HEALTH AND SAFETY PLAN
FOR SITE CHARACTERIZATION
VERTAC SITE, JACKSONVILLE, ARKANSAS

September 1989

Prepared by:
Roy F. Weston, Inc.
West Chester, Pennsylvania
for
Hercules Incorporated
(W.O.# 0267-12-01)
**APPROVAL/SIGN OFF SHEET**

I have read, understood, and agreed with the information set forth in this Health and Safety Plan (and attachments) and discussed in the Personnel Health and Safety briefing.

<table>
<thead>
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<th>Role</th>
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<tr>
<td>Site Health and Safety Coordinator (SHSC)</td>
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Personnel Health and Safety Briefing Conducted By:

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**PROJECT SITE PERSONNEL**

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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>SECTION</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OVERVIEW</td>
<td>1-1</td>
</tr>
<tr>
<td>1.1</td>
<td>Introduction</td>
<td>1-1</td>
</tr>
<tr>
<td>1.2</td>
<td>Scope</td>
<td>1-2</td>
</tr>
<tr>
<td>2</td>
<td>HEALTH AND SAFETY RESPONSIBILITY</td>
<td>2-1</td>
</tr>
<tr>
<td>2.1</td>
<td>Health and Safety Coordinator</td>
<td>2-1</td>
</tr>
<tr>
<td>2.2</td>
<td>Lines of Responsibility</td>
<td>2-1</td>
</tr>
<tr>
<td>2.3</td>
<td>Visitors</td>
<td>2-3</td>
</tr>
<tr>
<td>3</td>
<td>HEALTH AND SAFETY REQUIREMENTS FOR FIELD PERSONNEL</td>
<td>3-1</td>
</tr>
<tr>
<td>3.1</td>
<td>WESTON Field Personnel</td>
<td>3-1</td>
</tr>
<tr>
<td>3.2</td>
<td>Subcontractor Personnel</td>
<td>3-2</td>
</tr>
<tr>
<td>4</td>
<td>ANTICIPATED HAZARDS</td>
<td>4-1</td>
</tr>
<tr>
<td>5</td>
<td>PERSONAL PROTECTIVE MEASURES</td>
<td>5-1</td>
</tr>
<tr>
<td>5.1</td>
<td>Action Levels</td>
<td>5-1</td>
</tr>
<tr>
<td>5.2</td>
<td>Levels of Protection</td>
<td>5-5</td>
</tr>
<tr>
<td>5.3</td>
<td>Work Activities and Primary Levels of Protection</td>
<td>5-9</td>
</tr>
<tr>
<td>5.4</td>
<td>Task-Specific Health and Safety Procedures</td>
<td>5-11</td>
</tr>
<tr>
<td>5.4.1</td>
<td>Inventory of Process Vessels</td>
<td>5-11</td>
</tr>
<tr>
<td>5.4.2</td>
<td>Sampling of Process Vessel Contents</td>
<td>5-11</td>
</tr>
<tr>
<td>5.4.3</td>
<td>Sampling of Bagged Soils, Shredded Trash and Pallets, Containerized Spent Carbon or Leachate</td>
<td>5-13</td>
</tr>
<tr>
<td>5.4.4</td>
<td>Wipe Sampling of Process Equipment and Buildings/Structures</td>
<td>5-14</td>
</tr>
<tr>
<td>5.4.5</td>
<td>Rinsate Sampling of Empty Process Vessels</td>
<td>5-16</td>
</tr>
<tr>
<td>5.4.6</td>
<td>Soil Boring, Subsurface Soil Sampling, Drilling, and Monitor Well Installation</td>
<td>5-16</td>
</tr>
<tr>
<td>5.4.7</td>
<td>Sampling Groundwater</td>
<td>5-18</td>
</tr>
<tr>
<td>5.4.8</td>
<td>Sampling Surface Soil</td>
<td>5-19</td>
</tr>
<tr>
<td>5.4.9</td>
<td>Sampling for Asbestos</td>
<td>5-20</td>
</tr>
<tr>
<td>5.4.10</td>
<td>Inventory and Mapping of Sewers and Piping</td>
<td>5-21</td>
</tr>
<tr>
<td>5.4.11</td>
<td>Sampling Electrical Equipment</td>
<td>5-22</td>
</tr>
<tr>
<td>5.5</td>
<td>Work Zones</td>
<td>5-23</td>
</tr>
<tr>
<td>5.6</td>
<td>Decontamination Procedures</td>
<td>5-25</td>
</tr>
<tr>
<td>6</td>
<td>EMERGENCY RESPONSE</td>
<td>6-1</td>
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</tbody>
</table>
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>FIGURE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1</td>
<td>Site Map - Vertac Site, Jacksonville, Arkansas</td>
<td>1-3</td>
</tr>
<tr>
<td>2-1</td>
<td>Health and Safety Chain of Command</td>
<td>2-3</td>
</tr>
</tbody>
</table>

## LIST OF TABLES

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>TABLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-1</td>
<td>Potential Compounds of Concern, Exposure Limits Routes of Exposure, and Exposure Symptoms</td>
<td>4-2</td>
</tr>
<tr>
<td>4-2</td>
<td>Cross-reference to Available Analytical Data in the Work Plan</td>
<td>4-6</td>
</tr>
<tr>
<td>4-3</td>
<td>Physical Hazards</td>
<td>4-7</td>
</tr>
<tr>
<td>5-1</td>
<td>Action Levels and Response</td>
<td>5-3</td>
</tr>
<tr>
<td>5-2</td>
<td>Levels of Protection</td>
<td>5-6</td>
</tr>
<tr>
<td>5-3</td>
<td>Work Activities and Primary Levels of Protection</td>
<td>5-10</td>
</tr>
<tr>
<td>5-4</td>
<td>Personnel Decontamination Procedures</td>
<td>5-26</td>
</tr>
<tr>
<td>6-1</td>
<td>Emergency Response Contacts and Phone Numbers</td>
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</table>

## LIST OF ATTACHMENTS

- Attachment A - General Safety Guidelines and Heat/Cold Stress Conditions
- Attachment B - Material Safety Data Sheets: Potential Compounds of Concern
- Attachment C - Material Safety Data Sheets: Decontamination Solvents
- Attachment D - OSHA Job Safety and Health Protection Notice
- Attachment E - Field Site Safety Inspection Form
- Attachment F - Confined Space Entry Requirements
SECTION 1

OVERVIEW

1.1 INTRODUCTION

This document is a site-specific Health and Safety Plan (HASP) which establishes the health and safety program to be followed by WESTON personnel and WESTON subcontractors at the Vertac Chemical Corporation Facility (Site) located in Jacksonville, Arkansas. This HASP is developed in accordance with the occupational Health and Safety Act (OSHA) 29 Code of Federal Regulations (CFR) 1910. This HASP was developed by Roy F. Weston, Inc. (WESTON) at the request of Hercules Incorporated (Hercules) who is performing the Site characterization pursuant to an Administrative Order (AO) dated 12 July 1989 between Hercules and the U.S. Environmental Protection Agency (U.S. EPA). This HASP is developed in accordance with provisions in the Administrative Order (AO) and Attachment A to the AO (Work Plan).

The purpose of this document is to define specific procedures and protocols that will be implemented to protect the Health and Safety of WESTON personnel, and their subcontractors, during completion of activities at the Site which are described
3. NIOSH Pocket Guide to Chemical Hazards (September 1987).


5. Farm Chemicals Handbook.

6. Registry of Toxic Effects of Chemical Substances.


8. Material Safety Data Sheets for Known or Anticipated Compounds (Appendices B and C).

Activities which are not anticipated during performance of the Site characterization include entry into excavations or trenches. Such activities are specifically not covered by this plan.

WESTON will coordinate activities described in this HASP with site activities performed by other contractors, including the planned incineration of drummed wastes by the State of Arkansas. Coordination will be performed through communication with Hercules' site personnel and will include emergency
response, site control, and overall supervisory concurrent activities.
SECTION 2

HEALTH AND SAFETY RESPONSIBILITY

2.1 HEALTH AND SAFETY COORDINATOR

WESTON will provide an individual onsite to serve as Site Health and Safety Coordinator (SHSC). SHSC will be responsible for assuring that personnel and activities are performed in conformance with the protocols defined in this document. The SHSC will have control over Health and Safety matters onsite including portable air monitoring, emergency response, personnel sign-in, decontamination, coordination of field activities with other onsite contractors, and delegation of some responsibilities to members of field crews, particularly where more than one field crew is onsite at a time. The SHSC may at any time stop work if Health and Safety procedures are being compromised or are not sufficient. The SHSC will maintain regular contact with WESTON's Corporate Health and Safety Department.

If more than one field crew is required onsite at a time, one member from each crew will be assigned by the SHSC as the Field Safety Officer (FSO) for that crew. The FSO will work in...
conjunction with the SHSC and will provide portable air monitoring for the crew and assume responsibility for initial emergency response at the crew work location. Information regarding the crews activities and any emergency response will be brought to the attention of the SHSC.

2.2 **LINES OF RESPONSIBILITY**

WESTON's Corporate Health and Safety Director, Mr. George Crawford, CIH, and Project Director, Mr. Abraham Thomas, are responsible for assuring the Health and Safety of WESTON personnel and subcontractors (Figure 2-1). Individuals assigned to work on the project are to be responsible for their actions. In fulfillment of this responsibility, the Project Director, Project Manager, Site Health and Safety Coordinator, and project field personnel lend their support to the health and safety program. Their support is manifested by approving this HASP and by emphasizing the successful and SAFE completion of the project.

2.3 **VISITORS**

Visitors to WESTON work locations will be required to follow policies and procedures outlined in this HASP. Any visitor in the exclusion zone or contamination reduction zone will be expected to sign this HASP and should conform with applicable
FIGURE 2-1 HEALTH AND SAFETY CHAIN OF COMMAND
OSHA standards. Visitors will be required to provide their own personal protection equipment. If necessary, WESTON can provide visitors with work area specific orientation/training. WESTON’s intent is to be helpful to visitors but it is important for visitors to abide by procedures required for WESTON personnel in work areas and safe zones. In the event that a visitor does not adhere to the provisions of this HASP, the SHSC will record nonconformance in the Site Safety Logbook. If the nonconformance is threatening to the Health and Safety of personnel, the SHSC may decide to temporarily suspend work at that location.
SECTION 3

HEALTH AND SAFETY REQUIREMENTS FOR FIELD PERSONNEL

3.1 WESTON FIELD PERSONNEL

WESTON field personnel will have the following health and safety qualifications.

Training - Personnel entering the exclusion or contamination reduction zones will have certifications of completion of training in accordance with OSHA 29 CFR 1910, 29 CFR 1926/1910 or 29 CFR 1910.120.

Respirator Fit Testing - Personnel entering any area requiring the use or potential use of any negative pressure respirator will have had as a minimum, a qualitative fit test, administered in accordance with OSHA 29 CFR 1910.134 or ANSI within the last 12 months. If site conditions require the use of a full face negative pressure, air purifying respirator for protection from Asbestos or lead, employees will have had a Quantitative fit test, administered according to OSHA 29 CFR 1910.1002 or 1025 within the last 6 months.
Medical Monitoring Requirements - Personnel entering the exclusion or contamination reduction zones will be certified as medically fit to work, and to wear a respirator, if appropriate, in accordance with 29 CFR 1910, 29 CFR 1926/1910 or 20 CFR 1910.120.

The SHSC is responsible for verifying the certifications and fit tests. In addition to the qualifications for other WESTON field personnel, the SHSC will maintain the following:

- First Aid Certification;
- CPR certification;
- Significant experience in the highest level of protection anticipated for a particular activity;
- 8-hour additional training as required by OSHA 1910.120.

3.2 SUBCONTRACTOR PERSONNEL

Subcontractors to WESTON will be required to meet standards required for WESTON personnel. In addition, pertinent Federal, state, and local Health and Safety Standards must be adhered to.
The following information will be supplied by each subcontractor to WESTON:

- A general statement indicating that the subcontractor's health and safety program(s) is in compliance with applicable sections of 29 CFR 1910 and 1926. Specifically, the statement must identify that the subcontractor's employees are aware of, and that the subcontractor is in compliance with the intent of the OSHA standard, 1910.120, "Hazardous Waste Operations and Emergency Response."

- A statement indicating that subcontractor personnel who will or may take part in the Site characterization work are enrolled-in and the current-with, a medical monitoring program which complies with OSHA.

- A statement indicating that subcontractor will provide protective equipment for its own personnel, and that equipment is NIOSH/MSHA approved.

- A statement indicating that the subcontractor personnel will follow provisions in this HASP and cooperate with WESTON's site Health and Safety Coordinator.
A matrix or listing of each employee that will be, or may be, involved in the project. This list should include the following information for each employee:

- Name;

- Start Date;

- Medical Date (certifying fit to wear respirator protection and to work on hazardous waste site);

- Training Dates (specify type and quantity);

- Experience in Levels of Protection (hours, weeks);

- Years Working in the Field (drilling experience).
SECTION 4

ANTICIPATED HAZARDS

Hazards anticipated during completion of this work are both chemical and physical in nature. The chemical hazards are associated with those materials found onsite or anticipated during intrusive activities. The physical hazards are those associated with the use of personnel protection, proximity to operation of heavy equipment, and project activities related to rigorous field work.

The chemical hazards found onsite include: toluene, phenol, chlorophenols, dichlorophenols, trichlorophenols, dichlorophenoxyacetic acid (2,4-D), trichlorophenoxyacetic acid (2,4,5-T), Silvex (2,4,5-TP), 2,3,7,8-TCDD (Dioxin), caustic soda, Dalapon, HCl, Lacolene, butanol, dimethylamine, acetic acid, monochloroacetic acid, tetrachlorobenzene, methanol, fuel oil and gasoline. Protection against such chemical hazards will be provided by protective clothing, monitoring instruments, and good work practices as described in this HASP. Table 4-1 lists the potential compounds of concern and their exposure limits, routes of exposure, and acute exposure symptoms.
<table>
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<tr>
<th>Contaminant</th>
<th>PEL/TLV</th>
<th>IDLH (ppm)</th>
<th>Routes of Exposure</th>
<th>Symptoms of Exposure</th>
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<td>Toluene</td>
<td>100/100 ppm</td>
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<td>Inhalation, absorption, ingestion, contact</td>
<td>Fatigue, weakness, dizziness</td>
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<td>Phenol</td>
<td>5 ppm</td>
<td>250</td>
<td>Inhalation, absorption, ingestion, contact</td>
<td>Irritant - eyes, nose, throat; muscle ache, skin burn, convulsive twitch</td>
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<td>NE</td>
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<td>Irritant - skin, eyes, throat; headache, nausea, vomiting. See MSDS for further information.</td>
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<td>NE</td>
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<td>Irritant - skin, eyes, throat. See MSDS for further information.</td>
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<td>NE</td>
<td>Inhalation, ingestion, absorption</td>
<td>Irritant - skin, eyes, throat. See MSDS for further information.</td>
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<td>2,4-Dichlorophenoxy acetic acid (2,4-D)</td>
<td>10 mg/m³</td>
<td>NE</td>
<td>Inhalation, ingestion contact</td>
<td>CA^a</td>
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<td>2,4,5-Trichlorophenoxy acetic acid (2,4,5-T)</td>
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<td>NE</td>
<td>Inhalation, ingestion contact</td>
<td>CA^a</td>
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<td>Routes of Exposure</td>
<td>Symptoms of Exposure</td>
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<td>Caustic Soda</td>
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<td>250 mg/m³</td>
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<td>(Silvex) (2,4,5-TCP)</td>
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<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Asbestos</td>
<td>.2 f/cc</td>
<td>NE</td>
<td>Inhalation, ingestion</td>
<td>CA&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Fuel oil</td>
<td>500 ppm</td>
<td>10,000</td>
<td>Inhalation, ingestion, contact</td>
<td>Dizziness, drowsiness, headache, nausea; irritant - eyes, nose, throat</td>
</tr>
<tr>
<td>Petroleum distillates</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polychlorinated Biphenyls (PCBs)</td>
<td>1 mg/m&lt;sup&gt;3&lt;/sup&gt;</td>
<td>NE</td>
<td>Inhalation, ingestion, contact</td>
<td>Irritant to eyes; chloroacine</td>
</tr>
</tbody>
</table>

Notes:
- CA = Suspect human carcinogen.
- a = Symptoms of exposure are listed on Material Safety Data Sheets (Attachment B).
- b = PEL/TLV not established. PEL suggested 0.01 ng/m<sup>3</sup>, (Wade, R., 1984, PCB/TCDF cleanup at one Market Plaza: Proceedings of EPRI Symposium on FCDFs, EPRI Publication Number CSEL 4104) and (Schecter, A., 1983, Contamination of an Office Building in Binghamton, New York by PCBs, Dioxins and by Biphenylenes after an Electrical Panel and Electrical Transformer Incident: Chemosphere, Vol. 12, p. 669-680).
- NA = Information not available.
- NE = PEL/TLV or IDLH not established by OSHA or ACGIH.
Table 4-2 provides a cross-reference to available analytical data for process vessels, surface soils and groundwater. The major route of exposure to the compounds is inhalation. This rate of exposure will be controlled by utilizing various degrees of respiratory protection. Respiratory protection will also protect against exposure by ingestion. The second exposure route, skin contact, will be controlled with personnel protective clothing, such as Tyvek or Saranex coveralls, surgical gloves, silver shield gloves, neoprene gloves and Latex boot covers. Use and decontamination of such protective equipment is discussed on a task-specific basis in Section 5 of this HASP.

The physical hazards are described in Table 4-3. The critical monitoring and control techniques for physical hazards are personnel awareness and caution. A specific orientation at the initiation of each task will discuss physical hazards and the health and safety program to address these hazards. This orientation will assure that personnel are knowledgeable in the appropriate safety requirements. It is extremely important for site personnel to be constantly aware of site conditions and to inform fellow workers, especially the SHSC, of conditions which may effect health and safety, but which may not have been previously considered. An example of a condition which may have significant impact would be the discovery of a weakened access way to a vessel which was to be sampled. Another
Table 4-2
Cross-reference to Available Analytical Data in the Work Plan

<table>
<thead>
<tr>
<th>Matrix</th>
<th>Data Type</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process vessels</td>
<td>Chemical Data</td>
<td>Section 4.1</td>
</tr>
<tr>
<td></td>
<td>Asbestos</td>
<td>Appendix A</td>
</tr>
<tr>
<td>Surface Soils</td>
<td>TCDD</td>
<td>Section 2.6.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Appendix B</td>
</tr>
<tr>
<td>Groundwater</td>
<td>Chemical Data</td>
<td>Section 2.6.4.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Appendix E</td>
</tr>
<tr>
<td>Hazards</td>
<td>Task</td>
<td>Protection Protocols</td>
</tr>
<tr>
<td>----------------------</td>
<td>------------------------------------------------</td>
<td>-----------------------------------------------------------</td>
</tr>
<tr>
<td>Noise</td>
<td>5.4.1, 5.4.2, 5.4.3, 5.4.4, 5.4.7</td>
<td>American National Standards Institute (ANSI)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OSHA 29 CFR 1926.52</td>
</tr>
<tr>
<td>Heat/Cold</td>
<td>Each task&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Heat/cold stress guides</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Work/rest schedule</td>
</tr>
<tr>
<td>Electric storms</td>
<td>Outdoor tasks</td>
<td>SHSC</td>
</tr>
<tr>
<td>Heavy Manual Lifting</td>
<td>Each task&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Proper lifting procedures</td>
</tr>
<tr>
<td>Heavy Equipment Operation</td>
<td>5.4.4</td>
<td>29 CFR 1926.600; 1926.601</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1926.602; awareness/caution</td>
</tr>
<tr>
<td>Working at Elevation</td>
<td>5.4.1, 5.4.2, 5.4.3, 5.4.7</td>
<td>1910.23, 1910.24, 1926.450, 1926.451, 1926.500</td>
</tr>
<tr>
<td>Materials Handling</td>
<td>Each task&lt;sup&gt;a&lt;/sup&gt;</td>
<td>29 CFR 1926.250, 1926.251, 1926.252</td>
</tr>
<tr>
<td>Poor Lighting</td>
<td>Tasks taking place in structures</td>
<td>29 CFR 1926.56, minimum 5-foot candles</td>
</tr>
<tr>
<td>Fire Prevention</td>
<td>Each task&lt;sup&gt;a&lt;/sup&gt;</td>
<td>29 CFR 1910.157, 1926.150, 1926.151, 1926.152</td>
</tr>
<tr>
<td>Utilities</td>
<td>5.4.1, 5.4.3, 5.4.7</td>
<td>Utility search, 1926.415, 1926.416, 1926.417</td>
</tr>
</tbody>
</table>

<sup>a</sup> Each task is specified by section number.
condition which continually impacts personnel is the weather. An approaching storm, or a sudden rise or drop in ambient temperature would require personnel to react accordingly.
SECTION 5

PERSONAL PROTECTIVE MEASURES

This section describes specific procedures that will be implemented to monitor and protect personnel onsite. Levels of protection are described on a task-specific basis. Selection of levels of protection were based upon 29 CFR 1910.134 and WESTON's operating procedures which were developed in accordance with 29 CFR 1910.120.

5.1 Action Levels

WESTON will implement a conservative approach to setting action levels based on particulate dust and real time monitoring of breathing zone conditions for volatile organics. The breathing zone will be the lowest vertical space where personnel are inhaling. This procedure is in accordance with established industry standards and will account for unanticipated compounds which may be encountered during intrusive activities. The activities covered under this HASP are as follows:

- Inventory of process vessels;
- Sampling of vessel contents;
Sampling of bagged soils, shredded trash and pallets, containerized spent carbon or French drain leachate.

- Wipe sampling of process equipment and buildings/structures;

- Rinsate sampling of empty process vessels;

- Soil borings, subsurface soil sampling, drilling, and monitoring well installation;

- Sampling groundwater;

- Sampling surface soil;

- Sampling for asbestos;

- Inventory and mapping sewers or piping;

- Sampling electrical equipment.

Action levels for organic compound, shown in Table 5-1, will apply to volatile organic monitoring as detected by HNu photoionization detector (HNu) with a 10.2 eV probe or dust monitoring as detected with a miniature real-time aerosol monitor (MINIRAM). The action levels are based on the
Table 5-1

Action Levels and Response

<table>
<thead>
<tr>
<th>HNu Action Levela</th>
<th>Primary Level of Protection</th>
<th>Response when Action Level Exceeded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background (0)</td>
<td>Level D (as conditions allow, specified in Section 5 of HASP)</td>
<td>NA</td>
</tr>
<tr>
<td>1 to 50</td>
<td>Level C</td>
<td>Notify SHSC</td>
</tr>
<tr>
<td>50 to 500</td>
<td>Level B</td>
<td>Contact WESTON Corporate Health and Safety Director</td>
</tr>
<tr>
<td>&gt;500</td>
<td>NA</td>
<td>Leave area and notify WESTON Corporate Health and Safety Director</td>
</tr>
</tbody>
</table>

a - Units above background as measured in breathing zone with a HNu photoionization detector with 10.2 eV probe. Based upon volatile compounds and phenols which may be encountered.

NA - Not applicable.
Table 5-1 (Continued)

<table>
<thead>
<tr>
<th>MINIRAM</th>
<th>TCDD Concentration in Soil (ug/kg)</th>
<th>Response when Action Level Exceeded</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Particulate Action Level</strong> (mg/m³)</td>
<td><strong>0.01</strong></td>
<td><strong>1,000</strong></td>
</tr>
<tr>
<td><strong>0.1</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
<tr>
<td><strong>0.2</strong></td>
<td><strong>50</strong></td>
<td></td>
</tr>
<tr>
<td><strong>0.4</strong></td>
<td><strong>25</strong></td>
<td></td>
</tr>
<tr>
<td><strong>1.0</strong></td>
<td><strong>10</strong></td>
<td></td>
</tr>
<tr>
<td><strong>10.0</strong></td>
<td><strong>1</strong></td>
<td></td>
</tr>
</tbody>
</table>

a - Based upon recommended exposure limit of 0.01 ng/m³ (Wade, R., 1984, PCB/TCDF Cleanup at One Market Plaza: Proceedings of EPRI Symposium and TCDFs, EPRI Publication Number CSEL 4101), and (Schecter, A., 1983, Contamination of an Office Building in Binghamton, New York by PCBs, Dioxins, Furans and by Biphenylenes after an Electrical Panel and Electrical Transformer Incident: Chemosphere, Vol. 12, p. 669-680).
anticipated presence of toluene and a broad class of phenolic compounds (HNu) or dust with 2,3,7,8-TCDD (MINIRAM).

Particulate dust in the breathing zone is a concern because of the potential for some organic compounds, specifically 2,3,7,8-TCDD, to adsorb onto dust and be inhaled or ingested. Dust will be controlled by using engineering controls, where possible. Water or geotextile materials (burlap) or both will be used as needed to suppress fugitive dust. When dust control is not feasible during intrusive activities in the central process area, respiratory protection will be worn. Respiratory protection will also be worn for activities outside the Central Process Area, when dusty conditions prevail.

5.2 Levels of Protection

The primary levels of protection to be utilized during most activities will be Level C or Level B. Some tasks may be completed in upgraded Level D protection. Upgraded Level D protection will be used only where tasks do not pose inhalation hazards and therefore respiratory protection is not necessary but additional skin protection is required and provided by disposable protective clothing.

Table 5-2 lists the levels of protection to be utilized at the Site and the equipment required for each level.
Table 5-2

Levels of Protection

Level B

- Cotton coverall (or equivalent work uniform).
- Steel toed and shank boots.
- Latex boot covers.
- Saranex disposable coverall with hood.
- Pressure demand, self-contained breathing apparatus (SCBA, NIOSH/MSHA approved).
- Latex (surgical) gloves (underglove).
- Silver shield gloves (underglove).
- Neoprene gloves (overgloves, regular or heavy duty, 26") when contact with acidic solutions.
- Neoprene apron when contact with high concentrations of a liquid matrix or acidic solutions.
- Hard hat.
Table 5-2
(Continued)

Level C

- Cotton coverall (or equivalent work uniform).
- Steel toe and shank boots.
- Latex boot covers.
- Tyvek or Saranex disposable coverall with hood (Saranex will be used when splash hazards exist).
- Full face (NIOSH/MSHA approved) air purifying respirator with general organic vapor/high efficiency particulate filter cartridge (GMCH).
- Latex (surgical) gloves (underglove)
- Silver shield gloves (underglove).
- Nitrile or Neoprene gloves (overglove).
- Hard hat.
Table 5-2
(Continued)

Level D upgraded

- Cotton coveralls.
- Steel toe and shank boots.
- Latex boot covers.
- Tyvek disposable coveralls (dust hazards).*
- Saranex disposable coveralls (splash hazards).*
- Latex (surgical) gloves (undergloves).
- Work gloves.
- Hard hat.
- NIOSH/MSHA approved eye protection.

* Note: Decisions to wear Saranex or Tyvek will depend upon site conditions and will be made by the SHSC on consultation with the WESTON Corporate Health and Safety Director.
5.3 WORK ACTIVITIES AND PRIMARY LEVELS OF PROTECTION

Prior to commencement of intrusive activities on site, personnel and subcontractors will attend a site-specific Health and Safety Orientation. The purpose of this training will be to familiarize project personnel with site-specific hazards, to ensure compliance with the Health and Safety Plan, and to fulfill "Right-to-Know" regulations. The contents of this training will include the following:

- Chemical hazards.
- Physical hazards.
- Levels of protection.
- Decontamination procedures.
- Emergency procedures/telephone numbers.
- Hospital/infirmary directions.
- Health and safety chain of command.
- Respiratory check-out procedures.

The primary levels of protection for each task anticipated during Site Characterization are listed in Table 5-3.
<table>
<thead>
<tr>
<th>Activity</th>
<th>Level D Upgrade</th>
<th>Level C</th>
<th>Level B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventory of process vessels</td>
<td></td>
<td>X</td>
<td>X(a)</td>
</tr>
<tr>
<td>Sampling process vessel contents</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Sampling of bagged soils, shredded trash and pallets, containerized</td>
<td></td>
<td>X</td>
<td>X(a)</td>
</tr>
<tr>
<td>spent carbon or French drain leachate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wipe sampling of process equipment and buildings/structures</td>
<td></td>
<td>X</td>
<td>X(a)</td>
</tr>
<tr>
<td>Rinsate sampling of empty process vessels</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Soil boring, subsurface soil sampling, drilling, and monitoring well</td>
<td></td>
<td></td>
<td>X(a)</td>
</tr>
<tr>
<td>installation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sampling groundwater</td>
<td>X(a)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Sampling surface soil</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Site walk through</td>
<td>X(a)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Determining soils sampling location</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Sampling for asbestos</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Inventory and mapping of sewers and piping</td>
<td></td>
<td></td>
<td>X(a)</td>
</tr>
<tr>
<td>Sampling electrical equipment</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

\(a\) - Designates upgrade or downgrade level of protection. The primary level of protection is defined as that level of protection in which the specific activity will start. Subsequent downgrades/upgrades will be based on site conditions, monitoring results, and decisions made by the SHSC upon consultation with the Director of WESTON's Health and Safety Program.
5.4 TASK-SPECIFIC HEALTH AND SAFETY PROCEDURES

5.4.1 Inventory of Process Vessels

The primary hazards associated with this activity include inhalation of dust when dusty conditions prevail and inhalation of fumes and volatile organics from process vessels or drum (overpack) contents. Level D protection will be worn during the inventory except:

- When dusty conditions prevail, Level C will be worn.

- When inventory involves inspection of process vessels or drums located inside buildings, Level C will be worn. Latex gloves will be sufficient for Site walk through. Hand-held intrinsically safe lights may be required, where insufficient lighting exists.

- When inventory involves intrusive activities, such as opening ports, valves, or lids to assess volumes or phases, Level B will be worn (see Section 5.4.2).

5.4.2 Sampling of Process Vessel Contents

The primary hazards associated with this activity include inhalation of fumes and volatile organics from vessel contents
and skin contact with toxic and low or high pH solutions. Sampling as the term is used here includes any intrusive activity involving access to the interior of a vessel. Level B protection will be worn for this activity. Twenty-six inch neoprene gloves will be worn as an outer glove to provide protection against acidic liquids and some protection against chemical permeation. Silver shield gloves will be utilized as an underglove and provide additional protection from contaminant breakthrough. Saranex coveralls and a Neoprene apron will be worn for protection against splash hazards. Proper procedures and sampling techniques will be utilized to limit personnel contact with contents of process vessels.

Work rest schedules will be implemented to prevent workers from suffering from heat stress conditions. Heat stress guidelines for determining the proper work/rest schedule are presented in Attachment A. Also, the "TLV Handbook" published by the "American Conference of Governmental Industrial Hygienists (ACGIH)" provides information for determining the appropriate schedule.

Workers should be sure that the structural integrity of the access ways to each sampling point is evident before entry is attempted. If a safe access way is not provided, then another vessel should be selected. This decision will be made by the SHSC after conferring with WESTON's Corporate Health and Safety Director.
A minimum of three people is required for this activity. Air monitoring will be performed during opening and sampling of vessels with an HNu 10.2 photoionization detector and an explosimeter. Action guidelines for utilizing the HNu are provided in Table 5-1. If readings are obtained at 20% of the Lower Explosive Limit (LEL) with the explosimeter during opening of vessel and sampling, personnel will leave the area immediately.

5.4.3 **Sampling of Bagged Soils, Shredded Trash and Pallets, Containerized Spent Carbon or French Drain Leachate**

The primary hazards associated with these activities are the inhalation of fumes and volatile organics, and skin contact with potentially contaminated soils, trash, pallets, spent carbon, or leachate.

For sampling containerized spent carbon or leachate the initial five containers will be opened in Level B. Dependent on HNu readings obtained during these activities a downgrade to Level C can be instituted. An explosimeter will be used also during the opening of each container. If readings of 20% LEL are obtained, workers will evacuate to a safe area.
At a minimum, Level C protection will be worn for these activities. Volatile organics will be monitored using a HNue photoionization detector equipped with a 10.2 eV probe. If extreme ambient concentrations arise (>50 units), or if personnel are experiencing repeated "breakthrough" of the cartridges, engineering controls, such as fans, should be utilized to dissipate and control vapors. If engineering control methods are ineffective, work activities should be halted and the WESTON Corporate Health and Safety Director should be notified regarding a possible upgrade to Level B.

Physical hazards associated with this activity should be minimal. Dependent on sampling conditions, heat/cold stress and other problems associated with wearing a chemical resistant clothing are the primary hazards apparent. These can be negated by implementing an appropriate work/rest schedule and having workers use caution and awareness when approaching each job task and sample location.

5.4.4 Wipe Sampling of Process Equipment and Buildings/Structures

Level C personnel protection will be worn for wipe sampling tasks. The chemical hazards associated with this activity are inhalation and skin contact. Particulates could be generated into the breathing zone while accessing the sampling point.
Some potentially hazardous compounds not usually volatile may be volatilized into the workers breathing space by the solvent used for collecting the sample. This characteristic could increase the possibility of a contact exposure. Tyveks will be worn during this activity unless splash protection is required, then Saranex will be worn. Proper precautions related to sampling will be followed.

Physical hazards that need to be addressed are dependent on the sampling locations. Sampling locations that are at an elevation above ground level should either have a permanent access way that is structurally intact and safe for workers to utilize or a temporary structure with the same characteristics. Temporary access ways utilizing ladders and scaffolding should adhere to the specifications designated in OSHA Safety and Health Standard 29 CFR 1926.450 and 1926.451. Access structures need to adhere to 29 CFR 1926.500 also. Confined space entry, if necessary, will conform to requirements listed in Attachment F. As mentioned earlier when personnel protective clothing is worn work/rest schedules should be implemented due to heat/cold stress conditions, and care should be taken due to the added weight and the awkwardness of work in protective clothing.
5.4.5 **Rinsate Sampling of Empty Process Vessels**

Rinsate sampling will be performed in Level C utilizing Saranex for splash protection. The chemical hazards associated with this activity are inhalation and skin contact. The physical hazards associated with this activity include use of hoses at line pressure to fill and drain the empty vessels, structural integrity of the vessel supports and accessways, and use of equipment valves to control flow during sampling.

5.4.6 **Soil Boring, Subsurface Soil Sampling, Drilling, and Monitoring Well Installation**

As discussed in Section 3, subcontractor personnel must adhere to the specifications outlined in Section 3.0.

The primary hazards associated with these activities include inhalation of particulate dusts and volatile organics, and skin contact with potentially contaminated soils. Volatile organics in the breathing zone will be monitored for through the use of a HNu with a 10.2 eV probe. If extreme ambient concentrations persist (>50 units), or if personnel are experiencing repeated "breakthrough" of the cartridges, engineering controls, such as a fan, should be utilized. Dust generation should be controlled by using water or other dust suppression techniques. If dust control methods are ineffective, work will be halted...
and WESTON Corporate Health and Safety will be consulted regarding a possible upgrade in protection. Skin contact with potentially contaminated soils and water, will be controlled through the use of disposable protection clothing, good work practices, and thorough decontamination procedures (Section 5.6).

These drilling and intrusive activities will be performed in Level C. Saranex will be used during monitoring well installation because of potential splash hazards.

Physical hazards of concern are those hazards associated with working with or near heavy equipment. Applicable requirements specified in 29 CFR 1926.600, 1926.601 and 1926.602 should be followed. Due to the hazards associated with working with a drill rig, two WESTON personnel are required at each boring or well location. Their roles will be to oversee the subcontractors health and safety and to document and analyze field data. Each person should be aware of his surroundings during the boring and installation process and should be familiar with the safety procedures and cautions associated with drilling. The appropriate work/rest schedules will to be followed as established by the SHSC. Also, before any intrusive activity, there will be an utility search completed for both overhead and underground hazards. Work completed in the proximity of electrical equipment should adhere to OSHA 29 CFR 1926.400.
5.4.7 **Sampling Groundwater**

Each groundwater well will be opened and sampled in Level C. Prior to sampling monitoring wells, the well "head-space will be monitored using the HNu to indicate whether there has been an increase in volatile organics within the well. Monitoring will continue throughout the purging and sampling of each well. Tyvek can be substituted for Saranex if conditions warrant and provided that extensive contact with contaminated water is not a potential.

If after initial monitoring and continued monitoring indicates background levels of volatile organics, purging and sampling can be completed in upgraded Level D, however, if action levels in Table 5-1 are encountered, the purging and sampling effort will be completed in Level C. Any downgrade in a level of protection should be brought to the attention of SHSC and the WESTON Corporate Health and Safety Director.

Protection from skin contact with potentially contaminated soil, dust, and mud should be emphasized. This protection is provided by the use of Tyvek and Saranex, latex boot covers, and surgical and nitrile/neoprene gloves. The minimum level of protection once intrusive activities begin is Level C until a determination is made that conditions allow a downgrade. Personnel decontamination procedures (Section 5.6) will be adhered to, and the final hand wash and rinse is a vital step.
5.4.8 **Sampling Surface Soil**

The primary hazards associated with this activity include the inhalation and skin contact with dust and potentially contaminated soils. Level C protection will be worn for soil sampling, sample compositing, and equipment cleaning. Inhalation hazards will be protected against by utilizing MSA/NIOSH approved full-face respirators with the appropriate cartridge. Skin contact with potentially contaminated soils will be controlled through the use of disposable protective clothing, good work practices, and thorough personnel decontamination procedures. Nitrile or neoprene gloves will be worn with silver shield gloves as an underglove. When possible, engineering controls should be utilized to suppress dust generation.

Sample location determinations and gridding can be accomplished in upgraded Level D, except in the boiler house area and when dusty conditions prevail, in these latter situations, Level C will be worn. Tyveks may be used but they must be intact and zipped. Latex boot covers and surgical gloves will also be worn for this activity.

The physical hazards for this activity are associated with wearing personnel protection equipment. Heat/cold stress will be monitored and the appropriate work/rest schedule will be implemented.
Biological hazards may also exist during surface soil sampling. These hazards include snakes, bees, ticks, and poison ivy. Upgraded Level D or Level C protective clothing will help in limiting the exposure to biological hazards during sampling activities.

5.4.9 Sampling for Asbestos

Level C protection will be worn for this activity utilizing a powered air purifying respirator (PAPR) for outdoor sampling or a full face piece, supplied-air respirator operated in pressure-demand mode for indoor sampling. At a minimum, Tyvek will be worn with latex over-boots and surgical gloves.

Sample points located above ground elevation should have access ways that adhere to the specifications presented in Section 5.4.4. The SHSC will conduct a walk-through survey prior to the initiation of sample activities to identify unsafe work areas or conditions. The SHSC will report hazards which are found to Hercules for corrective action or will institute corrective action at that time. Any situation that cannot be resolved by the SHSC or Hercules will be referred to the WESTON Corporate Health and Safety Director and to the Project Manager prior to sampling.
Personnel decontamination will be conducted by one or two procedures. For bulk sampling activities, the protective clothing will be thoroughly wiped (or vacuumed, if necessary) with wet towels before protective clothing is removed. For abatement inspection and if shower facilities are provided, the protective clothing will be removed after gross contamination is wiped or vacuumed. The employee will then step into the shower. (In some cases where gross asbestos contamination is anticipated, the use of two layers of protective clothing may be worn so that after the outer layer is removed, the shower is taken in the complete inner layer, which is removed before entering the clean area.).

Respiratory protective gear is removed only after it has been cleaned and after other protective clothing has been removed.

5.4.10 **Inventory and Mapping of Sewers and Piping**

The primary hazards associated with this activity include inhalation of dust when dusty conditions prevail. Level D protection will be worn when performing this activity except when:

- Dusty conditions prevail, Level C will be worn.
When intrusive activities, including opening manhole covers and smoking lines, are performed, or activities need to be performed inside process buildings, Level C will be worn.

5.4.11 Sampling Electrical Equipment

The primary hazards associated with this activity include chemical hazards such as sampling potentially-PCB laden dielectric fluids and physical hazards including working with electrical equipment and at elevations above ground surface. Appropriate utility personnel will be notified and will be used to cut-off electrical service to equipment which may still be hooked-up. Level C will be worn for this activity. Access to above ground level equipment will be obtained by using procedures in accordance with those described in Section 5.4.4. If a cherry-picker is used to access sampling locations, use will conform to requirements of OSHA 29 CFR 1926.556, ANSI Standard A922 and the manufacturer’s specifications. Drain plugs will not be opened because of the potential for failure of these plugs. Plastic sheeting will be used for spill containment.
5.5 WORK ZONES

To minimize the potential for transporting contaminants into other areas and to minimize exposures to onsite personnel, site control measures will be implemented. The two primary control measures are definition of work zones and decontamination procedures (Section 5.6). The following discussion defines the different work zones in general and describes their purpose.

- **Exclusion Zone** - The active investigation will take place in this area. Personnel entering this zone will do so from the decontamination/equipment supply area. They will don the appropriate safety equipment as specified by this Plan, and will enter and exit the area via the prescribed route.

- **Contamination Reduction Zone (CRZ)** - Decontamination procedures for personnel and equipment will take place in this area. The specified levels of protection are a necessity for working in this area.

- **Support Zone** - This zone is used to stage equipment, vehicles, etc. It is defined as a "clean" area and therefore protective clothing is not required in this area. Care should be taken not to contaminate this zone or actively disturb soils in the area.
The exclusion zone is separated from the contamination reduction zone by the "hot line." Personnel and equipment crossing the hot line will be required to undergo decontamination. The decontamination equipment will be set up at the hot line. Decontamination may be modified in response to the level of contamination to which the worker was exposed during the day. Banner guard, or another physical barrier like rope, will delineate the "clean" support zone from the CRZ and exclusion zone. Personnel entering the CRZ or exclusion zone must be certified and must comply with the provisions of this HASP. Any visitor permitted beyond the banner guard must read and sign this HASP.

Given the nature and size of the Site, there will be many locations onsite which will require delineated work zones. For tasks which will take place at specific locations onsite (i.e., well installation, soil borings), work zones will be established (Hot Zone, CRZ, Support) and decontamination procedures will be localized at the location where each task is being performed. For tasks which will require a series of locations (i.e., surface soil sampling) work zones and personnel decontamination procedures will be centralized at the support area.
5.6 PERSONNEL DECONTAMINATION PROCEDURES

Personnel decontamination will be accomplished by a thorough, orderly removal of disposable protective clothing. The cleaning sequence(s) outlined on Table 5-4 will be followed, as appropriate, after initially washing and rinsing outer boots and outer gloves.
### Table 5-4

Personnel Cleaning Procedures

<table>
<thead>
<tr>
<th>Level B</th>
<th>Level C</th>
<th>Upgraded Level D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removes protective apron</td>
<td>Remove boot tape</td>
<td>Remove boot tape</td>
</tr>
<tr>
<td></td>
<td>Remove boot cover</td>
<td>Remove boot cover</td>
</tr>
<tr>
<td>Step 2</td>
<td>Remove boot tape</td>
<td>Remove wrist tape</td>
</tr>
<tr>
<td></td>
<td>Remove boot cover</td>
<td>Remove outer glove</td>
</tr>
<tr>
<td>Step 3</td>
<td>Remove wrist tape</td>
<td>Remove disposable coverall</td>
</tr>
<tr>
<td></td>
<td>Remove outer glove</td>
<td></td>
</tr>
<tr>
<td>Step 4</td>
<td>Remove disposable coverall</td>
<td>Remove APR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Remove surgical gloves</td>
</tr>
<tr>
<td>Step 5</td>
<td>Remove SCBA</td>
<td>Remove silver shield gloves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Remove cotton coveralls</td>
</tr>
<tr>
<td>Step 6</td>
<td>Remove silver shield gloves</td>
<td>Remove surgical gloves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wash/rinse hands</td>
</tr>
<tr>
<td>Step 7</td>
<td>Wash surgical gloves</td>
<td>Remove cotton coveralls</td>
</tr>
<tr>
<td>Step 8</td>
<td>Remove SCBA mask</td>
<td>Wash/rinse hands</td>
</tr>
<tr>
<td>Step 9</td>
<td>Remove surgicals</td>
<td></td>
</tr>
<tr>
<td>Step 10</td>
<td>Remove cotton coveralls</td>
<td></td>
</tr>
<tr>
<td>Step 11</td>
<td>Wash/rinse hands or shower</td>
<td></td>
</tr>
</tbody>
</table>
SECTION 6

EMERGENCY RESPONSE

Table 6-1 contains the phone numbers for responses that can be anticipated at this time.

Contingency Plan

Sampling procedures described in the Work Plan have been designed to minimize potential of an emergency. Emergency response, if needed, will depend upon the type of incident. Hercules maintains site personnel on a 24-hour basis. Hercules will be notified in the event of a spill. If the situation warrants, Hercules will initiate the site emergency response protocol.

Personal Injury or Exposure

As a minimum, WESTON will have at least one person onsite who is certified in Basic First Aid and CPR to perform First Aid. A First Aid kit will be maintained onsite in an unrestricted location. A log will be maintained of uses and inspections of the First Aid kit. Emergency eye wash/safety shower will be available. Injured personnel will be moved to 'clean' areas for attention, if practical.
If an injury or exposure occurs, the incident will be reported to the SHSC. The SHSC will notify WESTON’s Corporate Health and Safety Director. An incident report will be filed.

Spills and Releases

Field sampling procedures have been designed specifically to minimize the potential for spills or releases. In the unlikely event a spill occurs, attempts will be made to contain the spill by berming the area and avoiding contact with the material.

An inventory of drums, adsorbent, plastic and small hand tools (e.g., shovels) will be maintained at the Site for use in handling spillage which could occur during the Site characterization. Hercules will be notified of spillage by the SHSC.

Fire

WESTON will maintain a fire extinguisher for use in extinguishing a small, contained fire. WESTON will notify Hercules should a fire occur.
Table 6-1

Emergency Response Contacts and Phone Numbers

| General |
|------------------------|-----------------|
| WESTON's Main Switchboard | 215-692-3030 |
| WESTON's Corporate Health and Safety | George Crawford, 215-430-7406, Tom Baylis, 215-430-7221 |
| WESTON's Project Director | Abe Thomas, 215-430-3044 |
| WESTON's Program Manager | Randy Maud, 215-344-3687 |
| National Library of Medicine (WESTON) | 215-692-3030, ext. 2208 |
| National Pesticide Center | 800-845-7633 |
| NIOSH: Health Hazard Evaluation | 513-684-4382 |
| OSHA: Technical Data Center (Weekday) | 202-523-9700 |
| TSCA Hot Line - Weekday (PCBs) | 202-554-1404 |
| Center for Disease Control (Day) | 404-452-4100 |
| CHEM TREC | 800-424-9300 |
| EPA Asbestos Technical Information | 800-334-8571, ext. 6741 |
| Spill Control Association of America | 313-552-0500 |

In the event of an emergency (injury, accident), notify WESTON Health and Safety and Project Manager. WESTON Health and Safety must be notified within 24 hours. Phone numbers and maps for local services are posted by the Site telephone:

- Local Police - 911 or 982-3191
- Fire Department/Rescue Squad - 911 or 982-5111
- Ambulance Service - 911 or 982-5111
- Nearest Hospital/Emergency Room - (501) 982-9519/ (501) 982-2685

Contacts with personnel at the local facilities will be made prior to the start of the project. An inspected first-aid kit, eye wash, safety shower, and fire extinguishers will be available onsite.
ATTACHMENT A
GENERAL SAFETY GUIDELINES
AND
HEAT/COLD STRESS GUIDELINES
General Safety Guidelines

- Site personnel should sign a master sheet indicating they have read the site safety plan and will comply.

- There will be no eating, chewing, drinking, or tobacco use in the exclusion or contamination reduction zone.

- All personnel must pass through the contamination reduction zone to enter or exit the exclusion zone.

- As a minimum, emergency eye washes will be on the contaminated side of the contamination reduction zone and/or at the work station.

- Fire extinguishers will be on-site for use on equipment or small fires only.

- An adequately stocked first aid kit will be on scene at all times during operational hours.

- A morning safety meeting will be conducted for all site personnel who will sign a daily attendance sheet. The safety procedures and the day’s planned operations should be discussed.

- No drilling activities will be conducted during thunderstorms or lightning storms. The Field Safety Officer for each field crew will consult with the SHSC concerning this determination.

- All visitors and unnecessary personnel will maintain a one boom length distance from the drill rig.

- All project personnel will wash hands thoroughly before eating.
Heat Stress Prevention and Monitoring

Heat stress may occur at any time work is being performed at elevated temperatures. Wearing of chemical protective clothing, which may result in decreasing natural body ventilation, increases the risk of heat stress.

If the body's physiological processes fail to maintain a normal body temperature because of excessive heat, a number of physical reactions can occur, ranging from mild (such as fatigue, irritability, anxiety, and decreased concentration, dexterity, or movement) to fatal. Because heat stress is one of the most common and potentially serious illnesses at hazardous waste sites, regular monitoring and other preventative measures are vital.

Site workers must learn to recognize and treat the various forms of heat stress. The best approach is preventative heat stress management. In general:

- Have workers drink 16 ounces of water before beginning work, such as in the morning or after lunch. Provide disposable 4-ounce cups, and water that is maintained at 50 - 60°F. Urge workers to drink 1 to 2 of these cups of water every 20 minutes for a total of 1 to 2 gallons per day. Provide a cool area for rest breaks. Discourage the intake of coffee during working hours. Monitor for signs of heat stress.

- Acclimate workers to site work conditions by slowly increasing workloads, i.e., do not begin site work activities with extremely demanding activities.

- Provide cooling devices to aid natural body ventilation. These devices, however, add weight and their use should be balanced against worker efficiency. An example of a cooling aid is long cotton underwear which acts as a wick to absorb moisture and protect the skin from direct contact with heat-absorbing protective clothing.

- In extremely hot weather, conduct field activities in the early morning and evening.

- Ensure that adequate shelter is available to protect personnel against heat as well as cold, rain, snow, etc. which can decrease physical efficiency and increase the probability of both heat and cold stress. If possible, set up the command post in the shade.

- In hot weather, rotate shifts of workers wearing impervious clothing.

- Good hygienic standards must be maintained by frequent changes of clothing and showering. Clothing should be permitted to dry during rest periods. Persons who notice skin problems should immediately consult medical personnel.
The following is a discussion of specific results of heat stress:

1.0 Heat Stroke

Heat stroke is an acute and dangerous reaction to heat stress caused by a failure of heat regulating mechanisms of the body; the individual’s temperature control system that causes sweating stops working correctly. Body temperature rises so high that brain damage and death will result if the person is not cooled quickly.

- **Symptoms** - Red, hot, dry skin, although person may have been sweating earlier; nausea; dizziness; confusion; extremely high body temperature; rapid respiratory and pulse rate; unconsciousness or coma.

- **Treatment** - Cool the victim quickly. If the body temperature is not brought down fast, permanent brain damage or death will result. Soak the victim in cool, but not cold water; sponge the body with cool water or pour water on the body to reduce the temperature to a safe level (102°F). Observe the victim and obtain medical help. Do not give coffee, tea, or alcoholic beverages.

2.0 Heat Exhaustion

Heat exhaustion is a state of very definite weakness or exhaustion caused by the loss of fluids from the body. The condition is much less dangerous than heat stroke, but it nonetheless must be treated.

- **Symptoms** - Pale, clammy, moist skin; profuse perspiration and extreme weakness. Body temperature is normal, pulse is weak and rapid, breathing is shallow. The person may have a headache, may vomit, and may be dizzy.

- **Treatment** - Remove the person to a cool, air conditioned place, loosen clothing, place in a head-low position and provide bed rest. Consult physician, especially in severe cases. The normal thirst mechanism is not sensitive enough to ensure body fluid replacement. Have patient drink 1 to 2 cups of water immediately, and every 20 minutes thereafter until symptoms subside. Total water consumption should be about 1 to 2 gallons per day.
3.0 Heat Cramps

Heat cramps are caused by perspiration that is not balanced by adequate fluid intake. Heat cramps are often the first sign of a condition that can lead to heat stroke.

- **Symptoms** - Acute painful spasms of voluntary muscles, e.g., abdomen and extremities.

- **Treatment** - Remove victim to a cool area and loosen clothing. Have patient drink 1 to 2 cups of water immediately, and every 20 minutes thereafter until symptoms subside. Total water consumption should be 1 to 2 gallons per day.

4.0 Heat Rash

Heat Rash is caused by continuous exposure to heat and humid air and aggravated chafing clothes. The condition decreases ability to tolerate heat.

- **Symptoms** - Mild red rash, especially in areas of the body that come into contact with protective gear.

- **Treatment** - Decrease amount of time in protective gear and provide powder to help absorb moisture and decrease chafing.

5.0 Heat Stress Monitoring and Work Cycle Management

For strenuous field activities that are part of on-going site work activities in hot weather, the following procedures shall be used to monitor the body's physiological response to heat, and to manage the work cycle, even if workers are not wearing impervious clothing. These procedures are to be instituted when the temperature exceeds 70°F.

- **Measure Heart Rate** - Heart rate should be measured by the radial pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats/minute. If the HR is higher, the next work period should be shortened by 33%, while the length of the rest period stays the same. If the pulse rate still exceeds 110 beat/minute at the beginning of the next rest period, the following work cycle should be further shortened by 33%. The procedure is continued until the rate is maintained below 110 beats/minute.
Measure Body Temperature - When ambient temperatures over 90°, body temperatures should be measured with a clinical thermometer as early as possible in the resting period. Oral temperature (OT) at the beginning of the rest period should be shortened by 33%, while the length of the rest period stays the same. If the OT exceeds 99.6°F at the beginning of the next rest period, the following work cycle should be further shortened by 33%. The procedure is continued until the body temperature is maintained below 99.6°F.

Physiological Monitoring Schedule - The following Suggested Frequency of Physiological Monitoring Schedule for Fit and Acclimated Workers shall be used as a guideline:

<table>
<thead>
<tr>
<th>Temperature</th>
<th>(Level D)</th>
<th>(Level C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>90°F (32.2°C)</td>
<td>After each 45 minutes of work</td>
<td>After each 15 minutes of work</td>
</tr>
<tr>
<td>or above</td>
<td></td>
<td></td>
</tr>
<tr>
<td>87.5°F (30.8°C-32.2°C)</td>
<td>After each 60 minutes of work</td>
<td>After each 30 minutes of work</td>
</tr>
<tr>
<td>82.5°F-87.5°F (28.1°C-32.2°C)</td>
<td>After each 90 minutes of work</td>
<td>After each 60 minutes of work</td>
</tr>
<tr>
<td>77.5°F-82.5°F (25.3°C-28.1°C)</td>
<td>After each 120 minutes of work</td>
<td>After each 90 minutes of work</td>
</tr>
<tr>
<td>72.5°F-77.5°F (22.5°C-25.3°C)</td>
<td>After each 150 minutes of work</td>
<td>After each 120 minutes of work</td>
</tr>
</tbody>
</table>

Measure the air temperature with a standard thermometer. Estimate fraction of sunshine by judging what percent the sun is out.

- 100% sunshine = no cloud cover = 1.0
- 50% sunshine = 50% cloud cover = 0.5
- 0% sunshine = full cloud cover = 0.0

Adjusted temp. = actual temp. + 13 X (% sunshine factor).

The length of work period is governed by Frequency of Physiological Monitoring. The length of the rest period is governed by physiological parameters (heart rate and oral temperature). For example, if an individual's heart rate exceeds 110 beats/minute at the beginning of the rest period, that individual will remain on rest-time until his/her heart rate drops well below 110 beats/minute and their next work period (=duration of time before suggested physiological monitoring) is decreased by 33%.
Cold Stress

Persons working outdoors in low temperatures, especially at or below freezing are subject to cold stress. Exposure to extreme cold for a short time causes severe injury to the surface of the body, or results in profound generalized cooling, causing death. Areas of the body which have high surface area-to-volume ratio such as fingers, toes, and ears, are the most susceptible.

Chemical protective clothing generally does not afford protection against cold stress. In many instances, it increases susceptibility. Chemical hazard site workers must learn to dress carefully to provide chemical protection and thermal insulation while not dressing so warmly that exercise or strenuous activity will result in heat stress.

Provisions must also be made for the fact that after physical activity and accumulation of body heat, sudden chilling during decontamination and rest breaks may increase susceptibility to colds, etc.

Two factors influence the development of a cold injury: ambient temperature and the velocity of the wind. Wind Chill Indices describe the chilling effect of moving air in combination with low temperature.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air; thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is perspiration-soaked.

1.0 Frostbite

Local injury resulting from cold is included in the generic term frostbite. Frostbite of the extremities can be categorized into:

- Frost nip or incipient frostbite is characterized by sudden blanching or whitening of skin.
- Superficial frostbite is characterized by skin with a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- Deep frostbite is characterized by tissues that are cold, pale, and solid.
To administer first aid for frostbite: Take the victim indoors and rewarm the areas quickly in water that is between 39°C and 41°C (102°F-105°F). Give a warm drink - water, or juices not coffee, tea or alcohol. The victim must not smoke. Keep the frozen parts in warm water or covered with warm clothes for 30 minutes, even though the tissue will be very painful as it thaws. Then elevate the injured area and protect it from injury. Do not allow blisters to be broken. Use sterile, soft, dry material to cover the injured areas. Keep victim warm and get immediate medical care.

After thawing, the victim should try to move the injured areas a little, but no more than can be done alone, without help. Seek medical attention as soon as possible.

NOTE:

- Do not rub the frostbitten part (this may cause gangrene).
- Do not use ice, snow, gasoline or anything cold on the frostbitten area.
- Do not use heat lamps or hot water bottles to rewarm the part.
- Do not place the part near a hot stove.

2.0 Hypothermia

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. Its symptoms are usually exhibited in five stages:

- Shivering
- Apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95°F.
- Unconsciousness, glassy stare, slow pulse, slow respiration
- Death

If hypothermia is suspected in any field personnel, remove person to a warmer location until symptoms recede.
WET FEET

Under both hot and cold conditions, wet feet can lead to serious problems. Trench Foot, Paddy Foot and Immersion Foot are foot ailments resulting from feet being wet for long periods of time and are similar in effect. In their more serious form, these ailments can result in pain, skin loss and incapacitation.

Workers in wet conditions or when conditions result in sweating and feet becoming and remaining wet, must dry their feet and change socks regularly to avoid these ailments.
## ATTACHMENT B

### MATERIAL SAFETY DATA SHEETS: POTENTIAL COMPOUNDS OF CONCERN

<table>
<thead>
<tr>
<th>Compound</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toluene</td>
<td>B-1</td>
</tr>
<tr>
<td>Phenol</td>
<td>B-4</td>
</tr>
<tr>
<td>2-Chlorophenol</td>
<td>B-7</td>
</tr>
<tr>
<td>2,4-Dichlorophenol</td>
<td>B-10</td>
</tr>
<tr>
<td>2,6-Dichlorophenol</td>
<td>B-13</td>
</tr>
<tr>
<td>2,3,6-Trichlorophenol</td>
<td>B-15</td>
</tr>
<tr>
<td>2,4,6-Trichlorophenol</td>
<td>B-17</td>
</tr>
<tr>
<td>2,4,5-Trichlorophenol</td>
<td>B-20</td>
</tr>
<tr>
<td>2,4-Dichlorophenoxyacetic Acid</td>
<td>B-23</td>
</tr>
<tr>
<td>2,4,5-Trichlorophenoxyacetic Acid</td>
<td>B-25</td>
</tr>
<tr>
<td>Caustic Soda</td>
<td>B-29</td>
</tr>
<tr>
<td>1,2,3,4-Tetrachlorobenzene</td>
<td>B-32</td>
</tr>
<tr>
<td>1,2,3,5-Tetrachlorobenzene</td>
<td>B-34</td>
</tr>
<tr>
<td>2,3,7,8-Tetrachloro-dibenzo-p-dioxin</td>
<td>B-36</td>
</tr>
<tr>
<td>Butanol</td>
<td>B-42</td>
</tr>
<tr>
<td>Hydrochloric Acid</td>
<td>B-47</td>
</tr>
<tr>
<td>Acetic Acid</td>
<td>B-50</td>
</tr>
<tr>
<td>Monochloroacetic Acid</td>
<td>B-55</td>
</tr>
<tr>
<td>Polychlorinated Biphenyls (PCBs)</td>
<td>B-63</td>
</tr>
</tbody>
</table>
Material Safety Data Sheet

Product: Toluene, 99.9%, HPLC Grade

Identification

CAS #: 108-88-3

RTECS #: XS525000

Toluene

Irritation Data

Eye: 300 PPM
Skin: 435 MG/ML
Respirator: 670 MG/ML
Eye: 2 MG/24H

Toxicity Data

Oral: 1,000 MG/KG
IV: 2,500 MG/KG
Inh.: 300 PPM

Reviews, Standards, and Regulations

ACGIH TLV-TWA 100 PPM; STEL 150 PPM 85INA8 5,789,86
MSHA Standard: AIRITWA 100 PPM 1375 MG/H (SKIN) DTLWS* 3.29,73
OSHA Standard: AIRITWA 200 PPM CL 300/IPC 300/ICH FERAC 39,2350,74
NIOSH REL TO TOLUENE: AIRITWA 100 PPM 200 PPM/10M MMWR** 3.107,85
EPA GENETOX PROGRAM 1986: NEGATIVE: CELL TRANSFORMATION SA7/SHE IN VITRO
EPA GENETOX PROGRAM 1986: INCONCLUSIVE: E COLI PELA WITHOUT S9
EPA TSCA CHEMICAL INVENTORY: 1986
EPA TSCA: B1AI PRELIMINARY ASSESSMENT INFORMATION, FINAL RULE FERAC 39,2350,74
EPA TSCA SECTION 8(E) STATUS REPORT BEHQ-0680-0345 BEHQ-1080-0368:

EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, DECEMBER 1986
NIOSH ANALYTICAL METHODS: SEE HYDROCARBONS, AROMATIC, 1501;
HYDROCARBONS, BP 36-126 C, 1500
NIOSH ANALYTICAL METHODS: IN BLOOD, SEE 2-BUTANONE, ETHANOL, AND TOLUENE IN BLOOD 1992
NIH CAREGENS PORTATION TEST (TWO YEAR STUDIES), SEPTEMBER 1985
MEETS CRITERIA FOR PROPOSED OSHA MEDICAL RECORDS RULE FERAC 47,30420,82

Health Hazard Data

Acute Effects

May be harmful by inhalation, ingestion, or skin absorption. Vapor or mist is irritating to the eyes, mucous membranes and upper respiratory tract. Causes skin irritation.

Health effect: Sensation, coughing.

Emergency Sensitivity Coughing.

Material: Chemical Co.

Aldrich Chemical Co., Inc.
P.O. Box 355
Milwaukee, Wisconsin 53201 USA
(414) 273-5650

ATTN: SAFETY DIRECTOR
ROY F. WESTON, INC.
CAROLINE MAIDEN
WESTON WAY.
WESTCHESTER, PA 19380

MATERIAL SAFETY DATA SHEET  PAGE 1

PRODUCT #: 27037-7
NAME: TOLUENE, 99.9%, HPLC GRADE
CUST #: 521922

CATE: 08/18/87

1

03/05/01 7067
**MATERIAL SAFETY DATA SHEET**

**CATALOG #** 27037-7  **NAME:** TOLUENE, 99+%, HPLC Grade

**PHYSICAL DATA**

- **Melting Point:** -93 C
- **Boiling Point:** 111 C
- **Specific Gravity:** 0.867
- **Vapor Density:** 3.2
- **Vapor Pressure:** 24.0 mm Hg at 20 C

**FIRE AND EXPLOSION HAZARD DATA**

- **Lower Explosion Level:** 1.08
- **Upper Explosion Level:** 3.08
- **Flash Point:** 40 F

**EXTINGUISHING MEDIA**

Carbon Dioxide, Dry Chemical Powder, Alcohol or Polymer Foam. Water may be effective for cooling, but may not effect extinguishment.

**FIRST AID**

**EXPOSURE CAN CAUSE:**

Lung Irritation, Chest Pain and Edema which may be fatal.

**CHRONIC EFFECTS:**

Damage to the Liver, Blood Effects, Damage to the Kidneys. May cause Nervous System Disturbances.

**FIRST AID IN CASE OF CONTACT:**

Immediately flush eyes or skin with copious amounts of water for at least 15 minutes while removing contaminated clothing and shoes. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

**ADDITIONAL INFORMATION**

Use of alcohol can increase the narcotic effect and the blood effects of toluene.

**UNUSUAL FIRE AND EXPLOSION HAZARDS**

- Vapor may travel considerable distance to source of ignition and container explosion may occur under fire conditions.

**INCOMPATIBILITIES**

Oxidizing agents, Hazardous combustion or decomposition products.

**HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS**

Toxic Fumes of: Carbon Monoxide, Carbon Dioxide.

**SPILL OR LEAK PROCEDURES**

Steps to be taken if material is released or spilled:

- Shut off all sources of ignition.
- Wear self-contained breathing apparatus, rubber boots and heavy rubber gloves.
- Cover leaks with an activated carbon adsorbent, take up and place in closed containers. Transport outdoors.
- Ventilate area and wash spill site after material pickup is complete.

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**Aldrich Chemical Co.**

© P.O. Box 365, Milwaukee, Wisconsin 53201 USA • (414) 273-8880

**Material Safety Data Sheet Page:** 2

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**Additional Information:**

Use of alcohol can increase the narcotic effect and the blood effects of toluene.

**Physical Data**

- Melting Point: -93 C
- Boiling Point: 111 C
- Specific Gravity: 0.867
- Vapor Density: 3.2
- Vapor Pressure: 24.0 mm Hg at 20 C

**Fire and Explosion Hazard Data**

- Lower Explosion Level: 1.08
- Upper Explosion Level: 3.08
- Flash Point: 40 F

**Extinguishing Media**

Carbon Dioxide, Dry Chemical Powder, Alcohol or Polymer Foam. Water may be effective for cooling, but may not effect extinguishment.

**First Aid**

- **Exposure Can Cause:** Lung Irritation, Chest Pain and Edema which may be fatal.
- **Chronic Effects:** Damage to the Liver, Blood Effects, Damage to the Kidneys. May cause Nervous System Disturbances.
- **First Aid in Case of Contact:** Immediately flush eyes or skin with copious amounts of water for at least 15 minutes while removing contaminated clothing and shoes. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
- **Additional Information:** Use of alcohol can increase the narcotic effect and the blood effects of toluene.

**Unusual Fire and Explosion Hazards**

- **Vapor May Travel Considerable Distance to Source of Ignition and Container Explosion May Occur Under Fire Conditions.**

**Incompatibilities**

Oxidizing Agents, Hazardous Combustion or Decomposition Products.

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- Ventilate area and wash spill site after material pickup is complete.
MATERIAL SAFETY DATA SHEET

NAME: TOLUENE, 99.9+% HPLC GRADE

WASTE DISPOSAL METHOD
BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER BUT EXERT EXTRA CARE IN IGNITING AS THIS MATERIAL IS HIGHLY FLAMMABLE.

OBSERVE ALL FEDERAL, STATE & LOCAL LAWS.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

WEAR APPROPRIATE NIOSH/MSHA-APPROVED RESPIRATOR, CHEMICAL-RESISTANT GLOVES, SAFETY GOGGLES, OTHER PROTECTIVE CLOTHING.

MECHANICAL EXHAUST REQUIRED.

DO NOT BREATHE VAPOR.

AVOID CONTACT WITH EYES, SKIN AND CLOTHING.

AVOID PROLONGED OR REPEATED EXPOSURE.

WASH THOROUGHLY AFTER HANDLING.

IRRITANT.

KEEP TIGHTLY CLOSED.

KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME.

STORE UNDER NITROGEN.

STORE IN A COOL DRY PLACE.

ADDITIONAL PRECAUTIONS AND COMMENTS

NOT APPLICABLE

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. ALDRICH SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.
Material Safety Data Sheet

Date: 01/14/80  Cust # 521922  P.O. # 32252  Page:

SECTION I PRODUCT IDENTIFICATION

18545-0  PHENOL, 99+%  CAS # 108-95-2  MOLECULAR FORMULA: C6H6O

SECTION II TOXICITY HAZARDS

RTECS # SJ3325000  PHENOL

ORL-RAT LD50=1384 MG/KG GTPPAF 8.145,72
IHL-RAT LC50=316 MG/M3 GTPSA 41(6),103,76
SKN-RAT LD50=869 MG/KG BIMAG 27,155,70
IPR-RAT LD50=127 MG/KG FCTOD 22,665,84
ORL-MUS LD50=270 MG/KG GTPSA 38(8),6,73
IHL-MUS LC50=177 MG/M3 GTPSA 41(6),103,76
IPR-MUS LD50=180 MG/KG PHMAA 10,172,68
SCU-MUS LD50=344 MG/KG INHEAD 5,143,67
IVN-MUS LD50=112 MG/KG QPPPA 12,212,39
SKN-RBT LD50=850 MG/KG AIHAAP 37,596,76
IPN-MUS LC50=174 MG/M3 GTPZAB 19(6),37,75
TLV-TWA 5 PPM; STEL 10 PPM (SKIN) DTLVS* 4,328,80

USA STANDARD-AIR:TWA 5 PPM (SKIN) (SCP-L) FEREAC 39,23540,74

OCCUPATIONAL EXPOSURE TO PHENOL REC: AIR;TWA 20 MG/M3;CL 60 MG/M3/15M

NCI LARLINGENESIS BIOASSAY COMPLETED; RESULTS NEGATIVE; MOUSE, RAT
(NCITK* NC1-CG-TR-203,80)

"NIOSH MANUAL OF ANALYTICAL METHODS" VOL 6 330 NIMAH*
"NIOSH MANUAL OF ANALYTICAL METHODS" TO BE REVISED BY JUNE, 1985
"NIOSH MANUAL OF ANALYTICAL METHODS, 3RD ED." SEE: METHOD 3502
REPORTED IN EPA TSCA INVENTORY, 1983
EPA GENETIC TOXICITY PROGRAM, JANUARY 1984
MEETS CRITERIA FOR PROPOSED OSHA MEDICAL RECORDS RULE FEREAC 47,30420,82

SECTION III PHYSICAL DATA

MELTING POINT: 39,5 C TO 41,5 C
BOILING POINT: 181 C
DENSITY: 1.071

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 175 F

EXTINGUISHING MEDIA:
WATER SPRAY,
CARBON DIOXIDE, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.
MATERIAL SAFETY DATA SHEET

DATE: 01/14/86 CATALOG # 18545-0 CUST # 521922 P.O. # 32252

SPECIAL FIRE FIGHTING PROCEDURES:
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO
PREVENT CONTACT WITH SKIN AND EYES.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

SECTION V HEALTH HAZARD DATA
MAY BE FATAL IF INHALED, SWALLOWED, OR ABSORBED THROUGH SKIN.
MATERIAL IS EXTREMELY DESTRUCTIVE TO TISSUE OF THE MUCOUS MEMBRANES
AND UPPER RESPIRATORY TRACT, EYES AND SKIN.
INHALATION MAY BE FATAL AS A RESULT OF SPASM, INFLAMMATION AND EDEMA
OF THE LARYNX AND BRONCHI, CHEMICAL PNEUMONITIS AND PULMONARY EDEMA.
SYMPTOMS OF EXPOSURE MAY INCLUDE BURNING SENSATION, COUGHING,
WHEEZING, LARYNGITIS, SHORTNESS OF BREATH, HEADACHE, NAUSEA AND
VOMITING.
CHRONIC EFFECTS:
DAMAGE TO THE LIVER
DAMAGE TO THE KIDNEYS
DERMATITIS
MAY CAUSE NERVOUS SYSTEM DISTURBANCES.
TO THE BEST OF OUR KNOWLEDGE, THE CHEMICAL, PHYSICAL, AND
TOXICOLOGICAL PROPERTIES HAVE NOT BEEN THOROUGHLY INVESTIGATED.
FIRST AID:
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH COPIOUS
AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED
CLOTHING AND SHOES.
IF INHALED, REMOVED TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL
RESPIRATION, PREFERABLY MOUTH-TO-MOUTH. IF BREATHEING IS DIFFICULT,
GIVE OXYGEN.
IN CASE OF EXPOSURE, OBTAIN MEDICAL ATTENTION IMMEDIATELY.
WASH CONTAMINATED CLOTHING BEFORE REUSE.

SECTION VI REACTIVITY DATA
INCOMPATIBILITY:
STRONG OXIDIZING AGENTS
STRONG BASES
STRONG ACIDS
MAY DISCOLOR ON EXPOSURE TO LIGHT.
HAZARDOUS DECOMPOSITION PRODUCTS:
TOXIC FUMES OF:
CARBON MONOXIDE, CARBON DIOXIDE

SECTION VII SPILL OR LEAK PROCEDURES
SPILLS OR LEAKS:
EVACUATE AREA.
WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY
RUBBER GLOVES.
COVER WITH URY LIME OR SODA ASH, PICK UP, KEEP IN A CLOSED CONTAINER
AND HOLD FOR WASTE DISPOSAL.
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.
WASTE DISPOSAL:
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 & local laws concerning health & pollution.

SECTION VIII PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Wear appropriate OSHA/MSHA-approved respirator, chemical-resistant gloves, safety goggles, other protective clothing.
Safety shower and eye bath.
Use only in a chemical fume hood.
Do not breathe vapor.
Do not get in eyes, on skin, on clothing.
Avoid prolonged or repeated exposure.
Wash thoroughly after handling.
Readily absorbed through skin.
Highly toxic.
Vesicant.
Keep tightly closed.
Light-sensitive.
Store in a cool dry place.

SECTION IX SPECIAL PRECAUTIONS AND COMMENTS

Not applicable

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. Aldrich shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
MATERIAL SAFETY DATA SHEET

--------------------- IDENTIFICATION ---------------------

PRODUCT #: 18577-9   NAME: 2-CHLOROPHENOL, 99+% /
CAS #: 95-57-8

--------------------- TOXICITY HAZARDS ---------------------

RTECS #: SK2625000
PHENOL, O-CHLORO-

TOXICITY DATA

ORL-RAT LD50: 670 MG/KG
IPR-RAT LD50: 230 MG/KG
SCU-RAT LD50: 950 MG/KG
ORL-MUS LD50: 365 MG/KG
IPR-MUS LD50: 235 MG/KG
ORL-MAM LD50: 440 MG/KG

REVIEWS, STANDARDS, AND REGULATIONS

EPA TSCA CHEMICAL INVENTORY, 1986
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JUNE 1987
MEETS CRITERIA FOR PROPOSED OSHA MEDICAL RECORDS RULE FERAC 47, 30420, 82

ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION.

--------------------- HEALTH HAZARD DATA ---------------------

ACUTE EFFECTS

HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN.
CAUSES BURNS.
MATERIAL IS EXTREMELY DESTRUCTIVE TO TISSUE OF THE MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT, EYES AND SKIN.
INHALATION MAY BE FATAL AS A RESULT OF SPASM, INFLAMMATION AND EDEMA OF THE LARYNX AND BRONCHI, CHEMICAL PNEUMONITIS AND PULMONARY EDEMA.
SYMPTOMS OF EXPOSURE MAY INCLUDE BURNING SENSATION, COUGHING, WHEEZING, LARYNGITIS, SHORTNESS OF BREATH, HEADACHE, NAUSEA AND VOMITING.

REPEATED EXPOSURE CAN CAUSE:
DAMAGE TO THE LIVER
DAMAGE TO THE KIDNEYS

FIRST AID

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.
ASSURE ADEQUATE FLUSHING OF THE EYES BY SEPARATING THE EYELIDS WITH FINGERS.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
CALL A PHYSICIAN.
WASH CONTAMINATED CLOTHING BEFORE REUSE.
**MATERIAL SAFETY DATA SHEET**

**CATALOG # 18577-9**  
**NAME:** 2-CHLOROPHENOL, 99+%  

**PHYSICAL DATA**

- **MELTING POINT:** 8 °C  
- **BOILING POINT:** 175 °C TO 176 °C  
- **SPECIFIC GRAVITY:** 1.241

**FIRE AND EXPLOSION HAZARD DATA**

- **FLASH POINT:** 147 °F  
- **EXTINGUISHING MEDIA:** CARBON DIOXIDE, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.

**SPECIAL FIRE FIGHTING PROCEDURES**

- WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.

**UNUSUAL FIRE AND EXPLOSION HAZARDS**

- EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

**REACTIVITY DATA**

- **INCOMPATIBILITIES:** ACID CHLORIDES, ACID ANHYDRIDES, OXIDIZING AGENTS.

**HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS**

- TOXIC FUMES OF: CARBON MONOXIDE, CARBON DIOXIDE, HYDROGEN CHLORIDE GAS.

**SPILL OR LEAK PROCEDURES**

- **STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:** WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES. COVER WITH DRY LIME OR SODA ASH, PICK UP, KEEP IN A CLOSED CONTAINER AND HOLD FOR WASTE DISPOSAL. VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

**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 & LOCAL LAWS.

**PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE**

- WEAR APPROPRIATE NIOSH/MSHA-APPROVED RESPIRATOR, CHEMICAL-RESISTANT GLOVES, SAFETY GOGGLES, OTHER PROTECTIVE CLOTHING.
- USE ONLY IN A CHEMICAL FUME HOOD.
- SAFETY SHOWER AND EYE BATH.
- DO NOT BREATHE VAPOR.
- DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING.
- WASH THOROUGHLY AFTER HANDLING.
- CORROSIVE.
- TOXIC.
- HARMFUL LIQUID AND FUMES.
- KEEP TIGHTLY CLOSED.
- KEEP AWAY FROM HEAT AND OPEN FLAME.
- STORE IN A COOL, DRY PLACE.
MATERIAL SAFETY DATA SHEET

CATALOG # 18577-9  NAME: 2-CHLOROPHENOL, 99+%  

ADDITIONAL PRECAUTIONS AND COMMENTS

NOT APPLICABLE

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. ALDRICH SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.
MATERIAL SAFETY DATA SHEET

IDENTIFICATION

PRODUCT #: 10595-3
CAS #: 120-83-2
MF: C6H4Cl2O
SYNONYMS
DCP * 2,4-DCP * U031 * 2,4-DICHLOROPHENOL * NCI-C55345 * RCRA WASTE NUMBER U091 *

TOXICITY HAZARDS

RTECS #: SK85750000
PHENOL, 2,4-DICHLORO-

TOXICITY DATA

ORL-RAT LD50: 580 MG/KG
IPR-RAT LD50: 430 MG/KG
SCU-RAT LD50: 1730 MG/KG
ORL-MUS LD50: 1276 MG/KG
IPR-MUS LD50: 193 MG/KG
ORL-MAM LD50: 404 MG/KG
SKN-MAM LD50: 790 MG/KG

REVIEWS, STANDARDS, AND REGULATIONS

EPA GENETOX PROGRAM 1986, INCONCLUSIVE: HISTIDINE REVERSION-AMES TEST
EPA TSCA CHEMICAL INVENTORY, 1986
EPA TSCA TEST Submission (TSCATS) DATA BASE, MARCH 1988
NTP CARCINOGENICITY STUDIES: TEST COMPLETED (PEER REVIEW), JANUARY 1988
MEETS CRITERIA FOR PROPOSED OSHA MEDICAL RECORDS RULE FERAC 47,30420, 32

TARGET ORGAN DATA

BEHAVIORAL (ALTERED SLEEP TIME)
BEHAVIORAL (ATAXIA)
LUNGS, THORAX OR RESPIRATION (DYSPNÄE)
EFFECTS ON EMBRYO OR FETUS (FETOTOXICITY)
SPECIFIC DEVELOPMENTAL ABNORMALITIES (MUSCULOSKELETAL SYSTEM)
SPECIFIC DEVELOPMENTAL ABNORMALITIES (OTHER DEVELOPMENTAL ABNORMALITIES)

ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS)
DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION

HEALTH HAZARD DATA

ACUTE EFFECTS
HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN.
CAUSES EYE AND SKIN IRRITATION.
MATERIAL IS IRRITATING TO MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT.
Depending on the intensity and duration of exposure, effects may vary from mild irritation to severe destruction of tissue.
PROLONGED CONTACT CAN CAUSE:
DAMAGE TO THE EYES
SEVERE IRRITATION OR BURNS.
FIRST AID
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH ABUNDANT AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED...
MATERIAL SAFETY DATA SHEET PAGE:

CATALOG # 10595-3
NAME: 2,4-DICHLOROPHENOL, 99%

CLOTHING AND SHOES:
Assure adequate flushing of the eyes by separating the eyelids with fingers.
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen. Call a physician. Wash contaminated clothing before reuse.

-----------------PHYSICAL DATA -----------------

MELTING POINT: 42 C TO 43 C
BOILING POINT: 209 C TO 210 C

------- FIRE AND EXPLOSION HAZARD DATA -------

FLASH POINT: 237 F
EXTINGUISHING MEDIA
CARBON DIOXIDE, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.

SPECIAL FIRE FIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.
UNUSUAL FIRE AND EXPLOSION HAZARDS
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

----------------- REACTIVITY DATA -----------------

INCOMPATIBILITIES
ACID CHLORIDES
ACID ANHYDRIDES
OXIDIZING AGENTS

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
TOXIC FUMES OF:
CARBON MONOXIDE, CARBON DIOXIDE
HYDROGEN CHLORIDE GAS

----------------- SPILL OR LEAK PROCEDURES -----------------

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED
WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.
COVER WITH DRY LIME OR SODA ASH, PICK UP, KEEP IN A CLOSED CONTAINER AND HOLD FOR WASTE DISPOSAL.
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

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 & local laws.

--- PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE ---

WEAR APPROPRIATE NIOSH/MSHA-APPROVED RESPIRATOR, CHEMICAL-RESISTANT GLOVES, SAFETY GOGGLES, OTHER PROTECTIVE CLOTHING.
SAFETY SHOWER AND EYE BATH.
MECHANICAL EXHAUST REQUIRED.
DO NOT BREATHE VAPOR.
AVOID CONTACT WITH EYES, SKIN AND CLOTHING.
WASH THOROUGHLY AFTER HANDLING.
IRRITANT.
HARMFUL LIQUID.
KEEP TIGHTLY CLOSED.
STORE IN A COOL DRY PLACE.
MATERIAL SAFETY DATA SHEET

CATALOG # 10595-3
NAME: 2,4-DICHLOROPHENOL, 99%

ADDITIONAL PRECAUTIONS AND COMMENTS

NOT APPLICABLE

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. ALDRICH SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.
MATERIAL SAFETY DATA SHEET

SECTION I  PRODUCT SPECIFICATIONS
Cat No. 3689B  2-6-Dichlorophenol
CAS No. 87-65-0
Supplied by CHEM SERVICE INC. PO BOX 3108, WEST CHESTER, PA 19381 (215)692-3026

SECTION II  TOXICITY DATA
Rat or Mouse LD50 2940mg/kg  RTECS# Sr;S750000
This compound is considered to be slightly toxic.

SECTION III  PHYSICAL DATA
Melting point: 68-69°C  Boiling point: 218-220°C
STENCH: crystalline solid.

SECTION IV  FIRE AND EXPLOSION HAZARD DATA
Flash point: Data not available.
Extinguishing media: Carbon dioxide or dry chemical powder. Do not use water.
No explosion limits are available for this compound.

SECTION V  HEALTH HAZARD DATA
Contact lenses should not be worn in the laboratory.
All chemicals should be considered hazardous - Avoid direct physical contact!
May be fatal if absorbed through the skin! Can be fatal if inhaled!
Can be fatal if swallowed! Can cause skin irritation.
Dr. and/or vapors can cause irritation to respiratory tract.
Repeated exposure to vapors and/or dust can cause eye injury.
Vapors and/or direct eye contact can cause severe eye burns.
Can cause skin burns. Can cause severe skin burns. Ca. cause eye irritation.
Can be harmful if absorbed through the skin. Can be harmful if inhaled.
Can be harmful if swallowed. Can be irritating to mucous membranes.
Prolonged exposure can cause severe skin irritation.

SECTION VI  FIRST AID
An antidote is a substance intended to counteract the effect of a poison. It should be administered only by a physician or trained emergency personnel.
Medical advice can be obtained from a Poison Control Center.
In case of contact: Flush eyes continuously with water for 15-20 minutes. Flush skin with water for 15-20 minutes.
If no burns have occurred-use soap and water to cleanse skin.
If inhaled remove patient to fresh air. Administer oxygen if patient is having difficulty breathing.
If patient has stopped breathing administer artificial respirations.
If patient is in cardiac arrest administer CPR.
Continue life supporting measures until medical assistance has arrived.
Remove and wash contaminated clothing.
If patient is exhibiting signs of shock - Keep warm and quiet.
Contact Poison Control Center immediately if necessary.
Do not administer liquids if induce vomiting to an unconscious or convulsing person.
If patient is vomiting-watch closely to make sure airway does not become obstructed by vomit.
Get medical attention if necessary.

SECTION VII  REACTIVITY DATA
SECTION VIII SPILL OR LEAK PROCEDURES
Spills or leaks: Evacuate area. Wear appropriate OSHA-regulated equipment. Ventilate area. Sweep up and place in an appropriate container. Hold for disposal. Wash contaminated surfaces to remove any residues.

DISPOSAL:
Burn in a chemical incinerator equipped with an afterburner and scrubber.

SECTION IX PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE
This chemical should be handled only in a hood. Eye shields should be worn. Use appropriate OSHA/MSHA approved safety equipment. Avoid contact with skin, eyes and clothing. Keep tightly closed and store in a cool dry place.
Store only with compatible chemicals.

SECTION X SPECIAL PRECAUTIONS AND COMMENTS
The above information is believed to be correct on the date it is published and must not be considered all inclusive. The information has been obtained only by a search of available literature and is only a guide for handling the chemicals. OSHA regulations require that if other hazards become evident, an updated MSDS must be made available to the employee within three months. Responsibility for updates lies with the employer and not with CHEM SERVICE INC.
Persons not specifically and properly trained should not handle this chemical or its container. This MSDS is provided without any warranty expressed or implied including merchantability or fitness for any particular purpose.

This product is furnished FOR LABORATORY USE ONLY: Our products may NOT BE USED as drugs, cosmetics, agricultural or pesticidal products, food additives or as household chemicals.
MATERIAL SAFETY DATA SHEET

TOXICITY HAZARDS

RTECS: SK1200000

PHENOL, 2,3,6-TRICHLOROPHENOL

MATERIAL SAFETY DATA SHEET

PRODUCT #: 15158-0
NAME: 2,3,6-TRICHLOROPHENOL, 99%

CAS #: 93-75-5
MF: C6H3Cl3O

SYNONYMS:
2,3,6-TRICHLOROPHENOL

TOXICITY HAZARDS

RTECS #: SK1200000

PHENOL, 2,3,6-TRICHLOROPHENOL

REVIEW, STANDARDS, AND REGULATIONS

EPA TSCA CHEMICAL INVENTORY, 1986

ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION.

HEALTH HAZARD DATA

ACUTE EFFECTS
HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN.
CAUSES EYE AND SKIN IRRITATION.
MATERIAL IS IRRITATING TO MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT.
DEPENDING ON THE INTENSITY AND DURATION OF EXPOSURE, EFFECTS MAY BE PROLONGED CONTACT CAN CAUSE:
DAMAGE TO THE EYES.
SEVERE IRRITATION OR BURNS.

FIRST AID
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.
ASSURE ADEQUATE FLUSHING OF THE EYES BY SEPARATING THE EYELIDS WITH FINGERS.
IF INHALED: REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT: GIVE OXYGEN.
CALL PHYSICIAN.
WASH CONTAMINATED CLOTHING BEFORE REUSE.

PHYSICAL DATA

MELTING POINT: 35 C TO 37 C

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 174 F
Material Safety Data Sheet

Page: 2

CATALOG #: 15158-0
NAME: 2,3,6-TRICHLOROPHENOL, 99%

Extinguishing Media
CARBON DIOXIDE, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.

Special Fire Fighting Procedures
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.

Combustible
UNUSUAL FIRE AND EXPLOSION HAZARDS
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

Incompatibilities
ACID CLARIES, OXIDIZING AGENTS

Hazardous Combustion or Decomposition Products
TOXIC FUMES OF:
CARBON DIOXIDE, CARBON DIOXIDE HYDROGEN CHLORIDE GAS

Spill or Leak Procedures
WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.
COVER WITH DRY LIME OR SODA ASH, PICK UP, KEEP IN A CLOSED CONTAINER AND HOLD IN DISPOSAL VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

Waste Disposal Method
DISSOLVE OR MIX THE MATERIAL WITH A COMBUSTIBLE SOLVENT AND BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTER BURNER AND SCRUBBER.

Observe All Federal, State & Local Laws.

Precautions to Be Taken in Handling and Storage
WEAR APPROPRIATE NIOSH/MSHA-APPROVED RESPIRATOR, CHEMICAL-RESISTANT GLOVES, SAFETY GOGGLES, OTHER PROTECTIVE CLOTHING, SCUFF-SHOES AND EYE BATHS.
MECHANICAL EXHAUST REQUIRED.
DO NOT BREATHE DUST.
AVOID CONTACT WITH EYES, SKIN AND CLOTHING.
WASH THOROUGHLY AFTER HANDLING.
HARMFUL SOLID.
IRRITANT.
KEEP AWAY FROM HEAT AND OPEN FLAME.
KEEP TIGHTLY CLOSED.
STORE IN A COOL DRY PLACE.

Additional Precautions and Comments

Not Applicable

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. Aldrich shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and Conditions of Sale.

Aldrich Chemical Co.

Telephone: (414) 273-3650
TWX: (810) 262-3062 Aldrich MI
Telex: 26843 Aldrich MI
FAX: (414) 273-4979
MATERIAL SAFETY DATA SHEET

PRODUCT #: T5530-1  NAME: 2,4,6-TRICHLOROPHENYL, 98%
CAS #: 99-06-2

IDENTIFICATION

PTECS #: SN1575CO
PHENOL, 2,4,6-TRICHLOROPHENOL

IRRITATION DATA
SKN-RBT 500 MG/24H MCC
FYE-RBT 50 UG/24H SEV

TOXICITY DATA
ORL-RAT LD50: 820 MG/KG
IPR-RAT LD50: 274 MG/KG
ORL-MAM LD50: 1454 MG/KG
SKN-MAM LD50: 73 MG/KG

REVIEWS, STANDARDS, AND REGULATIONS
CARCINOGENIC REVIEW: ANIMAL INDEFINITE (MEMOT 27, 349, 75)
EPA GENETOX PROGRAM 1986, POSITIVE: CARCINOGENICITY-MOUSE/RAT; S
CERVICALIS-FORWARD MUTATION
EPA GENETOX PROGRAM 1986, NEGATIVE: MOUSE SPOT TEST; HISTIDINE
REVERSAL-AMES TEST
EPA GENETOX PROGRAM 1986, NEGATIVE: MOUSE CERVICALIS GENE CONVERSION; S
CERVICALIS-HOMC7YCLIS
EPA TLCA CHEMICAL INVENTORY, 1996
EPA TLCA TEST SUBMISSION (TSCATS) DATA BASE, DECEMBER 1986
NCI-CG-TR-155, 79
NTP FORTH ANNUAL REPORT ON CARCINOGENS, 1984
MEETS CRITERIA FOR PROPOSED OSHA MEDICAL RECORDS RULE FERENS 47, 302, 82
ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (TECECS)
DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN TECECS FOR COMPLETE INFORMATION.

HEALTH HAZARD DATA

ACUTE EFFECTS
HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN.
CAUSES EYE AND SKIN IRRITATION.
MATERIAL IS IRRITATING TO MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT.
DEPENDING ON THE INTENSITY AND DURATION OF EXPOSURE, EFFECTS MAY VARY FROM MILD IRRITATION TO SEVERE DESTRUCTION OF TISSUE.
PROLONGED CONTACT CAN CAUSE DAMAGE TO THE EYES.

CHRONIC EFFECTS
CARCINOGEN.

FIRST AID
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH copious AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.
ASSURE ADEQUATE FLUSHING OF THE EYES BY SEPARING THE LIDS WITH FINGERS.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION.
IF BREATHING IS DIFFICULT, GIVE OXYGEN.
CALL A PHYSICIAN.
WASH CONTAMINATED CLOTHING BEFORE REUSE.

DATE: 09/27/97
ATTN: SAFETY DIRECTOR
ROY F. WELTON, INC.
CAROLINE MAIDEN
WESTCHESTER WAY
WESTCHESTER, PA 19380

USA
Aldrich Chemical Co., Inc.
P.O. Box 355, Milwaukee, Wisconsin 53201 USA • (414) 273-3850

Belgium
Aldrich-Chemie NV S.A.
6 Rue Cardinal Copsus B-1660 Brussels
Telephone: 02/241000
Telex: 82502 Aldich B

France
Aldrich-Chemie S. A.
77, Route des Trones
F-75000 Strasbourg
Telephone: 02/241000
Telex: 82502 Aldich B

Japan
Aldrich Japan
Kyoano Bldg., Shin-Kana 16-10 Kanda-Murakicho
Chiyoda-ku, Tokyo
Telephone: 03/524-1111

United Kingdom
Aldrich Chemical Co. Ltd.
The Old Brewery, New Road
Grimgam, Dorset SP9 5AL
Telephone: 02420 2211
Telex: 46420 Aldich G

West Germany
Aldrich-Chemie GmbH & Co. KG
D-7801 Ettlingen
Telephone: 072258 82-0
Telex: 714855 Aldich D

03100001 7083
MATERIAL SAFETY DATA SHEET

CATALOG # T5530-1
NAME: 2,4,6-TRICHLORPHENOL, 99%

------------------- PHYSICAL DATA -------------------
MELTING POINT: 64 °C TO 66 °C
BOILING POINT: 246 °C

------------------- FIRE AND EXPLOSION HAZARD DATA -------------------
FLASH POINT: NONE

EXTINGUISHING MEDIA
CARBON DIOXIDE, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.

SPECIAL FIRE FIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.

UNUSUAL FIRE AND EXPLOSION HAZARDS
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

------------------- REACTIVITY DATA -------------------
INCOMPATIBILITIES
ACID CHLORIDES, ACID ANHYDRIDES, OXIDIZING AGENTS

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
TOxic FUMES OF: CARBON MONOXIDE, CARBON DIOXIDE, HYDROGEN CHLORIDE GAS

------------------- SPILL OR LEAK PROCEDURES -------------------

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED
EVACUATE AREA.
WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.
WEAR DISPOSABLE COVERALLS AND DISCARD THEM AFTER USE.
COVER WITH DRY LIME OR SODA ASH, PICK UP, KEEP IN A CLOSED CONTAINER AND HOLD FOR WASTE DISPOSAL.
Sweep up, place in a bag and hold for waste disposal.

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 & LOCAL LAWS.

--- PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE ---
WEAR APPROPRIATE NIOSH/MSHA-APPROVED RESPIRATOR, CHEMICAL-RESISTANT GLOVES, SAFETY GOGGLES, OTHER PROTECTIVE CLOTHING.

SAFETY SHOWER AND EYE FAX.
USE ONLY IN A CHEMICAL FUME HOOD.
DO NOT BREATHE DUST.
DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
AVOID PROLONGED OR REPEATED EXPOSURE.
WASH THOROUGHLY AFTER HANDLING.

TOxic, IMPITANT, CARCINOGEN.
KEEP TIGHTLY CLOSED.
STORE IN A COOL, DRY PLACE.

------------------- ADDITIONAL PRECAUTIONS AND COMMENTS -------------------

NOT APPLICABLE.

02/000001 7084

Aldrich Chemical Co. Inc.
P.O. Box 355, Milwaukee, Wisconsin 53201 USA • (414) 273-3850

MATERIAL SAFETY DATA SHEET PAGE: 1

USA
Aldrich Chemical Co., Inc.
540 West Saint Paul Avenue
Milwaukee, Wisconsin 53233
Telephone 1-800-952-1215
Fax 414-273-2209

Belgium
Aldrich Chimie N.V./S.A.
B-1020 Brussels
Telephone 02/7422750

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Aldrich Chimie S.A.
27 Fosse des Thermes
F-91900 Strasbourg
Telephone 03/88270100
Fax 0800085

Japan
Aldrich Japan
Kojdo. Big. Shimane-ku
10 Kanto-Miyako
Chiyoda-Ku, Tokyo
Telephone 03/256-0156
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United Kingdom
Aldrich Chemical Co. Ltd.
The Old Brewery Yard, New Road
Gillingham, Kent ME7 4RA
Telephone 0724767221
Fax 0724767222

West Germany
Aldrich-Chemie GmbH & Co. KG
D-7824 Steinauer
Telephone 07328-27-0
Fax 07328-27-30

MATERIAL SAFETY DATA SHEET PAGE: 1

007010

02/000001 7084
MATERIAL SAFETY DATA SHEET

CATALOG # T5530-1  NAME: 2,4,6-TRICHLORPHENOL, 28% 

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. ALDRICH SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR USE OF THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.
MATERIAL SAFETY DATA SHEET

IDENTIFICATION

PRODUCT #: 15651-5
NAME: 2,4,5-TRICHLOROPHENOL, 99%
CAS #: 95-95-4
MF: C₆H₃Cl₃O

SYNONYMS
COLOMOSOL * DOWCIDE 2 * DOWCIDE 2 * DOWCIDE 8 * NCI-C61187 * NURELLE * PREVENTOL I * RCRA WASTE NUMBER U230 * 2,4,5-TRICHLOROPHENOL *

TOXICITY HAZARDS

RTECS #: SN1400000
PHENOL, 2,4,5-TRICHLORO-

TOXICITY DATA

ORL-RAT LD₅₀: 820 MG/KG
IPR-RAT LD₅₀: 355 MG/KG
SCU-RAT LD₅₀: 2260 MG/KG
IVL-MUS LD₅₀: 2600 MG/KG
IVL-GPG LD₅₀: 56 MG/KG
UNR-MAM LD₅₀: 150 MG/KG

REVIEWS, STANDARDS, AND REGULATIONS
EPA TSCA CHEMICAL INVENTORY, 1986
MEETS CRITERIA FOR PROPOSED OSHA MEDICAL RECORDS RULE FERAC 47 30420 82
ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION

HEALTH HAZARD DATA

ACUTE EFFECTS
HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN.
CAUSES EYE AND SKIN IRRITATION.
MATERIAL IS IRRITATING TO MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT.
DEPENDING ON THE INTENSITY AND DURATION OF EXPOSURE, EFFECTS MAY VARY FROM MILD IRRITATION TO SEVERE DESTRUCTION OF TISSUE.
PROLONGED CONTACT CAN CAUSE DAMAGE TO THE EYES.

CHRONIC EFFECTS
OVEREXPOSURE MAY CAUSE REPRODUCTIVE DISORDER(S) BASED ON TESTS WITH LABORATORY ANIMALS.

FIRST AID
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.
ASSURE ADEQUATE FLUSHING OF THE EYES BY SEPARATING THE EYELIDS WITH FINGERS.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
CALL A PHYSICIAN.
WASH CONTAMINATED CLOTHING BEFORE REUSE.
MATERIAL SAFETY DATA SHEET

CATALOG # 15651-5
NAME: 2,4',5-TRICHLOROPHENOL, 99%

--------------------PHYSICAL DATA--------------------

MELTING POINT: 67 °C TO 69 °C
BOILING POINT: 248 °C/740MM.

-----------------FIRE AND EXPLOSION HAZARD DATA-----------------

EXTINGUISHING MEDIA
CARBON DIOXIDE, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.

SPECIAL FIRE FIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO
PREVENT CONTACT WITH SKIN AND EYES.

UNUSUAL FIRE AND EXPLOSION HAZARDS
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

------------------REACTIVITY DATA----------------------

INCOMPATIBILITIES
ACID CHLORIDES
ACID ANHYDRIDES
OXIDIZING AGENTS

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
TOXIC FUMES OF:
CARBON MONOXIDE, CARBON DIOXIDE
HYDROGEN CHLORIDE GAS

------------------SPILL OR LEAK PROCEDURES-----------------

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED
Wear self-contained breathing apparatus, rubber boots and heavy
rubber gloves. COVER WITH DRY LIME OR SODA ASH, PICK UP, KEEP IN A CLOSED CONTAINER
AND HOLD FOR WASTE DISPOSAL.
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

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 & LOCAL LAWS.

----- PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE ----- 
WEAR APPROPRIATE NIOSH/MSHA-APPROVED RESPIRATOR, CHEMICAL-RESISTANT
GLOVES, SAFETY GOGGLES, OTHER PROTECTIVE CLOTHING.
SAFETY SHOWER AND EYE BATH.
USE ONLY IN A CHEMICAL FUME HOOD.
DO NOT BREATHE DUST.
AVOID CONTACT WITH EYES, SKIN AND CLOTHING.
AVOID PROLONGED OR REPEATED EXPOSURE.
WASH THOROUGHLY AFTER HANDLING.
IRRITANT.
POSSIBLE TERATOGEN.
HARMFUL SOLID.
KEEP TIGHTLY CLOSED.
STORE IN A COOL DRY PLACE.

--------------ADDITIONAL PRECAUTIONS AND COMMENTS--------------

NOT APPLICABLE
THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. ALDRICH SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.
CERTIFIED SPECIFICATIONS and
MATERIAL SAFETY DATA SHEET

Feb 8 1988
Last revised May 1987

SECTION I PRODUCT SPECIFICATIONS
Cat No. 0-100 2,4-Dichlorophenoxyacetic acid
CAS No. 94-75-7 Other Name: 2,4-D
Supplied by CHEM SERVICE INC PO BOX 3108, WEST CHESTER, PA 19381 (215)692-3026
Lot No. 19-125 Purity 99% Certified by TP
This is to certify that analysis of this sample was made by various chromato-
graphic, spectral and thermal methods. The procedures used are considered to be
STATE OF THE ART. CHEM SERVICE INC guarantees purity of unopened bottle until
the expiration on the bottle.

SECTION II TOXICITY DATA
Rat or Mouse LD50 370mg/kg RTECS# AGS825000
This compound is considered to be toxic
OSHA PEL 10 mg/m3 ACGIH TLV (10 mg/m3)

SECTION III PHYSICAL DATA
Melting point: 136-140°C Boiling point: 335°C
Vapor pressure: 4mm@160°C
Phenol like odor. Colorless crystalline solid.
This compound is very slightly soluble in water

SECTION IV FIRE AND EXPLOSION HAZARD DATA
Flash point: Data not available.
Extinguishing media: Carbon dioxide, dry chemical powder or water spray
N explosion limits are available for this compound

SECTION V HEALTH HAZARD DATA
Contact lenses should not be worn in the laboratory
All chemicals should be considered hazardous - Avoid direct physical contact!
Can be harmful if swallowed. Can be harmful if inhaled
Can be harmful if absorbed through the skin
Can cause irritation to mucous membranes. Can cause cardiovascular system injury
Can cause liver injury.
Possible cholinesterase inhibitor-May cause seizures; nausea; vomiting; airway
obstruction and/or increased mucus secretions in the lungs
Can cause gastro-intestinal disturbances.
Dust and/or vapors can cause irritation to respiratory tract.
Can be irritating to mucous membranes. May be fatal if swallowed.
Suspected Carcinogen-may produce cancer.

SECTION VI FIRST AID
An antidote is a substance intended to counteract the effect of a poison. It
should be administered only by a physician or trained emergency personnel
Medical advice can be obtained from a Poison Control Center
In case of contact: Flush eyes continuously with water for 15-20 minutes. Flush
skin with water for 15-20 minutes
If no burns have occurred-use soap and water to cleanse skin
If inhaled remove patient to fresh air. Administer oxygen if patient is having
difficulty breathing
If patient has stopped breathing administer artificial respirations.
If patient is in cardiac arrest administer CPR.
Continue life supporting measures until medical assistance has arrived
If swallowed DO NOT induce vomiting. Remove and wash contaminated clothing
If patient is exhibiting signs of shock - keep warm and quiet
Get medical attention if necessary
Do not wear shoes or clothing until absolutely free of all chemical odors.
Contact Poison Control Center immediately if necessary.
Do not administer liquids or induce vomiting to an unconscious or convulsing person. If patient is vomiting—watch closely to make sure airway does not become constructed by vomit.

SECTION VII  REACTIVITY DATA
Incompatible with strong oxidizing agents. Sensitive to light. Sensitive to heat. Decomposition liberates toxic fumes.

SECTION VIII  SPILL OR LEAK PROCEDURES
Spills or leaks: Evacuate area. Wear appropriate OSHA-regulated equipment. Ventilate area. Sweep up and place in an appropriate container. Hold for disposal. Wash contaminated surfaces to remove any residues.

DISPOSAL:
Burn in a chemical incinerator equipped with an afterburner and scrubber.

SECTION IX  PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE
This chemical should be handled only in a hood. Eye shields should be worn. Use appropriate OSHA/MSMA approved safety equipment. Avoid contact with skin, eyes and clothing. Keep tightly closed and store in a cool dry place. Store only with compatible chemicals.

SECTION X  SPECIAL PRECAUTIONS AND COMMENTS
The above information is believed to be correct on the date it is published and must not be considered all inclusive. The information has been obtained only by a search of available literature and is only a guide for handling the chemicals. OSHA regulations require that if other hazards become evident, an updated MSDS must be made available to the employee within three months. Responsibility for updates lies with the employer and not with CHEM SERVICE INC. Persons not specifically and properly trained should not handle this chemical or its container. This MSDS is provided without any warranty expressed or implied including merchantability or fitness for any particular purpose.
MATERIAL SAFETY DATA SHEET

IDENTIFICATION

PRODUCT #: 19712-2  NAME: 2,4,5-TRICHLOROPHENOXYACETIC ACID, 98%

CAS #: 93-76-5

MF#: CBHSCLR03

SYNONYMS

ACID 2,4,5-TRICHLOROPHENOXYACETIC (FRENCH) * ACID (2,4,5-TRICHLOROPHENOXY)ACETIC (ITALIAN) * AMINE 2,4,5-T FOR RICE * BUSHKILLER * BRUSH-OFF 445 LOW VOLATILE BRUSH KILLER * BRUSH RAP * BRUSH TOX * DACTAMINE * DEBROUSAILLANT CENTREXON * DEBROUSAILLANT SUPER CENTREXON * DECAMEINE 4T * DED-WEED BRUSH KILLER * DED-WEED LV-6 * DED KILL AND T-5 BRUSH KILLER * DINOXOL * ENVERT-D * ESTERCIDE T-2 AND T-245 * KASAS 2,4,5-TROCHLOROPHENOL SYDOWY (POLISH) * LINE RIDER * NA 2765 (DOT) * PHORTOX * RCRA WASTE NUMBER U070 * REDDON * REDDOX * SPONTOX * SUPER D WEEDONE * 2,4,5-T * 2,4,5-T

TOXICITY HAZARDS

RTECS #: AU8400000

ACETIC ACID, (2,4,5-TRICHLOROPHENOXY)-

ACETIC ACID, (2,4,5-TRICHLOROPHENOXY)-

TOXICITY DATA

JRL-RAT LD50: 300 Mg/KG
SKN-RAT LD50: 1535 Mg/KG
JWR-RAT LD50: 550 Mg/KG
JRL-MUS LD50: 242 Mg/KG
JRL-DOG LD50: 100 Mg/KG
JRL-GP GD LD50: 313 Mg/KG
JRL-HAM LD50: 425 Mg/KG
JRL-SAN LD50: 310 Mg/KG
JRL-AM LD50: 550 Mg/KG

REVIEWS, STANDARDS, AND REGULATIONS

ACGIH TLV-TWA 10 MG/M3 85THAD 5,549,86
IARC CANCER REVIEW: HUMAN LIMITED EVIDENCE IMEHT 41, 357, 86
IARC CANCER REVIEW: ANIMAL INADEQUATE EVIDENCE IMEHT 15, 273, 77
IARC CANCER REVIEW: GROUP 2B INSULD 7, 156, 87
MSHA STANDARD- AIR: TWA 10 MG/M3 DTLVS 3, 242, 71
OSHA STANDARD- AIR: TWA 10 MG/M3 FEARAC 39, 235, 40, 74
EPA GENETOX PROGRAM 1983, POSITIVE: D MELANOGASTER SEX-LINKED LETHAL; S CEREBRISIA-REVERSION
EPA GENETOX PROGRAM 1983, POSITIVE/DOSE RESPONSE: IN VIVO
CYTOGENETICS-NONHUMAN BONE MARROW
EPA GENETOX PROGRAM 1983, NEGATIVE: D MELANOGASTER- WHOLE SEX CHROM.

03:00001.7091
MATERIAL SAFETY DATA SHEET

NAME: 2,4,5-TRICHLOROPHENOXYACETIC ACID, 98%

EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JUNE 1988

NIOSH ANALYTICAL METHODS: SEE 2,4-D AND 2,4,5-T, 5001

MEETS CRITERIA FOR PROPOSED JSHA MEDICAL RECORDS RULE FERAC 47,30420.

TARGET ORGAN DATA

BEHAVIORAL (SOMNOLENCE)

GASTROINTESTINAL (GASTRITIS)

LIVER (FATTY LIVER DEGENERATION)

BLEED (TUMORS)

PATERNAL EFFECTS (PROSTATE, SEMINAL VESICLE, COWPER'S, ACCESSORY GLANDS)

MATERNAL EFFECTS (OTHER EFFECTS ON FEMALE)

EFFECTS ON FERTILITY (POST-IMPLANTATION MORTALITY)

EFFECTS ON FERTILITY (LITTER SIZE)

EFFECTS ON EMBRYO OR FETUS (EXTRA EMBRYONIC STRUCTURES)

EFFECTS ON EMBRYO OR FETUS (FETOTOXICITY)

SPECIFIC DEVELOPMENTAL ABNORMALITIES (CENTRAL NERVOUS SYSTEM)

SPECIFIC DEVELOPMENTAL ABNORMALITIES (EYE, EAR)

SPECIFIC DEVELOPMENTAL ABNORMALITIES (CRANIOFACIAL)

SPECIFIC DEVELOPMENTAL ABNORMALITIES (MUSCULOSKELETAL SYSTEM)

SPECIFIC DEVELOPMENTAL ABNORMALITIES (GASTROINTESTINAL SYSTEM)

SPECIFIC DEVELOPMENTAL ABNORMALITIES (UROGENITAL SYSTEM)

SPECIFIC DEVELOPMENTAL ABNORMALITIES (OTHER DEVELOPMENTAL ABNORMALITIES)

EFFECTS ON NEWBORN (STILLBIRTH)

EFFECTS ON NEWBORN (LIVE BIRTH INDEX)

EFFECTS ON NEWBORN (VIAJILITY INDEX)

EFFECTS ON NEWBORN (WEIGHT AND LACTATION INDEX)

EFFECTS ON NEWBORN (GROWTH STATISTICS)

EFFECTS ON NEWBORN (BEHAVIORAL)

NUTRITIONAL AND GROSS METABOLIC (WEIGHT LOSS OR DECREASED WEIGHT GAIN)

TUMORIGENIC (EQUIVOCAL TUMORIGENIC AGENT BY RTECS CRITERIA)

ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION.

HEALTH HAZARD DATA

ACUTE EFFECTS

HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN.

CAUSES EYE AND SKIN IRRITATION.

MATERIAL IS IRRITATING TO MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT.

EXPOSURE CAN CAUSE:

STOMACH PAINS, VOMITING, DIARRHEA.

CHRONIC EFFECTS

HARM TO THE LIVER

DERMATITIS

OVEREXPOSURE MAY CAUSE REPRODUCTIVE DISORDER(S) BASED ON TESTS WITH LABORATORY ANIMALS.

POSSIBLE CARCINOGEN.

FIRST AID

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH LARGE QUANTITIES OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

CALL A PHYSICIAN.

WASH CONTAMINATED CLOTHING BEFORE REUSE.
MATERIAL SAFETY DATA SHEET

CATALOG #: 19712-2
NAME: 2,4,5-TRICHLOROPHENOXACYCETIC ACID, 98%

MELTING POINT: 154 C TO 158 C

PHYSICAL DATA

FIRE AND EXPLOSION HAZARD DATA

EXTINGUISHING MEDIA
WATER SPRAY.
CARBON DIOXIDE, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.

SPECIAL FIRE FIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING.
PREVENT CONTACT WITH SKIN AND EYES.

UNUSUAL FIRE AND EXPLOSION HAZARDS
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

INCOMPATIBILITIES
STRONG OXIDIZING AGENTS
STRONG Bases
HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
TOXIC FUMES OF:
CARBON MONOXIDE, CARBON DIOXIDE
HYDROGEN CHLORIDE GAS

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED
EVACUATE AREA.
WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.
Sweep up material in a bag and hold for waste disposal.
AVOID INHALING DUST.
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

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 & LOCAL LAWS.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

WEAR APPROPRIATE NIOSH/MSHA-APPROVED RESPIRATOR, CHEMICAL-RESISTANT GLOVES, SAFETY SHOES AND EYE JACKET.
USE ONLY IN A CHEMICAL FUME HOOD.
DO NOT BREATHE DUST.
DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING.
AVOID PROLONGED OR REPEATED EXPOSURE.

STORING: STORE IN A COOL, DRY PLACE.

TOXIC.
IRRITANT.
POSSIBLE CARCINOGEN.
POSSIBLE TERATOGEN.
KEEP TIGHTLY CLOSED.
MATERIAL SAFETY DATA SHEET

CATALOG #: 19712-2
NAME: 2,4,5-TRICHLOROPHENOXYACETIC ACID, 98%

ADDITIONAL PRECAUTIONS AND COMMENTS

NOT APPLICABLE

REGULATORY INFORMATION

THIS PRODUCT IS SUBJECT TO SARA SECTION 313 REPORTING REQUIREMENTS.

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. ALDRICH SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.
MATERIAL SAFETY
DATA SHEET

THESE MSDS COMPLIES WITH 29 CFR 1910.1200 (THE HAZARD COMMUNICATION STANDARD)

PRODUCT NAME: CAUSTIC SODA LIO SOX RAYON GRO
CAS NUMBER: 1310-73-2

ROY F. WESTON, INC.
ATTN: ACCOUNTS PAYABLE
WESTCHESTER
PA 19380

SECTION I - PRODUCT IDENTIFICATION

GENERAL OR GENERIC ID: ALKALI
DOT HAZARD CLASSIFICATION: CORROSIVE MATERIAL (173,240)

SECTION II - COMPONENTS

IF PRESENT, IARC, NTP AND ORMA CARCINOGENS ARE IDENTIFIED IN THIS SECTION
SEE DEFINITION PAGE FOR CLARIFICATION

INGREDIENT

SODIUM HYDROXIDE
CAS #: 1310-73-2
PEL: 2 MG/M3
TLV: 2 MG/M3

SECTION III - PHYSICAL DATA

PROPERTY

REFINEMENT

MEASUREMENT

BOILING POINT FOR PRODUCT
82.00 DEG F
9 760.00 MMHG

VAPOR PRESSURE FOR PRODUCT
3.00 MMHG
100.00 DEG F

SPECIFIC VAPOR DENSITY
UNAVAILABLE

SPECIFIC GRAVITY
1.522
6 48.00 DEG F

PERCENT VOLATILES
80.00

EVAPORATION RATE
SLOWER THAN ETHER

SECTION IV - FIRE AND EXPLOSION INFORMATION

FLASH POINT NOT APPLICABLE
EXPLOSIVE LIMIT NOT APPLICABLE

EXTINGUISHING MEDIA:
HAZARDOUS DECOMPOSITION PRODUCTS: NOT APPLICABLE

FIREFIGHTING PROCEDURES: WEAR SELF-CONTAINED BREATHING APPARATUS WITH A FULL
FACEPIECE OPERATED IN PRESSURE-Demand OR OTHER POSITIVE PRESSURE MODE AND FULL
BODY PROTECTIVE CLOTHING WHEN FIGHTING FIRES.

SPECIAL FIRE & EXPLOSION HAZARDS: CAN REACT WITH CHEMICALLY REACTIVE METALS SUCH AS
ALUMINUM, ZINC, MAGNESIUM, COPPER ETC. TO RELEASE HYDROGEN GAS WHICH CAN FORM
EXPLOSIVE MIXTURES WITH AIR.

SECTION V - HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LEVEL
2 MG/M3

THRESHOLD LIMIT VALUE
2 MG/M3

EFFECTS OF ACUTE OVEREXPOSURE: FOR PRODUCT

EYES - CAUSES SEVERE DAMAGE AND EVEN BLINDNESS VERY RAPIDLY.
SKIN - BURNS, POSSIBLE DEEP ULTERATION.
BREATHING - MAY CAUSE DAMAGE TO NASAL AND RESPIRATORY PASSAGES.
SWALLOWING - RESULTS IN SEVERE DAMAGE TO MUCOUS MEMBRANES AND DEEP TISSUES.

FIRST AID:

IF ON SKIN: IMMEDIATELY FLUSH EXPOSED AREA WITH WATER FOR AT LEAST 15 MINUTES, GET
MEDICAL ATTENTION. REMOVE CONTAMINATED CLOTHING. LAUNDER CONTAMINATED CLOTHING
BEFORE RE-USE.

IF IN EYES: IMMEDIATELY FLUSH WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES,
LIFTING UPPER AND LOWER LIDS OCCASIONALLY. GET IMMEDIATE MEDICAL ATTENTION.

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FINANCIAL ACCOUNTING

03100001 7095
SECTION V-HEALTH HAZARD DATA (CONTINUED)

If physician is not immediately available, continue flushing with water. Do not use chemical antidote.

If swallowed: do not induce vomiting. Vomiting will cause further damage to the throat. Dilute by giving water. Give milk of magnesia. Keep warm, quiet. Get medical attention immediately.

HAZARDOUS POLYMERIZATION: CANNOT OCCUR

STABILITY: STABLE

INCOMPATIBILITY: Avoid contact with reactive metals such as aluminum and magnesium, organic materials, water, strong organic acids, copper, strong mineral acids.

SECTION VI-REACTIVITY DATA

HAZARDOUS POLYMERIZATION: CANNOT OCCUR

STABILITY: STABLE

INCOMPATIBILITY: Avoid contact with reactive metals such as aluminum and magnesium, organic materials, water, strong organic acids, copper, strong mineral acids.

SECTION VII-SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

SMALL SPILL: Neutralize and mop up solution.

LARGE SPILL: Collect and add slowly to large volume of water. Persons not wearing protective equipment should be excluded from area of spill until clean-up is completed. Stop spill at source. Dike to prevent spreading. Pump to salvage tank.

WASTE DISPOSAL METHOD:

SMALL SPILL: Dispose of in accordance with all local, state and federal regulations.

LARGE SPILL: Pour into a large tank of water and neutralize. Flush to drain with large excess of water in accordance with applicable regulations.

RESPIRATORY PROTECTION: If TLV of the product or any component is exceeded, a NIOSH/MSHA jointly approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators under specified conditions. (See your safety equipment supplier). Engineering or administrative controls should be implemented to reduce exposure.

VENTILATION: Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below TLV(s).

PROTECTIVE GLOVES: Wear resistant gloves such as Neoprene, Nitrile rubber, Polyvinyl chloride, Polyethylene

EYE PROTECTION: Chemical splash goggles and face shield (8" min.) in compliance with OSHA regulations are advised. However, OSHA regulations also permit other type safety glasses. (Consult your safety equipment supplier)

OTHER PROTECTIVE EQUIPMENT: To prevent skin contact, wear impervious clothing and boots.

SECTION IX-SPECIAL PRECAUTIONS OR OTHER COMMENTS

Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed.

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances.
DEFINITIONS

SECTION I

PRODUCT IDENTIFICATION

GENERAL OR GENERIC ID.; CHEMICAL FAMILY OR PRODUCT DESCRIPTION.

DOT HAZARD CLASSIFICATION; PRODUCT MEETS DOT CRITERIA FOR HAZARDS LISTED.

SECTION II

COMPONENTS

COMPONENTS ARE LISTED IN THIS SECTION IF THEY PRESENT A PHYSICAL OR HEALTH HAZARD AND ARE PRESENT AT OR ABOVE 1% IN THE MIXTURE. IF A COMPONENT IS IDENTIFIED AS A CARCINOGEN BY NTP, IARC OR OSHA AS OF THE DATE ON THE MSDS, IT WILL BE LISTED AND NOTED IN THIS SECTION WHEN PRESENT AT OR ABOVE 0.1% IN THE PRODUCT. ADDITIONAL INFORMATION SHEET MAY BE FOUND IN SECTION V. OTHER COMPONENTS MAY BE LISTED IF DEEMED APPROPRIATE.

IDENTITIES OF COMPONENTS LISTED GENERALLY ARE DECLARED TRADE SECRET.

EXPOSURE RECOMMENDATIONS ARE FOR COMPONENTS. OSHA PERMISSIBLE EXPOSURE LIMITS (PELs) AND AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH) THRESHOLD LIMIT VALUES (TLVs) APPEAR ON THE LINE WITH THE COMPONENT IDENTIFICATION. OTHER RECOMMENDATIONS APPEAR AS FOOTNOTES.

SECTION III

PHYSICAL DATA

BOILING POINT: OF PRODUCT IF KNOWN, THE LOWEST VALUE OF THE COMPONENTS IS LISTED FOR MIXTURES.

VAPOR PRESSURE: OF PRODUCT IF KNOWN, THE HIGHEST VALUE OF THE COMPONENTS IS LISTED FOR MIXTURES.

SPECIFIC VAPOR DENSITY: COMPARISON TO AIR = 1. IF SPECIFIC VAPOR DENSITY OF PRODUCT IS KNOWN, IT WILL NOT BE LISTED.

SPECIFIC GRAVITY: COMPARISON TO WATER = 1.

PH: IF APPLICABLE.

PERCENT VOLATILES: PERCENTAGE OF MATERIAL WITH INITIAL BOILING POINT BELOW 25 DEGREES FAHRENHEIT.

EVAPORATION RATE: INDICATED AS FASTER OR SLOWER THAN ETHYL ETHER, UNLESS OTHERWISE STATED.

SECTION IV

FLASH POINT: METHOD IDENTIFIED.

EXPLOSION LIMITS: FOR PRODUCT IF KNOWN, THE LOWEST VALUE OF THE COMPONENTS IS LISTED FOR MIXTURES.

HAZARDOUS DECOMPOSITION PRODUCTS: KNOWN OR EXPECTED HAZARDOUS PRODUCTS RESULTING FROM HEATING, BURNING, OR OTHER REACTIONS.

SECTION V

HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LIMIT: FOR PRODUCT.

THRESHOLD LIMIT VALUE: FOR PRODUCT.

EFFECTS OF ACUTE OVEREXPOSURE: POTENTIAL LOCAL AND SYSTEMIC EFFECTS DUE TO SINGLE OR SHORT TERM OVEREXPOSURE TO THE EYES AND SKIN OR THROUGH INHALATION OR INGESTION.

EFFECTS OF CHRONIC OVEREXPOSURE: POTENTIAL LOCAL AND SYSTEMIC EFFECTS DUE TO REPEATED OR LONG TERM OVEREXPOSURE TO THE EYES AND SKIN OR THROUGH INHALATION OR INGESTION.

FIRST AID: PROCEDURES TO BE FOLLOWED WHEN DEALING WITH ACCIDENTAL OVEREXPOSURES.

SECTION VI

REACTIVITY DATA

HAZARDOUS POLYMERIZATION: CONDITIONS TO AVOID TO PREVENT HAZARDOUS POLYMERIZATION RESULTING IN A LARGE RELEASE OF ENERGY.

STABILITY: CONDITIONS TO AVOID TO PREVENT HAZARDOUS OR VIOLENT DECOMPOSITION.

INCOMPATIBILITY: MATERIALS AND CONDITIONS TO AVOID TO PREVENT HAZARDOUS REACTIONS.

SECTION VII

SPILL OR LEAK PROCEDURES

REASONABLE PRECAUTIONS TO BE TAKEN AND METHODS OF CONTAINMENT, CLEAN-UP AND DISPOSAL, CONSULT FEDERAL, STATE AND LOCAL REGULATIONS FOR ACCEPTED PROCEDURES AND ANY REPORTING OR NOTIFICATION REQUIREMENTS.

SECTION VIII

PROTECTIVE EQUIPMENT TO BE USED

PROTECTIVE EQUIPMENT WHICH MAY BE NEEDED WHEN HANDLING THE PRODUCT.

SECTION IX

ADDENDA

SPECIAL PRECAUTIONS OR OTHER COMMENTS COVERS ANY RELEVANT POINTS NOT PREVIOUSLY MENTIONED.

ADDITIONAL COMMENTS

CONTAINERS SHOULD BE EITHER RECONDITIONED BY CERTIFIED FIRMS OR PROPERLY DISPOSED OF BY APPROVED FIRMS. DISPOSAL OF CONTAINERS SHOULD BE IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS.

SPECIAL FIRE AND EXPLOSION HAZARDS: STATES HAZARDS NOT COVERED BY OTHER SECTIONS.

NFPA CODES: HAZARD RATINGS ASSIGNED BY THE NATIONAL FIRE PROTECTION ASSOCIATION.

SECTION XIV (CONT.)

EXTINGUISHING MEDIA: FOLLOWING NATIONAL FIRE PROTECTION ASSOCIATION CRITERIA.

FIREFIGHTING PROCEDURES: MINIMUM EQUIPMENT TO PROTECT FIREFIGHTERS FROM TOXIC PRODUCTS OF VAPORIZATION, COMBUSTION OR DECOMPOSITION IN FIRE SITUATIONS. OTHER FIREFIGHTING HAZARDS MAY ALSO BE INDICATED.

ADDITIONAL INFORMATION SHEET MAY ALSO BE FOUND IN SECTION V.
MATERIAL SAFETY DATA SHEET

SECTION I PRODUCT IDENTIFICATION

13184-9 1,2,3,4-TETRACHLOROBENZENE, 98%
CAS # 634-66-2
MOLECULAR FORMULA: C6H2Cl4

SECTION II TOXICITY HAZARDS

RTECS # DB9440000
BENZENE, 1,2,3,4-TETRACHLORO-
ORL-RAT LD50: 1167 MG/KG JTDH6 11,663,83
"NIOSH MANUAL OF ANALYTICAL METHODS" VOL 7 343 NIMAM*
"NIOSH MANUAL OF ANALYTICAL METHODS" TO BE REVISED BY JUNE, 1985
REPORTED IN EPA TSCA INVENTORY, 1983
EPA TSCA 8(A) PRELIMINARY ASSESSMENT INFORMATION, FINAL RULE FERED
47,26992,1982
MEETS CRITERIA FOR PROPOSED OSHA MEDICAL RECORDS RULE FERED 47,30420,82

SECTION III PHYSICAL DATA

MELTING POINT: 46 C TO 47 C
BOILING POINT: 254 C/761MM.

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: >235 F
EXTINGUISHING MEDIA:
WATER SPRAY.
CARBON DIOXIDE. DRY CHEMICAL POWDER. ALCOHOL OR POLYMER FOAM.
SPECIAL FIRE FIGHTING PROCEDURES:
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.
UNUSUAL FIRE AND EXPLOSION HAZARDS:
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.
MATERIAL SAFETY DATA SHEET

DATE: 03/10/86 CATALOG # 13184-9 CUST # 521922 P.O. # 33489

IN CASE OF CONTACT, IMMEDIATELY WASH SKIN WITH SOAP AND COPIOUS
AMOUNTS OF WATER.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL
RESPIRATION, PREFERABLY MOUTH-TO-MOUTH. IF BREATHING IS DIFFICULT,
GIVE OXYGEN.
CALL A PHYSICIAN.
WASH CONTAMINATED CLOTHING BEFORE REUSE.

SECTION VI REACTIVITY DATA

INCOMPATIBILITY:
STRONG OXIDIZING AGENTS
STRONG BASES
HAZARDOUS DECOMPOSITION PRODUCTS:
TOXIC FUMES OF:
CARBON MONOXIDE, CARBON DIOXIDE
HYDROGEN CHLORIDE GAS

SECTION VII SPILL OR LEAK PROCEDURES

SPILLS OR LEAKS:
WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY
RUBBER GLOVES.
Sweep up. Place in a bag and hold for waste disposal.
Avoid raising dust.
Ventilate area and wash spill site after material pickup is complete.

WASTE DISPOSAL:
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 & local laws.

SECTION VIII PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

CHEMICAL SAFETY GOGGLES.
RUBBER GLOVES
OSHA/MSHA-APPROVED RESPIRATOR.
SAFETY SHOWER AND EYE BATH.
MECHANICAL EXHAUST REQUIRED.
AVOID CONTACT AND INHALATION.
DO NOT GET IN EYES, ON SKIN, OR CLOTHING.
WASH THOROUGHLY AFTER HANDLING.
IRRITANT.
KEEP TIGHTLY CLOSED.
STORE IN A COOL DRY PLACE.

SECTION IX SPECIAL PRECAUTIONS AND COMMENTS

NOT APPLICABLE

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT
TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. ALDRICH SHALL
NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM
CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING
SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.

U.S.A.
940 West St. Paul Ave
Milwaukee, WI 53233
414-273-3850

FRANCE
Aldrich Chemical Co.
27, Fosse des Troyes
F-67,000 Strasbourg
France

JAPAN
Aldrich Japan
2-1-2 Kanda-Mishibacho
Chiyoda-Ku, Tokyo

BELGIUM
Aldrich Chemie S.A./N.V.
1010 Brussels
Belgium

CANADA
Aldrich Chemical Co.
1411 Fort St. #1403
Montreal, Quebec H3M 2N7
Canada

UNITED KINGDOM
Aldrich Chemical Co., Ltd.
The Old Brickyard, New Road
Gillingham, Dorset SP8 4JL

WEST GERMANY
Aldrich-Chemie GmbH & Co. KG
D-7622 Steinheim

MATERIAL SAFETY DATA SHEET

PRODUCT #: 15348-6
NAME: 1,2,3,5-TETRACHLOROBENZENE, 99%
CAS #: 634-90-2

------------------ IDENTITY ------------------

RTECS #: DB9445000
BENZENE, 1,2,3,5-TETRACHLOR-
REVIEW, STANDARDS, AND REGULATIONS
"NIOSH MANUAL OF ANALYTICAL METHODS" VOL 7 343 NIMAM*
"NIOSH MANUAL OF ANALYTICAL METHODS" TO BE REVISED BY JUNE 1985
MEETS CRITERIA FOR PROPOSED OSHA MEDICAL RECORDS RULE FEREC 47,30,20, 82

------------------ TOXICITY HAZARDS ------------------

ACUTE EFFECTS
MAY BE HARMFUL BY INHALATION, INGESTION, OR SKIN ABSORPTION.
CAUSES EYE AND SKIN IRRITATION.
MATERIAL IS IRRITATING TO MJCOUS MEMBRANES AND UPPER
RESPIRATORY TRACT.
TO THE BEST OF OUR KNOWLEDGE, THE CHEMICAL, PHYSICAL, AND
TOXICOLOGICAL PROPERTIES HAVE NOT BEEN THOROUGHLY INVESTIGATED.
FIRST AID
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH COPIOUS AMOUNTS OF
WATER FOR AT LEAST 15 MINUTES.
IN CASE OF CONTACT, IMMEDIATELY WASH SKIN WITH SOAP AND COPIOUS
AMOUNTS OF WATER.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL
RESPIRATION, PREFERABLY MOUTH-TO-MOUTH. IF BREATHING IS DIFFICULT,
GIVE OXYGEN.
CALL A PHYSICIAN.
WASH CONTAMINATED CLOTHING BEFORE REUSE.

------------------ PHYSICAL DATA ------------------

MELTING POINT: 50 C TO 52.5 C
BOILING POINT: 246 C

------------------ FIRE AND EXPLOSION HAZARD DATA ------------------

FLASH POINT: >230 F
EXTINGUISHING MEDIA
WATER SPRAY.
CARBON DIOXIDE, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.
SPECIAL FIRE FIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO
PREVENT CONTACT WITH SKIN AND EYES.
UNUSUAL FIRE AND EXPLOSION HAZARDS
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

------------------ REACTIVITY DATA ------------------

03400001 7100
**Material Safety Data Sheet**

**Name:** 1,2,3,5-Tetrachlorobenzene, 99%

**Incompatibilities**
- Strong oxidizing agents
- Strong bases
- Hazardous combustion or decomposition products
  - Toxic fumes of:
    - Carbon monoxide
    - Carbon dioxide
    - Hydrogen chloride gas

**Spill or Leak Procedures**

**Steps to be Taken If Material is Released or Spilled**
- Wear self-contained breathing apparatus, rubber boots and heavy rubber gloves.
- Sweep up, place in a bag and hold for waste disposal.
- Avoid raising dust.
- Ventilate area and wash spill site after material pickup is complete.
- Waste disposal method: dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Precautions to be Taken in Handling and Storage**
- Chemical safety goggles.
- Rubber gloves.
- OSHA/MSHA-approved respirator.
- Safety shower and eye bath.
- Mechanical exhaust required.
- Avoid contact and inhalation.
- Do not get in eyes, on skin, on clothing.
- Wash thoroughly after handling.
- Irritant.
- Keep tightly closed.
- Store in a cool dry place.

**Additional Precautions and Comments**

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. Aldrich shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
SUBSTANCE IDENTIFICATION

SUBSTANCE: DIOXIN

TRADE NAMES/SYNONYMS:
- 2,3,7,8-TETRACHLORO-DIBENZO-P-DIOXIN
- 2,3,7,8-TCDD
- TCDD
- DIOXIN (HERBICIDE CONTAMINANT)
- TETRARADIOXIN
- 2,3,7,8-TETRACHLORORIBENZO(B,E)(1,4)-DIOXAN
- 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN
- 2,3,7,8-TETRACHLORODIBENZO-1,4-DIOXIN

CHEMICAL FAMILY:
HYDROCARBON, POLYNUCLEAR

HALOGEN

MOLECULAR FORMULA: C12-H4-CL4-02

MOLECULAR WEIGHT: 321.96

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=0 PERSISTENCE=3

NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: DIOXIN

PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:
DIOXIN:
NONE ESTABLISHED

PHYSICAL DATA

DESCRIPTION: NEEDLES

BOILING POINT: >1292°F (>700°C) DECOM

MELTING POINT: 563 °F (295 °C)

VAPOR PRESSURE: 0.0000017 MMHG @ 25°C

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLECTIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.
FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR FOAM
(1984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR ALCOHOL FOAM
(1984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. DO NOT SCATTER SPILLED MATERIAL
WITH MORE WATER THAN NEEDED FOR FIRE CONTROL. DIKE FIRE CONTROL WATER FOR
LATER DISPOSAL (1984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3, GUIDE PAGE 31).

USE AGENTS SUITABLE FOR TYPE OF SURROUNDING FIRE. AVOID BREATHING HAZARDOUS
VAPORS, KEEP UPWIND.

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TOXICITY

2 MG EYE-RABBIT MODERATE IRRITATION; 22500 NG/KG ORAL-RAT LD50; 60 UG/KG
INTRAPERITONEAL-RAT LD50; 114 UG/KG ORAL-MOUSE LD50; 80 UG/KG SKIN-MOUSE LDLO;
200 UG/KG UNREPORTED-MOUSE LDLO; 3 MG/KG ORAL-DOG LDLO; 70 UG/KG ORAL-MONKEY
LDLO; 10 UG/KG ORAL-RABBIT LDLO; 275 UG/KG SKIN-RABBIT LD50; 500 NG/KG ORAL-
GUINEA PIG LD50; 5051 UG/KG ORAL-HAMSTER LD50; 25 UG/KG ORAL-CHICKEN LDLO;
MUTAGENIC DATA (RTEC); REPRODUCTIVE EFFECTS DATA (RTEC); TUMORIGENIC DATA
(RTEC); INDEFINITIE ANIMAL CARCINOGEN (IARC); INDEFINITIE HUMAN CARCINOGEN
(IARC).

DIOXIN IS AN IRRITANT TO EYE, SKIN, AND MUCOUS MEMBRANES AND IS HIGHLY
TOXIC. POISONING MAY AFFECT THE NERVOUS SYSTEM, SKIN AND LIVER. SKIN LESIONS
AND PERSONALITY CHANGES MAY PERSIST FOR YEARS. THE MECHANISM OF TOXICITY HAS
NOT BEEN DETERMINED.

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HEALTH EFFECTS AND FIRST AID

INHALATION:
DIOXIN:

ACUTE EXPOSURE - SYMPTOMS MAY INCLUDE A BURNING SENSATION IN THE EYES, NOSE,
AND THROAT FOLLOWED BY HEADACHE, DIZZINESS, NAUSEA AND VOMITING. ONE
TO SEVERAL DAYS LATER, ITCHING, REDNESS, AND SWELLING OF THE FACE THAT IS
MORE MARKED OVER THE EYELIDS, NOSE, AND LIPS MAY DEVELOP. WITHIN DAYS,
NODULES AS WELL AS PUSTULES, MAY APPEAR ON THE FACE, FOREARMS, SHOULDER,
NECK AND TRUNK, AND PROGRESS TO COMEDONES AND CYSTS. ACNEFORM ERUPTIONS
APPEAR AFTER A MONTH OR MORE, AND THE SKIN BECOMES HYPERKERATIZED. AT THE
SAME TIME, ACHING MUSCLES MAINLY IN THE THIGHS AND CHEST ARE EVIDENT.
THE MUSCLE PAIN IS AGGRAVATED BY EXERTION. INSOMNIA, EXTREME IRRITABILITY
AND LOSS OF LIBIDO MAY ALSO OCCUR. THERE MAY ALSO BE NEUROMUSCULAR SYMPTOMS
OF WEAKNESS AND PAIN WITH NERVE CONDUCTION ABNORMALITIES. POAPHYRIA
CUTANEA TARDA, HEPATIC DYSFUNCTION, HYPERLIPIDEMIA, HIRSUTISM, CHRONIC
EYE IRITATION, EMOTIONAL DISORDERS, AND NEUROSCHYTIC SYMPTOMS HAVE
BEEN OBSERVED. PERSONALITY CHANGES MAY PERSIST FOR YEARS. AN INDUSTRIAL
ACCIDENT WHICH OCCURRED IN GERMANY AFFECTED 53 WORKERS. ALL 53 SUFFERED
CHLORACNE, 42 IN SEVERE FORM, AND 21 OF THE 42 SUFFERED CONSEQUENT DAMAGE
TO INTERNAL ORGANS OR DISTURBANCES OF THE NERVOUS SYSTEM. THE MOST
RELEVANT FEATURES WERE POLYNEUROPATHIES, SENSORY IMPAIRMENTS AND LIVER
DAMAGE. IN A FOLLOW UP STUDY OF THESE WORKERS, 2 WORKERS, OF THOSE STILL
LIVING HAD ACNE OF THE FACE AND SCROTUM, AND 1 HAD PERMANENT LOSS OF
HEARING: THE REMAINING WORKERS WERE WELL EXCEPT FOR THE SCARS LEFT BY CHLORACNE. IN THE FOLLOW UP STUDY, 15 PEOPLE HAD DIED; 7 FROM CARDIOVASCULAR DISEASES, 4 FROM CANCER, 2 FROM SUICIDE, 1 FROM NECROTIC PANCREATITIS AND 1 FROM ESOPHAGEAL HEMORRHAGE. THE ACNEFORM ERUPTIONS WHICH OCCURS IS CALLED CHLORACNE AND IS THE MOST COMMON FEATURE OR POISONING. IT IS CHARACTERIZED BY FOLLICULAR HYPERKERATOSIS WITH OR WITHOUT CYSTS AND PUSTULES. IN CHLORACNE, ALMOST EVERY FOLLICLE MAY BE INVOLVED, WITH THE RESULT THAT THERE IS NOT EVEN PARTIALLY NORMAL SKIN IN AN INVOLVED AREA. IT USUALLY OCCURS ON THE FACE AND NECK, BUT IT MAY EXTEND TO THE BACK, CHEST, AND EXTREMITIES, BUT USUALLY NOT TO THE HANDS AND FEET. THE GENITALIA MAY BE INVOLVED IN MALES. ERYTHEMA AND EDEMA AND SOMETIMES PHOTOSENSITIVITY, MAY OCCUR BEFORE THE FOLLICULAR HYPERKERATITIS IS EVIDENT. SPOTTY PIGMENTATION, HYPERTRICHOSIS, AND/OR PORPHYRIA MAY ACCOMPANY CHLORACNE. CHLORACNE IS REVERSIBLE BUT ONLY VERY SLOWLY. THE LESION MAY PERSIST FOR YEARS AFTER EXPOSURE IS STOPPED AND HEALING MAY BE COMPLICATED BY SCARRING. THE LATENT PERIOD BETWEEN EXPOSURE AND THE APPEARANCE OF CLEAR SIGNS OF CHLORACNE RANGES FROM A FEW WEEKS TO SEVERAL MONTHS.

CHRONIC EXPOSURE: TWO CHEMISTS IN SEPARATE LABORATORIES SYNTHESIZED 2,3,7,8-TCDD, WHICH CAUSED THE MEN TO BE EXPOSED SEVERAL TIMES DURING THE COURSE OF A WEEK. ALTHOUGH APPROPRIATE PRECAUTIONS WERE TAKEN, THE PRECAUTIONS PROVED INADEQUATE. TYPICAL CHLORACNE BEGAN IN ONE MAN ABOUT 8 WEEKS AFTER THE SYNTHESIS. THE RASH GRADUALLY SUBSIDED 14 TO 20 MONTHS AFTER ITS APPEARANCE. EXCESSIVE OILINESS OF THE SKIN BEGAN 5 TO 6 WEEKS AFTER THE SECOND MAN'S FIRST EXPOSURE SO THAT IT LOOKED AS IF HIS NOSE, CHEEKS, AND NECK HAD BEEN SMEARED WITH MELTED BUTTER; TYPICAL CHLORACNE BEGAN ABOUT 8 WEEKS AFTER THE FIRST EXPOSURE. FOR ABOUT 6 MONTHS BEGINNING 2 YEARS AFTER THE ORIGINAL EPISODE, THIS MAN EXPERIENCED COLICKY ABDOMINAL PAINS, EXCESSIVE FLATULENCE, LOSS OF ABOUT 6.5 KG OF BODY WEIGHT, OPPRESSIVE HEADACHES, EXCESSIVE FATIGUE, AN UNUSUAL LOSS OF VIGOR, AND UNCHARACTERISTIC IRRITABILITY. CONCURRENT WITH THESE SYMPTOMS HE STARTED TO DEVELOP LONGER AND DARKER HAIR ON THE SHOULDERS, UPPER PARTS OF THE BACK AND CHEST, EYEBROWS, AND THE AREA BETWEEN THE EYEBROWS. THESE HAIR CHANGES LATER REGRESSED. SIMILAR SYMPTOMS HAVE BEEN REPORTED AMONG FACTORY WORKERS WHOSE EXPOSURE WAS PROLONGED. IN A FACTORY WHICH MANUFACTURES 2,4,5-T, WORKERS WERE EXPOSED TO THE CONTAMINANT TCDD WHEN THERE WAS A CHANGE IN THE INDUSTRIAL PROCESS. SYMPTOMS INCLUDED CHLORACNE, MUSCULAR WEAKNESS, LOSS OF APPETITE AND WEIGHT, SLEEP DISTURBANCES, ORTHOSTATIC HYPOTENSION, ABDOMINAL PAIN AND LIVER IMPAIRMENT AND MOST SUFFERED PSYCHOPATHOLOGICAL CHANGES.

FIRST AID—REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. GET MEDICAL ATTENTION IMMEDIATELY.

IN CONTACT:
OXIN:
ACUTE EXPOSURE—MAY CAUSE IRRITATION WITH ITCHING, REDNESS, AND SWELLING. CHLORACNE, A SKIN CONDITION, MAY OCCUR AS A LOCAL EFFECT DUE TO DIRECT SKIN CONTACT OR AS A SYSTEMIC EFFECT DUE TO SKIN ABSORPTION. IF SKIN ABSORPTION OCCURS SYMPTOMS OF POISONING MAY INCLUDE HEADACHE, DIZZINESS, HEAT, SEAT AND MUSCULAR WEAKNESS. 272 UG/KG APPLIED TO THE SKIN OF RABBITS LED TO THE DEATH OF HALF THAT WERE TESTED. CHLORACNE IS AN ERUPTION OF BLACKHEADS, USUALLY ACCOMPANIED BY SMALL, PALE-YELLOW CYSTS WHICH IN ALL BUT THE WORST CASES VARY FROM PIN-HEAD TO LENTIL SIZE. IN SEVERE CASES
THERE MAY BE PAPULES OR EVEN PUSTULES. THE DISEASE HAS A PREDILECTION FOR THE SKIN OF THE FACE, ESPECIALLY ON THE MALAR CRESCENT UNDER THE EYES AND BEHIND THE EARS IN THE VERY MILD CASES. WITH INCREASING SEVERITY THE REST OF THE FACE AND NECK SOON FOLLOW, WHILE THE OUTER UPPER ARMS, CHEST, BACK ABDOMEN, OUTER THIGHS AND GENITALIA MAY BE INVOLVED IN VARYING DEGREES IN THE WORST CASES. THE DISEASE IS OTHERWISE SYMPTOMLESS AND IS SIMPLY A DISFIGUREMENT. ITS DURATION DEPENDS TO A GREAT EXTENT UPON ITS SEVERITY AND THE WORST CASES MAY STILL HAVE ACTIVE LESIONS 15 OR MORE YEARS AFTER EXPOSURE.

CHRONIC EXPOSURE- MAY CAUSE DERMATITIS. ONE SCIENTIST WHO APPLIED 0.01% SOLUTION OF TCDD TO A CIRCUMSCRIBED AREA OF SKIN OF HIS FOREARM TWO TIMES SUFFERED A SLIGHT DERMATITIS AND SOME DAYS LATER FOLLICULAR HYPERKERATOSIS AND COMEDONES. THE SKIN WAS EXCISED AND FOUND TO SHOW TYPICAL HISTOLOGICAL LESIONS. NO DATA ON SYSTEMIC EFFECTS WERE AVAILABLE.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
DIOXIN:
IRRITANT.
ACUTE EXPOSURE- MAY CAUSE IRRITATION. 2 MG APPLIED TO THE EYE OF A RABBIT CAUSED MODERATE IRRITATION.
CHRONIC EXPOSURE- MAY CAUSE CONJUNCTIVITIS AFTER REPEATED OR PROLONGED EXPOSURE.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
DIOXIN:
HIGHLY TOXIC.
CHRONIC EXPOSURE- NO DATA AVAILABLE ON HUMANS. ONE MONKEY THAT RECEIVED A DIETARY LEVEL OF 0.02 PPM PER DAY BECAME LETHARGIC AFTER 3 DAYS AND DIED ON THE 12TH DAY WITH A 30% WEIGHT LOSS. PROLONGED INGESTION BY PREGNANT
MICE AND RATS CAUSED AN INCREASE IN THE FREQUENCIES OF CLEFT PALATES, EYE ABNORMALITIES, REDUCTION OF FETAL WEIGHT, GASTROINTESTINAL HEMORRHAGES AND AN INCREASE IN PRENATAL MORTALITY.

FIRST AID—REMOVE BY EMESIS WITH SYRUP OF IPECAC. AFTER EMESIS, PERFORM GASTRIC LAVAGE WITH ACTIVATED CHARCOAL AND FOLLOW WITH A SALINE CATHARTIC. (DREISBACH - HANDBOOK OF POISONING, 11TH ED.) TREATMENT SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:
NONE KNOWN.

DECOMPOSITION:
THERMAL DECOMPOSITION MAY RELEASE CORROSIVE FUMES OF HYDROGEN CHLORIDE AND TOXIC OXIDES OF CARBON.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

CONDITIONS TO AVOID:

MAY BURN BUT DOES NOT IGNITE READILY.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:
STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CLEAN, DRY CONTAINERS FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION:
PROCESS ENCLOSURE RECOMMENDED.

RESPIRATOR:
The specific respirator selected must be based on the contamination levels found in the work place, must not exceed the working limits of the respirator and be jointly approved by the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration.
The following respirators are recommended based on the data found in the physical data, health effects and toxicity sections. They are ranked in order from minimum to maximum respiratory protection:
TYPE 'C' SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE OR WITH A FULL FACEPIECE, HELMET OR HOOD OPERATED IN CONTINUOUS-FLOW MODE.

SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-Demand OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHALL PROVIDE AN EYE-WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

AUTHORIZED - OCCUPATIONAL HEALTH SERVICES, INC.
CREATION DATE: 05/12/86 REVISION DATE: 06/17/86
**BUTANOL-ISOKX**

**FISHER SCIENTIFIC**

**CHEMICAL DIVISION**

1 REAGENT LANE

FAIR LAWN NJ 07410

(201) 796-7100

**DATE:** 05/29/87

**PO NBR:** 41650

**ACCT:** 878660-05

**INDEX:** 06871460220

**CAT No:** A3971

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**SUBSTANCE IDENTIFICATION**

SUBSTANCE: **BUTANOL-ISOKX**

CAS-NUMBER 78-83-1

TRADENAMES/SYNONYMS:
- Isobutanol; fermentation butyl alcohol; isopropylcarbinol;
- 2-methylpropyl alcohol; 1-hydroxymethylpropane; 2-methanol propanol;
- 2-methyl-1-propanol; 2-methylpropan-1-ol; isobutyl alco-hol; A-379; A-424;
- A-397; ACC11640

CHEMICAL FAMILY:
- Hydroxyl, aliphatic

MOLECULAR FORMULA: C4-H10-O

MOL WT 74.12

CERCLA RATINGS (SCALE 0-3): HEALTH=1 FIRE=3 REACTIVITY=0 PERSISTENCE=0

NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: BUTANOL-ISOK

PERCENT: 100

OTHER CONTAMINANTS: NONE

- EXPOSURE LIMITS:
  - 100 PPM (300 MG/M3) OSHA TWA;
  - 50 PPM (150 MG/M3) ACGIH TWA;
  - 75 PPM (225 MG/M3) ACGIH STEL (NOTICE OF INTENDED CHANGE 1985-1986)

PHYSICAL DATA

- DESCRIPTION: Colorless liquid with a mild, sweet, non-residual odor
- BOILING POINT: 226 F (108 C)
- MELTING POINT: -162 F (-108 C)
SPECIFIC GRAVITY: 0.8  VAPOR PRESSURE: 8 MMHG @ 20 C

EVAPORATION RATE: (BUTACETONE=1) 0.8  SOLUBILITY IN WATER: SOLUBLE

ODOR THRESHOLD: 2. PPM  VAPOR DENSITY: 2.6

SOLVENT SOLUBILITY: ALCOHOL, ETHER, ACETONE

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FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
SEVERE FIRE HAZARD WHEN EXPOSED TO HEAT, FLAME OR OXIDIZERS. VAPORS ARE
HEAVIER THAN AIR AND MAY TRAVEL A GREAT DISTANCE TO A SOURCE OF IGNITION AND
FLASH BACK. MODERATE EXPLOSION HAZARD WHEN EXPOSED TO HEAT, FLAME OR OXIDANTS.

FLASH POINT: 82 F (28 C)  UPPER EXPLOSIVE LIMIT: 10.6% @ 202 F
LOWER EXPLOSIVE LIMIT: 1.7% @ 123 F  AUTOIGNITION TEMP.: 780 F (415 C)

FLAMMABILITY CLASS(OSHA): IB

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR ALCOHOL FOAM
(1984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).

FOR LARGE FIRES, USE DRY CHEMICAL, ALCOHOL FOAM, OR CARBON DIOXIDE
(1984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. COOL FIRE-EXPOSED CONTAINERS WITH
WATER FROM SIDE UNTIL WELL AFTER FIRE IS OUT. FOR MASSIVE FIRE IN STORAGE
AREA, USE UMMANNED HOSE HOLDER OR MONITOR NOZZLES, ELSE WITHDRAW FROM AREA
AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN CASE OF RISING SOUND FROM VENTING
SAFETY DEVICE OR ANY DISCOLORATION OF STORAGE TANK DUE TO FIRE (1984 EMERGENCY
RESPONSE GUIDEBOOK, DOT P 5800.3, GUIDE PAGE 26).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED; USE FLOODING AMOUNTS OF WATER AS A
FOG. SOLID STREAMS MAY BE INEFFECTIVE. COOL CONTAINERS WITH FLOODING
AMOUNTS OF WATER. APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATTHING
VAPORS, KEEP UPWIND (BUREAU OF EXPLOSIVES, EMERGENCY HANDLING OF HAZARDOUS
MATERIALS IN SURFACE TRANSPORTATION, 1981).

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TOXICITY

500 MG/24 HOURS SKIN-RABBIT MODERATE IRRITATION; 2 MG OPEN EYE-RABBIT SEVERE
IRRITATION; 2660 MG/KG ORAL-RAT LD50; 4240 MG/KG SKIN-RABBIT LD50; 8000 PPM/4
HOURS INHALATION-RAT LC50; 3750 MG/KG ORAL-RABBIT LD50; MUTAGENIC DATA (RTEC);
TUMORIGENIC DATA (RTEC); CARCINOGEN STATUS: NONE.

ISOBUTYL ALCOHOL IS AN EYE, SKIN, MUCOUS MEMBRANE AND RESPIRATORY TRACT
IRRITANT AND CENTRAL NERVOUS SYSTEM DEPRESSANT. USE OF ALCOHOLIC BEVERAGES
ENHANCES THE NARCOTIC EFFECT. PERSONS WITH A HISTORY OF RESPIRATORY OR SKIN
DISEASE MAY BE AT INCREASED RISK FROM EXPOSURE.
HEALTH EFFECTS AND FIRST AID

INHALATION:
IRRITANT/NARCOTIC. 8,000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.
ACUTE EXPOSURE- IRRITATION OF NOSE AND THROAT, COUGHING, HEADACHE, DROWSINESS, NARCOSIS, AND UNCONSCIOUSNESS MAY OCCUR. KIDNEY AND LIVER DAMAGE ARE POSSIBLE.

CHRONIC EXPOSURE- NOT REPORTED IN HUMANS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND AT REST. GET MEDICAL ATTENTION. OXYGEN MUST BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL. (DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

SKIN CONTACT:
IRRITANT/NARCOTIC.
ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE ERYTHEMA AND HYPEREMIA. ABSORPTION MAY CAUSE NARCOSIS.

CHRONIC EXPOSURE- PROLONGED OR REPEATED EXPOSURE MAY CAUSE DEFATTING OF THE SKIN AND ECZEMATOID DERMATITIS.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREAS WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION.

EYE CONTACT:
IRRITANT.
ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE MODERATE, BUT PROBABLY REVERSIBLE, CORNEAL INJURY. AT CONCENTRATIONS OF 100 PPM NO EVIDENCE OF EYE IRRITATION WAS NOTED IN HUMANS, BUT CONTACT WITH CONCENTRATED VAPORS MAY CAUSE INFLAMMATION AND KERATITIS.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE CONJUCTIVITIS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION.

INGESTION:
IRRITANT/NARCOTIC.
ACUTE EXPOSURE- MAY CAUSE ABDOMINAL PAIN, NAUSEA, VOMITING, DIZZINESS, HEADACHE, HYPOTENSION, AND OTHER SYMPTOMS OF CENTRAL NERVOUS SYSTEM DEPRESSION AS WITH ACUTE INHALATION.

FIRST AID- IF VICTIM IS CONSCIOUS, IMMEDIATELY GIVE 2 TO 4 GLASSES OF WATER, AND INDUCE VOMITING BY TOUCHING FINGER TO BACK OF THROAT. GET MEDICAL ATTENTION IMMEDIATELY.

REACTIVITY
**BUTANOL-ISOX**

**PAGE 04 OF 05**

**REACTIVITY:**
Stable under normal temperatures and pressures.

Reacts with strong oxidants or alkali metals to form highly flammable hydrogen gas.

**INCOMPATIBILITIES:**
Strong oxidants: Reacts when mixed to form highly flammable hydrogen gas.
Alkali metals: Reacts when mixed to form highly flammable hydrogen gas.
Plastics: Attacked

**DECOMPOSITION:**
Thermal-oxidative decomposition produces carbon monoxide.

**POLYMERIZATION:**
None known.

**CONDITIONS TO AVOID**
May be ignited by heat, sparks or flames. Container may explode in heat of fire. Vapor explosion hazard indoors, outdoors or in sewers. Run-off to sewer may create fire or explosion hazard.

**SPILL AND LEAK PROCEDURES**

Occasional spill:
Shut off ignition sources. Stop leak if you can do it without risk. Use water spray to reduce vapors. For small spills, take up with sand or other absorbent material and place into containers for later disposal. For larger spills, dike far ahead of spill for later disposal. No smoking, flames or flares in hazard area! Keep unnecessary people away; isolate hazard area and deny entry.

**PROTECTIVE EQUIPMENT**

**VENTILATION:**
Provide local exhaust ventilation or general dilution ventilation to meet permissible exposure limits. Ventilation equipment must be explosion-proof.

**RESPIRATOR:**
- 1000 PPM - Chemical cartridge respirator with organic vapor cartridge with a full facepiece.
- 5000 PPM - Gas mask with organic vapor canister (chin-style or front- or back-mounted canister). Supplied-air respirator with a full facepiece. Self-contained breathing apparatus with full facepiece.
- 8000 PPM - Type C supplied-air respirator with full facepiece operated in pressurized-demand or other positive pressure mode or with a full facepiece, helmet, or hood operated in continuous-flow mode.

Escape - Gas mask with organic vapor canister (chin-style or front- or
CLOTHING:
WEAR PROTECTIVE CLOTHING. PREVENT ANY POSSIBILITY OF CONTACT WITH LIQUID AND
REPEATED OR PROLONGED VAPOR CONTACT WITH SKIN.

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS
SUBSTANCE.

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A
FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.
WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO
THIS SUBSTANCE, THE EMPLOYER SHALL PROVIDE AN EYE-WASH FOUNTAIN WITHIN THE
IMMEDIATE WORK AREA FOR EMERGENCY USE.

AUTHORIZED - FISHER SCIENTIFIC GROUP, INC.
CREATION DATE: 01/18/85   REVISION DATE: 01/15/86

-ADDITIONAL INFORMATION-
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SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE
INFORMATION FOR THEIR PARTICULAR PURPOSES.
Hydrochloric Acid

SECTION III - PHYSICAL DATA (Continued)

Specific Gravity: 1.19

Evaporation Rate: N/A

Solubility (H2O): Complete (in all proportions)

% Volatiles by Volume: 100

Appearance & Odor: Clear, colorless or slightly yellow fuming liquid.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A

NFPA 704M Rating: 3-0-0

Fire Extinguishing Media

Use extinguishing media appropriate for surrounding fire.

Special Fire-Fighting Procedures

Firefighters should wear proper protective equipment and self-contained (positive pressure if available) breathing apparatus with full facepiece. Move exposed containers from fire area, if it can be done without risk. Use water to keep fire exposed containers cool; do not get water inside containers.

Toxic Gases Produced

hydrogen chloride

SECTION V - HEALTH HAZARD DATA

Toxicity:

LC50 (inhl-rat-1H) (ppm) - 3124
LD50 (ipr-mouse)(mg/kg) - 40
LD50 (oral-rabbit)(mg/kg) - 900

Effects of Overexposure

Liquid may cause severe burns to skin and eyes.
Inhalation of vapors may cause severe irritation of the respiratory system.
Inhalation of vapors may cause coughing and difficult breathing.

Emergency and First Aid Procedures

If swallowed, do NOT induce vomiting. Give water, milk, or milk of magnesia.
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Wash clothing before re-use.

Continued on Page:

B-47
Hydrochloric Acid

Effective: 10/09/85
Issued: 10/09/85

Stability: Stable

Conditions to Avoid: heat, moisture

Incompatibles: most common metals, water, strong bases, amines, carbonates, metal oxide

Decomposition Products: hydrogen chloride

SECTION VI - REACTIVITY DATA

Hazardous Polymerization: Will not occur

SECTION VII - SPILL AND DISPOSAL PROCEDURES

Steps to be taken in the event of a spill or discharge:
Wear self-contained breathing apparatus and full protective clothing. Stop leak if you can do so without risk. Ventilate area. Neutralize spill with soda ash or lime. With clean shovel, carefully place material into clean, dry container and cover; remove from area. Flush spill area with water.

J. T. Baker Neutrasorb® or Neutrasol® "Low Na" acid neutralizers are recommended for spills of this product.

Disposal Procedure
Dispose in accordance with all applicable federal, state, and local environmental regulations.

EPA Hazardous Waste Number: D002 (Corrosive Waste)

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

Ventilation: Use adequate general or local exhaust ventilation to keep vapor and mist levels as low as possible.

Respiratory Protection: None required where adequate ventilation conditions exist. If airborne concentration is high, a chemical cartridge respirator with acid cartridge is recommended. If concentration exceeds capacity of cartridge respirator, a self-contained breathing apparatus is advised.

Eye/Skin Protection: Safety goggles and face shield, uniform, protective suit, acid-resistant gloves are recommended.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

Special Precautions
Keep container tightly closed. Store in corrosion-proof area.

Continued on Page...
SECTION IX - STORAGE AND HANDLING PRECAUTIONS (Continued)

Do not store near oxidizing materials.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

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INTERNATIONAL (I.M.O.)

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A = Not Applicable or Not Available

The information published in this Material Safety Data Sheet has been compiled from our experience and data presented in various technical publications. It is the user's responsibility to determine the suitability of this information for the adoption of necessary safety precautions. We reserve the right to revise Material Safety Data Sheets periodically as new information becomes available.
**ACETIC ACID, GLACIAL**

**MATERIAL SAFETY DATA SHEET**

**FISHER SCIENTIFIC**

**CHEMICAL DIVISION**

**GASTON L. PILLORE**

**1 REAGENT LANE**

**FAIR LAWN NJ 07010**

**DATE: 02/27/89**

**CHEMICAL DIVISION CASTOR L. PILLORE: (201) 796-7100**

**INDEX 06890170085**

**C201} 796-7523 CHEMTREC ASSISTANCE: C 80 0 3 1-29-9300 CAT NO: A38C212**

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**SUBSTANCE IDENTIFICATION**

**CAS-NUMBER 64-19-7**

**SUBSTANCE: ACETIC ACID, GLACIAL**

**TRADE NAMES/SYNONYMS:**

- ACETIC ACID
- GLACIAL ACETIC ACID
- ETHANIC ACID
- VINEGAR ACID
- ETHYLIC ACID
- PYROLINEUS ACID
- METHANECARBOXYLIC ACID
- STCC t-931303; UN 2789; A-37; A-38; A-38-C; A-38-F; A-38-SI; A-38-S; A-507; A-465; C2H'<-02| ACC00120 QJ

**CHEMICAL FAMILY:**

CARBOXYLIC ACID, ALIPHATIC

**MOLECULAR FORMULA:** C3H6O2

**MOLECULAR WEIGHT:** 60.05

**CERCLA RATINGS (SCALE 0-3): HEALTH=2 FIRE=2 REACTIVITY=1 PERSISTENCE=0**

**NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=2 REACTIVITY=1**

**COMPONENTS AND CONTAMINANTS**

**COMPONENT: ACETIC ACID, GLACIAL**

**PERCENT: 100**

**OTHER CONTAMINANTS: NONE**

**EXPOSURE LIMITS:**

- ACETIC ACID, GLACIAL;
  - 10 PPM (25 MG/M3) OSHA TWA
  - 10 PPM (25 MG/M3) ACGIH TWA
  - 15 PPM (37 MG/M3) ACGIH STEL

**5000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY**

**DESCRIPTION:** CLEAR, COLORLESS LIQUID WITH A STRONG, PUNGENT, CHARACTERISTIC ODOR OF VINEGAR AND WHEN WELL DILUTED WITH WATER, AN ACID TASTE.

**BOILING POINT:** 118 F (118 C)

**MELTING POINT:** 52 F (17 C)

**SPECIFIC GRAVITY:** 1.0152

**VAPOR PRESSURE:** 11.8 MMHG @ 20 C

**EVAPORATION RATE:** (BUTYL ACETATE=1) 0.97 PM; 2.4 (1.0 M SOL.)

**SOLUBILITY IN WATER:** VERY SOLUBLE

**ODOR THRESHOLD:** 1.0 PPM

**VAPOR DENSITY:** 2.07

**SOLVENT SOLUBILITY:** SOLUBLE IN ETHANOL, GLYCEROL, ETHER, ACETONE, BENZENE, CARBON TETRACHLORIDE, INSOLUBLE IN CARBON DISULFIDE, CHLOROFORM, DIMETHYL SULFOXIDE

**VISCOSITY:** 1.22 CPS @ 20 C

**PHYSICAL DATA**

**FIRE AND EXPLOSION DATA**

**FIRE AND EXPLOSION HAZARD:** MODERATE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

**VAPOR-AIR MIXTURES ARE EXPLOSIVE ABOVE FLASH POINT.**

**VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLASH BACK.**

**FLASH POINT:** 103 F (39 C) (CC)

**UPPER EXPLOSIVE LIMIT:** 19.9% @ 250 F

**LOWER EXPLOSIVE LIMIT:** 4.0%

**AUTOIGNITION TEMP.: 567 F (464 C)**

**FLAMMABILITY CLASS(OSHA): II**

**FIREFIGHTING MEDIA:**

DRY CHEMICAL, CARBON DIOXIDE, HALON, WATER SPRAY OR STANDARD FOAM

(1997 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

**0230007116**
FOR LARGER FIRES, USE WATER SPRAY, FOG OR STANDARD FOAM (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. DO NOT GET WATER INSIDE CONTAINER. COOL FIRE-EXPOSED CONTAINERS WITH WATER FROM SIDE UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM STORAGE TANK ENDS. WITHDRAW IMMEDIATELY IN CASE OF RISING SOUND FROM VENTING SAFETY DEVICE OR ANY DISCOLORATION OF STORAGE TANK DUE TO FIRE (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4, GUIDE PAGE 29).

USE FLOODING AMOUNTS OF WATER AS A FOG; SOLID STREAMS MAY BE INEFFECTIVE. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER FROM AS FAR A DISTANCE AS POSSIBLE. USE WATER SPRAY TO ABSORB CORROSIVE VAPORS. AVOID BREATHING CORROSIVE VAPORS; KEEP UPWIND.

ACETIC ACID (NFPA FIRE PROTECTION GUIDE ON HAZARDOUS MATERIAL, EIGHTH EDITION).

FIRE FIGHTING PHASES: USE WATER SPRAY, DRY CHEMICAL, ALCOHOL FOAM, OR CARBON DIOXIDE. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL. IF A LEAK OR SPILL HAS NOT IGNITED, USE WATER SPRAY TO DISPERSE THE VAPORS AND TO PROTECT THE MEN ATTEMPTING TO STOP A LEAK. USE WATER SPRAY TO DISPERSE THE VAPORS. WATER SPRAY MAY BE USED TO FLUSH SPILLS AWAY FROM EXPOSURES AND TO DILUTE SPILLS TO NONFLAMMABLE MIXTURES (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

TRANSPORTATION DATA
DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49CFR172.101: CORROSIVE MATERIAL
DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49CFR172.101 AND 172.402: CORROSIVE
DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS; 49CFR173.245
EXCEPTIONS: 49CFR173.244

TOXICITY
ACETIC ACID, GLACIAL;
IRITATION DATA: 50 MG/24 HOURS SKIN-HUMAN MILD; 525 MG OPEN SKIN-RABBIT SEVERE; 50 MG/24 HOURS SKIN-RABBIT MILD; 50 MG OPEN EYE-RABBIT SEVERE; 20 MG/24 HOURS SKIN-RABBIT MODERATE; 5 MG/10 SECONDS RINSED EYE-RABBIT MILD.

ACUTE TOXICITY DATA: 116 PPM/3 MINUTES INHALATION-HUMAN TDLo; 16,000 PPM/4 HOURS INHALATION-RAT LDi; 5620 PPM/1 HOUR INHALATION-MOUSE LDSo; 1060 MG/KG SKIN-RABBIT LDSo; 1470 MG/KG ORAL-HUMAN TDLo; 3530 MG/KG ORAL-RAT LDSo; 1160 MG/KG INTRAVENOUS-MOUSE LDLo; 208 MG/KG INTRAMUSCLE-RAT LDLo; 1200 MG/KG SUBCUTANEOUS-MOUSE LDLo; 1200 MG/KG RECTAL-RAT LDLo; MUTAGENIC DATA (ATCCS); REPRODUCTIVE EFFECTS DATA (ATCCS).

Carcinogen Status: NONE.
Local Effects: CORROSIVE- EYE, SKIN, MUCOUS MEMBRANES.
Acute Toxicity Level: MODERATELY TOXIC BY INHALATION, DERMAL ABSORPTION, INGESTION.
Target Effects: POISONING MAY AFFECT THE LIVER, KIDNEYS, AND CARDIOVASCULAR SYSTEM.
At Increased Risk: PERSONS WITH A HISTORY OF RESPIRATORY, SKIN OR EYE DISEASE.

HEALTH EFFECTS AND FIRST AID

INHALATION:
ACETIC ACID, GLACIAL;
CORROSIVE. 1000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH. ACUTE EXPOSURE- MAY CAUSE SEVERE IRRITATION OF THE RESPIRATORY TRACT. 50 PPM OR MORE IS INTOLERABLE TO MOST PERSONS AND RESULTS IN PHARYNGEAL EDema AND CHRONIC BRONCHITIS. OTHER SYMPTOMS MAY INCLUDE COUGHING, DYSPNEA, SHORTNESS OF BREATH, LARYNGITIS, PULMONARY EDema, BRONCHOPNEUMONIA AND HYPTENSION.
CHRONIC EXPOSURE- WORKERS REPEATEDLY EXPOSED TO CONCENTRATIONS UP TO 50 PPM HAVE BEEN FOUND TO SUFFER FROM PERIPHERAL EDema WITH HYPERTROPHY OF THE LYMPH NODES. CHRONIC PHARYNGITIS. CHRONIC BRONCHITIS AND IN SOME CASES, ASTHMATIC BRONCHITIS AND TRACES OF EROSION OF THE TEETH. COMPLAINTS OF DIGESTIVE DISORDERS WITH PYROSIS AND CONSTIPATION HAVE ALSO BEEN REPORTED.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:
ACETIC ACID, GLACIAL;
CORROSIVE.
ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE SEVERE IRRITATION WITH PAIN, BURNS, ERYTHEMA, Blisters and Superficial Destruction of the Skin With Slow Healing. The Skin May Become Blackened, Hyperkeratotic And Fissured.
CHRONIC EXPOSURE- REPEATED AND PROLONGED CONTACT MAY CAUSE DARKENING OF THE SKIN AND DERMATITIS.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL...
EYE CONTACT:
ACETIC ACID, GLACIAL:
CORROSIVE.
ACUTE EXPOSURE- DIRECT CONTACT CAUSES SEVERE IRRITATION, LACRIMATION, CORNEAL EROSION, OPACIFICATION, IRIITIS AND POSSIBLY LOSS OF SIGHT IN HUMANS; REGENERATION OF THE EPITHELIUM MAY TAKE MANY MONTHS. BUT CORNEAL ANESTHESIA AND OPACIFICATION WILL USUALLY BE PERMANENT. IN SEVERE CASES, CONJUNCTIVITIS, PHOTOPHOBIA AND HYPEREMIA OF THE CONJUNCTIVA OCCURRED. THE VAPOR AND DILUTE SOLUTIONS MAY CAUSE CONJUNCTIVAL HYPEREMIA AND SOMETIMES INJURY TO THE CORNEAL EPITHELIUM.
CHRONIC EXPOSURE- DEPENDING ON THE CONCENTRATION AND DURATION OF EXPOSURE, EFFECTS SIMILAR TO ACUTE EXPOSURE MAY OCCUR.
FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
ACETIC ACID, GLACIAL:
CORROSIVE.
ACUTE EXPOSURE- IN CASES OF ACCIDENTAL INGESTION, SEVERE ULCERONECROTIC LESIONS OF THE UPPER DIGESTIVE TRACT, STRICATURE OF THE ESOPHAGUS, AND PERFORATION OF THE ESOPHAGUS AND STOMA HAVE BEEN OBSERVED WITH HEMOGLOBINURIA, SHOCK, HEMOCYANIN, FOLLOWED BY ANURIA AND UREMIA. OTHER SYMPTOMS MAY INCLUDE VOMITING, ABDOMINAL SPASMS, THIRST, DIFFICULTY IN SWALLOWING, HYPOThERMIA, RAPID AND WEAK PULSE, SLOW AND STAGNANT LARYNGITIS, BRONCHITIS, PULMONARY EDEMA, PNEUMONIA, HEMOLYSIS, ALBUMINURIA, HEMATURIA, TWITCHING, CONVULSIONS, CARDIOVASCULAR COLLAPSE, SHOCK AND DEATH. EFFECTS ON THE NEWBORN HAVE BEEN REPORTED IN RATS ADMINISTERED 100 MG/KG 18 DAYS AFTER GESTATION.
CHRONIC EXPOSURE- NO DATA AVAILABLE.
FIRST AID- IF VICTIM IS CONSCIOUS, GIVE LARGE QUANTITIES OF WATER IMMEDIATELY TO DILUTE THE ACID. DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION IMMEDIATELY.
ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY:
REACTS EXOTHERMICALLY WITH WATER.

INCOMPATIBILITIES:
ACETIC ACID, GLACIAL:
ACETALDEHYDE: VIOLENT, EXOTHERMIC POLYMERIZATION REACTION.
ACETIC ANHYDRIDE + WATER: VIOLENT, EXOTHERMIC REACTION.
2-AMINOETHANOL: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
AMMONIUM NITRATE: IGNITES ON WARMING; TEMPERATURE AND PRESSURE INCREASE ESPECIALLY IF CONCENTRATED.
5- AZIDOTETRAZOLE: POSSIBLE EXPLOSIVE REACTION.
BASES: EXOTHERMIC REACTION.
BUTYLONE PENTAFLUORIDE: FIRE AND EXPLOSION HAZARD.
CARBONATES: INCOMPATIBLE.
CHLORINE TRIFLUORIDE: VIOLENT, POSSIBLY EXPLOSIVE REACTION.
CHLOROSULFONIC ACID: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
CHROMIC ACID: EXPLOSIVE REACTION IF NOT KEPT COLD.
CHROMIUM TRIoxide: POSSIBLE FIRE AND EXPLOSION HAZARD.
DINITROETHYL CARBONATE AND OZONE: EXPLOSIVE REACTION.
ETHYLENE DIAMINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
ETHYLENIMINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
HYDROGEN PEROXIDE: EXOTHERMIC REACTION ON HEATING WITH THE PRODUCTION OF PERACETIC ACID WHICH WILL EXPLODE AT 110 C.
HYDROOXIDES: INCOMPATIBLE.
LEAD: CORRODES.
METHES: ATTACKS MOST METALS, INCLUDING ZINC.
NITRIC ACID: EXPLOSIVE REACTION IF NOT KEPT COLD.
NITRIC ACID AND ACETONE: EXPLOSIVE REACTION (DELAYED) IN CLOSED CONTAINER.
OLEUM: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
PERCHLORIC ACID: EXPLOSIVE REACTION.
PERMANGANATES: EXPLOSIVE REACTION IF NOT KEPT COLD.
PHOSPHATES: INCOMPATIBLE.
PHOSPHORUS ISOcyanate: VIOLENT REACTION.
PHOSPHORUS TRICHLORIDE: EXPLOSIVE REACTION.
PHOSPHORUS TRichloride: VIOLENT REACTION.
POTASSIUM PEROXIDE: EXPLOSIVE REACTION IF INADEQUATELY COOLED.
POTASSIUM TERT-BUTOXIDE: IGNITION REACTION.
SODIUM HYDROXIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
SODIUM HYDROXIDE: EXPLOSIVE REACTION IF NOT KEPT COLD.
XYLENE: FORMS EXPLOSIVE COMPOUND UNLESS WATER IS PRESENT.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.
OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING
OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE
ENVIRONMENTAL PROTECTION AGENCY.

PROTECT AGAINST PHYSICAL DAMAGE. DETACHED STORAGE IS PREFERRED. SEPARATE FROM
OXIDIZING MATERIALS AND AVOID STORAGE NEAR COMBUSTIBLE MATERIALS. KEEP ABOVE
ITS FREEZING POINT (62 F) TO AVOID RUPTURE OF CARBOYS AND GLASS CONTAINERS
(NFPA 9, HAZARDOUS CHEMICALS DATA, 1975).

BONDING AND GROUNDING: SUBSTANCES WITH LOW ELECTROCONDUCTIVITY, WHICH
MAY BE IGNITED BY ELECTROSTATIC SPARKS, SHOULD BE STORED IN CONTAINERS
WHICH MEET THE BONDING AND GROUNDING GUIDELINES SPECIFIED IN NFPA 77-1983,
RECOMMENDED PRACTICE ON STATIC ELECTRICITY.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF
HAZARDOUS WASTE, *0 CFR 262. EPA HAZARDOUS WASTE NUMBER D002.

CONDITIONS TO AVOID
MAY BE IGNITED BY HEAT, SPARKS OR FLAMES. CONTAINER MAY EXPLODE IN HEAT OF
FIRE. EXPLOSION HAZARD INDOORS, OUTDOORS OR IN SEWERS. RUN-OFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

USUAL SHIPPING CONTAINERS:
GLASS AND POLYETHYLENE CARBOYS AND POLYETHYLENE-LINED DRUMS, TANK BARGE,
(NFPA 9, HAZARDOUS CHEMICALS DATA, 1975).

SPILL AND LEAK PROCEDURES

SOIL SPILL:
DIG A HOLDING AREA SUCH AS A PIT, POND OR LAGOON TO CONTAIN SPILL AND DIKE
SURFACE FLOW USING BARRIER OF SOIL, SANDBAGS, FOAMED POLYURETHANE OR FOAMED
CONCRETE. ABSORB LIQUID MASS WITH FLY ASH OR CEMENT POWDER.

NEUTRALIZE WITH CAUSTIC SODA (NAOH) OR SODA ASH (NA2CO3)

AIR SPILL:
KNOCK DOWN VAPORS WITH WATER SPRAY. KEEP UPWIND.

WATER USED TO KNOCK DOWN VAPORS MAY BECOME CORROSIVE OR TOXIC AND SHOULD BE
CONTAINED PROPERLY FOR LATER DISPOSAL.

WATER SPILL:
NEUTRALIZE WITH CAUSTIC SODA.

OCCUPATIONAL SPILL:
SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU
CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. DO NOT GET WATER
INSIDE CONTAINER. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT
MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS,
DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN
HAZARD AREA! KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND DENY ENTRY.

REPORTABLE QUANTITY (RQ): 5000 POUNDS
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES
THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS
SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE
AND THE STATE EMERGENCY RESPONSE COMMISSION (*0 CFR 355.40). IF THE RELEASE OF
THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE
CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 426-8802 OR (202) 426-8875 IN THE
METROPOLITAN WASHINGTON, D.C. AREA (*0 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:
PROVIDE LOCAL EXHAUST VENTILATION SYSTEM TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:
THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS
BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO
CHEMICAL HAZARDS OR NIOSH CRITERIA DOCUMENTS; OR DEPARTMENT OF LABOR,
29CFR1910 SUBPART Z.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND
IN THE WORKPLACE AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE OF
OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION.

ACETIC ACID, GLACIAL
250 PPM- SUPPLIED-AIR RESPIRATOR OPERATED IN CONTINUOUS FLOW MODE,
POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).
500 PPM- CHEMICAL CARTRIDGE RESPIRATOR WITH FULL FACEPIECE AND ORGANIC VAPOR
CARTRIDGE(S).
SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE.
**ACETIC ACID, GLACIAL**

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE.

AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.

POWERED AIR-PURIFYING RESPIRATOR WITH TIGHT-FITTING FACEPIECE AND ORGANIC VAPOR CARTRIDGE(S).

1000 PPM- SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.

ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE. CONTACT LENSES SHOULD NOT BE WORN.

EMERGENCY WASH FACILITIES:

WHERE THERE IS A POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

AUTHORIZED - FISHER SCIENTIFIC GROUP, INC.
CREATION DATE: 09/06/84  REVISION DATE: 12/08/88

-ADDITIONAL INFORMATION-

THE INFORMATION BELOW IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST INFORMATION CURRENTLY AVAILABLE TO US. HOWEVER, WE MAKE NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO SUCH INFORMATION, AND WE ASSUME NO LIABILITY RESULTING FROM ITS USE. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION FOR THEIR PARTICULAR PURPOSES.
ATTN: SAFETY DIRECTOR
ROY W. WESTON, INC.
ATTN: SCOTT SPITTLER
WESTON WAY
WESTCHESTER, PA 19380

DATE: 01/24/89
CUST # 521922 P.O. # 131852

MATERIAL SAFETY DATA SHEET

IDENTIFICATION

PRODUCT #: 24080-5
NAME: CHLOROACETIC ACID, 99+%, GOLD LABEL
CAS #: 73-11-8
MF: C2H3ClO2

SYNONYMS:
ACIDE CHLORACETIQUE (FRENCH) * ACIDE MONOCHLORACETIQUE (FRENCH) * ACIDO MONOCLOROACETICO (ITALIAN) * CHLORACETIC ACID * CHLORACETIC ACID * ALPHA-CHLORACETIC ACID * CHLORACETIC ACID, LIQUID (DOT) * CHLORACETIC ACID, SOLID (DOT) * CHLOROETHANIC ACID * KYSELINA CHLOROCTOVA (CZECH) * MCA * MONOCHLORAZIJNZUUR (DUTCH) * MONOCHLORACETIC ACID * MONOCHLORURESIGSÄURE (GERMAN) * MONOCHLORACETIC ACID * MONOCHLOROETHANIC ACID * NCI-060231 * UN 1750 (DOT) * UN 1751 (DOT)

TOXICITY HAZARDS

RTECS #: AF8575000
ACETIC ACID, CHLORO-

TOXICITY DATA
ORL-RAT LD50: 500 MG/KG
IHL-RAT LD50: 110 MG/M3
IPK-RAT LD50: 16600 UG/KG
SCU-RAT LD50: 5 MG/KG
IVN-RAT LD50: 55 MG/KG
ORL-MUS LD50: 105 MG/KG
SCU-MUS LD50: 230 MG/KG

REVIEWS, STANDARDS, AND REGULATIONS
EPA GENETUX PROGRAM 1988, NEGATIVE: HISTIDINE REVERSION-AMES TEST
EPA TAURUS CHEMICAL DATABASE 1986
EPA TSCA SECTION B(2) STATUS REPORT DEHq-0578-0154 P
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JUNE 1988
NIOSH ANALYTICAL METHODS: SEE CHLORACETIC ACID, 2008
NTP CARCINOGENESIS STUDIES: PROPOSED USHA MEDICAL RECORDS RULE PHEREAC 47,30420,

TARGET ORGAN DATA
LUNGS, THORAX OR RESPIRATION (TUMORS)
GASTROINTESTINAL (OTHER CHANGES)
LIVER (TUMORS)
TUMORIGENIC (EQUIVOCAL TUMORIGENIC AGENT BY RTECS CRITERIA)
TUMORIGENIC (TUMORS AT SITE OF APPLICATION)

ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS)
DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION

HEALTH HAZARD DATA

ACUTE EFFECTS
MAY BE FATAL IF INHALED, SWALLOWED, OR ABSORBED THROUGH SKIN.
MATERIAL IS EXTREMELY DESTRUCTIVE TO TISSUE OF THE MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT, EYES AND SKIN.
INHALATION MAY BE FATAL AS A RESULT OF SPASM, INFLAMMATION AND EDEMA OF THE LARYNX AND BRONCHI. CHEMICAL PNEUMONITIS AND PULMONARY EDEMA.
SYMPTOMS OF EXPOSURE MAY INCLUDE BURNING SENSATION, COUGHING,
MATERIAL SAFETY DATA SHEET PAGE: 2

CATALOG #: 24060-5 NAME: CHLOROACETIC ACID, 99+%, GOLD LABEL

WHEEZING, LARYNGITIS, SHORTNESS OF BREATH, HEADACHE, NAUSEA AND VOMITING.

FIRST AID
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. CALL A PHYSICIAN.

WASH CONTAMINATED CLOTHING BEFORE REUSE.

---PHYSICAL DATA---

MELTING POINT: 62 C TO 64 C
BOILING POINT: 139 C
VAPOR DENSITY: 3.26
VAPOR PRESSURE: 0.75 MM @ 20 C
3.0 MM @ 55 C

---FIRE AND EXPLOSION HAZARD DATA---

LOWER EXPLOSION LIMIT: 32

EXTINGUISHING MEDIA
WATER MAY BE EFFECTIVE FOR COOLING, BUT MAY NOT EFFECT EXTINGUISHMENT.
CARBON DIOXIDE, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.

SPECIAL FIRE FIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.

UNUSUAL FIRE AND EXPLOSION HAZARDS
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

---REACTIVITY DATA---

INCOMPATIBILITIES
STRONG OXIDIZING AGENTS
STRONG BASES
STRONG REDUCING AGENTS

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
TOXIC FUMES OF:
CARBON MONOXIDE, CARBON DIOXIDE
HYDROGEN CHLORIDE GAS
PHOSGENE GAS

---SPILL OR LEAK PROCEDURES---

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED
WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.
Sweep up or place in a JAG and hold for WASTE DISPOSAL.
AVOID RAISING DUST.
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

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 & LOCAL LAWS.

---PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE---

WEAR APPROPRIATE NIOSH/MSHA-APPROVED RESPIRATOR, CHEMICAL-RESISTANT GLOVES, SAFETY GOGGLES, OTHER PROTECTIVE CLOTHING.

USE ONLY IN A CHEMICAL FUME HOOD.
MATERIAL SAFETY DATA SHEET

CATALOG # 24060-5
NAME: CHLOROACETIC ACID, 99+%, GOLD LABEL

DO NOT BREATHE DUST.
AVOID CONTACT WITH EYES, SKIN AND CLOTHING.
AVOID PROLONGED OR REPEATED EXPOSURE.
READILY ABSORBED THROUGH SKIN.
WASH THOROUGHLY AFTER HANDLING.
HIGHLY TOXIC.
CORROSIVE.
KEEP TIGHTLY CLOSED.
HYGROSCOPIC.
STORE IN A COOL DRY PLACE.

ADDITIONAL PRECAUTIONS AND COMMENTS

NOT APPLICABLE

REGULATORY INFORMATION

THIS PRODUCT IS SUBJECT TO SARA SECTION 313 REPORTING REQUIREMENTS.

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. ALDRICH SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.
MONOCHLOROACETIC ACID

I. IDENTIFICATION

Chemical Name: Monochloroacetic acid
CAS #: 79-11-8
Synonyms: acetic acid, chloro: chloroethanoic acid; chloroacetic acid; MCA; MCAA
Structural Formula:
\[
\text{Cl} - \text{CH}_2 - \text{C} - \text{OH}
\]
Molecular Formula: C₂H₅O₂Cl

II. CHEMICAL AND PHYSICAL PROPERTIES

A. Chemical Properties

Reactivity: Monochloroacetic acid is a very strong acid which reacts with alcohols and esters and forms salts with inorganic and organic bases. It also attacks metals and rubbers.¹

Stability: Stable to 370°C (698°F) ³

Incompatibilities: Incompatible with alkalis and amines.⁴

B. Physical Properties

White or colorless to light brown, deliquescent crystals or 80% aqueous solution. ⁵

Molecular Weight: 94.50⁶

Specific Gravity: 1.27 at 25°C (77°F) for 80% aqueous solution ⁹; 1.40 at 20°C (68°F) for flake. ¹⁰

Boiling Point: 143°C (290°F) for 80% aqueous solution ⁹; 189°C (372°F) for flake ¹⁰

Vapor Pressure: 17.8 mm Hg at 25°C (77°F) for 80% aqueous solution ⁹; 0.20 mm Hg at 25°C (77°F) for flake ¹⁰

Solubility: 81.5% solubility in water at 20°C (68°F); soluble in alcohol, ether,

chloroform, carbon disulfide, and benzene ¹² ²

pKₐ: 2.86 ³

pH: <1 for 80% aqueous solution ¹⁰

Flash Point: 118°C (244°F) for 80% aqueous solution ¹⁰; 126°C (259°F) for flake ¹⁰

I.E.L.: 8% by volume for 80% aqueous solution ¹⁰

Odor Threshold: 0.01 ppm ¹⁰

Maximum Airborne Concentrations: 23,500 ppm at 25°C and 760 mm Hg

III. USES AND VOLUME

MCA is used as an intermediate in the production of carboxymethylcellulose, ethyl chloroacetate, glycine, synthetic caffeine, sarcosine, thioglycolic acid, EDTA, 2,4-D and 2,4,5-T as well as in the manufacture of other herbicides, preservatives and bacteriostats. ¹³

The quantity produced domestically in 1980 was 15.7 million lbs.¹⁴

The quantity imported was 34.59 million lbs. in 1980.¹⁵

IV. SUMMARY OF TOXICOLOGIC AND USE EXPERIENCE

A. Toxicology Data

1. Animal Data

a. Acute Toxicity

Oral

Mouse LD₅₀ 255 mg/kg ¹²
Rat LD₅₀ 76 mg/kg ¹⁶

Guinea Pig LD₅₀ 80 mg/kg ¹⁶

Skin

In all animal species tested, when MCA was applied to 5% of the skin at tested concentrations, death uniformly
resulted in spite of rapid washing with water, sodium bicarbonate and/or pre- or post-anesthesia of the animals. Reported skin toxicity tests were as follows:

1. Molten 60°C MCA applied to 15% of body surface of a dog caused the following clinical changes:
   - Decreased blood glucose and WBC; an increase in BUN, SGOT, SGPT, and ventricular block.

2. Molten 60°C MCA in contact with 20% of the body surface of a mongrel dog for 15 minutes at 4100 mg/kg was lethal.

3. Molten 60°C MCA in contact with 50% or greater of the body surface of rabbits at 760 mg/kg proved lethal after a one minute exposure.

4. Solid MCA at room temperature produces a dermal LD50 after a 24 hr. occluded contact of approximately 180 mg/kg for rats and dogs. The dermal LD50 by DOT class B Poison Protocol was > 200 mg/kg.

5. In male rats dosed subcutaneously with aqueous solutions of monochloroacetic acid at 1 mL/100 g of body weight, the following clinical symptoms were observed: respiratory depression, clonic and tonic convulsion and enlarged livers and spleens were found at autopsy. The total sulfhydryl concentration in rat liver, kidney cortex and brain medulla was significantly affected at doses of 162 mg/kg.

Inhalation

1. Mice, rats and guinea pigs were exposed for 1.5 and 60 minutes to air saturated by bubbling through molten MCA at 75°C (167°F). The animals survived the exposure with only mild eye and nasal irritation. Mild hyperemia of the lungs was observed at autopsy. The actual concentration was not specified (estimated calculation of concentration is 307 ppm (118 mg/m³)).

b. Chronic Toxicity

Rats fed 0.1% of MCA for 208 days had significantly decreased body weight. No tissue change could be attributed on autopsy to MCA feeding.

c. Miscellaneous Information

Monochloroacetic acid inhibited [14C] acetate oxidation in in-vitro studies using rat tissue of animals administered a subcutaneous dose of 162 mg/kg. Monochloroacetic acid did not significantly alkylate sulfhydryl groups of cystein in-vitro using rat tissue of animals dosed subcutaneously at 162 mg/kg.

Ames Mutagenicity Tests — exposing MCA to S. typhimurium or B. subtilis showed no increase in the number of bacterial revertants. Only low concentrations could be tested because of the toxicity of MCA to bacteria.

2. Human Data

a. Acute Exposure

Three human fatalities have been attributed to monochloroacetic acid poisoning. The deaths in all cases were due to percutaneous absorption of molten MCA:

- Full body drench — MCA 60°C
- 10% body burns — MCA 58°C
- 10% body burns — MCA Temperature not published

In cases of 10% body burns, death occurred within 18 hours. The mechanism of morbidity and death is not known and specific antidotes and/or treatments that can reverse clinical processes, once initiated, are also unknown.

Clinical symptoms in the incident involving whole body drenching included: first degree burns of the skin, coughing and spitting up of blood, convulsions, loss of consciousness and death within 4 hours. Autopsy revealed the following in the case of full body drenching: 1st degree burns on the body; hemorrhage of the lungs, pleura membranes, liver, kidney, brain, and mucous membranes of the bronchia; point shaped bleedings on the epicardium, pleura and brain; spotted bleedings between the soft membranes of the brain; and the right heart cavities were dilated and filled with blood.

b. Although there have been no reported deaths due to skin exposure of non-molten MCA such as the 80% aqueous solution or flake material, there is no data that suggests that these forms of the material have reduced toxicity.
c. Chronic Exposure
   No information reported.

B. Human Use and Experience
   1. A major U.S. manufacturer has set an 8 hr.
      TWA internal guideline of 0.5 mg/m³ or
      0.13 ppm based on levels of irritation, and
      the potential for systemic effects.⁽¹⁾
   2. A Russian study, undertaken to experimentally substantiate a maximally per-
      missible concentration of chloroacetic acid, recommended 1 mg/m³ (0.26 ppm) as the
      regulatory MAC in workroom air. This conclusion was based on levels of respira-
      tory irritation and pungency after inhalation studies with rats.⁽¹²⁾
   3. The threshold for the perception of mucous membrane irritation in humans was reported
      as 5.7 mg/m³ (1.5 ppm).⁽¹⁾
   4. There has been a reported instance of vapors of monochloroacetic acid causing
      corneal epithelial injury.⁽¹⁹⁾ The concentra-
      tion and/or duration of exposure was not reported.

V. RECOMMENDED WEEL GUIDE

A. Rationale
   Monochloroacetic acid is a strong acid which causes severe burns and is corrosive to the skin.
   It can also produce burns of the eye and irritation of the respiratory tract. Skin exposure to
   molten MCA presents a life-threatening hazard and death has occurred as a result of skin
   absorption. The perception of mucous membrane irritation in humans has been reported to
   be 5.7 mg/m³ (1.5 ppm). Due to the lack of chronic inhalation toxicity testing, the WEEL
   has been established at a concentration that is low enough to prevent irritation while protecting
   against systemic toxicity.

B. WEEL Guide

   8 Hr. TWA
   0.3 ppm or 1 mg/m³ (Skin)

   15 Min. TWA
   1 ppm or 4 mg/m³ (Skin)

   SKIN CONTACT MUST BE PREVENTED

VI. REFERENCES

1. Fassett, David W., ed.: Patty's Industrial Hygiene and Toxicology. Vol. 2. 2nd Rev. Ed. New York:
   1981.
7. The International Technical Information Institute: Toxic and Hazardous Industrial Chemicals
   Safety Manual for Handling and Disposal with Toxicity and Hazard Data. Tokyo, Japan.
    249.
12. Maksimov, G.G. and O.N. Dubinina: Experimental Substantiation of the Maximally Per-
    missible Concentration of Monochloroacetic Acid in the Air of a Working Area. Gig. Tr.
    Prof. Zabol. 9 (1974).
    Growth Activity and Tissue Metabolism and Inhibitory Effect In Vivo Compared with Mono-
resulted in spite of rapid washing with water, sodium bicarbonate and/or pre- or post-anesthesia of the animals. Reported skin toxicity tests were as follows:

1. Molten 60°C MCA applied to 15% of body surface of a dog caused the following clinical changes:
   - Decreased blood glucose and WBC;
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4. Solid MCA at room temperature produces a dermal LD50 after a 24 hr. occluded contact of approximately 180 mg/kg for rats and dogs. The dermal LD50 by DOT class B Poison Protocol was >200 mg/kg.

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Rats fed 0.1% of MCA for 208 days had significantly decreased body weight. No tissue change could be attributed on autopsy to MCA feeding.

c. Miscellaneous Information

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- 10% body burns — MCA Temperature not published

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b. Although there have been no reported deaths due to skin exposure of non-molten MCA such as the 80% aqueous solution of flake material, there is no data that suggests that these forms of the material have reduced toxicity.
c. Chronic Exposure
   No information reported.

B. Human Use and Experience
1. A major U.S. manufacturer has set an 8 hr. TWA internal guideline of 0.5 mg/m$^3$ or 0.13 ppm based on levels of irritation, and the potential for systemic effects.\textsuperscript{60}

2. A Russian study, undertaken to experimentally substantiate a maximally permissible concentration of chloroacetic acid, recommended 1 mg/m$^3$ (0.26 ppm) as the regulatory MAC in workroom air. This conclusion was based on levels of respiratory irritation and pungency after inhalation studies with rats.\textsuperscript{121}

3. The threshold for the perception of mucous membrane irritation in humans was reported as 5.7 mg/m$^3$ (1.5 ppm).\textsuperscript{121}

4. There has been a reported instance of vapors of monochloroacetic acid causing corneal epithelial injury.\textsuperscript{121} The concentration and/or duration of exposure was not reported.

V. RECOMMENDED WEEL GUIDE

A. Rationale
   Monochloroacetic acid is a strong acid which causes severe burns and is corrosive to the skin. It can also produce burns of the eye and irritation of the respiratory tract. Skin exposure to molten MCA presents a life-threatening hazard and death has occurred as a result of skin absorption. The perception of mucous membrane irritation in humans has been reported to be 5.7 mg/m$^3$ (1.5 ppm). Due to the lack of chronic inhalation toxicity testing, the WEEL has been established at a concentration that is low enough to prevent irritation while protecting against systemic toxicity.

B. WEEL Guide
   \begin{itemize}
   \item \textbf{8 Hr. TWA:} 0.3 ppm or 1 mg/m$^3$ (Skin)
   \item \textbf{15 Min. TWA:} 1 ppm or 4 mg/m$^3$ (Skin)
   \end{itemize}
   \textbf{SKIN CONTACT MUST BE PREVENTED}

VI. REFERENCES
SECTION I - GENERAL INFORMATION

CATALOG NO 44808
PRODUCT NAME AROCLOR 1254 1UG/UL 1ML ISOOCTANE

DATA SHEET NO 448080

AROCLOR 1254 (1UG/UL)

FORMULA MIXTURE

CAS NRTECS
SYNONYM ANALYTICAL STANDARD IN ISOOCTANE

MANUFACTURER SUPELCO INC. PHONE 814-359-3441
ADDRESS SUPELCO PARK, BELLEFONTE, PA 16823-0048

SECTION II - HAZARDOUS INGREDIENTS OF MIXTURES

COMMON NAME - PERCENTAGE - CAS #
(FORMULA) - TLV(UNITS)
LD50 VALUE - CONDITIONS

AROCLOR 1254
AROCLOR 1254 0.0001 11097-69-:
1295 MG/KG ORAL RAT
PENTANE, 2,2,4-TRIMETHYL-
ISO-OCTANE
C8H18
N/A

SECTION III - PHYSICAL DATA

JILING POINT 99 C MM MELTING POINT -116 C
VAPOR PRESSURE 41 MM C VAPOR DENSITY 3.90 C (AIR=1)
SPECIFIC GRAVITY .690 G/ML C (WATER=1) PERCENT VOLATILE BY VOLUME 1
WATER SOLUBILITY N/A EVAPORATION RATE N/A (ETHER=1)
APPEARANCE COLORLESS LIQUID

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT 10 F CLOSED CUP FLAMMABLE LIMITS LEL 1.1 UEL 62

EXTINGUISHING MEDIA

CO2
FOAM
DRY CHEMICAL

SPECIAL FIRE FIGHTING PROCEDURES

WEAR SELF CONTAINED BREATHING APPARATUS WHEN FIGHTING A CHEMICAL FIRE.

UNUSUAL FIRE AND EXPLOSION HAZARDS

CAN REACT VIGOROUSLY WITH REDUCING MATERIALS.

SECTION V - HEALTH HAZARD DATA

TLV N/A

HEALTH AND FIRST AID PROCEDURES

...
SECTION V - HEALTH HAZARD DATA

**CONTINUED**

**FLUSH EYES WITH WATER FOR 15 MINUTES.**

**SKIN**

**FLUSH SKIN WITH LARGE VOLUMES OF WATER.**

**INHALATION**

**IMMEDIATELY MOVE TO FRESH AIR.**

**GIVE OXYGEN IF BREATHING IS LABORED**

**IF BREATHING STOPS, GIVE ARTIFICIAL RESPIRATION**

**INGESTION**

**NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON**

**NEVER TRY TO MAKE AN UNCONSCIOUS PERSON VOMIT**

**DO NOT INDUCE VOMITING.**

**EFFECTS OF OVEREXPOSURE**

**CONTAINS MATERIAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.**

SECTION VI - REACTIVITY DATA

**STABILITY**

**STABLE.**

**CONDITIONS TO AVOID**

**N/A**

**INCOMPATIBILITY**

**REDUCING AGENTS**

**HAZARDOUS DECOMPOSITION PRODUCTS**

**N/A**

**HAZARDOUS POLYMERIZATION WILL NOT OCCUR.**

**CONDITIONS TO AVOID**

**N/A**

SECTION VII - SPILL OR LEAK PROCEDURES

**NEVER TO BE USED IN CASE MATERIAL IS RELEASED OR SPILLED**

**FACE UP WITH APPLICABLE MATERIAL.**

B-64
SECTION VII - SPILL OR LEAK PROCEDURES
* CONTINUED *
VENTILATE AREA.

WASTE DISPOSAL METHOD

COMPLY WITH ALL APPLICABLE FEDERAL, STATE, OR LOCAL REGULATIONS

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFIC TYPE)
WEAR FACE MASK WITH ORGANIC VAPOR CANISTER.

PROTECTIVE GLOVES
WEAR GLOVES.

EYE PROTECTION
WEAR PROTECTIVE GLASSES.

VENTILATION
USE ONLY IN WELL VENTILATED AREA.

SPECIAL
N/A

OTHER PROTECTIVE EQUIPMENT
N/A

SECTION IX - SPECIAL PRECAUTIONS

STORAGE AND HANDLING
STORE IN SEALED CONTAINER IN COOL, DRY LOCATION.
KEEP AWAY FROM HEAT.
STORE IN DRY, WELL VENTILATED AREA.
KEEP AWAY FROM IGNITION SOURCES.

OTHER PRECAUTIONS
AVOID EYE OR SKIN CONTACT.
AVOID BREATHING VAPORS.
WHILE THE INFORMATION AND RECOMMENDATIONS SET FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE DATE HEREOF, SUPELCO, INC. MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

LAST REVISED 4/27/88
<table>
<thead>
<tr>
<th>Compound</th>
<th>Page</th>
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<tr>
<td>Hexane</td>
<td>C-1</td>
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<tr>
<td>Methanol</td>
<td>C-3</td>
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</table>
HEXANE

The information in this sheet applies to workplace exposure resulting from processing, manufacturing, storing or handling and is not designed for the population at large. Any generalization beyond occupational exposures should not be made. The best industrial hygiene practice is to maintain concentrations of all chemicals at levels as low as is practical.

Chemical Names: N-hexane, normal hexane, hexyl hydride; CAS 110-54-3.

Trade Names: Skellysolve B.

Uses As a solvent in quick drying rubber cements, inks, and oil extraction from seeds and other biological materials; a laboratory reagent; and others.

PHYSICAL INFORMATION

Appearance: Clear, colorless liquid.

Odor: Mild, gasoline-like.

Minimum Detectable by Odor: 130 ppm.

Behavior in Water: Does not mix, floats.

Evaporation: Rapid.

HEALTH HAZARD INFORMATION

OSHA Standard: Average 8 hour exposure -- 500 ppm.

NIOSH Recommended Limit: Average 10 hour exposure - 40 hour week -- 100 ppm.

ACGIH Recommended Limit: Average 8 hour exposure -- 50 ppm n-Hexane 500 ppm other isomers.

Short Term Exposure:

Inhalation: Exposure to levels above 500 ppm may cause headache, abdominal cramps, a burning feeling of the face, numbness and weakness of the fingers and toes. Levels above 1300 ppm may cause the above plus nausea and irritation of the nose and throat. Levels above 1500 ppm may cause the above plus blurred vision, loss of appetite and loss of weight. Most symptoms disappear within a few months if exposure ceases. Breathing liquid into the lungs may cause a chemical pneumonia.

Skin: Contact may cause irritation, redness, swelling, blisters and pain. Skin exposure may contribute to symptoms listed under inhalation.

Eyes: Levels over 880 ppm may cause irritation.

Ingestion: May contribute to symptoms listed under inhalation. Estimate lethal dose is one ounce to one pint.

Long Term Exposure:

May cause symptoms listed under inhalation. Exposure to levels above 650 ppm for two to four months can result in weakness and numbness of the arms and legs. Symptoms go away within a few months if exposure stops.

*Prepared by the Bureau of Toxic Substance Assessment, New York State Department of Health. For an explanation of the terms and abbreviations used, see "Toxic Substances: How Toxic is Toxic" available from the New York State Department of Health.
EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Move victim to fresh air. Give artificial respiration or oxygen, if necessary. Get medical attention, if necessary.

Skin: Remove contaminated clothing. Wash affected area with plenty of soap and water. If irritation persists, get medical attention.

Eyes: Rinse eyes for 15 minutes with plenty of water holding eyelids open. Get medical attention.

Ingestion: If victim is conscious, give milk or water. Do not induce vomiting. DO NOT force an unconscious person to drink. Get medical attention immediately.

Note to Physician: Electromyograms and nerve conduction tests may show signs of denervation in muscle and prolonged nerve conduction time. Cholinesterase levels in plasma may be lowered.

FIRE AND EXPLOSION INFORMATION

General: Flammable. Ignites at -21°C (-7°F).

Explosive Limits: Upper - 7.5%, lower - 1.1%

Extinguisher: Carbon dioxide, dry chemical or foam.

REACTIVITY

Materials to Avoid: Contact with oxidizing agents such as chromate or permanganate may cause fire or explosion.

Conditions to Avoid: Exposure to heat, flame or spark may result in fire or explosion.

PROTECTIVE MEASURES

Storage and Handling: Keep in a cool, well-ventilated area protected from damage and sources of ignition and separated from oxidizers.

Engineering Controls: Process enclosure, local exhaust or dilution ventilation as necessary; sinks, showers and eyewash stations should be provided.

Protective Clothing (Should not be substituted for proper handling and engineering controls): Hexane may attack some plastics, rubbers and coatings. Wear NBR, neoprene or Viton gloves and clothing as necessary, and chemical goggles or face shields if splash hazard exists.

Protective Equipment: For levels up to 1000 ppm use a chemical cartridge respirator with organic vapor cartridges, a supplied-air respirator or a self-contained breathing apparatus. For up to 5000 ppm use a gas mask with an organic vapor canister, a self-contained breathing apparatus with a full facepiece or a supplied-air respirator with a full facepiece, helmet or hood. For levels above 5000 ppm or in areas of unknown concentrations use a self contained breathing apparatus with a full facepiece and operated in a positive pressure mode or a combination Type C supplied-air respirator with an auxiliary self-contained breathing apparatus with a full facepiece operated in a positive pressure mode. For escape from a contaminated area use an escape self-contained breathing apparatus or a gas mask providing protection against organic vapors.

PROCEDURES FOR SPILLS AND LEAKS

Get workers out of spill area. Put on proper protective gear. Remove all sources of ignition and ventilate area. Cover spill with absorbent material such as sand or vermiculite. For final disposal contact your regional office of the New York State Department of Environmental Conservation.

For more information: Contact the Industrial Hygienist or Safety Officer at your worksite or the New York State Department of Health, Bureau of Toxic Substance Assessment, Empire State Plaza, Corning Tower Building, Albany, New York 12237.
MATERIAL SAFETY DATA SHEET

J. T. Baker Inc.
222 Washington St.
Philipsburg, NJ 08865
(908) 582-5011

Chemtrec (800) 424-9300
National Response Center (800) 424-8802

METHANOL

W015-05
Issued: 03/29/88
Effective: 09/14/87

SECTION I - PRODUCT IDENTIFICATION

Product Name: Methanol
Formula: CH₃OH
Formula Unit: 32.04
CAS No.: 67-56-1
NIOSH/RTECS No.: PC1400000
Common Synonyms: Methyl Alcohol; Wood Alcohol; Carbinol; Methylol; Wood Spirit
Product Codes: 9010, 9090, 9036, 9076, 9049, 9073, 5217, 9031, 9075, 5704, 9071, 9127, 5370, 9263, 9070, 9072, 9069, 9093, 9068

SECTION II - HAZARDOUS COMPONENTS

Component

0101

Continued on Page: 2

C-3

03400000 7136
SECTION II - HAZARDOUS COMPONENTS (Continued)

Methanol

SECTION III - PHYSICAL DATA

Boiling Point: 65°C (149°F) Vapour Pressure (mmHg): 36
Melting Point: -93°C (-144°F) Vapor Density (air=1): 1.11
Specific Gravity: 0.79 Evaporation Rate:
(H2O=1) (Butyl Acetate=1)
Solubility (H2O): Complete (in all proportions) % Volatiles by Volume: 100
Appearance & Odor: Clear, colorless liquid with characteristic pungent odor.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point (Closed Cup): 12°C (54°F) NFPA 704M Rating: 1-3-0
Flammable Limits: Upper - 36.0 % Lower - 6.0 %

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

Special Fire-Fighting Procedures
Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece operated in positive pressure mode. Move containers from fire area if it can be done without risk. Use water to keep fire-exposed containers cool.

Unusual Fire & Explosion Hazards
Vapors may flow along surfaces to distant ignition sources and flame back. Closed containers exposed to heat may explode. Contact with strong oxidizers may cause fire. Burns with a clear, almost invisible flame.

Toxic Gases Produced
Carbon monoxide, carbon dioxide, formaldehyde

SECTION V - HEALTH HAZARD DATA

TLV listed denotes (TLV-shin).
Threshold Limit Value (TLV/TWA): 260 mg/m³ (200 ppm)
Short-Term Exposure Limit (STEL): 310 mg/m³ (250 ppm)

Continued on Page: 3
Permissible Exposure Limit (PEL): 760 mg/m³ (200 ppm)

Toxicity:
- LD₅₀ (oral-rat)(mg/kg): 5628
- LD₅₀ (ipr-rat)(mg/kg): 3540
- LD₅₀ (scu-mouse)(mg/kg): 9300
- LD₅₀ (skin-rabbit)(g/kg): 20

Carcinogenicity: NTP: No  TARC: No  Z List: No  OSHA reg: No

Effects of Overexposure:
Inhalation and ingestion are harmful and may be fatal. Inhalation may cause headache, nausea, vomiting, dizziness, narcosis, suffocation, lower blood pressure, central nervous system depression. Contact with skin or eyes may cause irritation. Prolonged skin contact may result in dermatitis. Eye contact may result in temporary corneal damage. Ingestion may cause blindness.

Inhalation may cause nausea, vomiting, headache, dizziness, gastrointestinal irritation, central nervous system depression and hearing loss.

Chronic effects of overexposure may include kidney and/or liver damage.

Medical Conditions Generally Aggravated by Exposure: eye disorders, skin disorders, liver or kidney disorders

Routes Of Entry: inhalation, ingestion, eye contact, skin contact, absorption

Emergency and First Aid Procedures:
CALL A PHYSICIAN.
If swallowed, if conscious, give large amounts of water. Induce vomiting.
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before re-use.

SECTION VI - REACTIVITY DATA
Stability: Stable
Hazardous Polymerization: Will not occur

Conditions to Avoid: heat, flame, other sources of ignition

Incompatibilities: strong oxidizing agents, strong acids, zinc, aluminum, magnesium

Continued on Page: 4
SECTION VI - REACTIVITY DATA (Continued)
Decomposition Products: carbon monoxide, carbon dioxide, formaldehyde

SECTION VII - SPILL AND DISPOSAL PROCEDURES
Steps to be taken in the event of a spill or discharge
Wear self-contained breathing apparatus and full protective clothing. Shut off ignition sources, no flares, smoking or flames in area. Stop leak if you can do so without risk. Use water spray to reduce vapors. Take up with sand or other non-combustible absorbent material and place into container for later disposal. Flush area with water.

J. T. Baker Solusorb® solvent absorbent is recommended for spills of this product.

Disposal Procedure
Dispose in accordance with all applicable federal, state, and local environmental regulations.

FRC Hazardous Waste Number: U154 (Toxic Waste)

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT
Ventilation: Use general or local exhaust ventilation to meet TLV requirements.
Respiratory Protection: Respiratory protection required if airborne concentration exceeds TLV. At concentrations above 700 ppm, a self-contained breathing apparatus is advised.
Eye/Skin Protection: Safety goggles and face shield, uniform, protective suit, rubber gloves are recommended.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS
SAF-T-DATA™ Storage Color Code: Red (flammable)

Special Precautions
Bund and ground containers when transferring liquid. Keep container tightly closed. Store in a cool, dry, well-ventilated, flammable liquid storage area.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

Proper Shipping Name: Methyl alcohol Hazard Class: Flammable liquid
SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION (Continued)

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<thead>
<tr>
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<tr>
<td>Labels</td>
<td>FLAMMABLE LIQUID</td>
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<tr>
<td>Reportable Quantity</td>
<td>5000 LBS.</td>
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INTERNATIONAL (I.M.O.)

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<tr>
<th>Proper Shipping Name</th>
<th>Methanol</th>
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<tr>
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<tr>
<td>Labels</td>
<td>FLAMMABLE LIQUID, POISON</td>
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The information published in this Material Safety Data Sheet has been compiled from our experience and data presented in various technical publications. It is the user's responsibility to determine the suitability of this information for the adoption of necessary safety precautions. We reserve the right to revise Material Safety Data Sheets periodically as new information becomes available. J. T. Baker makes no warranty or representation about the accuracy or completeness nor fitness for purpose of the information contained herein.

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ATTACHMENT D

OSHA JOB SAFETY AND HEALTH PROTECTION NOTICE
(to be posted at Work Site)
The Occupational Safety and Health Act of 1970 provides job safety and health protection for workers by promoting safe and healthful working conditions throughout the Nation. Requirements of the Act include the following:

### Employers

All employers must furnish to employees employment and a place of employment free from recognized hazards that are causing or are likely to cause death or serious harm to employees. Employers must comply with occupational safety and health standards issued under the Act.

### Employees

Employees must comply with all occupational safety and health standards, rules, regulations and orders issued under the Act that apply to their own actions and conduct on the job.

The Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor has the primary responsibility for administering the Act. OSHA issues occupational safety and health standards, and its Compliance Safety and Health Officers conduct on-site inspections to help ensure compliance with the Act.

### Inspection

The Act requires that a representative of the employer and a representative authorized by the employees be given an opportunity to accompany the OSHA inspector for the purpose of aiding the inspection.

Where there is no authorized employee representative, the OSHA Compliance Officer must consult with a reasonable number of employees concerning safety and health conditions in the workplace.

### Complaint

Employees or their representatives have the right to file a complaint with the nearest OSHA office requesting an inspection if they believe unsafe or unhealthful conditions exist in their workplace. OSHA will withhold the names of employees complaining.

The Act provides that employees may not be discharged or discriminated against in any way for filing safety and health complaints or for otherwise exercising their rights under the Act.

Employees who believe they have been discriminated against may file a complaint with their nearest OSHA office within 30 days of the alleged discrimination.

### Citation

If upon inspection OSHA believes an employer has violated the Act, a citation alleging such violations will be issued to the employer. Each citation will specify a time period within which the alleged violation must be corrected.

The OSHA citation must be prominently displayed at or near the place of alleged violation for three days, or until it is corrected, whichever is later, to warn employees of dangers that may exist there.

### Proposed Penalty

The Act provides for mandatory penalties against employers of up to $1,000 for each serious violation and for optional penalties of up to $1,000 for each nonserious violation. Penalties of up to $1,000 per day may be proposed for failure to correct violations within the proposed time period. Also, any employer who willfully or repeatedly violates the Act may be assessed penalties of up to $10,000 for each such violation.

Criminal penalties are also provided for in the Act. Any willful violation resulting in death of an employee, upon conviction, is punishable by a fine of not more than $10,000, or by imprisonment for not more than six months, or both.

Conviction of an employer after a first conviction doubles these maximum penalties.

### Voluntary Activity

While providing penalties for violations, the Act also encourages efforts by labor and management, before an OSHA inspection, to reduce workplace hazards voluntarily and to develop and improve safety and health programs in all workplaces and industries. OSHA's Voluntary Protection Programs recognize outstanding efforts of this nature.

Such voluntary action should initially focus on the identification and elimination of hazards that could cause death, injury, or illness to employees and supervisors. There are many public and private organizations that can provide information and assistance in this effort, if requested. Also, your local OSHA office can provide considerable help and advice on solving safety and health problems or can refer you to other sources for help such as training.

### Consultation

Free consultative assistance, without citation or penalty, is available to employers, on request, through OSHA supported programs in most State departments of labor or health.

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**More Information**

Additional information and copies of the Act, specific OSHA safety and health standards, and other applicable regulations may be obtained from your employer or from the nearest OSHA Regional Office in the following locations:

- Atlanta, Georgia
- Boston, Massachusetts
- Chicago, Illinois
- Dallas, Texas
- Denver, Colorado
- Kansas City, Missouri
- New York, New York
- Philadelphia, Pennsylvania
- San Francisco, California
- Seattle, Washington

Telephone numbers for these offices, and additional area office locations, are listed in the telephone directory under the United States Department of Labor in the United States Government listing.

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William E. Brock, Secretary of Labor

U.S. Department of Labor

Occupational Safety and Health Administration
ATTACHMENT E

FIELD SITE SAFETY INSPECTION FORM
### Field Site Safety Inspection Form

**Legend:**
- X = YES
- 0 = NO

1. **Site Name** ____________________________  WD # ____________________________

2. **Location** ____________________________  **Inspector** ____________________________  **Date** ____________________________

### Certification of Personnel
1. All Weston personnel on site are currently active on certification list? _____
2. Site safety officer and site supervisor are qualified? _____

### Medical and First Aid
1. First aid kits accessible & identified? _____
2. Emergency eye/safety washes available? _____
3. Daily first aid logs up to date? _____
4. First aid kits inspected weekly? _____
5. At least two first aid trained persons on site at all times when working? _____

### Site Safety/Emergency Plans
1. Safety plan posted on site and given to each person? _____
2. Initial site safety plan meeting held and documented before work begins? _____
3. Hazardous materials information available for all hazards? _____
4. Designated, qualified site health and safety coordinator on site? _____
5. Employees trained in toxicology/exposure risks? _____
6. Emergency telephone numbers posted? _____
7. Emergency routes designated? _____
8. Emergency plan and signal reviewed with all persons? _____

### Training
2. Question and answer time available to all site personnel? _____
3. All employees instructed in hazardous materials handling practices? _____

### Personal Protection
1. All equipment meets ANSI/OSH/BEA criteria? _____
2. Levels of protection (LOPs) established? _____
3. Site control zones clearly designated? _____
4. All employees know their LOP scheme? _____
5. OSHA respirator program in place? _____
6. Employees fit tested for respirators? _____
7. Defective equipment tagged out? _____
8. Breathing air grade "D" certified? _____
9. Sufficient quantities of equipment? _____
10. Safety instrumentation maintained and calibrated? _____
11. Maintenance & cal. logs up to date? _____

### Decontamination
1. Decon system set up on site? Used? _____
2. Contamination zone and corridor clearly delineated? _____
3. Appropriate waste recepticals available for all waste? _____
4. Recepticals properly closed at end of day? _____
5. All decon liquids properly contained and disposed of? _____
6. All wastes disposed of according to approved plan? _____
7. All personnel received decon training? _____
8. All reusable personal protective gear decontaminated and disinfected at least daily? _____
FIELD SITE SAFETY INSPECTION FORM (CONT'D)  

LEGEND X = YES  
0 = NO

**FIRE PREVENTION/PROTECTION**

1. **NOT WORK PERMITS REQUIRED**
   0

2. **SMOKING RESTRICTED TO DESIGNATED AREA?**
   0

3. **FIRE LINES ESTABLISHED & MAINTAINED**
   0

4. **FLAMMABLE/COMBUSTIBLE LIQUID DISPENSING TRANSFER SYSTMS GROUNDED & BONDED?**
   0

5. **PROPER FLAMMABLE MATERIALS STORAGE?**
   0

6. **FIRE ALARM ESTABLISHED, WORKERS AWARE?**
   0

**WALKING AND WORKING SURFACES**

1. **ACCESSWAYS, STAIRS, RAMPS AND LADDERS FREE OF ICE, MUD, SNOW OR DEBRIS?**
   0

2. **LADDERS EXCEED MAX LENGTH?**
   0

3. **LADDERS USED IN PASSAGEWAYS, DOORS OR DRIVEWAYS?**
   0

4. **BROKEN OR DAMAGED LADDERS TAGGED OUT?**
   0

5. **METAL LADDERS PROHIBITED IN ELECTRICAL SERVICE?**
   0

6. **SAFETY FEET ON STRAIGHT AND EXTENSION LADDERS?**
   0

**EXCAVATIONS, CONFINED SPACES, TUNNELS**

1. **EXCAVATIONS SLOPED OR SHORED TO PREVENT CAVE-INS?**
   0

2. **SHORING APPROVED BY ENGINEER?**
   0

3. **GUARDRAILS OR FENCES PLACED AROUND EXCAVATIONS NEAR WALKWAYS OR ROADS?**
   0

4. **EXCAVATION LOCATIONS VISIBLE AT NIGHT?**
   0

5. **UTILITY CHECK PERFORMED AND DOCUMENTED BEFORE EXCAVATION OR DRILLING?**
   0

6. **LADDERS AVAILABLE IN TRENCHES MORE THAN 4 FEET DEEP AND AT A MINIMUM, 25' INTERVALS ALONG A FENCE?**
   0

7. **EXCAVATED MATERIAL IS AT LEAST 24" FROM THE EDGE OF ALL TRENCHES?**
   0

8. **CONFINED SPACE ENTRY PERMIT PROCEDURE IN PLACE AND COMMUNICATED TO ALL?**
   0

9. **EMPLOYEE TRAINING INCLUDES CSS HAZARDS?**
   0

10. **TUNNELS ARE ADEQUATELY VENTILATED?**
    0

11. **THER IS PROPER LIGHTING?**
    0

**MOTOR VEHICLES/HEAVY EQUIPMENT**

1. **INSPECTED BEFORE EACH USE?**
   0

2. **OPERATORS LICENSED FOR EQUIPMENT USED?**
   0

3. **UNSAFE EQUIP TAGGED OUT AND REPAIRED?**
   0

4. **ALL SAFETY APPLIANCES/GUARDS IN PLACE?**
   0

5. **SHUT DOWN FOR FUELING?**
   0

**SLINGS AND CHAINS**

1. **SLINGS, CHAINS AND RIGGING INSPECTED PER OSHA AND DOCUMENTED?**
   0

2. **DAMAGED SLINGS, CHAINS OR RIGGING TAGGED OUT AND REPAIRED**
   0

---

**E-2**

08:39:01 7145
FIELD SITE SAFETY INSPECTION FORM (CONT'D)

LEGEND X = YES

0 = NO

ELECTRICAL

1. WARNING SIGNS INDICATE HIGH VOLTAGE, 250 V OR GREATER, PRESENT AND LOCATION?

2. ELECTRICAL EQUIPMENT AND WIRING PROPERLY GUARDED?

3. ELECTRICAL LINES, EXTENSION CORDS AND CABLES GUARDED AND PROPERLY MAINTAINED?

4. EXTENSION CORDS KEPT OUT OF WET?

5. DAMAGED EQUIPMENT TAGGED OUT?

6. UNDERGROUND ELECTRICAL LINES LOCATED AND INDICATED?

7. OVERHEAD ELECTRICAL LINES DE-ENERGIZED OR ELEVATED WORK PLATFORMS, WORK AREAS, BOOMS OR LADDERS ERECTED SO NO CONTACT CAN OCCUR WITH ELECTRICAL LINES?

8. A POSITIVE ELECTRICAL LOCK-OUT SYSTEM IS USED WHENEVER WORK IS DONE ON OR IN ELECTRIC EQUIPMENT OR ELECTRICALLY ACTIVATED EQUIPMENT?

HAND AND POWER TOOLS

1. GUARDS AND SAFETY DEVICES IN PLACE AND USED?

2. INSPECTED BEFORE EACH USE?

3. TAGGED OUT IF DEFECTIVE?

4. EYE PROTECTION AREAS IDENTIFIED AND PROTECTION WORN?

5. NON SPARKING TOOLS AVAILABLE?

WELDING AND CUTTING

1. FIRE EXTINGUISHERS PRESENT AT ALL WELDING AND CUTTING OPERATIONS?

2. CONFINED SPACES, TANKS, PIPELINES TESTED BEFORE WELDING OR CUTTING? API OR NFPA PROCEDURES USED?

3. HOT WORK PERMITTING SYSTEM IN USE?

4. PROPER HELMETS AND SHIELDS (INCLUDING PROPER TINT FOR UV PROTECTION) USED?

5. PROPERLY GROUNDED?

6. FUEL GAS AND O₂ GAS CYLINDERS STORED AT LEAST 20' APART? STORED UPRIGHT AND SECURED?

7. ONLY TRAINED WELDERS PERMITTED?

COMPRESSED GAS CYLINDERS/PRESSURIZED LINES

1. BREATHING AIR CYLINDERS CHARGED ONLY TO PRESCRIBED PRESSURE?

2. NO OTHER GAS SYSTEM CAN BE MISTAKEN FOR BREATHING AIR? FITTINGS PROHIBIT CROSS CONNECTION?

3. CYLINDERS SEGREGATED APPROPRIATELY IN CONTROLLED, PROTECTED BUT WELL VENTILATED AREAS?

4. SMOKING PROHIBITED IN STORAGE AREAS? SIGNS SO STIPULATING THIS IN PLACE?

5. CYLINDERS STORED UPRIGHT AND SECURED?

6. CYLINDER CAPS IN PLACE WHEN STORED (NOT IN USE) OR WHEN CYLINDERS MOVED?

7. FUEL GAS AND O₂ MINIMUM 20' APART WHEN STORED?

8. PRESSURIZED AIR OR WATERLINES ARE SECURELY CONNECTED?

9. ALL SITE PERSONNEL KNOW NEVER TO STEP ACROSS A PRESSURIZED LINE?

10. GAS OR OTHER HAZARDOUS LINES ARE LABELED APPROPRIATELY?
FIELD SITE SAFETY INSPECTION FORM (CONT'D)  

LEGEND  X = YES  
0 = NO

MISCELLANEOUS

1. TOOLS AND OTHER EQUIPMENT (PORTABLE) ARE STORED AWAY FROM WALKWAYS, ROADS, OR DRIVEWAYS WHERE THEY CANNOT FALL ON OR BE FALLEN OVER BY SITE PERSONNEL?

2. OVERHEAD HAZARDS ARE NOTED, COMMUNICATED TO ALL AND LABELLED AS NEEDED?

3. HARD HAT, EYE HEARING AND PROTECTION AREAS ARE DEFINED AND SIGNS IN PLACE?

4. HARD HATS, EYE AND HEAD PROTECTION IS USED WHERE APPROPRIATE?

5. SIGNS OR LABELS (AS SHOWN ON THE ATTACHMENT) ARE IN PLACE OR APPROPRIATE TRAINING RECEIVED?

6. COPIES OF CONTRACTS WITH CLIENT AND SUB-CONTRACTORS ARE ON-SITE. WESTON'S ROLE REGARDING SITE HEALTH AND SAFETY RESPONSIBILITIES ARE CLEAR IN THESE AND IN THE MINDS OF THE SITE MANAGER(S)?

7. SUBCONTRACTORS HAVE RECEIVED APPROVED COPIES OF THEIR SAFETY PLAN OR HAVE SIGNIFIED THEIR INTENT TO CONFORM WITH WESTON'S SAFETY PLAN. THIS INTENT HAS BEEN SIGNED BY ALL SITE PERSONNEL AND A SUB-CONTRACTOR COMPANY OFFICER?

8. SITE MANAGERS UNDERSTAND THEIR RESPONSIBILITIES FOR SUB-CONTRACTORS' CONFORMANCE WITH ALL OSHA AND OTHER HEALTH AND SAFETY REQUIREMENTS?

9. SITE MANAGERS KNOW WHAT TO DO IN THE EVENT OF AN OSHA INSPECTION?

COMMENTS

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

E-4
ATTACHMENT F

CONFINED SPACE ENTRY REQUIREMENTS
Confined Spaces Entry

No task(s) involving Confined Spaces Entry may begin until an appropriate Confined Space Entry Permit is issued.

The Site Health and Safety Coordinator is responsible for recognizing confined spaces and issuing these permits.

A confined space is any space having a limited means of egress, which is subject to the accumulation of toxic or flammable contaminants or has an oxygen deficient atmosphere. Confined spaces include, but are not limited to, storage tanks, process vessels, bins, boilers, ventilation or exhaust ducts, sewers, underground utility vaults, tunnels, pipelines, open top spaces more than 4 feet in depth such as pits, tubs, vaults and vessels.

Permits must be reissued at the beginning of each work day, each work shift or if the confined space has not been monitored within 1/2 hour. Specific Confined Spaces entry procedures are found in Confined Spaces Section below.
1.0 CONFINED SPACE ENTRY PROCEDURES

A confined space provides the potential for unusually high concentrations of contaminants, explosive atmospheres, limited visibility, and restricted movement. This section will establish requirements for safe entry into, continued work in, and safe exit from confined spaces. Additional information regarding confined space entry can be found in 29 CFR 1926.21, 29 CFR 1910 and NIOSH 80-106.

1.1 Definitions

Confined Space: A space or work area not designed or intended for normal human occupancy, having limited means of egress and poor natural ventilation; and/or any structure, including buildings or rooms, which have limited means of egress.

Confined Space Entry Permit (CSEP): A document to be initiated by the supervisor of personnel who are to enter into or work a confined space. The Confined Space Entry Permit (CSEP) will be completed by the personnel involved in the entry and approved by the SHSC before personnel will be permitted to enter the confined space. The CSEP shall be valid only for the performance of the work identified and for the location and time specified. The beginning of a new shift with change of personnel will require the issuance of a new CSEP.

Confined Space Observer: An individual assigned to monitor the activities of personnel working within a confined space. The confined space observer monitors and provides external assistance to these inside the confined space. The confined space observer summons rescue personnel in the event of emergency and assists the rescue team.

1.2 General Provisions

- When possible, confined spaces should be identified with a posted sign which reads: "Caution - Confined Space".
- Only personnel trained and knowledgeable of the requirements of these Confined Space Entry Procedures will be authorized to enter a confined space or be a confined space observer.
- A Confined Space Entry Permit (CSEP) must be issued prior to the performance of any work within a confined space. The CSEP will become a part of the permanent and official record of the site.
- Natural ventilation shall be provided for the confined space prior to initial entry and for the duration of the CSEP. Positive/forced mechanical ventilation may be required. However, care should be taken to not spread contamination outside of the enclosed area.
- If flammable liquids, gases or vapors may be contained within the confined space, explosion proof equipment will be used. All equipment shall be positively grounded.
The contents of any confined space shall, where necessary, be removed prior to entry. All sources of ignition must be removed prior to entry.

Feed lines to confined spaces shall be broken and blanked-out and sources of electrical or mechanical energy which could activate any area of the confined space must be identified and shall be tagged and locked out prior to anyone entering a confined space. The lock-out/tag-out procedure must be documented in the CSEP.

Hand tools used in confined spaces shall be in good repair, explosion proof and spark proof, and selected according to intended use. Where possible, pneumatic power tools are to be used.

Hand-held lights and other illumination utilized in confined spaces shall be equipped with guards to prevent contact with the bulb and must be explosion proof.

Compressed gas cylinders, except cylinders used for self-contained breathing apparatus, shall not be taken into confined spaces. Gas hoses shall be removed from the space and the supply turned off at the cylinder valve when personnel exit from the confined space.

If a confined space requires respiratory equipment or where rescue may be difficult, safety belts, body harnesses, and lifelines will be used. The outside observer shall be provided with the same equipment as those working within the confined space.

A ladder is required in all confined spaces deeper than the employee's shoulders. The ladder shall be secured and not removed until all employees have exited the space.

Only self-contained breathing apparatus or NIOSH approved airline respirators equipped with a 5-minute emergency air supply (egress bottle) shall be used in untested confined spaces or in any confined space with conditions determined immediately dangerous to life and health.

Where air-moving equipment is used to provide ventilation, chemicals shall be removed from the vicinity to prevent introduction into the confined space.

Vehicles shall not be left running near confined space work or near air-moving equipment being used for confined space ventilation.

Smoking in confined spaces is prohibited.

Any deviation from these Confined Space Entry Procedures requires the prior permission of the Corporate Health and Safety Director.
1.3 Procedure for Confined Space Entry

- Evaluate the job to be done and identify the potential hazards before a job in a confined space is scheduled.
- Ensure that all process piping, mechanical and electrical equipment, etc., have been disconnected, purged, blanked-off or locked and tagged as necessary.
- If possible, ensure removal of any materials that may produce toxic or air displacing gases, vapors, or dust.
- Initiate a Confined Space Entry Permit (CSEP)
- Ensure that any hot work (welding, burning, open flames, or spark producing operation) that is to be performed in the confined space has been approved by the SHSC and is indicated on the CSEP.
- Ensure that the space is ventilated before starting work in the confined space and for the duration of the time that the work is to be performed in the space.
- Ensure that the personnel who enter the confined space and the confined space observer are familiar with the contents and requirements of this instruction.
- Ensure remote atmospheric testing of the confined space prior to employee entry and before validation/revalidation of a CSEP to ensure the following:
  1. Oxygen content between 19.5% - 23.0%.
  2. No concentration of combustible gas in the space. Sampling will be done throughout the confined space and specifically at the lowest point in the space.
  3. The absence of other atmospheric contaminants, if the space has contained toxic, corrosive, or irritant material.
  4. If remote testing is not possible, Level B PPE is required as referenced in III 13. A monitor for oxygen content and combustible gases will be carried into the confined space with the entry team.
- Designate whether hot or cold work will be allowed. If all tests in a. through c. in IV 8 are satisfactory, complete the CSEP listing any safety precautions, protective equipment, or other requirements.
- The CSEP must be posted at the work site, and a copy placed in the project health and safety file after use.

The CSEP shall be considered void if work in the confined space does not start within one half hour after the tests in IV 8 are performed or if significant changes within the confined space atmosphere or job scope occurs.

The posted CSEP shall be removed at the completion of the job or the end of the shift, whichever is first.
1.4 Confined Space Observer

- While personnel are inside the confined space, a confined space observer will monitor the activities and provide external assistance to those in the space. The observer will have no other duties which may take his attention away from the work or require him to leave the vicinity of the confined space at any time while personnel are in the space.

- The confined space observer shall maintain some form of contact with all personnel in the confined space. Visual contact is preferred, if possible.

- The observer shall be instructed by his supervisor in the method for contacting rescue personnel in the event of an emergency.

- If irregularities within the space are detected by the observer, personnel within the space will be ordered to exit.

- In the event of an emergency, the observer must NEVER enter the confined space prior to contacting and receiving assistance from a helper. Prior to this time, he should attempt to remove personnel with the lifeline and to perform all other rescue functions from outside the space.

- A helper shall be designated to provide assistance to the confined space observer in case the observer must enter the confined space to retrieve personnel.
PROCEDURE - A confined space entry permit form will be prepared and updated as needed for all entries to any confined space. It is the responsibility of the Site Health and Safety Coordinator to prepare and keep current the permit. Permits must be renewed as conditions require but no less frequently than the beginning of each day or shift.

DEFINITION - A confined space is any area which is so enclosed that natural ventilation will not maintain an adequate oxygen concentration (20%) or remove toxic or combustible gases or vapors sufficiently to remove risk of illness or explosion.

EXAMPLES - Examples of confined spaces are sewer system manholes, syphon chambers, pump station wet wells and underground levels, sewer lines, chlorine pits, treatment tanks, utility tunnels, vaults and storage rooms or other closed areas of chemical manufacturing or storage facilities.

ENTRY PERMIT

1. Qualified safety watch stationed outside? ______ NAME__________________________

2. SCBA __ or Combination airline/SCBA worn by safety watch? ______

3. Respirator checked out? ______

4. Chemical and physical protective clothing required? ______
   Hard Hat __, eye & face protection ___, rain gear ___, Saran tyvek ___,
   acid suit ___, inner gloves ___, outer gloves ___, inner boots ___,
   outer boots ___, other _____________________________________________.

5. Equipment indicated above available for Safety Watch ______, entering workers ______

6. PP/ID SCBA or Combination and/or forced ventilation for entering workers ______

7. Ventilation (forced or natural) plus knowledge of contents and air monitoring will all entry without air supplying respirators ________.


11. Lighting explosion proof? ______

12. Explosion proof tools used? ______

13. Confined space requires continuous monitoring from outside? _____, By entry team? _____

14. Safety watch has lock-out keys? ______

15. Feed lines blanked out? _____, Electric lines/controls de-energized? _____,
   locked out? _____, tagged? _____, Mechanical equipment locked out? _____, Tagged? _____

F-6  02/03/061  7154
Contaminants to be monitored for: O₂  COMBUST  CO  H₂S  Org. Vap.

Initial levels without vent

Initial Levels with vent

LEVELS SAFE FOR ENTRY

THIS CONFINED SPACE

(Identify confined space specifically)

HAS BEEN PERMITTED WITH THE STIPULATIONS STATED ON THE REVERSE BY:

_________________________________ Date ___/___/____ Time ______

(SHSC Signature)

Permit must be renewed ________________

FURTHER CONDITIONS FOR TANK ENTRY

A. All sources of ignition (matches, open flames, smoking, gas engines, welding, exposed electrical wiring and equipment) removed from the vicinity of the tank? ___

B. Gases or vapors from tank cannot reach ignition sources or populated areas? ___

C. All product, steam, foam or similar lines are disconnected and blanked? ___

D. All agitators and other mechanical devices locked out? ___

E. API ___ or NFP A ___ procedures will be used for all cutting on tanks and any other closed system including transport lines.

F. Steam ___ Water wash lines bounded to tank? ___

G. Cutting on feed lines or other closed system which have not been steamed or otherwise shown to be clean will be in Level B protection. ___ A Hot Work Permit will be needed? ___

ENTRY TEAM AND SAFETY WATCH SIGN-OFF

I/We have read this confined space entry permit and understand the requirements.

_________________________________  __________________________________

(Name)  (Name)

_________________________________  __________________________________

(Name)  (Name)

_________________________________  __________________________________

(Name)  (Name)

_________________________________  __________________________________

(Name)  (Name)

THIS CONFINED SPACE ENTRY PERMIT MUST BE POSTED AT THE SITE LISTED ABOVE. WHEN A NEW PERMIT IS ISSUED, THIS PERMIT MUST BE RETAINED IN THE SITE FILES.