5.8.4. Physical Activity Restriction Report

The Regional EHS Manager maintains a list of employees with physical activity restrictions. The Regional EHS Manager provides each Manager and Project/Location EHS Representative in his/her region with a list of the employees with physical activity restrictions assigned to to their project/location.

The Regional EHS Manager audits locations and projects from time to time to ensure employees with physical activity restrictions are not exceeding their limitations. Evidence of an employee exceeding his/her physical activity restriction is brought to the attention of the Department Manager and the employee's Manager/Supervisor for resolution.

5.8.5 Annual Reports

The Medical Services Contractor provides annual reports of utilization, medical trends, and statistical analyses. These reports are prepared to improve the service, reverse unfavorable trends, and reduce the cost of the medical surveillance program.

5.9 Cost Accounting

The Medical Services Contractor submits invoices directly to Corporate Accounts Payable. Each examination and service provided is coded with the organization code of the employee examined or receiving the service. The cost of medical surveillance is borne by the organizations with employees participating in the program.

6.0 EXCEPTION PROVISIONS

None permitted.

If an office elects not to use the Medical Services Contractor, the examination will be repeated by the Medical Services Contractor at additional cost to the organization.

7.0 CROSS REFERENCE

HS603 Occupational Injury and Illness

8.0 ATTACHMENTS

Attachment 1: Responsibility Matrix
Attachment 2: Medical Services Contractor
Attachment 3: Form HSF601-F1 Authorization For Medical Examination
Attachment 4: Form HSF601-F2 Notification of Physical Activity Restriction

RESPONSIBILITY MATRIX

Action	Procedure Section	Employee	Manager	Project/ Location EHS Rep	Regional/ Division EHS Manager	Corporate EHS Manager
Determining applicability of medical surveillance program	5.3.1		X			
Enrolling in medical surveillance program	5.3	X	X		X	
Scheduling initial examination	5.4		X			
Scheduling periodic examinations	5.5	X				
Scheduling exit examination	5.6		X			
Responding to delinquent examinations	5.8.3	X	X		X	X
Advise Operations about *Physical Activity Restriction*	5.3.3			X	X	

MEDICAL SERVICES CONTRACTOR

EMR, Inc.
4360 Chamblee Dunwoody Road, Suite 202
Atlanta, Georgia 30341

(404) 455-0818
(800) 229-3674
FAX (404) 457-1429

R. Burt Prater, MD
Chairman, CEO

Randall K. Hindman
President

DEDICATED EARTH TECH ACCOUNT TEAM

MEDICAL DEPARTMENT

Elayne F.Theriault, MD
Medical Director
medical@emrinc.uucp.netcom.com

Gail K. Mastin, COHN
Director, Medical Evaluation & Review

Susan Vollett, RN
Medical Review RN

ACCOUNT MANAGEMENT

Holly Beavor
Account Manager
ext. 350
acctg@emrinc.uucp.netcom.com

PRODUCTION SERVICES

Richard DeLuca, CIH
Vice President, Production Services

Terijene "TJ" Wolff
Director, Client Services

Mary Blake
Production Service Manager

EXPOSURE RECORDS MANAGEMENT

Rich DeLuca
Director, Environmental Health and Safety Services

EARTH TECH TEAM - TEAM 4

Marilynn Brooks
Client Service Manager
ext. 440
team4@emrinc.uucp.netcom.com

Marcia Campbell
Team Leader/Client Support
ext. 314

MEDICAL FACILITY AND LABORATORY MANAGEMENT

Lura K. Atchley
Director, Medical Network Services
clinic@emrinc.uucp.netcom.com

Evelyn Cuckler
Medical Network Services Administrative Asst.

Kim Alcorn
Medical Network Services Administrative Asst.

RECORDS MANAGEMENT

David Goodman
Records Management

ACCOUNTING

Laurie Leimkuehler
Staff Accountant

Sherie Dunagan
Staff Accountant

EMR
Medical Management Solutions Through Information Technology

EARTH TECH

AUTHORIZATION FOR MEDICAL EXAMINATION

To be faxed to EMR at least 48-hours prior to exam

Part I - Site Information

Program Coordinator requesting exam: _____

Coordinator's phone #: _____ FAX #: _____

Location (city/state): _____ EMR Site Code: _____

Earth Tech Organizational Code: _____

Part II - Medical Evaluation Required

- ☐ Pre-placement
- ☐ EKG
- ☐ Drug Screen ONLY this visit (EMR Collection Kit)
- ☐ Drug Screen in addition to exam at this visit
- ☐ Examinee requires or will require DOT Certification
- ☐ Additional testing required this visit _____
- ☐ Employee
- ☐ Chest X-ray
- ☐ Non-Nida Drug Screen
- ☐ NIDA Split Specimen Drug Screen
- ☐ Random NIDA Split Specimen Drug Screen (11D1)
- ☐ RUSH
- ☐ Tetanus
- ☐ Breath Alcohol

Type of Exam Requested		Type of Exam Requested	
Field	☐ Baseline (15F) ☐ Annual (26F) ☐ Exit (35Fe)	Combo Field/Asbestos	☐ Baseline (15H) ☐ Annual (26H) ☐ Exit (35He)
Field/DOT	☐ Baseline (15D) ☐ Annual (26D) ☐ Exit (35De)	Field Biennial	☐ Baseline (15B) ☐ Biennial (26B) ☐ Exit (35Be)

Part III - Facility Scheduling Information

Name of Facility to be used: _____

Location of Facility _____

Date of Exam: _____ Facility A#: _____

Part IV - Examinee Information

Name (print): _____ ☐ Male ☐ Female

Social Security #: _____ Date of Birth: _____

Home Address: _____
Street Address

_____
City State Zip

I authorize the release of any medical information necessary to determine my medical or physical condition concerning my application for employment, or ongoing employment, with this company. I further authorize EMR to release the results of this medical information to the designated individual at this company.

_____
Examinee's Signature Date

Fax this Authorization Form to EMR at (770) 455-0814

Questions? Call EMR at (800) 229-3674

EARTH TECH

NOTIFICATION OF PHYSICAL ACTIVITY RESTRICTION

Employee Name	Employee SS No.	
Job Title	Dept/Sect.	Location

TO MANAGER/SUPERVISOR _____:

- ***Physical Activity Restriction***
  The employee identified above has a medical condition for which the limitations described below are prescribed. Please ensure his/her work assignments are consistent with the limitation. If the limitations are inconsistent with his/her normal duties, please find a light duty work assignment.

  - ☐ No reaching above shoulder
  - ☐ No pushing or pulling
  - ☐ No climbing of stairs or ladders
  - ☐ No operating or working around moving machinery/driving
  - ☐ No lifting over _____ pounds
  - ☐ No repetitive waist bending
  - ☐ No kneeling or squatting
  - ☐ No exposure to hepatotoxic chemicals
  - ☐ No exposure to extreme cold or extreme heat
  - ☐ _____

  _____

  _____

  Duration of Physical Activity Restriction: _____

- ***Light Duty Work***
  If the employee is unable to perform his/her normal duties with the above physical activity restriction, please notify the Regional Environmental Health and Safety Manager. EARTH TECH provides light duty work assignments whenever possible for employees with physical activity restrictions.

- ***Medically Unable to Work***
  If the employee is unable to be placed in any assignment consistent with his/her physical activity restrictions as described above, please notify the Regional Environmental Health and Safety Manager. EARTH TECH assists employees unable to work due to injury or illness in obtaining needed medical care and other benefits available to them.

  Regional EHS Manager: _____ Phone: _____

CURRENT EMPLOYEE LISTING

Name (Last, First)	Date of Birth	Social Security Number	Exposure Category	Loc. Code	Org. Code	Date of Last Medical Exam

Exposure Categories
Field (HAZWOPER)
Combo (Field & Asbestos)
Field & Lead
Field & DOT (Commercial Drivers License)

EHS CONTACT LISTING

Loc. Code	Org. Code	Address	Telephone	Facsimile	Primary Contact	Secondary Contact

APPENDIX E

HS301 HAZWOPER TRAINING AND REFRESHER

EARTH TECH	PROCEDURE NO. HS301
	DATE June 13, 1996
STANDARD PROCEDURE	SUPERSEDES New
SUBJECT HAZWOPER TRAINING AND REFRESHER	APPROVED James L. Unmack James L. Unmack

1.0 PURPOSE AND POLICY

1.1 Purpose

To establish the EARTH TECH policy for HAZWOPER training, defining who must be trained and how training will be accomplished.

1.2 Policy

It is the policy of EARTH TECH that all employees who have occasion to work on a hazardous waste operation or hazardous waste site or supervise work on a hazardous waste operation or hazardous waste site as defined by 29 CFR 1910.120(b) shall receive training meeting the requirements of 29 CFR 1910.120(e).

2.0. TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility.

The Corporate Director, Health and Safety, is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities.

The Responsibility Matrix can be found as Attachment 1 in Section 8.0.

4.0 DEFINITIONS

Hazardous Waste. Hazardous waste means a waste or combination of wastes as defined by 40 CFR 261.3 and 49 CFR 171.8.

Hazardous Waste Operation. Hazardous waste operation means any clean up operation or corrective action at a hazardous waste site.

Hazardous Waste Site. A hazardous waste site is any site where clean up or corrective action is required by a governmental body, whether federal, state, or local, involving hazardous waste. Hazardous waste sites include, but are not limited to, sites on the EPA's National Priority Site List (NPL), state priority site lists, sites recommended for the EPA NPL, and government identified sites before the initial investigation determines the presence or absence of hazardous waste. Hazardous waste sites also include sites covered by the Resource Conservation and Recovery Act of 1976 (RCRA) as amended (42 U.S.C. 6901 et seq.) and treatment, storage, and disposal (TSD) facilities regulated by 40 CFR Parts 264 and 265 pursuant to RCRA; or by agencies under agreement with U.S.E.P.A. to implement RCRA regulations, where clean-up operations or corrective actions are conducted, and sites where voluntary clean-up operations are conducted involving hazardous substances or hazardous waste.

HAZWOPER. Hazardous Waste Operations and Emergency Response, as applied to hazardous waste operations.

HAZWOPER Worker. A person who works on hazardous waste operation.

5.0 PROCEDURE

Employees shall not be permitted to participate in or supervise field activities until they have been trained to a level required by their job function and responsibility.

5.1 Business Unit Managers

- Ensure that all employees who are or will be assigned to work on a hazardous waste operation or hazardous waste site or supervise work on a hazardous waste operation or hazardous waste site as defined by 29 CFR 1910.120(b) receive training meeting the requirements of 29 CFR 1910.120(e).
- Schedule or provide for safety and health training meeting the requirements of 29 CFR 1910.120(e).
- Provide adequate facilities for in-house training to meet the needs of the scheduled training.
- Ensure that Project Managers, Response Managers, Construction Managers, and Supervisors of HAZWOPER workers receive 8 hours of hazardous waste operations supervisor training in accordance with 29 CFR 1910.120(e)(4).

5.2 Project, Response, Construction Managers

- Ensure that each of their employees who is assigned to work on a hazardous waste operation or hazardous waste site or supervise work on a hazardous waste operation or hazardous waste site as defined by 29 CFR 1910.120(b) receive a minimum of 40 hours of instruction off the site before being dispatched to the site, and a minimum of three days actual field experience under the direct supervision of a trained, experienced supervisor.
- Ensure that onsite employees who manage or supervise HAZWOPER workers receive 8 hours of hazardous waste operations supervisor training in accordance with 29 CFR 1910.120(e)(4).
- Ensure that each of their employees who is assigned to work on a hazardous waste operation or hazardous waste site or supervise work on a hazardous waste operation or hazardous waste site receives eight hours of refresher training annually.
- Schedule work assignments to allow timely completion of refresher training in accordance with 29 CFR 1910.120(e)(8).

5.3 HAZWOPER Employees

- Attend initial 40 hours of health and safety training for hazardous waste site workers before working on a hazardous waste site or supervising hazardous waste operations.

- Obtain and document a minimum of three days actual field experience under the direct supervision of a trained, experienced supervisor. See Attachment 2 to document field experience.

- Attend 8-hour HAZWOPER Refresher training no longer than 365 days from their last HAZWOPER training. If more than 24 months have passed since the last HAZWOPER training, the initial 40-hour training must be repeated.

- Provide copies of their 40-hour HAZWOPER training certificate and their most recent 8-hour HAZWOPER Refresher training certificate to the location Health and Safety Coordinator and to the Project/Response/Construction Manager.

5.4 Health and Safety Coordinators

- Keep a copy of each HAZWOPER training certificate received by employees assigned to the business unit.

- Remind HAZWOPER employees when due to take HAZWOPER refresher training in time to avoid expiration of HAZWOPER training certification.

- Coordinate with Business Unit Managers to schedule HAZWOPER training courses.

- Coordinate with Health and Safety Department to schedule in-house HAZWOPER refresher training.

5.5 Health and Safety Department

- Provides trainers for in-house HAZWOPER refresher training when resources are available.

- Assists Health and Safety Coordinator to schedule out-sourced training.

6.0 EXCEPTION PROVISIONS

Variances to this procedure shall be requested in accordance with established procedures. See HS109.

7.0 CROSS REFERENCE

None

8.0 ATTACHMENTS

Attachment 1: Responsibility Matrix
Attachment 2: References
Attachment 3: Field Experience Documentation

RESPONSIBILITY MATRIX

Action	Procedure Section	Business Unit Manager	PM, RM, CM	HS Coordinator	Corporate EHS Manager
Issuance, revision and maintenance of this procedure	3.1				X
Facilities for training	5.1	X			
Enforcement of training requirements	5.2		X		
Maintenance of training records	5.4			X	

PM Project Manager
RM Response Manager
CM Construction Manager
HS Health and Safety
EHS Environmental Health and Safety

REFERENCES

29 CFR 1910.120 Hazardous Waste Operations and Emergency Response

29 CFR 1926.65 Hazardous Waste Operations and Emergency Response

42 U.S.C. 6901 et seq. Resource Conservation and Recovery Act of 1976

40 CFR 261.3 Definition of Hazardous Waste

40 CFR 264 Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

40 CFR 265 Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

49 CFR 171.8 Definitions and Abbreviations

FIELD EXPERIENCE DOCUMENTATION

NAME: _____

Title 29 of the Code of Federal Regulations, Part 1910.120(e)(3) requires general site workers (such as equipment operators, general laborers, and supervisory personnel) engaged in hazardous sut stance removal or other activities which expose or potentially expose workers to hazardous substances and health hazards to receive a minimum of three days actual field experience under the direct supervision of a trained, experienced supervisor following a minimum of 40 hours of initial instruction off the site. This *on-the-job training* is documented as follows:

DATE	PROJECT	SUPERVISOR'S SIGNATURE

Employee's Signature Date

APPENDIX F

HEALTH AND SAFETY FORMS

EARTH TECH

Site Safety Meetings
Tourtelot Cleanup Project
Tailgate Safety Briefing Sign-in Log

Date: _____ **Time:** _____

Briefing Conducted By:	Signature:	Company Name:

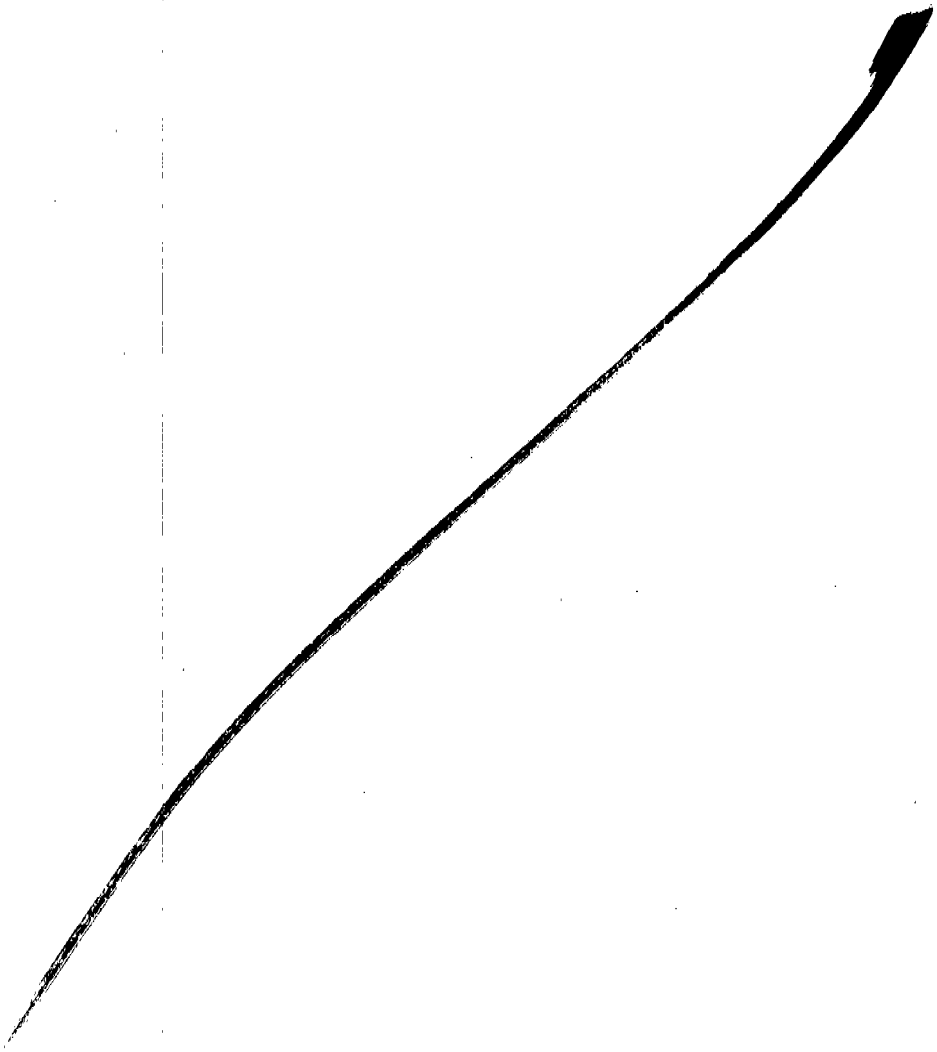
This sign-in log documents the tailgate safety briefing conducted in accordance with 29 CFR 1910.120 "Hazardous Waste Operations and Emergency Response" as well as other applicable regulatory requirements. Personnel who perform work operations onsite are required to attend each safety briefing and acknowledge receipt of such briefings daily or as required.

TOPICS COVERED:

☐ General PPE usage	☐ Decontamination Procedures	☐ Emergency Procedures
☐ Respiratory Protection	☐ Smoking Eating and Drinking	☐ Existing Work Zones
☐ Hearing Conservation	☐ Slips, Trips, and Falls	☐ Lockout/Tagout
☐ Personal Hygiene	☐ Heat and Cold Stress	☐ Excavation/Confined Spaces
☐ Exposure Guidelines	☐ Site Control	☐ New Work Procedures

Personnel Sign-in List

Printed Name	Signature	Company Name



Supervisor's Report of Incident

This is an official document to be initiated by the injured employee's Supervisor. Please answer all questions completely. Fax to your Region EHS Manager within 24 hours of the injury. See reverse side for instructions.

Section 1: Employee (Must complete each item or processing delays will occur) - Print Clearly

SCMS Claim#: _____ WC Location Code: _____

(877)261-8926

Employee Data	S.S. No.	Sex	Birth Date
Injured's Name	Phone	Marital Status	Dependents
Home Address	City	State	Zip Code
Job Title / Dept No.	Office Location Address		
Injury Illness Vehicle Injury Near Miss		Hire Date	Hourly Wage

Section 2: Supervisor (Must complete each item or processing delays will occur) - Print Clearly

Date of Incident	Time	Date Reported	To Whom
Client Name	Job Assignment at Time of Incident		Time Shift Began
Exact Location & Address of Incident		Did injured leave work? When?	
Has injured returned to work? Yes No		Did employee miss a regularly scheduled shift? Yes No	
Doctor/Hospital Name		Address of Hosp.	
Witness Name		Statements Attached Yes No	
Nature of Injury		Body Part	
Medical Attention			
Describe Incident			
What caused the incident?			
Corrective Action(s) to Prevent Future Occurrence:			
Supervisor/Foreman (Print Name)	Signature	Telephone Date	

Section 3: Manager

Comments on incident and corrective action		
Manager (Print Name)	Signature	Telephone Date

Section 4: Environmental, Health and Safety

Concur with action taken? Yes No Remarks:		
OSHA Classification Pending Incident only First aid No lost work days		
OSHA Recordable Yes No Lost work days _____ Days of restricted activity _____ Fatality		
EHS Professional (Print Name)	Signature Date	Telephone

EHS101-F1 Revised July 19, 1999 This report contains information protected by the Privacy Act.

Supervisor's Report of Incident
Instructions For Completion

The following types of incidents must be reported using this form:

1. Occupational Injury or Illness (includes first aid only, medical treatment, hospitalization, fatality)
2. Vehicle Accident Injuries
3. Near Miss (incident where employee(s) could have been injured)

INSTRUCTIONS

Immediate:

1. Employees must report such incidents to their Supervisor **immediately**.
2. The Supervisor must complete **Sections 1 and 2, Employee Data and the Supervisor Section** of the SRI. Incomplete items will delay timely processing. Any work-related injury or illness that requires medical treatment or care will require notifying SCMS at 877-261-8926.
3. The Supervisor must verbally notify his/her Manager, who in turn must sign **Section 3, Manager**, of the SRI. To avoid delaying SRI process, a separate copy of the SRI with the Manager's signature can be faxed within 3 days to the REHSM.
4. The Supervisor must verbally notify his/her REHSM with a follow-up SRI faxed within 24 hours (see below for fax numbers). The REHSM will review and complete **Section 4, Environmental Health and Safety,** and fax the SRI to the WCA at 804-515-8313.
5. For near-miss situations that could have resulted in an injury to an employee, the Supervisor must notify his/her Manager (see Item 3 above) and the REHSM with a follow-up SRI faxed within 24 hours.

PRIMARY CONTACTS

East REHSM: Dale Prokopchak, CIH, CSP
Telephone: 804-515-8556
Fax: 804-515-8313
Pager: 877-830-1981

WCA:
Telephone: 804-515-8557
Fax: 804-515-8313

Midwest REHSM: Jeff Grant, CIH
Telephone: 616-940-4426
Fax: 616-940-4396
Cell Phone: 734-516-5232

West REHSM: Bob Poll, CIH, CSP
Telephone: 562-951-2242
Fax: 562-495-9257
Cell Phone: 562-884-1414

APPENDIX G

TASK HAZARD ANALYSES

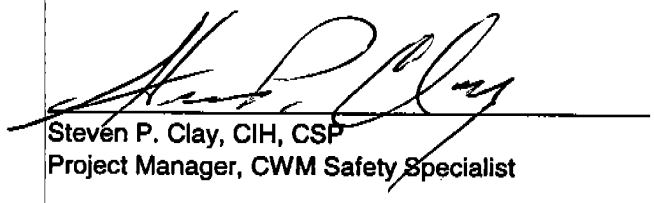
Certification of Hazard Assessment

This is to certify that Earth Tech has performed a workplace hazard assessment for the Tourtelot Cleanup Project site in Benicia, California. The workplace hazard assessment covered all present and likely to be present hazards as required by 29 CFR 1910.132(d).

The Hazard Assessment was performed on November 5 and 20, 1999.

The Hazard Assessment was performed by Mr. Jonathan Moore, CSP and Mr. Steven P. Clay, CIH, CSP.

The Workplace Hazard Assessment is certified by:



Steven P. Clay, CIH, CSP
Project Manager, CWM Safety Specialist

Tourtelot Cleanup Project - Task Hazard Analyses

Task/Activity: Drilling Borehole Installation **Prepared By/Date:** Johnathan Moore, CSP - 11/4/99

Task Description	Potential Hazard(s) & Controls	Required PPE: Modified Level D
1. Subsurface Boring using hollow-stem and air or mud rotary drilling techniques. 2. Soil Sample Collection.	1. Contaminant Exposure. 2. Drilling/Well Installation. 3. OE Avoidance. 4. Underground/Overhead Utilities. 5. Dust Suppression. 6. Hazardous Noise. 7. Heat Stress. 8. Heavy Equipment Operations. 9. Slips, Trips, Falls. 10. Handling of Investigation-Derived Wastes.	1. Hard Hat. 2. Safety Toe Boots. 3. Short Sleeve Shirt. 4. Full-length Pants or Coveralls. 5. Safety Glasses. 6. Hearing Protection. 7. Outer Chemical Resistant Gloves (leather work gloves may be used by drillers helper personnel). 8. Inner Chemical Resistant Gloves. 9. Fullface Respirator Equipped w/N100 Cartridges (available for use).
Equipment to be Used	**Observation/Monitoring Requirements**	**Applicable Training Requirements**
1. Drill Rigs. 2. Shovels. 3. Decontamination Equipment and Supplies. 4. 55-gallon Drums. 5. Support Vehicles.	**Work Area Observation(s):** 1. SSC must be onsite at all times. 2. Control of work area required at all times. 3. All personnel must be medically monitored in accordance with 8 CCR, Section 5192(f). **Air Monitoring:** 1. See Section 7.0 and Table 7-1.	1. Hazard Communication. 2. Site Orientation/SSHP Review. 3. HAZWOPER 40-hour training. 4. HAZWOPER 8-hour refresher training (as applicable). 5. HAZWOPER Supervisor Training (for SSC and other applicable supervisory personnel as needed). 6. Daily Tailgate Safety Briefings.

Tourtelot Cleanup Project - Task Hazard Analyses

Task/Activity: Geophysical Clearance **Prepared By/Date:** Johnathan Moore, CSP -

Task Description	Potential Hazard(s) & Controls	Required PPE: Level D
1. Identification and marking/staking of identified subsurface anomalies adjacent to anticipated boring and well locations.	1. OE Avoidance. 2. Ticks. 3. Heat Stress. 4. Slips, Trips, Falls.	1. Safety Toe Boots (The use of safety toe boots does not influence readings produced during the use of GPR and are therefore, required at all times). 2. Short Sleeve Shirt. 3. Full-length Pants or Coveralls. 4. Safety Glasses.
Equipment to be Used	**Observation/Monitoring Requirements**	**Applicable Training Requirements**
1. Ground Penetrating Radar (GPR) 2. Stakes and/or various colored pin flags. 3. Marking paints.	**Work Area Observation(s):** 1. SSC must be onsite at all times. 2. Control of work area required at all times. 3. All personnel must be medically monitored in accordance with 8 CCR, Section 5192(f). **Air Monitoring:** 1. None.	1. Hazard Communication. 2. Site Orientation/SSHP Review. 3. HAZWOPER 40-hour training. 4. HAZWOPER 8-hour refresher training (as applicable). 5. HAZWOPER Supervisor Training (for SSC and other applicable supervisory personnel as needed).

Tourtelot Cleanup Project - Task Hazard Analyses

Task/Activity: Geophysical Inspection **Prepared By/Date** Steven P. Clay CIH, CSP - 11/22/99

Task Description	Potential Hazard(s) & Controls	Required PPE: Level D
1. Identification and marking/staking of identified subsurface anomalies adjacent to anticipated boring and well locations.	1. OE controlled by UXO escort. The UXO escort will provide a path to the work area and perform down hole anomaly detection activities per the OE Avoidance Program in Appendix H. 2. Ticks, Snakes, Poisonous Plants controlled by PPE. 3. Heat Stress controlled by adherence to OSHA regulations and weather. 4. Slips, Trips, Falls controlled by personal awareness.	1. Safety Toe Boots (The use of safety toe boots does not influence readings produced during the use of GPR and are therefore, required at all times). 2. Short Sleeve Shirt. 3. Full-length Pants or Coveralls. 4. Safety Glasses.
Equipment to be Used	**Observation/Monitoring**	**Applicable Training Requirements**
1. Stakes and/or various colored pin flags. 2. Marking paints. 3. Schonstedt Magnetometer	**Work Area Observation(s):** 1. SSC must be onsite at all times. 2. Control of work area required at all times. 3. All personnel must be medically monitored in accordance with 8 CCR, Section 5192(f). **Air Monitoring:** 1. None.	1. Hazard Communication. 2. Site Orientation/SSHP Review. 3. HAZWOPER 40-hour training. 4. HAZWOPER 8-hour refresher training (as applicable). 5. HAZWOPER Supervisor Training (for SSC and other applicable supervisory personnel as needed).

Tourtelot Cleanup Project - Task Hazard Analyses

Task/Activity: Handling of Investigation-derived Wastes **Prepared By/Date:** Johnathan Moore, CSP - 11/4/99

Task Description	Potential Hazard(s) & Controls	Required PPE: Level D
1. Movement and storage of Investigation-derived waste drums that includes, but is not limited to: soils, purge and decontamination water, and waste PPE and potential contaminated refuse.	1. OE Avoidance. 2. Handling of Investigation-derived wastes. 3. Ticks. 4. Heat Stress. 5. Slips, Trips, Falls.	1. Safety Toe Boots. 2. Short Sleeve Shirt. 3. Full-length Pants or Coveralls. 4. Safety Glasses.
Equipment to be Used	**Observation/Monitoring Requirements**	**Applicable Training Requirements**
1. Drum dollies. 2. Support vehicles. 3. Marking paints.	**Work Area Observation(s):** 1. SSC must be onsite at all times. 2. Control of work area required at all times. 3. All personnel must be medically monitored in accordance with 8 CCR, Section 5192(f). **Air Monitoring:** 1. None.	1. Hazard Communication. 2. Site Orientation/SSHP Review. 3. HAZWOPER 40-hour training. 4. HAZWOPER 8-hour refresher training (as applicable). 5. HAZWOPER Supervisor Training (for SSC and other applicable supervisory personnel as needed).

Tourtelot Cleanup Project - Task Hazard Analyses

Task/Activity: Vegetation Removal **Prepared By/Date:** Steven P. Clay CIH, CSP - 11/22/99

Task Description

1. Removal of vegetation in areas not previously surface cleared or as necessary to facilitate field teams.
2. Use of Tractor pulled Bushhog
3. Use of gas powered hand tools.

Potential Hazard(s) & Controls

1. Contaminant Exposure controlled by PPE.
2. OE controlled by UXO escort. The UXO escort will provide a path to the work area and survey area prior to allowing vegetation removal activities.
3. Underground/Overhead Utilities controlled by review of underground utilities plans and personal awareness of overhead hazards.
4. Dust Suppression controlled by water spray.
5. Hazardous Noise controlled by hearing protection as necessary.
6. Heat Stress controlled by adherence to OSHA regulations and weather.
7. Heavy Equipment Operations controlled by personal awareness.
8. Slips, Trips, Falls controlled by personal awareness.
9. Handling of Investigation-Derived Wastes controlled by PPE.
10. Ticks, Snakes, Poisonous Plants controlled by PPE.
11. Noise controlled by PPE.

Required PPE: Modified Level D

1. Hard Hat.
2. Safety Toe Boots.
3. Short Sleeve Shirt.
4. Full-length Pants or Coveralls.
5. Safety Glasses.
6. Hearing Protection.
7. Outer Chemical Resistant Gloves (leather work gloves may be used by drillers helper personnel).
8. Inner Chemical Resistant Gloves.
9. Fullface Respirator Equipped w/N100 Cartridges (available for use).

Equipment to be Used

1. Drill Rigs.
2. Shovels.
3. Decontamination Equipment and Supplies.
4. 55-gallon Drums.
5. Support Vehicles.
6. Schonstedt Magnetometer

Observation/Monitoring

Work Area Observation(s):

1. SSC must be onsite at all times.
2. Control of work area required at all times.
3. All personnel must be medically monitored in accordance with 8 CCR, Section 5192(f).

Air Monitoring:

1. See Section 7.0 and Table 7-1.

Applicable Training Requirements

1. Hazard Communication.
2. Site Orientation/SSHP Review.
3. HAZWOPER 40-hour training.
4. HAZWOPER 8-hour refresher training (as applicable).
5. HAZWOPER Supervisor Training (for SSC and other applicable supervisory personnel as needed).
6. Daily Tailgate Safety Briefings.

Tourtelot Cleanup Project - Task Hazard Analyses

Task/Activity: Site Reconnaissance **Prepared By/Date:** Johnathan Moore, CSP - 11/4/99

Task Description	Potential Hazard(s) & Controls	Required PPE: Level D
1. Identification and marking/staking of anticipated boring, well, and surface and water sampling locations.	1. OE Avoidance. 2. Ticks. 3. Heat Stress. 4. Slips, Trips, Falls.	1. Safety Toe Boots. 2. Short Sleeve Shirt. 3. Full-length Pants or Coveralls. 4. Safety Glasses.
Equipment to be Used	**Observation/Monitoring Requirements**	**Applicable Training Requirements**
1. Stakes and/or various colored pin flags. 2. Marking paints.	**Work Area Observation(s):** 1. SSC must be onsite at all times. 2. Control of work area required at all times. 3. All personnel must be medically monitored in accordance with 8 CCR, Section 5192(f). **Air Monitoring:** 1. None.	1. Hazard Communication. 2. Site Orientation/SSHP Review. 3. HAZWOPER 40-hour training. 4. HAZWOPER 8-hour refresher training (as applicable). 5. HAZWOPER Supervisor Training (for SSC and other applicable supervisory personnel as needed).

Tourtelot Cleanup Project - Task Hazard Analyses

Task/Activity: Surface and Groundwater Sampling **Prepared By/Date:** Johnathan Moore, CSP - 11/4/99

Task Description	Potential Hazard(s) & Controls	Required PPE: Modified Level D
1. Identification and collection of surface water samples from various source locations of the site. 2. Collection of groundwater samples from installed groundwater monitoring well during installation, development and routine groundwater sampling activities.	1. Contaminant Exposure. 2. OE Avoidance. 3. Ticks 4. Heat Stress. 5. Slips, Trips, Falls. 6. Handling of Investigation-Derived Wastes.	1. Hard Hat. 2. Safety Toe Rubber Boots. 3. Short Sleeve Shirt. 4. Full-length Pants or Coveralls. 5. Safety Glasses. 6. Hearing Protection. 7. Outer Chemical Resistant Gloves 8. Inner Chemical Resistant Gloves.
Equipment to be Used	**Observation/Monitoring Requirements**	**Applicable Training Requirements**
1. Water Sampling Equipment 2. Decontamination Equipment and Supplies. 3. 55-gallon Drums. 4. 5-gallon Buckets 5. Support Vehicles.	**Work Area Observation(s):** 1. SSC must be onsite at all times. 2. Control of work area required at all times. 3. All personnel must be medically monitored in accordance with 8 CCR, Section 5192(f). **Air Monitoring:** 1. In accordance with Section 7.0 and Table 7-1	1. Hazard Communication. 2. Site Orientation/SSHP Review. 3. HAZWOPER 40-hour training. 4. HAZWOPER 8-hour refresher training (as applicable). 5. HAZWOPER Supervisor Training (for SSC and other applicable supervisory personnel as needed).

Tourtelot Cleanup Project - Task Hazard Analyses

Task/Activity: Surface/Shallow Subsurface Soil Sampling **Prepared By/Date:** Johnathan Moore, CSP - 11/4/99

Task Description	Potential Hazard(s) & Controls	Required PPE: Modified Level D
1. Identification and collection of surface and shallow subsurface soil samples from various source locations of the site.	1. Contaminant Exposure. 2. OE Avoidance. 3. Dust Suppression 4. Ticks 5. Heat Stress. 6. Slips, Trips, Falls. 7. Handling of Investigation-Derived Wastes.	1. Hard Hat. 2. Safety Toe Rubber Boots. 3. Short Sleeve Shirt. 4. Full-length Pants or Coveralls. 5. Safety Glasses. 6. Leather Work Gloves (optional) 7. Outer Chemical Resistant Gloves (required for use during sample handling and contact during direct contact with soils. 8. Inner Chemical Resistant Gloves (required for use during sample handling and contact during direct contact with soils.
Equipment to be Used	**Observation/Monitoring Requirements**	**Applicable Training Requirements**
1. Soil Sampling Equipment 2. Support Vehicles. 3. Decontamination Supplies and Equipment (as applicable)	**Work Area Observation(s):** 1. SSC must be onsite at all times. 2. Control of work area required at all times. 3. All personnel must be medically monitored in accordance with 8 CCR, Section 5192(f). **Air Monitoring:** 1. In accordance with Section 7.0 and Table 7-1	1. Hazard Communication. 2. Site Orientation/SSHP Review. 3. HAZWOPER 40-hour training. 4. HAZWOPER 8-hour refresher training (as applicable). 5. HAZWOPER Supervisor Training (for SSC and other applicable supervisory personnel as needed).

APPENDIX H

HAZARDS OF ELECTROMAGNETIC RADIATION TO ORDNANCE AND OE SAFETY & HEALTH PROGRAM - OE AVOIDANCE

HAZARDS OF ELECTROMAGNETIC RADIATION TO ORDNANCE

On-site use of devices which emit electromagnetic radiation (EMR) presents a significant hazard due to the susceptibility of electro-explosive devices (EED) to accidental detonation by EMR. EMR-emitting devices include many of the common types of communication equipment and navigation aids regularly employed on site (e.g., cellular telephones, two-way radios, etc.). While curtailment in use of these devices is preferable, some on-site activities are required. Accordingly, the ordnance and explosives (OE) hazard distance (referred to as the safe separation distance SSD) must be determined for each device which emits or produces EMR.

The Safe Separation Distance Formulae Table below, presents the formulas used to calculate SSD, based on the emission frequency of the EMR and the following parameters:

D = SSD (in feet)
F = EMR frequency (in megahertz [MHz])
P = EMR output power (in watts)
G = absolute (numerical) power gain ratio of the transmitting antenna (unitless)[1]

Safe Separation Distance Formulae Table

Frequency Range	SSD Formula
f <0.02 MHz	$D = 0.093 \times (PG)^{0.5}$
0.02 MHz ≤ f < 0.1 MHz	$D = 4.63f \times (PG)^{0.5}$
0.1 MHz ≤ f < 2.0 MHz	$D = 18f \times (PG)^{0.5}$
2.0 MHz ≤ f < 32 MHz	$D = 90 \times (PG)^{0.5}$
32 MHz ≤ f < 1000 MHz	$D = 1200/f \times (PG)^{0.5}$

The following rules should be observed when calculating SSDs:

Rule 1: Where emissions occur over a range of frequencies the SSD will be determined for the highest and lowest frequency in the range, and the greater value accepted as the SSD for the device.

Rule 2: If the device can be manually set to operate at different frequencies a separate distance can be calculated for each operating frequency. If frequencies can be changed automatically the set of available frequencies should be treated as a range and analyzed per Rule 1.

Calculated SSDs for each device should be recorded on an SSD Log established for the site. The information should also be affixed to each device so that it is readily identifiable by device operators.

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[1] If antenna gain is expressed in decibels (dB), the absolute gain can be calculated using the following formula:

$$G = 10^{(G_{db}/10)}$$

OE SAFETY AND HEALTH PROGRAM
OE AVOIDANCE
RI/FS TOURTELOT CLEANUP PROJECT
BENICIA, CALIFORNIA

1.0 General

Ordnance and explosives avoidance escort services will be provided in support of the RI/FS field sampling activity to be performed on the Project Site. The fieldwork is expected to commence in late November 1999.

All work will be conducted in accordance with the Site Specific Safety and Health Plan. All personnel engaged in the work are required to read and understand all pertinent sections of this document prior to commencing any work at the Project Site. Because the work may be in areas contaminated with ordnance explosives (OE), all activities shall be conducted in full compliance with CEHNC, USACE, DA, DOD and the DTSC requirements regarding personnel, equipment and procedures.

The work will be performed in substantial compliance with CERCLA (Section 104) and the National Contingency Plan (Sections 300.120(c) and 300.400(e)). The provisions of 29 CFR 1910.120 shall apply to all actions taken at this site. Additionally, the Occupational Safety and Health Administration (OSHA) requires all employers performing on-site activities to develop and maintain an ongoing written Safety and Health Program in compliance with OSHA Standard 29 CFR 1910.120(b) and 29 CFR 1926.65(b). The program, including updates, shall be made available upon request.

2.0 Specific Requirements

This task will comprise providing UXO technicians/escorts to:

- visually sweep the sampling areas before personnel and equipment enter,
- escort the vegetation removal activities, and
- sweep the specific path to field sampling locations and the specific sampling location prior to the ground being broken.

The UXO technician/escort will lead all activities and personnel in areas of the field not previously surface cleared. The UXO escort will visually and mechanically (with the aid of a Schonstedt magnetometer) inspect the path to be traversed by personnel and equipment before allowing personnel or equipment access. All personnel and equipment are required to follow the path designated by the UXO escort. At a minimum, the path will be twice the width of the widest vehicle. The boundaries of the approach path will be clearly marked with white pin flags to prevent personnel from straying into uncleared areas.

The UXO escort will provide down hole anomaly detection during all drilling and boring operations per the SSHP section 6.7.3 Drilling Activities.

If OE is encountered, it will be marked with a pin flag for disposal at a later date. All field sampling personnel and equipment will be kept clear of the OE items.

A detailed accounting of all OE found shall be maintained by the PM. OE locations shall be identified using pin flags as directed in the RI/FS Work Plan.

3.0 Data Tracking

The progress of field activities will be recorded in bound field notebooks and maps (one for each UXO supervisor onsite) detailing activities and providing an accounting of all OE found during avoidance activities.

4.0 Schedule

The work is planned to begin in late November 1999 and complete within 15 work days.

5.0 Personnel Qualifications

The Earth Tech shall submit resume(s) for personnel that will be onsite to perform the fieldwork (with alternates, as necessary). All UXO personnel will be graduates of the U.S. Navy EOD Course, Indian Head, Maryland.

6.0 Assumptions

- Two (2) escorts will provide OE avoidance for field teams each day. A Senior UXO Supervisor will be responsible for all OE-related work activities.
- Because this will be an OE avoidance-only activity, UXO personnel are not limited to a 40-hour work-week. All other safety requirements will be met.

7.0 Equipment Requirements

Earth Tech is responsible for providing instrumentation and equipment. Earth Tech will maintain all equipment in good working order and provide routine and preventative maintenance. The OE avoidance will be performed with the aid of a Schonstedt Magnetometer.

8.0 Applicable Codes

All work shall be in accordance with the requirements of regulatory agencies and all federal regulations, including but not limited to:

- United States Environmental Protection Agency
- United States Occupational Safety and Health Administration Regulation 29 CFR 1910.120, and 8CCR 5192
- United States Fish and Wildlife
- United States Department of Transportation
- Department of Toxic Substance Control
- State Division of Wildlife
- State Department of Health and Welfare

9.0 Records

Accurate records of all work shall be maintained in a daily field logbook or on daily field activities. The information to be recorded in the field logbook shall be consistent with the work described above.

10.0 Health and Safety

All activities at the site shall be in compliance with this SSHP, as approved by the DTSC for this task. The anticipated health and safety requirements for this project entail only standard practices required for modified Level D protection (as described by OSHA Hazardous Waste Operation regulations). Prior to commencement of Work at the Project Site, all field personnel shall be required to attend a project health and safety meeting and shall be required to sign a statement that they have received, read, and are

familiar with the project SSHP, and agree to follow procedures outlined in the plan. Following the initial health and safety meeting, the field personnel shall attend daily health and safety meetings prior to the start of work each day.

Note: Soil containing TNT in excess of 10% is considered to be OE in accordance with ER-1110-1-8153. Personnel should avoid contact with soils in excess of 10% TNT. Spark, flame, and heat producing items and activities are not permitted in areas these areas.

Note: Personnel using the medication "Viagra" will not be permitted to hand materials containing explosive constituents. Health hazards due to dermal absorption of explosives, while taking Viagra, can cause severe illness and death.

Note: Soil containing TNT in excess of 10% cannot be shipped. Laboratory analysis of soil in excess of 10% must be performed on site or performed after remediation activities to eliminate or reduce TNT content

11.0 Controls

OSHA requirements pertaining to construction/excavation equipment, materials handling, appliances, wiring and other construction aids shall be observed. OSHA requirements shall govern where mandatory; otherwise, compliance will be with the most stringent applicable requirements.

APPENDIX I

DRILL RIG SAFETY GUIDELINES

Drill Rig Safety Guidelines

A. General Drilling Practices

Prior to the start of site work, the drilling subcontractor will inspect all drilling equipment. The inspection will be documented in the field records. If field operations last longer than 1 week, the drilling equipment inspection must be repeated on a weekly basis.

EARTH TECH will conduct geophysical clearance and determine the location of all underground utilities before the start of drilling operations. In addition to obtaining the utility locations from the client, EARTH TECH will make a utility survey of each drilling point. The utility survey shall include both magnetometer and ground-penetrating radar survey. Documentation that nearby utilities have been marked on the ground and that the drill site has been cleared shall be kept in the EARTH TECH project trailer and confirmed to the drilling subcontractor.

Drill rig maintenance and safety is the responsibility of the drilling subcontractor. The following information is provided as general guidelines for safe practices during drilling activities, and installation of monitoring/extraction wells.

1 No food or beverage will be consumed or stored in the work area.

2. EARTH TECH will contact appropriate utilities agency to survey, mark, and flag locations of buried utility lines.

3. Maintain orderly housekeeping on and around the drill rig.

4. Store tools, materials, and supplies to allow safe handling by drill crew members. Proper storage on racks or sills will prevent spreading, rolling, or sliding.

5. Avoid storage or transportation of tools, materials, or supplies within or on the drill rig derrick.

6. Maintain working surfaces free of obstructions or potentially hazardous substances.

7. Store gasoline only in containers specifically designed or approved for such use.

8. Wear eye protection when chipping, chiseling or breaking material that presents risk of flying objects.

9. The departing driller should inform the oncoming driller of any special hazards or ongoing work that may affect the safety of the crew.

10. Fire fighting equipment should not be tampered with and should not be removed for other than the intended fire fighting purposes or for servicing.

11. If lubrication fittings are not accessible with guards in place, machinery should be stopped for oil and greasing.

12. Rigging material equipment for material handling should be checked prior to use on each shift and as often as necessary to ensure it is safe. Defective rigging should be removed from service.

13. The area around the derrick ladder should be kept clear to provide unimpeded access to the ladder.

14. Work areas and walkways should not be obstructed.

15. The rotary table of the rig floor shall be kept free of obstructions and free of undue accumulation of oil, water, ice, or circulating fluids.

B. Moving Rig to Drilling Location

1. Inspect the route of travel before moving drill rig off-road. Note rocks, trees, erosion, and uneven surfaces.

2. Remove all passengers from the cab before moving drill rig onto rough or sloped terrain.

3. Engage multiple drive power trains (when available) on rig vehicle when mobilizing off-road.

4. Travel directly up or down grade on slopes when feasible. Avoid off-camber traverse approaches to drill sites.

5. Approach changes in grade squarely to avoid shifting loads or unexpected unweighting.

6. Use a spotter (person at grade) to provide guidance when vertical and lateral clearance is questionable.

7. Use hand brakes and block rigwheels when grades are steep.

8. Lower rig mast before moving rig.

9. Secure all loads to rig prior to off-road mobilization.

10. EARTH TECH will use geophysical techniques, or equivalent, to locate buried utility lines.

C. Raising Mast

1. Locate visually overhead and buried utilities prior to drilling operations.

2. Treat overhead electrical lines as if they were energized and maintain at least a 40-foot clearance.

3. EARTH TECH will contact appropriate utilities agency to manipulate and deactivate overhead service in areas that interfere with drilling operations. Do not attempt to handle utilities.

4. Stabilize and level each work site prior to drill rig setup.

5. The derrick must not be raised until the rig has been blocked, leveled, and chocked.

6. Note wind speed and direction to prevent overhead utility lines from contacting rig derrick. Allow at least a 20-foot clearance between rig mast and utility lines.

D. Hoisting Operations

1. Drillers should never engage the rotary clutch without watching the rotary table and ensuring it is clear of personnel and equipment.

2. Unless the draw works is equipped with an automatic feed control, the brake should not be left unattended without first being tied down.

3. Drill pipe or casing should not be picked up suddenly.

4. Drill pipe should not be hoisted until the driller is sure that the pipe is latched in the elevator, or the derrick man has signaled that he may safely hoist the pipe.

5. During instances of unusual loading of the derrick or mast, such as when making an unusually hard pull, only the driller should be on the rig floor and no one should be on the rig or derrick.

6. The brakes on the draw works of every drilling rig should be tested by each driller, when he comes on shift, to determine whether they are in good order. The brakes should be thoroughly inspected by a competent individual each week.

7. A hoisting line with a load imposed should not be permitted to be in direct contact with any derrick member or stationary equipment, unless it has been specifically designed for line contact.

8. Workers should never stand near the well bore whenever any wire line device is being run.

9. Hoisting control stations should be kept clean and controls labeled as to their functions.

10. Inspect wire, rope, hoisting hardware, swivels, hooks, bearings, sheaves, guides, rollers, clutches, brakes for the following:

    - abrasions
    - breaks
    - wear
    - fatigue

- corrosion
- jamming
- kinking.

11. Avoid the suspension of loads when hoist is unattended.

12. Prevent hoisting loads directly over field personnel.

13. Restrict hoisting operations during unfavorable environmental conditions such as rain or high winds.

14. Maintain safe hand distance from hoisting equipment (e.g., wire rope, hooks, pinch points) when slack is reduced.

E. Riding Hoisting Equipment

Under no circumstances will personnel be permitted to ride the traveling block or elevators, nor will the cat line be used as a personnel carrier.

F. Cat Line Operations

1. Only experienced workers will be allowed to operate the cat head controls. The kill switch must be clearly labeled and operational prior to operation of the cat line.

2. The cat head area must be kept free of obstructions and entanglements.

3. The operator should not use more wraps than necessary to pick up the load. More than one layer of wrapping is not permitted.

4. Personnel should not stand near, step over, or go under a cable or cat line that is under tension.

5. Employees rigging loads on cat lines should:

   - Keep out from under the load
   - Keep fingers and feet where they will not be crushed
   - Be sure to signal clearly when the load is being picked up
   - Use standard visual signals only and not depend on shouting to coworkers
   - Make sure the load is properly rigged, since a sudden jerk in the cat line will shift or drop the load.

G. Pipe Handling

1. Pipe should be loaded and unloaded, layer by layer, with the bottom layer pinned or blocked securely on all four corners. Each successive layer should be effectively blocked or chocked.

2. Workers should not be permitted on top of the load during loading, unloading, or transferring of pipe or rolling stock.

3. Employees should be instructed never to try to stop rolling pipe or casing; they should be instructed to stand clear of rolling pipe.

4. Slip handles should be used to lift and move slips. Employees should not be permitted to kick slips into position.

5. When pipe is being hoisted, personnel should not stand where the bottom end of the pipe could whip and strike them.

6. Pipe stored in racks, catwalks, or on flatbed trucks should be chocked to prevent rolling.

H. Derrick Operations

1. The derrick climber should be used whenever climbing the derrick. Personnel on the derrick should be tied off, or otherwise protected from falling when working in an unguarded elevated position.

2. All stands of pipe and drill collars racked in a derrick should be secured with rope or otherwise adequately secured.

3. Tools, derrick parts, or materials of any kind should not be thrown from the derrick.

4. The elevators must be properly clamped onto all pipe joints prior to the driller engaging the load.

I. Making and Breaking Joints

1. Tongs should be used for the initial making up and breaking of the joint. The rotary table should not be used for the initial breaking of a joint.

2. Employees making or breaking joints should not be permitted to stand within the arc of the tong handles when the tong pull line is under tension. Employees should handle the tongs only by the appropriate handles.

3. Employees should be trained in the safe use of spinning chains. Spinning chains should not be handled near the rotary table while it is in motion.

J. Drilling Operations

1. Begin auger borings slowly with the drive engine operating at low speed.

2. Establish a communication system between driller, helper, and geologist for responsibilities during drilling operations.

3. Engage auger to power coupling as recommended by manufacturer.

4. Restrict contact with power coupling or auger during rotation.

5. Prevent placing hands or feet under auger during rotation.

6. Prevent placing hands or feet under auger sections during hoisting over hard surfaces.

7. Avoid the removal of spoil cuttings with hands or feet.

8. Assure drill rig is in neutral and the augers are not rotating before cleaning augers.

PRECISION SAMPLING, INC.
DAILY SAMPLING RIG CHECKLIST

DATE: _____ LOCATION: _____

PROJECT #: _____ RIG: _____

ITEM NAME	REQUIREMENT	YES	NO	COMMENT
Hydraulic systems controls & levers.	No leaking fittings or connections. Levers are in good operating condition. Fluid levels are full.			
Fuel, oil, water and coolant lines.	No leaks.			
Hoses	No leaks in hoses or connections. No signs of excessive wear, kinked or bent hoses.			
Gauges	Operational and visible to operator.			
Switches	Operational and accessible to operator & helper			
Drive chains	No signs of excessive wear, broken or defective links.			
Parking brakes	Set and operational			
Outriggers	No leaks. Set on pads (as necessary to avoid damage)			
Lights (head, tail and running lights)	Operational and without cracked lenses			
Back-up alarm	Operational, spotter used.			
Cables and ropes	No fraying, birdnesting, flattening, stretching. Must be braided or properly clamped at connections.			
Pulleys, drums and spools	No excessive wear or cracking.			
Winch	Properly spooled cable, rated to lift loads.			
Safety Equipment	Safety harness, fire extinguisher, flares, safety reflectors, first aid kit, grounding wire for fueling, and spill response equipment (for fueling & repairs).			

ITEM NAME	REQUIREMENT	YES	NO	COMMENT
Guards	All rotating parts designed with guards. Guards must have warning labels.			
Miscellaneous (as applicable)				

Deficiencies (Explain all negative responses and list corrective actions; all deficiencies must be corrected before the rig is entered into service):

Other Repairs or Routine Maintenance:

Inspection Conducted and Rig Certified by:

Operator: _____

Date: _____

Report Reviewed by:

Supervisor: _____

Date: _____

APPENDIX J

HS501 PERSONAL PROTECTIVE EQUIPMENT PROGRAM

EARTH TECH

STANDARD PROCEDURE

SUBJECT
PERSONAL PROTECTIVE EQUIPMENT

PROCEDURE NO. HS501
DATE April 22, 1996
SUPERSEDES December 17, 1995
APPROVED Diane C. Creel

1.0 PURPOSE AND POLICY

1.1 Purpose

Wherever it is necessary by reason of hazards of processes or environment, chemical hazards, radiological hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact, EARTH TECH shall provide protective equipment, including personal protective equipment for eyes, face, head, and extremities, protective clothing, respiratory devices, and protective shields and barriers.

1.2 Policy

It is the policy of EARTH TECH to assess the hazards of every workplace, mitigate those hazards through practical engineering and work practice controls, and provide personal protective equipment to protect employees from residual hazards. EARTH TECH will reimburse the actual cost of personal protective equipment up to $150 per year per employee for such personal items as footwear and prescription safety glasses. Other items of PPE of a less personal nature, such as hard hats, traffic vests, etc., will be purchased with department operating funds.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility. The Corporate Environmental Health and Safety Director is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities. The Responsibility Matrix is shown in Attachment 1 to Section 8.

4.0 DEFINITIONS

The following definitions apply to all requirements of this procedure:

EHS. Environmental Health and Safety

EHS Professional. Environmental Health and Safety Professional, an individual assigned to the Environmental Health and Safety Department who is certified in the practice of either industrial hygiene (CIH) or safety (CSP), or any other individual designated by the Environmental Health and Safety Department Manager.

EHS Staff. A person whose primary work assignment is to prevent injury or illness. A Site Safety Officer is an EHS Staff.

Field Personnel. Field personnel include any employee who performs field work as part of his/her assigned duties.

Field Work. Any work activity occurring outside of an office setting.

HASP. Health and Safety Plan, the site-specific document written in accordance with HS209.

PPE. Personal Protective Equipment, devices worn by the worker to protect against hazards in the environment.

SOW. Statement of Work, a document to describe the work to be performed.

5.0 TEXT

5.1 General

The goal is to prevent harm to the body from hazards in the work environment. The preferred method is to eliminate the source of the hazard. When this is not possible, the next line of defense is stopping, capturing, or containing the hazard at its source. The next fall back is to intercept the hazard along its path to the worker. The last resort is shielding the person with personal protective equipment.

5.1.1 Hazard Determination

Every operation, activity, and task is evaluated by management to determine hazards and potential hazards that may be present that would necessitate the use of personal protective equipment (PPE).

Where hazards derive from exposure to chemical substances, managers seek the assistance of an Environmental Health and Safety (EHS) Professional.

5.1.2 Hierarchy of Controls.

Engineering and work practice controls are used to eliminate the hazard or stop, contain, or capture at the source or intercept it along its path to the worker. When feasible, these controls are preferred to burdening the worker with PPE. Administrative controls are control measures to limit the duration of exposure to the hazard. Generally, administrative controls are not acceptable to control inhalation or direct skin hazards, except when no other control technology is feasible or effective. With the exception of administrative controls to prevent heat-, cold-, or radiation- related illness, the use of administrative controls requires the approval of the Corporate EHS Director.

5.1.3 Routes of Entry.

Various types of PPE are used to prevent the entry of chemical and biological substances through

- Inhalation
- Absorption through intact skin
- Ingestion
- Penetration through break in skin (injection).

5.1.4 Selection

The selection of PPE is based on the hazards identified in the workplace hazard assessment and the activities that will be performed while using the PPE. To assure adequate protection, the selected PPE meets ANSI requirements where standards have been published, such as foot, eye, and head protection, and NIOSH or MSHA requirements for respiratory protection. Corporate EHS maintains comprehensive data to aid in the selection of PPE.

5.1.5 Training

Every worker who is required to use PPE receives training provided by his/her supervisor, with assistance from EHS Professional when requested, which covers the following topics:

- When is PPE necessary
- What PPE is necessary
- How to properly don, doff, adjust, and wear PPE
- The limitations of PPE
- The proper care, maintenance, useful life, and disposal of the PPE.

5.1.6 Maintenance of PPE

After each use, employees inspect all PPE that will be used again. Any item needing maintenance or repair will be identified and removed from service until the maintenance or repair has been completed and the item verified fit for use. Maintenance and repair will use only replacement parts approved by the manufacturer and be conducted in a manner consistent with manufacturer's instructions. Maintenance and repair will restore PPE to a condition meeting original certification (NIOSH, MSHA, ANSI, etc.) or the item will be discarded as not reparable or beyond economical repair.

5.1.7 Loss of protection.

The major reason for loss of protection from PPE results from non-use. Other factors influencing loss of protection include contamination of the PPE, penetration (i.e., rips, tears, holes, etc.), and permeation through the materials of construction. There are many factors influencing non-use of PPE. Because using PPE is generally less comfortable than not using PPE, workers need to be motivated to use it. Through education and training, workers need to recognize the need for PPE and understand the benefits of using it. Acceptance of PPE is aided by providing sizes and styles that improve fit and comfort. The PPE must be selected with full consideration for the task to be performed while using it.

Non-use of PPE becomes more of a problem when the PPE is not stored in a readily accessible location, handy to the work. No one likes to use PPE that is not clean, dry, and protected from

deterioration. PPE that is difficult to put on or take off will be avoided. To reduce this as an influence for non-use, ease of donning and doffing must be a consideration in the selection of PPE.

5.2 PPE Program Responsibilities

5.2.1 Supervisor of Field Personnel.

- Coordinates with Project/Response Managers to determine the necessary and appropriate personal protective equipment to be permanently assigned to his/her employees.
- Ensures that his/her employees have all appropriate personal protective equipment.
- Conducts periodic inspections of his/her employees' personal protective equipment to ensure it is properly maintained and ready for use.
- Coordinates with Project Manager when conditions require change in PPE or additional training.

5.2.2 Project/Response Manager.

- Ensures that project documents, such as statements of work, health and safety plans, or accident prevention plans, clearly state the required PPE to be used on the project.
- Verifies that personnel assigned to project have completed the appropriate training for the PPE required for the project and maintains copy of training certificate in project file.
- Ensures that personnel working on the project have and use the PPE specified for the assigned tasks.

5.2.3 Environmental Health and Safety Professional.

- Determines hazards through review of Statement of Work (SOW), Work Plan, or other project documents or site visit.
- Ensures workplace hazard assessment has been completed. In accordance with 29 CFR 1910.132, there must be a written certification of the workplace hazard assessment. The form HS501-F1 *Workplace Hazard Assessment* as shown in Attachment 2 in Section 8 of this procedure provides a convenient means to certify the workplace hazard assessment.
- Selects PPE to provide adequate protection for identified hazards. PPE must be compatible with intended activities.
- Communicates selection via project documents (HASP, etc.) to project personnel.

- During the performance of field inspections in accordance with HS205, inspects company and employee owned PPE to assure the adequacy, maintenance, and sanitation of such equipment.
- Audits the use of PPE to assure adequacy and proper use of such equipment.
- Conducts annual evaluation to determine where PPE programs can be improved.

5.2.4 **Field Personnel.**

- Ensures he/she has all the required PPE for the work assignment. Coordinates with Supervisor to obtain any item that he/she is lacking.
- Ensure PPE fits properly.
- Maintains permanently assigned PPE in sanitary and reliable condition.
- Inspects all PPE that will be used again after each use.
- Repairs or replaces PPE when worn, damaged, or missing.
- Ensures defective and damaged PPE is removed from service.
- Facilitates timely replacement of worn, depleted, and missing items of permanently assigned personal protective equipment to assure reliable operation.
- Properly disposes of all single-use PPE after each use.

6.0 EXCEPTION PROVISIONS

Exceptions to this procedure must be approved by the responsible Environmental Health and Safety Manager with notification to Corporate EHS Director.

7.0 CROSS REFERENCE

HS201 Injury and Illness Prevention Program
HS205 Safety Inspections and Audits
HS503 Respiratory Protection
HS505 Eye Protection
HS507 Foot Protection
HS509 Hand Protection
HS511 Body Protection
HS513 Supplied Air Respirators, including SCBA
29 CFR 1910.132 Personal Protective Equipment

8.0 ATTACHMENTS

Attachment 1: Responsibility Matrix
Attachment 2: Workplace Hazard Assessment Certification HS501-F1

RESPONSIBILITY MATRIX

Action	Procedure Section	Employee	Supervisor	Project Manager	EHS Professional	Corporate EHS Manager
Issuance, revision and maintenance of this procedure	3.1					X
Hazard assessment and determination of need for PPE	5.1		X		X	
Selection of PPE	5.1.5				X	
Issuance of PPE	5.2.1		X	X		
Training	5.1.6					
Maintenance of PPE	5.1.7	X				
PPE program evaluation	5.2.3				X	

EARTH TECH

WORKPLACE HAZARD ASSESSMENT

I. WORKPLACE IDENTIFICATION

PROJECT NAME	PROJECT NUMBER
LOCATION	
PROJECT MANAGER	
OPERATION/ACTIVITY/TASK DESCRIPTION	

II. REFERENCE AND SOURCES USED FOR HAZARD ASSESSMENT

STATEMENT OF WORK	☐
WORK PLAN	☐
HEALTH AND SAFETY PLAN	☐
SITE VISIT	☐
OTHER	☐

III. CERTIFICATION

I certify that a hazard assessment was performed in accordance with 29 CFR 1910.132 on the workplace herein identified on this date.
NAME SIGNATURE

MINIMUM STANDARDS OF PERSONAL PROTECTIVE APPAREL

The following are minimum standards of apparel, personal protective equipment, and dress for field activities.

1. Field work **not** involving chemical or physical hazards; activities **not** at industrial, manufacturing, or construction locations:

    - Shirt with sleeves
    - Pants, full length
    - Footwear, closed-toe

2. Field work involving equipment, such as drill rigs, field work at construction sites, activities at industrial sites, and activities at manufacturing locations requires, in addition to the above, the following personal protective items:

    - Hard hat (May be optional in industrial and manufacturing settings depending on conditions)
    - Safety toe footwear
    - Safety glasses, cover goggles, or faceshield

3. Where exposure or potential exposure to chemical hazards exist, personal protective equipment shall be selected and used which is appropriate for the work to be done and which will provide adequate protection for the chemical hazard. Chemical protective PPE includes respirators, gloves, aprons, coveralls, overalls, boots, boot covers, etc.

4. Where noise hazards exist or are likely, hearing protectors shall be selected and worn. Hearing protectors shall be selected to be compatible with the rest of the required PPE and the activities to be performed.

5. Where physical hazards exist, such as hot surfaces, sharp objects, vibrating tools, extremely cold surfaces, etc., the personal protective equipment shall be selected and used that is appropriate to hazard, provides adequate protection, and is compatible with the rest of the protective apparel

6. Not acceptable for any field work are the following:

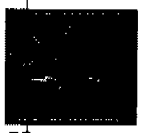
    - Dress, skirt, kilt
    - Tank tops, halter tops, topless, shirtless
    - Slippers, sandals, thongs, flip-flops, go-aheads, "Tijuana specials"
    - Shorts, cut-offs, bathing suit

7. Exceptions to these minimum standards requires the approval of an EHS Professional.

APPENDIX K

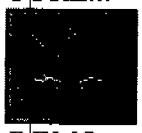
TRAINING PROGRAM OUTLINES

Training Links:



Home...

CORE...



DEMO...

TMD...

BIO/CHEM...

Reserve Training...

Training at the
Explosive Ordnance Disposal School

We are a Navy managed command located at Eglin Air Force Base, Florida and Indian Head Maryland, that is jointly staffed by over 300 Army, Marine Corps, Navy, and Air Force personnel. Each year approximately 325 U.S. Soldiers, Sailors, Marines, and Airman graduate from the seven month (12 for Navy) basic course. Also, over 100 non-U.S. students graduate each year and over 63 countries have EOD technicians who have been trained at this school. U.S. graduates from this school are currently performing EOD missions in places such as Bosnia, Laos, Cambodia, Korea, the Arabian Gulf, on board ships and U.S. bases throughout the world.

Currently EOD training is broken down into two phases.

Phase I consists of eleven (11) weeks of "basic level" EOD training at NAVSCOLEOD DET, Eglin Air Force Base, Florida. Eglin Air Force Base is located in Florida's north west panhandle.

Phase II consists of fifteen (15) weeks of "advanced" level EOD training at Naval Ordnance Station, Indian Head, Maryland. Naval Ordnance Station, Indian Head is located about 45 miles south of Washington DC. Training at Indian Head, Maryland is scheduled to consolidate with training at Eglin AFB, Florida sometimes late in 1998.

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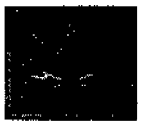
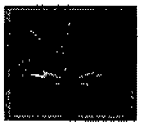

Home...


Training...


Welcome Aboard...


History...


The Future...

Phase I Training at
Explosive Ordnance Disposal School Detachment

Prior to starting training students will be given a one day indoctrination into the school. All aspects of the school are covered, giving each student an overview of the school, what they can expect as well as what is expected of them. Phase I training at NAVSCOLEOD Detachment is broken down into four (4) training divisions.

Training begins in the CORE Division. This division is 18 days long and covers a variety of subjects from basic safety to EOD operations and planning.

Students then enter the Demolition Division were in 15 days they will learn about basic demolition materials, explosive safety, and disposal techniques.

The next division is the Tools and Methods Division. Students will spend 11 days learning about EOD special tools and procedures, to include explosively actuated tools and ordnance locators.

As they enter the last division, which is the Biological and Chemical Division, they will be expected to put together what they have learned in the first three divisions and apply that during these last 11 days. This training provides basic information in biological/chemical materials, clothing, as well as related procedures. It also places the students in a EOD scenario while operating in a simulated chemical/biological environment.

Upon successful completion students then head north to Phase II training. This will be 15 weeks of training at Naval School, Explosive Ordnance Disposal, Indian Head, Maryland.

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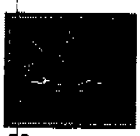
"The First Division"

Training Links: **CORE Division**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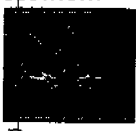
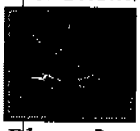

Demo...


TMD...


Bio/Chem...


Phase I...


Training...

CORE Division provides the backbone of skills and knowledge upon which Explosive Ordnance Disposal (EOD) is built. During the course of 18 training days, a student would be immersed in the basic principles of electricity, physics, fuze functioning and ordnance identification. Students would also be trained in the use of the automated EOD publications systems. After the first 13 days of classroom instruction, the student will conduct and be evaluated on the application of these *core* skills in an outdoor environment. This environmental laboratory would require the student to approach a suspected item, make some preliminary evaluations, research, and positively identify the suspected munition, while observing safety during the whole evolution.

Routinely CORE Division is considered by most students to be the hardest division at NAVSCOLEOD. It is important that the student learn the safeties and fundamental theories first, before learning how to "save the world".

Yearning for excitement, most students look forward to the "blow and go" demonstrations of explosives in the Demolition Division, the second stop at Phase I.

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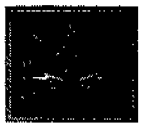
"The Second Division, It's a Blast"

Training Links:


Home...


TMD...


Bio/Chem...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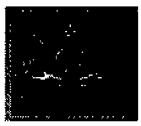
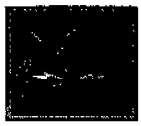

Phase I...


Training...

Demo Division

Welcome to the world of the *demolition* division. It is better known as "DEMO". Demo training last 15 days. This block of instruction begins with extensive classroom training in explosive safety, an essential element of any EOD operation.

The training provides a summary of the history of explosives, and expands into Explosives, and Explosives Effects (EEE) such as blast and fragmentation, and details explosive storage, handling and transportation requirements. From that base of information, demolition materials and their designated use become the heart of the Demo division.

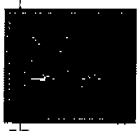
After 5 intensive days in the classroom the student progresses to the practical application of electric, non-electric, and radio firing systems. This prepares trainees for disposal operations, i.e., disposal by detonation and disposal by burning. They will also learn Shaped Charges and Special Explosives. The remaining 10 days will be spent in practical application and testing.

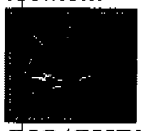
There are 5 tests in this division, but tests alone do not determine whether students successfully complete the Demolition division. Lack of concentration, casualness, inappropriate attitude or unsafe acts will eliminate them from this "High Risk" training before ever reaching the first test. This is a fun division but requires a serious approach.

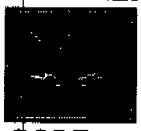
Upon successful completion of this "It's a Blast" division, students will be moving on to the third division of Phase I the Tools and Methods division.

"The Third Division"

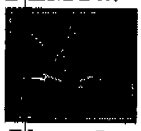
Training Links: **Tools and Methods Division**


Home...


BIO/CHEM...


CORE...


DEMO...


Phase I...


Training...

Welcome to the Tools and Methods Division. During this eleven day block of instruction students will be exposed to a variety of EOD specific tools and techniques recognized by Explosive Ordnance Disposal technicians around the world. This division is primarily a "hands on" training evolution. There will be some classroom sessions necessary to expose trainees to the basic information needed to complete the practical exercises. Students will learn about non-magnetic tools and the roles they play when working on ordnance items. There will be classroom instruction on ordnance locators as well as practical applications and testing. Upon successful completion of ordnance locator training students will be able to located buried unexploded ordnance and mines.

Students will receive classroom training on manual remote procedures designed to accomplish render safe procedures on hazardous fuzed munitions. After several days of practicing these procedures they will be expected to pass practical tests on the various methods.

Training will also be received on explosively acuated EOD tools. These tools are powered by special .50 caliber cartridges and are designed to perform render safe procedures on unexploded ordnance with hazardous fuzes.

Final passage from the TMD division will be a written comprehensive test covering all of the information covered while in this division. Upon successful completion of this division students will move on to the Biological and Chemical Division, the final training division here at Phase I.

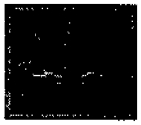
Phase II Links:


Home...

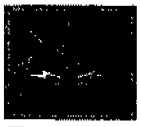

Ground Ordnance...


Air Ordnance...


IED Division...


Nuclear Weapons...


Underwater...


Training...

Phase II Training at

Explosive Ordnance Disposal School, Indian Head, Maryland

Phase II consists of fifteen (15) weeks of "advanced" level EOD training at Naval Ordnance Station, Indian Head, Maryland. Naval Ordnance Station, Indian Head is located about 45 miles south of Washington DC. Training at Indian Head, Maryland is scheduled to consolidate with training at Eglin AFB, Florida sometimes late in 1998.

Before commencing training students will be given a two day indoctrination into the school. All aspects of the school are covered, giving each student an overview of the school, what they can expect as well as what is expected of them. Phase II training at NAVSCOLEOD is broken down into four divisions for surface students, Ground Ordnance, Air Ordnance, Improvised Explosive Devices, and Nuclear Weapons. Navy students attend a fifth division, Underwater Ordnance and Operations.

Phase I

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Last updated:

Phase II Links:

Home...

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Phase II...

Ground Ordnance

Learning in Phase II begins in the Ground Ordnance Division. This division consists of 18 days of instruction and both classroom and practical testing in all aspects of emergency EOD response involving grenades, land mines, rockets, and projectiles. Focus has shifted from Phase I to where students are expected to perform EOD procedures on individual ordnance items, vice the methodology and techniques taught during the Core phase of training. This holds true for the remaining areas in Phase II as well.

Air Ordnance

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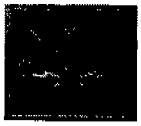
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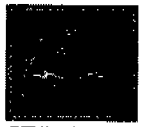
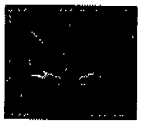
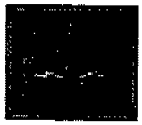

IED Division...


Nuclear Weapons...


Underwater...


Ground Ordnance...


Phase II...

Air Ordnance

After completion of Ground successful students will progress to the Air Ordnance Division where they will spend the next 30 class-days learning the intricacies of air dropped munitions and associated devices. Classroom and practical training includes "Aircraft Explosive Hazards", "Guided Missiles", "Bombs and Bomb Fuzes", and "Dispensers and Payloads".

IED Division

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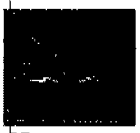
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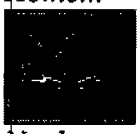
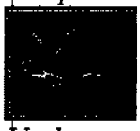
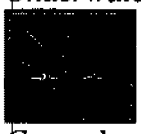
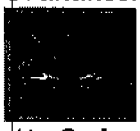

Nuclear Weapons...


Underwater...


Ground Ordnance...


Air Ordnance...


Phase II...

Improvised Explosive Devices

Students then move on to the Improvised Explosive Devices (IEDs) Division. The next 9 class-days are spent studying improvised explosive device construction, effects, render safe, and disposal. Search techniques as well as methods of exploitation are also covered.

Nuclear Weapons Division

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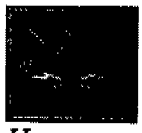
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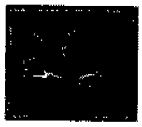
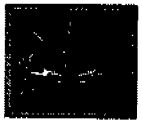

Underwater...

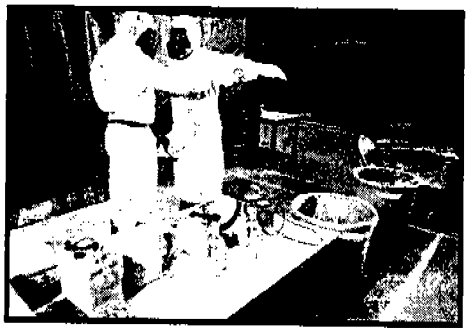

Ground Ordnance...


Air Ordnance...


IED Division...


Phase II...

Nuclear Weapons



The last division for surface students is the Nuclear Ordnance Division. A 21 class-day curriculum includes studying and testing on various aspects of nuclear physics, weapon design and effects, and EOD emergency response procedures. Also included is contamination detection, personnel protection, and contamination control. After completion of this division, surface students graduate and receive their "crab"! Navy students move on to their next block of instruction.

Underwater

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Phase II Links:

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Phase II...

Underwater

Instruction in the last division for Navy students takes place in the Underwater Ordnance Division. Here Navy students spend their last 62 training days learning all the intricacies of locating, rendering safe, exploitation, and disposal of all types of underwater ordnance including mines, torpedoes, limpet mines, and other miscellaneous devices. Practical problems involving use of SCUBA equipment and instruction in MK 16 influence ordnance diving techniques are included.

Phase II

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40 HOUR HAZWOPER
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FIRST AID/CPR

Paul Lepore - Captain/Paramedic

Book Design by AJ Graphics/Huntington Beach, CA

EMS Safety Services, Inc.
800-215-9555 Fax 714-8442-6889

APPENDIX L

MSDS FOR CONTAMINANTS OF CONCERN

International Chemical Safety Cards

2,4,6-TRINITROTOLUENE

ICSC: 0967

2,4,6-TRINITROTOLUENE
2-Methyl-1,3,5-trinitrobenzene
alpha-Trinitrotoluol
TNT
$C_7H_5N_3O_6/C_6H_2(CH_3)(NO_2)_3$
Molecular mass: 227.1

CAS # 118-96-7
RTECS # XU0175000
ICSC # 0967
UN # 0209
EC # 609-008-00-4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Explosive.	NO open flames, NO sparks, and NO smoking.	Water in large amounts. Do not attempt to extinguish large fire, evacuate area.
EXPLOSION	Risk of fire and explosion upon rapid heating or strong shock.	Do NOT expose to friction or shock. Do not expose to heat.	In case of fire: keep drums, etc., cool by spraying with water. Combat fire from a sheltered position.
EXPOSURE		STRICT HYGIENE!	IN ALL CASES CONSULT A DOCTOR!
• **INHALATION**	Abdominal cramps. Blue lips or finger nails. Blue skin. Cough. Headache. Laboured breathing. Vomiting. Symptoms may be delayed (see Notes).	Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
• **SKIN**	MAY BE ABSORBED! Redness. Pain (further see Inhalation).	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention. Wear protective gloves when administering first aid.
• **EYES**	Redness. Pain.	Face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• **INGESTION**	(further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Wear protective gloves when inducing vomiting.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Wet spilled material before picking it up, do not attempt to sweep up dry material. Do NOT wash away	Fireproof. Separated from combustible and reducing substances, heavy metals and initiator explosives. Tightly closed. Cool. Dry.	Unbreakable packaging; put breakable packaging into closed unbreakable container. E symbol

into sewer. Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment (extra personal protection: self-contained breathing apparatus).		T symbol R: 2-23/24/25-33 S: 35-44 UN Hazard Class: 1.1D

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0967

International Chemical Safety Cards

2,4,6-TRINITROTOLUENE

ICSC: 0967

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
YELLOW CRYSTALS.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
May explosively decompose on shock, friction, or concussion. Upon heating, toxic fumes are formed. Reacts violently with reducing agents causing fire and explosion hazard. Reacts with heavy metals. Explodes on heating to 240°C.

OCCUPATIONAL EXPOSURE LIMITS (OELs):
TLV: ppm; 0.5 mg/m^3 (skin) (ACGIH 1991-1992).
PDK not established.

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance irritates the eyes, the skin, and the respiratory tract. The substance may cause effects on the blood , resulting in hemolysis, formation of methaemoglobin. Exposure may result in death. The effects may be delayed (see Notes). Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the liver, blood and eyes , resulting in jaundice, anaemia, cataract.

PHYSICAL PROPERTIES

Boiling point (decomposes): 240°C
Melting point: 80.1°C
Relative density (water = 1): 1.65
Solubility in water: none
Vapour pressure, Pa at 20°C: <0.1
Relative vapour density (air = 1): 7.85
Octanol/water partition coefficient as log Pow: 1.60

ENVIRONMENTAL DATA

This substance may be hazardous to the environment; special attention should be given to aquatic organisms.

NOTES

Combustion in a confined space may turn into detonation. Depending on the degree of exposure, periodic medical examination is indicated. Specific treatment is necessary in case of poisoning with this substance; the appropriate means with instructions must be available. Do NOT take working clothes home. Tolite, Tritol, Trotyl, Entsufon are trade names.

Transport Emergency Card: TEC (R)-10G03
NFPA Code: H 2; F 4; R 4;

ADDITIONAL INFORMATION

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

WATLOW GORDON -- IRON-JPX JP
MATERIAL SAFETY DATA SHEET
NSN: 343900F053034
Manufacturer's CAGE: 93768
Part No. Indicator: A
Part Number/Trade Name: IRON-JPX JP

General Information

Company's Name: WATLOW GORDON
Company's Street: 5710 KENOSHA ST
Company's P. O. Box: 500
Company's City: RICHMOND
Company's State: IL
Company's Country: US
Company's Zip Code: 60071-5000
Company's Emerg Ph #: 815-678-2211
Company's Info Ph #: 815-678-2211
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 21MAY96
Safety Data Review Date: 25MAR97
MSDS Preparer's Name: ALAN HAMACKA
Preparer's Company: WATLOW GORDON
Preparer's St Or P. O. Box: 5710 KENOSHA ST
Preparer's City: RICHMOND
Preparer's State: IL
Preparer's Zip Code: 60071-5000
MSDS Serial Number: CDQYF

Ingredients/Identity Information

Proprietary: NO
Ingredient: RED IRON OXIDE/IRON (III) OXIDE/FERRIC OXIDE/YELLOW FERRIC OXIDE/YELLOW IRON OXIDE/IRON OXIDE PIGMENT
Ingredient Sequence Number: 01
Percent: 99
NIOSH (RTECS) Number: NO7400000
CAS Number: 1309-37-1
OSHA PEL: 10 MG/CUM
ACGIH TLV: 5 MG/CUM (FE)

Physical/Chemical Characteristics

Fire and Explosion Hazard Data

Flash Point: NONFLAMMABLE
Unusual Fire And Expl Hazrds: SPARKS FROM GRINDING/WELDING MAY IGNITE FLAMMABLE/COMBUSTIBLE MATERIALS.

Reactivity Data

Stability: YES
Hazardous Decomp Products: METAL DUST/FUMES
Hazardous Poly Occur: NO

Health Hazard Data

Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: IRRITATION TO THE NOSE, EYES, THROAT/SKIN. CHRONIC EXPOSURE MAY CAUSE SEVERE LUNG DISEASES, LUNG FIBROSIS, PNEUMOCONIOSIS/NEUROLOGICAL DAMAGE. SKIN SENSITIVITY MAY ALSO OCCUR.
Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
Signs/Symptoms Of Overexp: DISCOMFORT, IRRITATION, NAUSEA, TIGHTNESS OF CHEST, DIZZINESS, WATERING OF EYES, HEADACHES, DIFFICULTY IN BREATHING, COUGHING, CHEST PAINS.
Med Cond Aggravated By Exp: THOSE HAVING PRE-EXISTING CONDITIONS/OTHER OCCUPATIONAL ILLNESSES BECAUSE OF THE WIDE VARIATION IN INDIVIDUAL SUSCEPTIBILITES.
Emergency/First Aid Proc: INHALATION: MOVE TO FRESH AIR. SKIN: WASH W/ SOAP & WATER. EYES: IMMEDIATELY WASH W/LARGE AMOUNTS OF WATER, WASH FOR 15 MINS. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Precautions for Safe Handling and Use

Waste Disposal Method: GRINDING PARTICLES/DUSTS/WELDING FUMES/CHEMICAL CLEANING SOLUTIONS MUST BE DISPOSED OF IN ACCORDANCE W/LOCAL, STATE & FEDERAL REGULATIONS.
Other Precautions: ARC/SPARK GENERATED WHEN WELDING/BURNING COULD BE A SOURCE OF IGNITION FOR COMBUSTIBLE & FLAMMABLE MATERIALS.

Control Measures

Respiratory Protection: REQUIRED WHEN EXPOSED TO LEVELS THAT EXCEED THOSE ESTABLISHED BY OSHA WHEN GRINDING/WELDING. USE NIOSH APPROVED RESPIRATORS.
Ventilation: REQUIRED.
Protective Gloves: NIOSH APPROVED
Eye Protection: FACE SHIELDS
Other Protective Equipment: PROTECTIVE CLOTHING WHEN REQUIRED.

Transportation Data

Disposal Data

Label Data

LEAD METAL

MSDS Number: L2347 --- *Effective Date: 12/08/96*

1. Product Identification

Synonyms: Granular lead, pigment metal; C.I. 77575
CAS No.: 7439-92-1
Molecular Weight: 207.19
Chemical Formula: Pb
Product Codes: J.T. Baker: 2256, 2266 Mallinckrodt: 5668

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Lead	7439-92-1	95 - 100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! MAY BE FATAL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. NEUROTOXIN. AFFECTS THE GUM TISSUE, CENTRAL NERVOUS SYSTEM, KIDNEYS, BLOOD AND REPRODUCTIVE SYSTEM. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

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

Health Rating: 3 - Severe (Life)
Flammability Rating: 0 - None
Reactivity Rating: 0 - None

Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Lead can be absorbed through the respiratory system. Local irritation of bronchia and lungs can occur and, in cases of acute exposure, symptoms such as metallic taste, chest and abdominal pain, and increased lead blood levels may follow. See also Ingestion.

Ingestion:
POISON! The symptoms of lead poisoning include abdominal pain and spasms, nausea, vomiting, headache. Acute poisoning can lead to muscle weakness, "lead line" on the gums, metallic taste, definite loss of appetite, insomnia, dizziness, high lead levels in blood and urine with shock, coma and death in extreme cases.

Skin Contact:
Lead and lead compounds may be absorbed through the skin on prolonged exposure; the symptoms of lead poisoning described for ingestion exposure may occur. Contact over short periods may cause local irritation, redness and pain.

Eye Contact:
Absorption can occur through eye tissues but the more common hazards are local irritation or abrasion.

Chronic Exposure:
Lead is a cumulative poison and exposure even to small amounts can raise the body's content to toxic levels. The symptoms of chronic exposure are like those of ingestion poisoning; restlessness, irritability, visual disturbances, hypertension and gray facial color may also be noted.

Aggravation of Pre-existing Conditions:
Persons with pre-existing kidney, nerve or circulatory disorders or with skin or eye problems may be more susceptible to the effects of this substance.

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4. First Aid Measures

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

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

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

Eye Contact:

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

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard. Powder/dust is flammable when heated or exposed to flame.

Explosion:
Not considered to be an explosion hazard.

Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire. Do not allow water runoff to enter sewers or waterways.

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. Can produce toxic lead fumes at elevated temperatures and also react with oxidizing materials.

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. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Areas in which exposure to lead metal or lead compounds may occur should be identified by signs or appropriate means, and access to the area should be limited to authorized persons. 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:
For lead, metal and inorganic dusts and fumes, as Pb: -OSHA Permissible Exposure Limit (PEL): 0.05 mg/m3 (TWA) For lead, elemental and inorganic compounds, as Pb: -ACGIH Threshold Limit Value (TLV): 0.05 mg/m3 (TWA), A3 animal carcinogen ACGIH Biological Exposure Indices (BEI): 30 ug/100ml, notation B (see actual Indices for more information). For lead, inorganic: -NIOSH Recommended Exposure Limit

(REL): 0.1 mg/m3 (TWA)

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

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face high efficiency dust/mist respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece high efficiency dust/mist respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

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

Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Other Control Measures:
Eating, drinking, and smoking should not be permitted in areas where solids or liquids containing lead compounds are handled, processed, or stored. See OSHA substance-specific standard for more information on personal protective equipment, engineering and work practice controls, medical surveillance, record keeping, and reporting requirements. (29 CFR 1910.1025).

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9. Physical and Chemical Properties

Appearance:
Small, white to blue-gray metallic shot or granules.

Odor:
Odorless.

Solubility:
Insoluble in water.

Density:
11.34

pH:
No information found.

% Volatiles by volume @ 21C (70F):
0

Boiling Point:
1740C (3164F)

Melting Point:
327.5C (622F)

Vapor Density (Air=1):
No information found.

Vapor Pressure (mm Hg):
1.77 @ 1000C (1832F)

Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
Does not decompose but toxic lead or lead oxide fumes may form at elevated temperatures.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Ammonium nitrate, chlorine trifluoride, hydrogen peroxide, sodium azide, zirconium, disodium acetylide, sodium acetylide and oxidants.

Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:
Investigated as a tumorigen, mutagen, reproductive effector.

Reproductive Toxicity:
Lead and other smelter emissions are human reproductive hazards. (Chemical Council on Environmental Quality; Chemical Hazards to Human Reproduction, 1981).

Carcinogenicity:
EPA / IRIS classification: Group B2 - Probable human carcinogen, sufficient animal evidence.

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

---NTP Carcinogen---

Ingredient	Known	Anticipated	IARC Category
Lead (7439-92-1)	No	No	2B

12. Ecological Information

Environmental Fate:
When released into the soil, this material is not expected to leach into groundwater. This material may bioaccumulate to some extent.

Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Lead (7439-92-1)	Yes	Yes	Yes	Yes

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

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Lead (7439-92-1)	Yes	Yes	No	Yes

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

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Lead (7439-92-1)	No	No	Yes	No

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

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Lead (7439-92-1)	10	No	No

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

Prop 65:
THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: No information found.
Poison Schedule: S6

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

16. Other Information

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

Label Hazard Warning:
POISON! DANGER! MAY BE FATAL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. NEUROTOXIN. AFFECTS THE GUM TISSUE, CENTRAL NERVOUS SYSTEM, KIDNEYS, BLOOD AND REPRODUCTIVE SYSTEM. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

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

Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:
Laboratory Reagent.

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

Disclaimer:
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****

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

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

MSDS Material Safety Data Sheet

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

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.

Manganese, 1000 (u)g/mL (0.10% w/v)

MSDS Number: M0678 --- *Effective Date: 09/08/97*

1. Product Identification

Synonyms: None
CAS No.: Not applicable to mixtures.
Molecular Weight: Not applicable to mixtures.
Chemical Formula: Mn and HNO3 in H2O
Product Codes: 6933

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Manganese	7439-96-5	< 1%	No
Nitric Acid	7697-37-2	1 - 2%	Yes
Water	7732-18-5	97 - 98%	No

3. Hazards Identification

Emergency Overview

DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. VAPOR IRRITATING TO EYES AND RESPIRATORY TRACT. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

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

Health Rating: 2 - Moderate
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Corrosive)

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Nitric acid is extremely hazardous; it is corrosive, reactive, an oxidizer, and a poison. The following hazards are for concentrated solutions. Hazards of less concentrated solutions may be reduced. Degree of hazard for reduced concentrations is not currently addressed in the available literature.

Inhalation:
Corrosive! Inhalation of vapors can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract, and in severe cases, pulmonary edema, circulatory failure, and death.
Ingestion:
Corrosive! Swallowing can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract. May cause nausea, vomiting, and diarrhea, and in severe cases, death.
Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.
Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.
Chronic Exposure:
Long-term exposure to concentrated vapors may cause erosion of teeth and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye disease, or cardiopulmonary diseases may be more susceptible to the effects of this substance.

4. First Aid Measures

Immediate first aid treatment reduces the health effects of this substance.
Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Not combustible, but concentrated material is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition.
Explosion:
Concentrated material reacts explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc. Reacts with most metals to release hydrogen gas which can form explosive mixtures with air.
Fire Extinguishing Media:
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. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Nitric Acid:
OSHA Permissible Exposure Limit (PEL):
2 ppm (TWA)
ACGIH Threshold Limit Value (TLV):
2 ppm (TWA); 4 ppm (STEL)
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for

details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Canister-type respirators using sorbents are ineffective.
Skin Protection:
Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Odorless.
Solubility:
Complete (100%)
Specific Gravity:
ca. 1.0
pH:
1.0 (0.1M HNO3)
% Volatiles by volume @ 21C (70F):
ca. 99
Boiling Point:
ca. 100C (ca. 212F)
Melting Point:
ca. 0C (ca. 32F)
Vapor Density (Air=1):
Essentially the same as water.
Vapor Pressure (mm Hg):
Essentially the same as water.
Evaporation Rate (BuAc=1):
Essentially the same as water.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
When heated to decomposition, emits toxic nitrogen oxides fumes and hydrogen nitrate.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
A dangerously powerful oxidizing agent, concentrated nitric acid is incompatible with most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics.
Conditions to Avoid:
Heat and incompatibles.

11. Toxicological Information

For Nitric Acid: Investigated as a mutagen and reproductive effector.

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

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Manganese (7439-96-5)	No	No	None
Nitric Acid (7697-37-2)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

13. Disposal Considerations

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

14. Transport Information

Not regulated.

15. Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Manganese (7439-96-5)	Yes	Yes	No	Yes
Nitric Acid (7697-37-2)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

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

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Manganese (7439-96-5)	Yes	Yes	No	Yes
Nitric Acid (7697-37-2)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

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

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Manganese (7439-96-5)	No	No	Yes	No
Nitric Acid (7697-37-2)	1000	1000	Yes	No
Water (7732-18-5)	No	No	No	No

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

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Manganese (7439-96-5)	1	No	No
Nitric Acid (7697-37-2)	1000	No	No
Water (7732-18-5)	No	No	No

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

Australian Hazchem Code: No information found.
Poison Schedule: S5
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. VAPOR IRRITATING TO EYES AND RESPIRATORY TRACT. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep container closed.
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, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:

Disclaimer:
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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.

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

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

MSDS Material Safety Data Sheet

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

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.

Antimony

MSDS Number: A7152 — *Effective Date: 09/08/97*

1. Product Identification

Synonyms: Stibium, C.I. 77050
CAS No.: 7440-36-0
Molecular Weight: 121.75
Chemical Formula: Sb
Product Codes: 0848

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Antimony	7440-36-0	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! MAY BE FATAL IF INHALED. CAUSES IRRITATION.
TARGET ORGAN(S): Respiratory system, cardiovascular system, eyes, skin.

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

Health Rating: 3 - Severe (Poison)
Flammability Rating: 1 - Slight
Reactivity Rating: 2 - Moderate
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Is harmful may be fatal.
Ingestion:
None identified.
Skin Contact:
Prolonged contact may cause dermatitis.
Eye Contact:
None identified.
Chronic Exposure:
Kidney damage, liver damage.
Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Prompt action is essential.
Ingestion:
If large amounts were swallowed, give water to drink and get medical advice.
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.

5. Fire Fighting Measures

Fire:
Not expected to be a fire hazard.
Explosion:
Can be an explosion hazard, especially when heated.
Fire Extinguishing Media:
Use extinguishing media appropriate for surrounding fire.
Special Information:
No information found.

6. Accidental Release Measures

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

7. Handling and Storage

Keep container tightly closed. Store in secure poison area. Keep product out of light.

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:
-OSHA Permissible Exposure Limit (PEL):
0.5 mg/m3 (TWA)

-ACGIH Threshold Limit Value (TLV):
0.5 mg/m3 (TWA)
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):
For conditions of use where exposure to the substance is apparent, consult an industrial hygienist. For emergencies, or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Silvery-white metal.
Odor:
No information found.
Solubility:
Negligible (< 0.1%)
Specific Gravity:
6.68
pH:
No information found.
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
1635C (2975F)
Melting Point:
630C (1166F)
Vapor Density (Air=1):
4.2
Vapor Pressure (mm Hg):

Not applicable.
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
No information found.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizing agents, strong acids, halogen acids, chlorine, fluorine.
Conditions to Avoid:
Heat, Light.

11. Toxicological Information

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

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Antimony (7440-36-0)	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
Antimony (7440-36-0)	Yes	Yes	No	Yes

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

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Antimony (7440-36-0)	Yes	Yes	No	Yes

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

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Antimony (7440-36-0)	No	No	Yes	Antimony com

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

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Antimony (7440-36-0)	5000	No	No

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

Australian Hazchem Code: No information found.
Poison Schedule: No information found.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

Label Hazard Warning:
POISON! DANGER! MAY BE FATAL IF INHALED. CAUSES IRRITATION.
TARGET ORGAN(S): Respiratory system, cardiovascular system, eyes, skin.
Label Precautions:
Avoid contact with eyes, skin, clothing.
Do not breathe dust. Keep in tightly closed container. Use with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Prompt action is essential. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse.
Product Use:
Laboratory Reagent.
Revision Information:

Disclaimer:

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

ARSENIC, 1000 ug/ml (0.10% w/v)

MSDS Number: A7440 — *Effective Date: 11/06/97*

1. Product Identification

Synonyms: None
CAS No.: 7647-01-0
Molecular Weight: 36.46
Chemical Formula: mostly water
Product Codes: 6919

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Arsenic Trioxide	1327-53-3	< 1%	Yes
Hydrogen Chloride	7647-01-0	1 - 2%	Yes
Water	7732-18-5	> 97%	No

3. Hazards Identification

Emergency Overview

DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. CANCER HAZARD. CONTAINS INORGANIC ARSENIC WHICH CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure. MAY CAUSE LIVER AND KIDNEY DAMAGE.

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

Health Rating: 4 - Extreme (Cancer Causing)
Flammability Rating: 0 - None
Reactivity Rating: 2 - Moderate

Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Health hazards given on this data sheet apply to concentrated (5 - 37%) solutions of hydrochloric acid. Hazards of this product are expected to be reduced. Degree of hazard for these reduced concentrations is not currently addressed in the available literature.

Inhalation:
Symptoms are expected to be less severe than exposure to higher concentrations of hydrochloric acid, where symptoms may include irritation to the respiratory tract.
Ingestion:
Symptoms are expected to be less severe than exposure to higher concentrations of hydrochloric acid, where symptoms may include burning sensation, vomiting and diarrhea. Arsenic is highly toxic! May cause burning in esophagus, vomiting, and bloody diarrhea. Symptoms of cold and clammy skin, low blood pressure, weakness, headache, cramps, convulsions, and coma may follow. May cause damage to liver and kidneys. A suspected fetal toxin. Death may occur from circulatory failure. Estimated lethal dose 120 milligrams.
Skin Contact:
Symptoms are expected to be less severe than exposure to higher concentrations of hydrochloric acid, where symptoms may include irritation, redness, pain and burns.
Eye Contact:
Splashes cause irritation. Symptoms are expected to be less severe than exposure to higher concentrations of hydrochloric acid, where symptoms may include severe burns and eye damage.
Chronic Exposure:
Arsenic on repeated or prolonged skin contact may cause bronzing of the skin, edema, dermatitis, and lesions. Repeated or prolonged inhalation of dust may cause damage to the nasal septum. Chronic exposure from inhalation or ingestion may cause hair and weight loss, a garlic odor to the breath and perspiration, excessive salivation and perspiration, central nervous system damage, hepatitis, gastrointestinal disturbances, cardiovascular damage, and kidney and liver damage. Arsenic compounds are known human carcinogens and may be teratogenic based on effects in laboratory animals.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye disease, or cardiopulmonary diseases may be more susceptible to the effects of this substance.

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4. First Aid Measures

First aid procedures given apply to concentrated solutions. Exposures to dilute solutions may not require these extensive first aid procedures.
Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse. Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to this substance.

Eye Contact:

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

Note to Physician:

If emesis if unsuccessful after two doses of Ipecac, consider gastric lavage. Monitor urine arsenic level. Alkalization of urine may help prevent disposition of red cell breakdown products in renal tubular cells. If acute exposure is significant, maintain high urine output and monitor volume status, preferably with central venous pressure line. Abdominal X-rays should be done routinely for all ingestions. Chelation therapy with BAL, followed by n-penicillamine is recommended, but specific dosing guidelines are not clearly established.

5. Fire Fighting Measures

Fire:

Not considered to be a fire hazard. May react with metals or heat to release flammable hydrogen gas.

Explosion:

Not considered to be an explosion hazard.

Fire Extinguishing Media:

Water or water spray. Neutralize with soda ash or slaked lime.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Structural firefighter's protective clothing is ineffective for fires involving hydrochloric acid. Stay away from ends of tanks. Cool tanks with water spray until well after fire is out.

6. Accidental Release Measures

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

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

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Protect from freezing. Isolate from incompatible substances. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Hydrochloric acid:
- OSHA Permissible Exposure Limit (PEL):
5 ppm (Ceiling)
- ACGIH Threshold Limit Value (TLV):
5 ppm (STEL/Ceiling)

For Inorganic Arsenic compounds (as As):
- OSHA Permissible Exposure Limit (PEL):
10 (u)g/m3 (TWA), 5 (u)g/m3(Action Level), cancer hazard.
- ACGIH Threshold Limit Value (TLV):
0.01 mg/m3 (TWA), A1, confirmed human carcinogen.

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

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face respirator with an acid gas cartridge may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with an acid gas cartridge may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

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

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

Other Control Measures:
Any area where inorganic arsenic is stored, handled, used, etc., must be established as a 'Regulated Area' with controlled access, limited to authorized persons. Containers of inorganic arsenic and Regulated Areas must be labeled to show a CANCER SUSPECT AGENT is present. Eating, drinking, and smoking should not be permitted in areas where solids or liquids containing arsenic or lead compounds are handled, processed, or stored.

See OSHA substance-specific standard for more information on personal protective equipment, engineering and work practice controls, medical surveillance, record keeping, and reporting requirements. (arsenic: 29 CFR 1910 .1018; lead: 29 CFR 1910.1025).

9. Physical and Chemical Properties

Appearance:
Clear, colorless solution.
Odor:
Odorless.
Solubility:
Infinitely soluble.
Specific Gravity:
ca. 1
pH:
No information found.
% Volatiles by volume @ 21C (70F):
> 99
Boiling Point:
ca. 100C (ca. 212F)
Melting Point:
ca. 0C (ca. 32F)
Vapor Density (Air=1):
Essentially the same as water. Not applicable.
Vapor Pressure (mm Hg):
Essentially the same as water.
Evaporation Rate (BuAc=1):
Essentially the same as water.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
When heated to decomposition, emits toxic hydrogen chloride fumes and will react with water or steam to produce heat and toxic and corrosive fumes. Thermal oxidative decomposition produces toxic chlorine fumes and explosive hydrogen gas. Emits toxic fumes of arsenic when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
A strong mineral acid, concentrated hydrochloric acid is highly reactive with strong bases, metals, metal oxides, hydroxides, amines, carbonates and other alkaline materials. Incompatible with materials such as cyanides, sulfides, sulfites, and formaldehyde.
Conditions to Avoid:
Heat, direct sunlight, incompatibles.

11. Toxicological Information

Toxicological Data:

Hydrochloric acid: Inhalation rat LC50: 3124 ppm/1H; Oral rabbit LD50: 900 mg/kg. Investigated as a tumorigen, mutagen, reproductive effector. Arsenic trioxide: oral rat LD50: 14.6 mg/kg; investigated as a mutagen, tumorigen, reproductive effector.

Carcinogenicity:

For arsenic and inorganic arsenic compounds:
Regulated by OSHA as a carcinogen.
EPA / IRIS classification: Group A - Known human carcinogen.

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

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Arsenic Trioxide (1327-53-3)	Yes	No	1
Hydrogen Chloride (7647-01-0)	No	No	3
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:

For Hydrochloric Acid (Concentrated Solutions):
When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater.

Environmental Toxicity:

For Hydrochloric Acid (Concentrated Solutions):
This material may be toxic to aquatic life. LC50 Shrimp: 100-300 ppm/48-hr/salt water; LC100 trout: 10 mg/l/24-hr; TLm mosquito fish: 282 ppm/96-hr.

13. Disposal Considerations

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

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (HYDROGEN CHLORIDE)
Hazard Class: 8
UN/NA: UN3264
Packing Group: III
Information reported for product/size: 500ML

International (Water, I.M.O.)

Proper Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (HYDROGEN CHLORIDE)
Hazard Class: 8

UN/NA: UN3264
Packing Group: III
Information reported for product/size: 500ML

International (Air, I.C.A.O.)

Proper Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (HYDROGEN CHLORIDE)
Hazard Class: 8
UN/NA: UN3264
Packing Group: III
Information reported for product/size: 500ML

15. Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Arsenic Trioxide (1327-53-3)	Yes	Yes	Yes	Yes
Hydrogen Chloride (7647-01-0)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

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

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Arsenic Trioxide (1327-53-3)	Yes	Yes	No	Yes
Hydrogen Chloride (7647-01-0)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

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

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Arsenic Trioxide (1327-53-3)	1	100*	No	Arsenic comp
Hydrogen Chloride (7647-01-0)	5000	500*	Yes	No
Water (7732-18-5)	No	No	No	No

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

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Arsenic Trioxide (1327-53-3)	1	P012	No
Hydrogen Chloride (7647-01-0)	5000	No	No
Water (7732-18-5)	No	No	No

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

WARNING:
THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: No information found.
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products

Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. CANCER HAZARD. CONTAINS INORGANIC ARSENIC WHICH CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure. MAY CAUSE LIVER AND KIDNEY DAMAGE.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe mist.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
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, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:

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

BARIUM, 1,000 UG/ML OR 10,000 UG/ML

MSDS Number: B0334 --- *Effective Date: 02/12/98*

1. Product Identification

Synonyms: None
CAS No.: Not applicable to mixtures.
Molecular Weight: 137.33
Chemical Formula: Ba
Product Codes: 5705, 5719

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Barium Nitrate	10022-31-8	< 2%	Yes
Nitric Acid	7697-37-2	< 4%	Yes
Water	7732-18-5	> 94%	No

3. Hazards Identification

Emergency Overview

DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. VAPOR IRRITATING TO EYES AND RESPIRATORY TRACT. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

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

Health Rating: 3 - Severe (Life)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Corrosive)

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Nitric acid is extremely hazardous; it is corrosive, reactive, an oxidizer, and a poison. The health effects from exposure to diluted forms of this chemical are not well documented. They are expected to be less severe than those for concentrated forms which are referenced in the descriptions below.

Inhalation:
Corrosive! Inhalation of vapors can cause breathing difficulties and lead to pneumonia and pulmonary edema, which may be fatal. Other symptoms may include coughing, choking, and irritation of the nose, throat, and respiratory tract.
Ingestion:
Corrosive! Swallowing nitric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract.
Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.
Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.
Chronic Exposure:
Long-term exposure to concentrated vapors may cause erosion of teeth and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye disease, or cardiopulmonary diseases may be more susceptible to the effects of this substance.

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4. First Aid Measures

Immediate first aid treatment reduces the health effects of this substance.
Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Not combustible, but concentrated material is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition.
Explosion:
Concentrated material reacts explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc. Reacts with most metals to release hydrogen gas which can form explosive mixtures with air.
Fire Extinguishing Media:
If involved in a fire, use water spray.
Special Information:
Increases the flammability of combustible, organic and readily oxidizable materials. In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

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

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

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Nitric Acid:
OSHA Permissible Exposure Limit (PEL):
2 ppm (TWA)
ACGIH Threshold Limit Value (TLV):
2 ppm (TWA); 4 ppm (STEL)

For Soluble Barium Compounds:
OSHA Permissible Exposure Limit (PEL):
0.5 mg (Ba)/m3
ACGIH Threshold Limit Value (TLV):
0.5 mg (Ba)/m3

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Canister-type respirators using sorbents are ineffective.
Skin Protection:
Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Odorless.
Solubility:
Infinitely soluble.
Specific Gravity:
No information found.
pH:
No information found.
% Volatiles by volume @ 21C (70F):
> 99
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. Containers may burst when heated.
Hazardous Decomposition Products:
When heated to decomposition, emits toxic nitrogen oxides fumes and hydrogen nitrate.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
A dangerously powerful oxidizing agent, concentrated nitric acid is incompatible with most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics.
Conditions to Avoid:
Heat, incompatibles.

11. Toxicological Information

For Nitric Acid: Investigated as a mutagen and reproductive effector. For Barium Nitrate: Oral rat LD50: 355 mg/kg. Irritation Data: Skin rabbit 500 mg/24H mild. Eye rabbit 100 mg/24H severe.

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

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Barium Nitrate (10022-31-8)	No	No	None
Nitric Acid (7697-37-2)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

13. Disposal Considerations

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

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.

(NITRIC ACID)
Hazard Class: 8
UN/NA: UN3264
Packing Group: III
Information reported for product/size: 100ML

International (Water, I.M.O.)

Proper Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (NITRIC ACID)
Hazard Class: 8
UN/NA: UN3264
Packing Group: III
Information reported for product/size: 100ML

International (Air, I.C.A.O.)

Proper Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (NITRIC ACID)
Hazard Class: 8
UN/NA: UN3264
Packing Group: III
Information reported for product/size: 100ML

15. Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Barium Nitrate (10022-31-8)	Yes	Yes	Yes	Yes
Nitric Acid (7697-37-2)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

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

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Barium Nitrate (10022-31-8)	Yes	Yes	No	Yes
Nitric Acid (7697-37-2)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

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

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Barium Nitrate (10022-31-8)	No	No	No	Barium compo
Nitric Acid (7697-37-2)	1000	1000	Yes	No
Water (7732-18-5)	No	No	No	No

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

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Barium Nitrate (10022-31-8)	No	No	No
Nitric Acid (7697-37-2)	1000	No	No
Water (7732-18-5)	No	No	No

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

Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: No information found.
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. VAPOR IRRITATING TO EYES AND RESPIRATORY TRACT. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep container closed.
Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.
Product Use:
Industrial chemical.
Revision Information:
MSDS Section(s) changed since last revision of document include: 3, 5, 7, 8, 10, 13, 16.
Disclaimer:
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Copper, 1000 (u)g/mL (0.10% w/v)

MSDS Number: C5166 — *Effective Date: 09/08/97*

1. Product Identification

Synonyms: None
CAS No.: Not applicable to mixtures.
Molecular Weight: Not applicable to mixtures.
Chemical Formula: Cu and HNO3 in H2O
Product Codes: 6928

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Copper	7440-50-8	< 1%	No
Nitric Acid	7697-37-2	1 - 2%	Yes
Water	7732-18-5	97 - 98%	No

3. Hazards Identification

Emergency Overview

DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. VAPOR IRRITATING TO EYES AND RESPIRATORY TRACT. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

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

Health Rating: 2 - Moderate
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Corrosive)

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Nitric acid is extremely hazardous; it is corrosive, reactive, an oxidizer, and a poison. The following hazards are for concentrated solutions. Hazards of less concentrated solutions may be reduced. Degree of hazard for reduced concentrations is not currently addressed in the available literature.

Inhalation:
Corrosive! Inhalation of vapors can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract, and in severe cases, pulmonary edema, circulatory failure, and death.
Ingestion:
Corrosive! Swallowing can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract. May cause nausea, vomiting, and diarrhea, and in severe cases, death.
Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.
Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.
Chronic Exposure:
Long-term exposure to concentrated vapors may cause erosion of teeth and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye disease, or cardiopulmonary diseases may be more susceptible to the effects of this substance.

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4. First Aid Measures

Immediate first aid treatment reduces the health effects of this substance.
Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Nitric Acid Component:
Not combustible, but concentrated material is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition.
Explosion:
Nitric Acid Component: Concentrated material reacts explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc. Reacts with most metals to release hydrogen gas which can form explosive mixtures with air.
Fire Extinguishing Media:
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. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker NEUTRASORB(tm) acid neutralizer is recommended for spills of this product.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Nitric Acid:
OSHA Permissible Exposure Limit (PEL):
2 ppm (TWA)
ACGIH Threshold Limit Value (TLV):
2 ppm (TWA); 4 ppm (STEL)
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures

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

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Canister-type respirators using sorbents are ineffective.

Skin Protection:
Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure to prevent skin contact.

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

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9. Physical and Chemical Properties

Appearance:
Clear, blue liquid.

Odor:
Odorless.

Solubility:
Completely soluble in water.

Specific Gravity:
No information found.

pH:
1.0 (0.1M HNO3)

% Volatiles by volume @ 21C (70F):
ca. 99

Boiling Point:
ca. 100C (ca. 212F)

Melting Point:
ca. 0C (ca. 32F)

Vapor Density (Air=1):
Essentially the same as water.

Vapor Pressure (mm Hg):
Essentially the same as water.

Evaporation Rate (BuAc=1):
Essentially the same as water.

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
When heated to decomposition, emits toxic nitrogen oxides fumes, hydrogen nitrate and copper fumes.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
A dangerously powerful oxidizing agent, concentrated nitric acid is incompatible with

most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics.
Conditions to Avoid:
Heat and incompatibles.

11. Toxicological Information

For Nitric Acid: Investigated as a mutagen and reproductive effector.

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

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Copper (7440-50-8)	No	No	None
Nitric Acid (7697-37-2)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

13. Disposal Considerations

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

14. Transport Information

Not regulated.

15. Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Copper (7440-50-8)	Yes	Yes	No	Yes
Nitric Acid (7697-37-2)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

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

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Copper (7440-50-8)	Yes	Yes	No	Yes
Nitric Acid (7697-37-2)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

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

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Copper (7440-50-8)	No	No	Yes	No
Nitric Acid (7697-37-2)	1000	1000	Yes	No
Water (7732-18-5)	No	No	No	No

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

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Copper (7440-50-8)	5000	No	No
Nitric Acid (7697-37-2)	1000	No	No
Water (7732-18-5)	No	No	No

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

Australian Hazchem Code: No information found.
Poison Schedule: S5
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. VAPOR IRRITATING TO EYES AND RESPIRATORY TRACT. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep container closed.
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, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.

Revision Information:

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

GAF CHEMICALS -- MICROPOWDER IRON GRADE S-SERIES - **METALLIC IRON**
MATERIAL SAFETY DATA SHEET
NSN: 681000F024648
Manufacturer's CAGE: 46575
Part No. Indicator: A
Part Number/Trade Name: MICROPOWDER IRON GRADE S-SERIES

General Information

Item Name: METALLIC IRON
Company's Name: GAF CHEMICALS CORPORATION
Company's Street: 1361 ALPS ROAD
Company's City: WAYNE
Company's State: NJ
Company's Country: US
Company's Zip Code: 07470
Company's Emerg Ph #: (800) 228-5635 EXT. 016
Company's Info Ph #: (201) 628-3000
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 01MAY91
Safety Data Review Date: 24SEP92
Preparer's Company: GAF CHEMICALS CORPORATION
Preparer's St Or P. O. Box: 1361 ALPS ROAD
Preparer's City: WAYNE
Preparer's State: NJ
Preparer's Zip Code: 07470
MSDS Serial Number: BNYCM

Ingredients/Identity Information

Proprietary: NO
Ingredient: IRON
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: NO4565500
CAS Number: 7439-89-6

Physical/Chemical Characteristics

Appearance And Odor: UNIFORM POWDER, 3-6 MICRONS DIAMETER
Boiling Point: 4982F
Melting Point: 2795F
Solubility In Water: INSOLUBLE

Fire and Explosion Hazard Data

Extinguishing Media: CO2
Unusual Fire And Expl Hazrds: STRONG HEAT/SPARKS WILL INITIATE RAPID OXIDATION. W/SUFFICIENT AIR, WILL SPONTANEOUSLY GLOW DULL RED & IGNITE COMBUSTIBLES. DUSTING IN AIR IS EXPLOSION HAZARD.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HEAT, SPARKS, FLAME, MOISTURE
Materials To Avoid: ACIDS, STRONG OXIDIZING AGENTS, CHLORINE TRIFLUORIDE, FLUORINE, NITROGEN DIOXIDE, IRON
Hazardous Poly Occur: NO

Health Hazard Data

LD50-LC50 Mixture: ORAL (RAT) LD50: 30,000 MG/KG
Route Of Entry - Inhalation: NO
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: EYES: RUST RINGS IN CORNEA, IRRITATION,

HYPEREMIA OF CONJUNCTIVA & INFLAMMATION. SKIN: IRRITATION & DERMATITIS.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
Signs/Symptoms Of Overexp: EYES: RUST RINGS IN CORNEA, IRRITATION, HYPEREMIA OF CONJUNCTIVA & INFLAMMATION. SKIN: IRRITATION & DERMATITIS.
Emergency/First Aid Proc: EYES: FLUSH W/PLENTY OF WATER. SKIN: WASH AFTER EXPOSURE. INGESTION: INDUCE VOMITING BY DRINKING TWO GLASSES OR WATER & STICKING FINGER DOWN THROAT. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: SCOOP UP. FLUSH SPILL AREA W/WATER.
Waste Disposal Method: DISPOSE OF W/SOLID WASTE ACCORDING TO FEDERAL, STATE & LOCAL REGULATIONS.
Precautions-Handling/Storing: USE W/ADEQUATE VENTILATION.
Other Precautions: MAINTENANCE: WASH EQUIPMENT THOROUGHLY W/STEAM OR WARM WATER. CHECK FOR FLAMMABLES W/EXPLOSION METER & OXYGEN LEVEL W/OXYGEN METER. FOLLOW GOOD SAFETY PRACTICES BEFORE ENTERING EQUIPMENT.

Control Measures

Respiratory Protection: DUST MASK WHERE DUSTING CANNOT BE AVOIDED.
Ventilation: ADEQUATE
Eye Protection: SAFETY GLASSES

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 24SEP92
Label Date: 10AUG92
Label Status: F
Common Name: MICROPOWDER IRON GRADE S-SERIES
Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-Slight: X
Contact Hazard-Moderate: X
Fire Hazard-None: X
Reactivity Hazard-Slight: X
Special Hazard Precautions: EYES: RUST RINGS IN CORNEA, IRRITATION, HYPEREMIA OF CONJUNCTIVA & INFLAMMATION. SKIN: IRRITATION & DERMATITIS.
Protect Eye: Y
Protect Respiratory: Y
Label Name: GAF CHEMICALS CORPORATION
Label Street: 1361 ALPS ROAD
Label City: WAYNE
Label State: NJ
Label Zip Code: 07470
Label Country: US
Label Emergency Number: (800) 228-5635 EXT. 016
Year Procured: UNK

ALDRICH CHEMICAL -- BENZO (A) PYRENE, 98%, B1008-0
MATERIAL SAFETY DATA SHEET
NSN: 681000N065303
Manufacturer's CAGE: 60928
Part No. Indicator: A
Part Number/Trade Name: BENZO (A) PYRENE, 98%, B1008-0

General Information

Company's Name: ALDRICH CHEMICAL CO INC
Company's P. O. Box: 355
Company's City: MILWAUKEE
Company's State: WI
Company's Country: US
Company's Zip Code: 53201
Company's Emerg Ph #: 414-273-3850
Company's Info Ph #: 414-273-3850
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 05JAN95
Safety Data Review Date: 23OCT95
MSDS Serial Number: BZRGR

Ingredients/Identity Information

Proprietary: NO
Ingredient: BENZO(A)PYRENE (CERCLA)
Ingredient Sequence Number: 01
Percent: 98
NIOSH (RTECS) Number: DJ3675000
CAS Number: 50-32-8
OSHA PEL: 0.2 MG/M3
ACGIH TLV: A2

Physical/Chemical Characteristics

Appearance And Odor: YELLOW GREEN POWDER.
Boiling Point: 923F,495C
Melting Point: >351F,>177C

Fire and Explosion Hazard Data

Extinguishing Media: WATER SPRAY, CARBON DIOXIDE, DRY CHEMICAL POWDER OR APPROPRIATE FOAM.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: NONE SPECIFIED BY MANUFACTURER.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: OXIDIZING AGENTS.
Hazardous Decomp Products: CARBON MONOXIDE, CARBON DIOXIDE.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE:HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. MAY CAUSE EYE IRRITATION. MAY CAUSE SKIN IRRITATION. SKIN LUNGS. TO THE BEST OF MANUFACTURER'S KNOWLEDGE, THE CHEMICAL, PHYSICAL

& TOX PROPERTIES HAVE NOT BEEN THORO INVESTIGATED.
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: BENZO (A) PYRENE:IARC MONO, SUPP, VOL 7, PG 56, 1987:GROUP 2A. NTP 7TH ANNUAL RPT ON CARCINS. 1994:ANTIC TO BE (SUP DAT)
Signs/Symptoms Of Overexp: SEE HEALTH HAZARDS.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYES:FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. SKIN:FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. INHALATION: REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. INGESTION:WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS. CALL A PHYSICIAN IMMEDIATELY.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: EVACUTE AREA. WEAR NIOSH/MSHA APPROVED SCBA, RUBBER BOOTS AND HEAVY RUBBER GLOVES. WEAR DISPOSABLE COVERALLS AND DISCARD THEM AFTER USE. SWEEP UP, PLACE IN BAG & HOLD FOR WASTE DISP. VENT AREA & WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISSOLVE OR MIX THE MATERIAL WITH A COMBUSTIBLE SOLVENT AND BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER. OBSERVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.
Precautions-Handling/Storing: DO NOT BREATHE DUST. DO NOT GET IN EYES, ON SKIN, ON CLOTHING. CARCINOGEN. MUTAGEN. TERATOGEN. KEEP TIGHTLY CLOSED. STORE IN A COOL, DRY PLACE.
Other Precautions: NONE SPECIFIED BY MANUFACTURER.

Control Measures

Respiratory Protection: WEAR APPROPRIATE NIOSH/MSHA APPROVED RESPIRATOR.
Ventilation: USE ONLY IN A CHEMICAL FUME HOOD.
Protective Gloves: CHEMICAL-RESISTANT GLOVES.
Eye Protection: ANSI APPROVED CHEM WORKERS GOGGS (FP N).
Other Protective Equipment: ANSI APPROVED EMERGENCY EYE WASH AND DELUGE SHOWER (FP N). OTHER PROTECTIVE CLOTHING.
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.
Suppl. Safety & Health Data: EXPLAN OF CARCIN: CARCINOGEN. ANIMAL:SKIN, LUNG, LIVER.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 23OCT95
Label Status: G
Common Name: BENZO (A) PYRENE, 98%, B1008-0
Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X
Fire Hazard-Slight: X
Reactivity Hazard-None: X
Special Hazard Precautions: TOXIC. ACUTE:HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. MAY CAUSE EYE IRRITATION. MAY CAUSE SKIN IRRITATION. CHRONIC:CANCER HAZARD. CONTAINS BENZO(A)PYRENE WHICH IS LISTED AS AN ANIMAL LUNG, SKIN AND LIVER CARCINOGEN (FP N). MAY ALTER GENETIC MATERIAL. TERATOGEN. TARGET ORGAN(S):SKIN, LUNGS. TO THE BEST OF MANUFACTURER'S KNOWLEDGE, THE CHEMICAL, PHYSICAL & TOX PROPERTIES HAVE NOT BEEN THOROUGHLY INVESTIGATED.

ACCUSTANDARD -- 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN SOLUTION, M-613
MATERIAL SAFETY DATA SHEET
NSN: 685000N072525
Manufacturer's CAGE: 0U4A8
Part No. Indicator: A
Part Number/Trade Name: 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN SOLUTION, M-613

General Information

Company's Name: ACCUSTANDARD INC
Company's Street: 25 SCIENCE PARK SUITE 687
Company's City: NEW HAVEN
Company's State: CT
Company's Country: US
Company's Zip Code: 06511
Company's Emerg Ph #: 203-786-5290
Company's Info Ph #: 203-786-5290
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 24FEB95
Safety Data Review Date: 29AUG96
MSDS Serial Number: CBYLC

Ingredients/Identity Information

Proprietary: NO
Ingredient: DIBENZO-P-DIOXIN, 2,3,7,8-TETRACHLORO-; (2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN) (TCDD) (CERCLA)
Ingredient Sequence Number: 01
Percent: 0.001
NIOSH (RTECS) Number: HP3500000
CAS Number: 1746-01-6
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: TOLUENE (SARA 313) (CERCLA)
Ingredient Sequence Number: 02
Percent: 99.999
NIOSH (RTECS) Number: XS5250000
CAS Number: 108-88-3
OSHA PEL: 200 PPM
ACGIH TLV: 50 PPM, S

Physical/Chemical Characteristics

Appearance And Odor: CLEAR LIQUID, WITH AROMATIC ODOR
Boiling Point: 232F,111C
Melting Point: -139F,-95C
Vapor Pressure (MM Hg/70 F): 21.9 @ 20C
Vapor Density (Air=1): 3.2
Specific Gravity: 0.87 (H*2O=1)
Evaporation Rate And Ref: 2.2 (BUTYL ACETATE=1)
Solubility In Water: INSOLUBLE
Percent Volatiles By Volume: >99

Fire and Explosion Hazard Data

Flash Point: 40.0F,4.4C
Flash Point Method: TCC
Lower Explosive Limit: 1.30%
Upper Explosive Limit: 7.10%
Extinguishing Media: USE DRY CHEMICAL, FOAM, CARBON DIOXIDE. WATER SPRAY TO COOL EXPOSED CONTAINERS.
Special Fire Fighting Proc: WEAR NIOSH APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire And Expl Hazrds: DANGEROUS FIRE AND EXPLOSION HAZARD. VAPOR CAN TRAVEL DISTANCES TO IGNITION SOURCES AND FLASH BACK.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HEAT; CONTACT WITH IGNITION SOURCES.
Materials To Avoid: OXIDIZERS, STRONG MINERAL ACIDS.
Hazardous Decomp Products: CO*X, HYDROCARBONS.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE: HARMFUL/FATAL IF SWALLOWED. VAP HARMFUL IF INHALED. SYMPS: HDCH, DIZZ, HALLUCINATIONS, DISTORTED PERCEPTIONS, CHANGES IN MOTOR ACTIVITY, NAUS, RESP IRRIT, CNS DEPRESS, UNCON, LIVER, KIDNEY & LUNG DMG. CONT MAY CAUSE SEV EYE IRRIT. MAY CAUSE SKIN IRRIT. CHRONIC: TOLUENE APPEARS ON THE NAVY (EFTS OF OVEREXPOSURE)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT.
Signs/Symptoms Of Overexp: HLTH HAZ: OCCUPATIONAL CHEMICAL REPRODUCTIVE HAZARDS LIST. SEEK CONSULTATION FROM APPROPRIATE HEALTH PROFESSIONALS CONCERNING LATEST HAZARD LIST INFORMATION AND SAFE HANDLING AND EXPOSURE INFORMATION (FP N).
Med Cond Aggravated By Exp: RESPIRATORY, LIVER AND KIDNEY CONDITIONS.
Emergency/First Aid Proc: GET MEDICAL ASSISTANCE FOR ALL CASES OF OVEREXPOSURE. EYES: IMMEDIATELY FLUSH THOROUGHLY W/WATER FOR AT LEAST 15 MINUTES. SKIN: IMMEDIATELY FLUSH THOROUGHLY W/LARGE AMOUNTS OF WATER. INHAL: REMOVE TO FRESH AIR; GIVE ARTIFICIAL RESPIRATION IF BREATHING HAS STOPPED. INGEST: CALL MD IMMEDIATELY. ONLY INDUCE VOMITING AT THE INSTRUCTIONS OF MD. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR SUITABLE PROTECTIVE EQUIPMENT. ELIMINATE ANY IGNITION SORUCES 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.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISPOSE AS HAZARDOUS WASTE. COMPLY WITH FEDERAL, STATE AND LOCAL REGULATIONS.
Precautions-Handling/Storing: KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL AREA AWAY FROM IGNITION SOURCES AND OXIDIZERS. DO NOT BREATHE VAPOR OR MIST.
Other Precautions: DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING. ELECTRICALLY GROUND ALL EQUIPMENT WHEN HANDLING THIS PRODUCT.

Control Measures

Respiratory Protection: IF WORKPLACE EXPOS LIM OF PROD/ANY COMPONENT IS EXCEEDED (SEE TLV/PEL), A NIOSH APPRVD AIR SUPPLIED RESP IS ADVISED IN ABSENCE OF PROPER ENVIRON CTL. OSHA REGS ALSO PERMIT OTHER NIOSH APPRVD RESPS (NEG PRESS TYPE) UNDER SPECIFIED (SUP DAT)
Ventilation: MATERIAL SHOULD BE HANDLED OR TRANSFERRED IN AN APPROVED FUME HOOD OR WITH ADEQUATE VENTILATION.
Protective Gloves: VITON OR EQUIVALENT.
Eye Protection: ANSI APPRVD CHEM WORKERS GOGGS (FP N).
Other Protective Equipment: EMERGENCY EYEWASH & DELUGE SHOWER MEETING ANSI DESIGN CRITERIA (FP N).
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING. DO NOT TAKE INTERNALLY.

Suppl. Safety & Health Data: RESP PROT: CNDTNS (SEE YOUR SFTY EQUIP SUPPLIER). ENGINEERING AND/OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE EXPOS.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 29AUG96
Label Date: 29AUG96
Label Status: G
Common Name: 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN SOLUTION, M-613
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
Special Hazard Precautions: FLAMMABLE. ACUTE: HARMFUL OR FATAL IF SWALLOWED. VAPOR HARMFUL IF INHALED. SYMPTOMS: HEADACHE, DIZZINESS, HALLUCINATIONS, DISTORTED PERCEPTIONS, CHANGES IN MOTOR ACTIVITY, NAUSEA, RESPIRATORY IRRITATION, CENTRAL NERVOUS SYSTEM DEPRESSION, UNCONSCIOUSNESS, LIVER, KIDNEY AND LUNG DAMAGE. CONTACT MAY CAUSE SEVERE EYE IRRITATION. MAY CAUSE SKIN IRRITATION. CHRONIC: TOLUENE APPEARS ON THE NAVY OCCUPATIONAL CHEMICAL REPRODUCTIVE HAZARDS LIST (FP N).
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ACCUSTANDARD INC
Label Street: 25 SCIENCE PARK SUITE 687
Label City: NEW HAVEN
Label State: CT
Label Zip Code: 06511
Label Country: US
Label Emergency Number: 203-786-5290

ACCUSTANDARD -- DIOXIN MIX, M-8280A
MATERIAL SAFETY DATA SHEET
NSN: 685000N072524
Manufacturer's CAGE: 0U4A8
Part No. Indicator: A
Part Number/Trade Name: DIOXIN MIX, M-8280A

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General Information

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Company's Name: ACCUSTANDARD INC
Company's Street: 25 SCIENCE PARK SUITE 687
Company's City: NEW HAVEN
Company's State: CT
Company's Country: US
Company's Zip Code: 06511
Company's Emerg Ph #: 203-786-5290
Company's Info Ph #: 203-786-5290
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 15JUN95
Safety Data Review Date: 27AUG96
MSDS Serial Number: CBYLB

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: DIBENZO-P-DIOXIN, 2,3,7,8-TETRACHLORO-; (2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN) (TCDD) (CERCLA)
Ingredient Sequence Number: 01
Percent: 0.0005
NIOSH (RTECS) Number: HP3500000
CAS Number: 1746-01-6
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: DIBENZO-P-DIOXIN, 1,2,3,7,8-PENTACHLORO-; (1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN)
Ingredient Sequence Number: 02
Percent: 0.0005
NIOSH (RTECS) Number: HP3395000
CAS Number: 40321-76-4
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: DIBENZO-P-DIOXIN, HEXACHLORO-; (1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN)
Ingredient Sequence Number: 03
Percent: 0.0005
NIOSH (RTECS) Number: HP3200000
CAS Number: 39227-28-6
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: DIBENZO-P-DIOXIN, 1,2,3,4,6,7,8-HEPTACHLORO-; (1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN)
Ingredient Sequence Number: 04
Percent: 0.0005
NIOSH (RTECS) Number: HP3190000
CAS Number: 35822-46-9
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO

Ingredient: DIBENZO-P-DIOXIN, 1,2,3,4,6,7,8,9-OCTACHLORO-;
(OCTACHLORODIBENZO-P-DIOXIN)
Ingredient Sequence Number: 05
Percent: 0.0005
NIOSH (RTECS) Number: HP3350000
CAS Number: 3268-87-9
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: TOLUENE (SARA 313) (CERCLA)
Ingredient Sequence Number: 06
Percent: 99.99
NIOSH (RTECS) Number: XS5250000
CAS Number: 108-88-3
OSHA PEL: 200 PPM
ACGIH TLV: 50 PPM, S

Physical/Chemical Characteristics

Appearance And Odor: CLEAR LIQUID, WITH AROMATIC ODOR
Boiling Point: 232F,111C
Melting Point: -139F,-95C
Vapor Pressure (MM Hg/70 F): 21.9 @ 20C
Vapor Density (Air=1): 3.2
Specific Gravity: 0.87 (H*2O=1)
Evaporation Rate And Ref: 2.2 (BUTYL ACETATE=1)
Solubility In Water: INSOLUBLE
Percent Volatiles By Volume: >99

Fire and Explosion Hazard Data

Flash Point: 40.0F,4.4C
Flash Point Method: TCC
Lower Explosive Limit: 1.30%
Upper Explosive Limit: 7.10%
Extinguishing Media: USE DRY CHEMICAL, FOAM, CARBON DIOXIDE. USE WATER SPRAY TO COOL EXPOSED CONTAINERS.
Special Fire Fighting Proc: WEAR NIOSH APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: DANGEROUS FIRE AND EXPLOSION HAZARD. VAPOR CAN TRAVEL DISTANCES TO IGNITION SOURCE AND FLASH BACK.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HEAT; CONTACT WITH IGNITION SOURCES.
Materials To Avoid: OXIDIZERS AND STRONG MINERAL ACIDS.
Hazardous Decomp Products: CO*X, HYDROCARBONS.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE: HARMFUL OR FATAL IF SWALLOWED. VAPOR HARMFUL IF INHALED. SYMPTOMS: HEADACHE, DIZZINESS, HALLUCINATIONS, DISTORDED PERCEPTIONS, CHANGES IN MOTOR ACTIVITY, NAUSEA, RESPIRATORY IRRITATION, CENTRAL NERVOUS SYSTEM DEPRESSION, UNCONSCIOUSNESS, LIVER, KIDNEY AND LUNG DAMAGE. CONTACT MAY CAUSE SEVERE (EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT.
Signs/Symptoms Of Overexp: HLTH HAZ: EYE IRRITATION. MAY CAUSE SKIN

IRRITATION. CHRONIC: TOLUENE APPEARS ON THE NAVY LISTING OF OCCUPATIONAL CHEMICAL REPRODUCTIVE HAZARDS. SEEK CONSULTATION FROM APPROPRIATE HELTH PROFESSIONALS CONCERNING LATEST HAZARD LIST INFORMATION AND SAFE HANDLING AND EXPOSURE INFORMATION (FP N).
Med Cond Aggravated By Exp: RESPIRATORY, LIVER AND KIDNEY CONDITIONS.
Emergency/First Aid Proc: GET MEDICAL ASSISTANCE FOR ALL CASES OF OVEREXPOSURE. EYES: IMMEDIATELY FLUSH THOROUGHLY W/WATER FOR AT LEAST 15 MINUTES. SKIN: IMMEDIATELY FLUSH THOROUGHLY W/LARGE AMOUNTS OF WATER. INHAL: REMOVE TO FRESH AIR; GIVE ARTIFICIAL RESPIRATION IF BREATHING HAS STOPPED. INGEST: CALL MD IMMEDIATELY. ONLY INDUCE VOMITING AT THE INSTRUCTIONS OF MD. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR SUITABLE PROTECTIVE EQUIPMENT. 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.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISPOSE AS HAZARDOUS WASTE. COMPLY WITH FEDERAL, STATE AND LOCAL REGULATIONS.
Precautions-Handling/Storing: KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL AREA AWAY FROM IGNITION SOURCES AND OXIDIZERS. DO NOT BREATHE VAPOR OR MIST.
Other Precautions: DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING. ELECTRICALLY GROUND ALL EQUIPMENT WHEN HANDLING THIS PRODUCT.

Control Measures

Respiratory Protection: IF WORKPLACE EXPOS LIM OF PROD/ANY COMPONENT IS EXCEEDED (SEE TLV/PEL), A NIOSH APPRVD AIR SUPPLIED RESP IS ADVISED IN ABSENCE OF PROPER ENVIRON CTL. OSHA REGS ALSO PERMIT OTHER NIOSH APPRVD RESPS (NEG PRESS TYPE) UNDER SPECIFIED (SUP DAT)
Ventilation: MATERIAL SHOULD BE HANDLED OR TRANSFERRED IN AN APPROVED FUME HOOD OR WITH ADEQUATE VENTILATION.
Protective Gloves: VITON OR EQUIVALENT.
Eye Protection: ANSI APPRVD CHEM WORKERS GOGGS (FP N).
Other Protective Equipment: EMERGENCY EYEWASH & DELUGE SHOWER MEETING ANSI DESIGN CRITERIA (FP N).
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING. DO NOT TAKE INTERNALLY.
Suppl. Safety & Health Data: RESP PROT: CNDTNS (SEE YOUR SFTY EQUIP SUPPLIER). ENGINEERING AND/OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE EXPOSURE.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 27AUG96
Label Date: 27AUG96
Label Status: G
Common Name: DIOXIN MIX, M-8280A
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Moderate: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
Special Hazard Precautions: EXTREMELY FLAMMABLE. ACUTE: HARMFUL OR FATAL IF SWALLOWED. VAPOR HARMFUL IF INHALED. SYMPTOMS: HEADACHE, DIZZINESS, HALLUCINATIONS, DISTORTED PERCEPTIONS, CHANGES IN MOTOR ACTIVITY, NAUSEA, RESPIRATORY IRRITATION, CENTRAL NERVOUS SYSTEM DEPRESSION, UNCONSCIOUSNESS,

APPENDIX M

STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURES FOR RESPIRATOR FIT TESTING

Every respirator wearer shall receive fitting instructions including demonstrations and practice in how the respirator should be worn, how to adjust it, and how to determine if its fits properly. Respirators shall not be worn when conditions prevent a good face seal. Such conditions as a growth of beard, sideburns, facial scarring or the temple or nose piece on a set of eyeglasses may prevent proper sealing. Also any dental changes or cosmetic surgery may seriously affect the fit of the facepiece. If an individual has a weight gain or loss of twenty or more pounds, he or she must be fit tested again to ensure a proper seal. The respirator shall be checked by the wearer each time the respirator is donned. Fit testing shall be documented using the Qualitative Respirator Fit Test Form presented in Attachment I.

Earth Tech personnel using air-purifying respirators shall be fit-tested using both isoamyl acetate and smoke irritant methods within this section.

1. Isoamyl Acetate Fit Test Procedures

3.1 Pre-exposure – Prior to testing, the test subject will be exposed to a varied concentration of isoamyl acetate to assure that he/she can detect the odor.

3.2 Donning the Respirator – The wearer dons the respirator in the normal manner.

3.3 Positive Pressure Test – The wearer covers the exhalation valve(s) with the palm of the hand and exhales. A positive pressure should be formed inside the facepiece with no leakdown during a ten (10) second period.

3.4 Negative Pressure Test – The wearer covers the inhalation opening on the filter, cartridge, or canister and attempts to inhale. A negative pressure should be created inside the facepiece with no leakdown for a period of ten (10) seconds.

3.5 Test Enclosure – The wearer enters a test enclosure (plastic bag, test tent, etc.) which is to become contaminated with the isoamyl acetate.

3.6 Exposure – A saturated cloth, stencil brush, or ampule is passed close to the respirator sealing surfaces. Care should be taken to avoid touching the skin of the respirator wearer. The person administering the test should wear rubber gloves.

- If the wearer smells banana oil, he returns to clean air and readjusts the facepiece and/or adjusts the head straps without unduly tightening them.

- The wearer repeats the second step. If he does not smell banana oil, he is assumed to have satisfactory fit. If he smells the vapor, an attempt should be made to find the leakage point. If the leak cannot be located, another respirator of the same type and brand should be tried.

- During the test, the employee should perform movements that approximate a normal working situation. These may include:

  - Normal breathing.

  - Deep breathing, as during heavy exertion (this should not be done long enough to cause hyperventilation symptoms).

  - Side-to-side and up-and-down movements should be exaggerated, and should approximate those that take place on the job.

  - Talking. This most easily accomplished by asking the wearer to recite something familiar or by reading a prepared test loudly enough to be understood by someone standing nearby.

  - Additional exercises may be added depending upon the situation.

    Note: Respirators equipped with <u>organic vapor cartridges</u> must be used for this fit test method.

2. **<u>Irritant Smoke Fit Test Procedures</u>**

   2.1 <u>Donning the Equipment</u> – The wearer puts on the respirator in the normal manner, taking care not to tighten the head straps uncomfortably.

   2.2 <u>Positive Pressure Test</u> – The wearer covers the exhalation valve(s) with the palm of the hand and exhales. A positive pressure should be formed inside the facepiece with no leakdown during a ten (10) second period.

   2.3 <u>Negative Pressure Test</u> – The wearer covers the inhalation opening on the filter, cartridge, or canister and attempts to inhale. A negative pressure should be created inside the facepiece with no leakdown during a period of ten (10) seconds.

   2.4 <u>Prepare Test Material</u> – both ends of a ventilation smoke tube are broken. Once end of the tube is connected to a two-way positive pressure aspirator bulb while the other end has a 2" to 3" length of plastic tubing attached. The test smoke is generated by squeezing the aspirator bulb.

2.5 Test Enclosure – The wearer enters a test enclosure (plastic bag, test tent, etc.) which is to become contaminated with the irritant smoke.

2.6 Contaminant Exposure – The smoke will be generated by aiming the end of the smoke tube with the plastic near the sealing surface of the respirator. Issue 8 to 10 puffs of smoke per exercise while the wearer is instructed to execute:

- Normal breathing.
- Deep breathing, as during heavy exertion (this should not be done long enough to cause hyperventilation symptoms).
- Side-to-side and up-and-down movements should be exaggerated, and should approximate those that take place on the job.
- Talking. This is most easily accomplished by asking the wearer to recite something familiar or by reading a prepared text loudly enough to be understood by someone standing nearby.
- Additional exercises may be added depending upon the situation.

Note: Respirators equipped with high efficiency filters must be used for this test. If a half-mask respirator is being tested, the test employee shall be instructed to wear goggles at all times during this test.

3. Field Fit Check Procedures

3.1 Positive Pressure Test – The wearer covers the exhalation valve(s) with the palm of the hand and exhales. A positive pressure should be formed inside the facepiece with no leakdown during a ten (10) second period.

3.2 Negative Pressure Test – The wearer covers the inhalation opening of the filter, cartridge, or canister and attempts to inhale. A negative pressure should be created inside the facepiece with no leakdown for a period of ten (10) seconds.

Attachment I

QUALITATIVE RESPIRATOR FIT TEST

Name: _____ SSN# _____

Division: _____ Date: _____

Location: _____

		FULL FACE		HALF FACE	
		PASS	FAIL	PASS	FAIL
1	Challenge test subject with testing agent				
2	Positive pressure fit test				
3	Negative pressure fit test				
4	Normal breathing				
5	Deep breathing				
6	Turn head from side to side				
7	Nod head up and down				
8	Talking				
9	Jogging in place				
10	Normal breathing				
11	Sensitivity check				

Respirator Identification

		FULL FACE	HALF FACE
A.	Manufacturer		
B.	Model		
C.	Size		
D.	Approval Number (TC#)		

Testing Agent*

1	Irritant Fume	
2	Saccharin Solution	
3	Isoamyl Acetate	

* Testing must be conducted with agent No. 1 and either agent No. 2 or No. 3

Qualitative fit testing shall be:

1	Conducted for full face and half face respirators.
2	Performed immediately when the subject has a weight charge of 20 pounds or more, significant facial scarring, significant dental changes, reconstructive or cosmetic surgery or any other condition that may interfere with facepiece sealing.
3	Performed only on test subjects without hair growth or any other obstruction between the skin and facepiece.
4	Fit-testing for asbestos to be conducted every six months.

_____ _____

Test Conductor Signature / Date Employee Signature / Date

STANDARD OPERATING PROCEDURES FOR DECONTAMINATION OF EQUIPMENT

The soil sampling equipment will be decontaminated after every sample is collected using the following method:

1. Wash with Alconox™ water solution.
2. Rinse with potable water.
3. Rinse with Type II reagent grade water or equivalent water.
4. Rinse with pesticide-grade methanol.
5. Allow sampling equipment to air dry prior to further use. If the equipment will not be used immediately, it will be wrapped in oil-free aluminum foil and sealed in a plastic bag for storage.

The Type II reagent grade water noted above will be supplied by Earth Tech Inc. and will be certified by the manufacturer or by an analytical data to meet the specifications of ASTM D 1193-77. If another source of water is used, it will be analyzed by a laboratory and shown to be free of analytes of interest or other contaminants.

Rinse solutions will be disposed of in a designated DOT-approved 55-gallon drum. Used stainless steel liners will be rinsed and held for later decontamination.

STANDARD OPERATING PROCEDURES FOR MINIRAM CALIBRATION

Although every MINIRAM has been factory-calibrated using a representative dust, the user may wish to change the calibration constant of the instrument for a specific type of aerosol. Such calibration should be performed by obtaining a concurrent filter collection (e.g., by means of a personal filter sampler), sampling from the same environment within which the MINIRAM is placed. The average concentration obtained by the MINIRAM (i.e., TWA reading) at the end of the test should be compared with the filter-gravimetric-determined concentration. The ratio of the two concentration values can be used to correct the MINIRAM calibration. The comparison should be replicated several times (to minimize) errors to obtain an average ratio.

To change the MINIRAM calibration proceed as follows:

1. Place MINIRAM in a clean environment (e.g. air conditioned office).

2. Remove batter pack (follow procedure of section 7.0).

3. Disconnect battery connector (remember that all stored data will thus be lost/erased from MINIRAM memory).

4. While leaving batter pack lying next to MINIRAM, re-connect the two units (i.e., plug connector).

5. Immediately observe MINIRAM display. It will be performing a slow segment-by-segment display checkout. As soon as it displays ".00", press OFF, thus interrupting the initial automatic zero check of the MINIRAM. Wait until the display indicates "OFF" and then press MEAS and wait approximately 36 seconds.

6. Observe a 10-second readings (typically in the range of 1 to 3 mg/m3) and record manually a few consecutive readings. Calculate the average of these values.

7. Identify small potentiometer screw (visible through an opening in the foil shield of the MINIRAM) opposite the digital output jack. Adjust this potentiometer, using a fine screw driver, until the average MINIRAM reading is increased or decreased (with respect to the averaged obtained in step 6) by the desired ratio (e.g. as determined by previous gravimetric comparison runs).

8. Shut off MINIRAM, reposition and secure battery pack, and re-zero instrument as usual. All subsequent concentration readings are now corrected by the desired ratio.

STANDARD OPERATING PROCEDURES
FOR DECONTAMINATION OF SOIL SAMPLING EQUIPMENT

The soil sampling equipment will be decontaminated after every sample is collected using the following method:

1. Wash with Alconox™ water solution.

2. Rinse with potable water.

3. Rinse with Type II reagent grade water or equivalent water.

4. Rinse with pesticide-grade methanol.

5. Rinse with pesticide-grade hexane.

6. Allow sampling equipment to air dry prior to further use. If the equipment will not be used immediately, it will be wrapped in oil-free aluminum foil and sealed in a plastic bag for storage.

The Type II reagent grade water noted above will be supplied by Earth Tech Inc. and will be certified by the manufacturer or by an analytical data to meet the specifications of ASTM D 1193-77. If another source of water is used, it will be analyzed by a laboratory and shown to be free of analytes of interest or other contaminants.

Rinse solutions will be disposed of in a designated DOT-approved 55-gallon drum. Used stainless steel liners will be rinsed and held for later decontamination.

STANDARD OPERATING PROCEDURES
FOR DECONTAMINATION OF WATER SAMPLING EQUIPMENT

All sampling equipment and apparatus, including internal components, will be thoroughly decontaminated prior to use and between sample points to avoid cross contamination. All equipment used for water sampling will be decontaminated as follows:

1. Wash with a non-phosphate detergent-water solution;
2. Rinse with potable water;
3. Rinse with Type II reagent grade water or equivalent water;
4. Rinse with pesticide-grade methanol;
5. Rinse with pesticide-grade hexane; and
6. Air dry.

Ample time will be given for evaporation of solvents and for the equipment to dry prior to reuse. Analytical data or manufacturer's certification which verifies the quality of Type II reagent grade water or equivalent water will be provided. Sampling equipment used to collect samples for organic analysis will not be allowed to come into contact with any type of plastic, such as plastic storage bags. Solvents used to decontaminate sampling equipment will be stored in glass or Teflon™ containers. Sampling equipment that is not readily decontaminated will be discarded after each use. Discarded materials, including decontamination solutions, will be accumulated and stored in appropriate receptacles for proper disposal. The actual disposal of the decontamination materials will be in accordance with directions from the AFFTC/EM POC.

Purge equipment, including bailers and pumps, will be decontaminated by flushing/pumping an Alconox™-water solution, potable water, then Type II reagent grade water or equivalent water through the components. The pumps will be disassembled as far as possible (down to the check valve) steam cleaned with a hot water and Alconox™ solution and then rinsed with hot water. The pump will be reassembled, submerged in an Alconox™-water mixture, and allowed to pump 20 to 30 gallons through its components. The pump will then be steam cleaned again and 20 to 30 gallons of tap water will be pumped through the components. The exterior of the pump inlet hose will be steam cleaned. Non-disposable bailers, but not pumps, will then be rinsed with pesticide-grade methanol followed by a pesticide-grade hexane rinse, and allowed to air dry. If dedicated polyethylene tubing is utilized for purging activities, the exterior of the pump will be cleaned with an Alconox™ water mixture and rinsed with deionized water.

If a rig is used to handle equipment during purging or sampling, any grease that may contact equipment going into the well must be removed with an Alconox™ solution, after which the rig will be steam cleaned and rinsed with potable water.

STANDARD OPERATING PROCEDURES
FOR DECONTAMINATION OF SOIL SAMPLING EQUIPMENT

The soil sampling equipment will be decontaminated after every sample is collected using the following method:

1. Wash with Alconox™ water solution.
2. Rinse with potable water.
3. Rinse with Type II reagent grade water or equivalent water.
4. Rinse with pesticide-grade methanol.
5. Rinse with pesticide-grade hexane.
6. Allow sampling equipment to air dry prior to further use. If the equipment will not be used immediately, it will be wrapped in oil-free aluminum foil and sealed in a plastic bag for storage.

The Type II reagent grade water noted above will be supplied by Earth Tech Inc. and will be certified by the manufacturer or by an analytical data to meet the specifications of ASTM D 1193-77. If another source of water is used, it will be analyzed by a laboratory and shown to be free of analytes of interest or other contaminants.

Rinse solutions will be disposed of in a designated DOT-approved 55-gallon drum. Used stainless steel liners will be rinsed and held for later decontamination.

STANDARD OPERATING PROCEDURES
FOR DECONTAMINATION OF WATER SAMPLING EQUIPMENT

All sampling equipment and apparatus, including internal components, will be thoroughly decontaminated prior to use and between sample points to avoid cross contamination. All equipment used for water sampling will be decontaminated as follows:

1. Wash with a non-phosphate detergent-water solution;
2. Rinse with potable water;
3. Rinse with Type II reagent grade water or equivalent water;
4. Rinse with pesticide-grade methanol;
5. Rinse with pesticide-grade hexane; and
6. Air dry.

Ample time will be given for evaporation of solvents and for the equipment to dry prior to reuse. Analytical data or manufacturer's certification which verifies the quality of Type II reagent grade water or equivalent water will be provided. Sampling equipment used to collect samples for organic analysis will not be allowed to come into contact with any type of plastic, such as plastic storage bags. Solvents used to decontaminate sampling equipment will be stored in glass or Teflon™ containers. Sampling equipment that is not readily decontaminated will be discarded after each use. Discarded materials, including decontamination solutions, will be accumulated and stored in appropriate receptacles for proper disposal. The actual disposal of the decontamination materials will be in accordance with directions from the AFFTC/EM POC.

Purge equipment, including bailers and pumps, will be decontaminated by flushing/pumping an Alconox™-water solution, potable water, then Type II reagent grade water or equivalent water through the components. The pumps will be disassembled as far as possible (down to the check valve) steam cleaned with a hot water and Alconox™ solution and then rinsed with hot water. The pump will be reassembled, submerged in an Alconox™-water mixture, and allowed to pump 20 to 30 gallons through its components. The pump will then be steam cleaned again and 20 to 30 gallons of tap water will be pumped through the components. The exterior of the pump inlet hose will be steam cleaned. Non-disposable bailers, but not pumps, will then be rinsed with pesticide-grade methanol followed by a pesticide-grade hexane rinse, and allowed to air dry. If dedicated polyethylene tubing is utilized for purging activities, the exterior of the pump will be cleaned with an Alconox™ water mixture and rinsed with deionized water.

If a rig is used to handle equipment during purging or sampling, any grease that may contact equipment going into the well must be removed with an Alconox™ solution, after which the rig will be steam cleaned and rinsed with potable water.

STANDARD OPERATING PROCEDURES
FOR RIG START-UP

INTRODUCTION

Most accidents involving machine operation and maintenance can be avoided by following basic rules and precautions. Read and understand all the safety messages in this manual and the safety signs on the machine before you operate or service the machine. See your supervisor if you have any questions.

In addition to the training you receive from your supervisor, read this manual completely to make sure you understand the characteristics of speed, stability, and steering of this machine.

BEFORE OPERATION

Avoid loose fitting clothing, loose or uncovered hair, jewelry and loose person articles which may become caught in machinery.

Use protective equipment such as hard hats, steel-toe boots, gloves, reflective vests and hearing protection when operating or working around machine. Know and use the equipment that is required before you start the job.

Be prepared for emergencies. Always have a first aid kit and fire extinguisher with you and know how to use them.

Know the hand signals used on your job. See instructions in the Site Health and Safety Plan for your project for specific information on hand signals.

Check that doors, guards, and covers are installed correctly and closed.

Foreign material or grease on the steps and handrails can cause accidents. Keep the steps and hand rails clean.

Before you operate at night, check that all lamps illuminate.

Know the rules, laws, and safety equipment necessary for transporting this machine on a road or highway.

Always face the machine and use the hand rails and steps when getting on. Do not rush.

Before you start each day, walk around the machine and check for oil or fluid leaks. Replace all broken or missing parts and do the required lubrication and maintenance as shown in this manual. Clean all trash and debris from the machine.

Remove all loose objects from the operators area and from the machine. Loose objects can jam controls and cause accidents.

Engine exhaust fumes can cause death. If you operate the machine in an enclosed area, ensure adequate ventilation to replace the exhaust fumes with fresh air.

Make sure all persons are away form the machine and give a warning before you start the engine.

MACHINE OPERATION

Check all controls in a clear area and make sure the machine is operating correctly.

Do not allow other persons to ride on the machine. Other persons may fall or cause an accident.

Contact with overhead power lines can cause severe electrical burns or death from electrocution. Make sure there is adequate clearance between the machine and overhead power lines or other overhead obstructions.

Electrical cables, gas pipes, water pipes, sewers, or other underground utilities or objects can cause injury or death. Learn the location of underground hazards before you operate the machine.

If this machine rolls over you can be injured or killed. You must take into account weather, road, slope and other physical conditions to determine if safe operation of the machine is possible.

Stay away from hazardous areas such as ditches, overhead obstructions, and steep slopes. Always walk around the work area and look for hazards before you start.

Be alert and always know the location of other workers in the area. Keep all other persons completely away from your machine. Injury or death can result if you do not follow these instructions.

Operate the machine controls form the operators seat only.

Keep the sampling unit low when moving around the work area.

BURN PREVENTION

Battery acid causes sever burns. Batteries contain sulfuric acid. Avoid contact with skin, eyes, or clothing. Flush any areas of external contact with sulfuric acid with water. If taken internally, drink large quantities of water or milk, followed with beaten egg or vegetable oil. Call doctor immediately (see Site Health and Safety Plan for emergency phone numbers for your project). If sulfuric acid contacts eyes, flush with water for fifteen minutes and get prompt medical attention.

When battery electrolyte is frozen, the battery can explode if you try to charge the battery or if you try to jump-start and run the engine. To prevent the battery electrolyte from freezing, try to keep the batter at full charge. If you do not follow these instructions, you or others in the area can be injured.

Hot coolant can spray out when the radiator cap is removed. To remove the radiator cap, let the system cool, turn to the first notch, wait until pressure is released, then remove cap.

FIRE OR EXPLOSION PREVENTION

Sparks or flame can cause the hydrogen gas in a battery to explode. To prevent and explosion, do the following:

- When disconnecting the battery cables, disconnect the negative cable first; when connecting the battery cables, connect the negative cable last.
- When connecting jumper cable to start the engine, use the procedure specified in this manual under Operating Instructions, Booster Battery Connection, on page 7.
- Do not short circuit the batter posts with metal items.
- Do not weld, grind, or smoke near a battery.

Sparks from the electrical system or engine exhaust can cause an explosion and fire. Before you operate this machine in an area with flammable dust or vapors, use good ventilation to remove the dust or vapors before starting engine.

Engine fuel can cause and explosion or fire. Do not fill the fuel tank with the engine running, if you are near and open fire, or if you are welding or smoking.

Use nonflammable cleaning solvent to clean parts.

A fire can cause injury or death. Always have a fire extinguisher near or on the machine. Make sure the fire extinguisher is serviced according to the manufactures instructions.

If a fire extinguisher has been used, always recharge or replace the fire extinguisher before operating the machine.

Remove all trash or debris from the machine each day, making especially sure the engine and exhaust areas are free of trash or debris.

If you weld, grind, or use a cutting torch on the machine, always remove the starting fluid container from the machine. Use compressed air to remove any ether fumes from the area.

Starting fluid can cause injury or death. Do not breathe starring fluid vapors. Wear face protection when you remove or install a starting fluid container or when you use an aerosol spray starting fluid.

If the machine has oil, fuel, or hydraulic fluid leak, always repair the leak and clean the area before operating.

Keep the cooling system clean and maintain the correct coolant level.

Make sure that you do not store oily rags or other flammable materials on the machine.

Check the electrical system for loose connections or frayed insulation. Repair or replace the loose or damaged parts.

Before welding or using a torch on the machine, clean the area to be repaired.

MAINTENANCE

Before you service the machine, put a "Do Not Operate" tag on the instrument panel.

Improper service or repair can cause injury or death. Machine may only be serviced by Precision's mechanic, or by personnel specifically authorized by the Operations Manager.

If you must service this machine with the engine running, have another person help you. Do not leave the operators seat with the engine running.

Metal chips or debris can cause eye injury. Always wear eye or face protection when you use a hammer on this machine. Us a hammer with a soft face, such as brass, to drive hardened pins.

Hydraulic fluid or grease injected into your skin can cause severe injury or death. Keep you hands and body away from any pressurized leak. If fluid is injected into your skin, see a doctor immediately.

When you service this machine, always wear face or eye protection and safety shoes.

SAFETY DECALS

Injury or death can result if you cannot read a safety decal or if a safety decal is missing. Replace any missing or damaged safety decal and keep all safety decals clean.

Make sure you can read all safety decals and all instruction decals. Check these decals every day before you start. Clean these decals if you cannot read the words.

When you clean the decals, use only a cloth, water, and soap. Do not use solvent or gasoline.

HAND SIGNALS

You and your helper must use hand signals for communication when operating the machine. Before you start, make sure that you understand the signals that will be used.

MAINTENANCE

Machine service and maintenance is performed by Precision's mechanic. You are required to complete a daily sampling rig inspection form to assist in identifying and correcting any mechanical problems with your sampling rig.

INSTRUMENTS AND CONTROLS

Instrument Panel

Fuel Gauge (1)

This gauge illuminated to indicate the amount of fuel in the fuel tank when the key switch in the ON position. Symbols indicate full fuel tank, half-full fuel tank, or empty tank.

Systems Normal Indicator Lamp (2)
This lamp illuminates and stays illuminated during machine operation until on or more of the following conditions occur: (1) low engine oil pressure, (2) high hydraulic fluid temperature, (3) low alternator output, (4) system voltage below 11 volts, or (5) high engine coolant temperature.

Hydraulic Filter Warning Lamp (3)
Lamp illuminates when the engine is started and the hydraulic fluid is cold, or when the engine is running and the hydraulic filter is in need of service. If the lamp is illuminated after 15 minutes of machine operation, or if the lamp illuminates during machine operation, stop the engine and service the hydraulic filter. If this lamp illuminates, the systems normal indicator lamp will stay illuminated and the warning alarm will not actuate.

Engine Oil Pressure Warning Lamp (4)
This lamp illuminates when the engine is running and the engine temperature is too low. Then, the warning alarm will actuate and the systems normal indicator lamp will stop illuminating. Stop the engine and check for the problem.

Battery Warning Lamp (5)
This lamp illuminates when the battery voltage falls below 11 volts. Then, the systems normal indicator lamp will stop illuminating.

Hour meter (7)
Shows the total hours of engine operations in hours and tenths of an hour. Use the hour meter to measure the time between the maintenance intervals.

Seat Belt Warning Lamp (8)
This lamp reminds you to fasten your seat belt.

Hydraulic Temperature Warning Lamp (9)
Lamp illuminates when the engine is running and the hydraulic fluid temperature is too high. Then the warning alarm will actuate and the system normal indicator lamp will stop illuminating. Stop the machine and check for the problem.

Alternator Warning Lamp (10)
This lamp illuminates when the engine is running and there is a problem with the alternator. The warning alarm will actuate and the systems normal lamp stops illuminating. Make sure the engine speed is at full throttle to check this warning lamp. Stop the machine and check the alternator charging system.

Air Filter Warning Lamp (11)
This warning lamp illuminates when the engine is running and the air filter requires service.

NOTE: If you have corrected a problem, the warning lights will stop illuminating, the warning alarm will stop actuating and the systems normal indicator lamp will illuminate.

Key Switch

The key switch has four positions: ACC, OFF, ON, and START. ACC (accessory) position energizes the horn and lights. OFF position is used to stop the engine and deenergize the electrical system. ON position energizes the electrical system and is the normal position of the key when the engine is running. START position is used to actuate the starter motor to start the engine.

Light Switch

Pull the light switch knob out to illuminate the lights. Push the knob in for Off.

Engine Hand Throttle

Push the engine hand throttle completely forward for maximum engine speed. Pull rearward to decrease. It is recommended that you run the engine at full throttle when you operate the machine.

Horn Button

Push the horn button to actuate the horn.

Operators Seat

Move the lever on the left side of the seat bottom to slide the seat forward or backward. Release the lever to hold the seat in position.

Operator Protection Bars

The operator protection bars have two positions, UP and DOWN. When UP the lifter arm control is held in neutral position and the parking latch is applied. When operator protection bars are down, the lift arm control is free to move and the parking latch is released. To release the operator protection bars from the DOWN position, pull back both release levers and move the bars to the UP position.

Steering Controls

Push both steering controls forward to move the machine forward. Pull both steering controls rearward to move the machine in reverse. Move the controls forward a short distance for maximum power and slow speed. Move the control completely forward for maximum speed.

Seat Belt

Always fasten the seat belt and pull down the operator protection bars before you start the engine. Always stop the engine before you release the operators protection bars and seat belt.

ENGINE OPERATION

Walk Around Inspection

Each day before you start the engine check for leaks under the machine. Check tires for damage and wear. Check for broken, damaged, loose or missing parts and replace tighten or adjust as required before you operate the machine.

Clean all debris from machine, especially around engine area. Clean or replace any safety decal or instruction decal that cannot be read. Clean the handrails, step, and operators compartment.

Starting the Engine

Adjust the seat and fasten the seat belt. Pull both operator protection bars down. Warn all persons in the area that you are going to start the engine. Push the throttle forward about one inch. Turn the key switch ON. All warning lamps will illuminate for two seconds. Turn the key switch to START. Release the key as soon as engine starts.

If engine starts and stops, do not actuate the starter motor again until the starter stops turning. Do not operate the starter motor for more than fifteen seconds at one time. Let the starter motor cool for three minutes before you actuate the starter motor again. While the starter motor is engaged, white or black smoke must be seen at the exhaust pipe. If no smoke is seen, check the fuel supply.

After the engine starts, check the instruments to make sure the indications are correct. Run the engine at about 1/4 throttle until the engine coolant is warm.

Do not run the engine at idle speed for long periods. This can cause low operating temperature. Low operating temperature can cause acids and deposits in the engine oil. It is recommended that you run the engine at full throttle when operating conditions permit and when safe.

Parking the Machine and Stopping the Engine

Park on level ground and lower the sampling unit to the ground. If the machine has been running at full load, run the engine at no load half speed for about two to three minutes before shutting off. This procedure will cool the engine parts evenly. Turn the key OFF to stop the engine. Remove the key, release the operator protection bars and release the seat belt. Always use the handrails and steps when leaving the cab. The parking latch is engaged automatically.

Booster Battery Connection (Jump Starting)

Warning: Wrong jumper cable connections or shorting across the starter terminals can cause the machine to move suddenly out of control. You can be injured or killed. Use the correct method described here to connect jumper cables to this machine.

Warning: Batteries contain acid and explosive gas. Explosion can result from sparks, flares, or wrong cable connections. To connect the jumper cables correctly follow these instructions. Failure to follow these instructions can cause serious injury or death.

Two persons are required for this procedure. Make sure that you and the person making the connections are wearing face protection.

Remove the floor plate. Sit in the operators seat and have the other person make the connections. Make sure the jumper battery is 12 volts. If using another machine for power, make sure the two machines do not touch. Connect the positive (+) jumper cable to the positive (+) battery terminal. Connect the negative (-) jumper cable to a good frame ground away from the battery. Start the engine and have the other person disconnect the negative (-) jumper cable first and the positive (+) jumper cable last. Install the floor plate.

MACHINE OPERATION

Before you operate the machine, check the steering control levers, instruments, warning lamps, engine throttle, and equipment hydraulic controls. Also, check the operator protection bars. When the two operator protection bars are in the UP position the parking latch is engaged and the loader control levers are held in the neutral position.

If you know there is a malfunction, a missing part, or a part that needs adjustment, stop the machine and correct the problem.

Set the engine speed at full throttle and control the machine speed with the steering control levers.

Keep all machine movements smooth.

TRANSPORTING THE MACHINE

Before you put the machine on a trailer or truck, make sure the ramp and parking surface is free of all oil, grease, ice, etc.

Block the front and rear of the trailer wheels. Back the machine slowly onto the trailer. Lower the sampling unit to the floor. Stop the engine. Remove the key. Block the front and rear of each tire. Use chains to fasten the machine to the trailer at three places.