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Volume 4
Health and Safety Plan (HSP)
Phase 1, Task 4 Field Investigation

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Figure 4-2 WPAFB Medical Center Location
LIST OF ACRONYMS

ACGIH American Conference of Governmental Industrial Hygienists
ANSI American National Standards Institute
APR Air Purifying Respirator
CFR Code of Federal Regulations
CNS Central Nervous System
CONRAIL Consolidated Rail Corporation
CPR Cardiopulmonary Resuscitation
DCA 1,2-Dichloroethane
DCE 1,1-Dichloroethylene
ECRP Emergency Contingency and Response Plan
EPA U.S. Environmental Protection Agency
HR Heart Rate
HSC Health and Safety Coordinator
HSP Health and Safety Plan
IDLH Immediately Dangerous to Life and Health
IT International Technology Corporation
LEL Lower Exposure Limit
MSDS Material Safety Data Sheet
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSHA</td>
<td>Mining Safety and Health Administration</td>
</tr>
<tr>
<td>NFPA</td>
<td>National Fire Protection Association</td>
</tr>
<tr>
<td>NIOSH</td>
<td>National Institute of Occupational Safety and Health</td>
</tr>
<tr>
<td>NOAA</td>
<td>National Oceanic and Atmospheric Administration</td>
</tr>
<tr>
<td>OEPA</td>
<td>Ohio Environmental Protection Agency</td>
</tr>
<tr>
<td>OJTR</td>
<td>On-The-Job Training Record</td>
</tr>
<tr>
<td>OSHA</td>
<td>Occupational Safety and Health Administration</td>
</tr>
<tr>
<td>OVA</td>
<td>Organic Vapor Analyzer</td>
</tr>
<tr>
<td>PCE</td>
<td>Perchloroethylene</td>
</tr>
<tr>
<td>PEL</td>
<td>Permissible Exposure Limit</td>
</tr>
<tr>
<td>PVC</td>
<td>Polyvinyl Chloride</td>
</tr>
<tr>
<td>SAP</td>
<td>Sampling and Analysis Plan</td>
</tr>
<tr>
<td>SCBA</td>
<td>Self-Contained Breathing Apparatus</td>
</tr>
<tr>
<td>SOP</td>
<td>Standard Operating Procedure</td>
</tr>
<tr>
<td>SSO</td>
<td>Site Safety Officer</td>
</tr>
<tr>
<td>STEL</td>
<td>Short Term Exposure Limit</td>
</tr>
<tr>
<td>TCA</td>
<td>1,1,1-Trichloroethane</td>
</tr>
<tr>
<td>TCE</td>
<td>Trichloroethylene</td>
</tr>
<tr>
<td>TLV</td>
<td>Threshold Limit Value</td>
</tr>
<tr>
<td>USCG</td>
<td>U.S. Coast Guard</td>
</tr>
<tr>
<td>VC</td>
<td>Vinyl Chloride</td>
</tr>
<tr>
<td>VOC</td>
<td>Volatile Organic Compound</td>
</tr>
</tbody>
</table>
WBTI  Wet Bulb Temperature Index

WPAFB  Wright-Patterson Air Force Base
1.0 INTRODUCTION

This Health and Safety Plan (HSP) was developed for the Environmental Investigation of Ground-Water Contamination Investigation at Wright-Patterson Air Force Base near Dayton, Ohio, based on the projected scope of work for the Phase I, Task 4 Field Investigation. The HSP describes hazards that may be encountered during the investigation, assesses the hazards, and indicates what type of personal protective equipment is to be used for each task performed. The HSP also addresses the medical monitoring program, decontamination procedures, air monitoring, training, site control, accident prevention, and emergency response. The contents of this plan are in compliance with current regulations and guidelines, including:

- Occupational Safety and Health Administration (OSHA) Standards 29 CFR 1910 and 1926 especially the Final Rule for Hazardous Waste Operations, 29 CFR 1910.120.


This plan consists of three major parts. The first part provides the site-specific Health and Safety Plan. The second part is the general Health and Safety Program, and the third part is the Emergency Contingency and Response Plan. The HSP is based on information available as of July 1990, and is subject to revision as new data and information concerning health and safety become available.
2.0 SITE SPECIFIC HEALTH AND SAFETY PLAN

2.1 SITE BACKGROUND

Wright-Patterson Air Force Base (WPAFB) is located in southwestern Ohio east of the city of Dayton. The Base is comprised of two areas, Areas A and C and Area B. Areas A and C include the active flightlines of Patterson Field. Area B, which lies to the south and southwest of Areas A and C includes the abandoned runways of Wright Field. These two areas are physically separated by Springfield Pike (State Route 444) and the Consolidated Rail Corporation (CONRAIL) tracks (Figures 2-1 and 2-2).

The focus of the Phase I, Task 4 Field Investigation includes the western boundary of Area C, and the northern boundary of Area B along Springfield Pike.

2.2 KNOWN SITE HAZARDS

2.2.1 Chemical Hazards

Past investigations at WPAFB have identified that volatile organic compounds (VOC's) in environmental samples are present in ground water. Detected chlorinated organic solvents include 1,2-dichloroethane (DCA), 1,1-dichloroethylene, (DCE), perchloroethylene (PCE), 1,1,1-trichloroethane (TCA), trichloroethylene (TCE), and vinyl chloride (VC). Although, the source of these contaminants is not fully characterized, it is reasonable to assume that VOC's may be found in the soil, and ground water at the Base.

2.2.2 Physical Hazards

The physical hazards at WPAFB and hazard control methods or Standard Operating Procedures (SOP's) are described in this section.

2.2.2.1 Drilling Operations

Physical hazards are those associated with subsurface drilling operations and the use of heavy equipment. Underground utilities, underground storage tanks and other subsurface obstructions must be positively located before soil borings are installed. The drill rig presents a physical hazard in itself, including the potential for being struck by overhead objects, the use of heavy equipment, and the operation of rotary machinery. Fingers can be severed if the rope "grabs" the "cat head" during hammering operations; this is more likely to occur if the rope is damp or wet.
Figure 2-1. Wright-Patterson Air Force Base Site Plan, Area B (Wright Field).
Hazard Control

The IT Project Manager will be responsible for securing utility clearances. The driller must also use caution during damp weather when using the hammer rope and "cat head". The Site Safety Officer (SSO) has the authority to stop site activities if weather conditions increase the hazard of site operations. After dark work will be stopped by the SSO if Level C full-faced respirator is required due to site conditions (Section 2.4).

2.2.2.2 General Safety

Physical hazards include those found with any outdoor labor: slips, trips and falls, and material handling (back injuries). Biological hazards may be typically present in the outdoors including ticks, mosquitoes, or other pests.

Hazard Control

Site workers should stay alert to the activity around them and the walking surfaces where they are working. Practice proper lifting methods. Insect repellents should be used if insects are found to be a problem.

2.3 HAZARD EVALUATION, SITE CONTAMINATION

2.3.1 Route of Exposure

The chemical contaminants may be a health hazard to site personnel via ingestion, skin absorption, or inhalation. Accidental ingestion of contaminants may occur via dust or soil on the hands. Ingestion may also occur if the dust is inhaled. Inhalation of vapors may occur during soil disruptive activities, water sampling, sample collection, and sample preparation. Skin absorption is possible if skin is in direct contact with contaminated soil, water or sediment.

2.3.2 Occupational Exposure Levels

A complete description of the contamination at WPAFB cannot be provided; however, a list of compounds that are likely to be encountered and the established levels for occupational exposure are shown in Table 2-1.
<table>
<thead>
<tr>
<th>Substance</th>
<th>CAS No.</th>
<th>PEL</th>
<th>Ceiling</th>
<th>STEL</th>
<th>Health effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>perchloroethylene</td>
<td>127-18-4</td>
<td>25</td>
<td>200</td>
<td>--</td>
<td>potential carcinogen, irritates eyes and nervous membranes. May cause headaches, narcosis.</td>
</tr>
<tr>
<td>(tetrachloroethylene)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,1,1-trichloroethane</td>
<td>71-55-6</td>
<td>310</td>
<td>--</td>
<td>450</td>
<td>may cause dizziness, sleepiness, headaches. Irritates eyes.</td>
</tr>
<tr>
<td>(methyl chloroform)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>chloroform</td>
<td>57-66-3</td>
<td>2</td>
<td>--</td>
<td>--</td>
<td>potential carcinogen. Irritates eyes, skin. May cause dizziness, mental dullness.</td>
</tr>
<tr>
<td>trichloroethylene</td>
<td>79-01-6</td>
<td>100</td>
<td>300</td>
<td>200</td>
<td>potential carcinogen. Irritates eyes, and mucous membranes.</td>
</tr>
<tr>
<td>1,1-dichloroethene</td>
<td>75-35-4</td>
<td>1</td>
<td>--</td>
<td>--</td>
<td>may cause CNS depression, eye irritation.</td>
</tr>
<tr>
<td>(vinylidene chloride)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,2-dichloroethane</td>
<td>107-06-2</td>
<td>1</td>
<td>100</td>
<td>--</td>
<td>potential carcinogen. May cause CNS depression, nausea. Irritates eyes and skin.</td>
</tr>
<tr>
<td>(ethylene dichloride)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vinyl chloride</td>
<td>75-01-4</td>
<td>1</td>
<td>--</td>
<td>5</td>
<td>carcinogen. Inhalation can cause weakness, abdominal pain, liver, and CNS effects.</td>
</tr>
</tbody>
</table>

Footnotes:

PEL  OSHA Permissible Exposure Limit, 8-hour time-weighted average.
Ceiling OSHA exposure limit that shall not be exceeded for any period of time.
STEL Short Term Exposure Limit: A 15-minute time-weighted average which should not be exceeded at any time during the work day.
CNS  Central nervous system.
2.4 AIR MONITORING

Depending on the work to be completed, continuous or periodic daily air monitoring by qualified personnel may be required using a direct-reading instrument such as a photolization detector with a 11.7 eV lamp (HNU), and/or flame ionization detector (organic vapor analyzer, OVA). Air monitoring using one of these instruments will be conducted at the beginning of each day when each site is entered to establish background concentrations. Continuous or periodic air monitoring shall be performed during all drilling activities. Daily monitoring levels shall be recorded on a form such as the Real Time Air Monitoring Log (Appendix E, Figure 11) for each work location. Periodic monitoring shall also be conducted during drilling and soil sampling. Monitoring for flammable/oxygen deficient atmospheres is to be conducted using a MSA 260, GasTech 1314, or equivalent combustible gas/percent oxygen meter, at the discretion of the SSO.

It will be the responsibility of the Health and Safety Coordinator (HSC) or SSO to define the proper monitoring effort prior to the commencement of the work activity. Based on the results of the air monitoring, the SSO has the authority to upgrade or down grade the level of protection.

Monitoring equipment shall be checked to note if they are functioning properly prior to each shift’s start-up, and measured background levels shall be recorded. Calibration of equipment will be conducted at the beginning of each work day; all calibration activities will be recorded on a Calibration Log (Appendix B, Figure 12).

2.5 PERSONAL PROTECTIVE EQUIPMENT

2.5.1 Levels of Protection

Personal protective equipment must be compatible with and must provide protection against the chemical compounds identified on site. The selection of protective equipment and clothing shall be in accordance with the work activity and hazardous/toxic vapor concentrations. Personnel protective equipment shall provide respiratory, skin, head, foot, ear and eye protection for personnel operating in the designated exclusion and contamination reduction zones. Respiratory equipment shall be MSHA/NIOSH certified. The projected work to be conducted at the facility will require Level D and possibly Level C protection. Use of Level B protection is not anticipated to complete the present scope of work. The HSC is responsible for
designating the appropriate level of protection for each activity. The SSO may authorize a change in level of protection based on an evaluation of actual field conditions after consulting with the HSC.

2.5.1.1 Level D

Level D protection should be worn only as a work uniform and not in any work area with respiratory or skin hazards. The following criteria allow the use of Level D protection: direct reading instruments indicate levels from background to 5 ppm above background in the breathing zone; and the specific work function precludes splashes, immersion, or potential for unexpected inhalation of any chemicals.

Personal protective equipment includes:
- Coveralls or work uniform.
- Gloves*.
- Boots, leather or PVC (chemical resistant) steel toe and shank.
- Safety glasses or chemical splash goggles.
- Hard hat*.
- Hearing protection*.
- Face shield*.

*Optional, as applicable to task.

2.5.1.2 Level D-Plus

Level D-Plus is worn in areas where there are no respiratory hazards, but there may be low levels of skin hazards. The criteria for use of Level D-Plus are: direct reading instruments indicate levels from background to 5 ppm above background in the breathing zone; and occasional splashes or contact with environmental media may occur.

Personal protective equipment includes:
- Coveralls or work uniform.
- Gloves.
- Boots, Nitrile PVC (chemical resistant) steel toe and shank.
• Outer boots, latex or natural rubber (disposable)*.
• Safety glasses or chemical splash goggles.
• Hard hat*.
• Disposable Tyvek coveralls*.
• Hearing protection*.
• Face shield*.

*Optional, as applicable to task.

2.5.1.3 Level C

Level C protective equipment should be worn when concentration(s) and type(s) of airborne substance(s) are known and the criteria for using air purifying respirators are met. The criteria for use of Level C protection are as follows:

• Oxygen concentrations are not less than 19.5% by volume.
• Measured air concentrations of identified substances will be reduced by the respirator below the substance’s threshold limit value or permissible exposure limit (PEL) and the concentration is within the service limit of the canister/cartridge.
• Atmospheric contaminant concentrations do not exceed Immediately Dangerous to Life or Health (IDLH) levels.
• Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any body area left unprotected by chemical-resistant clothing.
• Job functions do not require self-contained breathing apparatus (SCBA).
• Direct readings are 5 ppm above background to 50 ppm above background on instruments such as the HNu or OVA.

Level C includes:

• Air-purifying respirator, full-face, canister/cartridge equipped for organic vapors, acid gas and particulates (MSHA/NIOSH approved), MSA GMC-H or equivalent.
• Chemical-resistant clothing (hooded, one-piece or two-piece chemical splash suit; chemical-resistant hood and apron; or disposable chemical-resistant coveralls).

• Gloves (outer), nitrile*.

• Gloves (inner), latex*.

• Boots, chemical-resistant PVC steel toe and shank.

• Boot covers, latex (disposable)*.

• Hard hat (face shield*).

• Escape mask*.

• Hearing protection*.

• 2-way radio communications* (intrinsically safe).

*Optional, as applicable to task.

2.5.2 Activity-Specific Levels of Protection

The following is a designation of the levels of protection that are deemed appropriate to the work activities for this investigation. The HSC and/or SSO may alter this program if the investigation reveals that additional protection is necessary:

• Soil borings and subsurface soil sampling--Level D--with hard hat, safety glasses and hearing protection.

• Monitoring well installation--Level D--(hard hat, safety glasses and hearing protection only if drill rig is present).

• Well development and ground water sampling--Level D-- safety glasses, chemical resistant gloves, and chemical resistant boots.

2.5.3 Respiratory Protection

Use of respiratory equipment on site shall be in compliance with the requirement of 29 CFR 1910.134, specifically with regard to maintenance, inspection, fit testing and operation. The requirements of the American National Standards Institute (ANSI) Z88.2-1980 Practice for Respiratory Protection, will also be followed.

The following respiratory protection program for Level C shall be followed:
• Air-purifying cartridges shall be replaced at the end of each shift or if breakthrough or load-up occurs.

• Only employees who have had pre-issue qualitative fit tests, and annual fit test thereafter, shall be allowed to work in atmospheres where respirators are required.

• No employee shall be assigned to tasks requiring the use of respirators if, based on the most recent examination, a physician determines that the employee will be unable to function normally wearing a respirator or that the health and safety of the employee or other employees will be impaired by use of a respirator.

• If a physical examination yields no medical reason, but an employee has demonstrated difficulty in breathing during the fit test or during use, he or she shall be evaluated to determine whether the employee can perform the required duty.

• The employee shall be permitted to change cartridges whenever an increase in breathing resistance is detected.

• Beards and other facial obstructions which prevent a good seal between the face and respirator will not be allowed.

• Each respiratory facepiece shall be individually assigned and not interchanged between workers without cleaning and sanitizing. Contact lenses are not to be worn with respirators.

• A procedure shall be established for ensuring daily cleaning, maintenance, and change-out of canister/cartridges, in the event respirator use becomes necessary.

2.5.4 Action Levels

The site hazards identified in Section 2.2.1 are relatively low levels of VOC's in ground water and in soil. The following action levels are designated for the work to be conducted at WPAFB.

• Based on OVA and HNu readings for VOC contaminants, action levels are recommended as:

  - Level D: Readings up to 5 ppm above background in the breathing zone. Field personnel will use their experience and judgement to aid in determining whether an initial reading greater than background is "drift" on the equipment, exhaust from a vehicle, or an additional source of erroneous reading. However, personnel will not be allowed to continue work in the area until the cause for the reading
has been determined. Cause will be determined using direct measuring devices, such as Draeger Tubes. Representative tubes (i.e., chloroform, trichloroethylene, perchloroethylene, and vinyl chloride) reflecting the range of contaminant types and PEL's will identify the type of chemical threat presented. The determination must be documented in the field activity daily log. Special emphasis will be placed in evaluation of personnel protection while drilling well cluster CW-5.

- Level C: Reading 5 ppm above background to 50 ppm above background in the breathing zone.

- Any breathing zone level beyond 50 ppm above background for five minutes or more will require withdrawal from the site. The Safety Coordinator and the Project Manager will be advised of the situation, and the Health and Safety Plan will be reevaluated, as necessary.

- A combustible gas meter/oxygen analyzer will be set to alarm at 10% of the lower explosive limit (LEL) and at oxygen levels of 19 percent. Conditions which exceed limits will require Level B protection or withdrawal from the area until conditions improve. The HSC will be immediately notified if this situation occurs.

- If non-aqueous phased liquids are encountered, personnel protection requirements will be re-evaluated and actions will be documented in the field activity daily log.

2.6 SITE CONTROL

The purpose of site control is to minimize the transfer of contaminants to surrounding areas and within the project site. Two contamination control methods are: 1) establishment of work zones at the project site; and 2) decontamination of field personnel and equipment.

2.6.1 Work Zones

The following discussion of work zones relates primarily to drilling activities. Less stringent work zones will be established for activities where potential contact with contaminants will be less likely.

Regulated areas will be established at the locations shown on Figure 2-4 within the job site to control the indiscriminate dispersion of contamination around the work area and to minimize personnel exposures and equipment contamination. Access to these controlled areas will be restricted to those designated employees who are qualified in
Figure 2-4. Site map delineating work zones
accordance with the HSP to perform hazardous materials work, who are properly attired in the required personal protective equipment, and have received authorization from the Project Manager and the HSC or SSO.

Three distinct control zones will be used to regulate the job site: Exclusion Zone, Decontamination Zone and Support Zone.

2.6.1.1 Exclusion Zone

This zone includes the actual areas of contamination and has the highest inhalation and skin exposure potential to chemicals on site. Wherever possible the Exclusion Zone will be delineated with stakes and hazard tape. During field activities at the project site, a 50 foot diameter circle surrounding the drill rig or monitoring well is included in the exclusion zone, shown on Figure 2-5. All personnel entering this zone must wear required protective equipment.

2.6.1.2 Decontamination Zone

The decontamination zone is situated at the interfaces of the Exclusion Zone and the Support Zone and includes the areas immediately surrounding the Exclusion Zone. Decontamination of equipment and personnel will be conducted in the Decontamination Zone before crossing into the Support Zone.

2.6.1.3 Support Zone

The Support Zone includes all areas outside of the Decontamination Zone which are considered to have no significant air, water or soil contamination. The Support Zone provides a changing area for personnel entering the Decontamination and Exclusion Zones.

The HSC/SSO shall clearly define and mark work zones in and around the site and shall specify equipment, operations, and personnel requirements within these areas.

2.6.2 Personnel Decontamination

All personnel working within the Exclusion Zone will be required to pass through a decontamination station to remove and/or wash off their protective equipment and clothing before they are permitted to enter the non-contaminated support areas of the job site. A decontamination line, consisting of plastic-lined containers and buckets of trisodium phosphate or Alconox detergent and water solutions will be set up in the Decontamination Zone. The decontamination process will require that all personnel
Figure 2-5. Generalized illustration of the exclusion zone at each drilling site.
 exiting the Exclusion Zone step into the decontamination line and complete the following decontamination steps:

- Wash and rinse/dispose outer suit, respirator, gloves and boots.
- Untape ankles and wrists.
- Remove outer suit, gloves, boot covers and hard hat.
- Wash and rinse/dispose inner gloves.
- Remove respirator, inner boots, wash hands and face, dry with paper towels.
- Exit into the Support Zone.

This procedure may be modified depending on the site conditions.

The break area will be the Decontamination Zone. All outer protective equipment shall be decontaminated before removal for a break. Drinking will be permitted in the decontamination zone only after hands and face have been washed. Eating and smoking is only permitted in the Support Zone.

2.6.3 Equipment Decontamination

All equipment used in exclusion zones during the field investigation shall be cleaned in the decontamination area before removal to the Support Zone. Protective equipment such as respirator facepieces will be decontaminated at the end of the shift. Heavy equipment will be transported to and be steam cleaned in a specified decontamination area before removal to the Support Zone. Monitoring equipment, (e.g., HN<sub>u</sub> meter, OVA meter, etc.), will be protected from the contamination to the extent practical by plastic bags. Exposed parts will be cleaned with wet cloths and alcohol wipes. Decontamination procedures for sampling equipment are presented in the Sampling and Analysis Plan (SAP).

Sampling equipment used in the field will be decontaminated following procedures specified in the SAP. Equipment to be decontaminated includes stainless steel bailers and wire leaders, augers, split spoons and any other sampling equipment that may come into contact with potentially contaminated soil or ground water.
2.6.4 Waste Disposal

Disposable protective clothing, APR cartridges and decontamination solution will be contained, bagged, labeled and secured for proper disposal, according to applicable state and federal regulations.

2.7 TEMPERATURE EXTREMES

The field investigations are expected to begin in September 1990 and be completed by October 1990. During this time period, the average seasonal maximum ambient temperature is as high as about 85°F during the early stages of the program.

Heat stress is a concern wherever impermeable or semi-impermeable garments are worn, this includes tyvek and coated tyvek. Heat stress and SOPs for prevention are reviewed below.

2.7.1 Heat Stress

The use of personal protective equipment during warm weather puts site workers at an additional risk to heat stress and other heat-related problems. Site personnel must be alerted to the following signs and conditions:

- **Heat Rash**: May result from continuous exposure to heat; person may experience decreased tolerance of heat, chafing and irritation from clothes.
- **Heat Cramps**: Muscle spasms and pain in the extremities and abdomen.
- **Heat Exhaustion**: Shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and lassitude.
- **Heat Stroke**: Red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong rapid pulse; coma. Immediate medical assistance must be obtained.

The HSC/SSO shall visually monitor all personnel to look for signs of heat stress. In addition, all field personnel will be instructed how to recognize symptoms of heat stress and will be apprised of the following methods on how to control heat stress:

- Provision of adequate liquids to replace lost body fluids. Employees must replace water and salt lost from sweating. Employees must be encouraged to drink more than the amount required to satisfy thirst. Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement.
• Replacement fluids can be commercial mixes such as Gatorade or Quick Kick. Workers should drink 16 ounces before beginning work.

• Establishment of a work regime that will provide adequate rest periods for cooling down. This may require additional shifts of workers.

• Cooling devices such as vortex tubes or cooling vests can be worn beneath protective garments.

• All breaks are to be taken in a cool shaded rest area.

• Employees shall remove impermeable protective garments during rest periods.

• Employees shall not be assigned other tasks during rest periods.

• All employees shall be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress.

When workers are wearing semipermeable or impermeable protective clothing, heat stress monitoring as recommended in the NIOSH/OSHA/USCG/EPA manual will be employed when ambient temperatures exceed 70°F.

• Heart Rate (HR) 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 per minute. If the HR is higher, the next work period should be shortened by 10 minutes, while the length of the rest period stays the same. If the pulse rate is 100 beats per minute at the beginning of the next rest period, the following work cycle should be shortened by another 33 percent.

When practical, the following monitoring methods will also be employed:

• Oral temperature. Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period. Oral temperature must be taken before the worker drinks anything.

If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period.

If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following work cycle by one-third.

Do not permit a worker to wear a semipermeable or impermeable garment when his/her oral temperature exceeds 100.6°F (38.1°C).
• Body water loss, if possible. Measure weight on a scale accurate to ± 0.25 lb at the beginning and end of each work day to see if enough fluids are being taken to prevent dehydration. Weights should be taken while the employee wears similar clothing or ideally, is nude. The body water loss should not exceed 1.5 percent total body weight loss in a work day.

When protective clothing is not being worn, the heat stress of employees on site may be monitored by the Wet Bulb Globe Temperature Index (WBGT) technique. This method will require the use of a heat stress monitoring device, such as the Wibget Heat Stress Monitor (Reuter Stokes), or Botsball thermometer. The WBGT shall be compared to the Threshold Limit Value (TLV) outlined in the ACGIH TLVs Manual, and a work-rest regime established, as necessary, according to the WBGT obtained.

2.8 NIGHT WORK

After sunset outdoor work areas must be adequately illuminated as described in Table 2.2. No work will be completed from 30 minutes before sunset to sunrise if Level C working conditions are required.
### TABLE 2.2 MINIMUM ILLUMINATION INTENSITIES IN FOOT-CANDLES

<table>
<thead>
<tr>
<th>Foot-Candles</th>
<th>Area or Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>5..............</td>
<td>General site areas.</td>
</tr>
<tr>
<td>3..............</td>
<td>Excavation and waste areas, access-ways, active storage areas, loading platforms, refueling, and field maintenance areas.</td>
</tr>
<tr>
<td>5..............</td>
<td>Indoors: warehouses, corridors, hallways, and exit-ways.</td>
</tr>
<tr>
<td>10...............</td>
<td>General shops (e.g., mechanical and electrical equipment rooms, active storerooms, barracks or living quarters, locker or dressing rooms, dining areas, and indoor toilets and workrooms.</td>
</tr>
<tr>
<td>30...............</td>
<td>First aid stations, infirmaries, and offices.</td>
</tr>
</tbody>
</table>

3.0 HEALTH AND SAFETY PROGRAM

3.1 STANDARD OPERATING PROCEDURES

The following work practices will be adhered to during the field investigation:

- Contamination (Exclusion and Decontamination) zones as established on the site shall be observed. Entry into the contamination zones shall be by prior notification and authorization of the Project Manager/HSC/SSO who established the zone. All required protective clothing shall be worn prior to entering contamination zones.

- Contaminated protective equipment, such as respirators, gloves, boots, etc., shall not be removed from the regulated area until they have been properly cleaned.

- Legible and understandable precautionary labels shall be prominently affixed to containers of contaminated scrap, waste, debris, and clothing.

- Contaminated materials shall be stored in tightly-closed containers in well-ventilated areas.

- No food or beverages shall be present or consumed in the regulated area.

- No tobacco products shall be present or used, and cosmetics shall not be applied in the regulated area.

- Emergency equipment shall be located outside storage areas in readily accessible locations which will remain minimally contaminated in an emergency.

- Personnel on site shall use the "buddy" system (pairs). Buddies should prearrange hand signals for communication in case of lack of radios or radio breakdown. Communication or visual contact shall be maintained between crew members at all times.

- Field personnel must observe each other for signs of toxic exposure. Indications of adverse effects include, but are not limited to:
  - Changes in complexion and skin discoloration
  - Changes in coordination
  - Changes in demeanor
  - Excessive salivation and pupillary response
  - Changes in speech pattern.

- Field personnel shall be cautioned to inform each other of non-visual effects of toxic exposure such as:
- Headaches
- Dizziness
- Nausea
- Blurred vision
- Cramps
- Irritation of eyes, skin, or respiratory tract.

Any detected effects of toxic exposure shall be reported to the SSO immediately.

- The wearing of contact lenses is not allowed on-site.
- An emergency eyewash unit shall be located in close proximity to employees handling hazardous or corrosive materials, including decontamination fluids.
- If any on-site activities, including decontamination, continue later than dusk, adequate lighting must be provided. No work is to be conducted during storms.
- Enter work-site upwind (as possible) from visible contamination; this area should be marked by flagging. Practice contamination avoidance.

3.2 HEALTH AND SAFETY PROGRAM STRUCTURE

This HSP prescribes workplace procedures which will be followed in order to protect any persons who may be potentially exposed to hazardous materials present at the facility. The requirements listed may change as work progresses due to changing conditions, but no changes will be made without prior approval by the HSC. The program outlined is for IT employees, subcontractor personnel, and authorized visitors.

3.2.1 Project Manager

Project Manager is responsible for the safe and successful completion of the project. The Project Manager reports to the HSC on all matters pertinent to health and safety. This includes conducting audits, and consulting with the HSC and his representatives regarding appropriate changes in safety and health requirements. The Project Manager will be Mr. William Thompson.

3.2.2 Site Coordinator

The site coordinator is responsible for day-to-day implementation of the HSP and communicating specific health and safety requirements to all personnel. The Site
Coordinator will act as the SSO when the HSC is not present. The Site Coordinator also assumes specific responsibilities in the Emergency Contingency and Response Plan. (Section 4.0). The Site Coordinator will be Mr. Charles Schick.

3.2.3 Health and Safety Coordinator (HSC)

The HSC (who shall be a Professional Industrial Hygienist) will be responsible for the coordination of this plan. Only the HSC can change the provisions of this Plan. He, or his representative, the SSO, will be on-site for the project start-up and as necessary thereafter to supervise the worker protection program and evaluate compliance with this plan. Liaison with the Project Manager, officers or representatives of the facility on matters relating to safety and health will be handled by the HSC and SSO. The authority of the HSC supersedes that of the Project Manager on health and safety issues. The HSC will be Mr. William Max.

3.2.4 Site Safety Officer (SSO)

The SSO is responsible to the HSC for the implementation of this plan. His or her responsibilities are:

- Supervise the day-to-day implementation of the site-specific health and safety program.
- Train new site personnel on site specific health and safety items.
- Interact with project personnel on health and safety matters.
- Investigate and report accidents/incidents.
- Maintain liaison between field activities, the Project Manager, and the HSC.
- Perform air quality and personal monitoring as required.
- Assist the Project Manager in enforcing the requirements of this manual and the site-specific program.
- Complete all required forms on a timely basis.

The acting SSO for this investigation will be the Site Coordinator, Mr. Charles Schick.
3.2.5 IT Employees, Subcontractor Site Workers and Visitors

All facility employees and subcontractor personnel who may be exposed to the hazardous materials on-site are responsible for understanding and complying with the requirements of this plan, and must sign a statement that they have read, understood, and will abide by the plan (Figure 1, Appendix B). Failure to comply with this plan will result in disciplinary action, which could lead to removal from the site or termination.

With the exception of regulatory personnel, visitors will not be allowed to enter the Exclusion or Decontamination Zones (Section 2.6.1.1 and 2.6.1.2) unless they have: completed the requirements for training (Section 3.4) and medical surveillance (Section 3.5); read and understood this HSP; and have permission of the Project Manager, the HSC or the SSO. Regulatory personnel are responsible for providing their own safety equipment and obtaining their own medical monitoring, health and safety training, and respirator fit testing.

3.3 RECORD KEEPING AND DATA MANAGEMENT

Proper record keeping and data management are essential in the implementation of this HSP. The forms associated with the record keeping and data management requirements must be completed in an accurate, timely fashion and filed with the appropriate entities. It is the responsibility of the HSC or the SSO to ensure that the forms are properly completed. Completed forms will be kept and maintained by IT. Subcontractors will also be responsible for keeping a copy of the forms pertaining to their personnel. These records shall be maintained for a five-year period.

A listing of records to be completed and maintained relative to work at the facility is contained below. Examples are included as figures in Appendix B.

- Training (forms are described in Section 3.4)
  - Respiratory Training Completion Form (Figure 2, Appendix B)
  - Tailgate Safety Meeting (Figure 3, Appendix B)
  - On-The-Job Training Record (OJTR) (Figure 4, Appendix B)

- Medical records (described in Section 3.5.2)
  - Medical Examination
  - Update Examination
  - Medical Examination Report
  - Physical Activity Restriction
  - Authorization for Treatment/Examination
- Supervisor's Employee Injury Report

- Monitoring (forms are described in Section 2.4)
  - Real Time Air Monitoring Log (Figure 11, Appendix B)
  - Calibration Log (Figure 12, Appendix B)

- Other Forms
  - Vehicle Accident Report - Upon occurrence of any accident involving a vehicle, the supervisor will immediately complete a vehicle accident report form. It is very important to obtain information about involved outside parties. The form must be submitted to the appropriate office within 24 hours.

  Additional information, e.g., police report, is to be forwarded as it becomes available.

  - General Liability, Property Damage and Loss Report - This form is used to record damage or loss of equipment outside of vehicle accidents (theft, accidental breakage, fire). The procedure for completing and submitting this form is the same as for the vehicle accident report (Figure 14, Appendix B).

  - Release of Liability - This form is to be used on projects for anyone wishing to come on site that has not been pre-approved through the medical and training program (Figure 15, Appendix B).

  - OSHA Information Bulletin - The information bulletin from OSHA, "Job Safety and Health Protection," must be posted at each site in an area where all employees can have an opportunity to read it (Figure 16, Appendix B).

  - Emergency Telephone Numbers Forms - This form contains emergency telephone numbers that can be used in the event of a medical, fire, security, chemical or utility emergency. Prior to project start-up, contacts are to be made with the appropriate local personnel or agencies that provide these services and their telephone numbers recorded on this form. Site location information should be provided to them. This form must be posted by the site telephone, in all trailers, and in all vehicles. A map outlining the route to the nearest hospital is to accompany this form (Figure 17, Appendix B).

In addition, the HSC and/or SSO will keep daily logs which will include the following items:
• Date.
• Activity description.
• Area (site specific) checked.
• Employees in a particular area.
• Protective clothing being worn by employees.
• Protective devices (including monitoring equipment) being used by employees.
• Signature and date.

An example of a daily log form is included in Appendix B as Figure 18.

3.4 TRAINING PROGRAM

This training program will be designed to address the requirements of OSHA Hazard Communication Standards (29 CFR 1910.1200), and the OSHA Hazardous Waste Operations and Emergency Response Final Rule (29 CFR 1910.120).

3.4.1 Preproject Training

All employees and subcontractors who work on site shall have successfully completed a formal training program which shall include, at a minimum, the following items before they are permitted to enter the Exclusion or Decontamination Zones:

• Basic Safety Training - This course shall stress fundamentals such as the cause and prevention of slip, trip, and fall hazards; safe lifting techniques; heat stress illnesses and their prevention.

• Hazard Protection - This course shall deal with the identification, recognition, and safe work procedures with toxic materials. The use and limitations of applicable protective clothing, and decontamination procedures are an important part of this course.

• First Aid and Cardiopulmonary Resuscitation (CPR) - A portion of employees will have completed the standard Red Cross First Aid and CPR courses.

• Health Hazard Awareness - Information shall be given concerning hazardous materials to which employees may be exposed. Information will include routes of exposure, toxic effects, appropriate protective equipment, medical surveillance, and the specific nature of the job which could result in exposure to hazardous materials.
• Work practices and engineering controls to minimize risk.

• Emergency Response Training - Procedures outlined in site emergency procedures are to be reviewed with all personnel.

• Hearing Conservation Program.

• Respirator Training - The use, limitations, and inspection of air purifying respirators, and SCBAs will be discussed. Proper decontamination procedures will also be covered. Respirator fit test will be given to all personnel consisting of qualitative fit test using irritant smoke in a plastic containment. Personnel shall breath normally and heavily, move their heads up and down and side to side, and talk while wearing the respirator in the smoke.

As noted in 29 CFR 1910.120 (e)(1) through (e)(4), all employees and subcontractors, who are expected to routinely enter the Exclusion and/or Decontamination Zones shall have received a minimum of 40 hours of initial off-site instruction. On-site supervisors shall complete at least eight additional hours of specialized training. However, 29 CFR 1910.120 (e)(9) does provide that employers who can show by an employee’s work experience and/or training that the employee has had initial training equivalent to that training required in paragraphs (e)(1) through (e)(4) of this section shall be not be required to provide the initial training requirements of these paragraphs. Equivalent training includes the training that existing employees might have already received from actual hazardous waste site experience.

3.4.2 Initial On-Site Training

All personnel, prior to being allowed site access, will attend a training session conducted by the HSC/SSO that communicates the potential health and safety hazards on the site and instructs the individuals on the requirements of the HSP. This site-specific training will be documented by completion of the HSP Certification form shown in Figure 1, Appendix B and will include the following items:

• Acute and chronic effects of the toxic chemicals identified at the site, including odors and conditions likely to indicate the presence of site-specific chemicals.
• Physical health hazards identified at the site.
• Personal hygiene.
• Safety equipment, the procedures required for personnel protection, and their effectiveness and limitations.
• Proper use and fitting of respirators.
• Work areas established at the site.
• Prohibitions in contaminated areas.
• Change in site operations.
• Buddy system.

3.4.3 Safety Meetings

A safety meeting will be conducted at the beginning of each shift or whenever new employees or subcontractors arrive at the job site once the job begins. These meetings discuss the health and safety considerations for the day’s activities and outline the necessary protective equipment. This meeting will be conducted by the HSC/SSO who will complete the Tailgate Safety Meeting form shown in Figure 3, Appendix B.

3.4.4 Training Records

All training that is conducted on site will be documented using the appropriate forms (Figures 2, 3, and 4, Appendix B). These forms will be retained at the facility in the employee’s job file, which will be maintained by IT. Forms covering subcontractor employment will be maintained by IT and copies will also be forwarded to those organizations.

3.4.5 Material Safety Data Sheets (MSDS)

Completed MSDS forms or their equivalent shall be kept on the job site for the toxic materials that may be encountered during the remedial activities. A compilation of pertinent MSDS forms is included in Appendix A.
3.5 MEDICAL SURVEILLANCE

IT employees and subcontractors will utilize the services of an IT approved medical clinic(s) to provide medical examinations and conduct surveillance compliant with the guidance herein.

3.5.1 Physical Examinations

All personnel who work in the Exclusion or Decontamination Zones will have received a pre-employment physical examination followed by yearly update examinations. Subcontractors who have not had the required examinations will be required to do so prior to working on the site. The examination will include:

- Medical and occupational history and physical examinations (including a history of respiratory disease).
- Complete blood count and differential.
- Urinalysis (dip stick and microscopic).
- SMA-20 or equivalent.
- Audiometric examination.
- Chest X-ray (14 x 17 posterior/anterior view)*.
- Pulmonary function test (FVC and FEV 1.0).
- EKG for employees over 45 years of age or when there is an indication of problem.
- Vision acuity and color.
- Drug and alcohol screen.
- Any other tests deemed appropriate based on site hazards.

*The chest X-ray may be omitted for personnel who have had one within the past three years.

The physical examinations will be performed at an IT approved clinic by a physician certified in Occupational Medicine. The physician medically approves/disapproves the employee for work with hazardous materials. Any physical
activity that should be restricted based on the physician’s evaluation is noted on the proper form and maintained in the employees medical file.

3.5.2 Injury and Illness Treatment

Any employee who is suspected of having an overexposure to the chemicals on site will be given a complete physical examination. A clinic selected and approved by IT is to provide this service as well as to treat injuries that occur on the job that are not handled at the facility as first aid or treated as an emergency hospital visit.

The Authorization for Treatment Form is to be completed and sent with any personnel who needs medical attention for any work related illness or injury. The clinic’s physician will certify that the employee is fit to return to work before his/her employment on site can continue. Any physical activity that should be restricted based on the physician’s evaluation is to be noted on the proper form.

In the event of any injury or accident, a "Supervisor's Employee Injury Report" (Figure 10, Appendix B) shall be completed by a supervisor within 24 hours of the event. This report shall be reviewed by the Project Manager the HSC/SSO, and the IT Accident Review Committee.

3.5.3 Medical Records

All medical surveillance records shall be maintained for a period of 30 years by IT and the subcontractors, and shall be available as required by state and/or local regulations; namely 29 CFR 1910.20 (a)-(e) and (g)-(l).
4.0 EMERGENCY CONTINGENCY AND RESPONSE PLAN

4.1 SCOPE OF WORK

The HSP for the WPAFB investigation has been established to allow site operations to be conducted in order to minimize hazardous health impacts on employee and community health and safety. In addition, this Emergency Contingency and Response Plan (ECRP) has been developed to cover extraordinary conditions that might occur at the site.

All accidents and unusual events will be dealt with in a manner to minimize health risk to site workers and the surrounding community. In the event of an accident or other unusual event, the following will be followed:

- First aid and other appropriate initial action will be administered by properly trained personnel closest to the incident. This assistance will be conducted in a manner to assure that those rendering assistance are not placed in a situation of unacceptable risk.

- All incidents will be reported to and documented by the designated Emergency Coordinator, who is responsible for coordinating the emergency response in an efficient, rapid, and safe manner. The Emergency Coordinator will decide if off-site assistance, medical treatment, or both is required and arrange for such assistance. The Emergency Coordinator will ensure that adequate emergency equipment will be available on site.

- All workers on site are responsible to conduct themselves in a mature, calm manner in the event of an accident or unusual event. All personnel must conduct themselves in a manner to avoid spreading danger to themselves, surrounding workers, or the community in general.

The Project Manager or Site Coordinator will assist site security during activation of the ECRP.

4.2 RESPONSIBILITIES

4.2.1 Emergency Coordinator

The site Project Manager is responsible for field implementation of the ECRP, and will designate the person/persons to be Site Emergency Coordinator. This person has training and experience in emergency response. As the Emergency Coordinator, specific duties include:
• Communicating site ECRP requirements to all personnel, whether directly involved in emergency response or not.

• Specifying a backup alternate (most likely the HSC/SSO).

• Purchasing supplies, as necessary.

• Controlling activities of subcontractors and responding to outside agencies.

• Anticipating, identifying, assessing, and controlling fires, explosions, chemical releases, and other emergency situations.

The ECRP for the site will be Mr. Charles Schick.

4.2.2 Health and Safety Coordinator/Site Safety Officer (HSC/SSO)

The HSC is responsible for:

• Establishing health and safety procedures

• Conducting preproject training

• Directing the SSO

• Monitoring during project start-up.

He/she will make advance arrangements with appropriate support groups and alert them to the site hazards and types of emergencies that may arise. As the Safety Coordinator, specific duties include:

• Providing a map of the site location and define the egress routes.

• Determining response time and adequacy of emergency support services.

• Identifying medical and emergency facilities.

• Providing training and information about hazards on site and special handling procedures.

4.2.3 Emergency Response Team

The emergency response team will consist of IT employees who are trained in CPR and First Aid.
4.2.4 Employees and Subcontractors

All on-site personnel, whether involved in emergency response or not, will be notified of their responsibilities in an emergency. They will be familiar with the ECRP and the Emergency Coordinator's authority.

The ECRP teams will be trained in decontamination, response and rescue. These teams will be American Red Cross-certified (or equivalent) in CPR and emergency first aid.

4.3 EMERGENCY EQUIPMENT

Emergency equipment that will be on site with IT personnel will include the following:

- First aid kit.
- Eye wash bottles.
- Two-way radios.
- Clean water for emergency rinse.
- Fire extinguisher.

4.3.1 Personal Protection

Personal protective equipment will include several of the following:

- Neoprene boots.
- Tyvek suits - polyethylene coated and uncoated.
- PVC and nitrile gloves.
- Face shields and goggles.
- SCBA.
- Full-face chemical cartridge respirators with cartridges for organic vapors and dust.

4.3.2 Medical

Emergency first aid equipment will include several of the following:
• Antiseptics.
• Blankets.
• Emergency eye wash.
• Cold packs.
• Reference books containing basic first aid procedures and information on treatment of specific chemical injuries.
• Water in portable containers.
• Antibacterial ointments.
• Bandage materials.

4.4 COMMUNICATION AND NOTIFICATION

4.4.1 Communications

The primary communication system will rely on telephone communications or two-way radios. Personnel will be familiar with protocol for contacting support groups and agencies identified in the ECRP. Emergency numbers (Table 4.1) will be placed in company vehicles and at strategic locations throughout the site.

4.4.2 Emergency Services Route Maps

Emergency services route maps (Figures 4-1 and 4-2) will be located in company vehicles and posted with the emergency number list on site showing the location of the nearest hospital.

The map will be used in training sessions and in emergency response planning. Practice "runs" will be made along all emergency service routes by supervisory personnel.

4.4.3 Notification

If the Emergency Coordinator determines that the site has an uncontrolled situation such as a spill, fire, or explosion which could threaten public health or the environment, he/she will report his findings as follows:

• Alert site personnel via telephone or two-way radio.
### TABLE 4.1

**EMERGENCY TELEPHONE CONTACTS**

<table>
<thead>
<tr>
<th>Service</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>WPAFB Security</td>
<td>257-6841</td>
</tr>
<tr>
<td>WPAFB Fire</td>
<td>257-3033</td>
</tr>
<tr>
<td>Medical Emergency (WPAFB MC)</td>
<td>257-2969</td>
</tr>
<tr>
<td>Medical Emergency (St. Elizabeth's Hospital)</td>
<td>229-6387</td>
</tr>
<tr>
<td>IT Project Manager: Bill Thompson</td>
<td>(513) 782-4700</td>
</tr>
<tr>
<td>IT Health and Safety Coordinator: William Max</td>
<td>(612) 481-8084</td>
</tr>
<tr>
<td>EMO Project Manager Denny Reed</td>
<td>(513) 258-6710</td>
</tr>
<tr>
<td>WPAFB Project Manager Gary Selby</td>
<td>257-2201</td>
</tr>
</tbody>
</table>
FIGURE 4-2. WPAFB MEDICAL CENTER LOCATION

Reference: 7.5 Minute USGS Topographic quadrangle maps
Dayton North and Fairborn, Ohio 1965, revised 1981
• If his/her assessment indicates that evacuation of the work area may be advisable, he/she will immediately initiate the evacuation notice, stop the operation, and notify one person from each organization of the appropriate authorities listed in Table 4.1. He/she will be available to help appropriate officials decide whether adjacent areas should be evacuated.

• In the event normal communication lines fail, a backup communication system will be activated. This system will be able to access the appropriate emergency service providers.

The notification report will be made from the site trailer (if available) to the appropriate support groups and will include:

• Description of incident (e.g., release, fire).

• Name and telephone number of reporter.

• Name and address of incident.

• Name and quantity of materials or material involved to the extent known.

• The extent of injuries, if any.

• The possible hazards to human health or the environment and cleanup procedures.

• Assistance that is requested.

4.5 EMERGENCY PROCEDURES

Potential incidents fall under four general classifications: (1) fire or explosions; (2) chemical releases to the atmosphere, soil, or surface waters; (3) severe weather conditions such as tornado, blizzards, and lightning storms; and (4) worker injury or illnesses. The following sequence of events constitute the specific responses and control procedures to be taken in the event that one of these four incident scenarios occurs at the site.

The initial response to any emergency will be to protect human health and safety, and then the environment. Secondary response to the emergency will be identification, containment, treatment, and disposal assessment.
4.5.1 Hazard Assessment

The Emergency Coordinator in consultation with the HSC/SSO will assess possible hazards to human health or the environment that may result from the chemical release, fire, explosion, or severe weather conditions. The Emergency Coordinator will assess the hazards posed by an incident through the following steps, as appropriate:

- Assess immediate need to protect human health and safety.
- Identify the materials involved in the incident.
- Identify exposure and/or release pathways and the quantities of materials involved.
- Determine the potential effects of exposure/release, and appropriate safety precautions.

This assessment will consider both the direct and indirect effects of the chemical release, fire, explosion, or severe weather conditions, (e.g., the effects of any toxic, irritating, or asphyxiating gases that are generated, or the effects of any hazardous surface water runoff from water or chemical agents used to control fire and heat-induced explosions).

Based on this assessment, the Emergency Coordinator will determine what risks are posed to employees and community populations. If the incident cannot be controlled by operating personnel without incurring undue risk, the Emergency Coordinator will order the evacuation of all workers at risk and notify appropriate parties listed in Table 4.1 of the situation and the assistance required. If the Emergency Coordinator determines that any persons outside the site are at risk as a result of the incident, he will contact the appropriate agencies and departments listed in Table 4.1 and advise them of the risk and the need or potential need to institute off-site evacuation procedures.
4.5.2 Fire and Explosion

When fire or explosion appear imminent or have occurred, all field activities will cease. The Emergency Coordinator will assess the severity of the situation and decide whether the emergency event is or is not readily controllable with existing fire suppression equipment on hand. Fire fighting will only be done if the risk to operating personnel is minimal; that is, the fire is small, localized, there is no possibility of explosion and no possibility that exit routes will be blocked by fire. The WPAFB Fire Department will be called in all situations in which fires or explosions have occurred.

If the situation appears uncontrollable, and poses a direct threat to human life or the environment, a warning will be administered to all personnel to secure their emergency equipment. If the chances of an impending explosion are high, the entire site will be evacuated.

The Emergency Coordinator will alert all personnel when the danger has passed, as determined by the Fire Department.

Situations which will activate notification of other emergency contacts are:

- A fire causes or could cause the release of toxic fumes.
- The fire spreads and could possibly ignite nearby fuel oil or other liquid wastes, or could cause heat-induced explosions.
- The fire could possibly spread to off-site areas.
- Use of fire extinguisher and suppressants does not result in fire containment.
- An imminent danger exists that an explosion could occur, causing a safety or health hazard.
- An imminent danger exists that an explosion could ignite other hazardous waste at the facility.
- An imminent danger exists that an explosion could result in release of toxic materials.
- An explosion has occurred.
4.5.3 Chemical Release

If a chemical release resulting in probable vapor cloud is noted, the information will be immediately relayed to the Emergency Coordinator. The Emergency Coordinator in consultation with the HSC/SSO will assess the magnitude and potential seriousness of the release by reviewing the following information:

- MSDS for the material released.
- Source of the release.
- An estimate of the quantity released and the rate at which it is being released.
- The direction in which the air release is moving.
- Personnel who may be or may have been in contact with material, or air release, and possible injury or sickness as a result.
- Potential for fire or explosion resulting from the situation.
- Estimates of area under influence of release.

If the release is determined to lie within the on-site emergency response capabilities, the Emergency Coordinator will implement the necessary remedial action.

If the incident results in chemical concentrations at the site perimeter exceeding the action levels specified in Section 2.5, the Emergency Coordinator will notify the appropriate support agencies. The Emergency Coordinator may elect to make immediate notification if conditions warrant. In the event of an emergency release, all personnel not involved with emergency response activity will be evacuated from the immediate area. MSDS forms will be consulted in the event of a chemical release to air, land, or water (see Appendix A).

4.5.4 Natural Disaster

When a tornado warning has been issued or when a lightning storm occurs (within a five-mile radius of the site), the information will be immediately relayed to the Emergency Coordinator in the Support Area and all personnel shall standby for emergency procedures. In the case of a tornado sighting, personnel shall institute shutdown procedures and lie face down in a ditch or a depression.
When the storm passes, the Emergency Coordinator will inspect the on-site equipment to ensure its readiness for operation. If any equipment has been damaged, the work will not be restarted until the equipment has been repaired or replaced.

If the Emergency Coordinator's inspection indicates a fire, explosion, or release has occurred as the result of a severe weather condition, he will follow the appropriate procedures in Sections 4.5.

4.5.5 Security

During activation of the ECRP, the Emergency Coordinator or his designated representative along with local police officers, will control access to the site. The Emergency Coordinator will maintain a security incident log which will include:

- Time of entry.
- Expected exit time.
- Use of team or "buddy" system.
- Task being performed.
- Location of task.
- Rescue and response equipment used.
- Protective equipment being used.

4.5.6 Medical Treatment/Accident

Selected on-site emergency personnel will be trained:

- In on-the-spot first aid and CPR treatment techniques.
- To establish contact with medical experts.
- To establish liaisons with local emergency response support agencies.

Program elements will include as a minimum:

- Establishing liaison with local medical personnel, for example: local physician, medical specialists, hospital, ambulance service, and poison control center. Inform and educate these personnel about site-specific hazards so that they can be optimally helpful if an emergency occurs. Develop procedures for contacting them; familiarize all on-site emergency personnel with these procedures.
• Setting up on-site emergency first aid stations and providing that these stations are well supplied and restocked immediately after each emergency.

4.5.7 Follow-up Evaluation and Reentry

Before normal operations are resumed, the Emergency Coordinator will evaluate the response to the incident and determine whether another emergency can be handled by:

• Assuring all appropriate notifications were made.
• Restocking all equipment and supplies.
• Clean, refuel, and repair all additional equipment.
• Review and revise all aspects of the ECRP.

In addition, the Emergency Coordinator will verify that ambient concentrations of toxic chemicals are below limits generally recognized as safe.

4.5.8 Training

In addition to the preproject training outlined in the Health and Safety Plan, specific emergency response training will:

• Relate directly to site-specific, anticipated situations.
• Be repeated often in "tailgate" sessions.
• Ensure that training records are maintained.

Visitors will be briefed on basic emergency procedures such as decontamination, emergency signals, and evacuation routes.

Personnel without defined emergency response roles (e.g., state and federal agency representatives) must still receive a level of training that includes at a minimum:

• Hazard recognition.
• Standard operating procedures.
• Signaling an emergency: the signals used, how to summon help, what information to give and who to give it to.

• Evacuation routes and assembly area.

• The person or station to report to when the ECRP is activated.

Personnel involved with field activities will have a thorough understanding of the ECRP. Training will be directly related to their specific roles and will include:

• Emergency chain-of-command.

• Communication methods and signals.

• How to call for help.

• Emergency equipment and its use.

• Emergency evacuation while wearing protective equipment.
REFERENCES CITED


**VINYLIDENE CHLORIDE (VDCM)**

**MSDS NUMBER:**
07/20/88

**EDITION:**
006

**TRADE NAME:**
VINYLIDENE CHLORIDE (VDCM)

**CHEMICAL NAME/SYNONYMS:**
1,1-DICHLOROETHYLENE

**CHEMICAL FAMILY:**
CHLORINATED HYDROCARBON

**FORMULA:**
CH2 = CCL2

**U.S. DOT SHIPPING NAME:**
VINYLIDENE CHLORIDE, INHIBITED

**U.S. DOT HAZARD CLASS:**
FLAMMABLE LIQUID

**SUBSIDIARY RISK:**
N/A

**I.D. NUMBER:**
UN1303

**REPORTABLE QUANTITY:**
5000 LBS/2270 KG

**SECTION 1 * PHYSICAL DATA**

- **BOILING POINT @ 760 MM HG:** 88.9 F (31.6 C)
- **VAPOR DENSITY (AIR=1):** 3.34
- **SPECIFIC GRAVITY (H2O=1):** 1.213 @ 68/68 F
- **PH OF SOLUTIONS:** NEUTRAL
- **FREEZING/MELTING POINT:** -188.5 F
- **SOLUBILITY (WEIGHT % IN WATER):** 0.25% @ 68 F
- **BULK DENSITY:**
  10.1 LBS/GAL
- **VOLUME % VOLATILE:**
  100
- **VAPOR PRESSURE:**
  495 MM HG @ 68 F
- **EVAPORATION RATE:** (ETHYL ETHER=1): 1.0
- **HEAT OF SOLUTION:**
  N/A
- **APPEARANCE AND ODOR:**
  COLORLESS LIQUID; SWEET ODOR

**SECTION 2 * INGREDIENTS**

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<th>MATERIAL</th>
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**SECTION 3 * FIRE/EXPLOSION HAZARD DATA**

- **FLASH POINT (METHOD USED):**
  -5 F (TAG CLOSED CUP)
**VINYLIDENE CHLORIDE (VDCM)**

**FLAMMABLE LIMITS IN AIR (%) BY VOLUME**
- LEL: 7%
- UEL: 16%

**EXTINGUISHING MEDIA:**
- CARBON DIOXIDE, DRY CHEMICAL, FOAM, WATER SPRAY

**SPECIAL FIRE FIGHTING PROCEDURES:**
- FIRE FIGHTERS MUST WEAR NIOSH/OSHA APPROVED; PRESSURE DEMAND, SELF-CONTAINED BREATHING APPARATUS. WATER SPRAY SHOULD BE USED TO COOL STORAGE VESSELS, TO AVOID RUPTURE AND SPREAD OF FIRE.

**UNUSUAL FIRE AND EXPLOSION HAZARDS:**
- PRODUCTS OF COMBUSTION INCLUDE TOXIC, CORROSIVE GASES SUCH AS HYDROGEN CHLORIDE AND POSSIBLY TRACES OF PHOSGENE.

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**SECTION 4 * HEALTH HAZARD DATA**

**TOXICITY DATA:**
- **LC50 INHALATION:** (RATS) 600 PPM/4 HOURS
- **LD50 DERMAL:** UNKNOWN
- **SKIN/EYE IRRITATION:** SEE SECTION 5
- **LD50 INGESTION:** (RATS) 200 MG/KG
- **FISH, LC50 (LETHAL CONCENTRATION):** 96-HOUR TLM: 1000 - 10 PPM

**CLASSIFICATION: (POISON, IRRITANT, ETC.)**
- **INHALATION:** MODERATELY TOXIC
- **SKIN:** UNKNOWN
- **SKIN/EYE:** MODERATELY IRRITATING
- **INGESTION:** MODERATELY TOXIC
- **AQUATIC:** MODERATELY TOXIC

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**SECTION 5 * EFFECTS OF OVEREXPOSURE**

THIS SECTION COVERS EFFECTS OF OVEREXPOSURE FOR INHALATION, EYE/SKIN CONTACT, INGESTION AND OTHER TYPES OF OVEREXPOSURE INFORMATION IN THE ORDER OF THE MOST HAZARDOUS AND THE MOST LIKELY ROUTE OF OVEREXPOSURE.

IS CHEMICAL LISTED AS A CARCINOGEN OR POTENTIAL CARCINOGEN?
**VINYLIDENE CHLORIDE (VDCM)**

07/20/88 PAGE 3

NTP - NO    IARC - NO    OSHA - NO

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE:
PROLONGED EXPOSURE TO HIGH CONCENTRATIONS OF VINYLIDENE CHLORIDE MAY COMPLICATE EXISTING LIVER AND KIDNEY DISEASES.

PERMISSIBLE EXPOSURE LIMITS:
NONE ESTABLISHED BY OSHA.
ACGIH: 5 PPM, 8-HOUR TWA (TIME WEIGHTED AVERAGE); 20 PPM, STEL (SHORT-TERM EXPOSURE LIMIT).
PPG INTERNAL PERMISSIBLE EXPOSURE LIMIT (IPEL): 2.5 PPM, 8-HOUR TWA (TIME WEIGHTED AVERAGE); 10 PPM, STEL (SHORT-TERM EXPOSURE LIMIT).

ACUTE:
OVEREXPOSURE CAN LEAD TO DRUNKENNESS, ANESTHESIA, AND IF CONTINUED, UNCONSCIOUSNESS AND ULTIMATELY, DEATH. LIQUID VINYLIDENE CHLORIDE IS IRRITATING TO THE EYES AND SKIN. THE INHIBITOR CAN CAUSE LOCAL SKIN IRRITATION OR BURNS UNLESS WASHED OFF THOROUGHLY.

THE ODOR THRESHOLD (500-1000 PPM) OF VINYLIDENE CHLORIDE IS NOT AN ADEQUATE WARNING TO PREVENT OVEREXPOSURE.

ALTHOUGH SWALLOWING IS NOT LIKELY TO OCCUR IN INDUSTRIAL APPLICATIONS, ACCIDENTAL INGESTION OF VINYLIDENE CHLORIDE CAN RESULT IN ILLNESS AND MAY BE FATAL.

CHRONIC:

A TOTAL OF 18 LONG-TERM STUDIES HAVE BEEN CONDUCTED TO ASSESS THE CHRONIC TOXICITY AND ONCOGENICITY OF VINYLIDENE CHLORIDE IN MICE (SEVERAL STRAINS), RATS (SEVERAL STRAINS), AND HAMSTERS. WHEN ADMINISTERED BY INHALATION, ORAL GAVAGE, DRINKING WATER, SUBCUTANEOUS INJECTIONS, AND DERMAL APPLICATION, THESE STUDIES HAVE SHOWN THAT EXPOSURE TO HIGH LEVEL CONCENTRATION OF VINYLIDENE CHLORIDE CAUSES LIVER AND KIDNEY TOXICITY.

INHALATION: IN AN INHALATION STUDY, CD-1 MICE AND CD RATS WERE EXPOSED TO 55 PPM FOR 6 HOURS/DAY, 5 DAYS/WEEK FOR 7 TO 12 MONTHS. HEPATIC HEMANGIOSARCOMAS WERE FOUND IN 2/35 MALE MICE AND 1/35 FEMALE MICE. THE SIGNIFICANCE OF THIS FINDING WAS QUESTIONABLE, SINCE THESE TUMORS SOMETIMES OCCUR SPONTANEOUSLY. KIDNEY PATHOLOGY WAS OBSERVED IN THIS STUDY BUT NO KIDNEY ADENOCARCINOMAS WERE REPORTED. IN A SUBSEQUENT STUDY BY THIS GROUP, RATS AND MICE WERE EXPOSED 6 HOURS/DAY, 5 DAYS/WEEK FOR EITHER 1, 3, 6, OR 10 (RATS ONLY) MONTHS TO 55 PPM VINYLIDENE CHLORIDE VAPORS AND THEN KEPT FOR ONE YEAR AFTER EXPOSURE.
CUMULATIVE TUMOR INCIDENCE AND RATES WERE COMPARED TO AIR EXPOSED CONTROL GROUPS AND NO DIFFERENCES WERE OBSERVED. THERE WERE NO REPORTED HISTOLOGICAL CHANGES.

ADDITIONAL INHALATION STUDIES WERE CONDUCTED IN MICE, RATS, AND HAMSTERS. SWISS MICE WERE EXPOSED TO 10 TO 25 PPM FOR 4 HOURS/DAY, 5 DAYS/WEEK FOR 52 WEEKS AND RESULTS REPORTED THROUGH 98 WEEKS OF THE STUDY. AT 25 PPM, 20.5% (16/78) OF MALES AND 1.5% (1/65) OF FEMALES DEVELOPED KIDNEY ADENOCARCINOMAS. THESE TUMORS WERE NOT FOUND IN CONTROLS, IN MICE EXPOSED TO 16-PPM, OR IN RATS EXPOSED TO 10, 25, 50, 100, OR 150 PPM. OVERT TOXICITY AND MORTALITY OCCURRED EARLY IN THE EXPERIMENTS WHEN MICE WERE EXPOSED TO 50 PPM OR RATS AT 200 PPM FOR 4 HOURS/DAY. IT HAS BEEN INDIRECTLY REPORTED THAT OTHER STUDIES BY THESE INVESTIGATORS SHOWED NO INCREASE IN TUMORS IN THREE OTHER STRAINS OF MICE. THERE WAS NO INCREASE IN TUMORS IN RATS EXPOSED AT 10, 25, OR 50 PPM, BUT EXPOSURES TO 100 AND 150 PPM CAUSED A SIGNIFICANT INCREASE IN MAMMARY ADENOCARCINOMAS, A TUMOR WITH A NATURALLY HIGH INCIDENCE IN CONTROL RATS. TUMOR INCIDENCES WERE 32/100, 15/30, 12/30, 15/30, 18/30, AND 35/60 AT EXPOSURE CONCENTRATIONS OF 0, 10, 25, 50, 100, AND 150 PPM, RESPECTIVELY. THE BIOLOGICAL SIGNIFICANCE OF A MODERATE INCREASE IN FREQUENCY OF THIS NATURALLY OCCURRING TUMOR IS UNCERTAIN. HAMSTERS EXPOSED TO 20 PPM SHOWED NO INCREASED TUMOR INCIDENCE.

IN ANOTHER STUDY, EXPOSURE OF WISTAR AND SPRAGUE-DAWLEY RATS TO 75 OR 100 PPM FOR 6 HOURS/DAY, 5 DAYS/WEEK FOR 12 MONTHS SHOWED NO INCREASED TUMOR INCIDENCE. SIMILARLY, SPRAGUE-DAWLEY RATS WERE EXPOSED BY INHALATION (25 OR 75 PPM FOR 6 HOURS/DAY, 5 DAYS/WEEK, FOR 16 MONTHS) OR BY INGESTION IN DRINKING WATER (60, 100, OR 200 PPM (W/W) FOR 2 YEARS) AND FOUND NO INCREASED TUMOR INCIDENCE IN THESE ANIMALS.

A TWO-YEAR BIOASSAY WAS CONDUCTED BY THE NATIONAL TOXICOLOGY PROGRAM, IN WHICH VINYLIDENE CHLORIDE IN CORN OIL WAS ADMINISTERED ORALLY 5 DAYS/WEEK FOR 103 WEEKS TO B6C3F1 MICE (0, 2, AND 10 MG/KG) AND F344 RATS (0, 1, AND 5 MG/KG). THE STUDY SHOWED AN APPARENT DOSE RELATED CHRONIC NEPHRITIS IN BOTH SEXES OF RATS AND AN INCREASED INCIDENCE OF NECROSIS OF THE LIVER IN MALE MICE. UNDER THE CONDITIONS OF THIS BIOASSAY, THERE WAS NO EVIDENCE FOR CARCINOGENICITY IN RATS OR MICE OF EITHER SEX.

IN ICR SWISS MICE, VINYLIDENE CHLORIDE WAS INACTIVE AS A WHOLE MOUSE SKIN CARCINOGEN AND INACTIVE BY SUBCUTANEOUS INJECTION. IN A TWO-STAGE CARCINOGENESIS ASSAY WITH PHORBOL MYRISTATE ACETATE AS A PROMOTER, VINYLIDENE CHLORIDE WAS SHOWN TO BE ACTIVE AS A TUMOR.
INITIATOR.

A LIMITED COHORT STUDY OF HUMANS OCCUPATIONALLY EXPOSED TO VINYLIDENE CHLORIDE FOUND NO ADVERSE HEALTH EFFECTS ATTRIBUTABLE TO VINYLIDENE CHLORIDE EXPOSURE.

IN DEVELOPMENTAL TOXICITY STUDIES, THERE WAS NO EVIDENCE FOR BIRTH DEFECTS IN RATS AND RABBITS AFTER INHALATION EXPOSURES 7 HOURS/DAY UP TO 160 PPM. TOXICITY TO BOTH DAMS AND DEVELOPING OFFSPRING WAS OBSERVED IN RATS INHALING 80 TO 160 PPM AND IN RABBITS INHALING 160 PPM. AT EXPOSURE LEVELS WHICH CAUSED LITTLE OR NO MATERNAL TOXICITY (20 PPM IN RATS, 80 PPM IN RABBITS) THERE WAS NO ADVERSE EFFECT RELATIVE TO EMBRYOTOXICITY OR FETOTOXICITY).

A NUMBER OF ASSAYS HAVE BEEN CONDUCTED TO TEST FOR MUTAGENIC POTENTIAL. WHEREAS BACTERIAL ASSAYS HAVE PRODUCED SOME POSITIVE RESPONSES, TESTS IN MAMMALIAN SYSTEMS HAVE PRODUCED NEGATIVE RESULTS. THE EVIDENCE FOR MUTAGENICITY IS LIMITED.

* EMERGENCY AND FIRST AID PROCEDURES

* INHALATION:
   REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION, PREFERABLY MOUTH-TO-MOUTH. IF BREATHING IS DIFFICULT, GIVE OXYGEN. CALL A PHYSICIAN.

* EYE OR SKIN CONTACT:
   IMMEDIATELY FLUSH WITH PLENTY OF WATER (SOAP AND WATER FOR SKIN) FOR AT LEAST 15 MINUTES, WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. IF IRRITATION OCCURS, CONSULT A PHYSICIAN. THOROUGHLY CLEAN CONTAMINATED CLOTHING AND SHOES BEFORE REUSE OR DISCARD.

* INGESTION:
   IF CONSCIOUS: DRINK LARGE QUANTITIES OF WATER. DO NOT INDUCE VOMITING. TAKE IMMEDIATELY TO A HOSPITAL OR PHYSICIAN.
   IF UNCONSCIOUS, OR IN CONVULSIONS: TAKE IMMEDIATELY TO A HOSPITAL. DO NOT ATTEMPT TO INDUCE VOMITING OR GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

* NOTES TO PHYSICIAN (INCLUDING ANTIDOTES):
   NEVER ADMINISTER ADRENALINE FOLLOWING VINYLIDENE CHLORIDE OVEREXPOSURE. INCREASED SENSITIVITY OF THE HEART TO ADRENALINE MAY BE CAUSED BY OVEREXPOSURE TO VINYLIDENE CHLORIDE.
SECTION 6 * REACTIVITY DATA

STABILITY: STABLE

CONDITIONS TO AVOID: DIRECT SUNLIGHT, EXCESSIVE HEAT, EXPOSURE TO ATMOSPHERIC OXYGEN.

HAZARDOUS POLYMERIZATION: MAY OCCUR

CONDITIONS TO AVOID: ATMOSPHERIC OXYGEN

INCOMPATIBILITY (MATERIALS TO AVOID):

CONTAMINATION WITH FREE RADICAL INITIATORS, COPPER, ALUMINUM AND THEIR ALLOYS. EXPOSURE TO ATMOSPHERIC OXYGEN, SUNLIGHT AND EXCESSIVE HEAT.

HAZARDOUS DECOMPOSITION PRODUCTS:

EXPOSURE OF UNINHIBITED/INHIBITOR-DEPLETED MONOMER TO OXYGEN MAY FORM SHOCK-SENSITIVE,EXPLOSIVE PEROXIDES. BURNING OR DECOMPOSITION OF VDCM FORMS TOXIC, CORROSIVE HYDROGEN CHLORIDE, POSSIBLY TRACES OF PHOSGENE.

SECTION 7 * SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS SPILLED OR RELEASED:

EVACUATE AREA, PROVIDE MAXIMUM VENTILATION AND REMOVE ALL SOURCES OF IGNITION. KEEP EVACUATED PERSONNEL UPWIND TO AVOID EXPOSURE. ONLY PERSONNEL EQUIPPED WITH NIOSH/MSHA-APPROVED, SELF-CONTAINED BREATHING APPARATUS OR FULL FACE PIECE AIRLINE RESPIRATORS WITH AUXILIARY SCBA'S OPERATED IN THE PRESSURE DEMAND MODE SHOULD BE ALLOWED IN AREA (SEE SECTION 8). DIKE AREA OF SPILL, USING SAND OR VERMICULITE TO AVOID SPREAD OF SPILLED MATERIAL. THEN PUMP Diked MATERIAL INTO COVERED CONTAINER FOR DISPOSAL (SEE SECTION 6, HAZARDOUS DECOMPOSITION PRODUCTS). ANY REMAINING MATERIAL SHOULD BE ABSORBED ON SAND OR VERMICULITE AND SWEPT INTO CLOSED CONTAINERS FOR DISPOSAL. AFTER ALL VISIBLE TRACES OF SPILLED MATERIAL HAVE BEEN REMOVED, REMOVE UPPER LAYER OF CONTAMINATED SOIL AND PLACE IN COVERED CONTAINER FOR DISPOSAL.

WASTE DISPOSAL METHOD:

VDCM AND WASTE MUST BE DISPOSED OF IN A HAZARDOUS WASTE MANAGEMENT FACILITY. CARE MUST BE TAKEN WHEN USING OR DISPOSING OF CHEMICAL MATERIALS AND/OR THEIR CONTAINERS TO PREVENT ENVIRONMENTAL CONTAMINATION. IT IS YOUR DUTY TO DISPOSE OF THE CHEMICAL MATERIALS AND/OR THEIR CONTAINERS IN ACCORDANCE WITH THE CLEAN AIR ACT, THE CLEAN WATER ACT, THE RESOURCE CONSERVATIONS AND RECOVERY ACT, AS WELL AS ANY OTHER RELEVANT FEDERAL, STATE, OR LOCAL LAWS/REGULATIONS REGARDING DISPOSAL.
SECTION 8 * SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:

VENTILATION (TYPE):
LOCAL EXHAUST SUFFICIENT TO MAINTAIN EMPLOYEE EXPOSURES BELOW RECOMMENDED LIMITS.

EYE PROTECTION:
CHEMICAL SAFETY GOGGLES, UNLESS FULL FACEPIECE RESPIRATOR IS WORN.

GLOVES:
POLYVINYL ALCOHOL, VITON, CHLORINATED POLYETHYLENE

OTHER PROTECTIVE EQUIPMENT:

SECTION 9 * SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN DURING HANDLING AND STORING:
* MATERIAL SHOULD NOT BE STORED LONGER THAN FOUR (4) MONTHS.
* STORE IN A COOL, DRY PLACE, AWAY FROM DIRECT SUNLIGHT AND OTHER SOURCES OF HEAT.
* ADEQUATE VENTILATION MUST BE MAINTAINED IN STORAGE AREAS TO REDUCE FIRE HAZARD IN THE EVENT OF A LEAK.
* STORE ONLY IN CLOSED, PROPERLY LABELED CONTAINERS.
* WEAR GOGGLES, GLOVES AND SKIN PROTECTION WHEN HANDLING.
* WEAR RESPIRATORY PROTECTION IN ANY CASE WHERE EXPOSURE MAY BE ABOVE PERMISSIBLE EXPOSURE LIMITS.
* CONTAINER AND SYSTEMS MUST BE ELECTRICALLY GROUNDED BEFORE UNLOADING.
* BEFORE UNLOADING, PURGE AIR FROM UNLOADING SYSTEM WITH NITROGEN AND KEEP VINYLIDENE CHLORIDE IN A NITROGEN ATMOSPHERE.
* AVOID CONTAMINATION WITH WATER SUPPLIES. HANDLING, STORAGE AND USE PROCEDURES MUST BE CAREFULLY MONITORED TO AVOID SPILLS OR LEAKS. ANY SPILL
**VINYLIDENE CHLORIDE (VDC) **

OR LEAK HAS THE POTENTIAL TO CAUSE UNDERGROUND WATER CONTAMINATION WHICH MAY, IF SUFFICIENTLY SEVERE, RENDER A DRINKING WATER SOURCE UNFIT FOR HUMAN CONSUMPTION. CONTAMINATION THAT DOES OCCUR CANNOT EASILY BE CORRECTED.

OTHER PRECAUTIONS:
* KEEP AWAY FROM HEAT, SPARKS, AND FLAME.
* AVOID BREATHING VAPOR. EXCESSIVE VAPOR INHALATION CAN CAUSE ILLNESS OR DEATH. LONG-TERM, LOW LEVEL VAPOR INHALATION CAN CAUSE KIDNEY OR LIVER INJURY.
* USE ONLY WITH VENTILATION SUFFICIENT TO LIMIT EMPLOYEE EXPOSURE IN WORK AREAS BELOW PERMISSIBLE EXPOSURE LIMITS.
* AVOID CONTACT WITH EYES, SKIN OR CLOTHING. EYE OR SKIN CONTACT CAUSES IRRITATION AND MAY RESULT IN BURNS.
* DO NOT ALLOW AIR INTO CONTAINERS OR STORAGE VESSELS. EXPOSURE OF VINYLIDENE CHLORIDE TO AIR MAY FORM EXPLOSIVE PEROXIDES.

COMMENTS:
TSCA - VINYLIDENE CHLORIDE IS ON THE TSCA INVENTORY UNDER CAS NO. 75-35-4.

SARA TITLE III - A) LISTED IN 311/312 CATEGORIES AS FLAMMABLE, ACUTE AND CHRONIC, B) LISTED IN SECTION 313, C) NOT LISTED IN SECTION 302.

CERCLA - LISTED IN TABLE 302.4 AS A HAZARDOUS SUBSTANCE WITH A REPORTABLE QUANTITY OF 5000 POUNDS. RELEASES TO AIR, LAND, OR WATER WHICH EXCEED THE RQ MUST BE REPORTED TO THE NATIONAL RESPONSE CENTER, 800-424-8802.

RCRA - WASTE VINYLIDENE CHLORIDE AND CONTAMINATED SOILS/MATERIALS FROM SPILL CLEANUP ARE U078 HAZARDOUS WASTE AS PER 40 CFR 261.33 AND MUST BE DISPOSED OF ACCORDINGLY UNDER RCRA. SEE 40 CFR 261.33(C) AND 261.7(B)(3) FOR CLEANING REQUIREMENTS FOR EMPTY CONTAINERS.
MATERIAL SAFETY DATA SHEET
GENIUM PUBLISHING CORPORATION
P.O. BOX 1436, SCHENECTADY, NY 12301 USA
(518) 385-2577

1,2-DICHLOROETHANE
REVISION B
Date November 1978

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: 1,2-DICHLOROETHANE
OTHER DESIGNATIONS: Ethylene dichloride, C1C2H4Cl, sym-Dichloroethane, Ethylene Chloride, GE Material D554, CAS# 000 107 062
MANUFACTURER: Available from several suppliers, including Dow Chemical Company 1000 Main St. Midland, MI 48640

SECTION II. INGREDIENTS AND HAZARDS

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DIRECTORY 1978 intended changes list TLV. Current OSHA TLV is 50 ppm.

NIOSH (1976) proposed a 10-hr TWA of 5 ppm with a ceiling of 15 ppm (15 minute sample) and has now recommended that the material be handled in the workplace as if it were a carcinogen in man. (NIOSH Current Intelligence Bulletin No. 25 and 27, 1978)

SECTION III. PHYSICAL DATA

Boiling point at 1 atm, deg F (C) -- 182 (83.5) Specific gravity (20/4°C) -- 1.257
Vapor density (Air=1) --------- 3.4 Evaporation rate (CC14=1) -- 1.3
Vapor pressure at 25 C, mm Hg ---- 87 Molecular weight ------------ 98.96
Solubility in water -------------- Slight Freezing point, deg C -------- -35.7

Appearance & Odor: A colorless, oily liquid; chloroform-like odor whose recognition threshold (100% of test panel) is 40 ppm. Odor detection probably indicates an excessive exposure to vapors.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method Autoignition Temp. Flammability Limits In Air

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<tr>
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<td>15.9</td>
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Extinguishing Media: CO2, dry chemical, alcohol foam or water fog. Blanketing effect needed to smother fire. Water may be ineffective but can be used to cool fire-exposed containers.

It is a dangerous fire hazard and a moderate explosion hazard when exposed to heat or flame. Vapors can flow along surfaces to distant ignition sources and flash back. Firefighters should use self-contained breathing apparatus when this material is involved in a fire situation.

SECTION V. REACTIVITY DATA

This solvent is stable at ordinary working conditions. Explosion hazards can exist at elevated temperatures. No hazardous polymerization will occur. It may react vigorously with oxidizing materials. Thermal degradation products include highly toxic fumes of phosgene, oxides of carbon and nitrogen.

Explosions have occurred with mixtures of ethylene dichloride with liquid ammonia or with dimethylaminopropylamine. Finely divided aluminum or magnesium metal may be hazardous in contact with liquid.
SECTION VI. HEALTH HAZARD INFORMATION

Inhalation of this solvent can produce irritation and intoxication effects. Systemic toxicity from overexposure occurs in the liver, digestive tract, kidneys, adrenal glands and nervous system. Nausea, vomiting, depression, and diarrhea are signs of intoxication. Skin contact will irritate the skin and cause strong irritation or burn on prolonged contact. It is an eye irritant and liquid in the eye can produce serious injury (clouding of cornea) if not removed promptly. Human, oral LD₅₀ is 845 mg/kg.

FIRST AID:

Eye contact: Wash eyes promptly for 15 minutes with running water. Get prompt medical attention.

Skin contact: Wash contact area with soap and water; replace skin oils with an approved lanolin lotion.

Inhalation: Remove victim to fresh air. Restore breathing if required. Get medical help.

Ingestion: Give 3 glasses water or milk. Obtain immediate medical attention for stomach lavage. Induce vomiting when medical help unavailable.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Report to safety coordinator. Exclude from area personnel not assigned to clean-up and those without protection against inhalation of vapors and contact with liquid. Provide adequate ventilation. Remove ignition sources. Absorb spill on paper, vermiculite or other absorbent and place in covered metal container for disposal.

DISPOSAL: Burn in an approved, scrubber-equipped, incinerator, or (for small amounts only) in an open ditch away from buildings and people. A licensed chemical waste disposal company can also be used. Follow Federal, State and local regulations.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Ventilation must meet TLV requirements. Heavy vapors will collect in low areas; use proper hood design for heavy vapors. Exhaust fans should be explosion proof.

Use this volatile solvent in properly exhaust ventilated area only; hoods should maintain 100 fpm face velocity minimum. Air supplied or self-contained respirators are needed for non-routine use above TLV and for emergencies.

Near butyl or neoprene gloves to prevent skin contact. Wear goggles or safety glasses in areas of use. Use impervious aprons to prevent skin contact.

Provide eye wash stations and safety showers in areas of use.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store in a clean, cool well-ventilated area. Outside or detached storage of this flammable material is preferred. Store small quantities in brown bottles or opaque containers as this solvent is light sensitive. No smoking or other ignition sources in areas of use or storage. Use spark-proof tools.

Ground and bond metal containers for liquid transfers to prevent static sparks. Prevent skin contact! Promptly remove contaminated clothing and launder before reuse.

Avoid inhalation of vapors! Handle as a potential carcinogen; limit exposure to as few workers as possible.

DATA SOURCE(S) CODE: 1-9, 12, 19, 21
SECTION I - GENERAL INFORMATION

PRODUCT NAME: TRICHLOROETHYLENE 5000UG/ML, 1ML
FORMULA: C2HCL3
MATERIAL SAFETY DATA SHEET NO: 1400850

SECTION II - HAZARDOUS INGREDIENTS OF MIXTURES

<table>
<thead>
<tr>
<th>CHEMICAL NAME</th>
<th>COMMON NAME - PERCENTAGE - CAS #</th>
<th>(FORMULA) - PEL(UNITS) - TLV(UNITS)</th>
<th>LD50 VALUE - CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRICHLOROETHYLENE</td>
<td>7193 MG/KG ORAL RAT</td>
<td>50 PPM 50 PPM</td>
<td>SEE FOOTNOTE(4,6)</td>
</tr>
<tr>
<td>ETHENE, TRICHLORO-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRICHLOROETHYLENE</td>
<td>6793 MG/KG ORAL RAT</td>
<td>50 PPM 50 PPM</td>
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<tr>
<td>METHANOL</td>
<td>5628 MG/KG ORAL RAT</td>
<td>260 MG/M3 262 MG/M3</td>
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</tbody>
</table>

FOOTNOTES

4 CLASSIFIED BY IARC AS A CLASS 3 CARCINOGEN.
6 SUBJECT TO THE REPORTING REQUIREMENTS OF SARA TITLE III, SECTION 313.

SECTION III - PHYSICAL DATA

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>VALUE</th>
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</thead>
<tbody>
<tr>
<td>BOILING POINT</td>
<td>65 C</td>
</tr>
<tr>
<td>MELTING POINT</td>
<td>-98 C</td>
</tr>
<tr>
<td>VAPOR PRESSURE</td>
<td>100 MM</td>
</tr>
<tr>
<td>VAPOR DENSITY</td>
<td>1.10 C</td>
</tr>
<tr>
<td>SPECIFIC GRAVITY</td>
<td>0.790 G/ML</td>
</tr>
<tr>
<td>WATER SOLUBILITY</td>
<td>100</td>
</tr>
<tr>
<td>PERCENT VOLATILE</td>
<td>&gt;1</td>
</tr>
<tr>
<td>EVAPORATION RATE</td>
<td>&gt;1 (ETHER=1)</td>
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<tr>
<td>APPEARANCE</td>
<td>CLEAR COLORLESS LIQUID</td>
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SECTION IV - FIRE AND EXPLOSION HAZARD DATA

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLASH POINT</td>
<td>50 F</td>
</tr>
<tr>
<td>FLAMMABLE LIMITS</td>
<td>LEL 6.0 UEL 36</td>
</tr>
</tbody>
</table>

EXTINGUISHING MEDIA

- CO2
- DRY CHEMICAL
- ALCOHOL FOAM.

SPECIAL FIRE FIGHTING PROCEDURES

WEAR SELF CONTAINED BREATHING APPARATUS WHEN FIGHTING A CHEMICAL FIRE.

UNUSUAL FIRE AND EXPLOSION HAZARDS

THE FOLLOWING TOXIC VAPORS ARE FORMED WHEN THIS MATERIAL IS HEATED TO DECOMPOSITION.
CATALOG NO 40085
PRODUCT NAME TRICHLOROETHYLENE 5000UG/ML, 1ML
DATA SHEET NO 1400850
TRICHLOROETHYLENE

* CONTINUED *
HCL

SECTION V - HEALTH HAZARD DATA
LD50  5628  MG/KG  ORAL RAT
PEL  260  MG/M3

EMERGENCY AND FIRST AID PROCEDURES
EYES
FLUSH EYES WITH WATER FOR 15 MINUTES.
CONTACT A PHYSICIAN.

SKIN
FLUSH SKIN WITH LARGE VOLUMES OF WATER.

INHALATION
IMMEDIATELY MOVE TO FRESH AIR.
IF BREATHING STOPS, GIVE ARTIFICIAL RESPIRATION
CONTACT A PHYSICIAN

INGESTION
NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON
NEVER TRY TO MAKE AN UNCONSCIOUS PERSON VOMIT
GIVE 2 TABLESPOONS OF BAKING SODA IN A GLASS OF WATER
PRESS FINGERS TO BACK OF TONGUE TO INDUCE VOMITING.
IMMEDIATELY CONTACT A PHYSICIAN.

EFFECTS OF OVEREXPOSURE
HARMFUL IF INHALED
MAY BE FATAL IF SWALLOWED
CONTAINS MATERIAL(S) KNOWN TO THE STATE OF CALIFORNIA TO
CAUSE CANCER.
HEADACHE
NAUSEA
GASTROINTESTINAL DISTURBANCES
BLINDNESS

SECTION VI - REACTIVITY DATA
STABILITY STABLE.

CONDITIONS TO AVOID
N/A

INCOMPATIBILITY
OXIDIZING AGENTS
SECTION VI - REACTIVITY DATA

* CONTINUED *

CHROMIC ANHYDRIDE, LEAD PERCHLORATE, PERCHLORIC ACIDS

HAZARDOUS DECOMPOSITION PRODUCTS

HCL

HAZARDOUS POLYMERIZATION WILL NOT OCCUR.

CONDITIONS TO AVOID

N/A

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

TAKE UP WITH ABSORBENT MATERIAL.
VENTILATE AREA.
ELIMINATE ALL IGNITION SOURCES.

"ASTE 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 RUBBER GLOVES.

EYE PROTECTION

WEAR PROTECTIVE GLASSES.

VENTILATION

USE ONLY IN WELL VENTILATED AREA.

SPECIAL

N/A
SECTION VIII - SPECIAL PROTECTION INFORMATION

OTHER PROTECTIVE EQUIPMENT

N/A

SECTION IX - SPECIAL PRECAUTIONS

STORAGE AND HANDLING

REFRIGERATE IN SEALED CONTAINER.
KEEP AWAY FROM OXIDIZERS.
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 6/19/90
MATERIAL SAFETY DATA SHEET

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: INHIBITED 1,1,1-TRICHLOROETHANE
OTHER DESIGNATIONS: Methyl Chloroform, MC, CCl₃CH₃, GE Material D5B79, CAS # 000 071 556, α-Trichloroethane
TRADE NAMES & MANUFACTURER: BLACO-THANE (Baron-Blakeslee), CHLOROTHENE NU & VG (Dow), INHIBISOL (Penetone Corp.), TRI-ETHANE (PFG Ind. Inc.), TRITHENE (SRS, Inc.)

SECTION II. INGREDIENTS AND HAZARDS

1,1,1-Trichloroethane
Inhibitor, typical

*Inhibitors used are proprietary. Commercial materials contain up to about 5% inhibitor and are designed for cold cleaning or vapor degreasing use or both.

**Current OSHA PEL and ACGIH (1983) TLV. ACGIH STEL 450 ppm.

NIOSH (1976) proposed a 10-hr TWA of 200 ppm with a 350 ppm ceiling (15 minute sample) and has recommended caution in use.

SECTION III. PHYSICAL DATA

Boiling point, 1 atm, deg F ------- ca 165*
Vapor pressure, 20 C, mm Hg ------ 100
Vapor density (Air=1) ------ 4.55
Water solubility, g/100ml H₂O @20C - 0.09

Appearance & Odor: Colorless liquid with a mild, sweetish, pleasant, ether-like odor which may be just perceptible (unfatigued) at about 100 ppm in air.

*Properties depend on the inhibitor and inhibitor level.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method Autodetonation Temp Flammability Limits in Air

None 537 C (988 F) (High energy ignition source at 25C), Vol %

Lower Upper

8.0% 10.5%

This material is nearly nonflammable. High energy, such as electric arc, is needed for ignition, and the flame tends to go out when the ignition source is removed. Material involved in a fire can emit toxic and irritating fumes. Water fog, carbon dioxide, dry chemical, or foam may be used to fight fires. Use self-contained or air-supplied breathing apparatus for protection against suffocating vapors and toxic and corrosive decomposition products.

SECTION V. REACTIVITY DATA

This material can be hydrolyzed by water to form hydrochloric acid and acetic acid. It will react with strong caustic, such as caustic soda or caustic potash to form flammable or explosive material. Attacks natural rubber.

It requires inhibitor content to prevent corrosion of metals; and when inhibitor is depleted, it can decompose rapidly by reaction with finely divided white metals, such as aluminum, magnesium, zinc, etc. Do not use these metals for storage containers or in pressurized spraying equipment where MC is involved.

It will decompose at high temperature upon contact with hot metal, or under ultra-violet radiation to produce toxic and corrosive gases (hydrogen chloride, dichloroacetylene, chlorine and some phosphene).
SECTION VI. HEALTH HAZARD INFORMATION

<table>
<thead>
<tr>
<th>TLV</th>
<th>350 ppm or 1900 mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brief exposure at 900-1000 ppm causes mild eye irritation and loss of coordination due to the early effects of MC on the CNS. Excessive exposure gives headache, drowsiness, impaired judgement, unconsciousness. Defects skin on contact can produce irritation and dermatitis; can be absorbed through the skin. Eye contact gives pain and irritation. Considered low in toxicity among the chlorinated hydrocarbons.</td>
<td></td>
</tr>
</tbody>
</table>

FIRST AID:

Eye contact: Flush eyes well with plenty of running water for 15 min, including under eyebrows. Get medical attention for irritation.

Skin contact: Remove solvent-wet clothing promptly. Wash contact area with warm water and soap. Get medical attention for irritation.

Inhalation: Remove to fresh air. Restore and/or support breathing as needed. Get medical assistance. (Note: Advise physician not to use adrenaline.)

Ingestion: Contact physician. Aspiration a hazard! Possible spontaneous vomiting. (If medical help not readily available and amount swallowed was appreciable, give milk or water to drink and induce vomiting. Repeat. Estimated lethal dose for 150 lb man is 0.5 to 1 pint.)


SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

For small spills in ventilated area, mop, wipe or soak up with absorbent material avoiding inhalation and contact. Evaporate outdoors or in an exhaust hood. For large spills, inform safety personnel and evacuate area. Use protective equipment during clean-up (see Sect. VIII). Ventilate area. Contain liquid, pick up and place in closed metal containers. Do not allow to enter drains and water ways.

DISPOSAL: Dispose of via a licensed waste solvent disposal company, or reclaim by filtration and distillation procedures. Follow Federal, State and Local regulations. Aquatic hazard, toxicity TLm 96: 100-10 ppm. EPA hazardous waste number under RCRA is U226 (40CFR261).

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide general and local exhaust ventilation to meet TLV requirements. Air-supplied or self-contained respirator should be available for non-routine or emergency use. A chemical cartridg-type respirator can be used for a limited time below 1000 ppm. A full facepiece is needed above 500 ppm. Chemical goggles or a face shield should be worn if splashing is possible. Gloves and apron (of neoprene, polyethylene or polyvinyl chloride) should be worn when needed to avoid skin contact. Remove solvent-wet clothing promptly. A safety shower and eyewash station should be available to use area if splashing is probable. Replacemnt and periodic medical examinations should consider cardiovascular, liver, CNS functions, and skin.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store in closed containers in a cool, well-ventilated area. Keep water-free. Monitor inhibitor level for vapor degreasing use. Use caution in cleaning operations involving white metal lines (see Sect. V). Trichloroethylene contamination may cause decomposition when aluminum is degreased. Provide medical monitoring of those regularly exposed to MC in the workplace. Preclude those with CNS, liver, or heart disease from exposure. Personnel using this solvent should avoid drinking alcoholic beverages shortly before, during, or soon after exposure. NIOSH(1976 Crit. Doc.) expressed concern because of possible birth defects from high level pregnant rat exposures. Since 1976, directed studies have been negative. At occupational/physicians' seminar on "Reproductive Hazards in the Workplace," Washington, DC (4/25/83), no physician was aware of data to substantiate the NIOSH concern.

DOT Classification: ORM-A 1.D. No. UN2831

DATA SOURCE(S) CODE: 1-12, 14, 20, 23, 25, 26, 30, 31, 34, 37, 38, 45-49, 53

APPROVALS: MIS/CRD INDUSTRY HYGIENE/SAFETY MEDICAL REVIEW: 1 August 1983

GENIUM PUBLISHING
CHEMICAL NAME
TETRACHLOROETHYLENE

FORMULA
C2Cl4

SYNONYMS
PERCHLOROETHYLENE
PERK
NEMA
DIDAKENE
PERCLENE
NCI-C04580
UN 1897
PERCOSOLVE
ANKILOSTIN
CARBON DICHLORIDE
CARBON BICHLORIDE
ETHYLENE TETRACHLORIDE
PERCHLORETHYLENE
TETRACHLOROETHYLENE
TETRACHLOROETHENE
1,1,2,2-TETRACHLOROETHYLENE
TETRALEX
ENT 1,860
PERCHLOR
U210
OHS22900

PERMISSIBLE EXPOSURE LIMIT
100 PPM OSHA TWA - 200 PPM OSHA CEILING
300 PPM OSHA 5 MINUTE PEAK
50 PPM ACGIH TWA - 200 PPM ACGIH STEL
REDUCE EXPOSURE TO LOWEST FEASIBLE LIMIT (NIOSH)
SUSPECT ANIMAL CARCINOGEN (IARC)
POSITIVE CARCINOGEN IN MICE (NCI); NEGATIVE CARCINOGEN IN RATS (NCI)
EXPERIMENTAL CARCINOGEN (NTP)
TERATOGENIC DATA (RTEC) - MUTAGENIC DATA (RTEC)
AQUATIC TOXICITY RATING 2/2 (TLM96 10 - 100 PPM)
NO DATA LOCATED - RATED BY THE NATIONAL ACADEMY OF SCIENCES
CERCLA HAZARD RATINGS - TOXICITY 2 - IGNITABILITY 0 - REACTIVITY 0 - PERSISTENCE 2

TOXICOLOGY: TETRACHLOROETHYLENE IS AN EYE AND MUCOUS MEMBRANE IRRITANT,
PRIMARY SKIN IRRITANT, CENTRAL NERVOUS SYSTEM DEPRESSANT, AND HEPATO-
TOXIN.

ACUTE EXPOSURE IRRITATES THE EYES, NOSE, AND THROAT. INHALATION OR
INGESTION MAY CAUSE GASTRIC DISTURBANCES, NARCOSIS, LIVER AND KIDNEY
DAMAGE, AND PERIPHERAL NEUROPATHY.

THE TLV WAS SET TO PREVENT CNS EFFECTS AND LIVER DAMAGE.

IHL-HMN TCLO: 96 PPM/7 HR
IHL-MAN TCLO: 280 PPM/2 HR
IHL-MAN TCLO: 600 PPM/10 MIN
IHL-RAT LCLO: 4000 PPM / 4 HR
IHL-MUS LCLO: 2300 MG/H3 / 2 HR
ORL-RAT LD50: 8850 MG/KG
ORL-MUS LD50: 8100 MG/KG
ORL-DOG LDLO: 4000 MG/KG
ORL-CAT LDLO: 4000 MG/KG
ORL-RBT LDLO: 5000 MG/KG

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONCENTRATION
500 PPM
OSHA/NIOSH

PHYSICAL DESCRIPTION
COLORLESS LIQUID, ODOR LIKE ETHER/CHLOROFORM

CHEMICAL AND PHYSICAL PROPERTIES
MOLECULAR WEIGHT: 166
BOILING POINT AT 1 ATM, F: 250 F
SOLUBILITY IN WATER, G/100 G WATER AT 20C: .015 G/ML
FLASH POINT, CLOSED CUP, F (OR OPEN CUP IF 0C): NOT COMBUSTIBLE
VAPOR PRESSURE @ 20 C, MMHG: 15.8 MM
MELTING POINT, F: -2 F
UPPER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: NOT COMBUSTIBLE
LOWER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: NOT COMBUSTIBLE
SPECIFIC GRAVITY: 1.6227
VAPOR DENSITY (AIR=1): 5.8
ODOR THRESHOLD: 50 PPM
OCTANOIL/WATER PARTITION COEFFICIENT: 2.60

INCOMPATIBILITIES
STRONG OXIDIZERS
ACTIVE METALS
BARIUM
LITHIUM
BERYLLIUM

PERSONAL PROTECTIVE EQUIPMENT
FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES"

FOR CHEMICAL HAZARDS:

EMPLOYERS SHALL PROVIDE AND ENSURE THAT EMPLOYEES USE APPROPRIATE
PROTECTIVE CLOTHING AND EQUIPMENT NECESSARY TO PREVENT REPEATED OR
PROLONGED SKIN CONTACT WITH THIS SUBSTANCE. FACE SHIELDS SHALL COMPLY

EMPLOYERS SHALL ENSURE THAT CLOTHING WET WITH THIS SUBSTANCE IS PLACED
IN CLOSED CONTAINERS FOR STORAGE UNTIL IT CAN BE DISCARDED OR UNTIL THE
EMPLOYER PROVIDES FOR THE REMOVAL OF THE CONTAMINANT FROM THE CLOTHING.
IF THE CLOTHING IS TO BE LAUNDERED OR OTHERWISE CLEANED TO REMOVE THE
CONTAMINANT, THE EMPLOYER SHALL INFORM THE PERSON PERFORMING THE
CLEANING OPERATION OF THE HAZARDOUS PROPERTIES OF THE SUBSTANCE.

ACGIH "GUIDELINES FOR SELECTION OF CHEMICAL PROTECTIVE
CLOTHING" INDICATES THE FOLLOWING MATERIALS ARE
PROTECTIVE RATINGS BY INDEPENDENT VENDORS AGAINST TETRACHLOROETHYLENE:

EXCELLENT/GOOD:
NITRILE RUBBER
POLYVINYL ALCOHOL
VITON

GOOD/FAIR:
POLYURETHANE

FAIR/GOOD:
NITRILE/POLYVINYL CHLORIDE
POLYETHYLENE
CHLORINATED POLYETHYLENE
STYRENE-BUTADIENE RUBBER

FAIR/POOR:
BUTYL RUBBER
NATURAL RUBBER
NEOPRENE
NEOPRENE/STYRENE-BUTADIENE RUBBER
POLYVINYL CHLORIDE

GOGGLES
FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES FOR CHEMICAL HAZARDS":

EMPLOYERS SHALL PROVIDE AND ENSURE THAT EMPLOYEES USE SPLASH-PROOF SAFETY GOGGLES WHICH COMPLY WITH 29CFR1910.133(A)(2)-(A)(6) WHERE THIS LIQUID MAY CONTACT THE EYES.

WASHING CHEMICALS FROM THE SKIN
FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES FOR CHEMICAL HAZARDS":

EMPLOYERS SHALL ENSURE THAT EMPLOYEES WHOSE SKIN BECOMES CONTAMINATED WITH THIS SUBSTANCE PROMPTLY WASH OR SHOWER WITH SOAP OR MILD DETERGENT AND WATER TO REMOVE ANY CONTAMINANT FROM THE SKIN.

EMPLOYERS SHALL ENSURE THAT EMPLOYEES WHO HANDLE THIS SUBSTANCE WASH THEIR HANDS THOROUGHLY WITH SOAP OR MILD DETERGENT AND WATER BEFORE EATING, SMOKING, OR USING TOILET FACILITIES.

OBTAINING CHANGING OF WORK CLOTHING
NOT REQUIRED

CLOTHING REMOVAL FOLLOWING ACCIDENTAL CONTAMINATION
FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES FOR CHEMICAL HAZARDS":

EMPLOYERS SHALL ENSURE THAT NON-IMPERVIOUS CLOTHING WHICH BECOMES CONTAMINATED WITH THIS SUBSTANCE BE REMOVED PROMPTLY AND NOT REWORN UNTIL THE SUBSTANCE IS REMOVED FROM THE CLOTHING.
SPECIFIC EMERGENCY PROVISIONS
NONE REQUIRED

RESPIRATOR SELECTION (UPPER LIMIT DEVICES PERMITTED)

500 PPM
- CHEMICAL CARTRIDGE RESPIRATOR
  WITH AN ORGANIC VAPOR CARTRIDGE
  WITH A FULL FACE-PIECE
- GAS MASK
  WITH AN ORGANIC VAPOR CANISTER
  (CHIN-STYLE OR FRONT-OR BACK-MOUNTED CANISTER)
- SUPPLIED-AIR RESPIRATOR
  WITH A FULL FACE-PIECE, HELMET, OR HOOD
- SELF-CONTAINED BREATHING APPARATUS
  WITH A FULL FACE-PIECE

ESCAPE
- GAS MASK
  WITH AN ORGANIC VAPOR CANISTER
- SELF-CONTAINED BREATHING APPARATUS

FIREFIGHTING
- SELF-CONTAINED BREATHING APPARATUS
  WITH A FULL FACE-PIECE
  OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE

ROUTE OF ENTRY INTO BODY
INHALATION
INGESTION
SKIN OR EYE CONTACT

SYMPTOMS
EYE IRRITATION
NASAL IRRITATION
HEADACHE
NAUSEA
VERTIGO
DIZZINESS
INCOORDINATION
DROWSINESS
SKIN IRRITATION
KIDNEY DAMAGE
FACE/NECK FLUSHED
LIVER DAMAGE
SKIN BURNS
NARCOSIS
DROWSINESS
ERYTHEMA
COMATOSE
ABDOMINAL PAIN
UNCONSCIOUSNESS
PERIPHERAL NEUROPATHY
ANOREXIA

FIRST AID PROCEDURES FOLLOWING EXPOSURE
IF THIS CHEMICAL GETS INTO THE EYES, IMMEDIATELY WASH THE EYES WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING THE LOWER AND UPPER LIDS. GET MEDICAL ATTENTION IMMEDIATELY. CONTACT LENSES SHOULD NOT BE WORN WHEN WORKING WITH THIS CHEMICAL.

IF THIS CHEMICAL GETS ON THE SKIN, IMMEDIATELY WASH CONTAMINATED SKIN WITH SOAP OR MILD DETERGENT & WATER. IF THIS CHEMICAL SOAKS CLOTHING, IMMEDIATELY REMOVE CLOTHING & WASH SKIN WITH SOAP OR MILD DETERGENT & WATER. GET MEDICAL ATTENTION PROMPTLY.

IF THIS CHEMICAL GETS ON SKIN, IMMEDIATELY FLUSH CONTAMINATED SKIN WITH WATER. IF THIS CHEMICAL PENETRATES CLOTHING, IMMEDIATELY REMOVE THE CLOTHING AND FLUSH THE SKIN WITH WATER. GET MEDICAL ATTENTION PROMPTLY.

WHEN THIS CHEMICAL HAS BEEN SWALLOWED AND PERSON IS CONSCIOUS, IMMEDIATELY GIVE PERSON LARGE QUANTITIES OF WATER. AFTER WATER HAS BEEN SWALLOWED, TRY TO GET THE PERSON TO VOMIT BY HAVING HIM TOUCH THE BACK OF HIS THROAT WITH HIS FINGER. DO NOT MAKE AN UNCONSCIOUS PERSON VOMIT. GET MEDICAL ATTENTION IMMEDIATELY.

VOLATILE AND GASEOUS ANESTHETICS:
EMERGENCY TREATMENT - ESTABLISH AIRWAY AND MAINTAIN RESPIRATION. REMOVE ANESTHETIC BY FORCED VENTILATION.
FURTHER TREATMENT - MAINTAIN BLOOD PRESSURE BY INTRAVENOUS SALINE OR BLOOD TRANSFUSION. MAINTAIN BODY WARMTH. MAINTAIN ADEQUATE AIRWAY BY REMOVING SECRETIONS FROM TRACHEA BY CATHETER SUCTION. PREVENT HYPOXIA. IF HYPERThERMIA OCCURS, LOWER BODY TEMPERATURE BY APPLICATION OF WET TOWELS. FOR MALIGNANT HYPERThERMIA, GIVE DANTROLENE SODIUM, 1 MG/KG, EVERY FIFTEEN MINUTES, INTRAVENOUSLY TO A TOTAL OF 10 MG/KG, AND PROCAINAMIDE, 15 MG/KG, INTRAVENOUSLY, OVER TEN MINUTES. GIVE ICED NORMAL SALINE INTRAVENOUSLY AT A RATE OF 1 LITER EVERY TEN MINUTES FOR THIRTY MINUTES. LAVAGE STOMACH, URINARY BLADDER, RECTUM, AND PERITONEUM WITH ICED SALINE. TREAT ACIDOSIS WITH INTRAVENOUS SODIUM BICARBONATE. MONITOR SERUM TOTAL BASE, SERUM POTASSIUM, AND ARTERIAL PH AND TREAT APPROPRIATELY. MAINTAIN URINE OUTPUT AT 1-2 LITERS DAILY WITH FUROSEMIDE AND MANITOL. AFTER FIRST DAY, GIVE DANTROLENE, 1 MG/KG ORALLY DAILY, FOR THREE DAYS. (MEDICATION MUST BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL)
SPECIAL TREATMENT - TREAT LIVER DAMAGE.
(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)
GASTRIC LAVAGE - GIVE PATIENT GLASS OF WATER PRIOR TO PASSING OF STOMACH TUBE. LAY PATIENT ON ONE SIDE, WITH HEAD LOWER THAN WAIST. IMMobilize A STRUGGLING PATIENT WITH A SHEET OR BLANKET. MEASURE DISTANCE ON TUBE FROM MOUTH TO EPigastrum, MARK TUBE WITH INDELIBLE MARKING OR TAPE. REMOVE DENTURES AND OTHER FOREIGN OBJECTS FROM MOUTH. OPEN MOUTH, USE GAG IF NECESSARY. EXTEND HEAD BY LIFTING THE CHIN. PASS TUBE OVER TONGUE AND TOWARD BACK OF THROAT WITHOUT EXTENDING HEAD OR NECK. IF OBSTRUCTION IS MET BEFORE THE MARK ON TUBE REACHES LEVELS OF TEETH, DO NOT FORCE, BUT REMOVE TUBE AND REPEAT PROCEDURE UNTIL TUBE PASSES TO MARK. PLACE END OF TUBE IN GLASS OF WATER. IF TUBE IS OBSTRUCTED WHEN INTRODUCED ABOUT HALFWAY TO THE MARK, IT MAY HAVE ENTERED TRACHEA.

AFTER TUBE IS PLACED IN STOMACH, ASPIRATE FIRST TO REMOVE STOMACH CONTENTS BY IRRIGATION SYRINGE. SAVE STOMACH CONTENTS FOR EXAMINATION, AND REPEAT INTRODUCTION AND WITHDRAWAL OF 100-300 ML WARM WATER UNTIL AT LEAST 3 LITERS OF CLEAR RETURN ARE OBTAINED. USE ACTIVATED CHARCOAL AT BEGINNING OF LAVAGE TO AID IN POISON INACTIVATION. LEAVE 50 GRAMS OF CHARCOAL SUSPENDED IN WATER IN THE STOMACH. IF INTRODUCTION AND REMOVAL OF LAVAGE FLUID BY GRAVITY REQUIRES MORE THAN FIVE MINUTES, ASSIST WITH ASEPTO SYRinge. PREVENT ASPIRATION WITH CUFFED ENDOTRACHEAL TUBE. AVOID GIVING LARGE QUANTITIES OF WATER.

MASSAGE OF EPigastrum WHILE STOMACH TUBE IS BEING ASPIRATED MAY AID IN POISON REMOVAL.

IF PATIENT COMATOSE, INTUBATE TRACHEA WITH CUFFED ENDOTRACHEAL TUBE. SUCCINYLCHLORINE MAY BE ADMINISTERED BY QUALified MEDICAL PERSONNEL TO EASE INSERTION OF TRACHEAL CATHETER PRIOR TO PASSAGE OF STOMACH TUBE. (DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

PULMONARY EDEMA - RELIEVE ANXIETY. GIVE MORPHINE SULFATE, 10 MG, TO DECREASE RATE OF RAPID, INEFFICIENT RESPIRATION. GIVE 40% OXYGEN BY FACE MASK. USE INTERMITTENT POSITIVE-PRESSURE OXYGEN RESUSCITATOR FOR SHORT PERIODS. GIVE AMINOPHYLLINE, 0.5 G, INTRAVENOUSLY, TO RELIEVE ASSOCIATED BRONCHIAL CONSTRICTION. TREAT EDEMA CAUSED BY MORPHINE OR MORPHINE ANALOGS BY GIVING NALOXONE AND OXYGEN.
(MEDICATION MUST BE GIVEN BY QUALIFIED MEDICAL PERSONNEL) (DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

LIVER DAMAGE - REMOVE FROM EXPOSURE TO ALL CHEMICALS AND DRUGS. MAINTAIN COMPLETE BED REST. AVOID ANESTHESIA OR SURGICAL PROCEDURES. AVOID DEHYDRATION OR OVERHYDRATION. IF VOMITING SEVERE AND ORAL FLUIDS NOT RETAINED, REPLACE VOMITUS WITH AN EQUAL QUANTITY OF 100% DEXTROSE IN NORMAL SALINE. IN RENAL FUNCTION ADEQUATE, GIVE 1 LITER OF 5% DEXTROSE OR INVERT SUGAR IN NORMAL SALINE PLUS 1-3 LITERS OF 10% DEXTROSE OR INVERT SUGAR IN DISTILLED WATER INTRA-

VENOUSLY EVERY TWENTY-FOUR HOURS.
LEAKS AND SPILL PROCEDURES A REPORTABLE QUANTITY OF ONE POUND APPLIES TO THIS SUBSTANCE ESTABLISHED BY SECTIONS 101(14) AND 102(B) OR ADJUSTED UNDER SECTION 102(A) OF THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980 (CERCLA). SECTIONS 103(A) AND 103(B) REQUIRE THAT PERSONS IN CHARGE OF A VESSEL OR FACILITY FROM WHICH A HAZARDOUS SUBSTANCE HAS BEEN RELEASED IN A QUANTITY EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THAT SUBSTANCE IMMEDIATELY NOTIFY THE NATIONAL RESPONSE CENTER

(800) 424-8802; IN THE WASHINGTON, D.C. METROPOLITAN AREA (202) 426-2675 50FR13456 04/04/85

DEPARTMENT OF TRANSPORTATION HAZARD CLASS
49CFR172.101 HAZARDOUS MATERIALS TABLE
ORM-A

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS
49CFR172.101 (SUBJECT TO ADDITIONAL LABELING REQUIREMENTS OF 49CFR172.402)
NONE

INTERGOVERNMENTAL MARITIME ORGANIZATION HAZARD CLASS
49CFR172.102 OPTIONAL HAZARDOUS MATERIALS TABLE

CLASS 6.1-POISONOUS (TOXIC) SUBSTANCE

INTERGOVERNMENTAL MARITIME ORGANIZATION LABELING SPECIFICATIONS FOR DOMESTIC AND EXPORT SHIPMENTS
49CFR172.102

ST. ANDREWS CROSS

FOLLOWING INFORMATION FROM BUREAU OF EXPLOSIVES "EMERGENCY HANDLING OF HAZARDOUS MATERIALS":

IF MATERIAL ON FIRE OR INVOLVED IN FIRE:
* EXTINGUISH FIRE USING AGENT SUITABLE FOR TYPE OF SURROUNDING FIRE (MATERIAL ITSELF DOES NOT BURN OR BURNS WITH DIFFICULTY)

IF MATERIAL IS NOT ON FIRE AND IS NOT INVOLVED IN FIRE:
* KEEP MATERIAL OUT OF WATER SOURCES AND SEWERS
* BUILD DIKES TO CONTAIN FLOW AS NECESSARY

PERSONNEL PROTECTION:

* KEEP UPWIND
* WEAR BOOTS, PROTECTIVE GLOVES AND GAS TIGHT GOGGLES
* AVOID BREATHING DUST/VAPORS/FUMES FROM MATERIAL
* WASH AWAY ANY MATERIALS WHICH MAY HAVE CONTACTED THE BODY WITH COPIOUS AMOUNTS OF WATER OR SOAP AND WATER

LAND SPILL:
* DIG A PIT, POND, LAGOON OR HOLDING AREA TO CONTAIN LIQUID OR SOLID MATERIAL
* COVER SOLIDS WITH A PLASTIC SHEET TO PREVENT DISSOLVING IN RAIN OR FIREFIGHTING WATER

WATER SPILL:
* USE NATURAL DEEP WATER POCKETS, EXCAVATED LAGOONS, OR SAND BAG BARRIERS TO TRAP MATERIAL AT BOTTOM
* IF DISSOLVED, APPLY ACTIVATED CARBON AT 10 TIMES SPILLED AMOUNT AT 10PPM OR GREATER CONCENTRATION
* REMOVE TRAPPED MATERIAL WITH SUCTION HOSES
* USE MECHANICAL DREDGES OR LiftS TO REMOVE IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES

FOLLOWING INFORMATION FROM DEPARTMENT OF TRANSPORTATION/U.S. COAST GUARD "CHEMICAL RESPONSE INFORMATION SYSTEM", REGARDING WATER SPILLS:

* SUBSTANCE SINKS IN WATER
* RESTRICT HUMAN USE WHEN SUBSTANCE INVOLVED
* RESTRICT INDUSTRIAL USE WHEN SPILLED SUBSTANCE COULD CORRODE MACHINERY OR IF POSSIBILITY OF IGNITION FROM HIGHLY FLAMMABLE VAPORS DEVELOPS
* CONTAIN SURFACE SLICKS
* PUMP SINKING LIQUID OR FINELY DIVIDED SOLIDS
* HIGHLY VOLATILE, AVOID INHALATION, VAPORS OR DUST ARE IRRITATING OR TOXIC
* HIGHLY CORROSIVE, AVOID DIRECT CONTACT, CONTACT WITH SKIN OR EYES CAN CAUSE IRRITATION OR BURNS
* U.S. COAST GUARD REQUIRES 24 HOUR ADVANCE NOTICE TO CAPTAIN OF THE PORT WHEN THIS SUBSTANCE IS SCHEDULED TO ARRIVE AT PORT WHEN TRANSPORTED IN BULK QUANTITY

AS NUMBER
127-18-4

REGISTRY TOXIC CHEMICALS NUMBER
KX3850000
VNP000

VINYL CHLORIDE

CAS: 75-01-4

DOT: 1086

mf: C₄H₅Cl     mw: 62.50

PROP: Colorless liquid or gas (when inhibited); faintly sweet odor. Mp: -160°C; bp: -13.9°C; ld: 4%; ud: 22%; flash p: 17.6°F (COC), fp: -159.7°F, d (liquid): 0.9195 @ 15/4°C; vap press: 2600 mm @ 25°C, vap d: 2.15, autoign temp: 882°F. Slightly sol in water; sol in alc; very sol in ether.

SYNS:

CHLORETHERENE
CHLORETHENE
CHLORETHENE
CHLORURO DE VINYLE (FRENCH)
CLORURE DE VINILE (ITALIAN)
ETHYLENE MONOCHLORIDE
MONOCHLOROETHANE
MONOCHLOROETHYLENE (DOT)
RCRA WASTE NUMBER U043

DOT Classification: Flammable Gas; Label: Flammable Gas

THR: Poison by inhalation. Moderately toxic by ingestion. A human carcinogen which causes liver and blood tumors. An experimental carcinogen, tumorigen and teratogen. Human reproductive effects by inhalation: changes in spermatogenesis. Human mutagenic data. A severe irritant to skin, eyes, and mucous membranes. Causes skin burns by rapid evaporation and consequent freezing. In high concentration it acts as an anesthetic. Chronic exposure has shown liver injury. Circulatory and bone changes in the fingertips have been reported in workers handling unpolymerized materials.

A very dangerous fire hazard when exposed to heat, flame or oxidizers. Large fires of this material are practically inextinguishable. A severe explosion hazard in the form of vapor when exposed to heat or flame. Long-term exposure to air may result in formation of peroxides which can initiate explosive polymerization of the chloride. Can react vigorously with oxidizing materials. Can explode on contact with oxides of nitrogen. Before storing or handling this material, instructions for use should be obtained from the supplier. To fight fire, stop flow of gas. When heated to decomposition it emits highly toxic fumes of Cl⁻. See also CHLORINATED HYDROCARBONS, ALIPHATIC. For further information, see Vol. 6, No. 4 of DPIM Report.

TOXICITY DATA:

mna-sat 1 ppm
 cyt-man-ur  25 ppm/10Y
 cyt-hmm: hla 10 mmol/L
 dns-rat: lvr 2100 µmol/L
 oot-mus: emb  75 mg/L
 msc-ham: ovr 10 ppm
 ihl-man TClO: 30 mg/m³ (5Y male): REP
 ihl-rat TClO: 100 ppm/6H (55D male): REP
 ihl-rat TClO: 500 ppm/7H (6-15D preg): TER
 ihl-mus TClO: 500 ppm/7H (6-15D preg): TER
 ihl-man TClO: 200 ppm/14Y-1: CAR, LIV
 orl-rat TDL0: 3463 mg/kg/52W-1: CAR
 ihl-rat TClO: 1 ppm/4H/52W-1: CAR
 ihl-rat TClO: 10000 ppm/4H (12-18D preg): REP, CAR, TER
 ipr-rat TDL0: 21 mg/kg/65W-1: ETA
 scu-rat TDL0: 21 mg/kg/67W-1: ETA
 ihl-mus TClO: 50 ppm/30W-1: CAR
 ihl-ham TClO: 50 ppm/40W-1: CAR
 ihl-rat TClO: 50 ppm/7H/26W-C: CAR
 ihl-rat TClO: 100 ppm/7H/26W-C: CAR
 ihl-mus TClO: 50 ppm/47W-I: CAR
 orl-rat TD: 34 g/kg/3Y-1: CAR
 ihl-mus TClO: 50 ppm/6H/4W-1: CAR
 ihl-mus TClO: 50 ppm/4H/30W-1: CAR
 ihl-rat TClO: 250 ppm/2Y-1: CAR
 ihl-hmm TClO: 300 mg/m³/7W-C: CAR, BLD
 ihl-rat TClO: 5 ppm/4H/52W-I: CAR
 ihl-rat TClO: 5 ppm/6H-43W-I: CAR
 orl-rat LD50: 500 mg/kg
 ihl-gpg LClO: 20 ppm/30M

CODEN:

CBTQ02 1,159.85
MUREAV 51,271.78
TXCYAC 9,21,78
CNREDP 5,1629,84
CALEDO 28,85,85
EVSBRBT 28,91,82
GTPZAB 24(5),28,80


OSHA PEL: TWA 1 ppm; CL 5 ppm/15M; Cancer Suspect Agent
ACGIH TLV: TWA 5 ppm; Human Carcinogen
DFG TRK: 3 ppm

NIOSH REL: (Vinyl Chloride) Lowest Detectable Level
APPENDIX B

HEALTH AND SAFETY FORMS
FIGURE 1

EMPLOYEE HEALTH AND SAFETY PLAN CERTIFICATION

Project No. ____________

Employee name (printed): ____________________________

I have read and I understand the Safety and Health Plan for the _______________ Project. I will abide by this plan.

Signature ______________________

Date ______________________
# RESPIRATORY TRAINING COMPLETION FORM

**INITIAL ONLY THE APPROPRIATE BLOCKS**

<table>
<thead>
<tr>
<th>Name</th>
<th>Please Print</th>
<th>SCBA</th>
<th>Airline Pressure</th>
<th>Cartridge Fullface</th>
<th>Cartridge Halfmask</th>
<th>OTHER SCBA</th>
<th>Other air purifying respirators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td></td>
<td>IA</td>
<td>Egress</td>
<td>Demand</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. I understand why respiratory protection is needed and where and when it should be used.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2. I know how to use this respirator properly.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3. I know how to clean and inspect this respirator.</td>
<td></td>
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</tr>
<tr>
<td>4. I understand the limitations and restrictions of the respirators I will be using.</td>
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</tr>
<tr>
<td>5. I wore this respiratory equipment in normal air and checked the facepiece fit.</td>
<td></td>
<td></td>
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<tr>
<td>6. I wore this respiratory equipment in a test atmosphere generated by smoke or other means.</td>
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<tr>
<td>7. I understand that a good gas tight face seal cannot be achieved with obstruction such as facial hair or glasses (with fullface mask).</td>
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</tbody>
</table>

**Signature**

**ITC FORM 9501 (9-84) DIVISION ___________ LOCATION ___________ JOB TITLE ___________**
### FIGURE 3

**TAILGATE SAFETY MEETING**

<table>
<thead>
<tr>
<th>Division/Subsidiary</th>
<th>Facility</th>
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</thead>
<tbody>
<tr>
<td>Date</td>
<td>Time</td>
</tr>
<tr>
<td>Customer</td>
<td>Address</td>
</tr>
<tr>
<td>Specific Location</td>
<td></td>
</tr>
<tr>
<td>Type of Work</td>
<td></td>
</tr>
<tr>
<td>Chemicals Used</td>
<td></td>
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</tbody>
</table>

#### SAFETY TOPICS PRESENTED

- Protective Clothing/Equipment
- Chemical Hazards
- Physical Hazards
- Emergency Procedures

<table>
<thead>
<tr>
<th>Hospital / Clinic</th>
<th>Phone ( )</th>
<th>Paramedic Phone ( )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital Address</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special Equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### ATTENDEES

<table>
<thead>
<tr>
<th>NAME PRINTED</th>
<th>SIGNATURE</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

Meeting conducted by:

<table>
<thead>
<tr>
<th>NAME PRINTED</th>
<th>SIGNATURE</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

Supervisor              
Manager

36-8-85
ON-THE-JOB TRAINING RECORD (OJTR) & STRUCTURED ON-SITE TRAINING RECORD

TRAINEE ___________________________ DIVISION ___________________________

LOCATION __________________________

DATE: ________________ HRS. TRAINING: ___________ INSTRUCTOR: ___________
    Mo. Day Yr.

SUBJECT: __________________________

KEY POINTS: __________________________

PERFORMANCE EVALUATION: __________________________

INSTRUCTING SUPERVISOR SIGNATURE __________________________

TRAINEE SIGNATURE __________________________

DATE: ________________ HRS. TRAINING: ___________ INSTRUCTOR: ___________
    Mo. Day Yr.

SUBJECT: __________________________

KEY POINTS: __________________________

PERFORMANCE EVALUATION: __________________________

INSTRUCTING SUPERVISOR SIGNATURE __________________________

TRAINEE SIGNATURE __________________________

ITC FORM 6514-1(4/85)
FIGURE 5

PREEMPLOYMENT EXAMINATION

IT Location __________________________
IT Division __________________________
PC No. ________________________________
Project NO. __________________________
Temporary or Subcontractor _____________

Name ____________________________ Sex ______ Age ______ Birth Date __________ Soc. Sec. No. __________
Address __________________________ City ______ State ______ Zip ______ Telephone No. ( ) __________

APPLICANT NOTE - READ CAREFULLY This examination is to help place you in a job safe to yourself and to others according to your physical ability. Answer every question ( )
DO YOU OR HAVE YOU EVER HAD? (CHECK EVERY ITEM)

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>YEAR NO</th>
<th></th>
<th>YES</th>
<th>YEAR NO</th>
<th></th>
<th>YES</th>
<th>YEAR NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GLASSES FOR READING</td>
<td>35</td>
<td>CHANGE IN SKIN COLOR</td>
<td>69</td>
<td>MORNING COUGH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>GLASSES FOR DISTANCE</td>
<td>36</td>
<td>A GOUTER</td>
<td>70</td>
<td>KIDNEY TROUBLE</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td>EYE TROUBLE, OTHER THAN GLASSES</td>
<td>37</td>
<td>CHEST PAIN</td>
<td>71</td>
<td>URINARY BLADDER TROUBLE</td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td>EYE INJURY</td>
<td>38</td>
<td>BREAST TROUBLE</td>
<td>72</td>
<td>VENERAL DISEASE</td>
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<td></td>
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<td>5</td>
<td>NOSE TROUBLE</td>
<td>39</td>
<td>CHRONIC CHEST CONDITION</td>
<td>73</td>
<td>SWOLLEN FACE OR ANKLES</td>
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<td></td>
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<tr>
<td>6</td>
<td>BROKEN NOSE</td>
<td>40</td>
<td>LUNG DISEASE</td>
<td>74</td>
<td>RUPTURE OR HERNIA</td>
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<td></td>
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<tr>
<td>7</td>
<td>SINUS INFECTION</td>
<td>41</td>
<td>SHORTNESS OF BREATH</td>
<td>75</td>
<td>BROKEN BONES OR DISLOCATIONS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>MARY FEVER</td>
<td>42</td>
<td>A FEELING OF TIGHTNESS IN CHEST</td>
<td>76</td>
<td>SWOLLEN OR SWOLLEN JOINTS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>MOUTH TROUBLE</td>
<td>43</td>
<td>ASTHMA</td>
<td>77</td>
<td>RHEUMATISM</td>
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<td></td>
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<tr>
<td>10</td>
<td>CONSIDERABLE TEETH TROUBLE</td>
<td>44</td>
<td>NIGHT SWEATS</td>
<td>78</td>
<td>ARTHRITIS</td>
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<tr>
<td>11</td>
<td>BAD HEARING</td>
<td>45</td>
<td>TUBERCULOSIS</td>
<td>79</td>
<td>A KNEE INJURY</td>
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<td>12</td>
<td>EAR TROUBLE</td>
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<td>SILICOSIS</td>
<td>80</td>
<td>SWOLLEN ANKLES</td>
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<td>13</td>
<td>RUNNING EAR</td>
<td>47</td>
<td>CHRONIC COUGH</td>
<td>81</td>
<td>FOOT TROUBLE OR PAINFUL FEET</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>14</td>
<td>RINGING IN THE EAR</td>
<td>48</td>
<td>COUGHING UP OF BLOOD</td>
<td>82</td>
<td>BACK TROUBLE</td>
<td></td>
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</tr>
<tr>
<td>15</td>
<td>PUNCTURED EAR DRUM</td>
<td>49</td>
<td>HEART TROUBLE OR A HEART ATTACK</td>
<td>83</td>
<td>SPINE TROUBLE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>SOME TROUBLES</td>
<td>50</td>
<td>FREQUENT COLORS</td>
<td>84</td>
<td>OSTEOARTHRITIS (Bone Infection)</td>
<td></td>
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</tr>
<tr>
<td>17</td>
<td>PATIENCE</td>
<td>51</td>
<td>HIGH BLOOD PRESSURE</td>
<td>85</td>
<td>ALCOHOLISM</td>
<td></td>
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<tr>
<td>18</td>
<td>FREQUENT HEADACHES</td>
<td>52</td>
<td>CAUGHT OR LOST WEIGHT PAST YEAR</td>
<td>86</td>
<td>DIABETES</td>
<td></td>
<td></td>
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<tr>
<td>19</td>
<td>HEAD INJURY</td>
<td>53</td>
<td>BLEEDING OR BRUISING TENDENCY</td>
<td>87</td>
<td>MALARIA</td>
<td></td>
<td></td>
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<tr>
<td>20</td>
<td>SKULL FRACTURE</td>
<td>54</td>
<td>FREQUENT Nausea</td>
<td>88</td>
<td>ANEMIA OR OTHER BLOOD CONDITION</td>
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<tr>
<td>21</td>
<td>BRAIN CONCUSSION</td>
<td>55</td>
<td>FREQUENT VOMITING</td>
<td>89</td>
<td>CANCER</td>
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<tr>
<td>22</td>
<td>DIZZY SPELLS</td>
<td>56</td>
<td>ULCERS</td>
<td>90</td>
<td>GROWING OR TUMORS</td>
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<td>FASTING SPELLS</td>
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<td>STOMACH TROUBLE</td>
<td>91</td>
<td>ANY CHRONIC AILMENT</td>
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<td>24</td>
<td>CONVULSIONS</td>
<td>58</td>
<td>CHRONIC INDEGION</td>
<td>92</td>
<td>BLOOD DISORDER IN FAMILY</td>
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</tr>
<tr>
<td>25</td>
<td>EPILEPSY</td>
<td>59</td>
<td>ABDOMINAL PAIN</td>
<td>93</td>
<td>TETANUS SHOT LAST 10 YEARS</td>
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<tr>
<td>26</td>
<td>LIGHT HEADED</td>
<td>60</td>
<td>APPHYEHOTIS</td>
<td>94</td>
<td>FOR EMPLOYEE OR SPOUSE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>MEINGITIS</td>
<td>61</td>
<td>HOLLER BLADDER TROUBLE</td>
<td>95</td>
<td>FOR EMPLOYEE OR SPOUSE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>A &quot;STROKE&quot;</td>
<td>62</td>
<td>JAUNICE</td>
<td>96</td>
<td>MOUTH OR MOUTH</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>29</td>
<td>PARALYSIS</td>
<td>63</td>
<td>BOWEL TROUBLES</td>
<td>97</td>
<td>FEMALE SURGERY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>NERVOUS ATTACK</td>
<td>64</td>
<td>COLITIS</td>
<td>98</td>
<td>FOR FEMALE APPLICANTS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>MENTAL TROUBLE</td>
<td>65</td>
<td>PILES</td>
<td>99</td>
<td>ARE YOUR PERIODS REGULAR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>SHOCK TREATMENT</td>
<td>66</td>
<td>DARK URINE</td>
<td>100</td>
<td>DATE LAST PERIOD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>ALLERGIES</td>
<td>67</td>
<td>DO YOU SMOKE?</td>
<td>101</td>
<td>DATE LAST PERIOD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>SKIN TROUBLE OR RASHES</td>
<td>68</td>
<td>HAVE YOU EVER SMOKED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Explain fully items checked YES:

________________________________________________________________________

What illness have you had in the past 5 years:

When did you last see a doctor? __________________________ For What? __________________________

Name and address of personal physician __________________________ Date of last visit __________________________ Reason __________________________

What medicine do you now take?

Have you ever had an x-ray because of medical reason for military service? YES NO Date __________________________ Reason __________________________

For insurance? YES NO Date __________________________ Reason __________________________

For employment? YES NO Date __________________________ Reason __________________________

ITC Form 9410 1 (2/86)
### FIGURE 5

#### Occupational History

<table>
<thead>
<tr>
<th>List Kinds of Work Done</th>
<th>What Machines and Materials Have You Handled?</th>
<th>No. of Years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### All Occupational Illness and Injuries

<table>
<thead>
<tr>
<th>Date</th>
<th>Nature of Illness or Injuries</th>
<th>Name of Company and City</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Military Service — Connected Disabilities

<table>
<thead>
<tr>
<th>Nature of Disability</th>
<th>% Am. Rec. Per M.</th>
<th>Branch of Service</th>
<th>Serial No.</th>
<th>Claim No.</th>
<th>V.A. Regional Office</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Hospitalization

<table>
<thead>
<tr>
<th>Hospitalization</th>
<th>Why</th>
<th>When</th>
<th>Where</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### All Hospitalizations — Accidents — Sickness — (Except Occupational)

<table>
<thead>
<tr>
<th>Date</th>
<th>Nature</th>
<th>Date</th>
<th>Nature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

#### All Physical Defects or Abnormalities at This Time

<table>
<thead>
<tr>
<th>Parts of Body</th>
<th>Extent of Defect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I hereby certify that to the best of my knowledge the foregoing answers are complete and correct and I understand that any falsification of this record is cause for termination. I further understand that this physical examination is conducted for the purpose of employment and I agree that this form and any information acquired as a result of this examination will become the property of the employer. I hereby grant permission to obtain records from my previous physician(s) or hospital(s) where I have been treated, upon my termination of employment, I agree to participate in a company medical examination.

Job Position: ____________________ Date: ________ Signature: ____________________

Physician's Review of the Above History: ____________________
**FIGURE 5**

Physical Examination by Medical Doctor  
(For Physicians Use Only)

<table>
<thead>
<tr>
<th>Height</th>
<th>Weight</th>
<th>Blood Press.</th>
<th>Pulse</th>
<th>Resp</th>
<th>2 Min. After Exercise</th>
<th>Temp.</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Clinical Evaluation</td>
<td>Note: Describe every abnormality in detail. Enter pertinent item no. before each comment.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. GENERAL APPEARANCE</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. HEAD, FACE AND SCALP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. EYES, PUPILS, SCLERA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. EYES, FUNDOSCOPIC AND MOTILITY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. EYES, OCULAR TENSION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. EARS, CANALS AND DRUMS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. NOSES, SINUSES</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>8. MOUTH, TEETH AND PHARYNX</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>9. NECK</td>
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<tr>
<td>11. LUNGS</td>
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<td></td>
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</tr>
<tr>
<td>12. HEART AND BLOOD VESSELS</td>
<td></td>
<td></td>
<td></td>
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<td>13. BREASTS</td>
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<td>14. ABDOMEN</td>
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<td>15. HERNIA</td>
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<td>16. GENITALIA</td>
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<td>17. ANOCHRECTAL</td>
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<td></td>
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<tr>
<td>18. SPINE, LUMBAR AREA</td>
<td></td>
<td></td>
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<td>19. UPPER EXTREMITIES</td>
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<td>20. LOWER EXTREMITIES</td>
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<tr>
<td>21. SKIN, LYMPHATICS</td>
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<td>22. NEUROLOGIC</td>
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<td>23. PSYCHIATRIC</td>
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</table>

Addional Tests Indicated (Lab, X-Ray, EKG, etc.)
### Figure 5

**For Physicians Use Only**

<table>
<thead>
<tr>
<th>URINALYSIS</th>
<th>RESTRICTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spec. Gr</td>
<td>Albumin</td>
</tr>
<tr>
<td>Microscopic</td>
<td></td>
</tr>
<tr>
<td>X-RAY</td>
<td></td>
</tr>
<tr>
<td>Chest</td>
<td>70 mm</td>
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**Summary of positive findings:**

<table>
<thead>
<tr>
<th>VISION</th>
</tr>
</thead>
<tbody>
<tr>
<td>distance</td>
</tr>
<tr>
<td>Uncorrected</td>
</tr>
<tr>
<td>20/20</td>
</tr>
<tr>
<td>Near</td>
</tr>
<tr>
<td>Uncorrected</td>
</tr>
<tr>
<td>20/20</td>
</tr>
</tbody>
</table>

- Color Vision: Normal / Abnormal
- Depth Perception: Good / Poor / None

**CBC**
**CHEMISTRY**
**SPIROMETRY**
**EKG**
**AUDIO**
**CHEST X-RAYS**
**URINALYSIS**
**Suitable for work with Carcinogens**
**Suitable for work with Carcinogens with appropriate protective measures**
**Other:**

**Examining Physician**

Name (please print) ____________

Professional Degree ____________

Signature ____________

Address ____________

City ____________

State ____________

Phone Number ____________
UPDATE/END-OF-PROJECT/TERMINATION EXAMINATION

NAME_________________________ JOB TITLE_________________________ SEX__________ AGE__________
ADDRESS_______________________ CITY__________ STATE__________ ZIP__________
BIRTH DATE____________________ SS NO________________________ PHONE NO. ( )

It is important to bring to the attention of the doctor any changes in your health status occurring since your last health examination. Therefore, please carefully answer the following questions.

Explain all items checked yes below.

1. Have you had any injury or illness other than colds?
   YES NO

2. Have you been hospitalized for any reason?
   YES NO

3. Have you had any surgery in or out of the hospital?
   YES NO

4. Have you had any abnormal x-rays or electrocardiograms: any abnormal blood, urine, or laboratory tests?
   YES NO

5. Have you been nervous, depressed, or tense or had any emotional trouble?
   YES NO

6. Have you had headaches, dizzy spells or black-outs?
   YES NO

7. Have you had trouble with your eyes — change in vision, blurring, seeing double, pain or glaucoma?
   YES NO

8. Have you had trouble with nose and throat — persistent hoarseness, voice change?
   YES NO

9. Have you had trouble with ears — pain, change in hearing, noise exposure?
   YES NO

10. Have you had chronic cough; any sputum that was bloody, excessive or colored; any pain on breathing?
    YES NO

11. Have you had shortness of breath, difficulty breathing, any swelling of the ankles?
    YES NO

12. Have you had any chest pain, or history of heart trouble or high blood pressure?
    YES NO

13. Have you had abdominal pain (or distress) or persistent vomiting?
    YES NO

14. Have you had any change in bowel habits: any bloody or tarry black stools?
    YES NO

15. Have you had trouble starting, stopping, or holding urine, any bloody or very dark urine; any discharge?
    YES NO

16. Are you now taking any medication?
    YES NO

17. Have you had skin rashes, sores, new or growing lumps, or changing moles?
    YES NO

18. Have you gained or lost 10 pounds or more?
    YES NO

19. Have you had any pain, swelling or stiffness of back or joints?
    YES NO

20. Have you been bleeding or bruising more than at time of last examination?
    YES NO

21. Has there been any change in the family medical history, such as appearance of diabetes, heart disease, strokes, blood problems or conditions that you think may be inherited?
    YES NO

22. Are you a Diabetic?
    YES NO

23. Are you pregnant?
    YES NO

24. Have you had a Tetanus immunization within the last 10 years?
    YES NO

25. If you still smoke, how much?__________________________________________ How many years have you smoked?
    YES NO

26. Present use of alcohol: social moderate heavy
    YES NO

27. For employee or spouse(s), number of pregnancies number of miscarriages
    YES NO

28. If you have any medical problems you wish to discuss, please write them in.

<plain items checked yes

I hereby certify that to the best of my knowledge the foregoing answers are complete and correct and I understand that any false statement or incorrect information may result in my termination. I agree that this form and any information acquired as a result of this examination will become the property of the employer. I hereby grant permission to obtain records from all physician(s) or hospital(s) where I have been or am receiving medical treatment.

NATURE_________________________ DATE_________________________

FORM 8410 2 (7/85)
**FIGURE 6**

**MEDICAL EXAMINATION**

<table>
<thead>
<tr>
<th></th>
<th>WITHOUT GLASSES</th>
<th>GLASSES / CONTACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RIGHT</td>
<td>LEFT</td>
</tr>
<tr>
<td><strong>1. DISTANT VISION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SNIELLEN</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2. NEAR VISION</strong></td>
<td>20/</td>
<td>20/</td>
</tr>
<tr>
<td><strong>SLOAN</strong></td>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>NORMAL</th>
<th>TEST NOT</th>
<th>MEDICAL EXAMINER'S</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>YES / NO</td>
<td>PERFORMED</td>
<td>FINDINGS</td>
</tr>
</tbody>
</table>

1. Psychiatric — Neurologic
2. General Appearance — Physique
3. Head & Neck
4. Chest
5. Cardiovascular
6. Abdomen
7. Back
8. Hernia — Genitalia
9. Arms — Legs
10. Skin
11. Rectal

**LABORATORY**

1. Urinalysis
2. Complete Blood Count
3. Chemistry Panel
4. Audiometry
5. Spirometry
6. EKG
7. Chest X-ray
8. DOT/DMV
9. May wear respirator
10. May work with carcinogens

**SUMMARY OF EXAMINATION — WORK RESTRICTIONS — RECOMMENDATIONS**

---

XAMINING PHYSICIAN
AME (Please Print)

GNATURE. DATE PHONE NO.

PROFESSIONAL DEGREE

ADDRESS CITY STATE ZIP
FIGURE 7

MEDICAL EXAMINATION SUMMARY

EMPLOYEE NAME: ____________________________

SOCIAL SECURITY NUMBER: ____________________

EXAMINATION DATE: __________________________

DRUG SCREEN FOR CONTROLLED SUBSTANCES:

☐ NEGATIVE

☐ POSITIVE

MEDICAL EXAMINATION:

☐ ACCEPTABLE WITHOUT RESTRICTION

☐ ACCEPTABLE WITH THE FOLLOWING RESTRICTION(S):
  (Please list by number. See reverse side.)

PHYSICIAN SIGNATURE ____________________________
PHYSICAL ACTIVITY RESTRICTIONS

1. HEARING
   Employee shall use hearing protective devices when exposed to high level noise sources (e.g., greater than 85 dBA) and in areas which are high level noise areas.

2. RESPIRATORY
   Employee shall not be assigned work involving use of a respirator.

3. EXPOSURE
   No exposure to environments with dust, fumes, vapors, mists or gases.

4. CHEMICAL
   No handling of work with chemicals. Chemicals are defined as known or suspected toxic or hazardous agents, materials, including wastes, contaminated with hazardous or toxic agents, laboratory chemicals or reagents, industrial chemicals and samples.

5. VISION
   Employee must wear eye protection at all times while on the job.

6. COLOR
   No work requiring color discrimination (critical color vision).

7. CONTACTS
   Employee shall not wear contact lenses in atmosphere where a respirator is required.

8. B城
   No repeated bending, stooping, twisting or lifting over ____ lb.

9. KNEE
   No continuous walking or jumping. No prolonged kneeling, squatting or twisting. No heavy lifting over ____ lb.

10. BACK
    No work requiring use of olusive protective clothing.

11. EYES
     No work requiring use of olusive protective clothing.

12. BLOOD PRESSURE
    1. Employee must provide to the Health & Safety Department on quarterly basis a monitoring report from personal physician of (1) blood pressure value and (2) status of efforts to keep blood pressure under control.
    2. Employee shall avoid working at elevated locations, driving company vehicles and working with moving machinery.

13. HEART
    Employee shall work regular hours with normal lunch breaks. Shall not work extended hours. Shall avoid excessive physical exertion such as work that causes grunting and straining. Shall avoid environmental stress such as wearing olusive clothing and respirators on hot days. Shall avoid situations of emotional stress such as excessive responsibility and working to meet deadlines and should not lift more than ____ lb.

14. STRESS
    Employee shall avoid situations of emotional stress such as excessive responsibility and working to meet deadlines.

15. DIABETES MELLITUS
    1. No repetitive shift work and employee shall be assigned to regular work shifts with reliable access to food and medications. The employee shall not be assigned to work more than 10 hours a day or irregular hours at any location.
    2. No work in rapid temperature shifts over 30F. Employee shall not work in protective clothing where there is a danger of heat stress or exhaustion.
    3. No work exposure under LSF (speeding).
    4. No exposure to lower and upper extremity trauma or excessive moisture.

16. SEIZURE
    Employee must work regular hours with an opportunity to take medications on a regular basis. Must avoid protracted or irregular hours causing unusual fatigue and must work alone or unattended.
    Employee must not operate any vehicle, service or rental vehicle. Employee must not operate personal vehicle on company business or on company property.
    Employee must not work on ladders, scaffolds or platforms where a fall could cause injury and must not operate or be in close proximity to dangerous machinery or other dangerous environments.
    Restrictions apply for two years following last seizure. If no seizures in two years, restrictions will be waived.

17. PREGNANCY
    No handling of work with chemicals. Chemicals are defined as known or suspected toxic or hazardous agents, materials, including wastes, contaminated with hazardous or toxic agents, laboratory chemicals or reagents, industrial chemicals and samples.

WEEKS OF GESTATION

20
   No repetitive stooping and bending below knee level. (Not more than 10 times a day)
   No climbing ladders more than 4 times a shift
   No repetitive lifting more than 25 lbs or 10 lbs
24
   No protracted standing (more than 4 hours)
   No repetitive lifting between 11 and 22 lbs or 5-10 kg, only
28
   No bending and standing below knee level. (Not more than 2 times a shift)
   No climbing ladders more than 4 times a day
   No climbing stairs more than 4 times a shift
30
   Intermittent lifting only (no more than 20 lbs or 10 kg)
32
   Intermittent standing only (no more than 30 minutes)
40
   Sitting and no more than 4 hours of light tasks
   Intermittent lifting only (less than 30 minutes)
   No bending and standing below knee level. (Not more than 2 times a shift)
   No climbing stairs. (Less than 4 times a shift)
   Intermittent lifting only (less than 11 lbs or 5 kg)
FIGURE 9

LOCATION ___________________________ IT DIVISION ___________________________ PC NO. ________ PROJECT NO. ________

AUTHORIZATION FOR TREATMENT/EXAMINATION

☐ Work Related Injury/Illness Date of Injury/Exam ___________________________

☐ Drug Screen Only Employee's Name ___________________________

☐ Preplacement Examination Job Title ___________________________

☐ Update/Periodic Examination Employee's S.S.# ___________________________

☐ End-of-project Examination Supervisor's name ___________________________

☐ Exit Examination Site Location ___________________________

☐ Other ___________________________

Dr. ___________________________ Address ___________________________

Phone No. ___________________________

Industrial Injury

In the case of work-related accidents, please examine the above-named employee and if injury or illness is industrial, render necessary conservative treatment. Please forward copies of:

2. This form when fully completed.
3. All subsequent reports, including progress at monthly intervals, and

to the following address (over)

Medical Screening

In the case of preplacement, update/periodic, end-of-project, exit, or other exams, forward to Daniel F. Rubin, M.D., Health, Safety & Training, International Technology Corporation, PO Box 2995, Torrance, CA 90509, the following:

1. This form,
2. All examination data, results, Doctor's statements, etc., and

IT Authorization Signature ___________________________ Date ________ Phone No. ________

Doctor, please provide:

A. Medical Diagnosis ___________________________

B. Treatment Rendered or Recommended ___________________________

C. Recommended Work Limitation/Restriction ___________________________

D. Return Appointment Recommended ☐ Yes ☐ No When ___________________________ M.D. (PRINTED)

E. First-Aid Only This Visit ☐ Yes ☐ No ___________________________

F. Time In__________ Out__________

SIGNATURE ___________________________
FIGURE 10

SUPERVISOR’S EMPLOYEE INJURY REPORT

This is an official document to be initiated by the employee's supervisor. Please answer all questions completely. This report must be forwarded to the employee’s Regional Health and Safety office within 24 hours of the injury.

<table>
<thead>
<tr>
<th>Injured's Name</th>
<th>Sex</th>
<th>S.S. No.</th>
<th>Birthdate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Address</td>
<td>City</td>
<td>State</td>
<td>Zip</td>
</tr>
<tr>
<td>Job title</td>
<td>Employee's P.C.</td>
<td>Hire date</td>
<td>Hourly wage</td>
</tr>
</tbody>
</table>

Date of incident Time Time reported To whom?

Client name Client address Time shift began

Exact location of incident Did employee leave work? No Yes When

Has employee returned to work? No Yes When Did employee miss a regularly scheduled shift? No Ys

Doctor/Hospital name Address

Witness name(s) Statements attached? No Yes

Nature of injury Exact body part

Medical attention: None First aid on site Doctor's office Hospital ER Hospitalize

Job assignment at time of incident Job: Phase: Task: Subtask:

Describe incident

What unsafe physical condition or unsafe act caused the incident?

What corrective action has been taken to prevent recurrence?

Supervisor/Foreman (Print) Signature Date

MANAGER

Comments on incident and corrective action

Manager’s name (Print) Signature Date

HEALTH AND SAFETY

Concur with action taken? No Yes Remarks

OSHA Classification:

<table>
<thead>
<tr>
<th>Incident only</th>
<th>First aid</th>
<th>No lost workdays</th>
<th>Lost workdays</th>
<th>Restricted activity</th>
<th>Fatality</th>
</tr>
</thead>
</table>

Days away from work Days restricted work Total days charged

State jurisdiction Federal L&H Date ER submitted Which claims office

Coding: A. Injury type or illness B. Injured body part C. Activity at time of accident D. Injury cause code

E. Agent code F. Safety rule violated code G. Accident prevention code

Name (Print) Signature Date

FORM 9300.1-1 (07/85) Refer to ITC PRO 9300.1 for reporting procedures

White: Corporate Health and Safety Yellow: Regional Health and Safety Pink: Profit/Cost Center
<table>
<thead>
<tr>
<th>Date</th>
<th>Analyst</th>
<th>Time</th>
<th>Instrument (Mfg/Model/Serial No.)</th>
<th>Calibration Date &amp; Cpd.</th>
<th>Compound Measured</th>
<th>Span Set or Sens. Cal.</th>
<th>Conc. (Units)</th>
<th>Location/Activity/Comments</th>
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<tr>
<td>PROJECT NAME</td>
<td>PROJECT NO.</td>
<td>DATE/TIME</td>
<td>INSTRUMENT</td>
<td>STD CONC ppm</td>
<td>METER READING</td>
<td>COMMENTS</td>
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</table>
**VEHICLE ACCIDENT REPORT**

**VEHICLE OPERATOR:**

- Name: ____________________
- Phone No.: ____________________
- Address: ____________________
- City: ____________________
- Employer: ____________________
- Facility: ____________________

**DESCRIBE VEHICLE DAMAGE:**

- Vehicle No.: ____________________
- Year: ____________________
- Make: ____________________
- Model: ____________________
- Plate No.: ____________________

**OTHER PARTIES' NAME:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Phone No.</th>
<th>Address</th>
<th>City</th>
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</table>

**OWNER'S NAME:** (Check if same as driver C)

- Name: ____________________
- Address: ____________________
- City: ____________________
- Phone No.: ____________________
- Drivers License No.: ____________________
- S.S. No.: ____________________

**OWNER'S INSURANCE CARRIER:**

- Name: ____________________
- Address: ____________________
- City: ____________________
- Policy No.: ____________________

**DESCRIBE VEHICLE DAMAGE:**

- Plate No.: ____________________
- Year: ____________________
- Make: ____________________
- Model: ____________________

**INJURED PARTIES (Complete also a Supervisors Employee Injury Report if an IT Employee):**

1. Name: ____________________
   - Address: ____________________
   - City: ____________________
   - Phone No.: ____________________
   - Employer's Name & Address: ____________________

2. Name: ____________________
   - Address: ____________________
   - City: ____________________
   - Phone No.: ____________________
   - Employer's Name & Address: ____________________

**WITNESSES:**

1. Name: ____________________
   - Address: ____________________
   - City: ____________________
   - Phone No.: ____________________
   - Employer's Name & Address: ____________________

2. Name: ____________________
   - Address: ____________________
   - City: ____________________
   - Phone No.: ____________________
   - Employer's Name & Address: ____________________

**DESCRIPTION OF ACCIDENT:**

- Date: / /
- Time: ____________________

**LOCATION OF ACCIDENT:**

- ____________________
- ____________________

**POLICE OFFICER'S NAME:**

- ____________________
- ____________________

**Report Prepared By:** ____________________

**Name Printed:** ____________________
**Signature:** ____________________
**Date:** / /
FIGURE 14

GENERAL LIABILITY, PROPERTY DAMAGE, AND LOSS REPORT

DIVISION/SUBSIDIARY _____________________________ DATE __________

ADDRESS ________________________________________

HOW DID DAMAGE OR LOSS OCCUR: ______________________________________________________________________

DESCRIPTION OF DAMAGE OR LOSS: ______________________________________________________________________

IDENTIFICATION OF DAMAGED OR LOST PROPERTY: ______________________________________________________________________

LOCATION OF DAMAGED OR LOST PROPERTY (Before Loss): ______________________________________________________________________

DATE AND TIME OF DAMAGE OR LOSS: Date __________ Time __________ AM PM

OWNER OF DAMAGED OR LOST PROPERTY:
Name ____________________________________________ Phone No. __________________________
Address __________________________________________ City __________________________
Employer __________________________________________

INJURED PARTIES (Complete also a Supervisors Employee Injury Report if an IT Employee):
1. Name ____________________________________________ Phone No. __________________________
Address __________________________________________ City __________________________
Employer's Name & Address __________________________
Nature Of Injury ____________________________________

2. Name ____________________________________________ Phone No. __________________________
Address __________________________________________ City __________________________
Employer's Name & Address __________________________
Nature Of Injury ____________________________________

WITNESSES:
1. Name ____________________________________________ Phone No. __________________________
Address __________________________________________ City __________________________
Employer's Name & Address __________________________

2. Name ____________________________________________ Phone No. __________________________
Address __________________________________________ City __________________________
Employer's Name & Address __________________________

WERE PICTURES TAKEN □ YES □ NO
WERE POLICE NOTIFIED □ YES □ NO DEPT. __________

COMPLETED BY: ____________________________ Name Printed ____________________________ Signature ____________________________ Date __________
Manager ____________________________ Signature ____________________________ Date __________

ITC FORM 9300.1-3 (May 1984)
USE BACK SIDE IF NECESSARY
RELEASE OF LIABILITY

The undersigned hereby acknowledges that he/she is entering on properties where International Technology Corporation personnel are and/or may have worked. Entry is at his/her sole risk. The undersigned agrees to indemnify and hold harmless IT Corporation, its officers, employees, and agents from any and all claims and damages whatsoever including attorneys' fees resulting directly or indirectly from such entry for any cause whatsoever.

The undersigned recognizes and is aware of the dangers inherent on the site and hazards, including the risks associated with hazardous waste materials related to ongoing work, and executes the above indemnity with full knowledge of its consequences.

Name ________________________________

Signature ______________________________

Date ________________________________

Witnessed By __________________________
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 physical 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 possible 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 an 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 an inspection request if employees complaining.

The Act provides that employees may not be discharged or discriminated against in any way for having safety and health complaints or for otherwise enforcing 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 specifying 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.

Proposed Penalty

The Act provides for mandatory penalties against employers of up to $1,000 for each serious violation and for additional penalties of up to $1,000 for each subsequent violation. Penalties of up to $1,000 per day may be proposed for failure to correct violations within the proposed time period. 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 by both. Conviction of an employer after a first conviction doubles the 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 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.

More Information

Additional information and copies of the Act, specific OSHA safety and health standards, and other appropriate 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 Printing Office.

Washington, D.C.
1985
OSHA 2203

William E. Brock, Secretary of Labor
U.S. Department of Labor
Occupational Safety and Health Administration

Under provisions of this 79. Code of Federal Regulations, Part 1926.601 employers must post this notice at a conspicuous place where notices to employees are customarily posted.
# NUMBERS TO KNOW:

<table>
<thead>
<tr>
<th>EMERGENCY NUMBERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambulance ........................................................................</td>
</tr>
<tr>
<td>Doctor ...........................................................................</td>
</tr>
<tr>
<td>Hospital .....................................................................</td>
</tr>
<tr>
<td>Fire Dept. .....................................................................</td>
</tr>
<tr>
<td>Police ...........................................................................</td>
</tr>
<tr>
<td>Sheriff ........................................................................</td>
</tr>
<tr>
<td>U.S. EPA (24 Hour Hotline) ......................................800-424-8802</td>
</tr>
<tr>
<td>Chemtrec ........................................................................</td>
</tr>
<tr>
<td>National Poison Control Center .................................404-588-4400</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UTILITY NUMBERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric Co. ................................................................</td>
</tr>
<tr>
<td>Water Co. ....................................................................</td>
</tr>
<tr>
<td>Gas Co. ........................................................................</td>
</tr>
</tbody>
</table>

INTERNATIONAL TECHNOLOGY CORPORATION ... Creating a Safer Tomorrow
# FIELD ACTIVITY DAILY LOG

<table>
<thead>
<tr>
<th>PROJECT NAME</th>
<th>PROJECT NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIELD ACTIVITY SUBJECT:</td>
<td></td>
</tr>
</tbody>
</table>

**DESCRIPTION ON DAILY ACTIVITIES AND EVENTS:**

<table>
<thead>
<tr>
<th>VISITORS ON SITE:</th>
<th>CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WEATHER CONDITIONS:</td>
<td>IMPORTANT TELEPHONE CALLS:</td>
</tr>
</tbody>
</table>

| PERSONNEL ON SITE: | |

| (FIELD ENGINEER) | DATE |
SAFETY INSPECTION REPORT

IT DIVISION/SUBSIDIARY: ___________________________ DATE: ___________________________

CUSTOMER: ______________________________________ TIME FROM: ______________________ TO: ______________________

JOB LOCATION: ________________________________________________________________

SUPERVISOR: ______________________________ FOREMAN/LEADMAN: __________________________

GENERAL JOB DESCRIPTION: ______________________________________________________

EMPLOYEES: ________________________________________________________________

SAFETY CONDITIONS: ____________________________________________________________

________________________________________________________

AUTHOR: __________________________________________________

SIGNATURE: __________________________

(OSSH Dept.)

Form 9500-1
APPENDIX C
COMMENTS ON VOLUME
This appendix was attached to the front of the August 1990 Draft. The comments relevant to this volume have been incorporated into this issuance.
Completion of Work Plans, Off-Site Groundwater Investigation, Wright-Patterson Air Force Base

1. Attachments 1, 2, and 3 provide our comments, Ohio EPA comments (dated 20 Aug 90) and additional technical information respectively required for the subject work plans. The addition of this letter and the attachments to the front of Volumes 2-4 and Volume 3 Appendix A shall be considered sufficient to complete these work plans. The terms and conditions, as specified in the Ohio EPA letter dated 20 Aug 90, will be followed during the Field Investigation.

2. Should you have any questions or require additional copies of this letter, please contact Mr Gary W. Selby, (513) 257-2201.

FOR THE COMMANDER

JOHN A. NEPUTE, P.E., Acting Deputy Director Office of Environmental Management

3 Attach
1. EMR Comments, 20 Aug 90
2. OEPA Comments, 20 Aug 90
3. Additional Technical Information
DISTRIBUTION LIST

Ms Bonnie Bowker
Ohio EPA
40 S. Main Street
Dayton OH 45402-2086

Ms Kathy Nickel
Ohio EPA
40 S. Main Street
Dayton OH 45402-2086

Mr Douglas Hall
Department of Water
Room 412, Box 22
101 W. Third Street
Dayton OH 45401

Mr James Rozelle
Miami Conservancy District
38 E. Monument Avenue
Dayton OH 45402

Mr Jeff de Roche
US Geological Survey
Water Resources Division
975 W. Third Avenue
Columbus OH 43212-3192

Ms Kathy Davidson
Ohio EPA
1800 WaterMark Drive
Columbus OH 43266

Mr Turpin Ballard
USEPA Region V
230 S. Dearborn Street
Chicago IL 60604 5HS-11

Mr Henry Hunter
City of Fairborn
44 W. Hebble Avenue
Fairborn OH 45324

Mr William Thompson
IT Corporation
11499 Chester Road
Cincinnati OH 45246

HQ AFLC/DEVR
COMMENTS ON VOLUME 4, HEALTH AND SAFETY PLAN

1. List of Acronyms: Add CFR, OEPA and PVC. "Cardiopulmonary" is misspelled. "Analysis" is misspelled in "Sampling and Analysis Plan".

2. Page 2-4, first paragraph: Delete "rainfall or other" in the third sentence as rainfall is a weather condition.

3. Section 2.2.2.2: The first two sentences should be combined to form one paragraph.

4. Table 2.1: "1,1 Dichloroethane" should be "1,1 Dichloroethene".

5. Section 2.7.1.1, third sentence containing parentheses. Please switch.

6. Section 2.7, second sentence: Specify "85" as degrees F.

7. Title of Section 3.2.5: "Project" should be "IT".

8. Page 3-4, first full paragraph: In the first sentence, change "subcontractor, and regulatory" to read "and subcontractor".

9. Page 3-4, second full paragraph: The phrase "With the exception of regulatory personnel," should be added to the beginning of the first sentence. Also, at the end of this paragraph, the following sentence should be added: "Regulatory personnel are responsible for providing their own safety equipment and obtaining their own medical monitoring, health and safety training, and respirator fit testing."

10. Page 3-9, asterisk: "one" is a typo.
August 20, 1990

Re: Workplan for the Investigation of Ground Water Contamination at WPAFB

Scott Mallette, Chief
Environmental Restoration Branch
2750 ABW/EM (AFLC)
Wright-Patterson Air Force Base, Ohio 45433

Dear Mr. Mallette:

With exceptions noted, the following comments on the "Workplan, Phase I Task 4 Field Investigation" were discussed with Gary Selby, Denny Reed, and Bill Thompson at the August 13, 1990 progress meeting. It is Ohio EPA's understanding that the Air Force had no objections to the comments discussed at that meeting and that the comments will be incorporated into the work to be performed during the Phase I Task 4 investigation. It is also Ohio EPA's understanding that the drilling subcontractor was notified to mobilize so as to be able to start work on this project by September 5, 1990. Ohio EPA hereby concurs with the "Workplan, Phase I Task 4 Field Investigation" with the following four conditions:

1. All of Ohio EPA's comments appearing below will be incorporated into the work to be performed during this investigation.

2. In the interest of time, and with the intent of avoiding any delays in the start date for this investigation, the Workplans for the project will not be revised by the Air Force or resubmitted to Ohio EPA. In lieu of revision, this comment letter will be copied by the Air Force and bound into the front of each of the separate volumes of the Phase I Task 4 Field Investigation Workplan so as to become part of that Workplan.

3. Ohio EPA's August 2, 1990 correspondence containing comments on the Field SOPs for the RI/FS Workplan will be incorporated into the Phase I Task 4 field work. The RI/FS Field SOPs in combination with the procedures outlined in the RI/FS Workplan will be followed during the Phase I Task 4 field work except where modified by Ohio EPA approved project-specific amendments.
4. The Air Force will provide Ohio EPA with written confirmation that the conditions outlined above are understood and will be met during the Phase I Task 4 Field Investigation. This written confirmation is to be provided to Ohio EPA no later than Tuesday, August 28, 1990.

Ohio EPA Comments - Volume 2, Workplan for Phase I Task 4 Field Investigation - (August 6, 1990)

1. Page iii, Table 4-3: Correct page # for Table 4-3 is 4-17.

2. Page 2-4, third line from bottom: Typo - "product" should be "production".

3. Page 3-1, 3.1, second paragraph: Typo - "alternative" should be "alternatives".

4. Page 3-3, 3.2.1: "Dependant" should be spelled "dependent".

5. Page 3-3, 3.2.1: The confining layer would need to be under the area to be controlled, not over.

6. Page 3-6, 3.2.3, last sentence of first paragraph: Delete the word "or" from this sentence. Contaminants may have already migrated beyond the WPAFB boundary to a point where they are affecting Dayton’s well field. This may indeed require treatment at the well field. This does not mean that an interception system designed to prevent further off-base contaminant migration will not be necessary at the base boundary, although this is what seems to be implied by the current wording of this sentence. It must be clearly understood that treatment at Dayton’s well field is not an acceptable substitute for contaminant control at the base boundary.

7. Page 3-6, 3.2.3, last sentence on page: "Table 3-5" should read "Table 3-2".

8. Page 4-2, 4.1.1, second sentence: Delete this sentence. The referenced criteria are not used in the screening of remedial alternatives.

9. Page 4-3, third paragraph: Specify that the existing guidance being referred to is U.S. EPA’s "Interim Guidance for Preparing Quality Assurance Project Plans", (QAMS-005/80).

10. Page 4-5, 4.2, second paragraph: Reword to read: "Before the effectiveness of control or removal programs is evaluated, a numerical model will be developed. Additional
15. Page 10-3, section 10.2: Include a list of all QC methods that are to be used in the field and in the laboratory.

16. Page 12-1, section 12.0: Include the schedule of maintenance for the laboratory instrumentation.

17. Page 15-1, section 15.0: Include in the text a schedule of reports to management (monthly, quarterly) concerning the assessment of data accuracy, precision and completeness. These reports should also detail audit results and identified QA problems with recommended solutions.

18. Appendix B, no. 10-001-01, section 5.1.2: VOA analysis of water, when unpreserved (no HCl), must be completed within five days VTSR (laboratory data validation - functional guidelines for evaluating organic and inorganic analysis, page 5.)

19. Appendix B, inorganic glassware cleaning, SOP NO. 01-007-00, section 5.2, glassware cleaning. The glassware must be rinsed with a 10% solution of HCl between rinsing the soap off with tap water and the final rinse with deionized water.

Ohio EPA Comments - Volume 4, Health and Safety Plan (HSP) Phase I Task 4 Field Investigation - (August 6, 1990)

1. Ohio EPA's comments regarding site access which were contained in correspondence dated June 15 and July 27, 1990 have not been incorporated into the revised HSP. Revise the first sentence of the first paragraph on page 3-4 to read as follows: "All facility employees and subcontractors who may be ...etc" (delete the phrase "and regulatory"). Revise the first sentence of the second paragraph on this page as follows: "With the exception of regulatory personnel, visitors will not be allowed to enter....(etc.). Add the following sentence to the end of this paragraph: "Regulatory personnel are responsible for providing their own safety equipment and obtaining their own medical monitoring, health and safety training, and respirator fit testing."

2. As indicated in Ohio EPA's correspondence of July 27, 1990, a site map delineating work zones must be provided as required by 29 CFR 1910.120 (d) (3).


1. In performing the Phase I Task 4 field work, WPAFB is relying on portions of the Draft Field Standard Operating
7. FP 5-4, Amendments 2 and 3: These amendments are not acceptable. If the turbidity requirements are not met after 8 hours of development, development is to stop. Samples for silt and clay analysis and for TOC analysis as necessary will still need to be collected and submitted to the laboratory. The results will be needed to evaluate the remaining data obtained from the affected well.

8. FP 5-5, Amendments 1 and 2: These amendments are not acceptable (see FP 1-2, Amendment 1 above).

9. FP 5-6, Amendment 1: This amendment is not acceptable (see FP 1-2, Amendment 1 above).

10. FP 5-7, Amendment 1: This amendment is not acceptable.

11. FP 6-5, Amendment 3: This amendment is acceptable with the provision that a clear bailer is to be used when checking for free product.

12. FP 7-3, Amendment 2: This amendment is not acceptable (see FP 1-2, Amendment 1 above).

Please note that Ohio EPA comments 12 and 14 through 16 concerning "Volume 3, Sampling and Analysis Plan (SAP), Phase I Task 4" require that additional information be submitted by the Air Force in order to complete the Workplan. Please provide this information concurrent with the written confirmation required by Ohio EPA in condition number 4 above. If you have any questions regarding this letter or if I can be of any further assistance, please do not hesitate to contact me at 285-6357.

Sincerely,

Bonnie D. Bowker
Division of Emergency and Remedial Response

cc: Tom Winston, District Chief/SWDO
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    Jack Van Kley, AGO
    Wm. Turpin Ballard, USEPA Region 5
    Steve Coyle, 2750 ABW/EM
Figure. Generalized illustration of the exclusion zone at each drilling site.
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