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ENGINEERING INVESTIGATIONS AT INACTIVE HAZARDOUS WASTE SITES

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

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HEALTH & SAFETY PLAN

MACKENZIE CHEMICAL
CENTRAL ISLIP, NEW YORK

NYSDEC SITE NO.: 1-52-017
JULY 1998

Prepared For:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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H2M GROUP

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1.0 PURPOSE

The purpose of this Health and Safety Plan (HASP) is to establish protocols for protecting H2M and other on-site and off-site personnel from incidents that may arise while performing field activities during the Remedial Investigation (RI) to be conducted at the Mackenzie Chemical site located at One Cordello Avenue, Central Islip, New York. This HASP has been prepared in accordance with the United States Environmental Protection Agency (US EPA) document, "Emergency and Remedial Response Division's Standard Operating Safety Guides", November 1984. The plan establishes personnel protection standards, mandatory operations procedures, and provides contingencies for situations that may arise while field work is being conducted at the site. All H2M field personnel will be required to abide by the procedures set forth in this HASP.

Personnel performing the environmental field work involving chemical substances may encounter conditions that are unsafe or potentially unsafe. In addition to the potential risks associated with the physical, chemical, biological and toxicological properties of the material(s) which may be encountered, other types of hazards (i.e., electricity, water, temperature, heavy equipment, falling objects, loss of balance, tripping, etc.) can have an adverse effect on the health and safety of personnel. It is important that personnel protective equipment (PPE) and safety

requirements be appropriate to protect against potential and/or known hazards. PPE will be selected based on the type(s), concentration(s), and routes of personnel exposure from hazardous substances at a site. In situations where the type of materials and possibilities of contact are unknown or the potential hazards are not clearly identifiable, a more subjective (but conservative) determination will be made of the PPE required for initial safety.

Adherence to this HASP will minimize the possibility that personnel at the site or the surrounding community will be injured or exposed to site-related contaminants during field activities.

2.0 SITE CONDITIONS

The site is located within the Town of Islip, in Suffolk County. The property, which contains a manufacturing building, storage warehouse and a warehouse/laboratory, is approximately 1.4 acres in size. The property was originally owned by Ian Mackenzie and was used for the manufacturing of various chemical products by Mackenzie Chemical Works, Inc. from 1948 through 1987.

The Mackenzie Chemical site has been listed by the New York State Department of Environmental Conservation (NYSDEC) in the Registry of Inactive Hazardous Waste Sites in New York State (Site No. 1-52-017). The site is classified as a Class 2 site pursuant to the Environmental Conservation Law (ECL) 27-1305.4.b. A remedial investigation will be conducted at the site to identify and delineate potential areas of concern.

2.1 Proposed Field Activities

The field work will consist of surface soil sampling, drilling of Geoprobe soil borings and installation of monitoring wells, developing and sampling of these monitoring wells and field surveying of well locations and elevations. The primary site related contaminants of concern, based on prior sampling results, are volatile organic compounds (VOCs) including tetrachloroethene (PCE), trichloroethene (TCE) and 1,2,3-trichloropropane. Drilling and sampling procedures can cause field personnel to come into contact with the identified contaminants. The routes of potential exposure include inhalation, ingestion and adsorption through dermal contact. At the work site, the most probable route of exposure, if any, is via the inhalation of VOCs from contaminated soils or groundwater and adsorption through dermal contact. All proposed work will be completed using Level D PPE. Ambient air will be monitored using a flame ionization detector (FID) which will be utilized during any intrusive activities. If 5 ppm or more of volatile organic contaminants are detected during the work, PPE will be immediately upgraded to EPA Level C (air purifying respirators).

3.0 PERSONAL SAFETY

Personnel involved in field operations must often make complex decisions regarding safety. To make these decisions correctly requires more than elementary knowledge. For example, selecting the most effective PPE requires not only expertise in the technical areas of respirators, protective clothing, air monitoring, physical stress, etc., but also experience and professional judgment. Only competent, qualified personnel having the technical judgment to evaluate a particular situation and determine the appropriate safety requirements will perform field investigations at the site. These individuals, through a combination of professional education, on-the-job experience, specialized training, and continual study, have the expertise to make sound decisions. In addition, each individual must sign an appendix to the Health and Safety Plan, indicating they have read and understood its contents (included in Appendix A).

3.1 Training and Medical Surveillance

All personnel involved in field work will be trained to carry out their designated field operations. Training will be provided in the use of all equipment, including respiratory protection apparatus and protective clothing; safety practices and procedures; general safety requirements; and hazard recognition and evaluation. Each individual involved with the field work must provide documentation of training and medical surveillance, as per 29 CFR 1910.120. A copy of the documentation must be maintained at the job site for the duration of the project.

3.2 Health and Safety Manager

The Health and Safety Manager shall be responsible for overall implementation and coordination of the Health and Safety Program for field personnel at the site. Responsibilities include providing adequate staffing, materials, equipment, and time needed to safely accomplish the tasks under the site investigation. The Health and Safety Manager is also responsible for taking appropriate corrective actions when unsafe acts or practices arise. The Health and Safety Manager for this investigation project is Phil J. Schade, P.E. of H2M.

3.3 Site Health and Safety Officer

A designated individual(s) will perform the function of the project Site Health and Safety Officer (SHSO). Michael P. Engelmann will serve as the Site Health and Safety Officer during the site work. At all times the Site Health and Safety Officer will report directly to the Health and Safety Manager. As a minimum, the Site Health and Safety Officer will be responsible for the following:

1. Conducting and documenting daily site safety briefings for field personnel.

2. Assuring that all personnel protective equipment is available and properly utilized by all field personnel at the site.

3. Assuring that all personnel are familiar with standard operating safety procedures and additional instructions contained in the Health and Safety Plan.

4. Assuring that all personnel are aware of the hazards associated with the field operations.

5. Inspecting and documenting the site for hazards before field operations.

6. Conducting daily work area inspections to determine the effectiveness of the site HASP and identify and correct unsafe conditions in the responsible work area. Daily inspections and corrective actions taken shall be documented on daily inspection forms.

7. Determining personal protection levels including clothing and equipment for personnel and periodic inspection of protective clothing and equipment.

8. Monitoring of site conditions prior to initiation of field activities, and at various intervals during on-going operations as deemed necessary for any changes in site hazard conditions. (Monitoring parameters include, but are not limited to, volatile organic contaminant levels in the atmosphere, chemical hazard information, and weather conditions.)

9. Executing decontamination procedures.

10. Monitoring the work parties for signs of stress such as cold exposure, heat stress, or fatigue.

11. Prepare reports pertaining to incidents resulting in physical injuries or exposure to hazardous materials.

4.0 LEVELS OF PROTECTION

Anyone entering the investigation site must be protected against potential hazards. The purpose of the personal protection clothing and equipment is to minimize exposure to hazards while working on site. Careful selection and use of adequate PPE should protect the respiratory system, skin, eyes, face, hands, feet, head, body and hearing of all personnel.

The appropriate level of protection is determined prior to the initial entry on site based on available information and preliminary monitoring of the site. Subsequent information may warrant changes in the original level selected. Appropriate equipment to protect personnel against exposure to known or anticipated chemical hazards has been divided into four categories according to the degree of protection afforded.

4.1 Level A Protection

The highest degree of protection is used in a Level A situation. It should be worn when the highest available level of respiratory, skin and eye protection is needed. This level of protection is placed in effect when there is no historic information about the site and it is assumed that the worst possible conditions exist.

4.1.1 Personal Protective Equipment

a. Pressure demand, self-contained breathing apparatus-, approved by the Occupational Safety and Health Administration (OSHA) and National Institute of Occupational Safety and Health (NIOSH).

b. Fully encapsulating chemical-resistant suit.

c. Coveralls*.

d. Long cotton underwear*.

e. Gloves (inner and outer), chemical-resistant.

f. Boots, chemical-resistant, steel toe and shank. (Depending on suit construction, worn over or under suit boot.)

g. Hard hat* (under suit).

h. Disposable protective suit, gloves and boots* (worn over fully-encapsulating suit).

i. Two-way radio communications (intrinsically safe).

*Optional

4.1.2 Criteria for Selection

Meeting any of the criteria listed below warrants use of Level A protection:

a. The chemical substance(s) has been identified and requires the highest level of protection for skin, eyes and the respiratory system based on:

(1) Measured (or potential for) high concentrations-of atmospheric vapors, gases, or particulates; or

(2) Site operations and work functions involving high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates.

b. Extremely hazardous substances are known or suspected to be present and skin contact is possible.

c. The potential exists for contact with substances that destroy skin.

d. Operations must be conducted in confined, poorly ventilated areas until the absence of hazards requiring Level A protection is demonstrated.

e. An oxygen deficient atmosphere where the oxygen level is less than 20.9 percent (%) by volume as measured with an oxygen meter. This condition, existing alone, could result in a down grade to EPA Level B PPE.

f. Total atmospheric readings on photoionization detector indicate readings above 500 parts per million (ppm) of calibration gas equivalents (cge) of unidentified substances.

4.1.3 Limiting Criteria

a. Fully encapsulating suit material must be compatible with the substances involved.

4.1.4 Minimum Decontamination Procedure

Station 1: Segregated equipment drop.
Station 2: Outer garment, boots and gloves wash and rinse.
Station 3: Outer boot and glove removal.
Station 4: Tank change.
Station 5: Boots, gloves and outer garment removal.
Station 6: SCBA removal.
Station 7: Field wash.

4.2 Level B Protection

Level B protection will be used by all personnel entering confined spaces and/or if the conditions outlined in Section 4.2.2 are encountered.

4.2.1 Personal Protective Equipment

a. Pressure-demand, self-contained breathing apparatus or cascade supplied air system (OSHA/NIOSH approved).

b. Chemical-resistant clothing (coveralls and long-sleeved jacket; coveralls, hooded, one or two-piece chemical-splash suit; disposable chemical-resistant coveralls).

c. Coveralls.*

d. Gloves (outer), chemical-resistant.

e. Gloves (inner), chemical-resistant.

f. Boots, chemical-resistant, steel toe and shank.

g. Boots (outer), chemical resistant (disposable*).

h. Hard hat (face shield*).

i. Two-way radio communications (intrinsically safe).

*Optional

4.2.2 Criteria for Selection

Meeting any one of these criteria warrants use of Level B protection:

a. The type(s) and atmospheric concentration(s) of toxic substances have been identified and require the highest level of respiratory protection, but a lower level of skin and eye protection than is required with Level A. These would be atmospheres:

(1) With concentrations immediately dangerous-to life and health (IDLH); or

(2) Exceeding limits of protection afforded by a full-face, air-purifying mask; or

(3) Containing substances for which air-purifying canisters do not exist or have low removal efficiency; and/or

(4) Containing substances requiring air-supplied equipment, but substances and/or concentrations do not represent a serious skin hazard.

b. The atmosphere contains less than 19.5 percent oxygen.

c. Site operations make it highly unlikely that the small, unprotected area of the head or neck will be contacted by splashes of extremely hazardous substances.

d. Total atmospheric concentrations in the breathing zone of unidentified vapors or gases range from 50 ppm to 500 ppm (calibration gas equivalence units) on monitoring instruments, and vapors are not suspected of containing high levels of chemicals toxic to skin.

4.2.3 Limiting Criteria

a. Use only when the vapor or gases present are not suspected of containing high concentrations of chemicals that are harmful to skin or capable of being absorbed through skin contact.

b. Use only when it is highly unlikely that the work being done will generate high concentrations of vapors, gases, or particulates or splashes of material that will affect exposed skin.

4.2.4 Minimum Decontamination Procedures

Station 1: Equipment drop.
Station 2: Outer garment, boots and gloves wash and rinse.
Station 3: Outer boot and glove removal.
Station 4: Tank change.
Station 5: Boot, gloves and outer glove removal.
Station 6: SCBA removal.
Station 7: Field wash.

4.3 Level C Protection

Level C protection will be used by all personnel if the conditions outline in Section 4.3.2 are encountered.

4.3.1 Personal Protective Equipment

a. Full-face, air purifying, canister-equipped respirator (Mine Safety and Health Administration (MSHA) and National Institute of Occupational Safety and Health (NIOSH) approved).

b. Chemical-resistant clothing (coveralls; hooded, two-piece chemical splash suits; chemical-resistant hood and apron; disposable chemical-resistant coveralls).

c. Coveralls.*

d. Gloves (outer), chemical-resistant.

e. Gloves (inner), chemical resistant

f. Boots, steel toe and shank.

g. Boots cover (outer), chemical-resistant (disposable*).

h. Hard hat (face shield*).

i. Escape mask*.

j. Two-way radio communications (intrinsically safe).

*Optional

4.3.2 Criteria for Selection

Meeting all of these criteria permits use of Level C Protection:

a. Measured air concentrations of identified substances will be reduced by the respirator to, at or below the substance's exposure limit, and the concentration is within the service limit of the canister.

b. Atmospheric contaminant concentrations do not exceed IDLH levels.

c. Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect the small area of skin left unprotected by chemical-resistant clothing.

d. Job functions have been determined not to require self-contained breathing apparatus.

e. Total vapor readings register between 5 ppm cge and 50 ppm cge above background on instruments.

f. Air will be monitored periodically.

g. Cartridges are available and are approved by NIOSH and MSHA for the specific chemical(s) encountered.

4.3.3 Limiting Criteria

a. Atmospheric concentration of chemicals must not exceed IDLH levels.

b. The atmosphere must contain at least 19.5 percent oxygen.

c. Must have sufficient information available regarding specific compounds, and their concentrations, likely to be encountered.

4.3.4 Minimum Decontamination Procedures

Station 1: Equipment drop.
Station 2: Outer boot and glove removal.
Station 3: Canister or mask change.
Station 4: Boots, gloves and outer garment removal.
Station 5: Face piece removal.
Station 6: Field wash.

4.4 Level D Protection

Level D protection has been selected for personnel for this project except during confined space entries. Should conditions change, re-evaluation of personnel protection will be conducted.

4.4.1 Personal Protective Equipment

a. General work clothes or coveralls.

b. Gloves*.

c. Boots/shoes, leather or chemical-resistant, steel toe and shank.

d. Boots (outer), chemical/resistant (disposable)*.

e. Safety glasses or chemical splash goggles*.

f. Hard hat (face shield*).

g. Escape mask*.

*Optional

4.4.2 Criteria for Selection

Meeting any of these criteria allows use of Level D protection:

a. No hazardous air pollutants have been measured.

b. Work functions preclude splashes, immersion, or potential for unexpected inhalation of any chemicals.

c. Extensive information on suspected hazards/risks are known.

4.4.3 Limiting Criteria

a. The atmosphere must contain at least 20.9 percent oxygen.

4.4.4 Minimum Decontamination Procedure

Station 1: Equipment drop.

Station 2: Hand and face wash.

4.5 Duration of Work Period

The anticipated duration of the work period will be established prior to daily activities. The work will only be performed during daylight hours. Other factors that affect the length of time personnel may work include:

a. Air supply consumption (SCBA-assisted work);

b. Suit/ensemble, air purifying chemical cartridge, permeation and penetration by chemical contaminants; and

c. Ambient temperature and weather conditions.

5.0 DETERMINATION OF THE SITE-SPECIAL LEVEL OF HAZARD

Categories of personnel protection required depend on the degree of hazard and probability of exposure by a route of entry into the body. For this site, the most probable potential route of entry is via inhalation of VOCs, and potentially by dermal adsorption of contaminates released from field activities. The site-specific chemical contaminants of greatest concern are volatile organic compounds, including but not limited to tetrachloroethene (PCE), trichloroethene (TCE) and 1,2,3-trichloropropane.

Based upon information obtained from previous investigations and sampling results, and the examination of the hazardous substance data sheets (Appendix B) for the contaminants alleged or reported at the Mackenzie Chemical facility, it has been determined that the appropriate level of protection for the site is Level D, the minimal level of protection. Synthetic gloves with low permeability to liquids and Tyvek suits will be used by all personnel in contact with on-site soil or water to prevent dermal contact.

The determination of Level D protection is based on the fact that field work will be performed in open, well-ventilated areas and that the potential for accidents and injuries due to obstructions caused by and/or magnified by the use of level A, B, or C protection (i.e., slip/trip hazards) is greater than the potential for problems associated with potential exposure from contaminants using level D protection. Level C protection will be used if ambient air monitoring results warrant a protective equipment upgrade (above Level D conditions). The Site Health and Safety Officer will be responsible for requesting an upgrade in the level of personnel protection. The final decision will be made by the Health and Safety Manager in conjunction with the Project Manager and the appropriate regulatory authorities.

A FID will be used to monitor air quality throughout the course of field work. If necessary (based upon field equipment readings), the work zone will be evacuated and consideration will be given to upgrading the level of protection. An upgrade to the appropriate

level of protection for field personnel will be required before re-entering the work zone if hazardous conditions persist.

In addition to potential chemical hazards, there also exists potentially greater physical hazards associated with the activities at the facility. Due to the nature of the facility operations, heavy equipment including drilling rigs will be utilized on the job site. Therefore, all personnel should always be aware of vehicular traffic while working at the facility. Further, hard hats and steel-toed safety boots must be worn at all times around heavy equipment. All work must be performed in strict accordance with OSHA regulations.

5.1 Community Air Monitoring Plan

Due to the proximity of nearby residences, real time air monitoring for volatile organic compounds and particulate levels at the perimeter of the work area is necessary. A Community Air Monitoring Plan will be implemented with the following provisions:

5.1.1 Frequency of Monitoring

Volatile organic compounds must be monitored at the downwind perimeter of the work area daily at 2 hour intervals. If total organic vapor levels exceed 5 ppm above background, work activities must be halted and monitoring continued under the provisions of a Vapor Emission Response Plan. All readings must be recorded and be available for State (DEC & DOH) personnel to review.

5.1.2 Vapor Emission Response Plan

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the work area, activities will be halted and monitoring continued. If the organic vapor level decreases below 5 ppm above background, work activities can resume but more frequent intervals of monitoring, as directed by the Safety Officer, must be conducted. If the

organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the work area, activities can resume provided:

- the organic vapor level 200 feet downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background, and

- more frequent intervals of monitoring, as directed by the Safety Officer, are conducted.

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. When work shutdown occurs, downwind air monitoring as directed by the Safety Officer will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

5.1.3 Major Vapor Emission

If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work area or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted.

If, following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the work area, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structures (20 Foot Zone).

If efforts to abate the emission source are unsuccessful and if the following levels persist for more than 30 minutes in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect;

- if organic vapor levels are approaching 5 ppm above background.

However, the Major Vapor Emission Response Plan shall be immediately placed into effect if organic vapor levels are greater than 10 ppm above background.

5.1.4 Major Vapor Emission Response Plan

Upon activation, the following activities will be undertaken:

1. All Emergency Response Contracts, as listed in the Health and Safety Plan of the Work Plan, will go into effect.

2. The local police authorities will immediately be contacted by the Safety Officer and advised of the situation.

3. Frequent air monitoring will be conducted at 30 minute intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Safety Officer.

6.0 DESIGNATED WORK ZONES

Work zones will be determined prior to commencement of a specific field activity. An area large enough to encompass the activity will be delineated as the work zone. Only qualified field personnel involved in the field activity, with the proper PPE, will be allowed into the designated work zone. Within the work zone, ambient air quality will be periodically monitored using a FID to determine any changes from background air quality. If subsequent measurements suggest a significant change in air quality (greater than 5 ppm), the work area will be immediately evacuated. An upgrade to the appropriate level of PPE for field personnel will be required before re-entering the work zone.

7.0 DECONTAMINATION STATIONS

Decontamination stations will be located in fixed areas to be used for the cleaning of all heavy equipment, vehicles, tools and supplies required for the completion of field operations. Personnel decontamination procedures for the appropriate levels of protection are described in Section 4.0.

All drilling equipment (rigs, augers, etc.) will be steam cleaned between each soil boring and well installation. The staged decontamination area is located at the northeast corner of the facility property. All decontamination procedures will take place in this area.

8.0 SITE ACCESS CONTROL

Appropriate traffic controls and barricades will used in areas of vehicular and pedestrian traffic. Local requirements for traffic control will be adhered to (e.g., obtaining appropriate permits, and provisions for a flagman), as may be warranted.

9.0 PERSONAL HYGIENE

The following personal hygiene rules must be followed while performing work at the site:

1. Eating, drinking, chewing gum or tobacco, smoking, or any other practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in the work area.

2. Hands and face must be thoroughly washed upon leaving the work area and before eating, drinking, or any other activities.

3. Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garment is removed.

4. No excessive facial hair (i.e., beards), which interferes with a satisfactory fit of the mask-to-face seal, is allowed on personnel required to wear respiratory protective equipment.

5. Contact with contaminated or suspected contaminated surfaces will be avoided. Whenever possible, walking through puddles, mud and discolored surfaces; kneeling on ground; leaning, sitting, or placing equipment on drums, containers, vehicles, or the ground will be avoided.

6. Medicine and alcohol can increase the effects from exposure to toxic chemicals. Prescribed drugs will not be taken by personnel on site where the potential for absorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified physician. Alcoholic beverage intake will be prohibited during all on-site field operations.

10.0 CONTINGENCY PLAN

Section 10.0 shall serve as the investigation Contingency Plan. It has been developed to identify precautionary measures, possible emergency conditions, and emergency procedures. The plan shall be implemented by the Site Health and Safety Officer.

10.1 Emergency Medical Care and Treatment

This section addresses emergency medical care and treatment of field personnel, resulting from possible exposures to toxic substances and injuries due to accidents. The following items will be included in emergency care provisions:

a. Name, address and telephone number of the nearest medical treatment facility will be conspicuously posted. Directions for locating the facility, plus the travel time, will be readily available (see Appendix C).

b. Names and telephone numbers of ambulance service, police and fire departments, and procedures for obtaining these services will be conspicuously posted (see Appendix C).

c. Procedure for prompt notification of the H2M Site Health and Safety Officer.

d. Emergency eyewash fountains and first aid equipment will be readily available on site and located in an area known to all personnel.

e. Specific procedures for handling personnel with excessive exposure to chemicals or contaminated soil or water.

f. Readily available dry-chemical fire extinguisher.

10.2 Off-Site Emergency Medical Care

The Site Health and Safety Officer shall pre-arrange for access to emergency medical care services at a convenient and readily accessible medical facility and establish emergency routes. The Site Health and Safety Officer shall establish emergency communications with emergency response services.

10.3 Personnel Accidents

Bodily injuries which occur as a result of an accident during the operation at the site will be handled in the following manner:

a. First aid equipment will be available on site for minor injuries. If the injuries are not considered minor, proceed to the next step.

b. The local first aid squad rescue unit, a paramedic unit, the local hospital and the Site Health and Safety Officer shall be notified of the nature of the emergency.

c. The injured employee shall be transported by the local emergency vehicle to the local hospital.

d. A written report shall be prepared by the Site Health and Safety Officer detailing the events and actions taken during the emergency within 24 hours of the accident.

10.4 Personnel Exposure

In the event that any person is splashed or otherwise excessively contaminated by chemicals, the following procedure will be undertaken:

a. Disposable clothing contaminated with observable amounts of chemical residue is to be removed and replaced immediately.

b. In the event of direct skin contact in Level D, the affected area is to be washed immediately with soap and water, or other solutions as directed by medical personnel.

c. The Site Health and Safety Officer or other individuals who hold a current first aid certificate will determine the immediate course of action to be undertaken. This may involve using the first aid kit and/or eyewash stations.

10.4.1 Weather

Adverse weather conditions are an important consideration in planning and conducting site operations. Hot or cold weather can cause physical discomfort, loss of efficiency, and personal injury. Of particular importance is heat stress resulting when protective clothing decreases natural body ventilation. One or more of the following will help reduce heat stress:

a. Provide plenty of liquids. To replace body fluids (water and electrolytes) lost because of sweating, use a 0.1 percent salt water solution, more heavily salted foods, or commercial mixes. The commercial mixes may be preferable for those employees on a low sodium diet.

b. Provide cooling devices to aid natural body ventilation. These devices, however, add weight, and their use should be balanced against worker efficiency. Long cotton underwear help absorb moisture and protect the skin from direct contact with heat absorbing protective clothing.

c. Install mobile showers and/or hose down facilities to reduce body temperature and cool protective clothing.

d. In extremely hot weather, conduct operations in the early morning or evening.

e. Ensure that adequate shelter is available to protect personnel against heat, cold, rain, snow, etc.

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

10.4.2 Heat Stress

If field operations are conducted in the warm summer months, heat related fatigue will be closely monitored. Monitoring of personnel wearing impervious clothing should commence when the ambient temperature is 70 degrees Fahrenheit or above. Frequency of monitoring should increase as the ambient temperature increases or as slow recovery rates are indicated. When temperatures exceeds 85 degrees Fahrenheit, workers should be monitored for heat stress after every work period. The following screening mechanism will be used to monitor for heat stress:

> Heart rate (HR) will be periodically measured by the radial pulse for 30 seconds during a resting period. The HR should not exceed 110 beats per minute. If the HR is higher, the next work period should be shortened by 33 percent. 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 33 percent.

Heat-related illnesses range from heat fatigue to heat stroke, the most serious. Heat stroke requires prompt treatment to prevent irreversible damage or death. Protective clothing may have to be cut off. Less serious forms of heat stress require prompt attention or they may lead to a heat stroke. Unless the victim is obviously contaminated, decontamination should be omitted or minimized and treatment begun immediately. Heat-related problems can be categorized into:

Heat Rash: Caused by continuous exposure to hot and humid air and aggravated by chafing clothes. Decreases ability to tolerate heat as well as being a nuisance.

Heat Cramps: Caused by profuse perspiration with inadequate fluid intake and chemical replacement (especially salts). Signs: muscle spasm and pain in the extremities and abdomen.

Heat Exhaustion: Caused by increased stress on various organs to meet increased demands to cool the body. Signs: shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and lassitude.

Heat Stroke: The most severe form of heat stress. The body must be cooled immediately to prevent severe injury and/or death. Signs and symptoms are: red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma.

Some of the symptoms of heat stress are: hot dry skin, fever, nausea, cramps, red or spotted skin, confusion, lightheadedness, delirium, rapid pulse, convulsions and unconsciousness.

For workers suffering from heat stress, the following actions should be taken:

1. Remove the victim to a cool area
2. Loosen clothing
3. Thoroughly soak the victim in cool water or apply cold compresses
4. Call for medical assistance.

10.4.3 Cold Stress

If field operations are conducted in the cold winter months, cold stress will be monitored. Two factors influence the development of a cold injury: ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with

low temperature. For instance, 10 degrees Fahrenheit air with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at -18 degrees Fahrenheit.

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

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

Frost Nip or

Incipient Frostbite: Characterized by suddenly blanching or whitening of skin.

Superficial Frostbite: Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.

Deep Frostbite: Tissues are cold, pale and solid; extremely serious injury.

Hypothermia: Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperatures. Its symptoms are usually exhibited in five stages: (1) shivering; (2) apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body temperature to less than 95 degrees Fahrenheit; (3) unconsciousness, glassy stare, slow pulse and slow respiratory rate; (4) freezing of the extremities; and finally, (5) death.

10.5 Fire

The telephone number to the local fire department will be posted along with other emergency numbers conspicuously on-site at all times. (see Appendix C). In the event of a fire

occurring at the site, the following actions will be undertaken by the Site Health and Safety Officer and the designated fire control personnel:

a. Evacuate all unnecessary personnel from the area of the fire and site, if necessary.

b. Contact the local fire and police departments informing them of the fire and any injuries if they have occurred.

c. Contact the local hospital of the possibility of fire victims.

d. Contact the Site Health and Safety Officer, Health and Safety Manager, and the H2M Project Manager.

11.0 SUMMARY

The Health and Safety Plan establishes practices and procedures to be followed so that the welfare and safety of workers and the public are protected. It is important that personal equipment and safety requirements be appropriate to protect against the potential or known hazards at a site. Protective equipment will be based upon the type(s), concentration(s), and routes of personal exposure from substances at the site, as well as the potential for hazards due to heavy equipment use, vision impairment, weather, etc. All site operation planning incorporates an analysis of the hazards involved and procedures for preventing or minimizing the risk to personnel. The following summarizes the rules which must be obeyed:

a. The Health and Safety Plan will be made available to all personnel doing field work on site. All personnel must sign this plan, indicating they have read and understood its terms.

b. All personnel will be familiar with standard operating safety procedures and additional instructions contained in the Health and Safety Plan.

c. All personnel going on site will be adequately trained and thoroughly briefed on anticipated hazards, equipment to be worn, safety practices to be followed, emergency procedures and communications.

d. Any required respiratory protective devices and protective clothing will be worn by all personnel going into work areas.

e. Prior to commencement of work activities, notification to local police, fire and potential rescue personnel will be made.

APPENDIX A

HEALTH AND SAFETY ACKNOWLEDGMENT AND STATEMENT FORMS

H2M GROUP

I acknowledge that I have read and understand the provisions of this Health and Safety Plan, and that I will, to the best of my ability, abide by the terms of this plan:

Name	Date	Name	Date

H2M GROUP

SITE WORKER

HEALTH AND SAFETY STATEMENT FORM

I have read the Health and Safety Plan (HASP) for the Field Investigation at the Mackenzie Chemical facility and I have reviewed and understand the potential hazards and the precautions/contingencies of each potential hazard.

I agree to abide by the stipulations of this HASP and further agree to hold H2M Group harmless from, and indemnify against, any accidents which may occur as a result of activities in the site regardless of whether or not they were covered in the HASP.

Name: _____

Representing: _____

Print Name: _____ Date: _____

Sign: _____

Name: _____

Representing: _____

Print Name: _____ Date: _____

Sign: _____

H2M GROUP

Name: _____

Representing: _____

Print Name: _____ Date: _____

Sign: _____

Name: _____

Representing: _____

Print Name: _____ Date: _____

Sign: _____

APPENDIX B

HAZARDOUS SUBSTANCE DATA SHEETS

MATERIAL SAFETY DATA SHEET

07/07/98
LAST REVISED: June 4, 1997

SECTION I PRODUCT SPECIFICATIONS

CAT NO. O-654 CAS NO. 96-18-4
1.2.3-Trichloropropane
OTHER NAME: Allyl trichloride/Glycerol trichlorohydrin

Supplied by CHEM SERVICE, Inc. PO BOX 599, WEST CHESTER, PA, 19381 (610)692-3026
EMERGENCY PHONE: 610-692-3026

SECTION II TOXICITY DATA

ORAL RAT OR MOUSE LD50	RTECS#	OSHA PEL (TWA)	ACGIH TLV (TWA)
320mg/kg	TZ9275000	50ppm (300 mg/m3)	10 ppm(60 mg/m3)skin

This compound is considered to be toxic.
This statement is based upon OSHA's assessment of the LD50

CARCINOGENICITY: OSHA: (NO) IARC: (YES) NTP: (YES) ACGIH: (YES) NIOSH: (YES) OTHER: (NO)

SECTION III PHYSICAL DATA

COLOR:	Colorless
PHASE:	Liquid
MELTING POINT:	-14 C
BOILING POINT:	156 C
SPECIFIC GRAVITY:	1.387
VAPOR PRESSURE:	3.0mm @20 C
VAPOR DENSITY:	NOT AVAILABLE
SOLUBILITY IN WATER:	Very slightly soluble
ODOR:	Chloroform like
EVAPORATION RATE (Butyl acetate=1):	NOT AVAILABLE

NFPA Hazard Rating:

Health	Flammability	Reactivity
3	2	0

0 - Least, 1 - Slight, 2 - Moderate, 3 - High, 4 - Severe

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 82 C This is a combustible compound.
EXTINGUISHING MEDIA: Carbon dioxide, dry chemical powder or spray.
UPPER EXPLOSION LIMIT: 12.6% **LOWER EXPLOSION LIMIT:** 3.2%

SECTION V HEALTH HAZARD DATA

Contact lenses should not be worn in the laboratory.
All chemicals should be considered hazardous - Avoid direct physical contact!
Suspected Carcinogen-may produce cancer.
May be harmful by inhalation, ingestion, or skin absorption.
Vapors or mist is irritating to eyes, mucous membranes and upper respiratory tract.
Can cause skin irritation.
Symptoms of exposure may include; burning sensation, coughing, wheezing, laryng-itis, shortness of breath, headache, nausea and/or vomiting.
Possible mutagen-May cause birth defects in future generations.
Overall chemical, physical and toxic data has not been thoroughly investigated.
Target Organ - Liver and Kidneys. Target Organ - Pancreas.

SECTION V.1 PROPOSITION 65

This chemical is considered to be a CARCINOGEN by the state of California.

SECTION VI FIRST AID

An antidote is a substance intended to counteract the effect of a poison. It should be administered only by a physician or trained emergency personnel. Medical advice can be obtained from a POISON CONTROL CENTER.

In case of contact: Flush eyes continuously with water for 15-20 minutes. Flush skin with water for 15-20 minutes. If no burns have occurred-use soap and water to cleanse skin.
If inhaled remove patient to fresh air. Administer oxygen if patient is having difficulty breathing. If patient has stopped breathing administer artificial respirations.
If patient is in cardiac arrest administer CPR.
Continue life supporting measures until medical assistance has arrived.
If patient is exhibiting signs of shock - Keep warm and quiet.
If patient is vomiting-watch closely to make sure airway does not become obstructed by vomit.
If swallowed, rinse out mouth with water, providing the person is conscious.
Remove and wash contaminated clothing. Get medical attention if necessary.

SECTION VII REACTIVITY DATA

Combustible. Incompatible with strong bases. Incompatible with strong oxidizing agents.
Decomposition liberates toxic fumes. Decomposition products are corrosive.
Emits toxic fumes under fire conditions.
Hazardous combustion or decomposition products include: carbon monoxide, carbon dioxide and hydr ogen chloride gas.

SECTION VIII SPILL OR LEAK PROCEDURES

Spills or leaks: Evacuate area. Wear appropriate OSHA regulated equipment. Ventilate area.
Absorb on vermiculite or similar material. Sweep up and place in an appropriate container.
Hold for disposal. Wash contaminated surfaces to remove any residues.
DISPOSAL: Burn in a chemicals incinerator equipped with an afterburner and scrubber.

SECTION IX PRECAUTIONS TO BE TAKEN IN HANDLING

This chemical should be handled only in a hood. Eye shields should be worn. Use appropriate OSHA/MSHA approved safety equipment. Avoid contact with skin, eyes and clothing. Do not breath vapors. Keep tightly closed.
Store in a cool dry place. Store only with compatible chemicals.

SECTION X SPECIAL PRECAUTIONS AND COMMENTS

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

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

Please Note - This MSDS is a courtesy MSDS. No order accompanied this MSDS.

MATERIAL SAFETY DATA SHEET

06/27/97
LAST REVISED: October 1, 1992

SECTION I PRODUCT SPECIFICATIONS

CAT NO. O-659 CAS NO. 156-59-2
cis-1.2-Dichloroethene
OTHER NAME: cis-1.2-Dichloroethylene

Supplied by CHEM SERVICE, Inc. PO BOX 599, WEST CHESTER, PA, 19381 (610)692 3026
EMERGENCY PHONE: 610-692-3026

SECTION II TOXICITY DATA

ORAL RAT OR MOUSE LD50	RTECS#	OSHA PEL (TWA)	ACGIH TLV (TWA)
NOT AVAILABLE	KV9420000	200 ppm (790 mg/m3)	NOT AVAILABLE

NO TOXICITY DATA HAS BEEN FOUND. Assume this chemical to be hazardous.

SECTION III PHYSICAL DATA

COLOR:	Colorless
PHASE:	Liquid
MELTING POINT:	-80 C
BOILING POINT:	60 C
SPECIFIC GRAVITY:	1.284
VAPOR PRESSURE:	NOT AVAILABLE
VAPOR DENSITY:	NOT AVAILABLE
SOLUBILITY IN WATER:	Insoluble (immiscible)
ODOR:	NOT AVAILABLE
EVAPORATION RATE (Butyl acetate=1):	NOT AVAILABLE

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 6 C This is a flammable chemical.
EXTINGUISHING MEDIA: Carbon dioxide, dry chemical powder or spray.
No explosion limits are available for this compound.

SECTION V HEALTH HAZARD DATA

Contact lenses should not be worn in the laboratory.
All chemicals should be considered hazardous - Avoid direct physical contact!
May be harmful if absorbed through the skin. May be harmful if inhaled.
May be harmful if swallowed. Can cause skin irritation. Can be irritating to mucous membranes.
Dust and/or vapors can cause irritation to respiratory tract. Can cause eye irritation.
Exposure can cause liver damage. Narcotic at high concentrations.
Exposure can cause kidney damage. Can cause convulsions.
Anesthetic effect resulting in drowsiness, dizziness and headache.
Target Organ - Central Nervous System.

SECTION V HEALTH HAZARD DATA CONTINUED

Target Organ - Liver and Kidneys.

SECTION VI FIRST AID

n antidote is a substance intended to counteract the effect of a poison. It should be dministered only by a physician or trained emergency personnel. Medical advice can be obtained from a POISON CONTROL CENTER.

n case of contact: Flush eyes continuously with water for 15-20 minutes. Flush skin with water for 15-20 minutes. If no burns have occurred-use soap and water to cleanse skin.
f inhaled remove patient to fresh air. Administer oxygen if patient is having difficulty reathing. If patient has stopped breathing administer artificial respirations.
If patient is in cardiac arrest administer CPR.
ontinue life supporting measures until medical assistance has arrived.
f swallowed, rinse out mouth with water, providing the person is conscious.
Get medical attention if necessary. Remove and wash contaminated clothing.

SECTION VII REACTIVITY DATA

Vapors may travel considerable distance to source of ignition and flash back.
its toxic fumes under fire conditions. Incompatible with strong oxidizing agents.
o not use Magnesium/Aluminum or their alloys as containers.
Decomposition liberates toxic fumes. Decomposition products are corrosive. Flammable.
Air sensitive. Decomposed by moisture. May decompose on exposure to light. Sensitive to heat.

SECTION VIII SPILL OR LEAK PROCEDURES

ills or leaks: Evacuate area. Wear appropriate OSHA regulated equipment. Ventilate area.
sorb on vermiculite or similar material. Sweep up and place in an appropriate container.
Hold for disposal. Wash contaminated surfaces to remove any residues.
SPOSAL: Burn in a chemicals incinerator equipped with an afterburner and scrubber.

SECTION IX PRECAUTIONS TO BE TAKEN IN HANDLING

his chemical should be handled only in a hood. Eye shields should be worn. Use appropriate HA/MSHA approved safety equipment. Avoid contact with skin, eyes and clothing. Do not breath vapors. Keep tightly closed.
ORE UNDER REFRIGERATION. Store only with compatible chemicals.

SECTION X SPECIAL PRECAUTIONS AND COMMENTS

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

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

Please Note - This MSDS is a courtesy MSDS. No order accompanied this M[illegible]

MATERIAL SAFETY DATA SHEET

06/27/97
LAST REVISED: April 28, 1992

SECTION I PRODUCT SPECIFICATIONS

CAT NO. O-660 CAS NO. 156-60-5
rans-1.2-Dichloroethene
THER NAME: trans-1.2-Dichloroethylene

Supplied by CHEM SERVICE, Inc. PO BOX 599, WEST CHESTER, PA, 19381 (610)692 3026
MERGENCY PHONE: 610-692-3026

SECTION II TOXICITY DATA

ORAL RAT OR MOUSE LD50	RTECS#	OSHA PEL (TWA)	ACGIH TLV (TWA)
7536mg/kg	KV9400000	200 ppm (790 mg/m3)	200 ppm(793 mg/m3)

iis compound is generally considered to be non-toxic.
iis statement is based upon OSHA's assessment of the LD50

SECTION III PHYSICAL DATA

OLOR:	Colorless
ASE:	Liquid
LTING POINT:	-50 C
OILING POINT:	48 C
PECIFIC GRAVITY:	1.257
APOR PRESSURE:	NOT AVAILABLE
APOR DENSITY:	NOT AVAILABLE
OLUBILITY IN WATER:	Very slightly soluble
OR:	Fruity/Pleasant
APORATION RATE (Butyl acetate=1):	NOT AVAILABLE

SECTION IV FIRE AND EXPLOSION HAZARD DATA

LASH POINT: 6 C This is a flammable chemical.
XTINGUISHING MEDIA: Carbon dioxide, dry chemical powder or spray.
PER EXPLOSION LIMIT: 12.8% **LOWER EXPLOSION LIMIT:** 9.7%

SECTION V HEALTH HAZARD DATA

ontact lenses should not be worn in the laboratory.
ll chemicals should be considered hazardous - Avoid direct physical contact
y be harmful by inhalation, ingestion, or skin absorption. Can cause eye irritation.
n cause skin irritation. Dust and/or vapors can cause irritation to respiratory tract.
an be irritating to mucous membranes. Exposure can cause Central Nervous System depression.
rget Organ - Respiratory system. Target Organ - Eyes. Target Organ - Central Nervous System.

SECTION V HEALTH HAZARD DATA CONTINUED

SECTION VI FIRST AID

An antidote is a substance intended to counteract the effect of a poison. It should be administered only by a physician or trained emergency personnel. Medical advice can be obtained from a POISON CONTROL CENTER.

In case of contact: Flush eyes continuously with water for 15-20 minutes. Flush skin with water for 15-20 minutes. If no burns have occurred-use soap and water to cleanse skin.
If inhaled remove patient to fresh air. Administer oxygen if patient is having difficulty breathing. If patient has stopped breathing administer artificial respirations.
If patient is in cardiac arrest administer CPR.
Continue life supporting measures until medical assistance has arrived.
If patient is exhibiting signs of shock - Keep warm and quiet.
Contact Poison Control Center immediately if necessary.
Do not administer liquids or induce vomiting to an unconscious or convulsing person.
If patient is vomiting-watch closely to make sure airway does not become obstructed by vomit.
If swallowed, rinse out mouth with water, providing the person is conscious.
Get medical attention if necessary. Remove and wash contaminated clothing.

SECTION VII REACTIVITY DATA

Incompatible with strong oxidizing agents. Decomposition liberates toxic fumes.
Decomposition products are corrosive. Flammable. Air sensitive. Sensitive to heat.
May decompose on exposure to light. Decomposed by moisture.
Readily absorbed and retained on clothing and/or shoes.
Hazardous combustion or decomposition products include: carbon monoxide, carbon dioxide and hydrogen chloride gas.

SECTION VIII SPILL OR LEAK PROCEDURES

Spills or leaks: Evacuate area. Wear appropriate OSHA regulated equipment. Ventilate area.
Absorb on vermiculite or similar material. Sweep up and place in an appropriate container.
Hold for disposal. Wash contaminated surfaces to remove any residues.
DISPOSAL: Burn in a chemicals incinerator equipped with an afterburner and scrubber.

SECTION IX PRECAUTIONS TO BE TAKEN IN HANDLING

This chemical should be handled only in a hood. Eye shields should be worn. Use appropriate OSHA/MSHA approved safety equipment. Avoid contact with skin, eyes and clothing. Do not breath vapors. Keep tightly closed.
STORE UNDER REFRIGERATION. Store only with compatible chemicals.

SECTION X SPECIAL PRECAUTIONS AND COMMENTS

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

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

Please Note - This MSDS is a courtesy MSDS. No order accompanied this MSDS.

MATERIAL SAFETY DATA SHEET

06/27/97
LAST REVISED: September 11, 1992

SECTION I PRODUCT SPECIFICATIONS

CAT NO. 4681F CAS NO. 622-96-8
p-Ethyltoluene

Supplied by CHEM SERVICE, Inc. PO BOX 599, WEST CHESTER, PA, 19381 (610)692 3026
EMERGENCY PHONE: 610-692-3026

SECTION II TOXICITY DATA

ORAL RAT OR MOUSE LD50	RTECS#	OSHA PEL (TWA)	ACGIH TLV (TWA)
NOT AVAILABLE	XT2550000	NOT AVAILABLE	NOT AVAILABLE

NO TOXICITY DATA HAS BEEN FOUND. Assume this chemical to be hazardous.

SECTION III PHYSICAL DATA

COLOR:	Colorless
PHASE:	Liquid
MELTING POINT:	NOT AVAILABLE
BOILING POINT:	160-162 C
SPECIFIC GRAVITY:	0.861
VAPOR PRESSURE:	NOT AVAILABLE
VAPOR DENSITY:	NOT AVAILABLE
SOLUBILITY IN WATER:	NOT AVAILABLE
ODOR:	Aromatic
EVAPORATION RATE (Butyl acetate=1):	NOT AVAILABLE

NFPA Hazard Rating:

Health	Flammability	Reactivity
	2	0

0 - Least, 1 - Slight, 2 - Moderate, 3 - High, 4 - Severe

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 36 C This is a flammable chemical.
EXTINGUISHING MEDIA: Carbon dioxide, dry chemical powder or spray.
No explosion limits are available for this compound.

SECTION V HEALTH HAZARD DATA

Contact lenses should not be worn in the laboratory.
All chemicals should be considered hazardous - Avoid direct physical contact!

SECTION V HEALTH HAZARD DATA CONTINUED

Can cause eye irritation. Can cause skin irritation.
May be harmful if absorbed through the skin. May be harmful if inhaled.
)ust and/or vapors can cause irritation to respiratory tract. May be harmful if swallowed.
Can be irritating to mucous membranes.
Overall chemical, physical and toxic data has not been thoroughly investigated.

SECTION VI FIRST AID

'n antidote is a substance intended to counteract the effect of a poison. It should be dministered only by a physician or trained emergency personnel. Medical advice can be obtained from a POISON CONTROL CENTER.

n case of contact: Flush eyes continuously with water for 15-20 minutes. Flush skin with water for 15-20 minutes. If no burns have occurred-use soap and water to cleanse skin.
f inhaled remove patient to fresh air. Administer oxygen if patient is having difficulty reathing. If patient has stopped breathing administer artificial respirations.
If patient is in cardiac arrest administer CPR.
Continue life supporting measures until medical assistance has arrived.

SECTION VII REACTIVITY DATA

lammable. Incompatible with strong oxidizing agents. Decomposition liberates toxic fumes.

SECTION VIII SPILL OR LEAK PROCEDURES

pills or leaks: Evacuate area. Wear appropriate OSHA regulated equipment. Ventilate area. Absorb on vermiculite or similar material. Sweep up and place in an appropriate container. Hold for disposal. Wash contaminated surfaces to remove any residues.
ISPOSAL: Burn in a chemicals incinerator equipped with an afterburner and scrubber.

SECTION IX PRECAUTIONS TO BE TAKEN IN HANDLING

his chemical should be handled only in a hood. Eye shields should be worn. Use appropriate OSHA/MSHA approved safety equipment. Avoid contact with skin, eyes and clothing. Do not breath vapors. Keep tightly closed.
tore in a cool dry place. Store only with compatible chemicals.

SECTION X SPECIAL PRECAUTIONS AND COMMENTS

he above information is believed to be correct on the date it is published and must not be considered all inclusive. The information has been obtained only by a search of available iterature and is only a guide for handling the chemicals. OSHA regulations require that f other hazards become evident, an upgraded MSDS must be made avalible to the employee within three months. Responsibility for updates lies with the employer and not with CHEM SERVICE, Inc. Persons not specifically and properly trained should not handle this hemical or its container. This MSDS is provided without any warranty expressed or implied, ncluding merchantability or fitness for any particular purpose.

his product is furnished FOR LABORATORY USE ONLY! Our products may NOT BE USED as drugs, osmetics, agricultural or pesticidal products, food additives or as household chemicals.

lease Note - This MSDS is a courtesy MSDS. No order accompanied this MSDS.

MATERIAL SAFETY DATA SHEET

06/27/97
LAST REVISED: January 2, 1996

SECTION I PRODUCT SPECIFICATIONS

CAT NO. F14 CAS NO. 79-00-5
1,1,2-Trichloroethane

Supplied by CHEM SERVICE, Inc. PO BOX 599, WEST CHESTER, PA, 19381 (610)692 3026
EMERGENCY PHONE: 610-692-3026

SECTION II TOXICITY DATA

ORAL RAT OR MOUSE LD50	RTECS#	OSHA PEL (TWA)	ACGIH TLV (TWA)
1140mg/kg	KJ3150000	10ppm (45mg/m3) skin	10ppm (55mg/m3) ski

This compound is considered to be slightly toxic.
This statement is based upon OSHA's assessment of the LD50

CARCINOGENICITY: OSHA: (NO) IARC: (NO) NTP: (NO) ACGIH: (NO) NIOSH: (YES) OTHER: (NO)

SECTION III PHYSICAL DATA

COLOR:	Colorless
PHASE:	Liquid
MELTING POINT:	-37 C
BOILING POINT:	110-115 C
SPECIFIC GRAVITY:	1.44
VAPOR PRESSURE:	19 mm@20 C
VAPOR DENSITY:	NOT AVAILABLE
SOLUBILITY IN WATER:	Very slightly soluble
ODOR:	Fruity/Pleasant
EVAPORATION RATE (Butyl acetate=1):	NOT AVAILABLE

NFPA Hazard Rating:

Health	Flammability	Reactivity
2	1	0

0 - Least, 1 - Slight, 2 - Moderate, 3 - High, 4 - Severe

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: Non-flammable
EXTINGUISHING MEDIA: Carbon dioxide or dry chemical powder. DO NOT USE WATER!
UPPER EXPLOSION LIMIT: 15.5% **LOWER EXPLOSION LIMIT:** 6%

MATERIAL SAFETY DATA SHEET

06/27/97
LAST REVISED: January 26, 1995

SECTION I PRODUCT SPECIFICATIONS

CAT NO. O-771 CAS NO. 108-67-8
1 3.5-Trimethylbenzene
OTHER NAME: Mesitylene

Supplied by CHEM SERVICE, Inc. PO BOX 599, WEST CHESTER, PA, 19381 (610)692-3026
EMERGENCY PHONE: 610-692-3026

SECTION II TOXICITY DATA

ORAL RAT OR MOUSE LD50	RTECS#	OSHA PEL (TWA)	ACGIH TLV (TWA)
1303mg/kg	OX6825000	25 ppm	35 ppm

This compound is considered to be slightly toxic.
This statement is based upon OSHA's assessment of the LD50

SECTION III PHYSICAL DATA

COLOR:	Colorless
PHASE:	Liquid
MELTING POINT:	-45 C
BOILING POINT:	162-164 C
SPECIFIC GRAVITY:	0.864
VAPOR PRESSURE:	2.0mm @20 C
VAPOR DENSITY:	4.1
SOLUBILITY IN WATER:	Insoluble (immiscible)
ODOR:	Camphor like
EVAPORATION RATE (Butyl acetate=1):	NOT AVAILABLE

NFPA Hazard Rating:

Health	Flammability	Reactivity
0	2	0

0 - Least, 1 - Slight, 2 - Moderate, 3 - High, 4 - Severe

SECTION IV FIRE AND EXPLOSION HAZARD DATA

AUTOIGNITION TEMPERATURE: 550 C
FLASH POINT: 44 C This is a combustible compound.
EXTINGUISHING MEDIA: Carbon dioxide, dry chemical powder or spray.
UPPER EXPLOSION LIMIT: 6.1% **LOWER EXPLOSION LIMIT:** .88%

SECTION V HEALTH HAZARD DATA

Contact lenses should not be worn in the laboratory.
All chemicals should be considered hazardous - Avoid direct physical contact!
May be harmful if absorbed through the skin. May be harmful if inhaled.
May be harmful if swallowed. Can cause skin irritation. Can cause eye irritation.
Can be irritating to mucous membranes.
Prolonged exposure may cause nausea/headache/dizziness and/or eye damage.
Dust and/or vapors can cause irritation to respiratory tract.
Overall chemical, physical and toxic data has not been thoroughly investigated.

SECTION VI FIRST AID

An antidote is a substance intended to counteract the effect of a poison. It should be administered only by a physician or trained emergency personnel. Medical advice can be obtained from a POISON CONTROL CENTER.

In case of contact: Flush eyes continuously with water for 15-20 minutes. Flush skin with water for 15-20 minutes. If no burns have occurred-use soap and water to cleanse skin.
If inhaled remove patient to fresh air. Administer oxygen if patient is having difficulty breathing. If patient has stopped breathing administer artificial respirations.
If patient is in cardiac arrest administer CPR.
Continue life supporting measures until medical assistance has arrived.

SECTION VII REACTIVITY DATA

Incompatible with strong oxidizing agents. Decomposition liberates toxic fumes.
Decomposition products are corrosive. Combustible.
Vapors may travel considerable distance to source of ignition and flash back.

SECTION VIII SPILL OR LEAK PROCEDURES

Spills or leaks: Evacuate area. Wear appropriate OSHA regulated equipment. Ventilate area. Absorb on vermiculite or similar material. Sweep up and place in an appropriate container. Hold for disposal. Wash contaminated surfaces to remove any residues.
DISPOSAL: Burn in a chemicals incinerator equipped with an afterburner and scrubber.

SECTION IX PRECAUTIONS TO BE TAKEN IN HANDLING

This chemical should be handled only in a hood. Eye shields should be worn. Use appropriate OSHA/MSHA approved safety equipment. Avoid contact with skin, eyes and clothing. Do not breath vapors. Keep tightly closed.
Store in a cool dry place. Store only with compatible chemicals.

SECTION X SPECIAL PRECAUTIONS AND COMMENTS

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

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

Please Note - This MSDS is a courtesy MSDS. No order accompanied this MSDS.

MATERIAL SAFETY DATA SHEET

06/27/97
LAST REVISED: January 26, 1995

SECTION I PRODUCT SPECIFICATIONS

CAT NO. F832 CAS NO. 95-63-6
.2.4-Trimethylbenzene

Supplied by CHEM SERVICE, Inc. PO BOX 599, WEST CHESTER, PA, 19381 (610)692 3026
MERGENCY PHONE: 610-692-3026

SECTION II TOXICITY DATA

ORAL RAT OR MOUSE LD50	RTECS#	OSHA PEL (TWA)	ACGIH TLV (TWA)
5000mg/kg	NOT AVAILABLE	25 ppm	35 ppm

his compound is considered to be slightly toxic.
his statement is based upon OSHA's assessment of the LD50

SECTION III PHYSICAL DATA

OLOR:	Colorless
HASE:	Liquid
ELTING POINT:	-44 C
BOILING POINT:	168 C
PECIFIC GRAVITY:	0.889
APOR PRESSURE:	1.0mm @13.3 C
VAPOR DENSITY:	NOT AVAILABLE
OLUBILITY IN WATER:	Insoluble (immiscible)
DOR:	Aromatic
VAPORATION RATE (Butyl acetate=1):	NOT AVAILABLE

FPA Hazard Rating:

Health	Flammability	Reactivity
0	2	0

0 - Least, 1 - Slight, 2 - Moderate, 3 - High, 4 - Severe

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 48 C This is a combustible compound.
XTINGUISHING MEDIA: Carbon dioxide, dry chemical powder or spray.
PPER EXPLOSION LIMIT: 6.4% **LOWER EXPLOSION LIMIT:** 1.9%

SECTION V HEALTH HAZARD DATA

Contact lenses should not be worn in the laboratory.
All chemicals should be considered hazardous - Avoid direct physical contact!
May be harmful if absorbed through the skin. May be harmful if inhaled.
Can cause skin irritation. Can be irritating to mucous membranes. Can cause eye irritation.
May be harmful if swallowed. Can cause gastro-intestinal disturbances.
Prolonged exposure may cause nausea/headache/dizziness and/or eye damage.
Can cause sensitization by skin contact. Narcotic at high concentrations.

SECTION VI FIRST AID

An antidote is a substance intended to counteract the effect of a poison. It should be administered only by a physician or trained emergency personnel. Medical advice can be obtained from a POISON CONTROL CENTER.

In case of contact: Flush eyes continuously with water for 15-20 minutes. Flush skin with water for 15-20 minutes. If no burns have occurred-use soap and water to cleanse skin.
If inhaled remove patient to fresh air. Administer oxygen if patient is having difficulty breathing. If patient has stopped breathing administer artificial respirations.
If patient is in cardiac arrest administer CPR.
Continue life supporting measures until medical assistance has arrived.

SECTION VII REACTIVITY DATA

Combustible. Incompatible with strong oxidizing agents. Decomposition liberates toxic fumes. Hazardous combustion or decomposition products include: carbon monoxide and carbon dioxide.

SECTION VIII SPILL OR LEAK PROCEDURES

Spills or leaks: Evacuate area. Wear appropriate OSHA regulated equipment. Ventilate area. Absorb on vermiculite or similar material. Sweep up and place in an appropriate container. Hold for disposal. Wash contaminated surfaces to remove any residues.
DISPOSAL: Burn in a chemicals incinerator equipped with an afterburner and scrubber.

SECTION IX PRECAUTIONS TO BE TAKEN IN HANDLING

This chemical should be handled only in a hood. Eye shields should be worn. Use appropriate OSHA/MSHA approved safety equipment. Avoid contact with skin, eyes and clothing. Do not breath vapors. Keep tightly closed.
Store in a cool dry place. Store only with compatible chemicals.

SECTION X SPECIAL PRECAUTIONS AND COMMENTS

The above information is believed to be correct on the date it is published and must not be considered all inclusive. The information has been obtained only by a search of available literature and is only a guide for handling the chemicals. OSHA regulations require that if other hazards become evident, an upgraded MSDS must be made avalible to the employee within three months. Responsibility for updates lies with the employer and not with 3M SERVICE, Inc. Persons not specifically and properly trained should not handle this chemical or its container. This MSDS is provided without any warranty expressed or implied, including merchantability or fitness for any particular purpose.

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MATERIAL SAFETY DATA SHEET

06/27/97
LAST REVISED: February 9, 1996

SECTION I PRODUCT SPECIFICATIONS

CAT NO. F11 CAS NO. 71-55-6
1.1.1-Trichloroethane
THER NAME: Methyl chloroform

Supplied by CHEM SERVICE, Inc. PO BOX 599, WEST CHESTER, PA, 19381 (610)692 3026
MERGENCY PHONE: 610-692-3026

SECTION II TOXICITY DATA

ORAL RAT OR MOUSE LD50	RTECS#	OSHA PEL (TWA)	ACGIH TLV (TWA)
10300mg/kg	KJ2975000	350 ppm (1900 mg/m3)	350ppm (1910mg/m3)

his compound is generally considered to be non-toxic.
his statement is based upon OSHA's assessment of the LD50

RCINOGENICITY: OSHA: (NO) IARC: (NO) NTP: (NO) ACGIH: (NO) NIOSH: (NO) OTHER: (YES)

SECTION III PHYSICAL DATA

LOR: Colorless
HASE: Liquid
LTING POINT: -35 C
ILING POINT: 74.1 C
PECIFIC GRAVITY: 1.338
APOR PRESSURE: 100 mm@20 C
POR DENSITY: 4.6
LUBILITY IN WATER: Very slightly soluble
DOR: Fruity/Pleasant
APORATION RATE (Butyl acetate=1): NOT AVAILABLE

FPA Hazard Rating:

Health	Flammability	Reactivity
2	1	0

Least, 1 - Slight, 2 - Moderate, 3 - High, 4 - Severe

SECTION IV FIRE AND EXPLOSION HAZARD DATA

OIGNITION TEMPERATURE: 537 C
ASH POINT: Non-flammable
XTINGUISHING MEDIA: Carbon dioxide, dry chemical powder or spray.
ER EXPLOSION LIMIT: 12.5% **LOWER EXPLOSION LIMIT:** 7.5%

SECTION V HEALTH HAZARD DATA

Contact lenses should not be worn in the laboratory.
All chemicals should be considered hazardous - Avoid direct physical contact!
Possible Carcinogen. May be harmful if absorbed through the skin. May be harmful if inhaled.
May be harmful if swallowed. Can cause eye irritation. Can be irritating to mucous membranes.
Narcotic at high concentrations. Can cause skin irritation.
Dust and/or vapors can cause irritation to respiratory tract.
Avoid consumption of alcohol before and after handling of this compound because it will increase the toxicity of the compound. Can cause an allergic skin reaction.
Exposure can cause liver damage. Exposure can cause kidney damage.
High concentrations are extremely destructive to tissues of the mucous membranes and upper respiratory tract, eyes and skin.
Symptoms of exposure may include; burning sensation, coughing, wheezing, laryng-itis, shortness of breath, headache, nausea and/or vomiting. Exposure can cause Dermatitis.
Possible mutagen-May cause birth defects in future generations.
Target Organ - Liver and Kidneys. Target Organ - Central Nervous System.

SECTION VI FIRST AID

An antidote is a substance intended to counteract the effect of a poison. It should be administered only by a physician or trained emergency personnel. Medical advice can be obtained from a POISON CONTROL CENTER.

In case of contact: Flush eyes continuously with water for 15-20 minutes. Flush skin with water for 15-20 minutes. If no burns have occurred-use soap and water to cleanse skin.
If inhaled remove patient to fresh air. Administer oxygen if patient is having difficulty breathing. If patient has stopped breathing administer artificial respirations.
If patient is in cardiac arrest administer CPR.
Continue life supporting measures until medical assistance has arrived.
Remove and wash contaminated clothing.
If patient is exhibiting signs of shock - Keep warm and quiet.
If swallowed DO NOT induce vomiting. Contact Poison Control Center immediately if necessary.
Do not administer liquids or induce vomiting to an unconscious or convulsing person.
If patient is vomiting-watch closely to make sure airway does not become obstructed by vomit.
Get medical attention if necessary.

SECTION VII REACTIVITY DATA

Incompatible with strong oxidizing agents.
Do not use Magnesium/Aluminum or their alloys as containers. Incompatible with strong bases.
Incompatible with Iron and Zinc and other light metals.
Incompatible with active metals (e.g. Sodium).
Reacts violently with ketones and a wide variety of other compounds.
Decomposition liberates toxic fumes. Incompatible with powdered metals
Incompatible with Nitrates. Incompatible with caustics. Decomposition products are corrosive.
Emits toxic fumes under fire conditions. Air sensitive. Hygroscopic.
Substance that depletes the ozone layer.

SECTION VIII SPILL OR LEAK PROCEDURES

Spills or leaks: Evacuate area. Wear appropriate OSHA regulated equipment. Ventilate area.
Absorb on vermiculite or similar material. Sweep up and place in an appropriate container.
Hold for disposal. Wash contaminated surfaces to remove any residues.

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

SECTION IX PRECAUTIONS TO BE TAKEN IN HANDLING

This chemical should be handled only in a hood. Eye shields should be worn. Use appropriate OSHA/MSHA approved safety equipment. Avoid contact with skin, eyes and clothing. Do not breath vapors. Keep tightly closed.
Store in a cool dry place. Store only with compatible chemicals.

SECTION X SPECIAL PRECAUTIONS AND COMMENTS

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

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Please Note - This MSDS is a courtesy MSDS. No order accompanied this MSDS.

MATERIAL SAFETY DATA SHEET

06/27/97
LAST REVISED: May 11, 1994

SECTION I PRODUCT SPECIFICATIONS

CAT NO. F85 CAS NO. 127-18-4
Tetrachloroethene
OTHER NAME: Perchloroethylene/Tetrachloroethylene

Supplied by CHEM SERVICE, Inc. PO BOX 599, WEST CHESTER, PA, 19381 (610)692 3026
EMERGENCY PHONE: 610-692-3026

SECTION II TOXICITY DATA

ORAL RAT OR MOUSE LD50	RTECS#	OSHA PEL (TWA)	ACGIH TLV (TWA)
8850mg/kg	KX3850000	25ppm (170mg/m3)	25ppm (170mg/m3)

This compound is generally considered to be non-toxic.
This statement is based upon OSHA's assessment of the LD50

CARCINOGENICITY: OSHA: (NO) IARC: (YES) NTP: (YES) ACGIH: (NO) NIOSH: (YES) OTHER: (NO)

SECTION III PHYSICAL DATA

COLOR:	Colorless
PHASE:	Liquid
MELTING POINT:	-22 C
BOILING POINT:	121 C
SPECIFIC GRAVITY:	1.623
VAPOR PRESSURE:	14 mm@20 C
VAPOR DENSITY:	NOT AVAILABLE
SOLUBILITY IN WATER:	Very slightly soluble
ODOR:	Ether like
EVAPORATION RATE (Butyl acetate=1):	NOT AVAILABLE

NFPA Hazard Rating:

Health	Flammability	Reactivity
2	0	0

0 - Least, 1 - Slight, 2 - Moderate, 3 - High, 4 - Severe

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: Non-flammable
EXTINGUISHING MEDIA: No fire or explosion hazard.
No explosion limits are available for this compound.

SECTION V HEALTH HAZARD DATA

Contact lenses should not be worn in the laboratory.
All chemicals should be considered hazardous - Avoid direct physical contact!
uspected Carcinogen-may produce cancer. Can cause eye irritation. Can cause skin irritation.
Dust and/or vapors can cause irritation to respiratory tract.
Can be irritating to mucous membranes. May be harmful if absorbed through the skin.
ay be harmful if inhaled. May be harmful if swallowed.
rolonged exposure may cause nausea/headache/dizziness and/or eye damage.
Exposure can cause liver damage. Exposure can cause kidney damage.
Avoid consumption of alcohol before and after handling of this compound because it will increase the toxicity of the compound. Can cause delayed adverse health effects.
Narcotic at high concentrations.

SECTION V.1 PROPOSITION 65

This chemical is considered to be a CARCINOGEN by the state of California.

SECTION VI FIRST AID

An antidote is a substance intended to counteract the effect of a poison. It should be administered only by a physician or trained emergency personnel. Medical advice can be obtained from a POISON CONTROL CENTER.

In case of contact: Flush eyes continuously with water for 15-20 minutes. Flush skin with water for 15-20 minutes. If no burns have occurred-use soap and water to cleanse skin.
If inhaled remove patient to fresh air. Administer oxygen if patient is having difficulty breathing. If patient has stopped breathing administer artificial respirations.
If patient is in cardiac arrest administer CPR.
Continue life supporting measures until medical assistance has arrived.
Remove and wash contaminated clothing.
If patient is exhibiting signs of shock - Keep warm and quiet.
Contact Poison Control Center immediately if necessary.
Do not administer liquids or induce vomiting to an unconscious or convulsing person.
If patient is vomiting-watch closely to make sure airway does not become obstructed by vomit.
Get medical attention if necessary.

SECTION VII REACTIVITY DATA

Incompatible with strong bases. Decomposition liberates toxic fumes.
Decomposition products are corrosive. Emits toxic fumes under fire conditions.

SECTION VIII SPILL OR LEAK PROCEDURES

Spills or leaks: Evacuate area. Wear appropriate OSHA regulated equipment. Ventilate area. Absorb on vermiculite or similar material. Sweep up and place in an appropriate container. Hold for disposal. Wash contaminated surfaces to remove any residues.
DISPOSAL: Burn in a chemicals incinerator equipped with an afterburner and scrubber.

SECTION IX PRECAUTIONS TO BE TAKEN IN HANDLING

This chemical should be handled only in a hood. Eye shields should be worn. Use appropriate OSHA/MSHA approved safety equipment. Avoid contact with skin, eyes and clothing. Do not breath vapors. Keep tightly closed.
Store in a cool dry place. Store only with compatible chemicals.

SECTION X SPECIAL PRECAUTIONS AND COMMENTS

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

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Please Note - This MSDS is a courtesy MSDS. No order accompanied this MSDS.

MATERIAL SAFETY DATA SHEET

06/27/97
LAST REVISED: June 2, 1997

SECTION I PRODUCT SPECIFICATIONS

CAT NO. F87 CAS NO. 79-01-6
Trichloroethene
OTHER NAME: Trichloroethylene

Supplied by CHEM SERVICE, Inc. PO BOX 599, WEST CHESTER, PA, 19381 (610)692 3026
EMERGENCY PHONE: 610-692-3026

SECTION II TOXICITY DATA

ORAL RAT OR MOUSE LD50	RTECS#	OSHA PEL (TWA)	ACGIH TLV (TWA)
7193mg/kg	KX4550000	50ppm (270mg/m3)	50ppm (269mg/m3)

his compound is generally considered to be non-toxic.
his statement is based upon OSHA's assessment of the LD50

CARCINOGENICITY: OSHA: (NO) IARC: (YES) NTP: (NO) ACGIH: (NO) NIOSH: (YES) OTHER: (NO)

SECTION III PHYSICAL DATA

COLOR:	Colorless
PHASE:	Liquid
MELTING POINT:	-84.8 C
BOILING POINT:	86.7 C
SPECIFIC GRAVITY:	1.4649
VAPOR PRESSURE:	58 mm@20 C
VAPOR DENSITY:	4.53
SOLUBILITY IN WATER:	Insoluble (immiscible)
ODOR:	Fruity/Pleasant
VAPORATION RATE (Butyl acetate=1):	NOT AVAILABLE

NFPA Hazard Rating:

Health	Flammability	Reactivity
2	1	0

0 - Least, 1 - Slight, 2 - Moderate, 3 - High, 4 - Severe

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: Non-flammable
EXTINGUISHING MEDIA: No fire or explosion hazard.
UPPER EXPLOSION LIMIT: 41% **LOWER EXPLOSION LIMIT:** 11%

SECTION V HEALTH HAZARD DATA

Contact lenses should not be worn in the laboratory.
All chemicals should be considered hazardous - Avoid direct physical contact!
Possible mutagen-May cause birth defects in future generations.
Suspected Carcinogen-may produce cancer. May be harmful if absorbed through the skin.
May be harmful if inhaled. Lachrymator-Causes severe eye irritation.
Vapors and/or direct eye contact can cause severe eye burns. Can cause eye irritation.
Can cause skin irritation. Can cause skin burns. Can cause severe skin burns.
May be harmful if swallowed. Exposure can cause liver damage. Exposure can cause kidney damage.
Can cause gastro-intestinal disturbances. Can be irritating to mucous membranes.
Prolonged exposure may cause nausea/headache/dizziness and/or eye damage.
Can cause sensitization by skin contact.
May be rapidly absorbed thru the skin with potential adverse health effects.

SECTION V.1 PROPOSITION 65

This chemical is considered to be a CARCINOGEN by the state of California.

SECTION VI FIRST AID

An antidote is a substance intended to counteract the effect of a poison. It should be administered only by a physician or trained emergency personnel. Medical advice can be obtained from a POISON CONTROL CENTER.

In case of contact: Flush eyes continuously with water for 15-20 minutes. Flush skin with water for 15-20 minutes. If no burns have occurred-use soap and water to cleanse skin.
If inhaled remove patient to fresh air. Administer oxygen if patient is having difficulty breathing. If patient has stopped breathing administer artificial respirations.
If patient is in cardiac arrest administer CPR.
Continue life supporting measures until medical assistance has arrived.
Remove and wash contaminated clothing.
If patient is exhibiting signs of shock - Keep warm and quiet.
Contact Poison Control Center immediately if necessary.
Do not administer liquids or induce vomiting to an unconscious or convulsing person.
If patient is vomiting-watch closely to make sure airway does not become obstructed by vomit.
Get medical attention if necessary.

SECTION VII REACTIVITY DATA

Incompatible with strong reducing agents. Incompatible with strong bases
Incompatible with strong oxidizing agents. Decomposition liberates toxic fumes.
Decomposition products are corrosive.
Do not use Magnesium/Aluminum or their alloys as containers.
Sensitive to light - dark color does not affect purity.

SECTION VIII SPILL OR LEAK PROCEDURES

Spills or leaks: Evacuate area. Wear appropriate OSHA regulated equipment. Ventilate area.
Absorb on vermiculite or similar material. Sweep up and place in an appropriate container.
Hold for disposal. Wash contaminated surfaces to remove any residues.
DISPOSAL: Burn in a chemicals incinerator equipped with an afterburner and scrubber.

SECTION IX PRECAUTIONS TO BE TAKEN IN HANDLING

This chemical should be handled only in a hood. Eye shields should be worn. Use appropriate OSHA/MSHA approved safety equipment. Avoid contact with skin, eyes and clothing. Do not

breath vapors. Keep tightly closed.
Store in a cool dry place. Store only with compatible chemicals.

SECTION X SPECIAL PRECAUTIONS AND COMMENTS

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

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Please Note - This MSDS is a courtesy MSDS. No order accompanied this MSDS.

APPENDIX C

EMERGENCY RESPONSE INFORMATION

H2M GROUP

EMERGENCY TELEPHONE NUMBERS

HOSPITAL

Southside Hospital 301 E. Main Street Bay Shore, New York 11706	(516) 968-3000

POLICE DEPARTMENT

Emergency	911
Non-emergency	(516) 264-0400

FIRE DEPARTMENT

Emergency	911

AMBULANCE

Emergency	911
Non-emergency	(516) 226-1212

H2M GROUP	(516) 756-8000
Project Manager	Edward A. Maikish, P.E. (LMS)
Health & Safety Officer	Phil J. Schade, P.E. (H2M)
Site Safety Officer	Michael P. Engelmann (H2M)