSIBILITY FOR SAFETY

There is a joint responsibility for safety within the laboratory between the managerial or administrative branch and the chemists and technicians.

A. The Manager and Supervisors are, in general, responsible for providing:

1. Written safety guidelines for the laboratory

2. Written detailed laboratory procedures that address:
   a. Material hazards
   b. Disposal techniques
   c. Decontamination strategies

3. Ensure availability of personal protective equipment including:
   a. Respirators
   b. Respirator replacement filters
   c. Impermeable gloves
   d. Lab coats
   e. Eye protection

4. Maintain working eyewash, showers, fire extinguishers, and laboratory ventilation.

5. Adequate facilities for handling flammable storage, waste storage, gas/oxygen storage.

6. Employee training and education concerning personal protective equipment care and use.

7. Adequate and sufficient first aid equipment.

8. Accident and injury reporting and maintenance of statistics.

B. Chemists and technicians are responsible for:

1. Familiarizing themselves with and following the general safety rules.

2. Reviewing the chemical data sheets for chemical, physical or hazardous properties of materials prior to commencing a task.

3. Exercising advanced planning to anticipate and prevent potentially hazardous occurrences.

4. Questioning the lab supervisors or Director when there is an uncertainty in how to proceed with an operation.

5. Proper care and use of protective equipment.

6. Proper storage and labeling of chemicals and samples.

7. Reporting on:
   a. Safety equipment inventory shortages prior to depletion.
   b. Facility's problems with storage, ventilation, etc.
   c. Updating procedures with regard to safety.
   d. Improvements or additions to equipment, facilities, or procedures to improve safety.

8. Ensuring that there are no flammable vapors in an area before using open flame or spark-producing equipment such as motors, pumps, or open heaters.

9. Checking to ensure eyewashes are unblocked, accessible, and functioning on a daily basis.

10. Be familiar with the location and use of safety and emergency equipment.

11. Know about evacuation routes for the location in which you are working.

12. Work neatly and maintain good housekeeping.

13. Clean up small spills and broken glass immediately.

5.0 ACCIDENT REPORTING

A log of all accidents associated with laboratory work shall be maintained by the Lab Manager. A formal written report will be entered to document:

A. The name of those involved

B. The time and date of occurrence

C. A description of the injury

D. A description of the accident stating cause

E. Recommendation for prevention of recurrence

F. Follow-up

A yearly summary of accident type and frequency will be compiled.

6.0 EYE PROTECTION

Eye protection will be in accordance with OSHA's 29 CFR 1919.133 and ANSI 2-87-7 - 1979. These policies state that where there's a "reasonable probability" of the occurrence of ocular injury, eye protection must be worn.

The phase "reasonable probability" of occurrence will be interpreted to mean that a minimum of safety glasses be worn. The use of goggle-type eye protection or goggles in conjunction with full face shields are recognized as providing an ever greater degree of protection from spills and splashes. Use of goggle-type eye protection is therefore encouraged. Goggles should also be worn when there is damage of flying particles such as when vacuum pressure vessels are in use.

When handling or working around acids and alkalies, a full wrap-around face shield is mandatory. A face shield providing ear protection is preferred, as liquid materials are sometimes difficult to remove from the ear canal before severe damage is incurred.

Contact lenses are prohibited from use in the laboratory because vapors of solvent or other chemicals may be trapped next to the cornea, resulting in severe irreversible damage. In the event of a spill or splash of an acid or corrosive, contact lenses can fuse to damaged corneal tissues and entrap damaging chemicals.

The laboratory is equipped with eye washes in the event of ocular spills or splashes. The affected eye or eyes should be forcibly held opened and flushed with water for a minimum of fifteen (15) minutes. This first aid measure should be followed by treatment by an emergency room physician or ophthalmologist.

Certain chemicals can result in systemic exposures producing eye damage. For example, naphthalenes and alloxan are known to produce cataracts as a toxicological response to large doses. It is important to understand the chemical routes of exposure and biological hazard prior to working with a material. If there are questions or uncertainty, consult the lab manager or supervisor before proceeding.

7.0 LABORATORY FIRST AID

Any person who attempts to perform first aid treatment before professional treatment by a doctor should remember that such assistance is only stop gap - a means of emergency procedure to be followed until the physician arrives. Do not attempt to give full treatment, just emergency relief. Rescue the victim, start breathing, give CPR if necessary, stop bleeding, treat the wound, and prevent shock. Red Cross First Aid Manuals are located at each work station for reference in case of accident or emergency. A diagram of the locations of first aid and safety equipment is given in Figure 1.

It is highly recommended that all full-time staff are to attend Red Cross First Aid/CPR or First Responder Training. A yearly CPR refresher course is required to maintain certification. A minimum of two persons with Red Cross or First Responder training are required for each laboratory shift.

A directory of the emergency phone numbers is posted near the phones in the laboratory(see Example 1).

When an emergency occurs:

A. Report the nature and location of the emergency, given your name and telephone number and location. Tell where you will meet emergency vehicles. If an individual is involved, report on his condition (whether he/she is conscious, burned, trapped, etc.). Be the last person to hang up the telephone.

B. Notify others in the area. If there is a chemical spill, cordon off the area, evacuate if necessary, shut down power or ignition sources, etc.

   1. Meet emergency response vehicles and crews. Be calm and informative; advise them regarding your knowledge of the potential hazards.

   2. Do not move seriously injured persons unless there is imminent danger of further life threatening injury. Be particularly aware of back, neck and head injuries.

   3. Keep the phone lines free for use to contact emergency personnel or communicate the situation.

C. What to Do While Waiting for Assistance - Do what is necessary to protect life.

   1. Move an injured person only if he is in danger. Keep him warm.

   2. If his clothing is on fire, wrap him in a coat, blanket or whatever is available to extinguish the fire. Get medical attention promptly.

   3. If injured is not breathing, provide artificial respiration and CPR if no pulse.

Example 1
Emergency Action Plan
Phone List

Ambulance		911
Hospital	- Bradley Memorial	479-0111
	Cleveland Community	339-4100
Poison Control Center	- Memphis	1-901-528-6048
Fire Department	- Cleveland	911
Police Department	- Cleveland	911
Health & Safety Officer	- Bill Seymour	877-5537
Laboratory Director	- Bill Hartford	559-9107
Chemical Spill	- Bill Seymour	877-5537
	Brad Jackson	1-706-638-4711
After Hours	- Steve Miller	472-4094
	Bill Seymour	877-5537
	Michael Ryder	1-706-891-9042
	Todd Davis	559-9107
	Bill Hartford	559-9107
United Alarm	- Central Facility (24 HR)	265-1230

4. If he is bleeding severely, control the blood by compressing the would with a sterile gauze pad or whatever clean material that is available and elevate the injury above the level of the heart.

5. If chemicals have been spilled on the victim, get him under a shower or spigot to thoroughly wash the affected area. If he has chemicals in his eyes, check for an remove any contact lenses; then irrigate with plenty of water for fifteen (15) minutes.

6. If the person is in contact with a live electrical circuit, **DO NOT TOUCH HIM - DISCONNECT THE POWER FIRST** or you may be seriously injured.

7. If he is overcome with smoke or fumes, remove him t fresh air and treat for shock (provide oxygen inhalation, if possible).

8. If there is a fire, use proper extinguishers - cut off electrical circuits and gas lines; close fire doors.

9. If you are directed to leave the room, stop the experiment, turn off all burners or other heat-producing devices, and cease any additions of reagents or reactants.

8.0 FIRE AND FIRE SAFETY

8.1 FIRE PRECAUTION

Defective electrical wiring, sparks from electrical apparatus that is not explosion-proof, carelessness in using chemicals and gas burners, fires in fume hoods, and ill-advised use of volatile or explosive liquids are leading causes of laboratory fires.

Overloading electrical circuits - particularly multiple-socket installations - causes overheating which can develop into a mushrooming fire. Electric outlets for fume hoods should be placed outside the hood so they won't corrode and become a hazard. Sparks from electrical apparatus that do not have explosion-proof enclosures often ignite volatile vapors. Resultant fires generally develop so fast, they approach explosiveness.

The safest technique is to use small samples and to shut off all electrical equipment that is not explosion-proof before working with ethers, hydrocarbons in general, and other flammable liquids or gases. Never pour volatile liquids down the sink. Check the section on disposal in this manual and local ordinances for proper disposal methods.

8.2 FIRE FIGHTING

Fire in clothing should always be smothered in a fire blanket or heavy toweling, or by beating the flame out, rather than by dousing it with water.

As a general rule, the area immediately surrounding a fire should be cooled with an extinguisher to prevent the flames from spreading, then the base of the blaze extinguished, and finally, the scattered remnants of the fire smothered.

The first step in an electrical fire is to pull the switch. Use a carbon dioxide extinguisher, since it is non-conductor of electricity, and exercise caution to avoid becoming a part of the circuit.

If a poisonous gas is given off by a fire and the proper mask is not immediately available - or if the fire gets beyond control of the extinguishers at hand - get away from the room entirely. Make certain that no one is inside, shut the door to prevent drafts, and call the fire department.

8.3 CLASSES OF FIRES

The use of the proper type of extinguisher for each class of fire will give the best control of the situation and avoid compounding the problem. The classification of fires given here is based on the type of material being consumed.

Class A Fires: (For wood, paper, textiles, and similar materials.) Use foam, water pumps, gas cartridges, or almost any kind of extinguisher on fires of this class.

Class B Fires: (For grease, oil, paint, and related materials.) Use foam, dry chemical or vaporizing liquid extinguishers.

Class C Fires: (All fires in electrical equipment and in areas where live electricity is present should be treated as Class C fires.) Use carbon dioxide, dry chemical or vaporizing liquid extinguishers only. Avoid becoming a part of the circuit.

Class D Fires: Fires involving magnesium, aluminum, zinc, zirconium, lithium, sodium, potassium, or metal hydrides should be smothered with fine dry soda ash, sodium chloride, sand or graphite.

Underwriter's Laboratories, Inc. has established ratings for portable fire extinguishers to appear on the labels of UL-approved extinguishers. A letter (or letters) on the label refers to the class (or classes) of fire on which the extinguisher is most effective. A numeral indicates the relative fire extinguishing potential of the extinguisher, as well as the approximate square-foot area of a fire which an average operator can extinguish. For example: An extinguisher rated 10-B is most effective for Class B fires. You can expect it to extinguish 10 square feet of deep-layer flammable liquid fire, twice as much as fire as an extinguisher rated 5-B.

Extinguishers should be checked yearly to ensure the adequacy of their charge.

9.0 WASTE DISPOSAL

Chemical waste collection is everyone's responsibility in the laboratory. Initially it begins with cleaning up as you work; keeping your work area free from chemicals, scraps of paper, and dirty glassware. Wastepaper containers are for paper only. A separate container is available for broken glassware disposal and a box is available for glassware that will be repaired.

All hazardous chemical wastes must be placed in waste containers and never dumped down the drain or placed in a waste basket. If there is any doubt as to whether a chemical waste is hazardous or not, see your supervisor before disposing of that waste. We have four main types of waste containers: 1 gallon metal cans for all liquid wastes that are not corrosive, 4 liter glass bottles for corrosive liquid wastes, 1 gallon wide-mouth plastic bottles for solid wastes that do not contain a high percentage of solvents, and lastly, 1 gallon wide mouth glass containers for solid wastes that do have a high percentage of solvents.

All chemical waste containers must be labeled as to content and dated. This label must totally cover any existing labels on the container, be a permanent label, and be easy to read. If it is a mix of chemicals (ex. of safe mixes below), this label must state all components. Never mix chemical wastes unless you know they are compatible and have checked with your laboratory supervisor. Remember all waste containers are to be filled in a fume hood or the glove box as these are hazardous materials.

When filling any waste container, always leave an inch of air space on the top to allow for any expansion. The following is a list of the common laboratory wastes we collect in our laboratory and how the label should read:

Alcohol waste: methanol and isopropanol
Mercury waste
Methylene chloride waste, also contains hexane and acetone
Methylene chloride waste
Hexane and acetone waste
Chloroform waste
Freon waste
Phenol waste
PCB waste oil 50 mg/kg
PCB waste oil 50-500 mg/kg
PCB waste oil 500-5000 mg/kg
PCB waste oil 500 mg/kg
Cyanide-pyridine waste

It should be stated that this list is not all inclusive, and from time to time other waste containers may be needed. Some samples we analyze are considered hazardous and must be disposed of as such.

All partially-filled waste containers are stored on top of the solvent cabinet in the back room. Never place a container on the floor, since it can easily be stumbled over and, if glass, break. As soon as a waste

container is full, that individual must take the container up to the outside locked storage room or, in the summer months, take the container to the ventilated room behind the sample log-in area. This container contents must then be logged in on the waste disposal sheet. It is everyone's responsibility to keep this room neat and orderly. Do not stack waste cartons more than three high.

If old reagents are in need of disposing and are found to be hazardous, these may also be placed in the waste storage room and logged in.

The wastes are disposed of on a 90-day basis. All MDNR and EPA documentation is properly completed. A licensed hauler and disposal facility is retained for all hazardous waste disposal.

10.0 CHEMICAL STORAGE

Poor storage invites accidents:

One of the important essentials for safe operation in the laboratory is an adequate, efficiently planned storage room. The storeroom should contain no blind alleys, have a well-marked exit, be properly ventilated and lighted, and be laid out to segregate incompatible chemicals. Order and cleanliness should be maintained with constant vigilance.

Aisle clearance, proper ventilation, cleanliness, and lighting with enclosed lamps are of extreme importance t careful laboratory materials storage.

Apparatus and glass tubing should not project beyond the front shelf limits. Bulky and fragile apparatus should be clamped to the shelf to guard against the danger of accidentally brushing them or jarring them off the shelves. Wooden ridges installed along the front edges of shelves will reduce the danger of accidentally brushing them or jarring them off the shelves. Wooden ridges installed along the front edges of shelves will reduce the danger of glass reagent bottles jarring off shelves and breaking on the floor.

Special care should be used in grouping liquid reagents. Preplanning will circumvent the dangers of hazardous combinations. **Chemicals which might react together to produce dangerous fumes, fire or explosions should be stored away from each other**. Volatile liquids must be kept away from heat sources, sunlight, and electrical switches.

Store all glass bottles of flammable liquids, oxidizing agents, and acids in metal cabinets. Large glass containers of other liquid chemicals should be provided with a protective covering.

Chemicals containing inhibiting agents, corrosive chemicals, and vessels having vent caps or other means of control over possible internal deterioration, should be accessible for daily inspection.

Segregate reactive chemicals - Bases and acids should not be stored where breakage or spills would cause them to mix. Similarly oxidizing agents and organic chemicals should be stored separately.

The following areas are available for chemical storage:

Inorganic solids	Reagent cabinets, inorganic lab
Acids	Under fume hoods, inorganic lab
Bases	Under fume hoods, inorganic lab
Organic Solvent	Solvent cabinets, garage; under hoods, prep lab
Organic Solids	Safety cabinet, garage
Labile organic liquids or solids	Explosion-proof refrigerators, organic glassware lab

Refrigerators constitute a unique hazard since explosion may occur when they are used to store volatile or

unstable chemicals. Domestic or household type refrigerators should not be used to store chemical reagents unless they are modified to eliminate open electrical contacts inside the storage cabinet such as lights or switches. Furthermore, the door latch should be replaced by easily opened magnets. Frost-free refrigerator units with drains in their bottom tray should be plugged to prevent spilled liquid and vapors from reaching the motor. Use of special explosion-proofed laboratory refrigerators are encouraged to avoid these considerations where the budget permits.

Food, drink and chemical reagent or samples should not be stored together in laboratory refrigerators. A refrigerator has been provided in the lunch room for food and beverage storage.

11.0 SHELF-LIFE CHEMICALS

Shelf-life chemicals should be discarded when their time has expired; these include:

Ethyl ethers
Hydrogen peroxides
All analytical standards
Phosphate buffers
Phenol standards
Petroleum ethers

These items will be dated upon receipt. Chemicals with an expired shelf-life should not be used in any laboratory analysis.

12.0 ELECTRICAL HAZARDS

A. Only persons qualified by training or experience should work on electric or electronic equipment.

B. When handling electric wire:

1. Never use them as support.
2. Never pull on live wires.
3. Never pick up electric equipment.

C. Portable heaters must be located so as to prevent heating of combustible materials.

D. Any electrical failure or any evidence of undue heating of equipment should be reported immediately to the Laboratory Director.

Static Electricity and Spark Hazards

Protection from static electricity and sparks in hazardous areas and in handling flammable solvents and other chemicals is obtained by proper grounding and bonding of containers and equipment involved and by blanketing with inert gas when needed.

Some common potential sources of sparks and electrostatic discharges are these:

1. Metal tanks and containers.
2. Plastic laboratory aprons.
3. Making and breaking of an electric circuit while circuit is energized.
4. Persons who are inadequately grounded.
5. Metal-based clamps, nipples, or wire used with non-conducting hoses.

Electrical Outlets

All electrical outlets should carry a grounding connection requiring a 3-pronged plug. All electrical equipment except glass-cloth heaters and certain model oscillographs requiring a floating ground should be wired with a grounding plug. Continuity of grounding connections, including leads to the building ground itself, should be checked periodically by an authorized inspector. The National Electrical Code should be followed in all installations. This includes proper grounding as well as proper equipment for hazardous areas.

Don't underestimate electricity's shock power.

Wherever there are electrical outlets, plugs, wiring or connections, there is danger of electrical shock. High voltages and makeshift assemblies team up to cause trouble. In most cases, the manufacturer incorporates shielding apparatus but, especially in older instruments, care must be taken that insulation has not work off or connections fused or broken with use.
The usual "do's" and "dont's" of protection against shock in the home and in industry bear repeating. Don't use worn wires - replace connections immediately when there is any sign of thinning insulation. Use connections that are encased in heavy rubber and make sure that the wire is dry before plugging it into a circuit. Ground all apparatus using either 3-prong plugs or pigtail adapters. Check periodically for static accumulation, especially in high voltage situations.

Don't handle any electrical connections with damp hands or when standing in or near water. Don't continue to run a motor after liquid has been spilled on it. Turn it off immediately and allow it to dry thoroughly inside and out before attempting to use it again. Inform co-workers that the motor is not to be used for a definite period.

Electrical units which are to be operated in an area exposed to flammable vapors should be explosion-proof. All permanent wiring should be installed by an electrician with either conduit or BX cable to eliminate any danger of overloading the circuit with multiple receptacles and numerous extensions.

13.0 CHEMICAL HAZARDS

13.1 ORGANIC PEROXIDES

A. Hazards

Organic peroxides are a special class of compounds which have unusual stability problems and potential hazards. These peroxides are among the most hazardous chemicals normally handled in chemical laboratories and in manufacturing. As a class, organic peroxides are low-power explosives. They are hazardous because of their extreme sensitivity to shock, sparks, or other forms of accidental ignition. Many peroxides that are routinely handled in laboratories are far more sensitive to shock than most primary explosives such as TNT. Peroxides have a specific half-life or rate of decomposition under any given set of conditions. A low rate of decomposition may auto-accelerate into a violent explosion, especially in bulk quantities of peroxide. They are sensitive to heat, friction, impact, and light as well as to strong oxidizing and reducing agents. All peroxides are extremely flammable and fires involving bulk quantities of peroxides should be approached with extreme caution.

B. Precautions for Handling Peroxides

1. Limit the quantity of peroxide to be handled to the minimum amount required. Do not return unused peroxide to the container.

2. Clean up all spills immediately. Solutions of peroxides can be absorbed on vermiculite.

3. The sensitivity of most peroxides to shock and heat can be reduced by dilution with an inert solvent such as toluene and aliphatic hydrocarbons. Toluene is known to induce the decomposition of diacyl peroxides.

4. Do not use solutions of peroxides in volatile solvents under conditions in which the solvent will be vaporized, thereby increasing the peroxide concentration in the solution.

5. Never use a metal spatula with peroxides, because contamination by metals can lead to explosive compositions. Use ceramic or wooden spatulas.

6. Smoking, open flames, and other sources of heat should not be permitted near peroxides.

7. Avoid friction, grinding, and all forms of impact, especially with solid peroxides. Glass containers with screw-cap lids or glass stoppers should not be used. Use polyethylene bottles with screw-cap lids.

8. Peroxides should be stored at the lowest possible temperatures consistent with solubility or freezing point to minimize the rate decomposition. <u>CAUTION</u>: Do not refrigerate liquid or solutions of peroxides at or below the temperature at which the peroxide freezes or

precipitates. Peroxides in these forms are extremely sensitive to shock and heat.

C. Compounds of the Following Types are Known to Form Peroxides

1. Aldehydes, such as tetrahydrofuran.

2. Ethers, especially cyclic ethers. Containers of ethyl or isopropyl ether should be labeled with the date they are opened and the contents of the container should be destroyed by the user within one month.

3. Compounds containing benzylic hydrogen atoms. Such compounds are especially susceptible to peroxide formation if the hydrogens are on tertiary carbon atoms; e.g., cumene (isopropyl benzene).

4. Compounds containing the allylic (CH2+CHCH2R) structure, including most olefins.

5. Ketones, especially cyclic ketones.

6. Vinyl and vinylidene compounds; e.g., vinyl acetate and vinylidene chloride.

Specific examples of chemicals which can form dangerous concentrations of peroxides on long exposure to air are:

cyclohexene
cyclooctene
Decal in (decahydronaphthalene)
p-Dioxane
Ethyl Ether
Isopropyl Ether
Tetrahydrofuran (THF)
Tetralin (tetrahydronaphthalene)

D. Disposal of Peroxides

(CAUTION) Never dispose of neat (pure) peroxides. Peroxides must be diluted.

E. Small Quantities

(25 g or less) or peroxides are generally disposed of by first diluting with water to a concentration of 2% or less and then transferring to a polyethylene disposal bottle containing an aqueous solution of a reducing agent such as ferrous sulfate or sodium bisulfite. The material is then handled like any other waste chemical; however, it must not be mixed with other chemicals for disposal. Spilled peroxides should be absorbed on vermiculite as quickly as possible. The vermiculite-peroxide mixture may then be burned directly or may be stirred with a suitable solvent to form a slurry which is then treated as noted above.

CAUTION - Never flush organic peroxides down the drain.

13.2 CYANIDES AND NITRILES

A. **Hazards**: Cyanides and nitriles are among the most toxic and rapidly acting substances to be encountered in the chemical laboratory. Toxic symptoms occur if these materials are swallowed, inhaled, or absorbed through the skin. A few breaths (inhalations) of hydrogen cyanide (HCN) may be fatal.

B. **First-Aid Treatment for Cyanide and Nitrile Poisoning**: Because the toxic action of cyanides and nitriles is so rapid, first-aid treatment and an antidote of amyl nitrite must be administered immediately. The person administering first aid should break open an amyul nitrite ampule and hold it under the affected person's nose for about 15 seconds and continue administration until help arrives.

1. Never mix acid and cyanide together in the open lab. Only small quantities should be mixed in the fume hood or within specialized glassware as required for cyanide analysis.

13.3 CORROSIVE LIQUIDS

Liquid corrosives are, perhaps, the most important category in that they are involved in the most common type of corrosive injury, especially where external injury is concerned. Given below are typical corrosive liquids encountered in many workplaces.

Common Corrosive Liquids

Inorganic Acids	**Organic Acids**	**Other Inorganics**
Chlorosulfonic	Acetic	Bromine
Chromic	Butyric	Phosphorus Trichloride
Hydrochloric	Chloroacetic	Silicon Tetrachloride
Hydrofluoric	Formic	Sulfuryl Chloride
Nitric		Thionyl Chloride
Sulfuric		Peroxides
Caustic Solutions	**Organic Solvents**	**Other Organics**
Ammonia	Dichloroethylene	Acetic Anhydride
Sodium Hydroxide	Ethylene Chlorohydrin	Liquified Phenol
Potassium Hydroxide	Perchloroethylene	Triethanolamine
	Methyl Ethyl Ketone	2-Aminoethanol
	Gasoline	

The acids, caustics, other inorganics, 2-amino-ethanol, and acetic anhydride are the compounds listed in the

above table which require a DOT corrosive label. The others do not require such labeling but are, nonetheless, destructive to tissue.

The primary modes of attack of corrosive liquids are the skin and eyes. There is a danger of corrosive vapors escaping from some solutions; i.e., ammonia, nitric acid, bromine and others.

Corrosive Gases: The most serious hazard associated with corrosives is from materials in the gaseous state. In this state, corrosives are readily absorbed into the body by dissolution in skin moisture and by inhalation. Gaseous corrosives are usually grouped by solubility and the effect on the respiratory system. Typical examples are given at the left.

Group I

Very Soluble, Upper Respiratory Tract, or Very Irritating

Ammonia
Hydrogen Chloride
Hydrogen Fluoride
Formaldehyde
Sulfonyl Chloride
Thionyl Chloride

Group I compounds usually cause severe nose and throat irritations and, because of their high water solubility, do not penetrate deeply into the respiratory tract during the initial moments of exposure.

Group II

Soluble, Upper Respiratory Tract and Bronchi

Arsenic Trichloride
Bromine
Chlorine
Iodine
Phosphoric Pentachloride
Phosphorus Trichloride
Sulfur Dioxide

Group II compounds attack the upper respiratory tract and bronchi during initial exposure.

Group III

Least Soluble, Easily Reach Alveoli

Carbonyl Chloride (phosgene)
Nitrogen Dioxide
Ozone
Group II compounds reach the alveoli quickly, and frequently there is no nose or throat irritation to warn of the presence of the gas. Delayed pulmonary edema may result.

Corrosive Solids: The effects of solid corrosives are largely dependent on their solubility in skin and respiratory moisture and, of course, on the duration of contact. Some compounds do have a specific ability to penetrate the skin even through their solubility in water is relatively low. Of these phenol and salicylic acid are mentioned in the table below. Phenol is a very weak organic acid and salicylic is stronger. Besides the intrinsic corrosive properties of solids, the heat of solution is often an important factor in damaging tissue.

Dusting of corrosive solids presents the greatest danger in the industrial setting. Caustic alkalies, because of their frequent use, present the greatest hazard.

Alkalies

Calcium Oxide
Calcium Hydroxide
Cement
Potassium Hydroxide
Sodium Hydroxide
Sodium Peroxide
Sodium Phosphate

Organic Acids

Oxalic
Phenol
Salicylic
Trichloroacetic
Metal Salts

Tin(IV) Chloride
Phosphorus Pentoxide
Potassium Chromate
Mercury (II) Chloride

Elements

Sodium
Potassium
Lithium
Phosphorus
Iodine

Incompatibilities: Corrosive materials are incompatible with most metals as contact produces heat and liberates hydrogen gas. Hydrogen gas is very flammable and, consequently, a potential fire hazard must be considered whenever corrosives are spilled. In addition, corrosives are not compatible with organic solvents. Heat, fire or explosions may result when the two are mixed.

Safety Equipment: Dilute solutions of acid and bases can be used in the general laboratory with rubber gloves, laboratory coats, and safety glasses. Concentrated acids and bases should be used in the fume hood. Face shields, rubber aprons, and arm length gloves are required for handling concentrated materials.

First Aid: If acids or bases are spilled on the skin, immediately flush the affected area with large quantities of water. Secure medical attention as soon as possible.

If fumes have been inhaled, remove to fresh air and call for emergency medical assistance if the victim has difficulty in breathing.

Spill Response: If corrosive materials are spilled, the procedures below should be followed:

1. Ventilate area.

2. Remove open flames.

3. Neutralize the spill with sodium bicarbonate if acid or 7 N HCl if basic, or use Baker spill kit or spill pillows.

4. Wash spill area with water.

13.4 FLAMMABLE LIQUIDS

Flammable liquids are commonly used as solvents in the laboratory. Examples of flammable liquids are as follows:

Hexane
Petroleum Ether
Pentane
Ethyl Ether
Methanol
Isopropanol
Acetone
Ethanol
Toluene
Xylene

These materials are volatile and easily ignitable.

The handling of flammable liquids should be done in the fume hoods. This includes opening bottles and decanting liquids. Only small amounts of pure solvent (100 mls) should be transferred outside the hood. No open flames are permitted in the fume hood when flammable liquids are in use.

Incompatibilities: In addition to fire, flammable liquids are incompatible with concentrated acids, oxidizing agents, and reducing agents. The chemicals should be stored in the flammable storage cabinets located in the garage area. Do not store flammable liquids in the reagent cabinets.

Safety Equipment: In addition to using a fume hood, flammable liquids should be dispersed with neoprene gloves. A solvent resistant apron should also be worn outside of the lab coat.

First Aid: If flammable liquids are spilled on clothing or the skin, wash the affected area with large amounts of water. If vapors have been inhaled, remove to fresh air and call for medical assistance.

Spill Response: If flammable liquids are spilled, the procedures below should be followed:

1. Remove open flames.
2. Ventilate area.
3. Soak up spill with activated carbon/vermiculite.
4. Place sorbent material in a metal can and label as hazardous/flammable.
5. Wash spill area with water.

14.0 TOXINS AND CARCINOGENS

As part of laboratory operation, carcinogenic and/or toxic materials may be used in the preparation of analytical standards or reagents. In order to minimize potential exposures to these hazardous chemicals, the following rules should be observed.

A. Wherever possible, purchase prepared standards of carcinogens. If prepared standards are not available, only purchase small quantities (500 mg or less).

B. The preparation of all hazardous standards should be done in the glove box.

C. When working with hazardous materials, wear the proper protective clothing. Standard dress should include PVC/Tyveck lab coat, neoprene gloves, and safety glasses. If hazardous solvents must be used for extraction, an organic vapor respirator is required.

Medical monitoring is required for all laboratory employees. The program is conducted by a company appointed physician and includes a comprehensive evaluation of post medical history and present condition. The examinations are conducted on an annual basis. All records are retained by the company. Copies will be given to the employees upon request.

15.0 RESPIRATORY PROTECTION

A. Respiratory protection will be relied upon only as a last resort in controlling personnel exposures or in an interim period or emergency situation until engineering controls can be emplaced.

B. The Laboratory Manager will be responsible for the selection of the respiratory equipment based upon the nature of the chemical and the work to be performed. Selection will be determined in accordance with 29 CFR 1910.134.

C. Employee fit testing and training on care and limitations of a respirator will be conducted by the Health and Safety Officer.

D. The individual user should be responsible for the care and maintenance of a respirator assigned for personal use.

HEALTH AND SAFETY PLAN SIGN-OFF SHEET
For Meadowlands Plating and Finishing Site
Lab Safety Plan

I have read and fully understand the contents of the Earth Tech Health and Safety Plan.

Printed Name and Company	Date	Signature
KEITH P. EDWARDS, USCG	14 JAN 99	Keith P. Edwards
Kimberly A McLoud	14 JAN 99	[illegible]
ROBERT McKINNEY, ETRS	19 JAN 99	Robert McK
Bill Magowan	1/21/99	William J Magowan
Joe Wright	1/21/99	[illegible]
Robert C. Perry, USCG	2/1/99	Robert C. Perry
Jim Shaw	2/1/99	Jim Shaw
GARY E. BELAND	02/01/99	Gary E. Beland
MARK KROMISS	2/2/99	[illegible]
Don Mayer	2/17/99	Donald F. M
EUGENE CINTRON ETRS	2/22/99	Eugene Cintron
Roy McKenzie	2/22/99	[illegible]

I:\29076\HASP.DOC

HEALTH AND SAFETY PLAN SIGN-OFF SHEET
For Meadowlands Plating and Finishing Site
Lab Safety Plan

I have read and fully understand the contents of the Earth Tech Health and Safety Plan.

Printed Name and Company	Date	Signature

I:\29076\HASP.DOC

ACETIC ACID GLACIAL

Material Safety Data Sheet

nK250144

Mallinckrodt Chemical, Inc.
P.O. Box 800
Paris, Kentucky 40362

Emergency Telephone Numbe
314-539-1600

Effective Date: 07-13-87 Supersedes 09-26-85

PRODUCT IDENTIFICATION:

Synonyms: Acetic acid, methane carboxylic acid

Formula CAS No.: 64-19-7 Molecular Weight: 60.05

Hazardous Ingredients: Acetic Acid Glacial Chemical Formula: CH_3COOH

PRECAUTIONARY MEASURES

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

Do not get in eyes, on skin, or on clothing.
Avoid breathing vapor.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat and flame.
This substance is classified as a POISON under the Federal Caustic Poison Act.

EMERGENCY FIRST AID

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. If swallowed: DO NOT INDUCE VOMITING! Give large quantities of water or milk if available! 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 call a physician.
SEE SECTION 5.

SECTION 1

Physical Data

Appearance: Clear, colorless liquid.

Odor: Strong, vinegar-like.

Solubility: Infinite in water.

Boiling Point: 118 C (244 F) Vapor Density (Air=1): 2.1

Melting Point: 16.6 C (62 F) Vapor Pressure (mm Hg): 11 @ 20 C (68 F).

Density: 1.05 Evaporation Rate: 0.97

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

Fire and Explosion Information — SECTION 2

Fire: Combustible. Flashpoint: 40[illegible] (closed cup). Autoignition temperature [illegible] (800 F). Flammable limits, in air, % by volume at 100 C (212 F): lel: 5.4; uel: 16.0.

Explosion: Above flash point, vapor-air mixtures are explosive within flammable limits noted above.

Fire Extinguishing Media: Water, dry chemical, foam or carbon dioxide. 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 face piece operated in the pressure demand or other positive pressure mode. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures. Vapors can flow along surfaces to distant ignition source and flash back. Water diluted acid can react with metals to form hydrogen gas.

Reactivity Data — SECTION 3

Stability: Stable under ordinary conditions of use and storage. Heat and sunlight can contribute to instability.

Hazardous Decomposition Products: When heated to decomposition may emit toxic gases and vapors such as carbon monoxide.

Hazardous Polymerization: Will not occur.

Incompatibilities: Oxidizers, chromic acid, sodium peroxide, nitric acid, strong caustics, heat, flame.

Leak/Spill Disposal Information — SECTION 4

Ventilate and evacuate area. Clean-up personnel require protective clothing and respiratory protection from vapors. Allow only qualified personnel to handle the spill. If a leak or spill has not ignited, use water spray to disperse the vapors and to protect men attempting to stop leak. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures. Contain and recover liquid when possible. Absorb with vermiculite, dry sand, earth, or similar material. Scoop up with non-sparking tools and place in a closed container, and dispose in a RCRA approved facility. Do not flush to the sewer.
Reportable Quantity (RQ)(CWA/CERCLA) : 5000 lbs.
Ensure compliance with local, state and federal regulations.

Health Hazard Information — SECTION 5

A. Exposure/Health [illegible]

Inhalation: Inhalation of concentrated vapors may cause serious damage to the lining of the nose, throat, and lungs. Breathing difficulties may occur. Neither odor nor degree of irritation are adequate to indicate vapor concentration.

Ingestion: Swallowing can cause severe in[illegible] leading to death. Symptoms include sore throat, vomiting, diarrhea. Ingestion of as little as [illegible]0 ml has resulted in perforation of the esophagus.

Skin Contact: Contact with concentrated solution may cause serious damage to the skin. Effects may include redness, pain, skin burns. High concentrations may cause skin sensitization.

Eye Contact: Eye contact with concentrated solutions may cause severe eye damage followed by loss of sight. Exposure to vapor may cause intense watering and irritation to eyes.

Chronic Exposure: Repeated or prolonged exposures may cause darkening of the skin, erosion of exposed teeth, and chronic inflammation of the nose, throat, and bronchial tubes.

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 this substance.

B. FIRST AID

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 and milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Exposure: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician.

Eye Exposure: Wash eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

C. TOXICITY

(RTECS, 1986)

Oral rat LD50: 3310 mg/kg. Dermal rabbit LD50: 1.06g/Kg. Mutation references cited.

Occupational Control Measures — SECTION 6

Airborne Exposure Limits: -OSHA Permissible Exposure Limit (PEL): 10 ppm (TWA). -ACGIH Threshold Limit Value (TLV): 10 ppm (TWA); 15 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 TLV is exceeded a full face chemical cartridge respirator may be worn. In general, up to 100 times the TLV or the maximum use concentration specified by the respirator supplier, whichever is less. Alternatively, a supplied air full facepiece respirator or air lined hood may be worn.

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. Contact lenses should not be worn when working with this material. Maintain eye wash fountain and quick-drench facilities in work area.

Storage and Special Information — SECTION 7

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

****
Mallinckrodt provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. Individuals receivin the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR TO THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION
****

ALGLA

Addendum to Material Safety Data Sheet

REGULATORY STATUS

Hazard Categories for SARA
Section 311/312 Reporting

Acute	Chronic	Fire	Pressure	Reactive
	X	X		

Product or Components of Product:	SARA EHS Sec. 302 RQ	SARA EHS Sec. 302 TPQ	SARA Sec. 313 Chemicals Name List	SARA Sec. 313 Chemicals Chemical Category	CERCLA Sec.103 RQ lbs	RCRA Sec. 261.33
ACETIC ACID GLACIAL (64-19-7)	No	No	No	No	5000	No

SARA Section 302 EHS RQ:
Reportable Quantity of Extremely Hazardous Substance, listed at 40 CFR 355.

SARA Section 302 EHS TPQ:
Threshold Planning Quantity of Extremely Hazardous substance. An asterisk (*) following a Threshold Planning Quantity signifies that if the material is a solid and has a particle size equal to or larger than 100 micrometers, the Threshold Planning Quantity = 10,000 LBS.

SARA Section 313 Chemicals:
Toxic Substances subject to annual release reporting requirements listed at 40 CFR 372.65.

CERCLA Sec. 103:
Comprehensive Environmental Response, Compensation and Liability Act (Superfund) Releases to air, land or water of these hazardous substances which exceed the Reportable Quantity (RQ) must be reported to the National Response Center, (800-424-8802); Listed at 40 CFR 302.4

RCRA:
Resource Conservation and Recovery Act. Commercial chemical product wastes designated as acute hazardous or toxic under 40 CFR 261.33

ALGLA

ACETIC ACID GLACIAL
"ISSUED BY VWR 06-22-98"

JT9535-5

Fisher Scientific

CATALOGS ORDER LIST CONTENTS

Use your web browser's "Back" key to return to previous topic.

Acetone

****** MATERIAL SAFETY DATA SHEET ******

Acetone
00140

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Acetone
Catalog Numbers:
AC177170200, AC400100025, AC400100040, AC423240040, AC423240200, S70090, S70091-1, 57025, A11 1, A11 20, A11 200, A11 4, A11-1, A11-20, A11-200, A11-4, A111, A11200, A114, A11S 4, A11S-4, A11S4, A16F-1GAL, A16P 4, A16P-4 A16P4, A16S 20, A16S 20 001, A16S 4, A16S-20, A16S-4, A16S20, A16S20001, A16S4, A16S4LC, A18 1, A18 20, A18 200, A18 200 001, A18 4, A18 500, A18-1, A18-20, A18-200, A18-4, A18-500, A181, A1820, A18200, A18200001, A1820LC, A1820LOT003, A184, A184LC, A184LOT001, A18500, A18J500, A18P4, A18RB115, A18RB19, A18RB200, A18RB50, A18RS115, A18RS200, A18RS28, A18RS50, A18S 4, A18S-4, A18S4, A18SK 4, A18SK-4, A18SK4, A18SK4LC, A18SS 200, A18SS 50, A18SS-115, A18SS-200, A18SS-30, A18SS-50, A18SS200, A18SS50, A19 1, A19 4, A19-1, A19-4, A191, A194, A20-1, A40 4, A40-4, A404, A404LOT007, A404LOT008 A404LOT009, A928 4, A9284, A929 4, A929-1, A929-4, A9294, A9294LC, A9294LOT001, A9294LOT012, A9294LOT014, A9294LOT017, A9294LOT018, A9294LOT019, A9294LOT021, A9294LOT022, A9294LOT024, A929J4, A929RS115, A929RS200, A929RS28, A929RS50, A929SS115, A929SS200, A929SS28, A929SS50, A930-4, A946 4, A946-4, A9464, A946FB200, A946RB115, A946RB19, A946RB200, A946RB50, A949 1, A949 4, A949-1, A949-4, A9491, A9494, A9494LOT004, A949CU50, A949J4, A949LC, A949RS115, A949RS200, A949RS28, A949RS50, A949SK-1, A949SK-4, A949SS 115, A949SS 200, A949SS 30, A949SS 50, A949SS-11 A949SS-115, A949SS-20, A949SS-200, A949SS-30, A949SS-50, A949SS115, A949SS200, A949SS30, A949SS50, BPA946RB-115, BPA946RB-19, BPA946RB-200, BPA946RB-50, FLA929RS-115, FLA929RS-200, FLA929RS-28, FLA929RS-50, HC 300 1GAL, HC3001GAL, NC9475452, NC9475553, QUANT00184, S70091, S70091HPLC, S70091SPEC
Synonyms:
Dimethylformaldehyde, dimethyl ketone, 2-propanone, pyroacetic acid, pyroacetic ether
Company Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

---+---+---+---+

CAS#	Chemical Name	%	EINECS#
67-64-1	2-propanone	99	200-662-2

Hazard Symbols: F
Risk Phrases: 11

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: colourless. Flash Point: -4 deg F.
Danger! Extremely flammable liquid. May cause central nervous system depression. May cause liver and kidney damage. Causes eye and skin irritation. Causes digestive and respiratory tract irritation.
Target Organs: Kidneys, central nervous system, liver, respiratory system.

Potential Health Effects

Eye:
Produces irritation, characterized by a burning sensation, redness, tearing, inflammation, and possible corneal injury.

Skin:
Exposure may cause irritation characterized by redness, dryness, and inflammation.

Ingestion:
May cause irritation of the digestive tract. May cause central nervous system depression, kidney damage, and liver damage. Symptoms may include: headache, excitement, fatigue, nausea, vomiting, stupor, and coma.

Inhalation:
Inhalation of high concentrations may cause central nervous system effects characterized by headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. May cause liver and kidney damage. May cause motor incoordination and speech abnormalities.

Chronic:
Prolonged or repeated skin contact may cause dermatitis. Chronic inhalation may cause effects similar to those of acute inhalation.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid immediately.

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

Ingestion:
If victim is conscious and alert, give 2-4 cupfuls of milk or water. Get medical aid immediately.

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

Notes to Physician:
Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
Containers can build up pressure if exposed to heat and/or fire. As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors can travel to a source of ignition and flash back. Use water spray to keep fire-exposed containers cool.

Extinguishing Media:
For small fires, use dry chemical, carbon dioxide, water spray or

alcohol-resistant foam. For large fires, use water spray, fog, or alcohol-resistant foam.

Autoignition Temperature: 869 deg F (465.00 deg C)
Flash Point: -4 deg F (-20.00 deg C)
NFPA Rating: health-1; flammability-3; reactivity-0
Explosion Limits, Lower: 2.5
Upper: 12.8

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:

Absorb spill with inert material, (e.g., dry sand or earth), then place into a chemical waste container. Wear appropriate protective clothing to minimize contact with skin. Remove all sources of ignition.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:

Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage:

Keep away from sources of ignition. Store in a tightly closed container.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:

Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
2-propanone	500 ppm ; 1188 mg/m3; 750 ppm STEL; 1782 mg/m3 STEL	250 ppm TWA; 590 mg/m3 TWA 2500 ppm IDLH (lower explosive level)	1000 ppm TWA; 2400 mg/m3 TWA

OSHA Vacated PELs:

2-propanone:
750 ppm TWA; 1800 mg/m3 TWA

Personal Protective Equipment

Eyes:

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin:

Wear appropriate protective gloves to prevent skin exposure.

Clothing:

Wear appropriate protective clothing to prevent skin exposure.

Respirators:

Follow the OSHA respirator regulations found in 29CFR 1910.134. Always use a NIOSH-approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Liquid
Appearance:	colourless
Odor:	sweetish odor
pH:	7
Vapor Pressure:	180 mm Hg
Vapor Density:	2.0 (Air=1)
Evaporation Rate:	7.7 (n-Butyl acetate=1)
Viscosity:	Not available
Boiling Point:	133.2 deg F
Freezing/Melting Point:	-139.6 deg F
Decomposition Temperature:	Not available.
Solubility:	Soluble.
Specific Gravity/Density:	0.79 (Water=1)
Molecular Formula:	C3H6O
Molecular Weight:	58.0414

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable.
Conditions to Avoid:
High temperatures, temperatures above 220°C.
Incompatibilities with Other Materials:
Forms explosive mixtures with hydrogen peroxide, acetic acid, nitric acid, nitric acid+sulfuric acid, chromic anhydride, chromyl chloride, nitrosyl chloride, hexachloromelamine, nitrosyl perchlorate, nitryl perchlorate, permonosulfuric acid, thiodiglycol+hydrogen peroxide.
Hazardous Decomposition Products:
Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 67-64-1: AL3150000
LD50/LC50:
CAS# 67-64-1: Inhalation, rat: LC50 =50100 mg/m3/8H; Oral, mouse: LD50 = 3 gm/kg; Oral, rabbit: LD50 = 5340 mg/kg; Oral, rat: LD50 = 5800 mg/kg; Skin, rabbit: LD50 = 20 gm/kg.
Carcinogenicity:
2-propanone -
ACGIH: A4 - Not Classifiable as a Human Carcinogen
Epidemiology:
No information available.
Teratogenicity:
No information available.
Reproductive Effects:
Fertility: post-implantation mortality. Ihl, mam: TCLo=31500 ug/m3/24H (1-13D preg)
Neurotoxicity:
No information available.
Mutagenicity:
Cytogenetic analysis: hamster fibroblast, 40 g/L Sex chromosome loss/non-disjunction: S.cerevisiae, 47600 ppm
Other Studies:
None.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Rainbow trout LC50=5540 mg/L/96H Sunfish (tap water), death at 14250 ppm/24H Mosquito fish (turbid water) TLm=13000 ppm/48H
Environmental Fate:
Volatilizes, leeches, and biodegrades when released to soil.
Physical/Chemical:

No information available.

Other:

None.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

spose of in a manner consistent with federal, state, and local regulations.
RA D-Series Maximum Concentration of Contaminants:
one listed.
RCRA D-Series Chronic Toxicity Reference Levels: None listed.
RCRA F-Series: None listed.
RCRA P-Series: None listed.
RCRA U-Series: CAS# 67-64-1: waste number U002 (Ignitable waste).
CAS# 67-64-1 is banned from land disposal according to RCRA.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT

Shipping Name: ACETONE
Hazard Class: 3
UN Number: UN1090
Packing Group: II

IMO

Shipping Name: ACETONE
Hazard Class: 3.1
UN Number: 1090
Packing Group: 2

IATA

Shipping Name: ACETONE
Hazard Class: 3
UN Number: 1090
Packing Group: 2

RID/ADR

Shipping Name: ACETONE
Dangerous Goods Code: 3(3B)
UN Number: 1090

Canadian TDG

Shipping Name: ACETONE
Hazard Class: 3
UN Number: UN1090
Other Information: FLASHPOINT -20 C

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL

TSCA

CAS# 67-64-1 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

CAS# 67-64-1: export notification required - Section 4

TSCA Significant New Use Rule

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

SARA

Section 302 (RQ)

final RQ = 5000 pounds (2270 kg)

Section 302 (TPQ)

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 67-64-1: acute, chronic, flammable, sudden release of pressure.

Section 313

No chemicals are reportable under Section 313.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
2-propanone can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
California No Significant Risk Level:
None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: F
Risk Phrases:
R 11 Highly flammable.
Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 33 Take precautionary measures against static discharges.
S 9 Keep container in a well-ventilated place.
S 23C Do not breathe vapour.

WGK (Water Danger/Protection)
CAS# 67-64-1: 0

Canada
CAS# 67-64-1 is listed on Canada's DSL/NDSL List.
This product has a WHMIS classification of B2, D2B.
CAS# 67-64-1 is not listed on Canada's Ingredient Disclosure List.

Exposure Limits
CAS# 67-64-1:. OEL-AUSTRALIA:TWA 500 ppm (1185 mg/m3);STEL 1000 ppm. OEL-AUSTRIA:TWA 750 ppm (1780 mg/m3). OEL-BELGIUM:TWA 750 ppm (1780 mg/m3);STEL 1000 pp. OEL-CZECHOSLOVAKIA:TWA 800 mg/m3;STEL 4000 mg/m3. OEL-DENMARK:TWA 250 ppm (600 mg/m3). OEL-FINLAND:TWA 500 ppm (1200 mg/m3);STEL 625 ppm (1500 mg/m3). OEL-FRANCE:TWA 750 ppm (1800 mg/m3). OEL-GERMANY:TWA 1000 ppm (2400 mg/m3). OEL-HUNGARY:TWA 600 mg/m3;STEL 1200 mg/m3. OEL-INDIA:TWA 750 ppm (1780 mg/m3);STEL 1000 ppm (2375 mg/m3). OEL-JAPAN:TWA 200 ppm (470 mg/m3). OEL-THE NETHERLANDS:TWA 750 ppm (1780 mg/m3) JAN9. OEL-THE PHILIPPINES:TWA 1000 ppm (2400 mg/m3). OEL-POLAND:TWA 200 mg/m3. OEL-RUSSIA:TWA 200 ppm;STEL 200 mg/m3. OEL-SWEDEN:TWA 250 ppm (600 mg/m3);STEL 500 ppm (1200 mg/m3). OEL-SWITZERLAND:TWA 750 ppm (1780 mg/m3). OEL-TURKEY:TWA 1000 ppm (2400 mg/m3). OEL-UNITED KINGDOM:TWA 1000 ppm (2400 mg/m3);STEL 1250 ppm. OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV. OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 11/30/1994 Revision #40 Date: 12/12/1997

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

damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Material Safety Data Sheet
May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY (As Used on Label and List): ALCONOX

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name: ALCONOX, INC.	Emergency Telephone Number: (212) 473-1300
Address (Number, Street, City, State, and ZIP Code): 215 PARK AVENUE SOUTH	Telephone Number for Information: (212) 473-1300
NEW YORK, N.Y. 10003	Date Prepared: JANUARY 1, 1991
	Signature of Preparer (optional):

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
THERE ARE NO INGREDIENTS IN ALCONOX WHICH APPEARED ON THE OSHA STANDARD 29 CFR 1910 SUBPART Z.				

Section III — Physical/Chemical Characteristics

Boiling Point	N.A.	Specific Gravity (H_2O = 1)	N.A.
Vapor Pressure (mm Hg.)	N.A.	Melting Point	N.A.
Vapor Density (AIR = 1)	N.A.	Evaporation Rate (Butyl Acetate = 1)	N.A.

Solubility in Water: APPRECIABLE (GREATER THAN 10 PER CENT)

Appearance and Odor: WHITE POWDER INTERSPERED WITH CREAM COLORED FLAKES - ODORLESS

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used): NONE	Flammable Limits	LEL: N.A.	UEL: N.A.

Extinguishing Media: WATER, CO_2, DRY CHEMICAL, FOAM, SAND/EARTH

Special Fire Fighting Procedures: FOR FIRES INVOLVING THIS MATERIAL DO NOT ENTER WITHOUT PROTECTIVE EQUIPMENT AND SELF CONTAINED BREATHING APPARATUS.

Unusual Fire and Explosion Hazards: NONE

Section V — Reactivity Data

Stability			Conditions to Avoid
	Unstable		NONE
	Stable	XX	

Incompatibility (*Materials to Avoid*)
AVOID STRONG ACIDS

Hazardous Decomposition or Byproducts
MAY RELEASE CO_2 GAS ON BURNING

Hazardous Polymerization			Conditions to Avoid
	May Occur		NONE
	Will Not Occur	XX	

Section VI — Health Hazard Data

Route(s) of Entry: Inhalation? YES Skin? NO Ingestion? YES

Health Hazards (*Acute and Chronic*)
INHALATION OF POWDER MAY PROVE LOCALLY IRRITATING TO MUCOUS MEMBRANES. INGESTION MAY CAUSE DISCOMFORT AND/OR DIARRHEA.

Carcinogenicity: NTP? NO IARC Monographs? NO OSHA Regulated? NO

Signs and Symptoms of Exposure
EXPOSURE MAY IRRITATE MUCOUS MEMBRANES. MAY CAUSE SNEEZING.

Medical Conditions Generally Aggravated by Exposure
RESPIRATORY CONDITIONS MAY BE AGGRAVATED BY POWDER

Emergency and First Aid Procedures
EYES-FLUSH WITH PLENTY OF WATER FOR 15 MINUTES SKIN-FLUSH WITH PLENTY OF WATER
INGESTION-DRINK LARGE QUANTITIES OF WATER.GET MEDICAL ATTENTION FOR DISCOMFORT

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled
MATERIAL FOAMS PROFUSELY. SHOVEL AND RECOVER AS MUCH AS POSSIBLE. RINSE REMAINDER TO SEWER. MATERIAL IS COMPLETELY BIODEGRADABLE.

Waste Disposal Method
SMALL QUANTITIES MAY BE DISPOSED OF IN SEWER. LARGE QUANTITIES SHOULD BE DISPOSED OF ACCORDING TO LOCAL REQUIREMENTS FOR NON-HAZARDOUS DETERGENT.

Precautions to Be Taken in Handling and Storing
STORE IN A DRY AREA TO PREVENT CAKING.

Other Precautions
NO SPECIAL REQUIREMENTS OTHER THAN THE GOOD INDUSTRIAL HYGIENE AND SAFETY PRACTICES EMPLOYED WITH ANY INDUSTRIAL CHEMICAL.

Section VIII — Control Measures

Respiratory Protection (*Specify Type*)
DUST MASK

Ventilation		
	Local Exhaust: NORMAL	Special: N.A.
	Mechanical (*General*): N.A.	Other: N.A.

Protective Gloves: USEFUL-NOT REQUIRED
Eye Protection: USEFUL-NOT REQUIRED

Other Protective Clothing or Equipment
NOT REQUIRED

Work/Hygienic Practices
NO SPECIAL PRACTICES REQUIRED

• USGPO 1988-491-519/45775

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER.....

EM SCIENCE
A DIVISION OF EM INDUSTRIES
P.O. BOX 70
480 DEMOCRAT RD.
GIBBSTOWN, N.J. 08027

PREPARATION DATE.: [illegible]
DATE MSDS PRINTED.: [illegible]

INFORMATION PHONE NUMBER: [illegible]-9200
HOURS: MON. TO FRI. [illegible]
CHEMTREC EMERGENCY NUMBER: 800 424-9300
HOURS: 24 HRS A DAY

CATALOG NUMBER(S):
BX0035 800133 132

CHEMICAL NAME.....: BARBITURIC ACID
TRADE NAME.....: 2,4,6-(1H,3H,5H)-PYRIMIDINETRIONE
CHEMICAL FAMILY..: PYRIDINE DERIVATIVE
FORMULA.....: $C_4H_4N_2O_3$

MOLECULAR WEIGHT.: 128.09

2. COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENT	CAS #	APPR %
BARBITURIC ACID	67-52-7	100%

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
IRRITATING TO SKIN, EYES AND MUCOUS MEMBRANES.
MAY CAUSE ALLERGIC REACTION.
APPEARANCE.....
WHITE CRYSTALLINE POWDER.

POTENTIAL HEALTH EFFECTS (ACUTE AND CHRONIC)

SYMPTOMS OF EXPOSURE:
IRRITATING ON CONTACT WITH SKIN, EYES OR MUCOUS MEMBRANES.
MAY CAUSE ALLERGIC REACTION.

MEDICAL COND. AGGRAVATED BY EXPOSURE:
DATA NOT AVAILABLE.
ROUTES OF ENTRY:
INHALATION, INGESTION, SKIN.
CARCINOGENICITY:
THE MATERIAL IS NOT LISTED (IARC, NTP, OSHA) AS CANCER CAUSING AGENT.

4. FIRST AID MEASURES

EMERGENCY FIRST AID:
GET MEDICAL ASSISTANCE FOR ALL CASES OF OVEREXPOSURE.
SKIN: WASH THOROUGHLY WITH SOAP AND WATER.
EYES: IMMEDIATELY FLUSH THOROUGHLY WITH WATER FOR AT LEAST 15 MINUTES.
INHALATION: REMOVE TO FRESH AIR; GIVE ARTIFICIAL RESPIRATION IF BREATHING HAS STOPPED.
INGESTION: IF CONSCIOUS, DRINK WATER AND INDUCE VOMITING IMMEDIATELY AS DIRECTED BY MEDICAL PERSONNEL. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

5. FIRE FIGHTING MEASURES

FLASH POINT (F): NONE
FLAMMABLE LIMITS LEL: N/A
FLAMMABLE LIMITS UEL: N/A
EXTINGUISHING MEDIA:
CO2, DRY CHEMICAL.
FIRE FIGHTING PROCEDURES:
WEAR SELF-CONTAINED BREATHING APPARATUS.
FIRE & EXPLOSION HAZARDS:
THERMAL DECOMPOSITION PRODUCES TOXIC FUMES.

6. ACCIDENTAL RELEASE MEASURES

SPILL RESPONSE:
EVACUATE THE AREA OF ALL UNNECESSARY PERSONNEL.
WEAR SUITABLE PROTECTIVE EQUIPMENT LISTED UNDER EXPOSURE.
PERSONAL PROTECTION:
ELIMINATE ANY IGNITION SOURCES UNTIL THE AREA IS DETERMINED TO BE FREE FROM EXPLOSION OR FIRE HAZARDS.
CONTAIN THE RELEASE AND ELIMINATE ITS SOURCE, IF THIS CAN BE DONE WITHOUT RISK.
TAKE UP AND CONTAINERIZE FOR PROPER DISPOSAL AS DESCRIBED UNDER DISPOSAL.
COMPLY WITH FEDERAL, STATE, AND LOCAL REGULATIONS ON REPORTING.

RELEASES. REFER TO [illegible] INFORMATION FOR REPORTA[illegible]
QUANTITY AND OTHER [illegible] DATA.

7. HANDLING AND STORAGE

HANDLING & STORAGE:
KEEP CONTAINER CLOSED.
STORE AT CONTROLLED ROOM TEMPERATURE.
DO NOT BREATHE DUST.
DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT:

VENTILATION, RESPIRATORY PROTECTION, PROTECTIVE CLOTHING [illegible] ECTION
MATERIAL SHOULD BE HANDLED OR TRANSFERRED IN AN APPROVED [illegible]
HOOD OR WITH ADEQUATE VENTILATION.
PROTECTIVE GLOVES SHOULD BE WORN TO PREVENT SKIN CONTA[illegible] YLENE
OR EQUIVALENT.
SAFETY GLASSES WITH SIDE SHIELDS SHOULD BE WORN AT ALL TIMES.

WORK / HYGENIC PRACTICES:
WASH THOROUGHLY AFTER HANDLING.
DO NOT TAKE INTERNALLY.
EYE WASH AND SAFETY EQUIPMENT SHOULD BE READILY AVAILABLE.

EXPOSURE GUIDELINES

OSHA - PEL:

COMPONENT	TWA OR		STEL				
	PPM	MG/M3	PPM	MG/M3	PPM	MG/M3	SKIN
BARBITURIC ACID							

ACGIH - TLV:

COMPONENT	TWA		STEL				
	PPM	MG/M3	PPM	MG/M3	PPM	MG/M3	SKIN

BARBITURIC ACID

9. PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT (C 760 MMHG) 260 DECOMPOSES
MELTING POINT (C)..... 245
SPECIFIC GRAVITY (H2O = 1)..... N/A
VAPOR PRESSURE (MM HG)..... N/A 20C
PERCENT VOLATILE BY VOL (%): NONE
VAPOR DENSITY (AIR = 1)..... N/A
EVAPORATION RATE (BUAC = 1): N/A
SOLUBILITY IN WATER (%)..... SLIGHT
APPEARANCE.....
WHITE CRYSTALLINE POWDER

10. STABILITY AND REACTIVITY

STABILITY..... YES
HAZARDOUS POLYMERIZATION
DOES NOT OCCUR

HAZARDOUS DECOMPOSITION
NOX, COX

CONDITIONS TO AVOID.....
EXTREME HEAT, DUSTING

MATERIALS TO AVOID.....
( )WATER
( )ACIDS
( )BASES
( )CORROSIVES
(X)OXIDIZERS
( )OTHER :

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA:
ORL-RAT LD50: >5 G/KG
TOXICOLOGICAL FINDINGS:
NONE
CITED IN REGISTRY OF TOXIC EFFECTS OF SUBSTANCES (RTECS)

12. DISPOSAL CONSIDERATIONS

EPA WASTE NUMBER
TREATMENT:
MATERIAL DOES [illegible] WASTE NUMBER AND IS NO[illegible]
WASTE, HOWEVER [illegible] WITH A PERMITTED WASTE DISP[illegible]
(TSD) SHOULD BE [illegible]
ALWAYS CONTACT A [illegible] WASTE DISPOSER (TSD) TO ASSUR[illegible]
COMPLIANCE WITH ALL [illegible] LOCAL, STATE AND FEDERAL REG[illegible]

13. TRANSPORT INFORMATION

DOT PROPER SHIPPING NAME
(NON-REGULATED)
DOT ID NUMBER..... (NONE)

14. REGULATORY INFORMATION

TSCA INVENTORY.....
THE CAS NUMBER OF THIS PRODUCT IS LISTED ON THE TSCA INVENTORY

COMPONENT	SARA EHS TPQ (LBS)
BARBITURIC ACID	

COMPONENT	SARA 313 FLOOR LIST	SARA 313 FOR SARA 313
BARBITURIC ACID		

15. OTHER INFORMATION

COMMENTS:
NONE
NFPA HAZARD RATINGS:
HEALTH

FLAMMABILITY
REACTIVITY
SPECIAL HAZARD

REVISION HISTORY
08/07/86 09/10/88 02/[illegible]/89 03/01/91

I = REVISED SECTION
N/A = NOT AVAILABLE
N/E = NONE ESTABLISHED

THE STATEMENTS CONTAINED HEREIN ARE OFFERED FOR INFORMATIONAL PURPOSES ONLY AND ARE BASED UPON TECHNICAL DATA THAT EM SCIENCE BELIEVES TO BE ACCURATE. IT IS INTENDED FOR USE ONLY BY PERSONS HAVING THE NECESSARY TECHNICAL SKILL AND AT THEIR OWN DESCRETION AND RISK. SUCH PERSONS AND MANNER OF USE ARE BEYOND OUR CONTROL. WE MAKE NO EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS OR OTHERWISE.

PORTIONS COPYRIGHT ARIEL RESEARCH CORPORATION, 1991. RESTRICTED USE CONDITIONS APPLY. SELECTED REGULATORY INFORMATION IN THIS MSDS HAS BEEN DERIVED FROM ARIEL RESEARCH CORPORATION'S INTERNATIONAL CHEMICAL REGULATORY MONITORING SYSTEM (ICRMS). USE OF THIS DATA IS PROVIDED SUBJECT TO THE TERMS OF THE LICENSE AGREEMENT BETWEEN EM INDUSTRIES AND ARIEL RESEARCH CORPORATION. FURTHER DISTRIBUTION IS PROHIBITED WITHOUT AUTHORIZATION.

ISSUED BY VWR 06-22-98

J.T.BAKER INC., 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865

SECTION I -- PRODUCT IDENTIFICATION

PRODUCT NAME: CHLORAMINE-T, TRIHYDRATE
COMMON SYNONYMS: SODIUM P-TOLUENESULFONCHLORAMIDE, TRIHYDRATE
CHEMICAL FAMILY: AROMATIC COMPOUNDS
FORMULA: 1-CH3C6H4-4-SO2NCLNA 3H2O
FORMULA WT.: 281.69
CAS NO.: 7080-50-4
NIOSH/RTECS NO.: XT5617000
PRODUCT USE: LABORATORY REAGENT
PRODUCT CODES: E494

PRECAUTIONARY LABELING

BAKER SAF-T-DATA* SYSTEM

HEALTH	-	3	SEVERE (LIFE)
FLAMMABILITY	-	1	SLIGHT
REACTIVITY	-	2	MODERATE
CONTACT	-	2	MODERATE

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES

U.S. PRECAUTIONARY LABELING

WARNING

CAUSES IRRITATION. HARMFUL IF INHALED. LABORATORY TEST RESULTS INDICATE MATERIAL MAY BE MUTAGENIC.
KEEP AWAY FROM HEAT, SPARKS, FLAME. DO NOT GET IN EYES, ON SKIN, ON CLOTHING. DO NOT BREATHE DUST. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING.

INTERNATIONAL LABELING

AVOID CONTACT WITH EYES. AFTER CONTACT WITH SKIN, WASH IMMEDIATELY WITH PLENTY OF WATER. KEEP CONTAINER TIGHTLY CLOSED.

SAF-T-DATA* STORAGE COLOR CODE: BLUE (HEALTH)

CONTINUED ON PAGE: 2

SECTION II - COMPONENTS

COMPONENT	CAS NO.	WEIGHT %	OSHA/PEL	ACGIH/TLV
CHLORAMINE-T, TRIHYDRATE	7080-50-4	90-100	N/E	N/E

SECTION III - PHYSICAL DATA

BOILING POINT: N/A

VAPOR PRESSURE (MMHG): N/A

MELTING POINT: N/A

VAPOR DENSITY (AIR=1): 0.6

SPECIFIC GRAVITY: 1.43
(H2O=1)

EVAPORATION RATE: N/A

SOLUBILITY(H2O): APPRECIABLE (>10%)

% VOLATILES BY VOLUME: 0
(21 C)

P N/A

ODOR THRESHOLD (P.P.M.): N/A

PHYSICAL STATE: SOLID

COEFFICIENT WATER/OIL DISTRIBUTION: N/A

APPEARANCE & ODOR: WHITE TO YELLOW CRYSTALLINE POWDER. CHLORINE-LIKE ODOR.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP): 192 C (378 F)

AUTOIGNITION TEMPERATURE: N/A

FLAMMABLE LIMITS: UPPER - N/A LOWER - N/A

FIRE EXTINGUISHING MEDIA
USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE. (WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE

CONTINUED ON PAGE: 3

SECTION IV - FIRE AND EXPLOSION HAZARD DATA (CONTINUED)

WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CHLORAMINE T HAS BEEN REPORTED TO BE EXPLOSIVE IN NATURE WHEN AZEOTROPIC DISTILLATION WAS USED TO MAKE THE PRODUCT ANHYDROUS.

TOXIC GASES PRODUCED
CHLORINE, SULFUR DIOXIDE, OXIDES OF NITROGEN, CARBON MONOXIDE, CARBON DIOXIDE

EXPLOSION DATA-SENSITIVITY TO MECHANICAL IMPACT
NONE IDENTIFIED.

EXPLOSION DATA-SENSITIVITY TO STATIC DISCHARGE
NONE IDENTIFIED.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): NOT ESTABLISHED

SHORT-TERM EXPOSURE LIMIT (STEL): NOT ESTABLISHED

PERMISSIBLE EXPOSURE LIMIT (PEL): NOT ESTABLISHED

TOXICITY OF COMPONENTS

NO INFORMATION IS AVAILABLE
CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

CARCINOGENICITY
NONE IDENTIFIED.

REPRODUCTIVE EFFECTS
NONE IDENTIFIED.

CONTINUED ON PAGE: 4

SECTION V - HEALTH HAZARD DATA (CONTINUED)

EFFECTS OF OVEREXPOSURE

INHALATION: HEADACHE, COUGHING, DIFFICULT BREATHING, CHEST PAINS, SEVERE LUNG IRRITATION, PULMONARY EDEMA

SKIN CONTACT: IRRITATION, PROLONGED CONTACT MAY CAUSE SKIN SENSITIZATION

EYE CONTACT: IRRITATION

SKIN ABSORPTION: NONE IDENTIFIED

INGESTION: NONE IDENTIFIED

CHRONIC EFFECTS: NONE IDENTIFIED

TARGET ORGANS
NONE IDENTIFIED

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
ASTHMA

PRIMARY ROUTES OF ENTRY
INHALATION, SKIN CONTACT, EYE CONTACT

EMERGENCY AND FIRST AID PROCEDURES

INGESTION: CALL A PHYSICIAN. IF SWALLOWED, IF CONSCIOUS, GIVE LARGE AMOUNTS OF WATER. INDUCE VOMITING.

INHALATION: IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

SKIN CONTACT: IN CASE OF CONTACT, FLUSH SKIN WITH WATER.

EYE CONTACT: IN CASE OF EYE CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

SARA/TITLE III HAZARD CATEGORIES AND LISTS

ACUTE: YES CHRONIC: YES FLAMMABILITY: NO PRESSURE: NO REACTIVITY: NO

CONTINUED ON PAGE: 5

SECTION V - HEALTH HAZARD DATA (CONTINUED)

EXTREMELY HAZARDOUS SUBSTANCE: NO
CERCLA HAZARDOUS SUBSTANCE: NO
SARA 313 TOXIC CHEMICALS: NO
TSCA INVENTORY: YES

SECTION VI - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: AIR, HEAT, MOISTURE

INCOMPATIBLES: STRONG ACIDS, AMMONIA, AMMONIUM SALTS

DECOMPOSITION PRODUCTS: CHLORINE, OXIDES OF SULFUR, OXIDES OF NITROGEN, CARBON MONOXIDE, CARBON DIOXIDE

SECTION VII - SPILL & DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
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.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

VENTILATION: USE ADEQUATE GENERAL OR LOCAL EXHAUST VENTILATION TO KEEP FUME OR DUST LEVELS AS LOW AS POSSIBLE.

RESPIRATORY PROTECTION: A RESPIRATOR WITH DUST/MIST FILTER IS RECOMMENDED. IF AIRBORNE CONCENTRATION EXCEEDS CAPACITY OF RESPIRATOR, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

CONTINUED ON PAGE: 6

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT (CONTINUED)

EYE/SKIN PROTECTION: SAFETY GOGGLES, UNIFORM, APRON, RUBBER GLOVES ARE RECOMMENDED.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA* STORAGE COLOR CODE: BLUE (HEALTH)

STORAGE REQUIREMENTS
KEEP CONTAINER TIGHTLY CLOSED. STORE IN SECURE POISON AREA. STORE IN A COOL, WELL-VENTILATED AREA AWAY FROM SOURCES OF HEAT, FLAME, OR IGNITION.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME: CHEMICALS, N.O.S. (NON-REGULATED)

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME: CHEMICALS, N.O.S. (NON-REGULATED)
MARINE POLLUTANTS: NO

AIR (I.C.A.O.)

PROPER SHIPPING NAME: CHEMICALS, N.O.S. (NON-REGULATED)

U.S. CUSTOMS HARMONIZATION NUMBER: 29350040008

NOTE: WHEN HANDLING LIQUID PRODUCTS, SECONDARY PROTECTIVE CONTAINERS MUST BE USED FOR CARRYING.
*N/A = NOT APPLICABLE, OR NOT AVAILABLE;
N/E = NOT ESTABLISHED.-
THE INFORMATION IN THIS MATERIAL SAFETY DATA SHEET MEETS THE REQUIREMENTS OF THE UNITED STATES OCCUPATIONAL SAFETY AND HEALTH ACT AND REGULATIONS PROMULGATED THEREUNDER (29 CFR 1910.1200 ET. SEQ.) AND THE CANADIAN WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM. THIS DOCUMENT IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF

CONTINUED ON PAGE: 7

THE MATERIAL BY A PERSON TRAINED IN, OR SUPERVISED BY A PERSON TRAINED IN, CHEMICAL HANDLING. THE USER IS RESPONSIBLE FOR DETERMINING THE PRECAUTIONS AND DANGERS OF THIS CHEMICAL FOR HIS OR HER PARTICULAR APPLICATION. DEPENDING ON USAGE, PROTECTIVE CLOTHING INCLUDING EYE AND FACE GUARDS AND RESPIRATORS MUST BE USED TO AVOID CONTACT WITH MATERIAL OR BREATHING CHEMICAL VAPORS/FUMES.
EXPOSURE TO THIS PRODUCT MAY HAVE SERIOUS ADVERSE HEALTH EFFECTS. THIS CHEMICAL MAY INTERACT WITH OTHER SUBSTANCES. SINCE THE POTENTIAL USES ARE SO VARIED, BAKER CANNOT WARN OF ALL OF THE POTENTIAL DANGERS OF USE OR INTERACTION WITH OTHER CHEMICALS OR MATERIALS. BAKER WARRANTS THAT THE CHEMICAL MEETS THE SPECIFICATIONS SET FORTH ON THE LABEL.
BAKER DISCLAIMS ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED WITH REGARD TO THE PRODUCT SUPPLIED HEREUNDER, ITS MERCHANTABILITY OR ITS FITNESS FOR A PARTICULAR PURPOSE.
THE USER SHOULD RECOGNIZE THAT THIS PRODUCT CAN CAUSE SEVERE INJURY AND EVEN DEATH, ESPECIALLY IF IMPROPERLY HANDLED OR THE KNOWN DANGERS OF USE ARE NOT HEEDED. READ ALL PRECAUTIONARY INFORMATION. AS NEW DOCUMENTED GENERAL SAFETY INFORMATION BECOMES AVAILABLE, BAKER WILL PERIODICALLY REVISE THIS MATERIAL SAFETY DATA SHEET.
NOTE: CHEMTREC, CANUTEC, AND NATIONAL RESPONSE CENTER EMERGENCY TELEPHONE NUMBERS ARE 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-JTBAKER) FOR ASSISTANCE.

COPYRIGHT 1994 J.T.BAKER INC.
* TRADEMARKS OF J.T.BAKER INC.
===
APPROVED BY QUALITY ASSURANCE DEPARTMENT.

--- LAST PAGE ---
"ISSUED BY VWR 05/23/97"

exclusive United States distributors:
GALLARD-SCHLESINGER INDUSTRIES, IN
Carle Place, N.Y. 11514
Tel: (516) 333-5600 - Telex: 6852390
Fax: (516) 333-5628

E.C. safety data sheet

MN

Cat.No: 90604 Date: Jan. 29th 1997 updated:

1. Identification of the substance / preparation and company

1.1. **Identification of the substance /preparation:** CYANTESMO
E.E.C. characterisation: see chapter 15
E.E.C. number: 202-959-2 **Index number:**

1.2. **Manufacturer:** MACHEREY-NAGEL GmbH & Co.KG, P.O. Box 10 13 52, D-52313 Düren, Tel. (02421) 969-0
Commercial name: CYANTESMO
Informant: MACHEREY-NAGEL GmbH & Co.KG, Tel. (02421) 969-0

1.3. **Emergency telephone number:**

2. Composition / Information on ingredients

2.1. **Chemical characterisation / sum formula:** Filter Paper impregnated with N,N,N',N'-Tetra-methyl-4,4'-diamino-diphenylmethan
concentration: 0.6%

It is a dangerous substance: **CAS No.:** 101-61-1
GefStoffV (Germany): ≥ 0.1% T,

2.2. **Symbol-letters**

2.3. **Risk phrases (R sentences)**
R 45 May cause cancer

2.4. **Safety counsel (S sentences)**
S53 Avoid exposure - obtain special instructions before use.
S 37 Wear suitable gloves.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show label of bottle or box where possible).

2.5. **Description of further chemical properties** see page 2

3. Hazards identification

3.1. **Possible hazards:** see chapter 2.3

3.2. **Adverse human health effects / symptoms:**

4. First-aid measures

4.1. **First-aid measures:**
Rinse affected skin and eyes under running water. In case of swallowing rinse mouth with water. Consult doctor immediately.

4.2. **Further medical attention:** by a doctor

4.3. **Specific means of treatment that should be available at the workplace:**

5. Fire-fighting measures

Carry out appropriate extinguishing measures in accordance with local conditions.

5.1. **Suitable extinguishing media:**

5.2. **Extinguishing media that must not be used:**

5.3. **Special exposure hazards, combustion products, resulting gases:**

exclusive United States distributors:
GALLARD-SCHLESINGER INDUSTRIES, INC.
Carle Place, N.Y. 11514
Tel: (516) 333-5600 - Telex: 6852390
Fax: (516) 333-5628

11. Toxicological information

11.1. Toxicological effects

of N,N,N',N'-Tetra-methyl-4,4'-diamino-diphenylmethan

Harmful if swallowed, by inhalation or in contact with skin. Irritating to eyes and skin. Irritating to mucous membranes and upper respiratory ducts. Rersorption leads to composition of methhe moglobin; that - in higher concentration - may cause cyanose. Latent period: 2-4 hours

Chronic effects

Causes cancer. May cause genetic damage of liver and thyroid gland.

11.1. Toxicological data: LD_{50} (oral, mouse): 3160 mg/kg

12. Ecological information

12.1. Assessment of possible effects

12.2. Most important characteristics likely to have an effect on the environment

13. Disposal considerations

Please observe local regulations concerning handling of hazardous waste.

14. Transport information

There are no regulations.

15. Regulatory information

15.1. Identification acc. to E.C. rules:

Component which determines the hazard: N,N,N',N'-Tetra-methyl-4,4'-diamino-diphenylmethan

E.E.C number.:	202-959-2
R sentences:	R45
S sentences:	S 53-37-45

15.2. German rules:

Gesetz zum Schutz vor gefährlichen Stoffen (Chemikalengesetz - ChemG) vom 14. März 1990; BGBl. I 1990 S. 521;
TRGS 220, Sicherheitsdatenblatt für gefährliche Stoffe und Zubereitungen vom September 1993; BArbBl. Nr. 9/1993 S. 38
TRGS 200, Einstufung und Kennzeichnung von Stoffen, Zubereitungen und Erzeugnissen vom November 1994.
Water hazard class: 3

15.3. Other national rules: Toxic class (Switzerland): 2

16. Other data

The above information is provided to the best of our present knowledge and accumulated experience. Unnecessary steps have been eliminated to save space.

exclusive United States distributors:
GALLARD-SCHLESINGER INDUSTRIES, INC.
Carle Place, N.Y. 11514
Tel: (516) 333-5600 - Telex: 6852390
Fax: (516) 333-5628

5.4. Special protective equipment:

6. Accidental release measures

Collect for disposal

7. Handling and storage

7.1. Handling: See instructions.

7.2. Storage: Keep package closed and dry.

8. Exposure controls / personal protection

8.1. Precautionary measures in order to minimise worker exposure:

8.2. Precautionary technical measures:

8.3. Personal protection:

Respiratory protection: **Eye protection:**

Skin protection: **Hand protection:** x

Hygiene measures: Keep away from food, wash hands!

9. Physical and chemical properties

9.1. Physical state: paper stripes **9.2. Colour:** light green **9.3. Odour:** odourless

9.4. pH of the substance / preparation as supplied:

9.5. pH of aqueous solution: (at g/l H_2O)

9.6. Change of physical state:

Melting point / melting range:

Boiling point / boiling range:

9.7. Flash point:

9.8. Flammability (solid, gas):

9.9. Vapour pressure in mbar: (at °C)

9.10. Relative density: (at °C) g/m³

9.11. Solubility:

water solubility: (at 20 °C) g/l

fat solubility: (at °C) g/l

9.12. Partition coefficient:

9.13. Other data:

10. Stability and reactivity

10.1. Conditions to avoid:

10.2. Materials to avoid:

10.3. Hazardous decomposition products:

MATERIAL SAFETY DATA SHEET

EM SCIENCE

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER.....:

EM SCIENCE
A DIVISION OF EM INDUSTRIES
P.O. BOX 70
480 DEMOCRAT RD.
GIBBSTOWN, N.J. 08027

PREPARATION DATE.: 04/05/95
DATE MSDS PRINTED.: OCT 19, 1995

INFORMATION PHONE NUMBER.: 609-423-6300
HOURS: MON. TO FRI. 8:30-5
CHEMTREC EMERGENCY NUMBER: 800-424-9300
HOURS: 24 HRS A DAY

CATALOG NUMBER(S):

DX0830	DX0831	DX0832	DX0833	DX0835	DX0835P
DX0835T	DX0837	DX0838	DX0838P		

PRODUCT NAME.....:
DICHLOROMETHANE
SYNONYMS.....:
METHYLENE CHLORIDE
CHEMICAL FAMILY..:
CHLORINATED HYDROCARBON
FORMULA.....:
CH2CL2

MOLECULAR WEIGHT.:
84.93

2. COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENT	CAS #	APPR %
DICHLOROMETHANE	75-09-2	100%

MOST GRADES OF DICHLOROMETHANE CONTAIN A TRACE AMOUNT OF A STABILIZER.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA.
HARMFUL IF INHALED OR SWALLOWED.
VAPOR IRRITATING.
MAY CAUSE EYE INJURY.
MAY CAUSE SKIN IRRITATION.
MAY CAUSE DAMAGE TO LIVER, KIDNEYS, BLOOD AND CENTRAL NERVOUS SYSTEM.

APPEARANCE.....:
COLORLESS LIQUID, ETHER-LIKE ODOR

POTENTIAL HEALTH EFFECTS (ACUTE AND CHRONIC)

SYMPTOMS OF EXPOSURE:
TOXIC BY INGESTION AND INHALATION.
IRRITATING ON CONTACT WITH SKIN, EYES OR MUCOUS MEMBRANES.
MAY CAUSE EYE INJURY.
INHALATION OF HIGH VAPOR CONCENTRATIONS CAUSES DIZZINESS, NAUSEA, HEADACHE, NARCOSIS, IRREGULAR HEARTBEATS, COMA AND DEATH.
INGESTION MAY CAUSE IRRITATION OF THE GASTROINTESTINAL TRACT WITH VOMITING. IF VOMITING OCCURS, METHYLENE CHLORIDE CAN BE ASPIRATED INTO THE LUNGS, WHICH CAN CAUSE CHEMICAL PNEUMONIA AND SYSTEMIC EFFECTS.
EXCESSIVE EXPOSURE MAY CAUSE BLOOD DEFECTS AND CAN AFFECT LIVER, KIDNEYS AND CENTRAL NERVOUS SYSTEM.

MEDICAL COND. AGGRAVATED BY EXPOSURE:
HEART, KIDNEY AND LIVER CONDITIONS

ROUTES OF ENTRY.....:
INHALATION, INGESTION

CARCINOGENICITY.....:
TESTS ON LABORATORY ANIMALS INDICATE MATERIAL MAY BE CARCINOGENIC.

4. FIRST AID MEASURES

EMERGENCY FIRST AID:
GET MEDICAL ASSISTANCE FOR ALL CASES OF OVEREXPOSURE.
SKIN: WASH THOROUGHLY WITH SOAP AND WATER.
EYES: IMMEDIATELY FLUSH THOROUGHLY WITH WATER FOR AT LEAST 15 MINUTES.
INHALATION: REMOVE TO FRESH AIR; GIVE ARTIFICIAL RESPIRATION IF BREATHING HAS STOPPED.
INGESTION: DO NOT INDUCE VOMITING; GET IMMEDIATE MEDICAL ATTENTION.

5. FIRE FIGHTING MEASURES

FLASH POINT (F).....: NONE
FLAMMABLE LIMITS LEL (%).: 13.00
FLAMMABLE LIMITS UEL (%).: 23.00
EXTINGUISHING MEDIA.....:
WATER SPRAY, CARBON DIOXIDE, DRY CHEMICAL.

FIRE FIGHTING PROCEDURES.:

WEAR SELF-CONTAINED BREATHING APPARATUS.

FIRE & EXPLOSION HAZARDS.:
FORMS FLAMMABLE VAPOR-AIR MIXTURES ABOVE AMBIENT TEMPERATURE

6. ACCIDENTAL RELEASE MEASURES

SPILL RESPONSE:
EVACUATE THE AREA OF ALL UNNECESSARY PERSONNEL.
WEAR SUITABLE PROTECTIVE EQUIPMENT LISTED UNDER EXPOSURE / PERSONAL PROTECTION.
ELIMINATE ANY IGNITION SOURCES UNTIL THE AREA IS DETERMINED TO BE FREE FROM EXPLOSION OR FIRE HAZARDS.
CONTAIN THE RELEASE AND ELIMINATE ITS SOURCE, IF THIS CAN BE DONE WITHOUT RISK.
TAKE UP AND CONTAINERIZE FOR PROPER DISPOSAL AS DESCRIBED UNDER DISPOSAL.
COMPLY WITH FEDERAL, STATE, AND LOCAL REGULATIONS ON REPORTING RELEASES. REFER TO REGULATORY INFORMATION FOR REPORTABLE QUANTITY AND OTHER REGULATORY DATA.

7. HANDLING AND STORAGE

HANDLING & STORAGE:
KEEP CONTAINER TIGHTLY CLOSED.
STORE IN A COOL, WELL-VENTILATED AREA AWAY FROM OPEN FLAMES.
DO NOT BREATH VAPOR OR MIST.
DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING.
RETAINED RESIDUE MAY MAKE EMPTY CONTAINERS HAZARDOUS; USE CAUTION!

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT:

VENTILATION, RESPIRATORY PROTECTION, PROTECTIVE CLOTHING, EYE PROTECTION
RESPIRATORY PROTECTION: IF WORKPLACE EXPOSURE LIMIT(S) OF PRODUCT OR ANY COMPONENT IS EXCEEDED (SEE TLV/PEL), A NIOSH/MSHA APPROVED AIR SUPPLIED RESPIRATOR IS ADVISED IN ABSENCE OF PROPER ENVIRONMENTAL CONTROL. OSHA REGULATIONS ALSO PERMIT OTHER NIOSH/MSHA RESPIRATORS (NEGATIVE PRESSURE TYPE) UNDER SPECIFIED CONDITIONS (SEE YOUR SAFETY EQUIPMENT SUPPLIER). ENGINEERING AND/OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE EXPOSURE.
MATERIAL MUST BE HANDLED OR TRANSFERRED IN AN APPROVED FUME HOOD OR WITH EQUIVALENT VENTILATION.
PROTECTIVE GLOVES (VITON, PVA OR EQUIVALENT) MUST BE WORN

TO PREVENT SKIN CONTACT.
SAFETY GLASSES WITH SIDE SHIELDS MUST BE WORN AT ALL TIMES.

RK / HYGENIC PRACTICES:
WASH THOROUGHLY AFTER HANDLING.
DO NOT TAKE INTERNALLY.
EYE WASH AND SAFETY EQUIPMENT SHOULD BE READILY AVAILABLE.

EXPOSURE GUIDELINES

OSHA - PEL:

COMPONENT	TWA PPM	TWA MG/M3	STEL PPM	STEL MG/M3	CL PPM	CL MG/M3	SKIN
DICHLOROMETHANE	500				1000		

ACGIH - TLV:

COMPONENT	TWA PPM	TWA MG/M3	STEL PPM	STEL MG/M3	CL PPM	CL MG/M3	SKIN
DICHLOROMETHANE	50	174					

9. PHYSICAL AND CHEMICAL PROPERTIES

LING POINT (C 760 MMHG).: 39.8C
MELTING POINT (C).....: -95C
SPECIFIC GRAVITY (H20 = 1).: 1.326
VAPOR PRESSURE (MM HG).....: 340 20C
PERCENT VOLATILE BY VOL (%): 100%
VAPOR DENSITY (AIR = 1).....: 2.93
EVAPORATION RATE (BUAC = 1): 27.5
SOLUBILITY IN WATER (%).....: 2%
APPEARANCE.....:
COLORLESS LIQUID, ETHER-LIKE ODOR

10. STABILITY AND REACTIVITY

STABILITY.....: YES

HAZARDOUS POLYMERIZATION:
DOES NOT OCCUR

HAZARDOUS DECOMPOSITION.:
HCL, PHOSGENE, CHLORINE

CONDITIONS TO AVOID.....:

CONTACT WITH OPEN FLAME, WELDING ARCS, HOT SURFACES.

MATERIALS TO AVOID.....:
( ) WATER
( ) ACIDS
(X) BASES
( ) CORROSIVES
(X) OXIDIZERS
(X) OTHER :
ALKALI METALS, ALUMINUM AND MAGNESIUM POWDER, SODIUM, POTASSIUM, AND LITHIUM

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA:

ORL-HMN LDLO:	357 MG/KG	ORL-RAT LD50:	2136 MG/KG
IHL-HMN TCLO:	500 PPM/8H	IHL-MUS LC50:	14400 PPM//H

TOXICOLOGICAL FINDINGS:
TESTS ON LABORATORY ANIMALS INDICATE MATERIAL MAY CAUSE TUMORS AND PRODUCE ADVERSE MUTAGENIC AND REPRODUCTIVE EFFECTS.
CITED IN REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS)

12. DISPOSAL CONSIDERATIONS

EPA WASTE NUMBERS: U080
TREATMENT:
SPECIFIED TECHNOLOGY - INCINERATION TO A LEVEL BELOW TCA (TOTAL CONSTITUENT ANALYSES) LEVELS. CONTACT YOUR LOCAL PERMITTED WASTE DISPOSAL COMPANY (TSD) FOR PERMISSIBLE TREATMENT SITE.
ALWAYS CONTACT A PERMITTED WASTE DISPOSER (TSD) TO ASSURE COMPLIANCE WITH ALL CURRENT LOCAL, STATE AND FEDERAL REGULATIONS.

13. TRANSPORT INFORMATION

DOT PROPER SHIPPING NAME...:
DICHLOROMETHANE

DOT ID NUMBER.....:
UN1593

14. REGULATORY INFORMATION

TSCA STATEMENT .....

THIS PRODUCT IS A "MIXTURE". THE CAS NUMBERS OF ALL COMPONENTS ARE LISTED ON THE TSCA INVENTORY.

COMPONENT	SARA EHS (302)	SARA EHS TPQ (LBS)	CERCLA RQ (LBS)
DICHLOROMETHANE			1000

COMPONENT	OSHA FLOOR LIST	SARA 313	DEMINIMIS FOR SARA 313 (%)
DICHLOROMETHANE	Y	Y	0.1

15. OTHER INFORMATION

COMMENTS:

CATALOG NUMBER DX0832 DOES NOT CONTAIN A STABILIZER AND WOULD NOT BE CONSIDERED A MIXTURE UNDER THE TSCA INVENTORY.

NFPA HAZARD RATINGS:

HEALTH : 2
FLAMMABILITY : 1
REACTIVITY : 0
SPECIAL HAZARDS :

REVISION HISTORY:

08/01/81 09/01/83 09/26/86 05/01/87 08/28/87 10/27/87 01/14/88
10/06/89 03/11/90 03/01/91 07/16/91 11/20/91

| = REVISED SECTION
N/A = NOT AVAILABLE
N/E = NONE ESTABLISHED

THE STATEMENTS CONTAINED HEREIN ARE OFFERED FOR INFORMATIONAL PURPOSES ONLY AND ARE BASED UPON TECHNICAL DATA THAT EM SCIENCE BELIEVES TO BE ACCURATE. IT IS INTENDED FOR USE ONLY BY PERSONS HAVING THE NECESSARY TECHNICAL SKILL AND AT THEIR OWN DESCRETION AND RISK. SINCE CONDITIONS AND MANNER OF USE ARE OUTSIDE OUR CONTROL, WE MAKE NO WARRANTY, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS OR OTHERWISE.

PORTIONS COPYRIGHT ARIEL RESEARCH CORPORATION, 1993. RESTRICTED USE CONDITIONS APPLY. SELECTED REGULATORY INFORMATION IN EMCIS HAS BEEN DERIVED FROM ARIEL RESEARCH CORP'S. INTERNATIONAL CHEMICAL REGULATORY MONITORING SYSTEM (ICRMS). USE OF THIS DATA

IS SUBJECT TO THE TERMS OF A LICENSE AGREEMENT BETWEEN EM INDUSTRIES AND ARIEL RESEARCH CORP. FURTHER DISTRIBUTION WITHOUT AUTHORIZATION IS PROHIBITED.

MSDS Material Safety Data Sheet

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

MALLINCKRODT J.T.Baker

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

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 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.

1,5-DIPHENYLCARBOHYDRAZIDE

MSDS Number: D7816 --- *Effective Date: 12/08/96*

1. Product Identification

Synonyms: 1,5-Diphenylcarbazide; S-diphenylcarbazide; DPC
CAS No.: 140-22-7
Molecular Weight: 242.29
Chemical Formula: C6H5NHNHCONHNHC6H5
Product Codes: J.T. Baker: K620 Mallinckrodt: 1842

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
1,5-Diphenylcarbazide	140-22-7	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! MAY BE HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUG SKIN. MAY CAUSE 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: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Orange (General Storage)

Potential Health Effects

Information on the human health effects from exposure to this substance is limited.

Inhalation:
No information found, but compound should be handled as a potential health hazard. May cause irritation to the respiratory tract. Symptoms may include coughing, sore throat, labored breathing, and chest pain.

Ingestion:
No information found, but compound should be handled as a potential health hazard. May cause irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea.

Skin Contact:
No information found, but compound should be handled as a potential health hazard. May cause irritation with redness and pain. May be absorbed through the skin with possible systemic effects.

Eye Contact:
No information found, but compound should be handled as a potential health hazard. May cause irritation, redness and pain.

Chronic Exposure:
No information found.

Aggravation of Pre-existing Conditions:
No information found.

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:
Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.

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

Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention if irritation persists.

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard. As with most organic solids, fire is possible at elevated temperatures or by contact with an ignition source.

Explosion:
Fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust 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: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (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 to pinkish white crystalline powder.

Odor:
No information found.

Solubility:

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

Label Precautions:
Avoid breathing dust. Avoid contact with eyes, skin and clothing. Keep container closed. Use 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 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. If swallowed, give large amounts of water to drink. Never give anything by mouth to an unconscious person. In all cases, get medical attention.

Product Use:
Laboratory Reagent.

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.)

15. Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
1,5-Diphenylcarbazide (140-22-7)	Yes	Yes	Yes	Yes

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

Ingredient	Korea	Canada DSL	Canada NDSL	Phil.
1,5-Diphenylcarbazide (140-22-7)	Yes	Yes	No	Yes

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

Ingredient	SARA 302 RQ	SARA 302 TPQ	SARA 313 List	SARA 313 Chemical Catg
1,5-Diphenylcarbazide (140-22-7)	No	No	No	No

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

Ingredient	CERCLA	RCRA 261.33	TSCA 8(d)
1,5-Diphenylcarbazide (140-22-7)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: No 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

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

Label Hazard Warning:

No LD50/LC50 information found relating to normal routes of occupational exposure.
Investigated as a mutagen.

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

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
1,5-Diphenylcarbazide (140-22-7)	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.

Slightly soluble in water.

Specific Gravity:
No information found.

pH:
No information found.

% Volatiles by volume @ 21C (70F):
0

Boiling Point:
Not applicable.

Melting Point:
168 - 171C (334 - 340F)

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 carbon monoxide, carbon dioxide, nitrogen oxides.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Strong oxidizers.

Conditions to Avoid:
Heat, light, dusting and incompatibles.

11. Toxicological Information

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

MSDS Material Safety Data Sheet

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

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 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.

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

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

Ferric Citrate, n-Hydrate

MSDS Number: F1120 --- *Effective Date: 12/08/96*

1. Product Identification

Synonyms: None
CAS No.: 2338-05-8
Molecular Weight: Not applicable to mixtures.
Chemical Formula: FeC6H5O7.nH2O
Product Codes: M376

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Citric Acid, Iron Salt	2338-05-8	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

As part of good industrial and personal hygiene and safety procedure, avoid all unnecessary exposure to the chemical substance and ensure prompt removal from skin, eyes and clothing.

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

Health Rating: 1 - Slight
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:
No information found.

Ingestion:
No information found.

Skin Contact:
No information found.

Eye Contact:
No information found.

Chronic Exposure:
No information found.

Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
If a person breathes in large amounts, move the exposed person to fresh air.

Ingestion:
If large amounts were swallowed, give water to drink and get medical advice.

Skin Contact:
In case of contact, immediately wash skin with plenty of soap and 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:
No information found.

Fire Extinguishing Media:
Use extinguishing media appropriate for surrounding fire.

Special Information:
Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece operated in positive pressure mode.

---

6. Accidental Release Measures

Wear suitable protective clothing. Carefully sweep up and remove.

---

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:
In general, dilution ventilation is a satisfactory health hazard control for this substance. However, if conditions of use create discomfort to the worker, a local exhaust system should be considered.

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 protective gloves and clean body-covering clothing.

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:
Dark red to brown Powder.

Odor:
Odorless.

Solubility:
Complete (100%)

Specific Gravity:
No information found.

pH:
No information found.

% Volatiles by volume @ 21C (70F):
0

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:
Carbon monoxide, carbon dioxide.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
No information found.

Conditions to Avoid:
Light.

11. Toxicological Information

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

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Citric Acid, Iron Salt (2338-05-8)	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
Citric Acid, Iron Salt (2338-05-8)	Yes	Yes	Yes	Yes

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

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Citric Acid, Iron Salt (2338-05-8)	No	Yes	No	Yes

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

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Citric Acid, Iron Salt (2338-05-8)	No	No	No	No

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

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Citric Acid, Iron Salt (2338-05-8)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: No Chronic: No 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:
As part of good industrial and personal hygiene and safety procedure, avoid all unnecessary exposure to the chemical substance and ensure prompt removal from skin, eyes and clothing.

Label Precautions:
During use avoid contact with eyes, skin, clothing. Wash thoroughly after handling. When not in use keep in tightly closed container.

Label First Aid:
Not applicable.

Product Use:
Laboratory Reagent.

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.)

MATERIAL SAFETY DATA SHEET

EM SCIENCE

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER.....:

EM SCIENCE
A DIVISION OF EM INDUSTRIES
P.O. BOX 70
480 DEMOCRAT RD.
GIBBSTOWN, N.J. 08027

PREPARATION DATE.: 08/09/93
DATE MSDS PRINTED.: SEP 24, 1993

INFORMATION PHONE NUMBER.: 609-354-9200
HOURS: MON. TO FRI. 8:30-5
CHEMTREC EMERGENCY NUMBER: 800-424-9300
HOURS: 24 HRS A DAY

CATALOG NUMBER(S):
FX0245

CHEMICAL NAME....:
FERROUS AMMONIUM SULFATE
TRADE NAME.....:
MOHR'S SALT; AMMONIUM IRON (II) SULFATE
CHEMICAL FAMILY..: INORGANIC SALT
FORMULA.....:
$FE(NH_4)_2(SO_4)_2 \cdot 6H_2O$

MOLECULAR WEIGHT.: 392.14

2. COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENT	CAS #	APPR %
FERROUS AMMONIUM SULFATE	7783-85-9	100%

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
MAY BE HARMFUL IF INHALED OR SWALLOWED.
IRRITATING TO SKIN, EYES AND MUCOUS MEMBRANES.

APPEARANCE.....
BLUISH-GREEN CRYSTALS ODORLESS

POTENTIAL HEALTH EFFECTS (ACUTE AND CHRONIC)

SYMPTOMS OF EXPOSURE:
CONTACT OR DUST INHALATION MAY CAUSE IRRITATION TO SKIN, EYES,

NOSE AND THROAT.
INGESTION OF LARGE QUANTITIES CAN CAUSE NAUSEA, ABDOMINAL PAIN, DIARRHEA, ANOREXIA, RESPIRATORY FAILURE.

MEDICAL COND. AGGRAVATED BY EXPOSURE:
DATA NOT AVAILABLE.

ROUTES OF ENTRY.....:
INHALATION, INGESTION.

CARCINOGENICITY.....:
THE MATERIAL IS NOT LISTED (IARC, NTP, OSHA) AS CANCER CAUSING AGENT.

4. FIRST AID MEASURES

EMERGENCY FIRST AID:
GET MEDICAL ASSISTANCE FOR ALL CASES OF OVEREXPOSURE.
SKIN: WASH THOROUGHLY WITH SOAP AND WATER.
EYES: IMMEDIATELY FLUSH THOROUGHLY WITH WATER FOR AT LEAST 15 MINUTES.
INHALATION: REMOVE TO FRESH AIR; GIVE ARTIFICIAL RESPIRATION IF BREATHING HAS STOPPED.
INGESTION: IF CONSCIOUS, DRINK WATER AND INDUCE VOMITING IMMEDIATELY AS DIRECTED BY MEDICAL PERSONNEL. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

5. FIRE FIGHTING MEASURES

FLASH POINT (F).....: NONCOMBUSTIBLE
FLAMMABLE LIMITS LEL (%) : N/A
FLAMMABLE LIMITS UEL (%) : N/A
EXTINGUISHING MEDIA.....:
USE ANY SUITABLE FOR ADJACENT MATERIAL.

FIRE FIGHTING PROCEDURES.:
WEAR SELF-CONTAINED BREATHING APPARATUS.

FIRE & EXPLOSION HAZARDS.:
THERMAL DECOMPOSITION PRODUCES HIGHLY TOXIC FUMES.

6. ACCIDENTAL RELEASE MEASURES

SPILL RESPONSE:
EVACUATE THE AREA OF ALL UNNECESSARY PERSONNEL.
WEAR SUITABLE PROTECTIVE EQUIPMENT LISTED UNDER EXPOSURE PERSONAL PROTECTION.....: N/A
ELIMINATE ANY IGNITION SOURCES UNTIL THE AREA IS DETERMINED TO BE FREE FROM EXPLOSION OR FIRE HAZARDS.

CONTAIN THE RELEASE AND ELIMINATE ITS SOURCE, IF THIS CAN BE DONE WITHOUT RISK.
TAKE UP AND CONTAINERIZE FOR PROPER DISPOSAL AS DESCRIBED UNDER DISPOSAL.
COMPLY WITH FEDERAL, STATE, AND LOCAL REGULATIONS ON REPORTING RELEASES. REFER TO REGULATORY INFORMATION FOR REPORTABLE QUANTITY AND OTHER REGULATORY DATA.

7. HANDLING AND STORAGE

HANDLING & STORAGE:
KEEP CONTAINER CLOSED.
STORE IN A COOL, DRY, WELL-VENTILATED AREA.
DO NOT BREATHE DUST.
DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT:

VENTILATION, RESPIRATORY PROTECTION, PROTECTIVE CLOTHING, EYE PROTECTION
MATERIAL SHOULD BE HANDLED OR TRANSFERRED IN AN APPROVED FUME HOOD OR WITH ADEQUATE VENTILATION.
PROTECTIVE GLOVES (NEOPRENE, PVC OR EQUIVALENT) SHOULD BE WORN TO PREVENT SKIN CONTACT.
SAFETY GLASSES WITH SIDE SHIELDS SHOULD BE WORN AT ALL TIMES.

WORK / HYGENIC PRACTICES:
WASH THOROUGHLY AFTER HANDLING.
DO NOT TAKE INTERNALLY.
EYE WASH AND SAFETY EQUIPMENT SHOULD BE READILY AVAILABLE.

EXPOSURE GUIDELINES

OSHA - PEL:

COMPONENT	TWA PPM	TWA MG/M3	STEL PPM	STEL MG/M3	CL PPM	CL MG/M3	SKIN
FERROUS AMMONIUM SULFATE							

ACGIH - TLV:

COMPONENT	TWA PPM	TWA MG/M3	STEL PPM	STEL MG/M3	CL PPM	CL MG/M3	SKIN
FERROUS AMMONIUM SULFATE							

9. PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT (C 760 MMHG).: N/A
MELTING POINT (C)..... 100 DECOMPOSES
SPECIFIC GRAVITY (H20 = 1).: 1.864
VAPOR PRESSURE (MM HG)..... N/A 20C
PERCENT VOLATILE BY VOL (%): N/A
VAPOR DENSITY (AIR = 1)..... N/A
EVAPORATION RATE (BUAC = 1): N/A
SOLUBILITY IN WATER (%)..... 21
APPEARANCE.....
BLUISH-GREEN CRYSTALS ODORLESS

10. STABILITY AND REACTIVITY

STABILITY.....: YES

HAZARDOUS POLYMERIZATION:
DOES NOT OCCUR

HAZARDOUS DECOMPOSITION.:
NH3, SOX, NOX

CONDITIONS TO AVOID.....:

TEMPERATURES ABOVE 100C, DUSTING

MATERIALS TO AVOID.....:
( ) WATER
( ) ACIDS
( ) BASES
( ) CORROSIVES
(X) OXIDIZERS
( ) OTHER :

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA:

ORL-RAT LD50: 3250 MG/KG

TOXICOLOGICAL FINDINGS:
NONE
CITED IN REGISTRY OF TOXIC EFFECTS OF SUBSTANCES (RTECS)

12. DISPOSAL CONSIDERATIONS

EPA WASTE NUMBERS:
TREATMENT:
MATERIAL DOES NOT HAVE AN EPA WASTE NUMBER AND IS NOT A LISTED WASTE, HOWEVER CONSULTATION WITH A PERMITTED WASTE DISPOSAL SITE (TSD) SHOULD BE ACCOMPLISHED.
ALWAYS CONTACT A PERMITTED WASTE DISPOSER (TSD) TO ASSURE COMPLIANCE WITH ALL CURRENT LOCAL, STATE AND FEDERAL REGULATIONS.

13. TRANSPORT INFORMATION

DOT PROPER SHIPPING NAME....:
ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.

DOT ID NUMBER.....: UN3077

14. REGULATORY INFORMATION

TSCA INVENTORY.....
THIS PRODUCT IS A "MIXTURE". THE CAS NUMBERS OF ALL COMPONENTS ARE LISTED ON THE TSCA INVENTORY.

COMPONENT	SARA EHS (302)	SARA EHS TPQ (LBS)	CERCLA RQ (LBS)
FERROUS AMMONIUM SULFATE			

COMPONENT	OSHA FLOOR LIST	SARA 313	DEMINIMIS FOR SARA 313
FERROUS AMMONIUM SULFATE			

15. OTHER INFORMATION

COMMENTS:
NONE
NFPA HAZARD RATINGS:
HEALTH : 2
FLAMMABILITY : 0
REACTIVITY : 0
SPECIAL HAZARDS : NA
REVISION HISTORY:

12/01/82 11/01/86 10/27/87 03/01/91
| = REVISED SECTION
N/A = NOT AVAILABLE
N/E = NONE ESTABLISHED

THE STATEMENTS CONTAINED HEREIN ARE OFFERED FOR INFORMATIONAL PURPOSES ONLY AND ARE BASED UPON TECHNICAL DATA THAT EM SCIENCE BELIEVES TO BE ACCURATE. IT IS INTENDED FOR USE ONLY BY PERSONS HAVING THE NECESSARY TECHNICAL SKILL AND AT THEIR OWN DESCRETION AND RISK. SINCE CONDITIONS AND MANNER OF USE ARE OUTSIDE OUR CONTROL, WE MAKE NO WARRANTY, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS OR OTHERWISE.

PORTIONS COPYRIGHT ARIEL RESEARCH CORPORATION, 1991. RESTRICTED USE CONDITIONS APPLY. SELECTED REGULATORY INFORMATION IN THIS MSDS HAS BEEN DERIVED FROM ARIEL RESEARCH CORPORATION'S INTERNATIONAL CHEMICAL REGULATORY MONITORING SYSTEM (ICRMS). USE OF THIS DATA IS PROVIDED SUBJECT TO THE TERMS OF THE LICENSE AGREEMENT BETWEEN EM INDUSTRIES AND ARIEL RESEARCH CORPORATION. FURTHER DISTRIBUTION IS PROHIBITED WITHOUT AUTHORIZATION.

MATERIAL SAFETY DATA SHEET

EM SCIENCE

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER.....:

EM SCIENCE
A DIVISION OF EM INDUSTRIES
P.O. BOX 70
480 DEMOCRAT RD.
GIBBSTOWN, N.J. 08027

PREPARATION DATE.: 05/30/96
DATE MSDS PRINTED.: AUG 01, 1996

INFORMATION PHONE NUMBER.: 609-423-6300
HOURS: MON. TO FRI. 8:30-5
CHEMTREC EMERGENCY NUMBER: 800-424-9300
HOURS: 24 HRS A DAY

CATALOG NUMBER(S):

HX0290	HX0290P	HX0290PH	HX0292	HX0293	HX0294
HX0296	HX0297	HX0298	HX0299	HX0299P	HX0299S
HX0299T	HX0300	HX0310	9687		

PRODUCT NAME.....:
HEXANE
SYNONYMS.....:
HEXANES
CHEMICAL FAMILY..:
ALIPHATIC HYDROCARBON
FORMULA.....:
C6H14

MOLECULAR WEIGHT.:
86.18

2. COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENT	CAS #	APPR %
HEXANE	110-54-3	85-90%

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
EXTREMELY FLAMMABLE LIQUID AND VAPOR.
HARMFUL IF INHALED OR SWALLOWED.
MAY CAUSE DAMAGE TO KIDNEYS, NERVES, AND RESPIRATORY SYSTEM.
IRRITATING TO SKIN, EYES AND MUCOUS MEMBRANES.

APPEARANCE.....:
CLEAR, COLORLESS LIQUID,
CHARACTERISTIC ODOR

POTENTIAL HEALTH EFFECTS (ACUTE AND CHRONIC)

SYMPTOMS OF EXPOSURE:
TOXIC BY INGESTION AND INHALATION.
VAPOR INHALATION CAUSES IRRITATION OF NASAL AND RESPIRATORY PASSAGES, HEADACHE, DIZZINESS, NAUSEA, CENTRAL NERVOUS SYSTEM DEPRESSION.
N-HEXANE IS NEUROTOXIC. CHRONIC OVEREXPOSURE CAN CAUSE SEVERE NERVE DAMAGE. MAINLY RESPONSIBLE FOR THE (CHRONIC) TOXICITY IS THE METABOLITE 2,5-HEXANDION. IN HUMANS, THIS DIKETONE IS FORMED AS A MAIN METABOLITE, WHICH THE RAT MOSTLY METABOLIZES TO 2-HEXANOL. CONSEQUENTLY THE LD50 VALUE OF THE RAT WITH 28710 MG/KG IS NOT SUITABLE FOR THE TOXICITY IN HUMANS. IN THE RAT, A NEUROTOXIC EFFECT SHOWS UP ONLY ABOVE A CONCENTRATION OF 200 ML/CU.M., WHILE THE HUMAN ORGANISM CAN REACT WITH PLYNEUROPATIC SYMPTOMS AT 100 ML/CU.M.
CAUSES IRRITATION ON CONTACT WITH SKIN OR EYES.
MAY CAUSE DAMAGE TO KIDNEYS.

MEDICAL COND. AGGRAVATED BY EXPOSURE:
KIDNEY, RESPIRATORY AND CNS CONDITIONS

ROUTES OF ENTRY.....:
INHALATION, INGESTION OR SKIN CONTACT.

CARCINOGENICITY.....:
THE MATERIAL IS NOT LISTED (IARC, NTP, OSHA) AS CANCER CAUSING AGENT.
MAY CONTAIN TRACE AMOUNT OF BENZENE (SEE SECTION TWO).

4. FIRST AID MEASURES

EMERGENCY FIRST AID:
GET MEDICAL ASSISTANCE FOR ALL CASES OF OVEREXPOSURE.
SKIN: WASH THOROUGHLY WITH SOAP AND WATER.
EYES: IMMEDIATELY FLUSH THOROUGHLY WITH WATER FOR AT LEAST 15 MINUTES.
INHALATION: REMOVE TO FRESH AIR; GIVE ARTIFICIAL RESPIRATION IF BREATHING HAS STOPPED.
INGESTION: DO NOT INDUCE VOMITING; GET IMMEDIATE MEDICAL ATTENTION.

5. FIRE FIGHTING MEASURES

FLASH POINT (F).....: -7 F (CC)
FLAMMABLE LIMITS LEL (%).: 1.20
FLAMMABLE LIMITS UEL (%).: 7.50
EXTINGUISHING MEDIA.....:
CARBON DIOXIDE, DRY CHEMICAL, FOAM.

FIRE FIGHTING PROCEDURES.:
WEAR SELF-CONTAINED BREATHING APPARATUS.

FIRE & EXPLOSION HAZARDS.:
DANGEROUS FIRE AND EXPLOSIVE HAZARD.
VAPOR CAN TRAVEL DISTANCES TO IGNITION SOURCE AND FLASH BACK.

6. ACCIDENTAL RELEASE MEASURES

SPILL RESPONSE:
EVACUATE THE AREA OF ALL UNNECESSARY PERSONNEL.
WEAR SUITABLE PROTECTIVE EQUIPMENT LISTED UNDER EXPOSURE / PERSONAL PROTECTION.
ELIMINATE ANY IGNITION SOURCES UNTIL THE AREA IS DETERMINED TO BE FREE FROM EXPLOSION OR FIRE HAZARDS.
CONTAIN THE RELEASE AND ELIMINATE ITS SOURCE, IF THIS CAN BE DONE WITHOUT RISK.
TAKE UP AND CONTAINERIZE FOR PROPER DISPOSAL AS DESCRIBED UNDER DISPOSAL.
COMPLY WITH FEDERAL, STATE, AND LOCAL REGULATIONS ON REPORTING RELEASES. REFER TO REGULATORY INFORMATION FOR REPORTABLE QUANTITY AND OTHER REGULATORY DATA.
EM SCIENCE RECOMMENDS SPILL-X ABSORBENT AGENTS FOR VARIOUS TYPES OF SPILLS. ADDITIONAL INFORMATION ON THE SPILL-X PRODUCTS CAN BE PROVIDED THROUGH THE EM SCIENCE TECHNICAL SERVICE DEPARTMENT (609) 423-6300.
THE FOLLOWING EM SCIENCE SPILL-X ABSORBENT IS RECOMMENDED FOR THIS PRODUCT:

SX0863 SOLVENT SPILL TREATMENT KIT

7. HANDLING AND STORAGE

HANDLING & STORAGE:
KEEP CONTAINER CLOSED.
STORE IN A COOL AREA AWAY FROM IGNITION SOURCES AND OXIDIZERS.
DO NOT BREATHE VAPOR.
DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING.
ELECTRICALLY GROUND ALL EQUIPMENT WHEN HANDLING THIS PRODUCT.
RETAINED RESIDUE MAY MAKE EMPTY CONTAINERS HAZARDOUS; USE CAUTION!

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT:

VENTILATION, RESPIRATORY PROTECTION, PROTECTIVE CLOTHING, EYE PROTECTION
RESPIRATORY PROTECTION: IF WORKPLACE EXPOSURE LIMIT(S) OF PRODUCT

OR ANY COMPONENT IS EXCEEDED (SEE TLV/PEL), A NIOSH/MSHA APPROVED AIR SUPPLIED RESPIRATOR IS ADVISED IN ABSENCE OF PROPER ENVIRONMENTAL CONTROL. OSHA REGULATIONS ALSO PERMIT OTHER NIOSH/MSHA RESPIRATORS (NEGATIVE PRESSURE TYPE) UNDER SPECIFIED CONDITIONS (SEE YOUR SAFETY EQUIPMENT SUPPLIER). ENGINEERING AND/OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE EXPOSURE.
MATERIAL SHOULD BE HANDLED OR TRANSFERRED IN AN APPROVED FUME HOOD OR WITH ADEQUATE VENTILATION.
PROTECTIVE GLOVES SHOULD BE WORN TO PREVENT SKIN CONTACT (NITRILE OR EQUIVALENT)
SAFETY GLASSES WITH SIDE SHIELDS SHOULD BE WORN AT ALL TIMES.

WORK / HYGENIC PRACTICES:
WASH THOROUGHLY AFTER HANDLING.
DO NOT TAKE INTERNALLY.
EYE WASH AND SAFETY EQUIPMENT SHOULD BE READILY AVAILABLE.

EXPOSURE GUIDELINES

OSHA - PEL:

COMPONENT	TWA PPM	TWA MG/M3	STEL PPM	STEL MG/M3	CL PPM	CL MG/M3	SKIN
HEXANE	50	180					

ACGIH - TLV:

COMPONENT	TWA PPM	TWA MG/M3	STEL PPM	STEL MG/M3	CL PPM	CL MG/M3	SKIN
HEXANE	50	176					

9. PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT (C 760 MMHG).: 65C
MELTING POINT (C).....: -95C
SPECIFIC GRAVITY (H20 = 1).: 0.6603
VAPOR PRESSURE (MM HG).....: 125 20C
PERCENT VOLATILE BY VOL (%): 100%
VAPOR DENSITY (AIR = 1)....: 3.0
EVAPORATION RATE (BUAC = 1): 9.0
SOLUBILITY IN WATER (%)....: SLIGHT
APPEARANCE.....:
CLEAR, COLORLESS LIQUID,
CHARACTERISTIC ODOR

10. STABILITY AND REACTIVITY

STABILITY.....: YES

HAZARDOUS POLYMERIZATION:
DOES NOT OCCUR

HAZARDOUS DECOMPOSITION.:
COX

CONDITIONS TO AVOID.....:
HEAT; CONTACT WITH IGNITION SOURCES.

MATERIALS TO AVOID.....:
( ) WATER
( ) ACIDS
( ) BASES
( ) CORROSIVES
(X) OXIDIZERS
( ) OTHER :

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA:
IHL-HMN TCLO: 5000 PPM/10M
ORL-RAT LD50: 28710 MG/KG
(SEE SECTION 3 - SYMPTOMS OF EXPOSURE)

TOXICOLOGICAL FINDINGS:
TESTS ON LABORATORY ANIMALS INDICATE MATERIAL MAY PRODUCE ADVERSE
MUTAGENIC AND REPRODUCTIVE EFFECTS.
LISTED IN REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS)

12. DISPOSAL CONSIDERATIONS

EPA WASTE NUMBERS: D001
TREATMENT:
INCINERATION, FUELS BLENDING OR RECYCLE. CONTACT YOUR LOCAL
PERMITTED WASTE DISPOSAL SITE (TSD) FOR PERMISSIBLE TREATMENT
SITES.
ALWAYS CONTACT A PERMITTED WASTE DISPOSER (TSD) TO ASSURE
COMPLIANCE WITH ALL CURRENT LOCAL, STATE AND FEDERAL REGULATIONS.

13. TRANSPORT INFORMATION

DOT PROPER SHIPPING NAME...:
HEXANE

DOT ID NUMBER.....:

UN1209

14. REGULATORY INFORMATION

TSCA STATEMENT .....:
THE CAS NUMBER OF THIS PRODUCT IS LISTED ON THE TSCA INVENTORY.

COMPONENT	SARA EHS (302)	SARA EHS TPQ (LBS)	CERCLA RQ (LBS)
HEXANE			5000

COMPONENT	OSHA FLOOR LIST	SARA 313	DEMINIMIS FOR SARA 313 (%)
HEXANE	Y	Y	1.0

15. OTHER INFORMATION

COMMENTS:
NONE

NFPA HAZARD RATINGS:
HEALTH : 1
FLAMMABILITY : 3
REACTIVITY : 0
SPECIAL HAZARDS :

REVISION HISTORY:
05/01/83 09/26/86 06/03/87 08/28/87 10/27/87 01/27/88 11/29/88
04/26/89 06/28/89 05/11/90 03/01/91 01/25/94 03/03/95 09/07/95
11/20/95

| = REVISED SECTION
N/A = NOT AVAILABLE
N/E = NONE ESTABLISHED

THE STATEMENTS CONTAINED HEREIN ARE OFFERED FOR INFORMATIONAL PURPOSES ONLY AND ARE BASED UPON TECHNICAL DATA THAT EM SCIENCE BELIEVES TO BE ACCURATE. IT IS INTENDED FOR USE ONLY BY PERSONS HAVING THE NECESSARY TECHNICAL SKILL AND AT THEIR OWN DESCRETION AND RISK. SINCE CONDITIONS AND MANNER OF USE ARE OUTSIDE OUR CONTROL, WE MAKE NO WARRANTY, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS OR OTHERWISE.

"ISSUED BY VWR 05/23/97"

J.T.BAKER INC., 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: HYDROCHLORIC ACID
COMMON SYNONYMS: MURIATIC ACID; CHLOROHYDRIC ACID; HYDROGEN CHLORIDE, AQUEOUS
CHEMICAL FAMILY: INORGANIC ACIDS
FORMULA: HCL
FORMULA WT.: 36.46
CAS NO.: 7647-01-0
NIOSH/RTECS NO.: MW4025000
PRODUCT USE: LABORATORY REAGENT
PRODUCT CODES: 5537,5593,9548,9534,9543,9542,6900,9530,9537,9540,5800,9538 9535,9529,5814,5214,4800,5839,9536,9547,9546,9539,5367,9549 9544,5575

PRECAUTIONARY LABELING

BA[illegible]R SAF-T-DATA* SYSTEM

HEALTH	-	3	SEVERE (POISON)
FLAMMABILITY	-	0	NONE
REACTIVITY	-	2	MODERATE
CONTACT	-	3	SEVERE (CORROSIVE)

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

U.S. PRECAUTIONARY LABELING

POISON DANGER

CAUSES SEVERE BURNS. MAY BE FATAL IF SWALLOWED OR INHALED. DO NOT GET IN EYES, ON SKIN, ON CLOTHING. DO NOT BREATHE VAPOR. CAUSES DAMAGE TO RESPIRATORY SYSTEM (LUNGS), EYES AND SKIN. KEEP IN TIGHTLY CLOSED CONTAINER. LOOSEN CLOSURE CAUTIOUSLY. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF SPILL NEUTRALIZE WITH SODA ASH OR LIME AND PLACE IN DRY CONTAINER.

CONTINUED ON PAGE: 2

PRECAUTIONARY LABELING (CONTINUED)

INTERNATIONAL LABELING

RRITATING TO EYES AND SKIN.
EEP OUT OF REACH OF CHILDREN. IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY
ITH PLENTY OF WATER AND SEEK MEDICAL ADVICE.

SAF-T-DATA* STORAGE COLOR CODE: WHITE (CORROSIVE)

SECTION II - COMPONENTS

COMPONENT	CAS NO.	WEIGHT %	OSHA/PEL	ACGIH/TLV
HYDROCHLORIC ACID	7647-01-0	33-40	5 PPM	5 PPM
WATER	7732-18-5	60-67	N/E	N/E

SECTION III - PHYSICAL DATA

BOILING POINT: 149 C (300 F)
(AT 760 MM HG)

VAPOR PRESSURE (MMHG): N/A

MELTING POINT: -25 C (-13 F)
(AT 760 MM HG)

VAPOR DENSITY (AIR=1): 1.3

SPECIFIC GRAVITY: 1.18
(H2O=1)

EVAPORATION RATE: N/A

SOLUBILITY(H2O): COMPLETE (100%)

% VOLATILES BY VOLUME: 100
(21 C)

PH: 1.0 (0.1M SOLUTION)

ODOR THRESHOLD (P.P.M.): N/A

PHYSICAL STATE: LIQUID

COEFFICIENT WATER/OIL DISTRIBUTION: N/A

APPEARANCE & ODOR: CLEAR, COLORLESS FUMING LIQUID. PUNGENT ODOR.

CONTINUED ON PAGE: 3

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP): N/A NFPA 704M RATING: 3-0-0

AUTOIGNITION TEMPERATURE: N/A

FLAMMABLE LIMITS: UPPER - N/A LOWER - N/A

FIRE EXTINGUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL. DO NOT GET WATER INSIDE CONTAINERS.

UNUSUAL FIRE & EXPLOSION HAZARDS
MAY EMIT HYDROGEN GAS UPON CONTACT WITH METAL.

TOXIC GASES PRODUCED
HYDROGEN CHLORIDE, HYDROGEN

EXPLOSION DATA-SENSITIVITY TO MECHANICAL IMPACT
NONE IDENTIFIED.

EXPLOSION DATA-SENSITIVITY TO STATIC DISCHARGE
NONE IDENTIFIED.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 7 MG/M (5 PPM)

TLV (CEILING) IS FOR HYDROGEN CHLORIDE.

SHORT-TERM EXPOSURE LIMIT (STEL): NOT ESTABLISHED

PERMISSIBLE EXPOSURE LIMIT (PEL): 7 MG/M (5 PPM)

PEL (CEILING) IS FOR HYDROGEN CHLORIDE.

CONTINUED ON PAGE: 4

SECTION V - HEALTH HAZARD DATA (CONTINUED)

TOXICITY OF COMPONENTS

INTRAPERITONEAL MOUSE LD50 FOR HYDROCHLORIC ACID	40	MG/KG
ORAL RABBIT LD50 FOR HYDROCHLORIC ACID	900	MG/KG
INHALATION-1HR RAT LC50 FOR HYDROCHLORIC ACID	3124	PPM
INTRAPERITONEAL MOUSE LD50 FOR WATER	190	G/KG
INTRAVENOUS MOUSE LD50 FOR WATER	25	G/KG

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

CARCINOGENICITY
NONE IDENTIFIED.

REPRODUCTIVE EFFECTS
NONE IDENTIFIED.

EFFECTS OF OVEREXPOSURE

INHALATION: PULMONARY EDEMA, CIRCULATORY FAILURE, RESPIRATORY SYSTEM DAMAGE, COLLAPSE, COUGHING, DIFFICULT BREATHING

SKIN CONTACT: SEVERE BURNS

EYE CONTACT: SEVERE BURNS

SKIN ABSORPTION: NONE IDENTIFIED

INGESTION: IS HARMFUL AND MAY BE FATAL, SEVERE BURNS TO MOUTH, THROAT, AND STOMACH, NAUSEA, VOMITING

CHRONIC EFFECTS: MAY CAUSE TEETH DAMAGE

TARGET ORGANS
RESPIRATORY SYSTEM, EYES, SKIN

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

PRIMARY ROUTES OF ENTRY
INGESTION, INHALATION, SKIN CONTACT, EYE CONTACT

CONTINUED ON PAGE: 5

SECTION V - HEALTH HAZARD DATA (CONTINUED)

EMERGENCY AND FIRST AID PROCEDURES

INGESTION: CALL A PHYSICIAN. IF SWALLOWED, DO NOT INDUCE VOMITING. IF CONSCIOUS, GIVE WATER, MILK, OR MILK OF MAGNESIA.

INHALATION: IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

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 RE-USE.

EYE CONTACT: IN CASE OF EYE CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

SARA/TITLE III HAZARD CATEGORIES AND LISTS

[illegible]C[illegible]: YES CHRONIC: YES FLAMMABILITY: NO PRESSURE: NO REACTIVITY: NO

EXTREMELY HAZARDOUS SUBSTANCE:	YES	CONTAINS HYDROGEN CHLORIDE (RQ = 1 LB, TPQ = 500 LBS)
CERCLA HAZARDOUS SUBSTANCE:	YES	CONTAINS HYDROCHLORIC ACID (RQ = 5000 LBS)
SARA 313 TOXIC CHEMICALS:	YES	CONTAINS HYDROCHLORIC ACID
GENERIC CLASS:		GENERIC CLASS REMOVED FROM CFR: 7/1/91
TSCA INVENTORY:	YES	

SECTION VI - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, MOISTURE

INCOMPATIBLES: MOST COMMON METALS, WATER, AMINES, METAL OXIDES, ACETIC ANHYDRIDE, PROPIOLACTONE, VINYL ACETATE, MERCURIC SULFATE, CALCIUM PHOSPHIDE, FORMALDEHYDE, ALKALIES, CARBONATES, STRONG BASES, SULFURIC ACID, CHLOROSULFONIC ACID

DECOMPOSITION PRODUCTS: HYDROGEN CHLORIDE, HYDROGEN, CHLORINE

CONTINUED ON PAGE: 6

SECTION VII - SPILL & DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. VENTILATE AREA. NEUTRALIZE SPILL WITH SODA ASH OR LIME. WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

J. T. BAKER NEUTRASORB(R) OR TEAM(R) 'LOW NA+' ACID NEUTRALIZERS ARE FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: D002 (CORROSIVE WASTE)

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 100 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ACID CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, NEOPRENE GLOVES ARE RECOMMENDED.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA* STORAGE COLOR CODE: WHITE (CORROSIVE)

STORAGE REQUIREMENTS
KEEP CONTAINER TIGHTLY CLOSED. STORE IN CORROSION-PROOF AREA. ISOLATE FROM INCOMPATIBLE MATERIALS. DO NOT STORE NEAR OXIDIZING MATERIALS.

CONTINUED ON PAGE: 7

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME: HYDROCHLORIC ACID, SOLUTION
HAZARD CLASS: 8
UN/NA: UN1789 REPORTABLE QUANTITY: 5000 LBS. PACKAGING GROUP: II
LABELS: 8 CORROSIVE
REGULATORY REFERENCES: 49CFR 172.101

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME: HYDROCHLORIC ACID, SOLUTION
HAZARD CLASS: 8 I.M.O. PAGE: 8183
UN: UN1789 MARINE POLLUTANTS: NO PACKAGING GROUP: II
LABELS: CORROSIVE
REGULATORY REFERENCES: 49CFR PART 176; IMDG CODE

AIR (I.C.A.O.)

PROPER SHIPPING NAME: HYDROCHLORIC ACID, SOLUTION
HAZARD CLASS: 8
UN: UN1789 PACKAGING GROUP: II
LABELS: CORROSIVE
REGULATORY REFERENCES: 49CFR PART 175; ICAO=== WE BELIEVE THE TRANSPORTATION DATA AND REFERENCES CONTAINED HEREIN TO BE FACTUAL AND THE OPINION OF QUALIFIED EXPERTS. THE DATA IS MEANT AS A GUIDE TO THE OVERALL CLASSIFICATION OF THE PRODUCT AND IS NOT PACKAGE SIZE SPECIFIC, NOR SHOULD IT BE TAKEN AS A WARRANTY OR REPRESENTATION FOR WHICH THE COMPANY ASSUMES LEGAL RESPONSIBILITY.=== THE INFORMATION IS OFFERED SOLELY FOR YOUR CONSIDERATION, INVESTIGATION, AND VERIFICATION. ANY USE OF THE INFORMATION MUST BE DETERMINED BY THE USER TO BE IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE, AND LOCAL LAWS AND REGULATIONS. SEE SHIPPER REQUIREMENTS 49CFR 171.2, CERTIFICATION 172.204, AND EMPLOYEE TRAINING 49 CFR 173.1(B).

U.S. CUSTOMS HARMONIZATION NUMBER: 28061000000

CONTINUED ON PAGE: 8

NOTE: WHEN HANDLING LIQUID PRODUCTS, SECONDARY PROTECTIVE CONTAINERS MUST BE USED FOR CARRYING.
-N/A = NOT APPLICABLE, OR NOT AVAILABLE;
N/E = NOT ESTABLISHED.-
THE INFORMATION IN THIS MATERIAL SAFETY DATA SHEET MEETS THE REQUIREMENTS OF THE UNITED STATES OCCUPATIONAL SAFETY AND HEALTH ACT AND REGULATIONS PROMULGATED THEREUNDER (29 CFR 1910.1200 ET. SEQ.) AND THE CANADIAN WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM. THIS DOCUMENT IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF THE MATERIAL BY A PERSON TRAINED IN, OR SUPERVISED BY A PERSON TRAINED IN, CHEMICAL HANDLING. THE USER IS RESPONSIBLE FOR DETERMINING THE PRECAUTIONS AND DANGERS OF THIS CHEMICAL FOR HIS OR HER PARTICULAR APPLICATION. DEPENDING ON USAGE, PROTECTIVE CLOTHING INCLUDING EYE AND FACE GUARDS AND RESPIRATORS MUST BE USED TO AVOID CONTACT WITH MATERIAL OR BREATHING CHEMICAL VAPORS/FUMES.
EXPOSURE TO THIS PRODUCT MAY HAVE SERIOUS ADVERSE HEALTH EFFECTS. THIS CHEMICAL MAY INTERACT WITH OTHER SUBSTANCES. SINCE THE POTENTIAL USES ARE SO VARIED, BAKER CANNOT WARN OF ALL OF THE POTENTIAL DANGERS OF USE OR INTERACTION WITH OTHER CHEMICALS OR MATERIALS. BAKER WARRANTS THAT THE CHEMICAL MEETS THE SPECIFICATIONS SET FORTH ON THE LABEL.
B[illegible]R DISCLAIMS ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED WITH REGARD TO THE PRODUCT SUPPLIED HEREUNDER, ITS MERCHANTABILITY OR ITS FITNESS FOR A PARTICULAR PURPOSE.
THE USER SHOULD RECOGNIZE THAT THIS PRODUCT CAN CAUSE SEVERE INJURY AND EVEN DEATH, ESPECIALLY IF IMPROPERLY HANDLED OR THE KNOWN DANGERS OF USE ARE NOT HEEDED. READ ALL PRECAUTIONARY INFORMATION. AS NEW DOCUMENTED GENERAL SAFETY INFORMATION BECOMES AVAILABLE, BAKER WILL PERIODICALLY REVISE THIS MATERIAL SAFETY DATA SHEET.
NOTE: CHEMTREC, CANUTEC, AND NATIONAL RESPONSE CENTER EMERGENCY TELEPHONE NUMBERS ARE 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-JTBAKER) FOR ASSISTANCE.

COPYRIGHT 1994 J.T.BAKER INC.
® TRADEMARKS OF J.T.BAKER INC.

APPROVED BY QUALITY ASSURANCE DEPARTMENT.

--- LAST PAGE ---
"ISSUED BY VWR 05/23/97"

WARNER-LAMBERT -- HYDROGEN PEROXIDE TOPICAL SOLUTION, (USP) 3 - HYDROGEN PEROXIDE TOPICAL SOLU
MATERIAL SAFETY DATA SHEET
FSC: 6505
NIIN: 001538480
Manufacturer's CAGE: 82559
Part No. Indicator: A
Part Number/Trade Name: HYDROGEN PEROXIDE TOPICAL SOLUTION, (USP) 3

General Information

Item Name: HYDROGEN PEROXIDE TOPICAL SOLUTION, USP
Company's Name: WARNER-LAMBERT CO
Company's Street: 201 TABOR ROAD
Company's City: MORRIS PLAINS
Company's State: NJ
Company's Country: US
Company's Zip Code: 07950-2614
Company's Emerg Ph #: 201-540-2000
Company's Info Ph #: 201-540-2000
Record No. For Safety Entry: 009
Tot Safety Entries This Stk#: 009
Status: SE
Date MSDS Prepared: 17APR91
Safety Data Review Date: 13APR93
Supply Item Manager: CX
MSDS Preparer's Name: MITCH ROSALSKY
MSDS Serial Number: BQKMT
Specification Number: NONE
Spec Type, Grade, Class: NOT APPLICABLE
Hazard Characteristic Code: P2
Unit Of Issue: BT
Unit Of Issue Container Qty: 1 PINT
Type Of Container: BOTTLE
Net Unit Weight: 1.0 LBS

Ingredients/Identity Information

Proprietary: NO
Ingredient: HYDROGEN PEROXIDE (SARA III)
Ingredient Sequence Number: 01
Percent: 3
NIOSH (RTECS) Number: MX0900000
CAS Number: 7722-84-1
OSHA PEL: 1 PPM
ACGIH TLV: 1 PPM; 9293
Other Recommended Limit: NONE RECOMMENDED

Physical/Chemical Characteristics

Appearance And Odor: CLEAR, COLORLESS LIQUID. NO ODOR
Boiling Point: 212F,100C
Melting Point: 32.0F,0.0C
Vapor Pressure (MM Hg/70 F): 0.6
Vapor Density (Air=1): 1
Specific Gravity: 1.0
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: 1 WATER=1
Solubility In Water: COMPLETE
Percent Volatiles By Volume: 100
Viscosity: UNKNOWN
Corrosion Rate (IPY): UNKNOWN
Autoignition Temperature: NONE

Fire and Explosion Hazard Data

Flash Point: NONE
Lower Explosive Limit: NONE
Upper Explosive Limit: NONE
Extinguishing Media: USE WATER FOG, CARBON DIOXIDE, FOAM, OR DRY CHEMICAL.
Special Fire Fighting Proc: WEAR APPROVED SELF CONTAINED BREATHING APPARATUS.
Unusual Fire And Expl Hazrds: NONE

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HIGH HEAT
Materials To Avoid: STRONG OXIDIZING AGENTS
Hazardous Decomp Products: OXYGEN (PROMOTES BURNING)
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT APPLICABLE

Health Hazard Data

LD50-LC50 Mixture: LD50 (INH RAT) IS 2000 MG/M3/4H (90%)
Route Of Entry - Inhalation: NO
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: THE 3% HYDROGEN PEROXIDE SOLUTION MAY CAUSE MILD IRRITATION TO SKIN, EYES AND MUCOUS MEMBRANES.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: THIS PRODUCT IS NOT LISTED BY IARC, NTP, OR OSHA AS A CARCINOGEN.
Signs/Symptoms Of Overexp: THE 3% HYDROGEN PEROXIDE SOLUTION MAY CAUSE MILD IRRITATION TO SKIN, EYES AND MUCOUS MEMBRANES.
Med Cond Aggravated By Exp: NONE
Emergency/First Aid Proc: EYES: FLUSH WITH WATER FOR 15 MINUTES WHILE LIFTING EYELIDS. IF IRRITATION PERSISTS, GET MEDICAL ATTENTION. SKIN: WASH WITH SOAP AND WATER UNTIL FREE OF RESIDUE. INHALATION: REMOVE TO FRESH AIR. GET MEDICAL ATTENTION. INGESTION: DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: FOR SMALL SPILLS, FLUSH AREA WITH FLOODING AMOUNTS OF WATER TO DRAIN. IF NO DRAIN IS AVAILABLE, ABSORB ON NON-COMBUSTILBE MATERIAL; PLACE WASTE IN APPROPRIATE CONTAINER FOR LATER DISPOSAL.
Neutralizing Agent: NOT APPLICABLE.
Waste Disposal Method: DISPOSE IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS. INCINERATION IN A PERMITTED INCINERATOR IS THE PREFERRED DISPOSAL METHOD.
Precautions-Handling/Storing: STORE IN A COOL AREA. KEEP CONTAINERS TIGHTLY CLOSED WHEN NOT IN USE. PROTECT CONTAINERS FROM PHYSICAL DAMAGE. FOLLOW LABEL DIRECTIONS.
Other Precautions: MATERIAL SHOULD BE HANDLED IN SUCH A WAY AS TO AVOID SKIN/EYE CONTACT AND INHALATION OF VAPORS. USE HANDLING METHOD TO MINIMIZE VAPOR GENERATION. AVOID SPLASHES TO THE EYES.

Control Measures

Respiratory Protection: NOT NORMALLY REQUIRED.
Ventilation: NORMAL VENTILATION IS USUALLY SUFFICIENT.
Protective Gloves: NONE NORMALLY REQUIRED
Eye Protection: SAFETY GLASSES OR SPLASH GOGGLES
Other Protective Equipment: SAFETY SHOWER AND EYE WASH STATION
Work Hygienic Practices: SHOULD CONTACT OCCUR, WASH SKIN PROMPTLY. LAUNDER CLOTHING AND WASH PROTECTIVE EQUIPMENT BEFORE REUSE.
Suppl. Safety & Health Data: NONE

Transportation Data

Trans Data Review Date: 93103
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
Additional Trans Data: NONE

Disposal Data

Label Data

Label Required: NO
Technical Review Date: 13APR93
Label Status: Z

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

PRODUCT #: Z7759 NAME: ISOPROPYL ALCOHOL
MATERIAL SAFETY DATA SHEET, Valid 5/95 - 7/95
Printed Monday, June 19, 1995 3:29PM

Sigma Chemical Co.
P.O. Box 14508
St. Louis, MO 63178
Phone: 314-771-5765

Aldrich Chemical Co., Inc.
1001 West St. Paul
Milwaukee, WI 53233
Phone: 414-273-3850

Fluka Chemical Corp
980 South Second St
Ronkonkoma, NY 1177
Phone: 516-467-0980
Emergency Phone: 516-467-3535

SECTION 1. - - - - - - - - - - CHEMICAL IDENTIFICATION- - - - - - - - - - -

PRODUCT #: Z7759

NAME: ISOPROPYL ALCOHOL

SECTION 2. - - - - - COMPOSITION/INFORMATION ON INGREDIENTS - - - - - -

CAS #:67-63-0

SYNONYMS

ALCOOL ISOPROPILICO (ITALIAN) * ALCOOL ISOPROPYLIQUE (FRENCH) * ALCOJEL * ALCOSOLVE * AVANTIN * AVANTINE * CHROMAR * COMBI-SCHUTZ * DIMETHYLCARBINOL * HARTOSOL * 2-HYDROXYPROPANE * IMSOL A * ISOHOL * ISOPROPANOL (DOT) * ISO-PROPYLALKOHOL (GERMAN) * LUTOSOL * PETROHOL * PRO * PROPAN-2-OL * 2-PROPANOL * I-PROPANOL (GERMAN) * N-PROPAN-2-OL * PROPOL * SEC-PROPYL ALCOHOL * 2-PROPYL ALCOHOL * I-PROPYLALKOHOL (GERMAN) * SPECTRAR * STERISOL HAND DISINFECTANT * TAKINEOCOL * UN1219 (DOT) *

SECTION 3. - - - - - - - - - - HAZARDS IDENTIFICATION - - - - - - - - - -

LABEL PRECAUTIONARY STATEMENTS

FLAMMABLE (USA DEFINITION)
HIGHLY FLAMMABLE (EUROPEAN DEFINITION)
IRRITANT
IRRITATING TO EYES, RESPIRATORY SYSTEM AND SKIN.
RISK OF SERIOUS DAMAGE TO EYES.
TARGET ORGAN(S):
NERVES
KIDNEYS
KEEP AWAY FROM SOURCES OF IGNITION. NO SMOKING.
IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE.
WEAR SUITABLE PROTECTIVE CLOTHING.

SECTION 4. - - - - - - - - - - FIRST-AID MEASURES- - - - - - - - - - -

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES.
ASSURE ADEQUATE FLUSHING OF THE EYES BY SEPARATING THE EYELIDS WITH FINGERS.
IN CASE OF CONTACT, IMMEDIATELY WASH SKIN WITH SOAP AND COPIOUS AMOUNTS OF WATER.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IF SWALLOWED, WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS. CALL A PHYSICIAN.
REMOVE AND WASH CONTAMINATED CLOTHING PROMPTLY.

SECTION 5. - - - - - - - - - - FIRE FIGHTING MEASURES - - - - - - - - - - -

EXTINGUISHING MEDIA

CARBON DIOXIDE, DRY CHEMICAL POWDER OR APPROPRIATE FOAM.

SPECIAL FIREFIGHTING PROCEDURES

WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.
USE WATER SPRAY TO COOL FIRE-EXPOSED CONTAINERS.
FLAMMABLE LIQUID.

UNUSUAL FIRE AND EXPLOSIONS HAZARDS

VAPOR MAY TRAVEL CONSIDERABLE DISTANCE TO SOURCE OF IGNITION AND FLASH BACK.
CONTAINER EXPLOSION MAY OCCUR UNDER FIRE CONDITIONS.

SECTION 6. - - - - - - - - - ACCIDENTAL RELEASE MEASURES- - - - - - - - - -

SHUT OFF ALL SOURCES OF IGNITION.
EVACUATE AREA.
WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.
ABSORB ON SAND OR VERMICULITE AND PLACE IN CLOSED CONTAINERS FOR DISPOSAL.
USE NONSPARKING TOOLS.
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

SECTION 7. - - - - - - - - - - - HANDLING AND STORAGE- - - - - - - - - - - -

REFER TO SECTION 8.

SECTION 8. - - - - - - - EXPOSURE CONTROLS/PERSONAL PROTECTION- - - - - -

CHEMICAL SAFETY GOGGLES.
SAFETY SHOWER AND EYE BATH.
RUBBER GLOVES.
MECHANICAL EXHAUST REQUIRED.
NIOSH/MSHA-APPROVED RESPIRATOR.
DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
DO NOT BREATHE VAPOR.
WASH THOROUGHLY AFTER HANDLING.
SEVERE EYE IRRITANT.
KEEP TIGHTLY CLOSED.
KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME.
STORE IN A COOL DRY PLACE.

SECTION 9. - - - - - - - - PHYSICAL AND CHEMICAL PROPERTIES - - - - - - - -

APPEARANCE AND ODOR

COLORLESS LIQUID
BOILING POINT: 82.4 C
MELTING POINT: -89.5 C
FLASHPOINT 53 F
11C
AUTOIGNITION TEMPERATURE: 860 F 459C
UPPER EXPLOSION LEVEL: 12%
LOWER EXPLOSION LEVEL: 2.5%
VAPOR PRESSURE: 33MM 20 C 44MM 25 C
VAPOR DENSITY: 2.1
SOLUBILITY: WATER-SOLUBLE ETHANOL-SOLUBLE
ETHER -SOLUBLE
SPECIFIC GRAVITY: 0.785

SECTION 10. - - - - - - - - - -STABILITY AND REACTIVITY - - - - - - - - - -

INCOMPATIBILITIES
OXIDIZING AGENTS
ACIDS
ACID ANHYDRIDES
HALOGENS
ALUMINUM

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
TOXIC FUMES OF:
CARBON MONOXIDE, CARBON DIOXIDE

SECTION 11. - - - - - - - - - - TOXICOLOGICAL INFORMATION - - - - - - - - -

ACUTE EFFECTS
MAY BE HARMFUL BY INHALATION, INGESTION, OR SKIN ABSORPTION.
CAUSES SEVERE EYE IRRITATION.
CAUSES SKIN IRRITATION.
MATERIAL IS IRRITATING TO MUCOUS MEMBRANES AND UPPER
RESPIRATORY TRACT.
CAN CAUSE CNS DEPRESSION.
PROLONGED EXPOSURE CAN CAUSE:
NAUSEA, HEADACHE AND VOMITING
NARCOTIC EFFECT
PROLONGED OR REPEATED EXPOSURE TO SKIN CAUSES DEFATTING AND
DERMATITIS.

CHRONIC EFFECTS
TARGET ORGAN(S):
NERVES
KIDNEYS

RTECS NO: NT8050000
ISOPROPYL ALCOHOL (ACGIH,DOT,OSHA)

IRRITATION DATA

SKN-RBT 500 MG MLD	NTIS** AD-A106-944
EYE-RBT 100 MG SEV	AJOPAA 29,1363,46
EYE-RBT 10 MG MOD	TXAPA9 55,501,80
EYE-RBT 100 MG/24H MOD	85JCAE -,191,86

TOXICITY DATA

ORL-MAN LDLO:5272 MG/KG	AJCPAI 38,144,62
ORL-HMN LDLO:3570 MG/KG	34ZIAG -,339,69
UNR-MAN LDLO:2770 MG/KG	85DCAI 2,73,70
ORL-RAT LD50:5045 MG/KG	GISAAA 43(1),8,78
IHL-RAT LC50:16000 PPM/8H	NPIRI* 1,100,74
IPR-RAT LD50:2735 MG/KG	EVHPAZ 61,321,85
IVN-RAT LD50:1088 MG/KG	EVHPAZ 61,321,85
ORL-MUS LD50:3600 MG/KG	GISAAA 43(1),8,78
IPR-MUS LD50:4477 MG/KG	EVHPAZ 61,321,85
IVN-MUS LD50:1509 MG/KG	EVHPAZ 61,321,85
ORL-RBT LD50:6410 MG/KG	FAONAU 48A,114,70
SKN-RBT LD50:12800 MG/KG	NPIRI* 1,100,74
IPR-RBT LD50:667 MG/KG	EVHPAZ 61,321,85
IVN-RBT LD50:1184 MG/KG	EVHPAZ 61,321,85
IPR-GPG LD50:2560 MG/KG	EVHPAZ 61,321,85
IPR-HAM LD50:3444 MG/KG	EVHPAZ 61,321,85

TARGET ORGAN DATA

BEHAVIORAL (HALLUCINATIONS, DISTORTED PERCEPTIONS)
CARDIAC (PULSE RATE DECREASED WITH FALL IN BP)
VASCULAR (BP LOWERING NOT CHARACTERIZED IN AUTONOMIC SECTION)
GASTROINTESTINAL (NAUSEA OR VOMITING)
EFFECTS ON EMBRYO OR FETUS (FETAL DEATH)
ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION.

SECTION 12. - - - - - - - - - - ECOLOGICAL INFORMATION - - - - - - - - - - -

DATA NOT YET AVAILABLE.

SECTION 13. - - - - - - - - - - DISPOSAL CONSIDERATIONS - - - - - - - - - -

BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER BUT EXERT EXTRA CARE IN IGNITING AS THIS MATERIAL IS HIGHLY FLAMMABLE.

OBSERVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.

SECTION 14. - - - - - - - - - - - TRANSPORT INFORMATION - - - - - - - - - -

CONTACT SIGMA CHEMICAL COMPANY FOR TRANSPORTATION INFORMATION.

SECTION 15. - - - - - - - - - - REGULATORY INFORMATION - - - - - - - - - - -

REVIEWS, STANDARDS, AND REGULATIONS

ACGIH TLV-TWA 400 PPM; STEL 500 PPM	85INA8 6,828,91
IARC CANCER REVIEW:ANIMAL INADEQUATE EVIDENCE	IMEMDT 15,223,77

IARC CANCER REVIEW:HUMAN INADEQUATE EVIDENCE IMSUDL 7,229,87
IARC CANCER REVIEW:GROUP 3 IMSUDL 7,229,87
EPA FIFRA 1988 PESTICIDE SUBJECT TO REGISTRATION OR RE-REGISTRATION
FEREAC 54,7740,89
MSHA STANDARD-AIR:TWA 400 PPM (980 MG/M3)
DTLVS* 3,141,71
OSHA PEL (GEN INDU):8H TWA 400 PPM (980 MG/M3)
CFRGBR 29,1910.1000,93
OSHA PEL (CONSTRUC):8H TWA 400 PPM (980 MG/M3)
CFRGBR 29,1926.55,94
OSHA PEL (SHIPYARD):8H TWA 400 PPM (980 MG/M3)
CFRGBR 29,1915.1000,93
OSHA PEL (FED CONT):8H TWA 400 PPM (980 MG/M3)
CFRGBR 41,50-204.50,94
OEL-AUSTRALIA:TWA 400 PPM (980 MG/M3);STEL 500 PPM (1225 MG/M3) JAN93
OEL-BELGIUM:TWA 400 PPM (985 MG/M3);STEL 500 PPM (1230 MG/M3) JAN93
OEL-DENMARK:TWA 200 PPM (490 MG/M3);SKIN JAN93
OEL-FRANCE:STEL 400 PPM (980 MG/M3) JAN93
OEL-GERMANY:TWA 400 PPM (980 MG/M3) JAN93
OEL-JAPAN:STEL 400 PPM (980 MG/M3) JAN93
OEL-THE NETHERLANDS:TWA 400 PPM (980 MG/M3);SKIN JAN93
OEL-THE PHILIPPINES:TWA 400 PPM (980 MG/M3) JAN93
OEL-RUSSIA:STEL 400 PPM (10 MG/M3) JAN93
OEL-SWEDEN:TWA 150 PPM (350 MG/M3);STEL 250 PPM (600 MG/M3) JAN93
OEL-SWITZERLAND:TWA 400 PPM (980 MG/M3);STEL 800 PPM JAN93
OEL-TURKEY:TWA 200 PPM (500 MG/M3) JAN93
OEL-UNITED KINGDOM:TWA 400 PPM (980 MG/M3);STEL 500 PPM;SKIN JAN93
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA CHECK ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM CHECK ACGIH TLV
NIOSH REL TO ISOPROPYL ALCOHOL-AIR:10H TWA 400 PPM;STEL 500 PPM
NIOSH* DHHS #92-100,92
NOHS 1974: HZD 40987; NIS 465; TNF 213605; NOS 252; TNE 3183554
NOES 1983: HZD 40987; NIS 442; TNF 166327; NOS 270; TNE 4290990; TFE
1954610
EPA GENETOX PROGRAM 1988, NEGATIVE: CELL TRANSFORM.-SA7/SHE; N
CRASSA-ANEUPLOIDY
EPA TSCA CHEMICAL INVENTORY, JUNE 1993
EPA TSCA SECTION 8(E) STATUS REPORT 8EHQ-1180-0371
EPA TSCA SECTION 8(E) STATUS REPORT 8EHQ-0985-0566
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JULY 1994
NIOSH ANALYTICAL METHOD, 1994: ALCOHOLS I, 1400

SECTION 16. - - - - - - - - - - - OTHER INFORMATION- - - - - - - - - - - -

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO

BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. SIGMA, ALDRICH, FLUKA SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.

COPYRIGHT 1995 SIGMA CHEMICAL CO., ALDRICH CHEMICAL CO., INC., FLUKA CHEMIE AG
LICENSE GRANTED TO MAKE UNLIMITED PAPER COPIES FOR INTERNAL USE ONLY

MATERIAL SAFETY DATA SHEET

Section I

Suppliers Name Noco Energy — Emergency Phone Number 1-800-542-5563

Address 13613 Main St. Alden N.Y.

Chemical Name *Liquefied Petroleum Gas or Propane* — CAS Registry No. *74-98-6*

Chemical Family *Hydrocarbon* — Formula C_3H_8

Section II — **HAZARDOUS INGREDIENTS**

Hazardous Mixtures *Air with 2.15 to 9.60 percent propane*

Section III — **PHYSICAL DATA**

Boiling Point *−44°F* Specific Gravity (H_2O = 1) *0.51* Vapor Pressure (mm HG) at 100°F *9825* Percent, Volatile by Volume (%) *100* Vapor Density (Air = 1) *1.52* Evaporative Rate *None* Solubility in Water *Slightly* Appearance and Odor *Clear—unpleasant odor (caused by odorant)**

Section IV — **FIRE AND EXPLOSION HAZARD DATA**

Flammable Limits — LEL *2.15* UEL *9.60*

Flash Point *N/A* Classification *Flammable Gas UN 1075*

Extinguishing Media *Water Spray: Class A-B-C or BC Fire Extinguishers*

Special Fire Fighting Procedures *Stop flow of gas. Use water to keep fire-exposed containers cool. Use water spray to disperse unignited gas or vapor. If ignition has occurred and no water available, tank metal may weaken from overheating. Evacuate area. If gas has not ignited, LP-gas liquid or vapor may be dispersed by water spray or flooding.*

Section V — **HEALTH HAZARD**

Threshold Limit Value *1,000 PPM (Simple Asphyxiant)* OSHA Permissible Exposure Limit *1,000 PPM* Effects of Overexposure *Inhalation—concentration can lead to symptoms ranging from dizziness to anesthesia and respiratory arrest. Eyes—moderate irritation.* Emergency & First Aid Procedures *Inhalation—Remove to fresh air. Guard against self-injury. Apply artificial respiration if breathing has stopped.*

Section VI — **REACTIVITY DATA**

Stable *X* Unstable ____ Hazardous Decomposition Products *None*

Incompatability (materials to avoid) *Mixing with oxygen or air, except at burner*

Hazardous Polymerization: May occur ____ Will not occur *X*

Section VII — **SPILL OR LEAK PROCEDURES**

Steps to be taken in case material is released: *Keep public away. Shut off supply of gas. Eliminate sources of ignition. Ventilate the area. Disperse with water spray. Contact between skin and these gases in liquid form can cause freezing of tissue causing injury similar to thermal burn.* Waste Disposal Method *Controlled burning. Contact supplier.*

Section VIII — **SPECIAL PROTECTION INFORMATION**

Respiratory Protection *Stay out of gas or vapor (because of fire hazard).*

Ventilation *Explosion-proof motors and keep sources of ignition at safe distances.*

Personal Protective Equipment and Apparel *Gloves resistant to the actions of LP-gases, goggles for protection against accidental release of pressurized products.*

Section IX — **SPECIAL PRECAUTIONS**

Precautions to be taken when handling and storing *Keep containers away from heat sources and store in upright position. Containers should not be dropped. Keep container valve closed when not in use.*

Other Precaution *Install protective caps* when not connected for use.

Section X — **TOXICOLOGICAL INFORMATION**

OSHA Carcinogen Classification (29 CFR 1910) — Not listed/applicable *X*

Category I Carcinogen ____ — Category II Carcinogen ____

Listed as Possible Category I ____ — Listed as Possible Category II ____

Section XI — **DOT LABELING INFORMATION (49 CFR 100-199)**

Proper Shipping Name *Liquefied Petroleum Gas* Hazardous Classification *Flammable Gas*

Identification No. *UN 1075* Label(s) Required *Flammable, Class 2*

Date of Preparation or Last Change: 11-20-97

*For use with unodorized gas, remove these words: "UNPLEASANT ODOR (CAUSED BY ODORANT)

PRODUCT #: 258113 NAME: NITRIC ACID
MATERIAL SAFETY DATA SHEET, Valid 5/95 - 7/95
Printed Monday, June 19, 1995 3:28PM

Sigma Chemical Co.
P.O. Box 14508
St. Louis, MO 63178
Phone: 314-771-5765

Aldrich Chemical Co., Inc.
1001 West St. Paul
Milwaukee, WI 53233
Phone: 414-273-3850

Fluka Chemical Corp
980 South Second St
Ronkonkoma, NY 1177
Phone: 516-467-0980
Emergency Phone: 516-467-3535

SECTION 1. - - - - - - - - - - CHEMICAL IDENTIFICATION- - - - - - - - - -

STOCK #:25811-3
PRODUCT #: N9271
NAME: NITRIC ACID

SECTION 2. - - - - - COMPOSITION/INFORMATION ON INGREDIENTS - - - - - -

CAS #:7697-37-2

SYNONYMS

ACIDE NITRIQUE (FRENCH) * ACIDO NITRICO (ITALIAN) * AQUA FORTIS * AZOTIC ACID * AZOTOWY KWAS (POLISH) * HYDROGEN NITRATE * KYSELINA DUSICNE (CZECH) * NITRIC ACID OTHER THAN RED FUMING WITH >70% NITRIC ACID (DOT) * NITRIC ACID OTHER THAN RED FUMING WITH NOT >70% NITRIC ACID (DOT) * SALPETERSAURE (GERMAN) * SALPETERZUUROPLOSSINGEN (DUTCH) * UN2031 (DOT) *

SECTION 3. - - - - - - - - - - HAZARDS IDENTIFICATION - - - - - - - - -

LABEL PRECAUTIONARY STATEMENTS

OXIDIZING
HIGHLY TOXIC (USA DEFINITION)
TOXIC (EUROPEAN DEFINITION)
CONTACT WITH COMBUSTIBLE MATERIAL MAY CAUSE FIRE.
TOXIC BY INHALATION, IN CONTACT WITH SKIN AND IF SWALLOWED.
CAUSES BURNS.
REACTS VIOLENTLY WITH WATER.
KEEP AWAY FROM COMBUSTIBLE MATERIAL.
IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE.
TAKE OFF IMMEDIATELY ALL CONTAMINATED CLOTHING.
WEAR SUITABLE PROTECTIVE CLOTHING, GLOVES AND EYE/FACE PROTECTION.

SECTION 4. - - - - - - - - - - FIRST-AID MEASURES- - - - - - - - - - -

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.
ASSURE ADEQUATE FLUSHING OF THE EYES BY SEPARATING THE EYELIDS WITH FINGERS.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL

RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IF SWALLOWED, WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS.
CALL A PHYSICIAN IMMEDIATELY.
DISCARD CONTAMINATED CLOTHING AND SHOES.

SECTION 5. - - - - - - - - - - FIRE FIGHTING MEASURES - - - - - - - - - - -

EXTINGUISHING MEDIA

NONCOMBUSTIBLE.
USE EXTINGUISHING MEDIA APPROPRIATE TO SURROUNDING FIRE CONDITIONS.
DO NOT USE WATER.

SPECIAL FIREFIGHTING PROCEDURES

WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.
REACTS VIOLENTLY WITH WATER.

UNUSUAL FIRE AND EXPLOSIONS HAZARDS

STRONG OXIDIZER.
CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE.
VIGOROUSLY SUPPORTS COMBUSTION.
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

SECTION 6. - - - - - - - - - ACCIDENTAL RELEASE MEASURES- - - - - - - - -

WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.
ABSORB ON SAND OR VERMICULITE AND PLACE IN CLOSED CONTAINERS FOR DISPOSAL.
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

SECTION 7. - - - - - - - - - - - HANDLING AND STORAGE- - - - - - - - - - -

REFER TO SECTION 8.

SECTION 8. - - - - - - - EXPOSURE CONTROLS/PERSONAL PROTECTION- - - - - -

CHEMICAL SAFETY GOGGLES.
SAFETY SHOWER AND EYE BATH.
RUBBER APRON.
NIOSH/MSHA-APPROVED RESPIRATOR.
WEAR HEAVY RUBBER GLOVES.
MECHANICAL EXHAUST REQUIRED.
FACESHIELD (8-INCH MINIMUM).
AVOID CONTACT AND INHALATION.
AVOID PROLONGED OR REPEATED EXPOSURE.
WASH THOROUGHLY AFTER HANDLING.
POISON
CORROSIVE.
KEEP TIGHTLY CLOSED.
DO NOT STORE NEAR, NOR ALLOW CONTACT WITH, CLOTHING AND OTHER COMBUSTIBLE MATERIAL.
PROTECT FROM LIGHT.

DO NOT ALLOW CONTACT WITH WATER.
STORE IN A COOL DRY PLACE.

SECTION 9. - - - - - - - PHYSICAL AND CHEMICAL PROPERTIES - - - - - - -

APPEARANCE AND ODOR
LIQUID.
FLASHPOINT NONE
VAPOR PRESSURE: 8MM 20 C
VAPOR DENSITY: 1
SPECIFIC GRAVITY: 1.400

SECTION 10. - - - - - - - - - -STABILITY AND REACTIVITY - - - - - - - - - -

INCOMPATIBILITIES
BASES
REDUCING AGENTS
ALCOHOLS
ALKALI METALS
BRASS
FINELY POWDERED METALS
COPPER, COPPER ALLOYS
GALVANIZED IRON
ALUMINUM
CORRODES STEEL
ORGANIC MATERIALS
AMINES
MAY DISCOLOR ON EXPOSURE TO LIGHT.
REACTS VIOLENTLY WITH:
WATER

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
TOXIC FUMES OF:
NITROGEN OXIDES

SECTION 11. - - - - - - - - - - TOXICOLOGICAL INFORMATION - - - - - - - -

ACUTE EFFECTS
MAY BE FATAL IF INHALED, SWALLOWED, OR ABSORBED THROUGH SKIN.
CAUSES BURNS.
MATERIAL IS EXTREMELY DESTRUCTIVE TO TISSUE OF THE MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT, EYES AND SKIN.
INHALATION MAY BE FATAL AS A RESULT OF SPASM, INFLAMMATION AND EDEMA OF THE LARYNX AND BRONCHI, CHEMICAL PNEUMONITIS AND PULMONARY EDEMA.
SYMPTOMS OF EXPOSURE MAY INCLUDE BURNING SENSATION, COUGHING, WHEEZING, LARYNGITIS, SHORTNESS OF BREATH, HEADACHE, NAUSEA AND VOMITING.

RTECS NO: QU5775000
NITRIC ACID (ACGIH,OSHA)

TOXICITY DATA

ORL-HMN LDLO:430 MG/KG YAKUD5 22,651,80
UNR-MAN LDLO:110 MG/KG 85DCAI 2,73,70
ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION.

SECTION 12. - - - - - - - - - - ECOLOGICAL INFORMATION - - - - - - - - - - -

DATA NOT YET AVAILABLE.

SECTION 13. - - - - - - - - - - DISPOSAL CONSIDERATIONS - - - - - - - - - -

FOR SMALL QUANTITIES: CAUTIOUSLY ADD TO A LARGE STIRRED EXCESS OF WATER. ADJUST THE PH TO NEUTRAL, SEPARATE ANY INSOLUBLE SOLIDS OR LIQUIDS AND PACKAGE THEM FOR HAZARDOUS-WASTE DISPOSAL. FLUSH THE AQUEOUS SOLUTION DOWN THE DRAIN WITH PLENTY OF WATER. THE HYDROLYSIS AND NEUTRALIZATION REACTIONS MAY GENERATE HEAT AND FUMES WHICH CAN BE CONTROLLED BY THE RATE OF ADDITION.

OBSERVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.

SECTION 14. - - - - - - - - - - - TRANSPORT INFORMATION - - - - - - - - - -

CONTACT SIGMA CHEMICAL COMPANY FOR TRANSPORTATION INFORMATION.

SECTION 15. - - - - - - - - - - REGULATORY INFORMATION - - - - - - - - - - -

REVIEWS, STANDARDS, AND REGULATIONS

ACGIH TLV-TWA 2 PPM; STEL 4 PPM 85INA8 6,1088,91
MSHA STANDARD-AIR:TWA 2 PPM (5 MG/M3)
DTLVS* 3,181,71
OSHA PEL (GEN INDU):8H TWA 2 PPM (5 MG/M3)
CFRGBR 29,1910.1000,93
OSHA PEL (CONSTRUC):8H TWA 2 PPM (5 MG/M3)
CFRGBR 29,1926.55,94
OSHA PEL (SHIPYARD):8H TWA 2 PPM (5 MG/M3)
CFRGBR 29,1915.1000,93
OSHA PEL (FED CONT):8H TWA 2 PPM (5 MG/M3)
CFRGBR 41,50-204.50,94
OEL-ARAB REPUBLIC OF EGYPT:TWA 2 PPM (5 MG/M3) JAN93
OEL-AUSTRALIA:TWA 2 PPM (5 MG/M3);STEL 4 PPM (10 MG/M3) JAN93
OEL-BELGIUM:TWA 2 PPM (5.2 MG/M3);STEL 4 PPM (10 MG/M3) JAN93
OEL-CZECHOSLOVAKIA:TWA 2.5 MG/M3;STEL 5 MG/M3 JAN93
OEL-DENMARK:TWA 2 PPM (5 MG/M3) JAN93
OEL-FINLAND:TWA 2 PPM (5 MG/M3);STEL 5 PPM (13 MG/M3);SKIN JAN93
OEL-FRANCE:TWA 2 PPM (5 MG/M3);STEL 4 PPM (10 MG/M3) JAN93
OEL-GERMANY:TWA 10 PPM (25 MG/M3) JAN93
OEL-HUNGARY:STEL 5 MG/M3 JAN93
OEL-JAPAN:TWA 2 PPM (5.2 MG/M3) JAN93
OEL-THE PHILIPPINES:TWA 2 PPM (5 MG/M3) JAN93
OEL-POLAND:TWA 10 MG/M3 JAN93
OEL-RUSSIA:TWA 2 PPM;STEL 2 MG/M3;SKIN JAN93

OEL-SWEDEN:TWA 2 PPM (5 MG/M3);STEL 5 PPM (13 MG/M3) JAN93
OEL-SWITZERLAND:TWA 2 PPM (5 MG/M3);STEL 4 PPM (10 MG/M3) JAN93
OEL-THAILAND:TWA 2 PPM (5 MG/M3) JAN93
OEL-TURKEY:TWA 2 PPM (5 MG/M3) JAN93
OEL-UNITED KINGDOM:TWA 2 PPM (5 MG/M3);STEL 4 PPM (10 MG/M3) JAN93
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA CHECK ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM CHECK ACGIH TLV
NIOSH REL TO NITRIC ACID-AIR:10H TWA 2 PPM;STEL 4 PPM
NIOSH* DHHS #92-100,92
NOHS 1974: HZD 50742; NIS 197; TNF 18088; NOS 101; TNE 132401
NOES 1983: HZD 50742; NIS 196; TNF 17714; NOS 117; TNE 285885; TFE 74869
EPA GENETOX PROGRAM 1988, NEGATIVE: CELL TRANSFORM.-SA7/SHE
EPA TSCA CHEMICAL INVENTORY, JUNE 1993
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JULY 1994
NIOSH ANALYTICAL METHOD, 1994: ACIDS, INORGANIC, 7903
OSHA ANALYTICAL METHOD #ID-127
THIS PRODUCT IS SUBJECT TO SARA SECTION 313 REPORTING REQUIREMENTS.

SECTION 16. - - - - - - - - - - - OTHER INFORMATION- - - - - - - - - - - -

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. SIGMA, ALDRICH, FLUKA SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.

COPYRIGHT 1995 SIGMA CHEMICAL CO., ALDRICH CHEMICAL CO., INC., FLUKA CHEMIE AG
LICENSE GRANTED TO MAKE UNLIMITED PAPER COPIES FOR INTERNAL USE ONLY

ORION MATERIAL SAFETY DATA SHEET

a subsidiary of Thermedics Inc.
a Thermo Electron Company

Orion Research, Inc.
500 Cummings Center
Beverly, MA 01915-6199 USA
Telephone 978-922-4400

I. PRODUCT IDENTIFICATION

Product Name: pH 4.01 Buffer	**Catalog No.** 910104, 910460, 9104CB	**Effective Date** 10/15/96
Hazardous Shipment Labeling: DOT NA	IATA NA	
Prepared By	**Title** Quality Assurance Chemist	
Approved By	**Title** Director Regulatory Matters	

II. HAZARDOUS INGREDIENTS (IDENTIFY INFORMATION)

Hazardous Components * Specific Chemical Identity: Common Name(s)	CAS NO.	%	OSHA PEL	ACGIH TLV	LD_{50} mg/Kg
Potassium Hydrogen Phthalate (KHP)	877-24-7	1	None	None	*NA
Amaranth Red Dye ($C_{20}H_{11}N_2Na_3O_{10}S_3$)	915-67-3	<0.01	None	None	1,000 (IPR-MUS)
**Deionized Water (H_2O)	7732-18-5	99	NA	NA	190,000 (IPR-MUS)

III. PHYSICAL DATA

Boiling Point 750mm Hg 100°C	**Freezing Point** 0°C
Specific Gravity (H_2O=1) 1.0	**Vapor Pressure @** NA
pH @ 25 °C 4.01	**Solubility In Water, % by Wt @** Miscible
Volatiles % By Wt. NA	**Evaporation Rate (BUTYL, ACETATE = 1)** NA
Vapor Density (AIR = 1) NA	
Appearance and Odor Light red, odorless liquid	

IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point (Test Method) Not flammable	**Autoignition Temperature** NA
Flammable Limits in air, % by volume:	Lower NA / Upper NA
Extinguishing Media Water, CO_2 Dry chemical, foam or spray	
Special Fire-Fighting Procedures None, non-flammable	
Unusual Fire and Explosion Hazards None	

*Chemicals which are not classified as hazardous per U.S. OSHA guidelines (29CFR Parts 1915.2 or 1916.2) or the Massachusetts Substance List (105CMR670.000 Appendix A) will not necessarily be listed on this form even though one or more may be a constituent of this product
* NA Not available/not applicable
** Non-hazardous component

Liability is expressly disclaimed for any loss or injury arising out of the use of this information or the use of any materials designated. Safe use of the materials is the responsibility of the user.

Document No. 205487-001
Rev. G

Printed in U.S.A.
Form MSDS/1192

ORION MATERIAL SAFETY DATA SHEET

a subsidiary of Thermedics Inc.
a Thermo Electron Company

PRODUCT NAME: pH 4.01 Buffer **Catalog No.: 910104, 910460, 9104CB**

V. REACTIVITY DATA

Stability: Unstable	Stable X	**Conditions to Avoid** None
Incompatibility (Materials to avoid) HNO_3		
Hazardous Decomposition Products None		
Hazardous Polymerization: May Occur	Will Not Occur X	**Condition to Avoid** None

VI. HEALTH HAZARD DATA

Route(s) Of Entry:	**Inhalation?** No	**Skin?** Yes	**Ingestion?** Yes
Health Hazards (acute and chronic) Acute - low hazard because of low concentration of salts. Chronic possible skin irritant for prolonged exposure.			
Carcinogenicity:	**NTP?** Amaranth Red is suspected	**IARC Monographs? ***** (animal positive)***	**OSHA Regulated?** Not found
Signs and Symptoms of Exposure Skin irritation			
Medical Conditions Generally Aggravated by Exposure	Could aggravate diseases of the skin.		
Emergency And First Aid Procedures Wash off contact area with water. If ingested, give large amounts of water. Contact physician.			

VII. PRECAUTIONS (SAFE HANDLING AND USE)

Steps To be Taken In Case Material Is Released or Spilled
Wash down drain with excess water if local law allows.

Waste Disposal Method
Consult with and observe all Federal, State and Local laws when disposing of this product.

Precautions To Be Taken In Handling and Storing
Suitable for any general handling and storage. NFPA Rating: Scale (0-4); Health - 1, Fire - 0, Reactivity - 1, Specific - None.

Other Precautions
This product is not regulated under SARA TITLE III. Not affected by Cal. Prop. 65. Components are listed in the EPA TSCA inventory.

VIII. CONTROL MEASURES

Respiratory Protection (specify type) None			
Ventilation	**Local Exhaust** None	**Special** None	
Ventilation	**Mechanical (General)** None	**Other** None	
Protective Gloves	Yes	**Eye Protection**	Safety Glasses
Other Protective Clothing Or Equipment Lab Coat			
Work/Hygienic Practices No eating or drinking while working with this product.			

Date: 6/22/1998 15:59:31
Sender: Orion Research (888) 742-9466
Destination: 927-3932

ORION

Orion Research, Incorporated
500 CUMMINGS CENTER, BEVERLY, MA 01915 USA
a subsidiary of Thermedics Inc.
a Thermo Electron company

You have just received important information from the

New Orion Research Fax on Demand System

1 - (888) - PHAX - ION
1 - (888) - 742-9466

Let us know what *you* want on – line !!

Technical/Customer Service 1- (800) – 225 – 1480

Domestic E - Mail domcs1 @ orionres.com
International E - Mail intcs1@ orionres.com

Don't forget to check out the Orion WebSite!

WWW:http:// www.Orionres.com

MATERIAL SAFETY DATA SHEET

EM SCIENCE

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER.....:

EM SCIENCE
A DIVISION OF EM INDUSTRIES
P.O. BOX 70
480 DEMOCRAT RD.
GIBBSTOWN, N.J. 08027

PREPARATION DATE.: 12/09/92
DATE MSDS PRINTED.: DEC 21, 1992

INFORMATION PHONE NUMBER.: 609-354-9200
HOURS: MON. TO FRI. 8:30-5
CHEMTREC EMERGENCY NUMBER: 800-424-9300
HOURS: 24 HRS A DAY

CATALOG NUMBER(S):
5043 5044 PX1503 PX1505 PX1507 PX1508
PX1510 PX1512

CHEMICAL NAME....:
POTASSIUM IODIDE
TRADE NAME.....:
NONE
CHEMICAL FAMILY..: INORGANIC SALT
FORMULA.....: 1000 PPM BA IN SOLUTION

MOLECULAR WEIGHT.: 166.01

2. COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENT	CAS #	APPR %
POTASSIUM IODIDE	7681-11-0	100%

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
MAY BE HARMFUL IF SWALLOWED.
MAY BE IRRITATING TO SKIN, EYES AND MUCOUS MEMBRANES.

APPEARANCE.....:
COLORLESS, ODORLESS CRYSTALS OR GRANULES

POTENTIAL HEALTH EFFECTS (ACUTE AND CHRONIC)

SYMPTOMS OF EXPOSURE:
MAY BE HARMFUL IF SWALLOWED.

MAY BE IRRITATING ON CONTACT WITH EYES OR PROLONGED CONTACT WITH SKIN.

MEDICAL COND. AGGRAVATED BY EXPOSURE:
DATA NOT AVAILABLE.

ROUTES OF ENTRY.....:
INHALATION, INGESTION

CARCINOGENICITY.....:
THE MATERIAL IS NOT LISTED (IARC, NTP, OSHA) AS CANCER CAUSING AGENT.

4. FIRST AID MEASURES

EMERGENCY FIRST AID:
GET MEDICAL ASSISTANCE FOR ALL CASES OF OVEREXPOSURE.
SKIN: WASH THOROUGHLY WITH SOAP AND WATER.
EYES: IMMEDIATELY FLUSH THOROUGHLY WITH WATER FOR AT LEAST 15 MINUTES.
INHALATION: REMOVE TO FRESH AIR; GIVE ARTIFICIAL RESPIRATION IF BREATHING HAS STOPPED.
INGESTION: IF CONSCIOUS, DRINK WATER AND INDUCE VOMITING IMMEDIATELY AS DIRECTED BY MEDICAL PERSONNEL. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

5. FIRE FIGHTING MEASURES

FLASH POINT (F).....: NONCOMBUSTIBLE
FLAMMABLE LIMITS LEL (%).: N/A
FLAMMABLE LIMITS UEL (%).: N/A
EXTINGUISHING MEDIA.....:
USE ANY SUITABLE FOR ADJACENT MATERIAL.

FIRE FIGHTING PROCEDURES.:
WEAR SELF-CONTAINED BREATHING APPARATUS.

FIRE & EXPLOSION HAZARDS.:
THERMAL DECOMPOSITION PRODUCES HIGHLY TOXIC FUMES.

6. ACCIDENTAL RELEASE MEASURES

SPILL RESPONSE:
EVACUATE THE AREA OF ALL UNNECESSARY PERSONNEL.
WEAR SUITABLE PROTECTIVE EQUIPMENT LISTED UNDER EXPOSURE / PERSONAL PROTECTION.
ELIMINATE ANY IGNITION SOURCES UNTIL THE AREA IS DETERMINED TO BE FREE FROM EXPLOSION OR FIRE HAZARDS.
CONTAIN THE RELEASE AND ELIMINATE ITS SOURCE, IF THIS CAN BE DONE

WITHOUT RISK.
TAKE UP AND CONTAINERIZE FOR PROPER DISPOSAL AS DESCRIBED UNDER DISPOSAL.
COMPLY WITH FEDERAL, STATE, AND LOCAL REGULATIONS ON REPORTING RELEASES. REFER TO REGULATORY INFORMATION FOR REPORTABLE QUANTITY AND OTHER REGULATORY DATA.

7. HANDLING AND STORAGE

HANDLING & STORAGE:
KEEP CONTAINER TIGHTLY CLOSED.
STORE AT CONTROLLED ROOM TEMPERATURE.
DO NOT BREATHE DUST.
DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT:

VENTILATION, RESPIRATORY PROTECTION, PROTECTIVE CLOTHING, EYE PROTECTION
MATERIAL SHOULD BE HANDLED OR TRANSFERRED IN AN APPROVED FUME HOOD OR WITH ADEQUATE VENTILATION.
PROTECTIVE GLOVES (NEOPRENE, PVC OR EQUIVALENT) SHOULD BE WORN TO PREVENT SKIN CONTACT
SAFETY GLASSES WITH SIDE SHIELDS SHOULD BE WORN AT ALL TIMES.

WORK / HYGENIC PRACTICES:
WASH THOROUGHLY AFTER HANDLING.
DO NOT TAKE INTERNALLY.
EYE WASH AND SAFETY EQUIPMENT SHOULD BE READILY AVAILABLE.

EXPOSURE GUIDELINES

OSHA - PEL:

COMPONENT	TWA PPM	TWA MG/M3	STEL PPM	STEL MG/M3	CL PPM	CL MG/M3	SKIN
POTASSIUM IODIDE							

ACGIH - TLV:

COMPONENT	TWA PPM	TWA MG/M3	STEL PPM	STEL MG/M3	CL PPM	CL MG/M3	SKIN
POTASSIUM IODIDE							

9. PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT (C 760 MMHG).: 1420C
MELTING POINT (C).....: 723C
SPECIFIC GRAVITY (H2O = 1).: 3.12
VAPOR PRESSURE (MM HG).....: 1 745C
PERCENT VOLATILE BY VOL (%): N/A
VAPOR DENSITY (AIR = 1).....: N/A
EVAPORATION RATE (BUAC = 1): N/A
SOLUBILITY IN WATER (%).....: 60
APPEARANCE.....:
COLORLESS, ODORLESS CRYSTALS OR GRANULES

10. STABILITY AND REACTIVITY

STABILITY.....: YES

HAZARDOUS POLYMERIZATION:
DOES NOT OCCUR

HAZARDOUS DECOMPOSITION.:
IODINE, IODINE COMPOUNDS

CONDITIONS TO AVOID.....:
NONE INDICATED

MATERIALS TO AVOID.....:
( )WATER
( )ACIDS
( )BASES
( )CORROSIVES
(X)OXIDIZERS
(X)OTHER :
BROMINE TRIFLUORIDE, CHLORINE TRIFLUORIDE, FLUORINE PERCHLORATE

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA:

ORL-MUS LDLO: 1862 MG/KG IVN-RAT LDLO: 167 MG/KG

TOXICOLOGICAL FINDINGS:
TESTS ON LABORATORY ANIMALS INDICATE MATERIAL MAY PRODUCE ADVERSE MUTAGENIC AND REPRODUCTIVE EFFECTS.
CITED IN REGISTRY OF TOXIC EFFECTS OF SUBSTANCES (RTECS)

12. DISPOSAL CONSIDERATIONS

EPA WASTE NUMBERS:
TREATMENT:

MATERIAL DOES NOT HAVE AN EPA WASTE NUMBER AND IS NOT A LISTED WASTE, HOWEVER CONSULTATION WITH A PERMITTED WASTE DISPOSAL SITE (TSD) SHOULD BE ACCOMPLISHED.
ALWAYS CONTACT A PERMITTED WASTE DISPOSER (TSD) TO ASSURE COMPLIANCE WITH ALL CURRENT LOCAL, STATE AND FEDERAL REGULATIONS.

13. TRANSPORT INFORMATION

DOT PROPER SHIPPING NAME...:
NON-REGULATED

DOT ID NUMBER.....: NONE

14. REGULATORY INFORMATION

TSCA INVENTORY.....:
THE CAS NUMBER OF THIS PRODUCT IS LISTED ON THE TSCA INVENTORY.

COMPONENT	SARA EHS (302)	SARA EHS TPQ (LBS)	CERCLA RQ (LBS)
POTASSIUM IODIDE			

COMPONENT	OSHA FLOOR LIST	SARA 313	DEMINIMIS FOR SARA 313 (%)
POTASSIUM IODIDE			

15. OTHER INFORMATION

COMMENTS:
NONE
NFPA HAZARD RATINGS:
HEALTH : 2
FLAMMABILITY : 0
REACTIVITY : 0
SPECIAL HAZARDS :
REVISION HISTORY:
09/01/83 10/01/84 12/06/86 06/19/87 10/27/87 09/26/88 05/22/89
03/01/91
! = REVISED SECTION

N/A = NOT AVAILABLE
N/E = NONE ESTABLISHED

THE STATEMENTS CONTAINED HEREIN ARE OFFERED FOR INFORMATIONAL PURPOSES ONLY AND ARE BASED UPON TECHNICAL DATA THAT EM SCIENCE BELIEVES TO BE ACCURATE. IT IS INTENDED FOR USE ONLY BY PERSONS HAVING THE NECESSARY TECHNICAL SKILL AND AT THEIR OWN DESCRETION AND RISK. SINCE CONDITIONS AND MANNER OF USE ARE OUTSIDE OUR CONTROL, WE MAKE NO WARRANTY, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS OR OTHERWISE.

PORTIONS COPYRIGHT ARIEL RESEARCH CORPORATION, 1991. RESTRICTED USE CONDITIONS APPLY. SELECTED REGULATORY INFORMATION IN THIS MSDS HAS BEEN DERIVED FROM ARIEL RESEARCH CORPORATION'S INTERNATIONAL CHEMICAL REGULATORY MONITORING SYSTEM (ICRMS). USE OF THIS DATA IS PROVIDED SUBJECT TO THE TERMS OF THE LICENSE AGREEMENT BETWEEN EM INDUSTRIES AND ARIEL RESEARCH CORPORATION. FURTHER DISTRIBUTION IS PROHIBITED WITHOUT AUTHORIZATION.

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER.....:

EM SCIENCE
A DIVISION OF EM INDUSTRIES
P.O. BOX 70
480 DEMOCRAT RD.
GIBBSTOWN, N.J. 08027

PREPARATION DATE.: 00/01/91
DATE MSDS PRINTED.: JUN 11, 1992

INFORMATION PHONE NUMBER.: 609-354-9200
HOURS: MON. TO FRI. 8:30-5
CHEMTREC EMERGENCY NUMBER: 800-424-9300
HOURS: 24 HRS A DAY

CATALOG NUMBER(S):
PX2014 PX2015 PX2020

CHEMICAL NAME....: PYRIDINE
TRADE NAME.....: AZABENZENE
CHEMICAL FAMILY..: AROMATIC SOLVENT
FORMULA.....: C5H5N

MOLECULAR WEIGHT.: 79.10

2. COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENT	CAS #	APPR %
PYRIDINE	110-86-1	100%

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
FLAMMABLE LIQUID AND VAPOR.
HARMFUL IF INHALED, SWALLOWED OR ABSORBED THROUGH SKIN.
IRRITATING TO SKIN, EYES AND MUCOUS MEMBRANES.
MAY CAUSE EYE INJURY.
APPEARANCE.....:
COLORLESS TO LIGHT YELLOW LIQUID; SHARP, PENETRATING ODOR

POTENTIAL HEALTH EFFECTS (ACUTE AND CHRONIC)

SYMPTOMS OF EXPOSURE:

HARMFUL IF INHALED, SWALLOWED, OR ABSORBED THROUGH THE SKIN.
IRRITATING TO EYES, SKIN & UPPER RESPIRATORY TRACT. MAY CAUSE EYE DAMAGE. MAY CAUSE SERIOUS HEADACHE, NAUSEA & VOMITING AT 4-12 PPM.
MAY CAUSE DAMAGE TO KIDNEYS, LIVER, AND CENTRAL NERVOUS SYSTEM (CNS).
MEDICAL COND. AGGRAVATED BY EXPOSURE:
CNS, LIVER AND KIDNEY CONDITIONS.
ROUTES OF ENTRY.....:
INHALATION, INGESTION OR SKIN CONTACT.
CARCINOGENICITY.....:
THE MATERIAL IS NOT LISTED AS A CANCER CAUSING AGENT.

4. FIRST AID MEASURES

EMERGENCY FIRST AID:
GET MEDICAL ASSISTANCE FOR ALL CASES OF OVEREXPOSURE.
SKIN: IMMEDIATELY FLUSH THOROUGHLY WITH LARGE AMOUNTS OF WATER.
EYES: IMMEDIATELY FLUSH THOROUGHLY WITH WATER FOR AT LEAST 15 MINUTES.
INHALATION: REMOVE TO FRESH AIR; GIVE ARTIFICIAL RESPIRATION IF BREATHING HAS STOPPED.
INGESTION: CALL A PHYSICAN IMMEDIATELY. ONLY INDUCE VOMITING AT THE INSTRUCTIONS OF A PHYSICAN (DANGER OF ASPIRATION). NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.
REMOVE CONTAMINATED CLOTHING AND WASH BEFORE REUSE.

5. FIRE FIGHTING MEASURES

FLASH POINT (F).....: 68F (CC)
FLAMMABLE LIMITS LEL (%).: 1.80
FLAMMABLE LIMITS UEL (%).: 12.40
EXTINGUISHING MEDIA.....:
"ALCOHOL" FOAM, DRY CHEMICAL, CO2, WATER SPRAY TO COOL FIRE-EXPOSED CONTAINERS AND DISPERSE VAPORS
FIRE FIGHTING PROCEDURES.:
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING.
FIRE & EXPLOSION HAZARDS.:
DANGEROUS FIRE AND EXPLOSIVE HAZARD.
VAPOR CAN TRAVEL DISTANCES TO IGNITION SOURCE AND FLASH BACK.

6. ACCIDENTAL RELEASE MEASURES

SPILL RESPONSE:
EVACUATE THE AREA OF ALL UNNECESSARY PERSONNEL.
WEAR SUITABLE PROTECTIVE EQUIPMENT LISTED UNDER EXPOSURE / PERSONAL PROTECTION.
ELIMINATE ANY IGNITION SOURCES UNTIL THE AREA IS DETERMINED TO BE

FREE FROM EXPLOSION OR FIRE HAZARDS.
CONTAIN THE RELEASE AND ELIMINATE ITS SOURCE. IF THIS CAN BE DONE WITHOUT RISK.
TAKE UP AND CONTAINERIZE FOR PROPER DISPOSAL AS DESCRIBED UNDER DISPOSAL.
COMPLY WITH FEDERAL, STATE, AND LOCAL REGULATIONS ON REPORTING RELEASES. REFER TO REGULATORY INFORMATION FOR REPORTABLE QUANTITY AND OTHER REGULATORY DATA.
EM SCIENCE RECOMMENDS SPILL-X ABSORBENT AGENTS FOR VARIOUS TYPES OF SPILLS. ADDITIONAL INFORMATION ON THE SPILL-X PRODUCTS CAN BE PROVIDED THROUGH THE EM SCIENCE TECHNICAL SERVICE DEPARTMENT (609) 354-9200.
THE FOLLOWING EM SCIENCE SPILL-X ABSORBENT IS RECOMMENDED FOR THIS PRODUCT:

SX0863 SOLVENT SPILL TREATMENT KIT

7. HANDLING AND STORAGE

HANDLING & STORAGE:
EXPOSURE TO LEVELS OF 3600 PPM IS IMMEDIATELY DANGEROUS TO LIFE AND HEALTH.
STORE IN A WELL-VENTILATED AREA, AWAY FROM IGNITION SOURCES, ACIDS AND OXIDIZERS.
KEEP CONTAINER TIGHTLY CLOSED.
DO NOT BREATHE VAPOR.
DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING.
ELECTRICALLY GROUND ALL EQUIPMENT WHEN HANDLING THIS PRODUCT.
RETAINED RESIDUE MAY MAKE EMPTY CONTAINERS HAZARDOUS; USE CAUTION!

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT:

VENTILATION, RESPIRATORY PROTECTION, PROTECTIVE CLOTHING, EYE PROTECTION
MATERIAL MUST BE HANDLED OR TRANSFERRED IN AN APPROVED FUME HOOD OR WITH EQUIVALENT VENTILATION.
PROTECTIVE GLOVES MUST BE WORN TO PREVENT SKIN CONTACT (NEOPRENE OR EQUIVALENT)
SAFETY GLASSES WITH SIDE SHIELDS MUST BE WORN AT ALL TIMES.
RESPIRATORY PROTECTION: IF WORKPLACE EXPOSURE LIMIT(S) OF PRODUCT OR ANY COMPONENT IS EXCEEDED (SEE TLV/PEL), A NIOSH/MSHA APPROVED AIR SUPPLIED RESPIRATOR IS ADVISED IN ABSENCE OF PROPER ENVIRONMENTAL CONTROL. OSHA REGULATIONS ALSO PERMIT OTHER NIOSH/MSHA RESPIRATORS (NEGATIVE PRESSURE TYPE) UNDER SPECIFIED CONDITIONS (SEE YOUR SAFETY EQUIPMENT SUPPLIER). ENGINEERING

AND/OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE EXPOSURE.
IMPERVIOUS PROTECTIVE CLOTHING SHOULD BE WORN TO PREVENT SKIN CONTACT.

WORK / HYGENIC PRACTICES:
WASH THOROUGHLY AFTER HANDLING.
DO NOT TAKE INTERNALLY.
EYE WASH AND SAFETY EQUIPMENT SHOULD BE READILY AVAILABLE.

EXPOSURE GUIDELINES

OSHA - PEL:

COMPONENT	TWA PPM	TWA MG/M3	STEL PPM	STEL MG/M3	CL PPM	CL MG/M3	SKIN
PYRIDINE	5	15					

ACGIH - TLV:

COMPONENT	TWA PPM	TWA MG/M3	STEL PPM	STEL MG/M3	CL PPM	CL MG/M3	SKIN
PYRIDINE	5	16					

9. PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT (C 760 MMHG).: 115.3C
MELTING POINT (C).....: -42C
SPECIFIC GRAVITY (H2O = 1).: 0.978
VAPOR PRESSURE (MM HG).....: 16 20C
PERCENT VOLATILE BY VOL (%): 100
VAPOR DENSITY (AIR = 1)....: 2.73
EVAPORATION RATE (BUAC = 1): N/A
SOLUBILITY IN WATER (%)....: SOLUBLE
APPEARANCE.....:
COLORLESS TO LIGHT YELLOW LIQUID; SHARP, PENETRATING ODOR

10. STABILITY AND REACTIVITY

STABILITY.....: YES
HAZARDOUS POLYMERIZATION:
DOES NOT OCCUR

HAZARDOUS DECOMPOSITION.:
FUMES OF CYANIDE, CARBON MONOXIDE, POSSIBLY AMMONIA

CONDITIONS TO AVOID.....:
HEAT; CONTACT WITH IGNITION SOURCES

MATERIALS TO AVOID.....:
( )WATER
(X)ACIDS
( )BASES
( )CORROSIVES
(X)OXIDIZERS
( )OTHER :

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA:

ORL-RAT LD50: 891 MG/KG
IHL-RAT LCLO: 4000 PPM/4H
TOXICOLOGICAL FINDINGS:
TESTS ON LABORATORY ANIMALS INDICATE MATERIAL MAY PRODUCE ADVERSE MUTAGENIC EFFECTS.
CITED IN REGISTRY OF TOXIC EFFECTS OF SUBSTANCES (RTECS)

12. DISPOSAL CONSIDERATIONS

EPA WASTE NUMBERS: D001 D038
TREATMENT:
SPECIFIED TECHNOLOGY - INCINERATION OR FUELS BLENDING TO LESS THAN THE TCLP STANDARD. CONTACT YOUR LOCAL PERMITTED WASTE DISPOSAL SITE (TSD) FOR PERMISSIBLE TREATMENT SITES.
ALWAYS CONTACT A PERMITTED WASTE DISPOSER (TSD) TO ASSURE COMPLIANCE WITH ALL CURRENT LOCAL, STATE AND FEDERAL REGULATIONS.

13. TRANSPORT INFORMATION

DOT PROPER SHIPPING NAME...:
PYRIDINE
DOT ID NUMBER.....: UN1282

14. REGULATORY INFORMATION

TSCA INVENTORY.....:
THE CAS NUMBER OF THIS PRODUCT IS LISTED ON THE TSCA INVENTORY.

COMPONENT	SARA EHS (302)	SARA EHS TPQ (LBS)	CERCLA RQ (LBS)
PYRIDINE			1000

COMPONENT	OSHA FLOOR LIST	SARA 313	DEMINIMIS FOR SARA 313 (%)
PYRIDINE	Y	Y	1.0

15. OTHER INFORMATION

COMMENTS:
NONE
NFPA HAZARD RATINGS:
HEALTH : 2
FLAMMABILITY : 3
REACTIVITY : 0
SPECIAL HAZARDS:

REVISION HISTORY:
09/01/83 10/27/87 08/03/88

! = REVISED SECTION
N/A = NOT AVAILABLE
N/E = NONE ESTABLISHED

THE STATEMENTS CONTAINED HEREIN ARE OFFERED FOR INFORMATIONAL PURPOSES ONLY AND ARE BASED UPON TECHNICAL DATA THAT EM SCIENCE BELIEVES TO BE ACCURATE. IT IS INTENDED FOR USE ONLY BY PERSONS HAVING THE NECESSARY TECHNICAL SKILL AND AT THEIR OWN DESCRETION AND RISK. SINCE CONDITIONS AND MANNER OF USE ARE OUTSIDE OUR CONTROL, WE MAKE NO WARRANTY, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS OR OTHERWISE.

PORTIONS COPYRIGHT ARIEL RESEARCH CORPORATION, 1991.
RESTRICTED USE CONDITIONS APPLY. SELECTED REGULATORY
INFORMATION IN THIS MSDS HAS BEEN DERIVED FROM ARIEL
RESEARCH CORPORATION'S INTERNATIONAL CHEMICAL REGULATORY
MONITORING SYSTEM (ICRMS). USE OF THIS DATA IS PROVIDED
SUBJECT TO THE TERMS OF THE LICENSE AGREEMENT BETWEEN EM
INDUSTRIES AND ARIEL RESEARCH CORPORATION. FURTHER
DISTRIBUTION IS PROHIBITED WITHOUT AUTHORIZATION.

"ISSUED BY VWR 05/23/97"

J.T.BAKER INC., 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865
MATERIAL SAFETY DATA SHEET
24-HOUR EMERGENCY TELEPHONE -- (908) 859-2151
CHEMTREC # (800) 424-9300 -- NATIONAL RESPONSE CENTER # (800) 424-8802

666 M03 SODIUM ACETATE, TRIHYDRATE, CRYSTAL
EFFECTIVE: 01/04/94 PAGE: 1
ISSUED: 01/15/94

J.T.BAKER INC., 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: SODIUM ACETATE, TRIHYDRATE, CRYSTAL
COMMON SYNONYMS: N/A
CHEMICAL FAMILY: ORGANIC SODIUM SALTS
FORMULA: CH3COONa.3H2O
FORMULA WT.: 136.08
CAS NO.: 6131-90-4
NIOSH/RTECS NO.: AJ4375000
PRODUCT USE: LABORATORY REAGENT
PRODUCT CODES: 3469,3464,3461,3462,3460,4009

PRECAUTIONARY LABELING

BAKER SAF-T-DATA* SYSTEM

HEALTH	-	1	SLIGHT
FLAMMABILITY	-	0	NONE
REACTIVITY	-	0	NONE
CONTACT	-	1	SLIGHT

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES; LAB COAT

U.S. PRECAUTIONARY LABELING

CAUTION

MAY CAUSE IRRITATION.
DURING USE AVOID CONTACT WITH EYES, SKIN, CLOTHING. WASH THOROUGHLY AFTER HANDLING. WHEN NOT IN USE KEEP IN TIGHTLY CLOSED CONTAINER.

INTERNATIONAL LABELING

AVOID CONTACT WITH EYES. AFTER CONTACT WITH SKIN, WASH IMMEDIATELY WITH PLENTY OF WATER. KEEP CONTAINER TIGHTLY CLOSED.

SAF-T-DATA* STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

CONTINUED ON PAGE: 2

J.T.BAKER [illegible] RED SCHOOL LANE, PHILLIPSBURG [illegible]
MATERIAL SAFETY DATA S[illegible]
24-HOUR EMERGENCY TELEPHONE -- (908) 859-[illegible]
CHEMTREC # (800) 424-9300 - NATIONAL RESPONSE CENTER [illegible] 424-8802

[illegible]666 M03 SODIUM ACETATE, TRIHYDRATE, CRYSTAL [illegible] PAGE: 2
EFFECTIVE: 01/04/94 [illegible]ED: 01/15/94

SECTION II - COMPONENTS

COMPONENT	CAS NO.	WEIGHT %	OSHA [illegible]	ACGIH/TLV
SODIUM ACETATE, TRIHYDRATE	6131-90-4	99-100	N/E	N/E

SECTION III - PHYSICAL DATA

BOILING POINT: N/A

VAPOR PRESSURE (MM HG): N/A

MELTING POINT: 58 C (136 F)
(AT 760 MM HG)

VAPOR DENSITY (AIR=1): N/A

SPECIFIC GRAVITY: 1.45
(H2O=1)

EVAPORATION RATE: N/A

SOLUBILITY(H20): APPRECIABLE (>10%)

% VOLATILES BY VOLUME: 0
(21 C)

PH: N/A

[illegible]OR THRESHOLD (P.P.M.): N/A

PHYSICAL STATE: SOLID

COEFFICIENT WATER/OIL DISTRIBUTION: N/A

APPEARANCE & ODOR: COLORLESS CRYSTALS. ODORLESS.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP): N/A

AUTOIGNITION TEMPERATURE: N/A

FLAMMABLE LIMITS: UPPER - N/A LOWER - N/A

FIRE EXTINQUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE.

CONTINUED ON PAGE: 3

J.T.BAKER INC. 222 RED SCHOOL LANE, PHILLIPSBURG
M A T E R I A L S A F E T Y D A T A S H
24-HOUR EMERGENCY TELEPHONE -- (908) 859-2
CHEMTREC # (800) NATIONAL RESPONSE CENTER -8802

SECTION IV - FIRE AND EXPLOSION HAZARD DATA (CONTINUED)

UNUSUAL FIRE & EXPLOSION HAZARDS
NONE IDENTIFIED.

TOXIC GASES PRODUCED
CARBON MONOXIDE, CARBON DIOXIDE

EXPLOSION DATA-SENSITIVITY TO MECHANICAL IMPACT
NONE IDENTIFIED.

EXPLOSION DATA-SENSITIVITY TO STATIC DISCHARGE
NONE IDENTIFIED.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): NOT ESTABLISHED

SHORT-TERM EXPOSURE LIMIT (STEL): NOT ESTABLISHED

PERMISSIBLE EXPOSURE LIMIT (PEL): NOT ESTABLISHED

TOXICITY OF COMPONENTS

ORAL RAT LD50 FOR SODIUM ACETATE, TRIHYDRATE	3530 MG/KG
SUBCUTANEOUS MOUSE LD50 FOR SODIUM ACETATE, TRIHYDRATE	8000 MG/KG
INTRAVENOUS MOUSE LD50 FOR SODIUM ACETATE, TRIHYDRATE	335 MG/KG

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

CARCINOGENICITY
NONE IDENTIFIED.

REPRODUCTIVE EFFECTS
NONE IDENTIFIED.

CONTINUED ON PAGE: 4

J.T.BAKER INC. 222 RED SCHOOL LANE, PHILLIPSBURG
MATERIAL SAFETY DATA SHEET
24 HOUR EMERGENCY TELEPHONE -- (908) 859-2151
CHEMTREC # (800) 424-9300 NATIONAL RESPONSE CENTER (800) 424-8802

666 M03
EFFECTIVE: 01/04/94 SODIUM ACETATE, TRIHYDRATE, CRYSTAL PAGE: 4
01/15/94

SECTION V - HEALTH HAZARD DATA (CONTINUED)

EFFECTS OF OVEREXPOSURE

INHALATION: IRRITATION OF UPPER RESPIRATORY TRACT

SKIN CONTACT: IRRITATION

EYE CONTACT: IRRITATION

SKIN ABSORPTION: NONE IDENTIFIED

INGESTION: NONE IDENTIFIED

CHRONIC EFFECTS: NONE IDENTIFIED

TARGET ORGANS
NONE IDENTIFIED

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

PRIMARY ROUTES OF ENTRY
INHALATION, SKIN CONTACT, EYE CONTACT

EMERGENCY AND FIRST AID PROCEDURES

INGESTION: IF SWALLOWED AND THE PERSON IS CONSCIOUS, IMMEDIATELY GIVE LARGE AMOUNTS OF WATER. GET MEDICAL ATTENTION.

INHALATION: IF A PERSON BREATHES IN LARGE AMOUNTS, MOVE EXPOSED PERSON TO FRESH AIR.

SKIN CONTACT: IN CASE OF CONTACT, IMMEDIATELY WASH SKIN WITH PLENTY OF SOAP AND WATER FOR AT LEAST 15 MINUTES.

EYE CONTACT: IN CASE OF EYE CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

SARA/TITLE III HAZARD CATEGORIES AND LISTS

ACUTE: NO CHRONIC: NO FLAMMABILITY: NO PRESSURE: NO REACTIVITY: NO
EXTREMELY HAZARDOUS SUBSTANCES: NO

CONTINUED ON PAGE: 5

J.T.BAKER [illegible] RED SCHOOL LANE, PHILLIPSBUR[illegible]
M A[illegible] S A F E T Y D A T A S[illegible]
[illegible] EMERGENCY TELEPHONE -- (908) 859-[illegible]
CHEMTREC # (800) 424-9300 NATIONAL RESPONSE CENTER [illegible] 424-8802

[illegible]666 M03
EFFECTIVE: 01/04/94 SODIUM ACETATE, TRIHYDRATE, CRYSTAL PAGE: 5
ISSUED: 01/15/94

SECTION V - HEALTH HAZARD DATA (CONTINUED)

CERCLA HAZARDOUS SUBSTANCE: NO
SARA 313 TOXIC CHEMICALS: NO
TSCA INVENTORY: YES

SECTION VI - REACTIVITY DATA

STABILITY: STABLE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: MOISTURE

INCOMPATIBLES: STRONG OXIDIZING AGENTS, FLUORINE

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

SECTION VII - SPILL & DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE:
WEAR SUITABLE PROTECTIVE CLOTHING. CAREFULLY SWEEP UP AND REMOVE.

DISPOSAL PROCEDURE:
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

VENTILATION: USE ADEQUATE GENERAL OR LOCAL EXHAUST VENTILATION TO KEEP FUME OR DUST LEVELS AS LOW AS [illegible]

RESPIRATORY PROTECTION: NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION IS HIGH, USE AN APPROPRIATE RESPIRATOR OR DUST MASK.

EYE/SKIN PROTECTION: SAFETY GOGGLES, PROPER GLOVES ARE RECOMMENDED.

CONTINUED ON PAGE: 6

J.T.BAKER INC. 1022 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865
MATERIAL SAFETY DATA SHEET
24-HOUR EMERGENCY TELEPHONE -- (908) 859-2151
CHEMTREC # (800) 424-9300 -- NATIONAL RESPONSE CENTER (800) 424-8802

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA* STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

STORAGE REQUIREMENTS
KEEP CONTAINER TIGHTLY CLOSED. SUITABLE FOR ANY GENERAL CHEMICAL STORAGE AREA.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME: CHEMICALS, N.O.S. (NON-REGULATED)

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME: CHEMICALS, N.O.S. (NON-REGULATED)
MARINE POLLUTANTS: NO

AIR (I.C.A.O.)

PROPER SHIPPING NAME: CHEMICALS, N.O.S. (NON-REGULATED)

U.S. CUSTOMS HARMONIZATION NUMBER: 29152200004

NOTE: WHEN HANDLING LIQUID PRODUCTS, SECONDARY PROTECTIVE CONTAINERS MUST BE USED FOR CARRYING.
-N/A = NOT APPLICABLE OR NOT AVAILABLE;
N/E = NOT ESTABLISHED.-
THE INFORMATION IN THIS MATERIAL SAFETY DATA SHEET MEETS THE REQUIREMENTS OF THE UNITED STATES OCCUPATIONAL SAFETY AND HEALTH ACT AND REGULATIONS PROMULGATED THEREUNDER (29 CFR 1910.1200 ET. SEQ.) AND THE CANADIAN WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM. THIS DOCUMENT IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF THE MATERIAL BY A PERSON TRAINED IN, OR SUPERVISED BY A PERSON TRAINED IN, CHEMICAL HANDLING. THE USER IS RESPONSIBLE FOR DETERMINING THE PRECAUTIONS AND DANGERS OF THIS CHEMICAL FOR HIS OR HER PARTICULAR APPLICATION. DEPENDING ON USAGE, PROTECTIVE CLOTHING INCLUDING EYE AND FACE GUARDS AND RESPIRATORS MUST BE USED TO AVOID CONTACT WITH MATERIAL OR BREATHING CHEMICAL VAPORS/FUMES.
EXPOSURE TO THIS PRODUCT MAY HAVE SERIOUS ADVERSE HEALTH EFFECTS. THIS CHEMICAL MAY INTERACT WITH OTHER SUBSTANCES. SINCE THE POTENTIAL USES

CONTINUED ON PAGE: 7

J.T.BAKER [illegible] RED SCHOOL LANE, PHILLIPSBURG [illegible]
M A T [illegible] S A F E T Y D A T A S [illegible]
24-HOUR EMERGENCY TELEPHONE -- (908) 859-[illegible]
CHEMTREC # (800) 424-[illegible] -- NATIONAL RESPONSE CENTER [illegible] 424-8802

2666 M03
EFFECTIVE: 01/04/94 SODIUM ACETATE, TRIHYDRATE, CRYSTAL PAGE: 7
ISSUED: 01/15/94

==========

ARE SO VARIED, BAKER CANNOT WARN OF ALL OF THE POTENTIAL DANGERS OF USE OR INTERACTION WITH OTHER CHEMICALS OR MATERIALS. BAKER WARRANTS THAT THE CHEMICAL MEETS THE SPECIFICATIONS SET FORTH ON THE LABEL. BAKER DISCLAIMS ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED WITH REGARD TO THE PRODUCT SUPPLIED HEREUNDER, ITS MERCHANTABILITY OR [illegible]NESS FOR A PARTICULAR PURPOSE. THE USER SHOULD RECOGNIZE THAT THIS PRODUCT CAN CAUSE SEVERE INJURY AND EVEN DEATH, ESPECIALLY IF IMPROPERLY HANDLED OR THE KNOWN DANGERS OF USE ARE NOT HEEDED. READ ALL PRECAUTIONARY INFORMATION. AS NEW DOCUMENTED GENERAL SAFETY INFORMATION BECOMES AVAILABLE, BAKER WILL PERIODICALLY REVISE THIS MATERIAL SAFETY DATA SHEET.
NOTE: CHEMTREC, CANUTEC, AND NATIONAL RESPONSE CENTER EMERGENCY TELEPHONE NUMBERS ARE TO BE USED ONLY IN THE EVENT OF CHEMICAL EMERGENCIES INVOLVING A SPILL, LEAK, FIRE, EXPOSURE, OR ACCIDENT INVOLVING CHEMICALS. NON-EMERGENCY QUESTIONS SHOULD BE DIRECTED TO CUSTOMER SERVICE (1-800-JTBAKER) FOR ASSISTANCE.

COPYRIGHT 1994 J.T.BAKER INC.
* TRADEMARKS OF J.T.BAKER INC.
===
APPROVED BY QUALITY ASSURANCE DEPARTMENT.

LAST PAGE --
"ISSUED BY VWR 06-22-98"

EM-1252-2 SX0980

BDH INC.

M A T E R I A L S A F E T Y D A T A S H E E T

SECTION I CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER:

BDH INC.
350 EVANS AVENUE
TORONTO, ONTARIO
CANADA, M8Z 1K5

INFORMATION PHONE NO.: 416-255-8521
HOURS: MON. TO FRI. (0830 - 1630)
CHEMTREC TRANSPORTATION EMERGENCY CENTER
(CHEMTREC) 24-HOUR...1-800-424-9300

PRODUCT NAME: SODIUM CYANIDE, 2.5% W/V
CATALOGUE NUMBER(S): VW3666
CHEMICAL NAME/OTHER NAME: SODIUM CYANIDE, 2.5% W/V
CHEMICAL FORMULA: H2O, NACN
CHEMICAL FAMILY: INORGANIC SALT SOLUTION

SECTION II COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS NO.	OSHA PEL	ACGIH TLV	%(W/V)
SODIUM CYANIDE	143-33-9	5 MG/M3	5 MG/M3	2.5
WATER	7732-18-5	-	..	

SECTION III HAZARDS IDENTIFICATION

APPEARANCE: CLEAR, COLORLESS LIQUID

********** EMERGENCY OVERVIEW **********

* POISON *

* CONTACT WITH ACID LIBERATES POISONOUS GAS *

****

POTENTIAL HEALTH EFFECTS (ACUTE & CHRONIC)

SYMPTOMS OF EXPOSURE: THIS SUBSTANCE IS TOXIC BY INGESTION, INHALATION AND SKIN ABSORPTION. SYMPTOMS OF EXPOSURE MAY INCLUDE PERSISTENT RUNNY NOSE, WEAKNESS, DIZZINESS, GIDDINESS, HEADACHE, NAUSEA, VOMITING, ABDOMINAL PAIN, THROAT IRRITATION, CHANGES IN TASTE AND SMELL, MUSCLE CRAMPS, WEIGHT LOSS OR FLUSHING OF THE FACE.
MEDICAL CONDITION AGGRAVATED BY EXPOSURE: NONE IDENTIFIED
ROUTES OF ENTRY: INHALATION, INGESTION AND SKIN CONTACT

CARCINOGENICITY: THIS MATERIAL IS NOT LISTED (IARC, NTP, OSHA) AS A CANCER CAUSING AGENT.

SECTION IV FIRST AID MEASURES

EYE: IN CASE OF EYE CONTACT, FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE HOLDING THE EYELIDS OPEN. HAVE EYES EXAMINED BY MEDICAL PERSONNEL.
SKIN: IN CASE OF CONTACT, IMMEDIATELY FLUSH SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.
INGESTION: REMOVE VICTIM FROM CONTAMINATED AREA TO A QUIET, WELL VENTILATED AREA. IF THE VICTIM IS UNCONSCIOUS, LAY VICTIM ON THEIR LEFT SIDE AND LOOSEN COLLAR AND BELT. IF VICTIM IS CONSCIOUS, KEEP HIM/HER QUIET AND CALM. INDUCE VOMITING BY ASKING VICTIM TO TOUCH THE BACK OF THEIR THROAT WITH THEIR FINGER OR SOME OTHER BLUNT OBJECT. HAVE THE VICTIM SIT UP AND LEAN FORWARD WHILE VOMITING. SAVE VOMITUS FOR ANALYSIS LATER. SEEK MEDICAL ATTENTION IMMEDIATELY.

INHALATION: IF BREATHING HAS STOPPED, TRAINED PERSONNEL SHOULD BEGIN ARTIFICIAL RESPIRATION, OR IF THE HEART HAS STOPPED, CARDIOPULMONARY RESUSCITATION (CPR) IMMEDIATELY. SEEK MEDICAL ATTENTION.
AMYL NITRITE TREATMENT: IF THE VICTIM HAS DIFFICULTY BREATHING, IS BECOMING CONFUSED AND/OR IS LOSING CONSCIOUSNESS, ADMINISTER AMYL NITRITE. CRUSH ONE PEARL OF AMYL NITRITE ONTO A CLOTH AND HOLD UNDER THE VICTIM'S NOSE 15-30 SECONDS OF EACH MINUTE. USE A NEW PEARL EVERY 3-5 MINUTES.

SECTION V FIRE FIGHTING MEASURES

FLAMMABILITY CLASSIFICATION: NONCOMBUSTIBLE
EXTINGUISHING MEDIA: WATER SPRAY. DO NOT USE CARBON DIOXIDE(CO_2)
FLASH POINT(F)/METHOD: NOT APPLICABLE
FIRE & EXPLOSION HAZARD: THERMAL DECOMPOSITION PRODUCES TOXIC FUMES
UPPER FLAMMABLE LIMIT (%): NOT APPLICABLE
LOWER FLAMMABLE LIMIT (%): NOT APPLICABLE
AUTOIGNITION TEMPERATURE: NOT APPLICABLE
FIREFIGHTING PROCEDURES: FIREFIGHTERS SHOULD WEAR A SELF CONTAINED BREATHING APPARATUS.
HAZARDOUS COMBUSTION PRODUCTS: CYANIDE
SENSITIVITY TO STATIC DISCHARGE: NO
SENSITIVITY TO MECHANICAL IMPACT: NO

SECTION VI ACCIDENTAL RELEASE MEASURES

LEAK OR SPILL CLEANUP: EVACUATE THE AREA OF ALL UNNECESSARY PERSONNEL. WEAR SUITABLE PROTECTIVE EQUIPMENT LISTED IN EXPOSURE CONTROLS/PERSONAL PROTECTION. CONTAIN THE RELEASE AND ELIMINATE IT'S SOURCE, IF THIS CAN BE DONE WITHOUT RISK. TAKE UP AND CONTAINERIZE FOR PROPER DISPOSAL AS DESCRIBED UNDER

DISPOSAL.COMPLY WITH FEDERAL, STATE, AND LOCAL REGULATIONS ON REPORTING RELEASES. REFER TO REGULATORY INFORMATION FOR REPORTABLE QUANTITY AND OTHER REGULATORY DATA.

SECTION VII HANDLING & STORAGE

HANDLING & STORAGE: STORE IN A COOL, DRY AREA AWAY FROM ACIDS. DO NOT BREATHE SOLUTION MIST.

SECTION VIII EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: ENGINEERING AND/OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE EXPOSURE.

PERSONAL PROTECTIVE EQUIPMENT

GLOVES: NEOPRENE OR EQUIVALENT
RESPIRATORY PROTECTION: MATERIAL SHOULD BE HANDLED OR TRANSFERRED WITH ADEQUATE VENTILATION.
EYE PROTECTION: SAFETY GLASSES WITH SIDE SHIELDS
CLOTHING: IMPERVIOUS PROTECTIVE CLOTHING SHOULD BE WORN TO PREVENT SKIN CONTACT.

SECTION IX PHYSICAL & CHEMICAL PROPERTIES

PHYSICAL STATE: LIQUID
APPEARANCE: CLEAR, COLORLESS LIQUID
ODOR: NOT AVAILABLE
ODOR THRESHOLD: NOT AVAILABLE
VAPOR PRESSURE: NOT AVAILABLE
VAPOR DENSITY: NOT AVAILABLE
SPECIFIC GRAVITY: NOT AVAILABLE
BOILING POINT (F): NOT AVAILABLE
MELTING POINT (F): NOT AVAILABLE
EVAPORATION RATE: NOT AVAILABLE
PH: 11.7 (25% AQUEOUS SOLUTION)
SOLUBILITY IN WATER: SOLUBLE
OCTANOL/WATER PARTITION COEFFICIENT: NOT AVAILABLE
PER CENT VOLATILE BY VOL (%): NOT AVAILABLE
MOLECULAR WEIGHT: THIS PRODUCT IS A DILUTE SOLUTION

SECTION X STABILITY & REACTIVITY

CHEMICAL STABILITY: NORMALLY STABLE

CONDITIONS TO AVOID: HEAT
MATERIALS TO AVOID: ACIDS, NITRATES, PEROXIDES, FLUORIDE, MAGNESIUM,
HAZARDOUS POLYMERIZATION: DOES NOT OCCUR
HAZARDOUS DECOMPOSITION PRODUCTS: CYANIDE

SECTION XI TOXICOLOGICAL INFORMATION

EFFECTS OF ACUTE EXPOSURE: INHALATION OF MIST OR VAPOR CAN BE VERY IRRITATING TO THE NOSE AND THROAT. SYMPTOMS OF OVEREXPOSURE MAY INCLUDE: PERSISTANT RUNNY NOSE, WEAKNESS, DIZZINESS, GIDDINESS, HEADACHE, NAUSEA, VOMITING, ABDOMINAL PAIN, THROAT IRRITATION, CHANGES IN TASTE AND SMELL, MUSCLE CRAMPS, WEIGHT LOSS OR FLUSHING OF THE FACE.
EFFECTS OF CHRONIC EXPOSURE: THIS MATERIAL IS A VIOLENT POISON AND PROLONGED OVEREXPOSURE TO THIS SUBSTANCE CAN BE FATAL.
LD50: 6.4 MG/KG (ORAL-RAT) [SODIUM CYANIDE]
LC50: NOT AVAILABLE
IRRITANCY (DRAIZE TEST RESULTS): NO INFORMATION AVAILABLE
CARCINOGENICITY: THIS MATERIAL IS NOT LISTED (IARC, NTP, OSHA) AS A CANCER CAUSING AGENT.
TERATOGENICITY: NO INFORMATION AVAILABLE
MUTAGENICITY: NO INFORMATION AVAILABLE
REPRODUCTIVE EFFECTS: MAY CAUSE ADVERSE REPRODUCTIVE EFFECTS [SODIUM CYANIDE]
SENSITIZATION TO PRODUCT: NO INFORMATION AVAILABLE
TARGET ORGANS: NONE IDENTIFIED

SECTION XII DISPOSAL CONSIDERATIONS

EPA WASTE NUMBER(S): P106
ALWAYS CONTACT A PERMITTED WASTE DIPOSER (TSD) TO ASSURE COMPLIANCE WITH ALL CURRENT LOCAL, STATE AND FEDERAL REGULATIONS

SECTION XIII TRANSPORT INFORMATION

DOT SHIPPING NAME: CYANIDE SOLUTIONS, N.O.S.(SODIUM CYANIDE)
DOT NUMBER (UN): 1935
PACKING GROUP: I
HAZARD CLASS: 6.1

SECTION XIV REGULATORY INFORMATION

TSCA INVENTORY (YES/NO):YES, THIS MATERIAL IS A MIXTURE. THE CAS NUMBERS OF ALL COMPONENTS ARE LISTED ON THE TSCA INVENTORY.

COMPONENT	SARA EHS (302)	SARA EHS TPQ (LBS)	CERCLA RQ (LBS)
WATER	--	--	--
SODIUM CYANIDE	Y	100	10

COMPONENT	OSHA FLOOR LIST	SARA 313	DEMINIMIS (SARA 313)(%)
WATER	--	--	--
SODIUM CYANIDE	Y	--	--

SECTION XV OTHER INFORMATION

NFPA HAZARD RATINGS (0-4)

HEALTH: 3 FLAMMABILITY: 0 REACTIVITY: 0

NFPA SPECIAL WARNINGS: NONE
PREPARATION DATE: AUGUST 10, 1993
REVISION HISTORY: AUGUST 10, 1993
COMMENTS: NONE

PREPARED BY: TECHNICAL AFFAIRS DEPARTMENT, BDH INC.,
TORONTO, ONTARIO, CANADA
(416) 255-8521

THE STATEMENTS CONTAINED HEREIN ARE OFFERED FOR INFORMATIONAL PURPOSES ONLY AND ARE BASED UPON TECHNICAL DATA THAT BDH INC BELIEVES TO BE ACCURATE. IT IS INTENDED FOR USE ONLY BY PERSONS HAVING THE NECESSARY TECHNICAL SKILLS AND AT THEIR OWN DISCRETION AND RISK. SINCE CONDITIONS AND MANNER OF USE ARE OUTSIDE OUR CONTROL, WE MAKE NO WARRANTY,EXPRESS OR IMPLIED OF MERCHANTABILITY,FITNESS OR OTHERWISE.

COPYRIGHT BDH, 1996

BDH INC.

M A T E R I A L S A F E T Y D A T A S H E E T

SECTION I PRODUCT IDENTIFICATION AND USE

MANUFACTURER:
BDH INC.
350 EVANS AVENUE
TORONTO
ONTARIO
M8Z 1K5

EMERGENCY TELEPHONE NO.:
416-201-6383 (24 HR.)
INFORMATION TELEPHONE NO.:
416-255-8521 (0830-1630)

PRODUCT NAME: SODIUM HYDROXIDE SOLUTION 30-50% (7.5-12.5N)
PRODUCT CODE(S): R01928, VW3246, VW3247, VW3995, VW3996, R01419, R02567, R05129, M05589, XX1166, B80041, VW3363, VW3702, SX0607N, SX0597, VW5873
CHEMICAL NAME/OTHER NAME: SODIUM HYDROXIDE SOLUTION; CAUSTIC SODA SOLUTION; SODIUM HYDRATE SOLUTION; LIQUID CAUSTIC
CHEMICAL FORMULA: NAOH, H2O
CHEMICAL FAMILY: ALKALI SOLUTION
TDG SHIPPING NAME/UN: SODIUM HYDROXIDE, SOLUTION UN 1824
TDG CLASSIFICATION/PACKING GROUP: 8 (9.2) PG II
USE: LABORATORY REAGENT, INDUSTRIAL PROCESSES

SECTION II HAZARDOUS INGREDIENTS

CHEMICAL NAME	CAS NO.	%
SODIUM HYDROXIDE	1310-73-2	30-50

SECTION III PHYSICAL DATA

PHYSICAL STATE: LIQUID
APPEARANCE AND ODOUR: CLEAR COLOURLESS LIQUID; ODOURLESS
ODOUR THRESHOLD: NOT APPLICABLE
SPECIFIC GRAVITY: 1.2-1.4
VAPOUR PRESSURE: 1.5 MMHG AT 20 C
VAPOUR DENSITY: NOT AVAILABLE
EVAPORATION RATE: NOT AVAILABLE
BOILING POINT: 142-148 C
FREEZING POINT: 12-15 C
PH: >13.9
COEFFICIENT OF WATER/OIL DISTRIBUTION: NOT AVAILABLE

SECTION IV FIRE OR EXPLOSION HAZARD

CONDITIONS OF FLAMMABILITY: NONCOMBUSTIBLE
EXTINGUISHING MEDIA: USE AN EXTINGUISHER APPROPRIATE TO THE SURROUNDING

MATERIAL THAT IS BURNING
FLASH POINT / METHOD: NOT APPLICABLE
UEL: NOT APPLICABLE
LEL: NOT APPLICABLE
AUTOIGNITION TEMPERATURE: NOT APPLICABLE
HAZARDOUS COMBUSTION PRODUCTS: NA2O
EXPLOSION DATA - SENSITIVITY TO MECHANICAL IMPACT: NO
- SENSITIVITY TO STATIC DISCHARGE: NO

SECTION V REACTIVITY DATA

CONDITIONS OF INSTABILITY: NORMALLY STABLE
INCOMPATIBILITIES: STRONG ACIDS, METALS, PEROXIDES, FLAMMABLE LIQUIDS
CONDITIONS OF REACTIVITY: NORMALLY STABLE
HAZARDOUS DECOMPOSITION PRODUCTS: NA2O

SECTION VI TOXICOLOGICAL PROPERTIES / HEALTH HAZARD DATA

ROUTE OF ENTRY:
-SKIN CONTACT: CAUSES BURNS
-SKIN ABSORPTION: MAY BE HARMFUL
-EYE CONTACT: CAUSES SEVERE BURNS
-INHALATION: CAUSES BURNS
-INGESTION: TOXIC
LC50: NOT AVAILABLE
LD50: 1000-1666 MG/KG (ORL-RBT) (CALCULATED)
EXPOSURE LIMITS: TLV: 2 MG/M3
EFFECTS OF ACUTE EXPOSURE: SODIUM HYDROXIDE MAY BE DESTRUCTIVE TO TISSUE, PRODUCING SEVERE BURNS, FREQUENTLY WITH DEEP ULCERATION AND SCARRING ON CONTACT WITH ANY BODY TISSUES. CONTACT WITH EYES MAY CAUSE SEVERE DAMAGE WHICH MAY
PRODUCE LOSS OF SIGHT. INHALATION RESULTS IN SEVERE DAMAGE TO MUCOUS MEMBRANES
AND TO UNDERLYING TISSUE WITH WHICH THE CONTACT HAS BEEN MADE. SEVERE AND EXTENSIVE SCAR FORMATION MAY OCCUR. INHALATION MAY CAUSE DAMAGE TO THE UPPER RESPIRATORY TRACT AND LUNGS. ONSET OF SYMPTOMS MAY BE DELAYED.
EFFECTS OF CHRONIC EXPOSURE: CHRONIC LOCAL EXPOSURE MAY CAUSE PRIMARY DERMATITIS AND AREAS OF SUPERFICIAL SKIN DESTRUCTION. REPEATED INHALATION OF MISTS MAY RESULT IN VARYING DEGREES OF UPPER RESPIRATORY TRACT IRRITATION.
IRRITANCY: STANDARD DRAIZE TEST: SKIN, RABBIT 500 MG/24H - SEVERE; EYE, RABBIT 50 UG/24H - SEVERE (CONCENTRATED NAOH)
SENSITIZATION TO PRODUCT: NO INFORMATION AVAILABLE
CARCINOGENICITY: NO INFORMATION AVAILABLE
REPRODUCTIVE TOXICITY: NO INFORMATION AVAILABLE
TERATOGENICITY: NO INFORMATION AVAILABLE
MUTAGENICITY: NO INFORMATION AVAILABLE
TOXICOLOGICALLY SYNERGISTIC PRODUCTS: NONE FOUND

SECTION VII FIRST AID MEASURES

SKIN: FLUSH THE CONTACT AREA WITH LUKEWARM RUNNING WATER FOR AT LEAST 15 MINUTES. REMOVE CONTAMINATED CLOTHING, TAKING CARE NOT TO SPREAD THE CHEMICAL.

IF CONTAMINATION IS EXTENSIVE, REMOVE CLOTHING UNDER RUNNING WATER. DISCARD

DECONTAMINATE CLOTHING UNDER RUNNING WATER. DISCARD OR DECONTAMINATE CLOTHING

BEFORE USE. UNLESS CONTACT HAS BEEN SLIGHT, SEEK MEDICAL ATTENTION. SEEK MEDICAL ATTENTION IF IRRITATION PERSISTS.
EYE: FLUSH THE CONTAMINATED EYE(S) FOR AT LEAST 15 MINUTES WITH LUKEWARM RUNNING WATER, HOLDING THE EYELIDS OPEN. TAKE CARE NOT TO RINSE CONTAMINATED WATER INT THE NON-AFFECTED EYE. ALWAYS SEEK MEDICAL ATTENTION FOR ACCIDENTS INVOLVING THE EYES.
INHALATION: TAKE PROPER PRECAUTIONS TO ENSURE YOUR OWN SAFETY BEFORE ATTEMPTING RESCUE. REMOVE SOURCE OF CONTAMINATION OR MOVE VICTIM TO FRESH AIR. IF
BREATHING HAS STOPPED, TRAINED PERSONNEL SHOULD BEGIN ARTIFICIAL RESPIRATION,

OR IF THE HEART HAS STOPPED, CARDIOPULMONARY RESUSCITATION (CPR) IMMEDIATELY.

SEEK MEDICAL ATTENTION.
INGESTION: NEVER GIVE ANYTHING BY MOUTH IF VICTIM IS RAPIDLY LOSING CONSCIOUSNESS, OR IS UNCONSCIOUS OR CONVULSING. RINSE MOUTH THOROUGHLY WITH WATER. DO NOT INDUCE VOMITING. HAVE VICTIM DRINK 200-400 ML OF WATER TO DILUTE. IF BREATHING HAS STOPPED, TRAINED PERSONNEL SHOULD BEGIN ARTIFICIAL RESPIRATION, OR IF THE HEART HAS STOPPED, CARDIOPULMONARY RESUSCITATION (CPR)

IMMEDIATELY. SEEK MEDICAL ATTENTION.

SECTION VIII PREVENTIVE MEASURES

ENGINEERING CONTROLS: ENGINEERING CONTROL METHODS TO REDUCE HAZARDOUS EXPOSURES ARE PREFERRED. METHODS INCLUDE MECHANICAL VENTILATION (DILUTION AND LOCAL
EXHAUST), PROCESS OR PERSONNEL ENCLOSURE, CONTROL OF PROCESS CONDITIONS, AND PROCESS MODIFICATION. ADMINISTRATIVE CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT MAY ALSO BE REQUIRED. USE A CORROSION RESISTENT VENTILATION SYSTEM SEPARATE
FROM OTHER EXHAUST VENTILATION SYSTEMS. EXHAUST DIRECTLY TO THE OUTSIDE.
PERSONAL PROTECTIVE EQUIPMENT:
- -GLOVES: NEOPRENE, NITRILE OR PVC
- -RESPIRATORY PROTECTION: FUME HOOD, APPROVED RESPIRATOR AS APPROPRIATE
- -EYE PROTECTION: CHEMICAL SAFETY GOGGLES OR FACE SHIELD
- -CLOTHING: PLASTIC APRON, SLEEVES AND BOOTS AS APPROPRIATE

STORAGE REQUIREMENTS: STORE IN SUITABLE LABELLED CONTAINERS. KEEP CONTAINERS TIGHTLY CLOSED WHEN NOT IN USE AND WHEN EMPTY. PROTECT FROM DAMAGE. USE CORROSION RESISTANT STRUCTURAL MATERIALS AND LIGHTING AND VENTILATION SYSTEMS

IN THE STORAGE AREA.
HANDLING PROCEDURES AND EQUIPMENT: AVOID GENERATING MIST. FOLLOW ROUTINE SAFE

HANDLING PROCEDURES.
LEAK OR SPILL CLEAN-UP: BEFORE DEALING WITH SPILLAGES TAKE NECESSARY PROTECTIVE MEASURES, INFORM OTHERS TO KEEP AT A SAFE DISTANCE AND, FOR FLAMMABLE
MATERIALS, SHUT OFF ALL POSSIBLE SOURCES OF IGNITION. ABSORB ON INERT ABSORBENT, TRANSFER TO CONTAINER AND ARRANGE REMOVAL BY DISPOSAL COMPANY. WASH SITE OF
SPILLAGE THOROUGHLY WITH WATER AND DETERGENT.
DISPOSAL: FOLLOW ALL FEDERAL, PROVINCIAL AND LOCAL REGULATIONS FOR DISPOSAL.

USE ONLY LICENSED DISPOSAL AND WASTE HAULING COMPANIES. DISPOSAL OF SMALL AMOUNTS OF SPILLED MATERIAL MAY BE HANDLED AS DESCRIBED UNDER "LEAK OR SPILL CLEANUP". LARGE SPILLS MUST BE DEALT WITH SEPARATELY AND MUST BE HANDLED BY QUALIFIED DISPOSAL COMPANIES.
SPECIAL SHIPPING INFORMATION: FOLLOW ALL TDG REGULATIONS AND SEE CLASSIFICATION IN SECTION I

SECTION IX PREPARATION INFORMATION

PREPARED BY: TECHNICAL AFFAIRS DEPARTMENT, BDH INC.,
TORONTO, ONTARIO
(416)255-8521
DATE: AUG 22, 1988
REVISION DATE: FEB 22, 1989; MAR 20, 1989; FEB 15, 1990; SEP 27, 1990; JULY 7, 1992; MAR 29, 1994; AUG 10, 1994; AUG 25, 1994; APR 24, 1995; SEPT 13, 1996

WHMIS CLASSIFICATION: E, D1B

THE STATEMENTS CONTAINED HEREIN ARE OFFERED FOR INFORMATIONAL PURPOSES ONLY AND ARE BASED UPON TECHNICAL DATA THAT BDH INC BELIEVES TO BE ACCURATE. IT IS INTENDED FOR USE ONLY BY PERSONS HAVING THE NECESSARY TECHNICAL SKILLS AND AT THEIR OWN DISCRETION AND RISK. SINCE CONDITIONS AND MANNER OF USE ARE OUTSIDE OUR CONTROL, WE MAKE NO WARRANTY,EXPRESS OR IMPLIED OF MERCHANTABILITY,FITNESS OR OTHERWISE.

COPYRIGHT BDH, 1996

CLOROX -- CLOROX LIQUID BLEACH - SODIUM HYPOCHLORITE SOLUTION
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 013120376
Manufacturer's CAGE: 93098
Part No. Indicator: A
Part Number/Trade Name: CLOROX LIQUID BLEACH

General Information

Item Name: SODIUM HYPOCHLORITE SOLUTION
Company's Name: CLOROX COMPANY
Company's Street: 7200 JOHNSON DRIVE
Company's City: PLEASANTON
Company's State: CA
Company's Country: US
Company's Zip Code: 94566
Company's Emerg Ph #: 303-573-1014
Company's Info Ph #: 415-847-6100
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 09NOV89
Safety Data Review Date: 19MAR93
MSDS Serial Number: BSBBW
Hazard Characteristic Code: NK

Ingredients/Identity Information

Proprietary: NO
Ingredient: HYPOCHLOROUS ACID, SODIUM SALT; (SODIUM HYPOCHLORITE) (SARA III)
Ingredient Sequence Number: 01
Percent: 5.25
NIOSH (RTECS) Number: NH3486300
CAS Number: 7681-52-9
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance And Odor: CLEAR, LIGHT YELLOW LIQUID WITH CHLORINE ODOR.
Boiling Point: SUPP DATA
Specific Gravity: 1.085 (H*2O=1)
Solubility In Water: COMPLETE
pH: 11.4

Fire and Explosion Hazard Data

Extinguishing Media: USE MEDIA SUITABLE FOR SURROUNDING FIRE(FP N).
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N). IN FIRE, COOL CONTAINERS TO PREVENT RUPTURE & RELEASE OF SODIUM CHLORATE.
Unusual Fire And Expl Hazrds: NOT FLAMMABLE OR EXPLOSIVE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: SEE DECOMPOSITION PRODUCTS.
Hazardous Decomp Products: REACTS W/HOUSEHOLD CHEMS SUCH AS TOILET BOWL CLEANERS, RUST REMOVERS, VINEGAR, ACIDS OR AMMONIA CNTNG PRODS TO (SUPDAT)
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: CAUSES SEVERE BUT TEMPORARY EYE INJURY. MAY IRRIT SKIN. MAY CAUSE NAUSEA & VOMIT IF INGEST. EXPOS TO VAP/MIST MAY IRRIT NOSE, THROAT & LUNGS. UNDER NORMAL CONSUMER USE CONDITIONS THE LIKELIHOOD OF ANY ADVERSE HEALTH AFFECTS ARE LOW.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT.
Signs/Symptoms Of Overexp: SEE HEALTH HAZARDS.
Med Cond Aggravated By Exp: FOLLOWING MED CNDTNS MAY BE AGGRAVATED BY EXPOS TO HIGH CONCENTRATION OF VAP/MIST: HEART CDNTNS, CHRONIC RESP PROBLEMS SUCH AS ASTHMA, CHRONIC BRONCHITIS OR OBSTRUCTIVE LUNG DISEASE.
Emergency/First Aid Proc: EYES: IMMEDIATELY FLUSH EYES WITH PLENTY OF REMOVE CONTAMD CLOTHING. WASH AREA WITH WATER FOR AT LEAST 15 MINUTES. INGEST: DRINK A GLASSFUL OF WATER AND CALL MD. INHAL: IF BREATHING PROBLEMS DEVELOP REMOVE TO FRESH AIR.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: SMALL QTYS OF <5 GALS MAY BE FLUSHED DOWN DRAIN. FOR LARGER QTYS WIPE UP W/ABSORB MATL/MOP & DISP OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.
Neutralizing Agent: DILUTE WITH WATER TO MINIMIZE OXIDIZING EFFECT ON SPILLED AREA.
Waste Disposal Method: DISPOSE OF IN ACCORDANCE WITH ALL LOCAL, STATE & FEDERAL REGULATIONS (FP N)
Precautions-Handling/Storing: STORE IN A COOL, DRY PLACE. DO NOT REUSE EMPTY CONTAINER; RINSE CONTAINER AND PUT IN TRASH CONTAINER.
Other Precautions: KEEP OUT OF REACH OF CHILDREN. DO NOT GET IN EYES/ON SKIN. WASH THORO WITH SOAP & WATER AFTER HANDLING. DO NOT MIX W/OTHER HOUSEHOLD CHEMICALS.

Control Measures

Respiratory Protection: WEAR NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN(FP N).
Ventilation: USE GENERAL VENTILATION TO MINIMIZE EXPOSURE TO VAPOR OR MIST.
Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: ANSI APPROVED CHEM WORK GOGGLES (FP N).
Other Protective Equipment: AVOID EYE & SKIN CONTACT & INHALATION OF VAPOR OR MIST.
Work Hygienic Practices: WEAR SAFETY GLASSES. WITH REPEATED OR PROLONGED USE, WEAR GLOVES.
PRODUCE HAZARDOUS GASES, SUCH AS CHLORINE & OTHER CHLORINATED SPECIES. PROLONGED CONTACT WITH METAL MAY CAUSE PITTING OR DISCOLORATION.

Transportation Data

Trans Data Review Date: 93308
DOT PSN Code: HNV
DOT Proper Shipping Name: HYPOCHLORITE SOLUTIONS
DOT Class: 8
DOT ID Number: UN1791
DOT Pack Group: III
DOT Label: CORROSIVE
IMO PSN Code: NTF
IMO Proper Shipping Name: SODIUM HYPOCHLORITE, SOLUTION
IMO Regulations Page Number: SEE 8186
IMO UN Number: 1791

IMO UN Class: 8
IMO Subsidiary Risk Label: -
IATA PSN Code: NYC
IATA UN ID Number: 1791
IATA Proper Shipping Name: HYPOCHLORITE SOLUTION *
IATA UN Class: 8
IATA Label: CORROSIVE
AFI PSN Code: NYC
AFI Prop. Shipping Name: HYPOCHLORITE SOLUTIONS
AFI Class: 8
AFI ID Number: UN1791
AFI Pack Group: III
AFI Label: CORROSIVE
AFI Special Prov: N34
AFI Basic Pac Ref: 12-5

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 19MAR93
Label Date: 11MAR93
Label Status: G
Common Name: CLOROX LIQUID BLEACH
Chronic Hazard: NO
Signal Word: WARNING!
Acute Health Hazard-Slight: X
Contact Hazard-Moderate: X
Fire Hazard-None: X
Reactivity Hazard-Slight: X
Special Hazard Precautions: STRONG OXIDIZER! STORE IN A COOL, DRY PLACE. DO NOT GET IN EYES OR ON SKIN. DO NOT MIX W/OTHER HOUSEHOLD CHEMICALS. ACUTE:CAUSES SEVERE BUT TEMPORARY EYE INJURY. MAY IRRITATE SKIN. MAY CAUSE NAUSEA & VOMITING IF INGESTED. EXPOSURE TO VAPOR OR MIST MAY IRRITATE NOSE, THROAT & LUNGS. UNDER NORMAL CONSUMER USE CONDITIONS THE LIKELIHOOD OF ANY ADVERSE HEALTH AFFECTS ARE LOW.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: CLOROX COMPANY
Label Street: 7200 JOHNSON DRIVE
Label City: PLEASANTON
Label State: CA
Label Zip Code: 94566
Label Country: US
Label Emergency Number: 303-573-1014

URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

SODIUM PHOSPHATE MONOBASIC

Material Safety Data Sheet

Mallinckrodt Chemical, Inc.
P.O. Box 800
Paris, Kentucky 40362

Emergency Telephone Numbe
314-539-1600

Effective Date: 08-07-85

PRODUCT IDENTIFICATION:

Synonyms: Sodium phosphate monobasic monohydrate; sodium biphosphate; sodium acid phosphate; phosphoric acid, monosodium salt, monohydrate

Formula CAS No.: 10049-21-5 (Hydrate)
TSCA CAS No.: 7558-80-7 (Anhydrous)
Hazardous Ingredients: Not applicable.

Molecular Weight: 137.99

Chemical Formula: NaH2 PO4 H20

PRECAUTIONARY MEASURES

As part of good industrial and personal hygiene and safety procedure, avoid all unnecessary exposure to the chemical substance and ensure prompt removal from skin, eyes and clothing.

EMERGENCY FIRST AID

SECTION 5.

Physical Data

SECTION 1

Appearance: White crystalline pouder.

Odor: Odorless.

Solubility: 59.9 g/100g @ 0 C (32 F)

Boiling Point: Decomposes @ 204 C (399 F)

Vapor Density (Air=1): No information found.

Melting Point: Loses water @ 100 C (212 F)

Vapor Pressure (mm Hg): No information found.

Specific Gravity: 2.04

Evaporation Rate: No information found.

Fire and Explosion Information

SECTION 2

F[illegible]: 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.

Reactivity Data — SECTION 3

Stability: Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products: When heated to decomposition, it emits highly toxic fumes of phosphorous oxides.

Hazardous Polymerization: Will not occur.

Incompatibilities: No incompatibility data found.

Leak/Spill Disposal Information — SECTION 4

Ventilate area of leak or spill. Clean-up personnel may require respiratory protection from dust. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal. Disposal: Whatever cannot be saved for reclamation may be delivered to an approved waste disposal facility. Small amounts of residue may be flushed to sewer with plenty of water.

Ensure compliance with local, state and federal regulations.

Health Hazard Information — SECTION 5

A. Exposure/Health Effects

Inhalation: May cause mild irritation to the mucous membranes.

Ingestion: May cause mild irritation and redness to the G.I. tract.

Skin Contact: Contact may cause slight irritation.

Eye Contact: Contact may cause slight irritation.

Chronic Exposure: No information found.

Aggravation of Pre-existing Conditions: No information found.

B. FIRST AID

Inhalation: Remove to fresh air. Get medical attention for any breathing difficulty.

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

Skin Exposure: Wash exposed area with soap and water. Get medical

advice if irritation develops.

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

C. TOXICITY (RTECS, 1986)

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

Occupational Control Measures SECTION 6

Airborne Exposure Limits: None established.

Ventilation System: In general, dilution ventilation is a satisfactory health hazard control for this substance. However, if conditions of use create discomfort to the worker, a local exhaust system should be considered.

Personal Respirators (NIOSH Approved) For conditions of use where exposure to the dust is apparent, a dust/mist respirator may be worn. For emergencies, a self-contained breathing apparatus may be necessary.

Skin Protection: Wear protective gloves and clean body-covering clothing.

Eye Protection: Safety glasses. Maintain eye wash fountain and quick-drench facilities in work area.

Storage and Special Information SECTION 7

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

****
Mallinckrodt provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. Individuals receivin the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR TO THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION
****
SOPHM

Addendum to Material Safety Data Sheet

REGULATORY STATUS

Hazard Categories for SARA
Section 311/312 Reporting

Acute	Chronic	Fire	Pressure	Reactive

Product or Components of Product:	SARA EHS Sec. 302 RQ	SARA EHS Sec. 302 TPQ	SARA Sec. 313 Chemicals Name List	SARA Sec. 313 Chemicals Chemical Category	CERCLA Sec.103 RQ lbs	RCRA Sec. 261.33
SODIUM PHOSPHATE MONOBASIC (7558-80-7)	No	No	No	No	No	No

SARA Section 302 EHS RQ:
Reportable Quantity of Extremely Hazardous Substance, listed at 40 CFR 355.

SARA Section 302 EHS TPQ:
Threshold Planning Quantity of Extremely Hazardous substance. An asterisk (*) following a Threshold Planning Quantity signifies that if the material is a solid and has a particle size equal to or larger than 100 micrometers, the Threshold Planning Quantity = 10,000 LBS.

SARA Section 313 Chemicals:
Toxic Substances subject to annual release reporting requirements listed at 40 CFR 372.65.

CERCLA Sec. 103:
Comprehensive Enviromental Response, Compensation and Liability Act (Superfund) Releases to air, land or water of these hazardous substances which exceed the Reportable Quantity (RQ) must be reported to the National Response Center, (800-424-8802); Listed at 40 CFR 302.4

RCRA:
Resource Conservation and Recovery Act. Commercial chemical product wastes designated as acute hazards or toxic under 40 CFR 261.33

SOPHM

SODIUM PHOSPHATE MONOBASIC
"ISSUED BY VUR 05/23/97"

CHEMICAL PRODUCTS -- SODIUM SULFIDE, HYDRATED
MATERIAL SAFETY DATA SHEET
NSN: 681000N080155
Manufacturer's CAGE: 2R425
Part No. Indicator: A
Part Number/Trade Name: SODIUM SULFIDE, HYDRATED

General Information

Company's Name: CHEMICAL PRODUCTS CORP
Company's Street: 102 OLD MILL RD SE
Company's P. O. Box: 2470
Company's City: CARTERSVILLE
Company's State: GA
Company's Country: US
Company's Zip Code: 30120-1692
Company's Emerg Ph #: 800-424-9300(CHEMTREC)
Company's Info Ph #: 706-382-2144; 770-382-2212
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 01OCT95
Safety Data Review Date: 18NOV97
MSDS Serial Number: CFSBV

Ingredients/Identity Information

Proprietary: NO
Ingredient: SODIUM SULFIDE, ANHYDROUS; (SODIUM SULFIDE)
Ingredient Sequence Number: 01
Percent: 60-63
NIOSH (RTECS) Number: WE1905000
CAS Number: 1313-82-2
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: WATER
Ingredient Sequence Number: 02
Percent: 37-40
NIOSH (RTECS) Number: ZC0110000
CAS Number: 7732-18-5
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
DESTRUCTION OF LINING OF ESOPHAGUS & STOMACH. RAPID BRTHG, (ING 4)
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 3: CONFUSION, UNCON, PARALYSIS OF RESP MUSCLES LEADING TO DEATH. CHRONIC: INHAL: EXTREME IRRIT TO RESP (ING 5)
Ingredient Sequence Number: 04
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
EXTREME IRRIT TO EYES CAUSED BY DUSTS; CORNEAL (ING 6)

Ingredient Sequence Number: 05
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 5: OPACITY. INGEST:HEADACHE, NAUSEA, DIZZINESS, CONFUSION & PAINFUL ALKALI BURNS TO ESOPHAGUS. TOXICOLOGICAL (ING 7)
Ingredient Sequence Number: 06
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
CORROSIVE DUE TO PROD'S ALKALINITY. MAY BE TOXIC WHEN (ING 8)
Ingredient Sequence Number: 07
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
TOXIC - HUMAN ORAL LDLO REPORTED TO BE 50 MG/KG FOR (ING 9)
Ingredient Sequence Number: 08
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 8: ANHYDROUS SODIUM SULFIDE. INHAL:TOXIC - HYDROGEN SULFIDE INHAL IS ASSUMED. HUMAN LCLO IS 600 PPM FOR 30 (ING 10)
Ingredient Sequence Number: 09
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 9: MIN FOR HYDROGEN SULFIDE. SUB-CHRONIC:IRRIT TO CONJUNCTIVA & CORNEA OF EYE FROM VAPS. NOT A KNOWN CARCIN.(ING 11)
Ingredient Sequence Number: 10
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 10: CHRONIC ACUTE EXPOS TO DUST MAY CAUSE NEURO DEFICITS LIKE THOSE IN SURVIVORS OF OTHER SEV ASPHYXIANT POISONINGS.
Ingredient Sequence Number: 11
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: FIRST AID PROC: SKIN: FLUSH WITH LARGE QUANTITIES OF WATER. WASH WITH SOAP AND WATER IF AVAILABLE.
Ingredient Sequence Number: 12
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: SPILL PROC: AS HYDROGEN PEROXIDE OR SODIUM HYPOCHLORITE TO OXIDIZE SULFIDE & ELIM DANGER OF HYDROGEN SULFIDE EVOLUTION.
Ingredient Sequence Number: 13

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

Proprietary: NO
Ingredient: WASTE DISP METH: SULFATE; CARE SHOULD BE TAKEN AS REACTION MAY BE VIOLENT. WASTE WITH A PH OF 12.5 OR ABOVE IS (ING 15)
Ingredient Sequence Number: 14
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 14: HAZARDOUS BECAUSE OF ITS CORROSIVITY.
Ingredient Sequence Number: 15
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: EYE PROT: & FULL LENGTH FACESHIELD (FP N).
Ingredient Sequence Number: 16
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
==========

Physical/Chemical Characteristics

==========
Appearance And Odor: YELLOW OR ORANGE WAXY-LOOKING SOLID; "ROTTEN EGG" ODOR.
Boiling Point: 293F,145C
Melting Point: 196F,91C
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Specific Gravity: 1.69
Evaporation Rate And Ref: N/A
Solubility In Water: SUPDAT
pH: SUPDAT
==========

Fire and Explosion Hazard Data

==========
Flash Point: NON-FLAMMABLE
Extinguishing Media: USE WATER IN FLOODING QUANTITIES. A HEAVY FOG OF WATER MAY BE EFFECTIVE IN KNOCKING DOWN VAPORS.
Special Fire Fighting Proc: USE NIOSH APPRVD SCBA & FULL PROT EQUIPMENT (FP N). DO NOT USE CARBON DIOXIDE FIRE EXTINGUISHERS BECAUSE TOXIC HYDROGEN SULFIDE GAS MAY BE LIBERATED FROM PROD.
Unusual Fire And Expl Hazrds: FINELY DIVIDED DUST FORMS COMBUST MIXS W/ AIR. DRY GRINDING OF THESE FLAKES CAN RSLT IN FIRES IN GRINDING EQUIP. POISON, FLAM HYDROGEN SULFIDE GAS WILL (SUPDAT)
==========

Reactivity Data

==========
Stability: YES
Cond To Avoid (Stability): CONTACT W/ACIDS LIBERATES POISONOUS, FLAMMABLE HYDROGEN SULFIDE. MIXING W/STRONG OXIDIZERS CAUSES A VIOLENT REACTION.
Materials To Avoid: ACIDS AND STRONG OXIDIZERS.
Hazardous Decomp Products: VERY HIGH TEMPERATURES WILL DECOMPOSE THIS PRODUCT TO FORM POISONOUS HYDROGEN SULFIDE GAS.
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: HUMAN EFFECTS: HIGH ALKALINITY MAKES THIS PROD CORROSIVE TO MUC MEMBS - CHEM BURNS RSLT FROM CONTACT. DUST CAUSES IRRIT TO CONJUNCTIVA & CORNEA OF EYES & TO RESP PASSAGES. IN ACUTE OVEREXP, VICTIM EXPERIENCES HEADACHE, NAUSEA, DIZZINESS, CONFUSION & WEAKNESS OF EXTREMITIES, FOLLOWED BY PRECIPITOUS (EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT
SEVERE RESP DISTRESS, CONFUSION, WEAKNESS OF EXTREMITIES, UNCON, PULMONARY EDEMA, ASPHYXIATION & POSS CENTRAL RESP PARALYSIS LEADING TO DEATH. SKIN CONTACT: PAINFUL CHEM BURNS. SYSTEMIC POISONING BY SULFIDE CAUSES HEADACHE, NAUSEA, DIZZINESS, CONFUSION, WEAKNESS OF (SUPDAT)
Med Cond Aggravated By Exp: NONE ARE KNOWN.
Emergency/First Aid Proc: INGEST: HAVE VICTIM DRINK AS MUCH MILK OR WATER AS POSSIBLE. DO NOT INDUCE VOMITING. IF VOMITING OCCURS, GIVE MORE LIQUIDS. NEVER GIVE ANYTHING BY MOUTH TO UNCON PERSON. GET IMMED MED ASSISTANCE. INHAL: REMOVE FROM CONTAMD ATMOSPHERE. BEGIN ARTF RESP IMMED IF NEC. BEGIN CPR IMMED IF NEC. ADMINISTER OXYGEN IF AVAIL. EYES: FLUSH W/ LARGE QTYS OF WATER FOR AT LST 15 MIN. ALWAYS SEEK MED ATTN. (ING 12)
==========

Precautions for Safe Handling and Use

==========
Steps If Matl Released/Spill: SMALL SPILL: KEEP DRY & AWAY FROM ACID. SCOOP UP & STORE IN SEALED CONTAINERS. LARGE SPILLS: KEEP DRY & AWAY FROM ACID. RECOVER AS MUCH OF THE SOLID AS POSSIBLE. IF MATERIAL IS DISSOLVED IN WATER, MIX SOLUTION W/EXCESS OXIDIZING AGENT SUCH (ING 13)
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISPOSE OF I/A/W LOCAL, STATE & FED REGS. WASTE CONTAINING SULFIDE MAY BE HAZARDOUS & MAY REQUIRE DISPOSAL IN APPRVD HAZARDOUS WASTE LANDFILL. SULFIDE CAN BE OXIDIZED W/DILUTE HYDROGEN PEROXIDE OR ANY OTHER OXIDIZING AGENT TO NON-HAZARDOUS (ING 14)
Precautions-Handling/Storing: STORAGE TEMPERATURE: AS COOL AS PRACTICAL, NEVER ABOVE 80C(176F). STORAGE PRESSURE: ATMOSPHERIC.
Other Precautions: POISON HYDROGEN SULFIDE GAS WILL BE PRESENT IF THIS PRODUCT CONTACTS ACID. KEEP AWAY FROM ACID. DO NOT STORE IN CONTACT WITH COPPER, ZINC OR ALUMINUM. KEEP CONTAINERS CLOSED TO AVOID SLOW REACTION WITH AIR (OXYGEN AND CARBON DIOXIDE).
==========

Control Measures

==========
Respiratory Protection: USE NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS OR SUPPLIED-AIR RESPIRATOR IF THE PEL FOR HYDROGEN SULFIDE MIGHT BE EXCEEDED.
Ventilation: ADEQUATE VENTILATION IS REQUIRED TO REMOVE THE TOXIC AND CORROSIVE DUST WHICH MAY BE PRESENT.
Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: ANSI APPRVD CHEM WORKERS GOGGS (ING 16)
Other Protective Equipment: ANSI APPROVED EYE WASH & DELUGE SHOWER (FP N).
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: PH: HIGHLY ALKALINE. SOL IN H*2O: 25 GRAMS PER 100 ML OF WATER AT 10C(50F). EXPLO HAZ: BE EVOLVED FROM THIS PROD ON EXPOS TO ACID OR EXCESSIVE HEAT. IF PROD BURNS, TOXIC SULFUR OXIDE GASES ALKALI BURNS TO CONJUNCTIVA & CORNEA W/POSS (ING 3)
==========

Transportation Data

==========
==========

Disposal Data

==========

==========

Label Data

==========

Label Required: YES
Technical Review Date: 18NOV97
Label Date: 10NOV97
Label Status: G
Common Name: SODIUM SULFIDE, HYDRATED
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Severe: X
Fire Hazard-Slight: X
Reactivity Hazard-Slight: X
Special Hazard Precautions: CORROSIVE POISON. ACUTE: INHAL: SEV RESP DISTRESS, CONFUSION, WEAK OF EXTREMITIES, UNCON, PULM EDEMA, ASPHY & CENTRAL RESP PARALYSIS LEADING TO DEATH. SKIN: PAINFUL CHEM BURNS. SYSTEMIC POISONING CAUSES HDCH, NAUSEA, DIZZ, CONFUSION, WEAK OF EXTREMITIES & POSS UNCON. EYES: ALKALI BURNS TO CONJUNCTIVA & CORNEA W/POSS IRREVERSIBLE DESTRUCTION OF TISSUE. INGEST: DESTRUCTION OF LINING OF ESOPHAGUS & STOMACH. RAPID BRTHG, CONFUSION, UNCON, PARALYSIS OF RESP MUSCS LEADING TO EXTREME IRRIT; CORNEAL OPACITY. INGEST: HDCH, NAUSEA, DIZZ, CONFUSION & PAINFUL BURNS TO ESOPHAGUS.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: CHEMICAL PRODUCTS CORP
Label Street: 102 OLD MILL RD SE
Label P.O. Box: 2470
Label City: CARTERSVILLE
Label State: GA
Label Zip Code: 30120-1692
Label Country: US
Label Emergency Number: 800-424-9300(CHEMTREC)

SODIUM SULFIDE

Material Safety Data Sheet

Mallinckrodt Chemical, Inc.
P.O. Box 800
Paris, Kentucky 40362

Emergency Telephone Numbe
314-539-1600

Effective Date: 04-06-89 Supersedes 06-10-86

PRODUCT IDENTIFICATION:

Synonyms: Sodium sulfide nonhydrate; Sodium monosulfide

Formula CAS No.: 1313-84-4 (Hydrated)
TSCA CAS No.: 1313-82-2 (Anhydrous)
Hazardous Ingredients: Sodium sulfide

Molecular Weight: 240.18
Chemical Formula: Na2S.9H2O

PRECAUTIONARY MEASURES

DANGER! MAY BE FATAL IF SWALLOWED OR INHALED. CORROSIVE. CAUSES BURNS.

Do not get in eyes.
Avoid breathing gas.
Avoid contact with eyes, skin and clothing.
Keep container closed.
Use only with adequate ventilation.

EMERGENCY FIRST AID

If swallowed, give several glasses of water or milk to drink. Vomiting may occur spontaneously, but DO NOT INDUCE! Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. In all cases call a physician.
SEE SECTION 5.

Physical Data — SECTION 1

Appearance: White crystals.

Odor: Sulfide odor.

Solubility: 200 g in 100 g of water.

Boiling Point: Not applicable.

Vapor Density (Air=1): No information found.

Melting Point: ca. 50 C(ca. 122 F)

Vapor Pressure (mm Hg): No information found.

Density: 1.43

Evaporation Rate: No information found.

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

Fire and Explosion — SECTION 2

Information

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.

Reactivity Data — SECTION 3

Stability: Darkens on exposure to air or light. Sodium hydroxide forms in aqueous solutions.

Hazardous Decomposition Products: Hydrogen sulfide at room temperature, oxides of sulfur and sodium under fire conditions.

Hazardous Polymerization: This substance does not polymerize.

Incompatibilities: Acids, oxidants.

Leak/Spill Disposal Information — SECTION 4

Ventilate area of leak or spill. Clean-up personnel require protective clothing and respiratory protection from dust. Spills: Pick up and place in a suitable container for reclamation or disposal in a method that does not generate dust. Disposal: Whatever cannot be saved for reclamation may be disposed in a RCRA approved hazardous waste facility. Do not contact with acids. Do not handle with bare hands.

Ensure compliance with local, state and federal regulations.

Health Hazard Information — SECTION 5

A. Exposure/Health Effects

Inhalation: Hazard is highly toxic (50-100 ppm in air) hydrogen sulfide which may accumulate in confined spaces due to the decomposition of sodium sulfide or from its reaction with acids. Symptoms include painful conjunctivitis, headache, nausea, dizziness, coughing and, in extreme cases, pulmonary edema and possible death.

Ingestion: Corrosive, toxic. Sodium sulfide is a strong base and can cause severe burns on the mucous membrane. Hydrolysis by gastric fluids releases toxic hydrogen sulfide. The symptoms and effects are similar to those under inhalation, above.

Skin Contact: Irritant. Contact with skin can produce serious caustic burns with painful inflamation and possible destruction of tissue.

Eye Contact: Irritant. Inflamation, tearing and pain may be expected. Severe contact can cause destruction of tissue.

Chronic Exposure: No information found.

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

B. FIRST AID

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

Ingestion: Give several glasses of water or milk, if available, to drink. Vomiting may occur spontaneously, but DO NOT INDUCE! Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Exposure: 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. Call a physician immediately.

Eye Exposure: Wash eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

C. TOXICITY (RTECS, 1986)

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

Occupational Control Measures SECTION 6

Airborne Exposure Limits: For hydrogen sulfide: -OSHA Permissible Exposure Limit (PEL): 10 ppm, 15 ppm (STEL) -ACGIH Threshold Limit Value (TLV): 10 ppm, 15 ppm (STEL)

Ventilation System: A local exhaust system which captures the contaminant at its source is recommended to prevent dispersion of the contaminant into the workroom air.

Personal Respirators (NIOSH Approved) For conditions of use where exposure to the dust is apparent, a dust/mist respirator may be worn. For emergencies, a self-contained breathing apparatus may be necessary.

Skin Protection: Wear protective gloves and clean body-covering

clothing.

Eye Protection: Use chemical safety goggles. Contact lenses should not be worn when working with this material. Maintain eye wash fountain and quick-drench facilities in work area.

Storage and Special Information SECTION 7

Keep in a tightly closed container. Protect container from physical damage. Store in an explosion-proof refrigerator, Isolate from acids and alkalies.

****
Mallinckrodt provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. Individuals receivin the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR TO THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION
****
SOSUD

Addendum to Material Safety Data Sheet

REGULATORY STATUS

Hazard Categories for SARA
Section 311/312 Reporting

Acute	Chronic	Fire	Pressure	Reactive
X				

Product or Components of Product:	SARA EHS Sec. 302 RQ	SARA EHS Sec. 302 TPQ	SARA Sec. 313 Chemicals Name List	SARA Sec. 313 Chemicals Chemical Category	CERCLA Sec.103 RQ lbs	RCRA Sec. 261.33
SODIUM SULFIDE (1313-82-2)	No	No	No	No	No	No

SARA Section 302 EHS RQ:
Reportable Quantity of Extremely Hazardous Substance, listed at 40 CFR 355.

SARA Section 302 EHS TPQ:
Threshold Planning Quantity of Extremely Hazardous substance. An asterisk (*) following a Threshold Planning Quantity signifies that if the material is a solid and has a particle size equal to or larger than 100 micrometers, the Threshold Planning Quantity = 10,000 LBS.

SARA Section 313 Chemicals:

Toxic Substances subject to annual release reporting requirements listed at 40 CFR 372.65.

CERCLA Sec. 103:
Comprehensive Environmental Response, Compensation and Liability Act (Superfund) Releases to air, land or water of these hazardous substances which exceed the Reportable Quantity (RQ) must be reported to the National Response Center, (800-424-8802); Listed at 40 CFR 302.4

RCRA:
Resource Conservation and Recovery Act. Commercial chemical product wastes designated as acute hazards or toxic under 40 CFR 261.33

SOSUD

SODIUM SULFIDE
"ISSUED BY VWR 05/23/97"

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER.....:

EM SCIENCE
A DIVISION OF EM INDUSTRIES
P.O. BOX 70
480 DEMOCRAT RD.
GIBBSTOWN, N.J. 08027

PREPARATION DATE.: 03/01/91
DATE MSDS PRINTED.: JUN 11, 1992

INFORMATION PHONE NUMBER.: 609-354-9200
HOURS: MON. TO FRI. 8:30-5
CHEMTREC EMERGENCY NUMBER: 800-424-9300
HOURS: 24 HRS A DAY

CATALOG NUMBER(S):
SX0930 1252 1257 1259

CHEMICAL NAME....: STARCH, SOLUBLE
TRADE NAME.....: AMYLODEXTRIN, MODIFIED STARCH
CHEMICAL FAMILY..: CARBOHYDRATE
FORMULA.....: (C6H10O5)N

MOLECULAR WEIGHT.: VARIES

2. COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENT	CAS #	APPR %
STARCH, SOLUBLE	9005-84-9	100%

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
MAY BE IRRITATING TO RESPIRATORY SYSTEM.
APPEARANCE.....:
WHITE POWDER

POTENTIAL HEALTH EFFECTS (ACUTE AND CHRONIC)

SYMPTOMS OF EXPOSURE:
-TOXICITY CONSIDERED VERY LOW
DUST MAY BE IRRITATING TO RESPIRATORY PASSAGES
PROLONGED SKIN CONTACT MAY CAUSE IRRITATION

MEDICAL COND. AGGRAVATED BY EXPOSURE:
RESPIRATORY CONDITIONS
ROUTES OF ENTRY.....:
INHALATION, INGESTION
CARCINOGENICITY.....:
THE MATERIAL IS NOT LISTED AS A CANCER CAUSING AGENT.

4. FIRST AID MEASURES

EMERGENCY FIRST AID:
INGESTION: GET IMMEDIATE MEDICAL ATTENTION.
SKIN: WASH THOROUGHLY WITH SOAP AND WATER.
EYES: IMMEDIATELY FLUSH THOROUGHLY WITH WATER FOR AT LEAST 15 MINUTES.
DUST INHALATION: REMOVE TO FRESH AIR
INGESTION OF LARGE QUANTITY: IF CONSCIOUS, INDUCE VOMITING

5. FIRE FIGHTING MEASURES

FLASH POINT (F).....: NONE
FLAMMABLE LIMITS LEL (%).: N/A
FLAMMABLE LIMITS UEL (%).: N/A
EXTINGUISHING MEDIA.....:
WATER SPRAY, FOAM, CO2, DRY CHEMICAL
FIRE FIGHTING PROCEDURES.:
WEAR SELF-CONTAINED BREATHING APPARATUS.
FIRE & EXPLOSION HAZARDS.:
AIRBORN DUST CAN IGNITE OR EXPLODE WHEN EXPOSED TO FLAME.

6. ACCIDENTAL RELEASE MEASURES

SPILL RESPONSE:
EVACUATE THE AREA OF ALL UNNECESSARY PERSONNEL.
WEAR SUITABLE PROTECTIVE EQUIPMENT LISTED UNDER EXPOSURE / PERSONAL PROTECTION.
ELIMINATE ANY IGNITION SOURCES UNTIL THE AREA IS DETERMINED TO BE FREE FROM EXPLOSION OR FIRE HAZARDS.
CONTAIN THE RELEASE AND ELIMINATE ITS SOURCE, IF THIS CAN BE DONE WITHOUT RISK.
TAKE UP AND CONTAINERIZE FOR PROPER DISPOSAL AS DESCRIBED UNDER DISPOSAL.
COMPLY WITH FEDERAL, STATE, AND LOCAL REGULATIONS ON REPORTING RELEASES. REFER TO REGULATORY INFORMATION FOR REPORTABLE QUANTITY AND OTHER REGULATORY DATA.

7. HANDLING AND STORAGE

HANDLING & STORAGE:
KEEP CONTAINER CLOSED.
STORE AWAY FROM STRONG OXIDIZERS
DO NOT BREATHE DUST.
DO NOT GET IN EYES.
AVOID PROLONGED OR REPEATED SKIN CONTACT

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT:

VENTILATION, RESPIRATORY PROTECTION, PROTECTIVE CLOTHING, EYE PROTECTION
MATERIAL SHOULD BE HANDLED OR TRANSFERRED IN AN APPROVED FUME HOOD OR WITH ADEQUATE VENTILATION.
PROTECTIVE GLOVES (NATURAL RUBBER, NEOPRENE, PVC OR EQUIVALENT) SHOULD BE WORN TO PREVENT SKIN CONTACT
SAFETY GLASSES WITH SIDE SHIELDS SHOULD BE WORN AT ALL TIMES.

WORK / HYGENIC PRACTICES:
WASH THOROUGHLY AFTER HANDLING.
DO NOT TAKE INTERNALLY.
EYE WASH AND SAFETY EQUIPMENT SHOULD BE READILY AVAILABLE.

EXPOSURE GUIDELINES

OSHA - PEL:

COMPONENT	TWA PPM	TWA MG/M3	STEL PPM	STEL MG/M3	CL PPM	CL MG/M3	SKIN
STARCH, SOLUBLE							

ACGIH - TLV:

COMPONENT	TWA PPM	TWA MG/M3	STEL PPM	STEL MG/M3	CL PPM	CL MG/M3	SKIN
STARCH, SOLUBLE							

9. PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT (C 760 MMHG).: N/A
MELTING POINT (C).....: DECOMP.
SPECIFIC GRAVITY (H2O = 1).: N/A
VAPOR PRESSURE (MM HG).....: N/A 20C
PERCENT VOLATILE BY VOL (%): N/A
VAPOR DENSITY (AIR = 1).....: N/A
EVAPORATION RATE (BUAC = 1): N/A
SOLUBILITY IN WATER (%).....: SOLUBLE
APPEARANCE.....:
WHITE POWDER

10. STABILITY AND REACTIVITY

STABILITY.....: YES
HAZARDOUS POLYMERIZATION:
DOES NOT OCCUR

HAZARDOUS DECOMPOSITION.:
COX

CONDITIONS TO AVOID.....:
EXTREME HEAT; CONTACT WITH IGNITION SOURCE;
DUSTING

MATERIALS TO AVOID.....:
( )WATER
( )ACIDS
( )BASES
( )CORROSIVES
(X)OXIDIZERS
( )OTHER :

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA:

NONE ESTABLISHED
TOXICOLOGICAL FINDINGS:
NONE
CITED IN REGISTRY OF TOXIC EFFECTS OF SUBSTANCES (RTECS)

12. DISPOSAL CONSIDERATIONS

EPA WASTE NUMBERS:
TREATMENT:
MATERIAL DOES NOT HAVE AN EPA WASTE NUMBER AND IS NOT A LISTED WASTE, HOWEVER CONSULTATION WITH A PERMITTED WASTE DISPOSAL SITE (TSD) SHOULD BE ACCOMPLISHED.
ALWAYS CONTACT A PERMITTED WASTE DISPOSER (TSD) TO ASSURE COMPLIANCE WITH ALL CURRENT LOCAL, STATE AND FEDERAL REGULATIONS.

13. TRANSPORT INFORMATION

DOT PROPER SHIPPING NAME...:
(NON-REGULATED)
DOT ID NUMBER.....: (NONE)

14. REGULATORY INFORMATION

TSCA INVENTORY.....:
THE CAS NUMBER OF THIS PRODUCT IS LISTED ON THE TSCA INVENTORY.

COMPONENT	SARA EHS (302)	SARA EHS TPQ (LBS)	CERCLA RQ (LBS)
STARCH, SOLUBLE			

COMPONENT	OSHA FLOOR LIST	SARA 313	DEMINIMIS FOR SARA 313 (%)
STARCH, SOLUBLE			

15. OTHER INFORMATION

COMMENTS:
NONE
NFPA HAZARD RATINGS:
HEALTH : 0

FLAMMABILITY : 1
REACTIVITY : 0
SPECIAL HAZARDS:

REVISION HISTORY:
09/01/82 01/13/87 10/27/87 05/03/89

! = REVISED SECTION
N/A = NOT AVAILABLE
N/E = NONE ESTABLISHED

THE STATEMENTS CONTAINED HEREIN ARE OFFERED FOR INFORMATIONAL PURPOSES ONLY AND ARE BASED UPON TECHNICAL DATA THAT EM SCIENCE BELIEVES TO BE ACCURATE. IT IS INTENDED FOR USE ONLY BY PERSONS HAVING THE NECESSARY TECHNICAL SKILL AND AT THEIR OWN DESCRETION AND RISK. SINCE CONDITIONS AND MANNER OF USE ARE OUTSIDE OUR CONTROL, WE MAKE NO WARRANTY, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS OR OTHERWISE.

PORTIONS COPYRIGHT ARIEL RESEARCH CORPORATION, 1991. RESTRICTED USE CONDITIONS APPLY. SELECTED REGULATORY INFORMATION IN THIS MSDS HAS BEEN DERIVED FROM ARIEL RESEARCH CORPORATION'S INTERNATIONAL CHEMICAL REGULATORY MONITORING SYSTEM (ICRMS). USE OF THIS DATA IS PROVIDED SUBJECT TO THE TERMS OF THE LICENSE AGREEMENT BETWEEN EM INDUSTRIES AND ARIEL RESEARCH CORPORATION. FURTHER DISTRIBUTION IS PROHIBITED WITHOUT AUTHORIZATION.

J.T.BAKER INC. 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865

M A T E R I A L S A F E T Y D A T A S H E E T

24-HOUR EMERGENCY TELEPHONE -- (908) 859-2151

CHEMTREC # (800) 424-9300 -- NATIONAL RESPONSE CENTER # (800) 424-8802

MALLINCKRODT BAKER,INC., 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865

SECTION I -- PRODUCT IDENTIFICATION

PRODUCT NAME: SULFURIC ACID
COMMON SYNONYMS: OIL OF VITRIOL; HYDROGEN SULFATE; SULPHURIC ACID
CHEMICAL FAMILY: INORGANIC ACIDS
FORMULA: H2SO4
FORMULA WT.: 98.08
CAS NO.: 7664-93-9
NIOSH/RTECS NO.: WS5600000
PRODUCT USE: LABORATORY REAGENT
PRODUCT CODES: 9681,9694,9686,5815,9691,9673,4802,5340,9688,9685,9675,9687
5137,9680,9683,5432,9682,6902,9679,9693,5030,9676,9674,5802
9684,5374,5643,5837

PRECAUTIONARY LABELING

BAKER SAF-T-DATA* SYSTEM

HEALTH	-	3	SEVERE (POISON)
FLAMMABILITY	-	0	NONE
REACTIVITY	-	3	SEVERE (WATER REACTIVE)
CONTACT	-	4	EXTREME (CORROSIVE)

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

U.S. PRECAUTIONARY LABELING

POISON DANGER

CAUSES SEVERE BURNS. REACTS VIOLENTLY WITH WATER. HARMFUL IF SWALLOWED OR INHALED. CONTACT WITH OTHER MATERIALS MAY CAUSE FIRE.
DO NOT GET IN EYES, ON SKIN, ON CLOTHING. DO NOT BREATHE VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. LOOSEN CLOSURE CAUTIOUSLY. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF SPILL NEUTRALIZE WITH SODA ASH OR LIME AND PLACE IN DRY CONTAINER.

CONTINUED ON PAGE: 2

PRECAUTIONARY LABELING (CONTINUED)

INTERNATIONAL LABELING

AVOID CONTACT WITH EYES. AFTER CONTACT WITH SKIN, WASH IMMEDIATELY WITH PLENTY OF WATER. KEEP CONTAINER TIGHTLY CLOSED.

SAF-T-DATA* STORAGE COLOR CODE: WHITE (CORROSIVE)

SECTION II - COMPONENTS

COMPONENT	CAS NO.	WEIGHT %	OSHA/PEL	ACGIH/TLV
SULFURIC ACID	7664-93-9	80-98	1 MG/M3	1 MG/M3
WATER	7732-18-5	2-20	N/E	N/E

SECTION III - PHYSICAL DATA

BOILING POINT: 327 C (620 F)
(AT 760 MM HG)

MELTING POINT: -2 C (28 F)
(AT 760 MM HG)

SPECIFIC GRAVITY: 1.84
(H2O=1)

SOLUBILITY(H2O): COMPLETE (100%)

PH: 1.0 (0.05M SOLUTION)

ODOR THRESHOLD (P.P.M.): N/A

VAPOR PRESSURE (MMHG): <0.3
(20 C)

VAPOR DENSITY (AIR=1): 3.4

EVAPORATION RATE: <1
(BUTYL ACETATE = 1)

% VOLATILES BY VOLUME: N/A
(21 C)

PHYSICAL STATE: LIQUID

COEFFICIENT WATER/OIL DISTRIBUTION: N/A

APPEARANCE & ODOR: CLEAR, COLORLESS TO YELLOW VISCOUS LIQUID. ODORLESS.

CONTINUED ON PAGE: 3

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP): N/A

NFPA 704M RATING: 3-0-2 W

AUTOIGNITION TEMPERATURE: N/A

FLAMMABLE LIMITS: UPPER - N/A LOWER - N/A

FIRE EXTINGUISHING MEDIA
USE DRY CHEMICAL OR CARBON DIOXIDE. DO NOT USE WATER.

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. DO NOT GET WATER INSIDE CONTAINERS.

UNUSUAL FIRE & EXPLOSION HAZARDS
REACTS WITH MOST METALS TO PRODUCE HYDROGEN GAS, WHICH CAN FORM AN EXPLOSIVE MIXTURE WITH AIR. A VIOLENT EXOTHERMIC REACTION OCCURS WITH WATER. SUFFICIENT HEAT MAY BE PRODUCED TO IGNITE COMBUSTIBLE MATERIALS.

TOXIC GASES PRODUCED
SULFUR DIOXIDE, HYDROGEN

EXPLOSION DATA-SENSITIVITY TO MECHANICAL IMPACT
NONE IDENTIFIED.

EXPLOSION DATA-SENSITIVITY TO STATIC DISCHARGE
NONE IDENTIFIED.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 1 MG/M3

SHORT-TERM EXPOSURE LIMIT (STEL): NOT ESTABLISHED

PERMISSIBLE EXPOSURE LIMIT (PEL): 1 MG/M3

TOXICITY OF COMPONENTS

ORAL RAT LD50 FOR SULFURIC ACID 2140 MG/KG
INHALATION-2HR MOUSE LC50 FOR SULFURIC ACID 320 MG/M3

CONTINUED ON PAGE: 4

SECTION V - HEALTH HAZARD DATA (CONTINUED)

INHALATION-2HR RAT LC50 FOR SULFURIC ACID	510	MG/M3
INTRAPERITONEAL MOUSE LD50 FOR WATER	190	G/KG
INTRAVENOUS MOUSE LD50 FOR WATER	25	G/KG

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: YES OSHA REG: YES

CARCINOGENICITY
NONE IDENTIFIED.

REPRODUCTIVE EFFECTS
NONE IDENTIFIED.

EFFECTS OF OVEREXPOSURE

INHALATION: SEVERE IRRITATION OR BURNS OF RESPIRATORY SYSTEM, PULMONARY EDEMA, LUNG INFLAMMATION

SKIN CONTACT: SEVERE BURNS

EYE CONTACT: SEVERE BURNS

SKIN ABSORPTION: NONE IDENTIFIED

INGESTION: NAUSEA, VOMITING, SEVERE BURNS TO MOUTH, THROAT, AND STOMACH, KIDNEY DISFUNCTION

CHRONIC EFFECTS: LUNG DAMAGE

TARGET ORGANS
RESPIRATORY SYSTEM, LUNGS, EYES, SKIN, TEETH, KIDNEYS

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
RESPIRATORY SYSTEM DISEASE

PRIMARY ROUTES OF ENTRY
INHALATION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES

INGESTION: CALL A PHYSICIAN. IF SWALLOWED, DO NOT INDUCE VOMITING. IF CONSCIOUS, GIVE LARGE AMOUNTS OF WATER.

INHALATION: IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. PROMPT ACTION IS ESSENTIAL.

CONTINUED ON PAGE: 5

SECTION V - HEALTH HAZARD DATA (CONTINUED)

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 RE-USE.

EYE CONTACT: IN CASE OF EYE CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC) CLASSIFIED "STRONG INORGANIC ACID MISTS CONTAINING SULFURIC ACID" AS A CATEGORY 1 CARCINOGEN, A SUBSTANCE THAT IS "CARCINOGENIC TO HUMANS." THIS CLASSIFICATION IS FOR INORGANIC ACID MISTS ONLY AND DOES NOT APPLY TO SULFURIC ACID OR SULFURIC ACID SOLUTIONS. THE BASIS FOR THE IARC CLASSIFICATION RESTS ON SEVERAL EPIDEMIOLOGY STUDIES WHICH HAVE SEVERAL DEFICIENCIES. THESE STUDIES DID NOT ACCOUNT FOR EXPOSURE TO OTHER SUBSTANCES, SOME KNOWN TO BE ANIMAL OR POTENTIAL HUMAN CARCINOGENS, SOCIAL INFLUENCES (SMOKING OR ALCOHOL CONSUMPTION) AND INCLUDED SMALL NUMBERS OF SUBJECTS. BASED ON THE OVERALL WEIGHT OF EVIDENCE FROM ALL HUMAN AND CHRONIC ANIMAL STUDIES, NO DEFINITIVE CAUSAL RELATIONSHIP BETWEEN SULFURIC ACID MIST EXPOSURE AND RESPIRATORY TRACT CANCER HAS BEEN SHOWN.

SARA/TITLE III HAZARD CATEGORIES AND LISTS

ACUTE: YES CHRONIC: YES FLAMMABILITY: NO PRESSURE: NO REACTIVITY: YES

EXTREMELY HAZARDOUS SUBSTANCE:	YES	CONTAINS SULFUR ACID (RQ = 1,000 LBS, TPQ = 1,000 LBS)
CERCLA HAZARDOUS SUBSTANCE:	YES	CONTAINS SULFURIC ACID (RQ = 1000 LBS)
SARA 313 TOXIC CHEMICALS:	YES	CONTAINS SULFURIC ACID
GENERIC CLASS:		GENERIC CLASS REMOVED FROM CFR: 7/1/91
TSCA INVENTORY:	YES	

SECTION VI - REACTIVITY DATA

STABILITY: STABLE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: MOISTURE, HEAT

INCOMPATIBLES: WATER, MOST COMMON METALS, ORGANIC MATERIALS, STRONG REDUCING AGENTS, COMBUSTIBLE MATERIALS, STRONG BASES, CARBONATES, SULFIDES, CYANIDES, STRONG OXIDIZING AGENTS, CARBIDES

CONTINUED ON PAGE: 6

SECTION VI - REACTIVITY DATA (CONTINUED)

DECOMPOSITION PRODUCTS: OXIDES OF SULFUR, HYDROGEN

SECTION VII - SPILL & DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. DO NOT USE WATER.
NEUTRALIZE SPILL AND/OR WASHINGS WITH SODA ASH OR LIME.
WITH CLEAN SHOVEL, PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER.
MOVE CONTAINER(S) FROM SPILL AREA.

J. T. BAKER NEUTRASORB(R) OR TEAM(R) 'LOW NA+' ACID NEUTRALIZERS ARE FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: D002, D003 (CORROSIVE, REACTIVE WASTE)

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION EXCEEDS TLV, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM,PROTECTIVE SUIT, RUBBER GLOVES ARE RECOMMENDED.

CONTINUED ON PAGE: 7

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA* STORAGE COLOR CODE: WHITE (CORROSIVE)

STORAGE REQUIREMENTS
KEEP CONTAINER TIGHTLY CLOSED. STORE IN CORROSION-PROOF AREA. KEEP CONTAINERS OUT OF SUN AND AWAY FROM HEAT. ISOLATE FROM INCOMPATIBLE MATERIALS.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME: SULFURIC ACID (WITH MORE THAN 51% ACID)
HAZARD CLASS: 8
UN/NA: UN1830 REPORTABLE QUANTITY: 1000 LBS. PACKAGING GROUP: II
LABELS: 8 CORROSIVE
REGULATORY REFERENCES: 49CFR 172.101

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME: SULPHURIC ACID (WITH MORE THAN 51% ACID)
HAZARD CLASS: 8
UN: UN1830 MARINE POLLUTANTS: NO I.M.O. PAGE: 8230
LABELS: 8 CORROSIVE PACKAGING GROUP: II
REGULATORY REFERENCES: 49CFR PART 176; IMDG CODE

AIR (I.C.A.O.)

PROPER SHIPPING NAME: SULPHURIC ACID (WITH MORE THAN 51% ACID)
HAZARD CLASS: 8
UN: UN1830
LABELS: 8 CORROSIVE PACKAGING GROUP: II
REGULATORY REFERENCES: 49CFR PART 175; ICAO=== WE BELIEVE THE TRANSPORTATION DATA AND REFERENCES CONTAINED HEREIN TO BE FACTUAL AND THE OPINION OF QUALIFIED EXPERTS. THE DATA IS MEANT AS A GUIDE TO THE OVERALL CLASSIFICATION OF THE PRODUCT AND IS NOT PACKAGE SIZE SPECIFIC, NOR SHOULD IT BE TAKEN AS A WARRANTY OR REPRESENTATION FOR WHICH THE COMPANY ASSUMES LEGAL RESPONSIBILITY.=== THE INFORMATION IS OFFERED SOLELY FOR YOUR CONSIDERATION, INVESTIGATION, AND VERIFICATION. ANY USE OF THE INFORMATION MUST BE DETERMINED BY THE USER TO BE IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE, AND LOCAL LAWS AND REGULATIONS. SEE SHIPPER REQUIREMENTS 49CFR

CONTINUED ON PAGE: 8

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION (CONTINUED)

171.2, CERTIFICATION 172.204, AND EMPLOYEE TRAINING 49 CFR 173.1(B).

J.S. CUSTOMS HARMONIZATION NUMBER: 2807000001

NOTE: WHEN HANDLING LIQUID PRODUCTS, SECONDARY PROTECTIVE CONTAINERS MUST BE USED FOR CARRYING.
-N/A = NOT APPLICABLE, OR NOT AVAILABLE; -N/E = NOT ESTABLISHED

MALLINCKRODT BAKER 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 MAKES NO REPRESENTATIONS, OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

NOTE: CHEMTREC, CANUTEC AND NATIONAL RESPONSE CENTER EMERGENCY TELEPHONE NUMBERS ARE 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-JTBAKER) FOR ASSISTANCE.

COPYRIGHT 1996 MALLINCKRODT BAKER, INC.
*TRADEMARKS OF MALLINCKRODT BAKER, INC.
APPROVED BY QUALITY ASSURANCE DEPARTMENT.

-- LAST PAGE --
"ISSUED BY VWR 05/23/97"