



O'BRIEN & GERE
ENGINEERS, INC.

December 26, 2000

Mr. James Ludlam, P.E.
New York State Department of Environmental Conservation
Bureau of Central Remedial Action
50 Wolf Road
Albany, New York 12233-7010

Re: United Plating Site #4-47-018
Schenectady, New York

File: 10653\27265 #2

Dear Jim:

Enclosed are two copies of the Pre-design Investigations Work Plan for the United Plating superfund site in Schenectady, New York. The work plan includes a description of the fieldwork to be completed based on the NYSDEC-approved Work Plan dated December 5, 2000. Also included are the boring log sheet and protocols for collecting and logging the sub-surface soil samples, and the project specific Health and Safety Plan and Field Sampling Plan.

As discussed on December 22, 2000, we expect that the driller will mobilize and initiate the fieldwork on January 8, 2001. The soil borings are expected to take three days to complete barring any delays because of weather or unforeseen events. Following completion of the soil borings, the surveyor will visit the site to complete the site survey including the location of the newly installed soil borings. The completed survey is due to O'Brien & Gere by February 2, 2001.

It would be greatly appreciated if you could present your comments, if any, to the enclosed document by January 3, 2001 to provide us an opportunity to address your comments and distribute the document to the driller and supervising geologist in advance of the scheduled fieldwork. If necessary, you can fax your comments to (315) 463-7554.

Very truly yours,

O'BRIEN & GERE ENGINEERS, INC.

Alfred R. Farrell, P.E.
Senior Project Engineer

enclosure

cc: J. Pelton – O'Brien & Gere Engineers, Inc.



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DRAFT

WORK PLAN

Pre-design Investigations

United Plating, Site #4-47-018
Schenectady, New York

December 2000



O'BRIEN & GERE
ENGINEERS, INC.

WORK PLAN

Pre-design Investigations

*United Plating, Site #4-47-018
Schenectady, New York*

DRAFT

James R. Heckathorne, P.E.
Vice President

December 2000



O'BRIEN & GERE
ENGINEERS, INC.

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1. Introduction

This document is the pre-design investigation work plan for the United Plating site of Schenectady, New York. This work plan is based on the requirements of the March 2000 Record of Decision (ROD), as further clarified by the July 14, 2000 letter from the Department to O'Brien & Gere. It is also based on the December 5, 2000 project approach (Work Plan) approved by the New York State Department of Environmental Conservation (NYSDEC) by a letter dated December 14, 2000.

Based on the documents cited above, it is understood that the Department has selected a remedial alternative for the United Plating site under which soils exhibiting elevated (above background) concentrations of heavy metals and volatile organic compounds (VOCs) will be excavated and removed. As necessary, these soils are to be treated or otherwise stabilized to meet Land Disposal Regulations (LDRs) prior to disposal at an off-site location. To facilitate the removal of soil, the remedial alternative selected also identifies that dewatering of the excavation is to occur, and that collected water is to be transported to an off-site treatment or disposal facility. Alternatively, the collected water may be treated on site for disposal to the local publicly-owned treatment works (POTW) sewer near the site.

This work plan details the pre-design investigations necessary to complete the design of the NYSDEC-selected remedy and provides protocols for the fieldwork. The data generated as a result of these pre-design investigations will be used to detail the design basis and to establish the proposed excavation limits and estimate the volume of ground water that may be encountered.

For convenience, the work plan is divided into four sections. This section presents the introduction and project background. Section 2 presents the scope of work and protocols for completing the fieldwork. Section 3 presents the scope of work and protocols for completing the laboratory work. Section 4 describes the contents of the design basis report that will be prepared following the pre-design investigations. A health and safety plan for use during the fieldwork is also provided as Appendix A to the document.

1.1. Background

As indicated in the ROD, soils exhibiting contaminants of concern (COC) above applicable standards, criteria, and guidelines (SCGs) need to be removed from the site. The COCs identified by the ROD in connection with the soil include cadmium, chromium, copper, lead, nickel, zinc, trichloroethylene, tetrachloroethene, and 1,1,1-trichloroethane. The limiting SCG for each of these contaminants, as identified by Table 1 in the ROD, is identified in the table below.

Table 1. Limiting standard, criterion, or guideline value – soils

Cadmium:	10 mg/kg	Zinc (surface soil):	20 mg/kg
Chromium:	50 mg/kg	Zinc (subsurface soil):	112 mg/kg
Copper:	25 mg/kg	1,1,1-trichloroethane:	0.8 mg/kg
Lead:	500 mg/kg	Trichloroethylene:	0.7 mg/kg
Nickel:	13 mg/kg	Tetrachloroethene:	1.4 mg/kg

Source: O'Brien & Gere Engineers, Inc.

The soils at the site were previously characterized as part of the remedial investigation (RI) by collecting samples from direct push borings located across the site. The soil samples were analyzed for total metals and VOCs. As part of the pre-design investigations, the RI data will be compared to the limits presented above to establish the approximate limits of the proposed excavation.

2. Field Work

Eight additional soil borings will be advanced on the site to further characterize the extent of contamination within the former footprint of the razed building. The eight soil borings will be advanced to a depth of up to 20 ft. Figure 1 presents the approximate locations of the proposed borings. The soil borings are proposed to:

- More accurately establish the vertical extent of soils exhibiting COCs above the limiting SCGs listed in Table 1.
- Obtain soil samples for toxicity characteristic leaching procedure (TCLP) analyses to establish if, in fact, land disposal of this soil is prohibited by the LDRs without prior treatment.
- Evaluate the physical characteristics of the subsurface soils including soil type, porosity, water content, and degree of saturation.
- Obtain soil samples for the purpose of performing stabilization bench tests using several potential materials, then performing TCLP analyses to evaluate treatment effectiveness.

Following completion of the soil borings, a licensed land surveyor will be retained to complete a survey of the site.

The protocols for completing the soil borings and the survey are as follows.

2.1. Soil boring and sampling protocols

The soil borings will be completed using 4¼-inch hollow stem auger drilling methods. Continuous split-spoon samples will be collected at 2-ft intervals from the ground surface to the bottom of the boring. The sampling method employed shall be ASTM method D-1586-84 using either a standard 2-ft long, 2-inch outside diameter split barrel sampler with a 140-lb hammer, or a 3-inch diameter sampler with a 300-lb hammer.

Two representative soil samples will be obtained from each 2-ft interval for possible laboratory chemical analysis. These samples will be collected as described in the Field Sampling Plan (FSP) provided as Appendix B. A geologist from O'Brien & Gere will be on-site during the drilling and sampling operations to describe each soil sample collected on a Soil Boring Log Form. A sample of the Soil Boring Log

Form and protocols for completing it are provided as Appendix C. The description will include:

- Soil type
- Color
- Percent recovery
- Relative moisture content
- Odor
- Other miscellaneous observations, such as organic content and cohesiveness.

The supervising geologist will prepare the soil samples, place each sample in a glass container, and label the container with:

- Site name
- Boring number
- Sample interval preserved
- Date
- Time of sample collection.

The soil samples collected will be field screened for VOCs with a photo-ionization detector (PID), and the readings will be recorded in the field log. As soil samples are collected, aluminum foil will be used to cover the sample containers prior to sealing the jar with a screw-on lid. Field screening of the soil samples will consist of allowing the sample container to equilibrate prior to opening the container and inserting the PID probe. Following the equilibration period, the screw-on lid will be removed. The probe of the PID will be inserted through the aluminum foil, and the PID reading will be recorded. The PID results will be included on the soil boring log forms.

Six samples collected from each boring will be selected for laboratory chemical analyses. Specifically, two samples each will be selected from three of the boring depth intervals for each boring. It is proposed that the two samples obtained from the bottom interval will be analyzed, as well as the two samples each obtained from the intervals occurring at 1/3 and 2/3 the total depth of the soil boring. However, if the soil is observed to change character as a result of visual observation or PID screening at a particular depth, the samples collected from that interval may instead be selected.

2.2. Site survey

The survey will include property boundaries and the locations of existing ground water monitoring wells. Also, the survey will include the location of each of the additional soil borings advanced, and the location of RI sample collection points if they are marked. Other features on or adjoining the site such as utilities, pavements, structural features, fences,

or drainage features that may restrict or otherwise be encountered during construction will be recorded and shown as well.

The survey will include topographic lines on the existing grade drawn at 1-ft intervals to establish a baseline for the construction and requirement for post-construction restoration. Also, the elevation of each monitoring well casing pipe will be established from which ground water levels will be measured. For purposes of preparing the survey, a fixed point outside the proposed excavation area will be used to establish an arbitrary datum for vertical control.

3. Laboratory Work

3.1. Baseline analyses

One of the samples selected from each interval will be analyzed in the laboratory for total VOCs and total metals (RCRA listed and copper, zinc, and nickel). The results of these analyses will be compared to the limiting SCGs identified in the table above and to the results of the RI, and will be used to estimate the approximate depth of the excavation required within the footprint of the former facility.

The other sample selected from each interval will be used to prepare a TCLP extract, which then will be analyzed for VOCs (EPA Methods 1311/8240) and RCRA metals including copper, zinc and nickel (EPA Methods 1311/6010). The results of the TCLP extract analyses will be compared to the toxicity characteristic threshold values established by 6 NYCRR 371.3(e) to evaluate if the soil is characteristically hazardous, and to establish the extent to which this may be the case. The results of the TCLP extract analyses will also be compared to the Universal Treatment Standards (UTS) established by 6 NYCRR 376.4(j) to evaluate if the soil would be prohibited from land disposal without prior treatment/stabilization. The applicable limits for each of the COCs are identified in Table 2.

Table 2. Hazardous waste toxicity characteristic and land disposal restriction threshold values.

Contaminant of Concern	6 NYCRR 371.3(e) hazardous waste threshold value (mg/l)	6 NYCRR 376.4(j) universal treatment standard (mg/l)
Cadmium	1.0	0.049
Chromium	5.0	0.86
Copper	None published	None published
Lead	5.0	0.37
Nickel	5.0	5.0
Zinc	None published	5.3
Trichloroethylene	0.5	6.0
Tetrachloroethene	0.7	6.0
trans-1,2-dichloroethene	None published	30.0
Benzene	0.5	10.0
1,1,1-trichloroethane	None published	6.0

Source: O'Brien & Gere Engineers

In addition to the chemical analyses discussed above, a representative undisturbed sample from each of the borings will be submitted for physical characteristic testing including soil type, porosity, bulk density (ASTM D 698), specific gravity (ASTM D 8544), water content (ASTM D 2216-80) and degree of saturation. The results of these tests will be

used to evaluate the construction water generation potential, and to establish a baseline if soil stabilization is required to enable land disposal.

3.2. Soil stabilization bench-scale testing

O'Brien & Gere will perform bench-scale treatability studies on soil samples collected from the site if the results of TCLP analyses indicate that the LDRs would prohibit land disposal without prior treatment. These studies will be performed, if necessary, to identify appropriate agents (no more than five) for soils stabilization and establish an approximate mixing ratio for each agent, or combination of agents, to satisfy the UTS identified by 6 NYCRR 376.4(j).

Specifically, the testing laboratory will evaluate the availability and potential effectiveness of several common stabilization agents. Various combinations of reagents are widely used for waste stabilization, most notably cement and lime. Kiln dust and fly ash mixtures are also used.

In selecting agents, preference will be given to the following common materials that are available:

- Portland cement
- Lime products (e.g. quicklime, hydrated lime, lime kiln dust)
- Cement kiln dust
- Phosphate based stabilizers/admixtures

The initial mix design evaluation will involve testing three to five candidate solidifying agents either alone or in combination. A total of 15 mixtures will be evaluated to identify appropriate application rates that may meet the criteria for non-hazardous classification. A small quantity of soil (approximately 500 grams per batch) will be utilized for the mix design evaluation. At the conclusion of the blending procedure, observations will be noted regarding the workability of the sample, emissions observed (if any), and temperature changes observed. Workability observations include the mixability (tendency to clump) and uniformity (regarding color and texture). Emissions (the release of noxious odors or VOCs) and temperature changes will be evaluated qualitatively based on observations by testing personnel.

Test specimens will be placed in sealed containers and allowed to cure for three days at ambient temperature. A sample of five mixtures, selected based on the economics of the mix proportions, will be submitted for TCLP analyses for VOCs (EPA Methods 1311/8240) and RCRA metals including copper, zinc and nickel (EPA Methods 1311/6010) at the conclusion of the curing period. Samples of the other ten mixtures will be retained for future TCLP analyses if necessary.

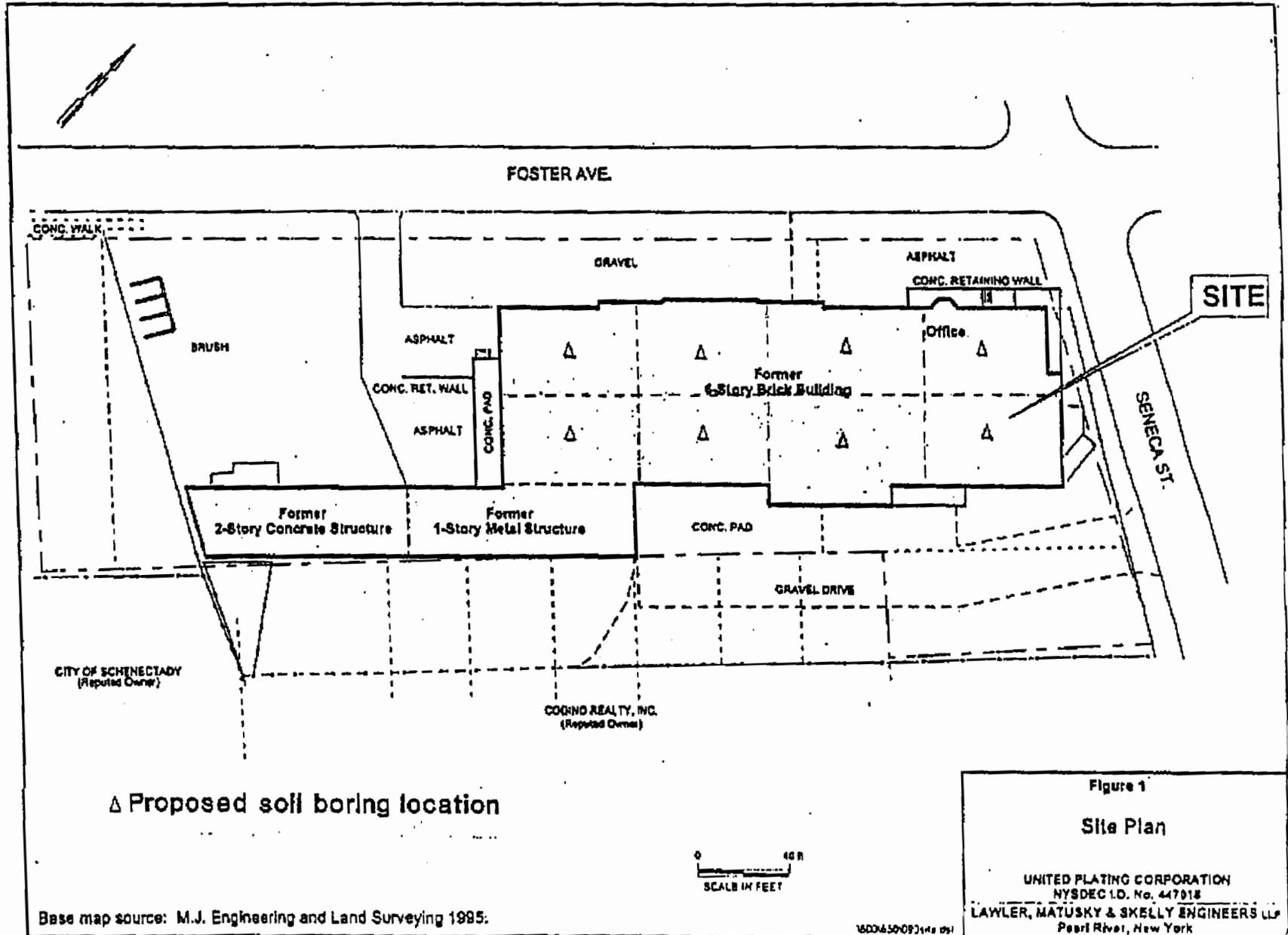
The confirmation testing results will be used to evaluate the leaching potential of the stabilized soil. Also, the TCLP test results will be compared to the test results for the unstabilized soil samples.

4. Design Basis Report

Following the pre-design investigations, a report presenting the locations of the soil borings and results of laboratory analyses will be prepared. The report will include the observations recorded and log sheets for the soil borings, including PID data. Based on the pre-design investigation laboratory results as well as the RI data, the volume and limits of material requiring excavation to satisfy the SCG limits will be estimated. The calculations and assumptions will be presented in the report.

The report will also present the results of the physical characteristic testing including soil type, porosity, bulk density, specific gravity, water content and degree of saturation. Based on these data and the anticipated limits of the excavation, the volume and rate of ground water that may be encountered during the construction will be estimated. The report will also summarize the results of the ground water characterizations completed during the RI. It should be noted, however, that no additional laboratory analyses will be completed as part of the pre-design investigations to further characterize the ground water that may be encountered in the excavation.

Additionally, the report will present the results of the bench-scale stabilization tests, if soil stabilization was required based on the results of the TCLP analyses to enable land disposal. The report will present the identified agents for soils stabilization and identify the approximate mixing ratio for each agent, or combination of agents, that achieved non-hazardous characteristics based on the results of TCLP analyses. It is understood, however, that the Department does not intend to stabilize soil at the site beyond the degree needed for transport.



Health and safety plan

HEALTH AND SAFETY PLAN

**Pre-design Investigations
United Plating Site #4-47-018
Schenectady, New York**

New York State Department of
Environmental Conservation

December 2000

HEALTH AND SAFETY PLAN

Pre-design Investigations
United Plating Site #4-47-018
Schenectady, New York

New York State Department of Environmental Conservation

DRAFT

S. Edward Wilson, CIH

December 2000



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1. Introduction

This Health and Safety Plan (HASP) has been developed to provide both general procedures and specific requirements to be followed by O'Brien & Gere Engineers, Inc. (O'Brien & Gere) personnel while performing pre-design activities at the United Plating Site in Schenectady, New York.

This HASP describes the responsibilities, training requirements, protective equipment, and standard operating procedures to be used by O'Brien & Gere personnel to address potential health and safety hazards while in investigation areas. This plan specifies procedures and equipment to be used by O'Brien & Gere personnel during work activities and emergency response to minimize exposures of O'Brien & Gere personnel to hazardous materials.

1.1 Site location and description

The United Plating Site, #4-47-018 is located at 1776 Foster Avenue in the City of Schenectady, Schenectady County, New York. The property is 1.8 acres in size. The site is bounded by Seneca Street to the north, and Foster Avenue to the west, in a mostly residential area. The Mohawk River is approximately 0.25 miles to the northwest of the site, and the natural topography drains to the Mohawk River. The site has been addressed as two separate operable units. An Operable Unit (OU) represents a portion of the site remedy which for technical or administrative reasons may be addressed separately to eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination.

OU1 consisted of the buildings at the site, including the building contents, contaminated debris, and contaminated interior and exterior surfaces.

The OUI Record of Decision (ROD) dated March 1997, called for cleaning of the building including contents and demolition and disposal of the structures at off-site locations. The remedy was completed in May 1999.

OU2 of the United Plating Site consists of the ground water and soils impacted by releases at the site. Results of the Remedial Investigation indicate the presence of significant levels of heavy metals and volatile

organic compounds (VOCs) in the soils and ground water beneath and adjacent to the former building complex that will require remediation.

The OU2 ROD, dated March 2000, calls for the excavation and disposal off-site of soil exhibiting elevated concentrations of heavy metals and VOCs. To facilitate the removal of soil, the ROD also identifies that dewatering of the excavation is to occur.

To establish the approximate limits of the required excavation and establish the requirements for water encountered during the construction, pre-design investigations including the installation of several soil borings will be completed on site. These field investigations are the focus of this Health and Safety Plan.

1.2. Implementation of Health and Safety Plan

The requirements and guidelines presented in this HASP are based on a review of available information and an evaluation of potential on-site hazards. This HASP incorporates by reference the applicable Occupational Safety and Health Administration (OSHA) requirements in 29 CFR Part 1910 and 29 CFR Part 1926. The protective equipment selection was made according to Subpart I of 29 CFR 1910. O'Brien & Gere personnel are required to read this HASP before beginning work on site. This HASP will be available for inspection and review by O'Brien & Gere employees while work activities are underway.

When conducting the site pre-design investigation activities listed in the Work Plan, O'Brien & Gere personnel will comply with this HASP. On-site O'Brien & Gere personnel will notify the O'Brien & Gere Site Safety and Health Coordinator (SSHC) of matters of health and safety. The SSHC is responsible to the Project Manager for monitoring activities, monitoring compliance with the provisions of this HASP, and for modifying this HASP to the extent necessary if site conditions change.

This HASP is specifically intended for guiding the conduct of O'Brien & Gere activities defined in the Work Plan in the areas of the United Plating Site specified for these work activities. Although this HASP can be made available to interested persons for informational purposes, O'Brien & Gere does not assume responsibility for the interpretations or activities of any persons or entities other than employees of O'Brien & Gere.

1.3. Project organization

All personnel involved in the activities at the United Plating Site implicitly have a part in implementing the HASP. Among them, the

Project Officer, the Project Manager, the Corporate Associate for Safety and Health, the SSHC, and the Site Supervisor have specifically designated responsibilities. Their names and telephone numbers are listed in Table 1-1. Other key O'Brien & Gere project personnel, the project's organization, and other primary contacts for the project are presented in the Work Plan.

Key project personnel and their responsibilities with regard to the sampling activities are discussed below.

Project Officer

Mr. James R. Heckathorne, P.E. is the Project Officer. The Project Officer is responsible for the overall administration and technical execution of the project. The Project Officer is further responsible for the acquisition and delegation of resources necessary for project completion and HASP implementation.

Project Manager

Mr. Alfred R. Farrell, P.E. is the Project Manager. The Project Manager reports to the Project Officer and is directly responsible for the technical progress and financial control of the project.

Associate for Safety and Health

Mr. Saunders E. Wilson, Jr, CIH, CSP, is the Corporate Associate for Safety and Health. Mr. Wilson will be responsible for implementation of this HASP. Procedural changes and modifications to this HASP must be approved by Mr. Wilson.

Site Safety and Health Coordinator

Mr. Jason Pelton, CPG, is the Site Safety and Health Coordinator (SSHC) for this investigation. The SSHC for O'Brien & Gere employees reports to the O'Brien & Gere Project Manager, coordinates his activities with the O'Brien & Gere Associate for Safety and Health and establishes operating standards and coordinates overall project safety and health activities for the site. The SSHC reviews project plans and revisions to plans to determine that safety and health procedures are maintained throughout the investigation. The SSHC audits the effectiveness of the HASP on a continuing basis and suggests changes, if necessary, to the Project Manager.

Table 1-1 *Project personnel.*

Name and Title	Telephone
James R. Heckathorne Project Officer Syracuse, New York	(315) 437-6100
Al Farrell Project Manager Syracuse, New York	(315) 437-6100
Saunders E. Wilson, Jr., C.I.H., C.S.P. Associate for Safety and Health Syracuse, New York	(315) 437-6100 (315) 420-0554
Jason Pelton Site Safety & Health Coordinator Albany, New York	(518) 452-9392
NYSDEC Key Personnel	
James Ludlam, P.E. Project Manager Albany, New York	(518) 457-5637

Specifically, the SSHC is responsible for the conducting the following actions:

- Provide a complete copy of the HASP at the site before the start of activities;
- Familiarize workers with the HASP;
- Conduct on-site health and safety training and briefing sessions;
- Document the availability, use, and maintenance of personal protective and other safety or health equipment;
- Maintain safety awareness among O'Brien & Gere employees on-site and communicating safety and health matters to them;
- Review field activities for performance in a manner consistent with O'Brien & Gere policy and this HASP;
- Monitor health and safety conditions during field activities;
- Coordinate with emergency response personnel and medical support facilities;
- Notify the Project Manager of the need to initiate corrective actions in the event of an emergency, an accident, or identification of a potentially unsafe condition;
- Notify the Project Manager of an emergency, an accident, the presence of a potentially unsafe condition, a health or safety problem encountered, or an exception to this HASP;
- Recommend improvements in safety and health measures to the Project Manager; and,
- Conduct safety and health performance and system audits.

The SSHC has the authority to recommend that the Project Manager take the following actions:

- Suspend field activities or otherwise limit exposures if the health or safety of any O'Brien & Gere employee appears to be endangered;
- Notify O'Brien & Gere personnel to alter work practices that the SSHC deems to not protect them; and,
- Suspend an O'Brien & Gere employee from field activities for violating the requirements of this HASP.

Site Supervisor

The Site Supervisor, Jason Pelton, will be responsible for the implementation of sampling programs. The site supervisor will be responsible for overall site coordination including field sampling collection and chain-of-custody. The Site Supervisor will report directly to the Project Manager or designee.

2. Hazard analysis

General site chemical and environmental hazards are summarized in Section 2.1. Specific health and safety considerations for pre-design field tasks are presented in separate subsections as outlined below:

- site reconnaissance/observation (Section 2.2)
- soil boring (Section 2.3)

In addition to the safety hazards specific to the tasks cited above, hazards associated with the operation of vehicles will be a concern. Of particular concern during the operation of support vehicles is the backing up of trucks. Both the potential health and safety hazards and the hazard and contaminant control procedures for each task of the pre-design are discussed in the sections below.

2.1. General site hazards

2.1.1. Chemical hazards

Chemical hazards associated with site operations are related to inhalation, ingestion, and skin exposure to site constituents of potential concern (COPC's). Site COPC's include volatile organic compounds, metals (copper, zinc, cadmium, chromium, lead and nickel), and cyanide salts.

Airborne concentrations of COPCs during certain site tasks may exceed OSHA action levels. Air monitoring requirements for site tasks are outlined in Section 6.

The potential for unprotected personnel of inhaling constituents during soil boring installation is moderate. The potential for unprotected personnel for dermal contact with soils, sediments or water containing COPCs during drilling and sampling operations is moderate. Proper use of personnel protective equipment is intended to reduce potential exposure to site contaminants. The Material Safety Data Sheets (MSDSs) for COPCs and materials used on site are included in Appendix A.

2.1.2. Potential environmental and physical hazards

Prior to initiating activity, the site conditions will be discussed with all employees. Hazards will be identified and protective measures will be explained.

Physical Hazards involved with field activities are primarily associated with the site environment. The work area presents hazards of slips, trips, and falls from scattered debris and irregular walking surfaces. Weather related hazards include wet, muddy, slick, walking surfaces and unstable soil, sunburn, lightning, rain, snow, ice, and heat and cold related illnesses. There exists a potential for incidents involving personnel struck by or struck against objects resulting in fractures, cuts, punctures, or abrasions. Walking and working surfaces during activities may involve slip, trip, and fall hazards.

Materials handling and manual site preparation may cause blisters, sore muscles, and joint and skeletal injuries; and may present eye, contusion and laceration hazards. A common type of accident that occurs in material handling operations is the "caught between" situation when a load is being handled and a finger or toe gets caught between two objects. Extreme care must be taken when loading and unloading material. Proper lifting technique, must be employed.

Working surfaces that are slippery can increase the likelihood of back injuries, overexertion injuries, and slips and falls. All personnel should frequently inspect working surfaces and keep working surfaces clear of debris and moisture.

2.1.3. Hazard and contaminant control

For each field task, Level D personal protective equipment (PPE) is to be worn initially. Protective equipment including boots with good treads will be worn and personnel will be reminded to remain alert of the area where they are walking to decrease the chance of slipping. Eye protection will be worn to minimize splashing into eyes. The specific requirements for Level D PPE are presented in Section 4.

The primary hazards for contaminant exposure for each task are summarized (Table 2-1) located at the end of Section 2. If odors are observed during field activities, air monitoring with a PID should be conducted to evaluate the concentrations that are present. Action levels for upgrading PPE are presented in Section 6.3. Airborne dusts from the site should be avoided.

Field equipment will be inspected and in proper working condition. Mechanical assistance will be provided for large lifting tasks. In the absence of properly grounded circuitry or when electrical equipment is used around wet conditions, a Ground Fault Circuit Interrupter (GFCI) will be used. Electrical extension cords will be protected or guarded from damage (*i.e.*, cuts from other machinery) and be maintained in good condition.

Measurement equipment that is potentially contaminated will be cleaned to the satisfaction of the Project Manager or SSHC. The field sampling

equipment will be cleaned and decontaminated using the equipment decontamination procedures outlined in the field sampling plan (FSP). The field decontamination wastes will be disposed of on-site next to the soil boring.

2.2. Site reconnaissance/survey

The site reconnaissance task will include establishing exclusion, contamination, reduction, and support zones for field mobilization efforts. During this initial phase, project personnel will walk the site to observe the existence of anticipated hazards, and identify safety and health issues that may have arisen since the writing of this plan. The hazards of this phase of activity are associated with heavy equipment movement, manual materials handling, and manual site preparation.

Surveying, site reconnaissance, and observation activities may involve a potential for exposure to physical and health hazards. Hazards may be associated with the site and the environmental conditions.

2.3. Soil boring field activities

Pre-design field operations include soil boring installation and sampling for subsurface soil. The physical hazards of this operation are primarily associated with operation of the drilling rig and contact with well or soil boring contents.

2.3.1. Potential health hazards and contaminants

Hazards generally associated with soil boring operations include noise levels exceeding the OSHA PEL of 90 dBA that are both a hazard and a hindrance to communication, carbon monoxide from the drill rig, and overhead electrical and telephone wires which can be hazardous when the drill rig boom is in the upright position. Moving parts on the drill rig may catch clothing. Free or falling parts from the cat head may cause head injury. Moving the drill rig over uneven terrain may cause the vehicle to roll over or get stuck in a rut or mud. High pressure hydraulic lines and air lines used on drill rigs are hazardous when they are in disrepair or incorrectly assembled. There may be underground utilities in the area where drilling is being performed.

During the retrieval of augers, the possibility exists for splashing of exposed subsurface materials onto the workers and release of dust and volatile materials onto workers' bodies and into the workers' breathing zones.

Other hazards generally encountered during subsurface soil sampling include exposure to vapors and contact with hazardous materials.

2.3.2. Hazard and contaminant control

General PPE requirements presented in Table 2.1 apply to this task. Personnel must wear hard hats and ear muffs and/or ear plugs when working near operating heavy machinery. Coveralls will be worn during drilling and when there is a need to handle or work with potentially impacted soil or liquid. Prior to approaching a drill rig, loose clothing will be secured and the boom position will be checked.

O'Brien & Gere personnel will remain upwind from the vehicle exhausts unless required by sampling work. During drilling, air will be sampled for volatile organic vapors using a PID at approximately five-minute intervals. Subsequent monitoring and respirator wear will be in accordance with Chapter 6 of this HASP.

The drilling subcontractor will be required to inspect chains, lines, cables, and high-pressure lines daily for weak spots, frays, and other signs of wear. The drilling subcontractor will be required to make repairs as necessary. To avoid contact with overhead lines, the drilling subcontractor will be required to lower the drill rig boom prior to moving the rig. The drilling subcontractor will be required to verify the location of underground utilities with both the facility and the local power and utility companies prior to drilling. Overhead and underground utilities will be considered "live" until verified otherwise.

Back strain can be prevented by employing proper lifting. Heavy equipment will only be lifted with the legs, preferably using two or three personnel.

Equipment that is potentially contaminated will be cleaned to the satisfaction of the project manager or SSHO. The field sampling equipment will be cleaned and decontaminated using the equipment decontamination procedures outlined in the FSP. The field decontamination wastes will be collected and disposed of properly according to the FSP.

Table 2-1. Personal protection requirements for the pre-design investigations

<i>Task</i>	<i>Description of primary health concerns</i>	<i>PPE level</i>	<i>Monitoring</i>	<i>Action level</i>
Site reconnaissance	Evaluate site vapor levels to screen for exposed wastes and verify appropriate levels of protection for other tasks.	Level (Section 4)	Organic vapor monitoring (Section 6.1)	See section 6.3
Installation of soil borings	Inhalation due to volatilization or dust, absorption by skin contact. Past disposal practices have resulted in concentration of site constituents in subsurface materials.	Level D including hard hat, hearing protection (Section 4)	Organic vapor monitoring (Section 6.1)	See section 6.3

Notes:

PID = photoionization detector

Section referred to in parentheses () is found in the HASP.

3. Personnel training

3.1. Site workers

O'Brien & Gere employees performing the activities listed in the Work Plan must have completed a training course of at least 40 hours meeting the requirements of 29 CFR 1910.120(e) for safety and health at hazardous waste operations. If the course was completed more than 12 months before the date of site work, completion of an approved, 8 hour, refresher course on health and safety at hazardous waste operations is required.

3.2. Management and supervisors

In addition to the requirements described in Section 3.1 for O'Brien & Gere site workers, O'Brien & Gere field supervisors performing on-site operations must have completed an off-site training course of at least 8-hr meeting the requirements of 29 CFR 1910.120(e) on supervisor responsibilities for safety and health at hazardous waste operations.

3.3. Emergency response personnel

O'Brien & Gere employees who respond to emergency situations involving health and safety hazards must be trained in how to respond to such emergencies in accordance with the provisions of 29 CFR 1910.120(l). Skills such as cardiopulmonary resuscitation (CPR), mouth-to-mouth rescue breathing, and basic first aid skills may be necessary. Off site personnel who respond to emergencies on site will be briefed on potential site hazards by the SSHC before being permitted to enter the buffer and exclusion zones.

3.4. Site-specific training

Site-specific training will be provided to each O'Brien & Gere employee and reviewed before implementing field assignments. O'Brien & Gere personnel will be briefed daily by the Site Supervisor or by the SSHC as

to the potential hazards that may be encountered during that day. Topics will include:

- Availability of this HASP;
- General site hazards and specific hazards in the work areas;
- Selection, use, testing, and care of the body, eye, hand, foot and respiratory protective equipment being worn and the limitations of each;
- Decontamination procedures for O'Brien & Gere personnel, their personal protective equipment, and other equipment used on-site;
- Emergency response procedures and requirements;
- NYSDEC general safety rules,
- Emergency notification procedures and evacuation routes to be followed; and,
- Procedures for obtaining emergency assistance and medical attention.

3.5. Training certification

A record of employee training completion will be maintained by the SSHC for each O'Brien & Gere employee who is trained. This record will include the dates of the completion of worker training, supervisor training, refresher training, emergency response training, and site-specific training for on-site O'Brien & Gere employees.

4. Personnel protection

The basic level of personal protective equipment (PPE) to be used during activities at the United Plating Site is OSHA Level D. PPE may be upgraded based on air monitoring results or at the discretion of the Project Manager and based on the SSHC's recommendations. A downgrade of PPE must be approved by the SSHC and the Project Manager.

If the SSHC determines that field measurements or observations indicate that a potential exposure is greater than the protection afforded by the equipment or procedures specified in this or other sections of this HASP, the work will be stopped. O'Brien & Gere personnel will be removed from the site until the exposure has been reduced or the level of protection has been increased.

O'Brien & Gere respirator users have been trained, medically approved and fit tested to use respiratory protection. Respirators issued are approved for protection against dust and organic vapors by the National Institute for Occupational Safety and Health (NIOSH). Respirators are issued for the exclusive use of one worker and will be cleaned and disinfected after each use by the worker. Respirator users must check the fit of the respirator before each day's use to see that it seals properly. The respirator must seal against the face so that the wearer receives air only through the air purifying cartridges attached to the respirator. No facial hair that interferes with the effectiveness of a respirator will be permitted on personnel required to wear respiratory PPE. Cartridges and filters for air-purifying respirators in use will be changed at the end of each workday that an air-purifying respirator is worn, unless the SSHC determines that a change is not necessary. The user will inspect the integrity of air-purifying respirators daily and record the inspection per the O'Brien & Gere QAM.

4.1. Protective equipment description

The level of personal protective equipment is categorized as Level A, B, C, or D, based upon the degree of protection required. For each level, hard hats will be required if dangers related to overhead objects may be present. For drilling activities, hard hats will be worn at all times. For other tasks, hard hats will be worn, as necessary. The following is a brief summary of the two levels that may be used on this site.

Level C - The concentration(s) and type(s) of airborne substance(s) is known and the criteria for using air purifying respirators are met. The following constitute Level C equipment:

- NIOSH approved full-face air purifying respirator with organic vapor/ acid gases cartridges and P100 filters;
- Chemical-resistant clothing (polyethylene coated overalls, chemical-splash suit, disposable chemical-resistant overalls) with ankles and cuffs taped closed;
- Gloves, outer, nitrile, chemical-resistant;
- Gloves, inner, nitrile, chemical-resistant;
- Shoes, with steel toe and shank meeting ANSI requirements;
- Boots, outer neoprene or Chemical resistant (latex or neoprene) boot covers;
- Hearing protection, if necessary
- Hard hat, if necessary; and,
- Face shield when not wearing a full face respirator.

Modified Level D - A work uniform providing additional skin protection when respiratory protection is not necessary. The following constitute Modified Level D equipment:

- Chemical-resistant clothing (polyethylene coated overalls, chemical-splash suit, disposable chemical-resistant overalls) with ankles and cuffs taped closed;
- Gloves, outer, nitrile, chemical-resistant;
- Gloves, inner, nitrile, chemical-resistant;
- Shoes, with steel toe and shank meeting ANSI requirements;
- Boots, outer neoprene or chemical resistant (latex or neoprene) boot covers;
- Hearing protection, if necessary
- Hard hat, if necessary;
- Escape mask (optional); and,
- Face shield when not wearing other eye protection.
- Respirator.

Level D - A work uniform affording minimal protection, used for nuisance contamination only. The following constitute Level D equipment:

- Coveralls or other appropriate work clothing;
- Shoes, with steel toe and shank meeting ANSI requirements;
- Optional chemical resistant boot covers;
- Safety glasses or chemical splash goggles;
- Gloves, nitrile if handling wet materials;
- Hearing protection, if necessary
- Hard hat, if necessary;
- Escape mask (optional); and,
- Face shield when not wearing other eye protection.

4.2. Protective equipment failure

If an individual experiences a failure or other alteration of PPE that may affect its protective ability, that person is to leave the work area immediately. The Project Manager or the SSHC must be notified and, after reviewing the situation, is to determine the effect of the failure on the continuation of on-going operations. If the Project Manager or the SSHC determine that the failure affects the safety of workers, the work site, or the surrounding environment, workers are to be evacuated until corrective actions have been taken. The SSHC will not allow re-entry until the equipment has been repaired or replaced and the cause of the failure has been identified.

5. Medical monitoring

5.1. Medical surveillance program

O'Brien & Gere has implemented a medical monitoring program in accordance with 29 CFR 1910.120. The O'Brien & Gere program is designed to monitor and reduce health risks to employees potentially exposed to hazardous materials and to provide baseline medical data for each employee involved in work activities. It is also designed to determine the employee's ability to wear personal protective equipment such as chemical resistant clothing and respirators.

Medical examinations are administered on a post-employment and annual basis and as warranted by symptoms of exposure or specialized activities. The examining physician is required to make a report to O'Brien & Gere of any medical condition that would increase the employee's risk when wearing a respirator or other PPE. O'Brien & Gere maintains site personnel medical records as required by 29 CFR 1910.120 and by 29 CFR 1910.1020, as applicable.

O'Brien & Gere employees performing the activities listed in the Work Plan of this document have or will receive medical tests as regulated by 29 CFR 1910.120. Where medical requirements of 29 CFR 1910.120 overlap those of 29 CFR 1910.134, the more stringent of the two will be enforced.

5.2. Respirator clearance

Employees who wear or may wear respiratory protection have been provided respirators as required by 29 CFR 1910.134. This standard requires that an individual's ability to wear respiratory protection be medically certified before performing designated duties.

6. Air monitoring

Unidentified organic vapors may be present in the investigation areas at the United Plating Site. Real time monitoring of these substances will be conducted on-site by, or under the supervision of, the SSHC. The SSHC will evaluate whether the personal protective measures employed during field activities are appropriate and will modify the protective measures accordingly. Field personnel will record readings in a notebook at the site. The SSHC will be responsible to maintain monitoring instruments throughout the investigation.

Personal monitoring must be conducted in the breathing zone and, if workers are wearing respiratory protective equipment, outside the face piece. However, this monitoring strategy may change if the operation or tasks change in the work areas or if exposures potentially increase as dictated in the HASP.

6.1. Field instrumentation and sampling

Field health and safety air sampling for the pre-design investigations consist of organic vapor monitoring using a portable PID equipped with a 10.2 electron volt detector to determine the presence and concentration of organic vapors before sampling and during soil boring.

Samples will be taken before starting sampling and, if the action levels are exceeded, continuously in the breathing zone of the worker collecting the samples and recorded at approximately 5-minute intervals. The PID will be checked for positive and accurate response to a predetermined concentration of isobutylene in accordance with the manufacturer's instructions before use each sampling day.

Personnel monitoring samples will be collected in the breathing zone and, if workers are wearing respiratory protective equipment, outside the face piece. The sampling strategies may change if work tasks or operations change. Monitoring instruments will be checked for appropriate response, in accordance with the manufacturer's instructions, before use each sampling day.

Hazard Monitored: Many organic and some inorganic gases and vapors.

Application: Detects the presence and total concentration of many organic and some inorganic gases and vapors.

Detection Method: Ionizes molecules using UV radiation, produces a current that is proportional to the number of ions present.

General Care and Maintenance: Recharge daily or replace the battery. Regularly clean the lamp window. Regularly clean and maintain the instrument and its accessories. Turn the function switch to "stand-by" and allow the instrument to "warm up" for 5 min. Calibrate once a day using an isobutylene gas standard according to the manufacturer's instructions. Repeat the procedure to validate calibration.

Typical Operating Time: 10 hours, or 5 hours with strip chart recorder.

6.2. Quality control – field health and safety sampling

The SSHC, or someone under the direct supervision of the SSHC, will collect health and safety samples. Bound log books and appropriate data sheets will be used to document the collection of health and safety samples and data so that an individual data set can be traced to its point of origin, the sampler, and the sampling equipment used. Sampling will be performed according to the manufacturer's instructions.

6.3. Action levels

Action levels are used to determine when activities should stop, to determine when site evacuation is necessary, to select emergency response levels, and to change PPE levels.

Organic vapors may be released during soil boring installation and soil sampling. A photoionization detector (PID) will be used to determine the presence of organic vapors according to the table on the following page.

PID monitoring

The breathing zone will be monitored continuously when VOC levels in the sampling zone exceeds 10 ppm. Actions, such as keeping the sampling upwind of the vehicle motor and fuel areas will be implemented to reduce potential interference due to vapors that may be associated with motor operation.

PPE will upgraded to Level C which includes air purifying respirators and chemical resistant clothing (Section 4) when the VOC concentration in the respective breathing zone exceeds 5 ppm as indicated on the PID. If the measured VOC concentration is greater than or equal to 50 ppm, the workers will leave that work area. Whenever air purifying respirators are being worn, the organic vapor level will be measured upwind and downwind of the site at approximately 30-minute intervals. If the downwind concentration exceeds the upwind concentration by more than 10 ppm, work on the site will stop until the downwind concentration is less than 10 ppm greater than the upwind concentration.

Table 6-1 - Vapor monitoring requirements in brief

<i>Total VOC Concentration (ppm)</i>	<i>Method</i>	<i>Monitoring zone</i>	<i>Monitoring requirements</i>	<i>PPE</i>
<10	PID	work zone	If odors are observed, monitor upwind and downwind of work area at 30-minute intervals.	Level D
>5 to 10	PID	work zone	Monitor upwind and downwind of work area at 30-minute intervals.	Level C
10-50	PID	work zone	Monitor upwind and downwind of work area continuously.	Level C. If downwind exceeds upwind by more than 10 ppm vacate area.
>50	PID	work zone	Vacate area	Vacate area.

7. Site control

7.1. Site security

Site security will be monitored and controlled during completion of the soil borings by the Site Supervisor. His duties will include limiting access to the work area to authorized personnel, overseeing project equipment and materials, and overseeing work activities. The procedures specified below will be followed to control access to the work site to prevent persons who may be unaware of site conditions from exposure to hazards. Work area control procedures may be modified as required by site conditions.

7.2. Site control

Work zones will be required during site activities identified in this HASP. The following two categories of work zones will be established at each sampling point: an exclusion zone and a buffer zone. The remainder of the site will be the support zone.

7.2.1. Exclusion zone

The exclusion zone is where sampling activities are conducted. The SSHC will identify this zone. It must be at least 30 ft in diameter and centered on the work activities. This zone will be designated with red flags attached to portable stakes or cones installed before beginning the field work. The zone may be enlarged to contain the necessary ancillary equipment and personnel for the work to be done.

7.2.2. Buffer zone

The buffer zone contains personnel and equipment decontamination stations and staging areas for samples. The buffer zone will be located upwind of the work activities. It will only be large enough to contain equipment and personnel necessary to keep potentially contaminated media and materials in the immediate work area. This area will be designated with yellow flags attached to portable stakes or cones.

7.2.3. Support zone

The remainder of the area is defined as the support zone. The support zone contains support facilities, extra equipment, transport vehicles, and additional personnel and equipment necessary to manage and perform work activities.

7.3. Site access procedures

Access during field activities will be limited to those personnel required. Such personnel are anticipated to include, but will not necessarily be limited to, O'Brien & Gere employees or subcontractors and those representatives as designated by the NYSDEC or local agencies. Site access will be monitored by the SSHC, who will maintain a log-in sheet. The log will include O'Brien & Gere and other personnel on the site, their arrival and departure times and their destination on the site.

7.4. Site communications

A cellular telephone will be used during activities to facilitate communications for emergency response and other purposes and to serve as the primary off-site communication network.

7.5. Confined space entry

No entry of permit required confined spaces is expected while O'Brien & Gere personnel perform the pre-design investigation tasks. A confined space is defined as a space that has limited or restricted means for entry (for example tanks, vessels, silos, storage bins, hoppers, vaults, and pits) and is not designed for continuous employee occupancy.

8. Decontamination

8.1. Emergency decontamination procedures

Although no contact with chemicals that present a hazard is anticipated for the field program, this section has been included in the event of an emergency. The extent of emergency decontamination depends on the severity of the injury or illness and the nature of the contamination. Minimum decontamination will consist of detergent washing, rinsing and removal of contaminated outer clothing and equipment. If time does not permit the completion of all of these actions, it is acceptable to remove the contaminated clothing without washing it. If the situation is such that the contaminated clothing cannot be removed, the person should be given required first aid treatment, and then wrapped in plastic or a blanket prior to transport to medical care. If heat stress is a factor in the victim's illness/injury, outer clothing will be removed from the victim immediately

8.2. Monitoring equipment decontamination procedures

Sampling equipment used for health monitoring purposes will be cleaned of visible contamination and debris before initial use on site, between uses, and after final use. Monitoring equipment that contacts contaminated media will be decontaminated after each use by a low phosphate detergent brushing followed by a clean water rinse. After decontamination, monitoring equipment will be stored separately from personal protective equipment. Decontaminated or clean equipment not in use will be covered with plastic and stored in a designated storage area in the support zone.

8.3. Decontamination supplies

The following supplies will be available on site for the decontamination of personnel, if necessary, and equipment:

- Plastic drop cloths;
- Plastic bags to collect non-reusable protective clothing;

- Plastic wash tubs;
- Soft bristled long-handle brushes;
- Hand spray units for decontamination;
- Soap, water, alcohol wipes, and towels to wash hands, faces, and respirators; and,

8.4. Disposition of washings

Cuttings are to be returned to the boring and field decontamination washings are to be discharged to the ground surface at the boring.

8.5. Refuse disposal

Site refuse will be contained in appropriate areas or facilities. Trash from the project will be properly disposed.

9. Emergency response

9.1. Notification of site emergencies

In an emergency, site personnel will signal distress either by yelling or with three blasts from a horn (vehicle horn, air horn and so forth). The SSHC, Site Supervisor, or the Project Manager will immediately be notified of the nature and extent of the emergency.

Table 9-1, located on the following page, contains emergency telephone numbers. This table will be kept with the portable telephone and updated as needed by the SSHC. The portable telephone will be used to notify off-site personnel of emergencies. The operating condition of this telephone will be determined daily before initiation of activities.

The nearest hospital is Ellis Hospital located at 1101 Nott Street in Schenectady. A map showing the location and the route to is attached as Figure 9-1. Directions to Ellis Hospital from the site are provided in the table below:

Directions to Ellis Hospital

<i>Directions</i>	<i>Approx. Distance</i>
Go Southwest on Foster Avenue towards Nott Street	0.4
Turn left on to Nott Street and head east toward the intersection with Rosa Road	0.5

Should someone be transported to a hospital or doctor, a copy of this HASP should accompany them.

Table 9-1 *Emergency response contact list – United Plating Site.*

Agency	Contact/Function	Phone Number
Police Dept.	Report Incidents	911
NYS Police Dept.	Report Incidents	911 or 1-800-342-4357
Schenectady County Sheriff's Dept.	Report Incidents	911
Schenectady Fire Dept.	Report Fire	911
Ambulance	Ambulance	518-374-4401
Ellis Hospital	Emergency Room Information	518-243-4121
USEPA Emergency Response Team		212-340-6656
CHEMTREC	Chemical Emergencies	1-800-424-9300
NYSDEC Albany, NY	Emergency	1-800-342-9296
Verizon Telephone Company	Telephone Repairs	1-890-7711
Emergency NYSDEC Project Contact	James Ludlam	518-457-5637
Underground Utility		1-800-457-7362
Oil Spill		1-800-457-7362
Poison Control Center		1-800-336-6997
Chemical Emergency Advice		1-800-424-9300
USEPA		215-597-3923
National Spill Response Center		1-800-424-8802

9.2. Responsibilities

The SSHC is responsible for responding to, or coordinating the response of off-site personnel to, emergencies. In the event of an emergency, the SSHC will direct notification and response, and will assist the Site Supervisor in arranging follow-up actions. Upon notification of an exposure incident, the SSHC will call the hospital, fire, and police emergency response personnel for medical diagnosis, recommended treatment if necessary, and transportation to the hospital.

Before the start of pre-design investigation activities at the United Plating Site, the SSHC will:

1. Notify emergency contacts, and health care facilities of the potentially hazardous activities on-site as a result of the activities listed in the Work Plan.
2. Confirm that the following safety equipment is available: eyewash and first aid supplies, air horn, and a fire extinguisher
3. Have a working knowledge of the O'Brien & Gere safety equipment.
4. Confirm that a map detailing the most direct route to Hospital (Figure 1) is prominently posted with the emergency telephone numbers (Table 9-1).
5. Confirm that employees who will respond to emergencies have been appropriately trained.

Before work may resume following an emergency, used emergency equipment must be recharged, refilled, or replaced and government agencies must be notified as required.

The Project Manager, assisted by the SSHC/Site Supervisor, must investigate the incident as soon as possible. The Project Manager will determine whether and to what extent exposure actually occurred, the cause of exposure, and the means to prevent similar incidents. The resulting report must be signed and dated by the Project Manager and the SSHC/Site Supervisor.

9.3. Accidents and injuries

In the event of an accident or injury, workers will immediately implement emergency isolation measures to assist those who have been injured or exposed and to protect others from hazards. Upon notification of an exposure incident, the SSHC will contact emergency response personnel who can provide medical diagnosis and treatment. If necessary, immediate medical care will be provided by personnel trained in first aid procedures. Other on-site medical or first aid response to an injury or illness will be provided only by personnel competent in such matters.

9.4. Safe refuge

Before commencing site activities the SSHC will identify the location on or next to the Site that will serve as the place of refuge for O'Brien & Gere workers in case of an emergency evacuation. During an emergency evacuation, personnel in the exclusion zone should evacuate the work

area both for their own safety and to prevent hampering rescue efforts. Following an evacuation, the SSHC will account for site personnel.

9.5. Fire fighting procedures

A fire extinguisher meeting the requirements of 29 CFR Part 1910 Subpart L, as a minimum, will be available in the support zone during on-site activities. This is intended to control small fires. When a fire cannot be controlled with the extinguisher, the exclusion zone will be evacuated, and the fire department will be contacted immediately. The SSHC/Site Supervisor will determine when to contact the fire department.

9.6. Emergency equipment

The following equipment, selected based on potential site hazards, will be maintained in the support zone for safety and emergency response purposes:

- Fire extinguisher
- First aid kit
- Eye wash bottles

9.7. Emergency site communications

Hand and verbal signals will be used at the site. Portable telephones will be available during site activities for emergency response communications.

9.8. Security and control

Work zone security and control during emergencies, accidents, and incidents will be monitored by the SSHC/Site Supervisor. The duties of the SSHC/Site Supervisor include limiting access to the work zones to authorized personnel and overseeing emergency response activities.

10. Special precautions and procedures

The activities listed in the Work Plan may expose personnel to both chemical and physical hazards. The hazards associated with specific site activities are discussed in Section 2. The potential for exposure to hazardous situations will be significantly reduced through the use of air monitoring, PPE, hazard awareness training, and administrative and engineering controls. Other general hazards that may be present on a hazardous waste work site are discussed below.

10.1. Cold injury

The project requires work during winter months such that cold injury could pose a threat to the health and safety of site personnel. Factors that influence the development of a cold related injury include ambient temperatures, wind velocity and wet clothing and skin. The SSHC will implement work and rest regimens so that O'Brien & Gere Engineers personnel do not suffer adverse effects from cold. These regimens will be developed by the SSHC following the guidelines in the 1997 edition of the ACGIH *Threshold Limit Values for Physical Agents in the Work Environment*. Special clothing and an appropriate diet and fluid intake will be recommended to O'Brien & Gere Engineers personnel involved in the activities specified in Section 2 to further reduce this hazard.

10.2. Heavy machinery/equipment

O'Brien & Gere employees performing site activities may use or work near operating heavy equipment and machinery. Respiratory protection and protective eyewear may be worn during portions of work activities. Since this protective equipment reduces peripheral vision of the wearer, O'Brien & Gere Engineers personnel should exercise extreme caution in the vicinity of operating equipment and machinery to avoid physical injury to themselves or others.

10.3. Additional safety practices

The following are important safety precautions that will be enforced during the completion of the activities listed in Section 2:

1. Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases that probability of hand-to-mouth transfer and ingestion of material is prohibited in the exclusion zone and buffer zones.
2. Hands and face must be thoroughly washed when leaving the support zone and before eating or drinking.
3. Contact with potentially contaminated surfaces should be avoided whenever possible. Workers should minimize walking through puddles, mud, or other discolored surfaces; kneeling on ground; and leaning, sitting, or placing equipment on drums, containers, vehicles, or the ground.
4. Medicine and alcohol can mask the effects of exposure to certain compounds. Consumption of prescribed drugs must be at the direction of a physician.
5. O'Brien & Gere Engineers personnel and equipment in the work areas will be minimized consistent with effective site operations.
6. Unsafe or inoperable equipment left unattended will be identified by a "DANGER, DO NOT OPERATE" tag.
7. Activities in the exclusion zone will be conducted using the "Buddy System." The Buddy is another worker fully dressed in the appropriate personal protective equipment who can perform the following activities:
 - Provide partner with assistance
 - Observe partner for sign of chemical or heat exposure
 - Periodically check the integrity of partner's PPE
 - Notify others if emergency help is needed.
8. The HASP will be reviewed frequently for its applicability to the current and upcoming operations and activities.

10.4. Daily log contents

The Project Manager and the SSHC will establish a system appropriate to the United Plating Site investigation areas that will record, at a minimum, the following information:

1. The O'Brien & Gere Engineers personnel and other personnel conducting the site activities, their arrival and departure times, and their destination at the investigation areas

2. Incidents and unusual activities that occur on the site such as, but not limited to, accidents, breaches of security, injuries, equipment failures and weather related problems
3. Changes to the Work Plan and the HASP
4. Daily Information such as:
 - Work accomplished and the current site status
 - Air monitoring results

CONNECTICUT COUNTY REPORT

505 ROAD

12

12

25

EXIT 4

WATER POLLUTION CONTROL

SEASIDE PARK

SUELLEN GARDENS

JEWISH COMMUNITY CENTER

U.S. ARMY RESERVE CTR

ELLIS HOSPITAL



Material safety data sheets

MATERIAL SAFETY DATA SHEET OHS22900

OCCUPATIONAL HEALTH SERVICES, INC. FOR EMERGENCY SOURCE INFORMATION
11 WEST 42ND STREET, 12TH FLOOR CONTACT: 1-615-366-2000
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR 1-212-769-3535

SUBSTANCE IDENTIFICATION

CAS-NUMBER 127-18-4
RTEC-NUMBER KX3850000

SUBSTANCE: TETRACHLOROETHYLENE

TRADE NAMES/SYNONYMS:

ETHENE, TETRACHLORO-: ETHYLENE, TETRACHLORO-: ANKILOSTIN: DIDAKEN:
NEMA: ETHYLENE TETRACHLORIDE: PERCHLOROETHYLENE: PERC:
PERCHLOROETHENE: PERCLENE: 1,1,2,2-TETRACHLOROETHYLENE: TETRACAP:
TETRACHLOROETHENE: PCE: RCRA U210: NCI-C04580: ENT 1,860: STCC
4940355: UN 1897: C2CL4: OHS22900

CHEMICAL FAMILY:

HALOGEN COMPOUND, ALIPHATIC

MOLECULAR FORMULA: CL2-C-C-CL2 MOLECULAR WEIGHT: 165.83

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

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

COMPONENTS AND CONTAMINANTS

COMPONENT: TETRACHLOROETHYLENE CAS# 127-18-4 PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMIT:

TETRACHLOROETHYLENE (PERCHLOROETHYLENE):
25 PPM (170 MG/M3) OSHA TWA
50 PPM (335 MG/M3) ACGIH TWA; 200 PPM (1340 MG/M3) ACGIH STEL
LOWEST FEASIBLE LIMIT NIOSH RECOMMENDED EXPOSURE CRITERIA

100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING
SUBJECT TO CALIFORNIA PROPOSITION 65 CANCER AND/OR REPRODUCTIVE TOXICITY
WARNING AND RELEASE REQUIREMENTS- (APRIL 1, 1988)

PHYSICAL DATA

DESCRIPTION: CLEAR, COLORLESS, VOLATILE LIQUID WITH A MILD ETHER-LIKE ODOR.

BOILING POINT: 250 F (121 C) MELTING POINT: -2 F (-19 C)

SPECIFIC GRAVITY: 1.6227 EVAPORATION RATE: (BUTYL ACETATE=1)
2.8

VOLATILITY: 100% SOLUBILITY IN WATER: 0.015%

VAPOR DENSITY: 5.83

VAPOR PRESSURE: 14 MMHG @ 20 C

ODOR-THRESHOLD: 50 PPM

OTHER SOLVENTS (SOLVENT - SOLUBILITY):
SOLUBLE IN ALCOHOL, ETHER, BENZENE, CHLOROFORM, OILS,
HEXANE.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD
NEGLEGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA:

DRY CHEMICAL OR CARBON DIOXIDE
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL
WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. ISOLATE FOR 1/2 MILE IN
ALL DIRECTIONS IF TANK, RAIL CAR OR TANK TRUCK IS INVOLVED IN FIRE (1990
EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 74).

EXTINGUISH USING AGENT(S) SUITABLE FOR TYPE OF SURROUNDING FIRE. AVOID
CONTAMINATION OF WATER SOURCES AND SEWERS. BUILD DIKES TO CONTAIN FLOW. AVOID
BREATHING VAPORS; KEEP UPWIND.

TRANSPORTATION

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
ORM-A

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
NONE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.605
EXCEPTIONS: 49 CFR 173.505

TOXICITY

TETRACHLOROETHYLENE (PERCHLOROETHYLENE):
IRRITATION DATA: 810 MG/24 HOURS SKIN-RABBIT SEVERE; 500 MG/24 HOURS
SKIN-RABBIT MILD; 162 MG EYE-RABBIT MILD; 500 MG/24 HOURS EYE-RABBIT MILD.
TOXICITY DATA: 96 PPM/7 HOURS INHALATION-HUMAN TCLO; 280 PPM/2 HOURS
INHALATION-HUMAN TCLO; 600 PPM/10 MINUTES INHALATION-HUMAN TCLO; 34,200 MG/M3/8

HOURLY INHALATION-RAT LC50; 5200 PPM/4 HOURS INHALATION-MOUSE LC50;
>10,000 MG/KG SKIN-RABBIT LD50 (DOW MSDS); 2629 MG/KG ORAL-RAT LD50;
8100 MG/KG ORAL-MOUSE LD50; 5000 MG/KG ORAL-RABBIT LDLO; 4000 MG/KG ORAL-CAT
LDLO; 4000 MG/KG ORAL-DOG LDLO; 2200 MG/KG SUBCUTANEOUS-RABBIT LDLO;
35 MG/KG INTRAVENOUS-DOG LDLO; 4578 MG/KG INTRAPERITONEAL-RAT LD50;
2100 MG/KG INTRAPERITONEAL-DOG LD50; MUTAGENIC DATA (RTECS); REPRODUCTIVE
EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).
CARCINOGEN STATUS: ANTICIPATED HUMAN CARCINOGEN (NTP); HUMAN INADEQUATE
EVIDENCE, ANIMAL SUFFICIENT EVIDENCE (IARC GROUP-2B). IN MICE, ORAL
ADMINISTRATION AND INHALATION PRODUCED HEPATOCELLULAR CARCINOMAS IN BOTH
SEXES. EXPOSURE OF RATS BY INHALATION PRODUCED AN INCREASED INCIDENCE OF
MONONUCLEAR CELL LEUKEMIA IN BOTH SEXES.
LOCAL EFFECTS: IRRITANT- INHALATION, SKIN, EYES.
ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INHALATION, INGESTION; SLIGHTLY
TOXIC BY SKIN ABSORPTION.
TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT. POISONING MAY ALSO AFFECT
THE LIVER AND KIDNEYS.
AT INCREASED RISK FROM EXPOSURE: PERSONS WITH PRE-EXISTING SKIN, EYE, LIVER,
KIDNEY, CARDIOVASCULAR OR NEUROLOGICAL DISORDERS.
ADDITIONAL DATA: ALCOHOL MAY ENHANCE THE TOXIC EFFECTS. STIMULANTS SUCH AS
EPINEPHRINE MAY INDUCE VENTRICULAR-FIBRILLATION. MAY BE EXCRETED IN BREAST
MILK. ONE STUDY SHOWS AN INCREASED RISK OF LEUKEMIA FOR CHILDREN WHOSE
FATHERS HAD OCCUPATIONAL EXPOSURE TO CHLORINATED SOLVENTS AFTER THE BIRTH OF
THE CHILD.

HEALTH EFFECTS AND FIRST AID

INHALATION: TETRACHLOROETHYLENE (PERCHLOROETHYLENE): IRRITANT/NARCOTIC/CARCINOGEN.

ACUTE EXPOSURE- VAPOR CONCENTRATIONS FROM 100-400 PPM MAY CAUSE IRRITATION
OF THE NOSE, THROAT AND MUCOUS MEMBRANES, FLUSHED FACE AND NECK, SINUS
CONGESTION, NASAL DISCHARGE, HEADACHE, DIZZINESS, LIGHTHEADEDNESS,
DROWSINESS, THICK TONGUE, TIGHTNESS AROUND THE MOUTH, SLURRED SPEECH,
CONFUSION, INCOORDINATION, NAUSEA, AND REVERSIBLE LIVER AND KIDNEY
CHANGES; 400-600 PPM MAY CAUSE SALIVATION, METALLIC TASTE, PERSPIRATION OF
THE HANDS, AND LOSS OF INHIBITIONS; 1000-2000 PPM MAY CAUSE MARKED
UPPER RESPIRATORY IRRITATION, ANESTHESIA OF THE LIPS AND NOSE, CONGESTED
EUSTACHIAN TUBES, ACHING FACIAL MUSCLES, INEBRIATION, EXHILARATION, MENTAL
SLUGGISHNESS, LASSITUDE, GAGGING, FAINTNESS, TINNITUS, DYSPNEA UPON
EXERTION, NARCOSIS, AND LIVER AND KIDNEY DAMAGE. OTHER REPORTED SYMPTOMS
INCLUDE WEAKNESS, ATAXIA, COUGHING, CHEST PAINS, RAPID, WEAK PULSE,
BLURRED VISION, IRRITABILITY, ANOREXIA, VOMITING, HALLUCINATIONS,
DISTORTED PERCEPTIONS, ACIDOSIS, LATENT JAUNDICE AND ABNORMAL LIVER
FUNCTION TESTS, ALBUMINURIA, HEMATURIA, ANURIA, AND PREMATURE VENTRICULAR
BEATS. MASSIVE EXPOSURES MAY CAUSE PULMONARY EDEMA, UNCONSCIOUSNESS, COMA
AND DEATH FROM ANESTHESIA OR RESPIRATORY ARREST. IN ONE FATAL CASE,
PATHOLOGIC FINDINGS INCLUDED CENTRAL FATTY NECROSIS AND FATTY INFILTRATION
OF THE LIVER AND MODERATE CLOUDY SWELLING OF THE RENAL TUBULAR EPITHELIUM.
EPINEPHRINE-INDUCED CARDIAC ARRHYTHMIAS HAVE OCCURRED WITH SOME
HYDROCARBONS, BUT TESTING OF TETRACHLOROETHYLENE IN DOGS HAS BEEN
NEGATIVE.

CHRONIC EXPOSURE- WORKERS EXPOSED TO 1-40 PPM OVER 7.5 YEARS SHOWED ALTERED
ELECTRODIAGNOSTIC AND NEUROLOGICAL RATING SCORES; 4 OF 16 EXPOSED TO
60-450 PPM FOR 2-20 YEARS HAD ABNORMAL EEG'S. REPEATED EXPOSURE MAY ALSO
CAUSE RESPIRATORY TRACT IRRITATION, CENTRAL NERVOUS SYSTEM DEPRESSION
WITHOUT NARCOSIS, CONFUSION, HEADACHE, FATIGUE, DIZZINESS, INEBRIATION,

INSOMNIA, NAUSEA, ANOREXIA, ABDOMINAL PAIN, CONSTIPATION, BLURRED VISION,
MULTIPLE PREMATURE VENTRICULAR BEATS, AND PERIPHERAL NEUROPATHY WITH
NUMBNESS IN THE FINGERS, TREMBLING, NEURITIS, AND MEMORY DEFECTS.
HEPATIC DAMAGE MAY OCCUR AND BE PERSISTENT. EXPOSURE TO LEVELS AROUND
250 PPM FOR 4 MONTHS HAS BEEN REPORTED TO HAVE CAUSED HEMOPTYSIS,
COUGHING, SWEATING ATTACKS, JAUNDICE, OLIGURIA, HEMATENESIS,
CARDIOVASCULAR FAILURE AND DEATH. OCCASIONAL IDIOSYNCRATIC REACTIONS HAVE
BEEN REPORTED INCLUDING PULMONARY EDEMA, BRONCHIAL ASTHMA, DEPENDENCY,
AND HYPERSENSITIVITY. CHRONIC STUDIES IN RATS HAVE PRODUCED LIVER AND
KIDNEY DAMAGE. IN STUDIES OF WOMEN WORKING IN THE DRY CLEANING INDUSTRY,
ONE STUDY SHOWED HIGHER INCIDENCES OF MENSTRUAL DISORDERS, INDICATING AN
EFFECT ON THE HORMONE SYSTEM. ANOTHER STUDY REVEALED AN ASSOCIATION
BETWEEN EXPOSURE DURING EARLY PREGNANCY AND A SIGNIFICANTLY INCREASED
INCIDENCE OF SPONTANEOUS ABORTIONS. REPRODUCTIVE EFFECTS HAVE ALSO BEEN
REPORTED IN ANIMALS. INHALATION STUDIES INDICATE AN INCREASED INCIDENCE OF
LIVER CARCINOMAS IN MICE AND MONONUCLEAR CELL LEUKEMIA IN RATS.

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

SKIN CONTACT:

TETRACHLOROETHYLENE (PERCHLOROETHYLENE):
IRRITANT.

ACUTE EXPOSURE- BRIEF IMMERSION OF THE HANDS IN THE LIQUID USUALLY CAUSES
ONLY MILD IRRITATION. HOWEVER, THE LIQUID ON THE SKIN FOR 40 MINUTES
RESULTED IN A PROGRESSIVELY SEVERE BURNING SENSATION, BEGINNING WITHIN
5-10 MINUTES, AND MARKED ERYTHEMA, WHICH SUBSIDED AFTER 1-2 HOURS.
SEVERE EXPOSURES MAY RESULT IN VESICULATION AND POSSIBLY BURNS.
ABSORPTION MAY OCCUR BUT IS PROBABLY NOT A SIGNIFICANT ROUTE OF EXPOSURE.
CHRONIC EXPOSURE- REPEATED OR PROLONGED SKIN CONTACT MAY PRODUCE DERMATITIS
WITH DRY, SCALY, FISSURED SKIN.

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

EYE CONTACT:

TETRACHLOROETHYLENE (PERCHLOROETHYLENE):
IRRITANT.

ACUTE EXPOSURE- VAPOR CONCENTRATIONS FROM 100-200 MAY CAUSE MILD IRRITATION.
HIGHER LEVELS OR DIRECT CONTACT MAY CAUSE PAIN, LACRIMATION, AND BURNING,
BUT SERIOUS INJURY IS UNLIKELY. AT 1500 PPM, THE IRRITATION IS ALMOST
INTOLERABLE. TWO STUDIES OF DIRECT APPLICATION TO RABBIT EYES RESULTED
IN CONJUNCTIVITIS AND EFFECTS ON THE CORNEAL EPITHELIUM; RECOVERY WAS
COMPLETE IN 2 DAYS TO 2 WEEKS.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS.
ONE STUDY HAS REPORTED AN INCREASED INCIDENCE OF LACRIMAL DUCT DISEASE IN
EXPOSED WORKERS.

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

INGESTION:

TETRACHLOROETHYLENE (PERCHLOROETHYLENE):
NARCOTIC/CARCINOGEN.

ACUTE EXPOSURE- MAY CAUSE SEVERE GASTROINTESTINAL IRRITATION WITH NAUSEA, VOMITING, ABDOMINAL CRAMPS AND DIARRHEA, POSSIBLY WITH BLOODY STOOLS. NARCOTIC EFFECTS MAY INCLUDE HEADACHE, DIZZINESS, EXHILARATION, INEBRIATION AND OTHER EFFECTS AS IN ACUTE INHALATION. A DOSE OF 500 MG/KG HAS BEEN INGESTED AND SURVIVED. DOGS GIVEN LETHAL DOSES EXHIBITED CARDIAC AND RESPIRATORY DEPRESSION; AUTOPSY REVEALED FATTY INFILTRATION OF THE HEART AND LIVER AND MARKED INFLAMMATION AND SHRIVELING OF THE SMALL INTESTINE. CHRONIC EXPOSURE- LONGTERM INGESTION OF 50 MG/KG PRODUCED LIVER AND KIDNEY DAMAGE IN MICE. CHRONIC INGESTION HAS PRODUCED HEPATOCELLULAR CARCINOMAS IN MICE.

FIRST AID- IF THE PERSON IS CONSCIOUS AND NOT CONVULSING, INDUCE EMESIS BY GIVING SYRUP OF IPECAC (KEEPING THE HEAD BELOW THE HIPS TO PREVENT ASPIRATION), FOLLOWED BY WATER. REPEAT IN 20 MINUTES IF NOT EFFECTIVE INITIALLY. IN PATIENTS WITH DEPRESSED RESPIRATION OR IF EMESIS IS NOT PRODUCED, PERFORM GASTRIC LAVAGE CAUTIOUSLY (DREIBACH, HANDBOOK OF POISONING, 12TH ED.). TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GASTRIC LAVAGE SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY SECTION

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

TETRACHLOROETHYLENE (PERCHLOROETHYLENE):
ALUMINUM: MAY FORM EXPLOSIVE MIXTURE.
BARIUM: FORMS A DETONABLE MIXTURE.
BASES: MAY FORM EXPLOSIVE MIXTURE.
BERYLLIUM: POSSIBLE EXPLOSIVE MIXTURE.
DINITROGEN TETRAOXIDE: EXPLOSIVE WHEN SUBJECTED TO EXTREME SHOCK.
METALS (LIGHT): VIOLENT REACTION.
OXYGEN (LIQUID): INCOMPATIBLE.
PLASTICS, RUBBER, AND COATINGS: MAY BE ATTACKED.
POTASSIUM HYDROXIDE: MAY FORM EXPLOSIVE MIXTURE.
SODIUM HYDROXIDE: MAY FORM EXPLOSIVE MIXTURE.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE HIGHLY TOXIC FUMES OF PHOSGENE, TOXIC AND CORROSIVE FUMES OF CHLORIDES, AND OXIDES OF CARBON.

POLYMERIZATION:

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

STORAGE-DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

STORAGE

STORE IN A COOL, DRY, WELL-VENTILATED LOCATION, AWAY FROM ANY AREA WHERE THE FIRE HAZARD MAY BE ACUTE (NFFA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

DISPOSAL

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40CFR 262. EPA HAZARDOUS WASTE NUMBER U210.

TETRACHLOROETHYLENE - REGULATORY LEVEL: 0.7 MG/L
MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D039.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. CONTAINER MAY EXPLODE IN HEAT OF FIRE.

SPILLS AND LEAKS

SOIL-RELEASE:

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

AIR-RELEASE:

APPLY WATER SPRAY TO KNOCK DOWN AND REDUCE VAPORS. KNOCK-DOWN WATER IS CORROSIVE AND TOXIC AND SHOULD BE DIKED FOR CONTAINMENT AND LATER DISPOSAL.

WATER-SPILL:

IF DISSOLVED, AT A CONCENTRATION OF 10 PPM OR GREATER, APPLY ACTIVATED CARBON AT TEN TIMES THE AMOUNT THAT HAS BEEN SPILLED.

USE SUCTION HOSES TO REMOVE TRAPPED SPILL MATERIAL.

THE CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) PROHIBITS CONTAMINATING ANY KNOWN SOURCE OF DRINKING WATER WITH SUBSTANCES KNOWN TO CAUSE CANCER AND/OR REPRODUCTIVE TOXICITY.

OCCUPATIONAL-SPILL:

SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND, EARTH OR OTHER ABSORBENT MATERIAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA! KEEP UNNECESSARY PEOPLE AWAY.

REPORTABLE QUANTITY (RQ): 1 FOUND
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT SECTION

VENTILATION:
PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:
THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO CHEMICAL HAZARDS; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

TETRACHLOROETHYLENE:

AT ANY DETECTABLE CONCENTRATION:

AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.
SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

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

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

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

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

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

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

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

AUTHORIZED BY- OCCUPATIONAL HEALTH SERVICES, INC.

CREATION DATE: 10/25/84

REVISION DATE: 12/03/90

NOTICE

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MATERIAL SAFETY DATA SHEET OHS14370

OCCUPATIONAL HEALTH SERVICES, INC. EMERGENCY CONTACT:
450 SEVENTH AVENUE, SUITE 2407 JOHN S. BRANSFORD, JR. (615) 292-1180
NEW YORK, NEW YORK 10123
(800) 445-MSDS (212) 967-1100

SUBSTANCE IDENTIFICATION

CAS-NUMBER 71-55-6
RTEC-NUMBER KJ2975000

SUBSTANCE: METHYL CHLOROFORM

TRADE NAMES/SYNONYMS:

1,1,1-TRICHLOROETHANE; ALPHA-TRICHLOROETHANE; AEROTHEME IT;
METHYLTRICHLOROMETHANE; METHYLCHLOROFORM; TRICHLOROMETHYLMETHANE;
TRICHLOROETHANE; ETHANE, 1,1,1-TRICHLOROETHANE; CHLORTEN;
1,1,1-TRICHLOROETHANE; TRICHLOROETHANE 111 DEGREASE COLD/VAPOR (ASHLAND);
ST-1000A CLEANER (STRESSCOAT); BLACO-THANE (BARON-BLAKESLEE); PERM
ETHANE DG (DREXEL CHEMICALS); SAFETY SOLVENT (LOCTITE CORPORATION);
STCC 4941176; RCRA U226; UN 2031; C2H3CL3; OHS14370

CHEMICAL FAMILY:

HALOGEN COMPOUND, ALIPHATIC

MOLECULAR FORMULA: C-H3-C-CL3

MOLECULAR WEIGHT: 133.40

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

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

COMPONENTS AND CONTAMINANTS

COMPONENT: METHYL CHLOROFORM

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMIT:

METHYL CHLOROFORM (1,1,1-TRICHLOROETHANE):
350 PPM (1900 MG/M3) OSHA TWA; 450 PPM (2450 MG/M3) OSHA STEL
350 PPM (1900 MG/M3) ACGIH TWA; 450 PPM (2450 MG/M3) ACGIH STEL
350 PPM NIOSH RECOMMENDED 15 MINUTE CEILING

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: CLEAR, COLORLESS LIQUID WITH A MILD CHLOROFORM-LIKE ODOR.

BOILING POINT: 165 F (74 C)

MELTING POINT: -26 F (-32 C)

SPECIFIC GRAVITY: 1.3390

EVAPORATION RATE: (BUTYL ACETATE=1)
5.0

SOLUBILITY IN WATER: 0.078% @ 25 C VAPOR DENSITY: 4.55

VAPOR PRESSURE: 100 MMHG @ 20 C ODOR-THRESHOLD: 44-100 PPM

OTHER SOLVENTS (SOLVENT - SOLUBILITY):

SOLUBLE IN ACETONE, BENZENE, CHLOROFORM, METHANOL,
ETHANOL, CARBON DISULFIDE, ETHER, CARBON TETRACHLORIDE, N-HEPTANE.

OTHER PHYSICAL DATA

VISCOSITY: 0.850 CPS @ 20 C

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD

SLIGHT FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

UPPER EXPLOSION LIMIT: 12.5%

LOWER EXPLOSION LIMIT: 7.5%

AUTOIGNITION TEMP.: 978 F (537 C)

FIREFIGHTING MEDIA:

DRY CHEMICAL, CARBON DIOXIDE OR HALON
(1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

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

FIREFIGHTING:

STAY AWAY FROM STORAGE TANK ENDS. COOL CONTAINERS EXPOSED TO FLAMES WITH WATER
FROM SIDE UNTIL WELL AFTER FIRE IS OUT (1987 EMERGENCY RESPONSE GUIDEBOOK,
DOT P 5800.4, GUIDE PAGE 74).

EXTINGUISH USING AGENTS FOR SURROUNDING FIRE. COOL FIRE-EXPOSED CONTAINERS
WITH FLOODING AMOUNTS OF WATER APPLIED FROM AS FAR A DISTANCE AS POSSIBLE.
DO NOT ALLOW RUN-OFF WATER INTO SEWERS AND WATER SOURCES. AVOID BREATHING
VAPORS.

TRANSPORTATION

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49CFR172.101;
ORM-A

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49CFR172.101 AND SUBPART E:
NONE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49CFR173.605
EXCEPTIONS: 49CFR173.505

TOXICITY

METHYL CHLOROFORM (1,1,1-TRICHLOROETHANE):

IRRITATION DATA: 450 PPM/8 HOURS EYE-MAN; 5 GM/12 DAYS INTERMITTENT SKIN-RABBIT MILD; 20 MG/24 HOURS SKIN-RABBIT MODERATE; 100 MG EYE-RABBIT MILD; 2 MG/24 HOURS EYE-RABBIT SEVERE.
TOXICITY DATA: 27 GM/M3/10 MINUTES INHALATION-MAN LCLO; 350 PPM INHALATION-MAN TCLO; 200 PPM/4 HOURS INHALATION-MAN TCLO; 920 PPM/70 MINUTES INHALATION-HUMAN TCLO; 18000 PPM/4 HOURS INHALATION-RAT LC50; 3911 PPM/2 HOURS INHALATION-MOUSE LC50; 24400 MG/M3 INHALATION-CAT LC50; 1 GM/KG SKIN-RABBIT LDLO; 670 MG/KG ORAL-HUMAN TDLO; 10300 MG/KG ORAL-RAT LD50; 11240 MG/KG ORAL-MOUSE LD50; 3660 MG/KG ORAL-RABBIT LD50; 9470 MG/KG ORAL-GUINEA PIG LD50; 750 MG/KG ORAL-DOG LD50; 16 GM/KG SUBCUTANEOUS-MOUSE LD50; 500 MG/KG SUBCUTANEOUS-RABBIT LDLO; 95 MG/KG INTRAVENOUS-DOG LDLO; 3593 MG/KG INTRAPERITONEAL-RAT LD50; 3636 MG/KG INTRAPERITONEAL-MOUSE LD50; 3100 MG/KG INTRAPERITONEAL-DOG LD50; 15000 MG/KG SKIN-RABBIT LD50 (EPA-600/8-82-003F, 1984);
MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS).
CARCINOGENIC STATUS: ANIMAL INADEQUATE EVIDENCE (IARC CLASS-3).
LOCAL EFFECTS: IRRITANT- INHALATION, SKIN, EYE.
ACUTE TOXICITY LEVEL: SLIGHTLY TOXIC BY INHALATION, DERMAL ABSORPTION AND INGESTION.
TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT. POISONING MAY ALSO AFFECT THE HEART AND POSSIBLY LIVER AND KIDNEYS.
AT INCREASED RISK FROM EXPOSURE: PERSONS WITH PRE-EXISTING SKIN DISORDERS, LIVER DISEASE OR CARDIOVASCULAR DISEASE.
ADDITIONAL DATA: ALCOHOL MAY POTENTIATE BOTH CARDIAC AND HEPATIC TOXICITY. EPINEPHRINE OR OTHER STIMULANTS MAY INDUCE VENTRICULAR ARRHYTHMIAS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

METHYL CHLOROFORM (1,1,1-TRICHLOROETHANE);

IRRITANT/NARCOTIC. 1000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- EXPOSURE TO 500 PPM FOR 60 MINUTES SHOULD CAUSE NO EFFECT EXCEPT FOR A DISTINCTIVE ODOR WHILE 900-1000 PPM FOR 20 MINUTES MAY CAUSE MILD RESPIRATORY TRACT IRRITATION AND PROMPT BUT MINIMAL IMPAIRMENT OF EQUILIBRIUM WHICH MAY BE ACCOMPANIED BY HEADACHE, LASSITUDE AND ATAXIA. IMPAIRED PERFORMANCE OF BEHAVIORAL TESTS WAS ALSO REPORTED AT 1000 PPM. HIGHER LEVELS OF 2000-5000 PPM MAY CAUSE INCOORDINATION, ANESTHESIA, LOSS OF CONSCIOUSNESS, COMA AND DEATH. EXCESSIVE CONCENTRATIONS OF 10,000 PPM MAY CAUSE DEATH DUE TO RESPIRATORY OR CARDIAC FAILURE. CARDIAC SENSITIZATION MAY BE A CONTRIBUTING FACTOR. OTHER EFFECTS MAY INCLUDE NAUSEA, VOMITING, DROWSINESS, CONVULSIONS, FALL OF BLOOD PRESSURE LIVER AND KIDNEY DAMAGE, BRADYCARDIA AND BLOOD CLOTTING CHANGES.

CHRONIC EXPOSURE- NO ADVERSE EFFECTS RELATED TO EXPOSURE WERE REPORTED IN VOLUNTEERS EXPOSED TO 500 PPM FOR 7 HOURS A DAY FOR 5 DAYS, OR IN WORKERS EXPOSED TO 200 PPM FOR SEVERAL MONTHS TO 6 YEARS. EXPOSURE OF ANIMALS FOR 3 MONTHS AT CONCENTRATIONS FROM 1000 TO 10,000 PPM CAUSED SYMPTOMS OF CENTRAL NERVOUS SYSTEM DEPRESSION AND SOME PATHOLOGICAL CHANGES IN THE LIVERS AND LUNGS OF SOME SPECIES. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

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

SKIN CONTACT:

METHYL CHLOROFORM (1,1,1-TRICHLOROETHANE);

IRRITANT.

ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE IRRITATION AND REDNESS. VAPORS ARE POORLY ABSORBED, BUT THE LIQUID, ESPECIALLY IF CONFINED UNDER AN IMPERMEABLE BARRIER MAY BE ABSORBED TO SOME EXTENT. THIS ALONE IS UNLIKELY TO RESULT IN TOXIC EFFECTS, BUT MAY ADD TO THE EFFECTS OF INHALATION EXPOSURE.

CHRONIC EXPOSURE- REPEATED SKIN CONTACT MAY PRODUCE A DRY, SCALY, FISSURED DERMATITIS DUE TO THE DEFATTING PROPERTIES OF THE LIQUID, AND POSSIBLY BURNS.

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

EYE CONTACT:

METHYL CHLOROFORM (1,1,1-TRICHLOROETHANE);

IRRITANT.

ACUTE EXPOSURE- EXPOSURE TO 500 PPM MAY CAUSE IRRITATION AND REDNESS.

DIRECT CONTACT WITH THE LIQUID MAY CAUSE TEMPORARY INJURY WITH COMPLETE RECOVERY EXPECTED IN 48 HOURS. DIRECT APPLICATION TO THE EYES OF RABBITS HAS CAUSED CONJUNCTIVAL IRRITATION, BUT NO CORNEAL DAMAGE.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE CONJUNCTIVITIS.

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

INGESTION:

METHYL CHLOROFORM (1,1,1-TRICHLOROETHANE);

NARCOTIC.

ACUTE EXPOSURE- MAY CAUSE NAUSEA, VOMITING, DIARRHEA, GASTROINTESTINAL DISTURBANCES AND ABDOMINAL PAIN FOLLOWED BY CENTRAL NERVOUS SYSTEM DEPRESSION WITH HEADACHE, DIZZINESS, WEAKNESS, INCOORDINATION, MENTAL CONFUSION AND UNCONSCIOUSNESS. DEATH MAY OCCUR FROM CHRONIC RESPIRATORY FAILURE. OTHER SYMPTOMS AS DESCRIBED IN ACUTE INHALATION MAY ALSO OCCUR. MYOCARDIAL SENSITIZATION TO EPINEPHRINE AND SUBSEQUENT DEATH DUE TO CARDIAC ARREST MAY OCCUR. ASPIRATION MAY RESULT IN PULMONARY EDEMA OR CHEMICAL PNEUMONITIS.

CHRONIC EXPOSURE- REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION AND ADVICE ON WHETHER TO USE GASTRIC LAVAGE. EXTREME CARE MUST BE TAKEN TO PREVENT ASPIRATION. A CUFFED ENDOTRACHEAL TUBE USED BY QUALIFIED MEDICAL PERSONNEL MIGHT BE ADVISABLE. KEEP HEAD LOWER THAN HIP TO PREVENT ASPIRATION SHOULD VOMITING OCCUR.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY:
SLOWLY DECOMPOSES OVER TIME YIELDING HYDROGEN CHLORIDE. AN INHIBITOR MAY BE ADDED TO SCAVENGE THE ACID THAT IS FORMED AND PREVENT CORROSION TO METALS. WATER MAY REACT WITH THE INHIBITOR AND ALLOW THE NATURAL DECOMPOSITION TO OCCUR.

INCOMPATIBILITIES:
METHYL CHLOROFORM (1,1,1-TRICHLOROETHANE);
ACETONE; EXOTHERMIC REACTION.
ALKALI (STRONG); POSSIBLE VIOLENT REACTION.
ALUMINUM AND ALLOYS; MAY DECOMPOSE VIOLENTLY.
BARIUM; FIRE AND EXPLOSION HAZARD.
MAGNESIUM; VIOLENT DECOMPOSITION WITH EVOLUTION OF HYDROGEN CHLORIDE.
METALS (POWDERED); FIRE AND EXPLOSION HAZARD.
NITROGEN TETROXIDE; FORMS EXPLOSIVE MIXTURE.
OXIDIZERS (STRONG); POSSIBLE VIOLENT REACTION.
OXYGEN (GAS); POSSIBLE EXPLOSION WHEN HEATED @ 100 C.
OXYGEN (LIQUID); POSSIBLE VIOLENT EXPLOSION.
POTASH; FORMS FLAMMABLE OR EXPLOSIVE PRODUCT.
POTASSIUM AND ALLOYS; FORMS SHOCK-SENSITIVE MIXTURE.
POTASSIUM HYDROXIDE; FORMATION OF SPONTANEOUSLY FLAMMABLE PRODUCT.
RUBBER, PLASTICS, COATINGS; MAY BE ATTACKED.
SODIUM AND ALLOYS; FIRE AND EXPLOSION HAZARD.
SODIUM HYDROXIDE; FORMS SPONTANEOUSLY FLAMMABLE PRODUCT.
SODIUM-POTASSIUM ALLOY; POSSIBLE EXPLOSION.
TIN AND ALLOYS; INCOMPATIBLE.
ZINC AND ALLOYS; INCOMPATIBLE.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC AND CORROSIVE FUMES OF CHLORIDES, TOXIC FUMES OF PHOSGENE AND CHLOROACETYLENES, AND OXIDES OF CARBON.

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

STORAGE-DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

***STORAGE**

STORE IN A COOL, DRY, WELL-VENTILATED LOCATION, AWAY FROM ANY AREA WHERE THE FIRE HAZARD MAY BE ACUTE (NFPA 49, HAZARDOUS CHEMICALS DATA, 1973).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

***DISPOSAL**

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40CFR 262. EPA HAZARDOUS WASTE NUMBER U226.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. CONTAINER MAY EXPLODE IN HEAT OF FIRE.

SPILLS AND LEAKS

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

WATER-SPILL:
LIMIT SPILL MOTION AND DISPERSION WITH NATURAL BARRIERS OR OIL SPILL CONTROL BOOMS.

TRAP SPILLED MATERIAL AT BOTTOM IN DEEP WATER POCKETS, EXCAVATED HOLDING AREAS OR WITHIN SAND BAG BARRIERS.

USE SUCTION HOSES TO REMOVE TRAPPED SPILL MATERIAL.

THE CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) PROHIBITS CONTAMINATING ANY KNOWN SOURCE OF DRINKING WATER WITH SUBSTANCES KNOWN TO CAUSE CANCER AND/OR REPRODUCTIVE TOXICITY.

OCCUPATIONAL-SPILL:
SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND, EARTH OR OTHER ABSORBENT MATERIAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA! KEEP UNNECESSARY PEOPLE AWAY.

REPORTABLE QUANTITY (RQ): 1000 POUNDS
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT SECTION

VENTILATION:
PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

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

OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION.

METHYL CHLOROFORM (1,1,1-TRICHLOROETHANE):

1000 PPM- ANY SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE.
ANY SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A
CHIN-STYLE OR FRONT OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

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

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

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

CLOTHING:

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

GLOVES:

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

EYE PROTECTION:

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

EMERGENCY WASH FACILITIES:

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

AUTHORIZED BY- OCCUPATIONAL HEALTH SERVICES, INC.

CREATION DATE: 10/25/84

REVISION DATE: 04/12/89

NOTICE

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EC-000085

MATERIAL SAFETY DATA SHEET OHS23850

OCCUPATIONAL HEALTH SERVICES, INC. EMERGENCY CONTACT:
450 SEVENTH AVENUE, SUITE 2407 JOHN S. BRANSFORD, JR. (615) 292-1100
NEW YORK, NEW YORK 10123
(800) 445-MSDS (212) 967-1100

SUBSTANCE IDENTIFICATION

SUBSTANCE: TRICHLOROETHYLENE
CAS-NUMBER 79-01-6
RTEC-NUMBER KX4550000

TRADE NAMES/SYNONYMS:
ACETYLENE TRICHLORIDE; ETHYLENE TRICHLORIDE; ALBYLEN;
1-CHLORO-2,2-DICHLOROETHYLENE; 1,1-DICHLORO-2-CHLOROETHYLENE; TCE;
ANAMENTH; ETHINYL TRICHLORIDE; TRICHLOROETHENE;
1,1,2-TRICHLOROETHYLENE; ETHYLENE, TRICHLORO-; CHLORYLEN;
1,1,2-TRICHLOROETHENE; ETHENE, TRICHLORO-; CHLORILEN; BLACO-TRI
(BARON-BLAKESLEE); UN 1710; RCRA U228; STCC 4941171; C2HCL3;
OHS23850

CHEMICAL FAMILY:
HALOGEN COMPOUND, ALIPHATIC

MOLECULAR FORMULA: CL-C-H-C-CL2 MOLECULAR WEIGHT: 131.39

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=1 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=1 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: TRICHLOROETHYLENE PERCENT: >99

OTHER CONTAMINANTS: TRACES OF AMINES OR EPOXIDES AS INHIBITORS.

EXPOSURE LIMIT:
TRICHLOROETHYLENE:
50 PPM (270 MG/M3) OSHA TWA; 200 PPM (1080 MG/M3) OSHA STEL
50 PPM (270 MG/M3) ACGIH TWA; 200 PPM (1080 MG/M3) ACGIH STEL
25 PPM NIOSH RECOMMENDED 10 HOUR TWA

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING
SUBJECT TO CALIFORNIA PROPOSITION 65 CANCER AND/OR REPRODUCTIVE TOXICITY
WARNING AND RELEASE REQUIREMENTS- (APRIL 1, 1988)

PHYSICAL DATA

DESCRIPTION: COLORLESS LIQUID WITH A MILD CHLOROFORM-LIKE ODOR.
BOILING POINT: 189 F (87 C) MELTING POINT: -99 F (-73 C)
SPECIFIC GRAVITY: 1.4642 EVAPORATION RATE: (CARBON
TETRACHLORIDE=1) 0.69

SOLUBILITY IN WATER: 0.1% VAPOR DENSITY: 4.53
VAPOR PRESSURE: 58 MMHG @ 20 C ODOR-THRESHOLD: 21 PPM
OTHER SOLVENTS (SOLVENT - SOLUBILITY):
SOLUBLE IN ALCOHOL, ETHER, ACETONE, CHLOROFORM,
BENZENE AND VEGETABLE OILS.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD
SLIGHT FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

UPPER EXPLOSION LIMIT: 52% @ 100 C LOWER EXPLOSION LIMIT: 7.8% @ 100 C

AUTOIGNITION TEMP.: 770 F (410 C)

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE OR HALON
(1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

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

FIREFIGHTING:
STAY AWAY FROM STORAGE TANK ENDS. COOL CONTAINERS EXPOSED TO FLAMES WITH WATER
FROM SIDE UNTIL WELL AFTER FIRE IS OUT (1987 EMERGENCY RESPONSE GUIDEBOOK,
DOT P 5800.4, GUIDE PAGE 74).

USE AGENT SUITABLE FOR TYPE OF FIRE. AVOID BREATHING TOXIC VAPORS, KEEP
UPWIND.

TRANSPORTATION

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49CFR172.101;
ORM-A

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49CFR172.101 AND SUBPART E:
NONE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49CFR173.605
EXCEPTIONS: 49CFR173.505

TOXICITY

TRICHLOROETHYLENE:
IRRITATION DATA: 2 MG/24 HOURS SKIN-RABBIT SEVERE; 20 MG/24 HOURS
EYE-RABBIT MODERATE.
TOXICITY DATA: 6900 MG/M3/10 MINUTES INHALATION-HUMAN TCLO; 160 PPM/83 MINUTES
INHALATION-HUMAN TCLO; 812 MG/KG INHALATION-HUMAN TDLO; 110 PPM/8 HOURS

INHALATION-HUMAN TCLO; 2900 PPM INHALATION-HUMAN LCLO; 8000 PPM/4 HOURS INHALATION-RAT LCLO; 8450 PPM/4 HOURS INHALATION-MOUSE LC50; 11,000 PPM INHALATION-RABBIT LCLO; 32,500 MG/M3/2 HOURS INHALATION-CAT LCLO; 37,200 PPM/40 MINUTES INHALATION-GUINEA PIG LCLO; 7 GM/KG ORAL-HUMAN LDLO; 2143 MG/KG ORAL-HUMAN TDLO; 2402 MG/KG ORAL-MOUSE LD50; 7330 MG/KG ORAL-RABBIT LDLO; 5864 MG/KG ORAL-CAT LDLO; 16 GM/KG SUBCUTANEOUS-MOUSE LD50; 1800 MG/KG SUBCUTANEOUS-RABBIT LDLO; 150 MG/KG SUBCUTANEOUS-DOG LDLO; 34 MG/KG INTRAVENOUS-MOUSE LD50; 150 MG/KG INTRAVENOUS-DOG LDLO; 1282 MG/KG INTRAPERITONEAL-RAT LD50; 1900 MG/KG INTRAPERITONEAL-DOG LD50; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).

CARCINOGEN STATUS: HUMAN INADEQUATE EVIDENCE, ANIMAL LIMITED EVIDENCE (IARC CLASS-3). ORAL ADMINISTRATION PRODUCED LIVER AND LUNG NEOPLASMS IN MICE; INHALATION WAS ASSOCIATED WITH AN INCREASED INCIDENCE OF LYMPHOMAS IN FEMALE MICE, BUT NOT IN RATS OR HAMSTERS.

LOCAL EFFECTS: IRRITANT-SKIN, EYE, INHALATION.

ACUTE TOXICITY LEVEL: INSUFFICIENT DATA.

TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT. POISONING MAY AFFECT THE LIVER, KIDNEYS, LUNGS AND HEART.

ADDITIONAL DATA: THE PRESENCE OF TETRACHLOROETHANE AS AN IMPURITY, OR THE CONSUMPTION OF ALCOHOLIC BEVERAGES MAY ENHANCE THE SYSTEMIC TOXICITY. EPINEPHRINE OR OTHER STIMULANTS MAY INDUCE VENTRICULAR ARRHYTHMIAS.

HEALTH EFFECTS AND FIRST AID

INHALATION:
TRICHLOROETHYLENE:
IRRITANT/NARCOTIC.

1000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- LEVELS OF 90-130 PPM FOR 8 HOURS HAVE RESULTED IN DECREASED PERFORMANCE IN TESTS OF PERCEPTION, MEMORY, COMPLEX REACTION TIME AND MANUAL DEXTERITY. ADDICTION HAS OCCURRED FROM DELIBERATE INHALATION OF MODERATE AMOUNTS WHICH CAUSE EUPHORIA, DISORIENTATION, VISUAL HALLUCINATIONS, DELUSIONS, AND OTHER PSYCHOTIC SYMPTOMS. AT LOW CONCENTRATIONS MILD RESPIRATORY IRRITATION, DROWSINESS, DIZZINESS, HEADACHE, EXCITATION, NAUSEA, VOMITING, ABDOMINAL CRAMPS, AND FLUSHED SKIN MAY OCCUR. AT HIGHER CONCENTRATIONS PALLOR, PROFUSE PERSPIRATION, PULMONARY EDEMA, NARCOSIS, FACIAL NERVE DYSFUNCTION, ANESTHESIA, UNCONSCIOUSNESS, AND COMA ARE POSSIBLE. IF CONSCIOUSNESS IS REGAINED, NAUSEA AND VOMITING MAY FOLLOW FOR SEVERAL HOURS. ANEMIA AND DAMAGE TO THE LIVER, KIDNEYS, AND LUNGS MAY OCCUR. ANIMAL STUDIES HAVE SHOWN SPLEEN DAMAGE ALSO. DEATH MAY OCCUR FROM RESPIRATORY ARREST OR VENTRICULAR FIBRILLATION AND PRIMARY CARDIAC FAILURE.

CHRONIC EXPOSURE- REPEATED EXPOSURE TO LEVELS BELOW 300 PPM MAY CAUSE NAUSEA, VOMITING, ABDOMINAL CRAMPS, SLEEPINESS, DRUNKENNESS, FLUSHING, ANOREXIA, SWELLING OF THE EYES, FACE, AND HANDS, AND MILD CARDIAC ARRHYTHMIA. OTHER POSSIBLE SYMPTOMS MAY BE WHEEZING, FACIAL NERVE PARALYSIS, LOSS OF COORDINATION AND SENSE OF SMELL AND TASTE, IMPAIRMENT OF TACTILE AND AUDITORY SENSES, DOUBLE VISION, CHANGES IN COLOR PERCEPTION, BLINDNESS AND JOINT AND MUSCLE PAIN. INTOLERANCE TO ALCOHOL, TREMOR, GIDDINESS, BRADYCARDIA, AND ANXIETY HAVE BEEN FOUND IN WORKERS CHRONICALLY EXPOSED TO 5-630 PPM. LIVER, KIDNEY, AND BRAIN DAMAGE MAY ALSO OCCUR. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS. ADMINISTRATION BY INHALATION WAS ASSOCIATED WITH AN INCREASED INCIDENCE OF LYMPHOMAS IN FEMALE MICE, BUT NOT IN RATS OR HAMSTERS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING

HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:
TRICHLOROETHYLENE:
IRRITANT.

ACUTE EXPOSURE- MAY CAUSE IRRITATION AND CAUSE CONTACT DERMATITIS. MAY ACT AS A SENSITIZER IN PREVIOUSLY EXPOSED INDIVIDUALS AND CAUSE GENERALIZED EXFOLIATIVE DERMATITIS, ERYTHRODERMA, OR PAPULOVESICULAR DERMATITIS. WHEN SKIN IS IN CONTACT WITH TRICHLOROETHYLENE SOAKED CLOTHING FOR A LONG PERIOD OF TIME, BLISTERING MAY OCCUR. MAY BE ABSORBED THROUGH THE SKIN, HOWEVER, DERMAL ABSORPTION IS NOT LIKELY TO BE OF TOXICOLOGICAL SIGNIFICANCE UNDER NORMAL USE.

CHRONIC EXPOSURE- MAY CAUSE A DEFATTING TYPE OF DERMATITIS RESULTING IN ROUGHNESS, CHAPPING, VESICULATION AND SECONDARY INFECTION. REPEATED CONTACT MAY RESULT IN PARALYSIS OF THE FINGERS. SENSITIZATION MAY OCCUR IN PREVIOUSLY EXPOSED INDIVIDUALS. CHRONIC LOW DOSE EXPOSURE MAY CAUSE SENSE OF INEBRIATION, IRRITABILITY AND PERSONALITY CHANGES. CHRONIC ABSORPTION MAY ALSO PRODUCE WEIGHT LOSS, NAUSEA, ANOREXIA, FATIGUE, VISUAL IMPAIRMENT, JOINT PAIN AND WHEEZING. JAUNDICE IS RARE.

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

EYE CONTACT:
TRICHLOROETHYLENE:
IRRITANT.

ACUTE EXPOSURE- DIRECT CONTACT WITH VAPOR OR LIQUID MAY CAUSE BURNS OF THE LIDS, CONJUNCTIVA AND CORNEA WITH SYMPTOMS OF REDNESS, TEARING AND BLURRED VISION. A SPLASH IN THE EYE MAY CAUSE SMARTING PAIN AND INJURED CORNEAL EPITHELIUM. EPITHELIUM MAY BE LOST BUT RAPIDLY REGENERATES AND COMPLETE RECOVERY IS USUAL. ACUTE EXPOSURE MAY RESULT IN LOSS OF SENSATION IN THE DISTRIBUTION OF THE TRIGEMINAL NERVE ON ONE OR BOTH SIDES. THIS MAY BE COMPLICATED BY CORNEAL EPITHELEAL ULCERATION, WHICH DOES NOT CAUSE DISCOMFORT BECAUSE OF THE CORNEAL ANESTHESIA DUE TO PARALYSIS OF THE SENSORY NERVE. OCULOMOTOR PARALYSIS MAY ACCOMPANY THE TRIGEMINAL PALSIES. CHRONIC EXPOSURE- REPEATED AND PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS AND CORNEAL INFLAMMATION. CHRONIC INTOXICATION MAY CAUSE OPTIC NEURITIS, DOUBLE VISION, NYSTAGMUS, CHANGES IN COLOR PERCEPTION AND BLINDNESS.

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

INGESTION:
TRICHLOROETHYLENE:
NARCOTIC/CARCINOGEN.

ACUTE EXPOSURE- MAY CAUSE SEVERE BURNING SENSATION IN THE MOUTH, THROAT, ESOPHAGUS, AND STOMACH, DIARRHEA, INEBRIATION, CONFUSION, TACHYCARDIA, AND CENTRAL NERVOUS SYSTEM DEPRESSION WITH DIZZINESS, NAUSEA, VOMITING, HEADACHE, COLLAPSE, CONVULSIONS, AND COMA FOLLOWED BY DEATH FROM RESPIRATORY, CARDIAC OR HEPATORENAL FAILURE. LOW-LEVEL CONCENTRATIONS MAY CAUSE HEADACHE, AMNESIA, NUMBNESS, WEAKNESS OF THE EXTREMITIES, HEMIPARESIS AND PSYCHOSIS.

CHRONIC EXPOSURE- MAY CAUSE IRRITATION OF MUCOUS MEMBRANES, HEADACHE,

DROWSINESS, FATIGUE, GIDDINESS, EXCITABILITY, INDIGESTION, NAUSEA, DISTURBANCES OF SENSATIONS IN THE EXTREMITIES AND OTHER SYMPTOMS NOTED IN CHRONIC INHALATION. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS. REPEATED ORAL ADMINISTRATION PRODUCED LIVER AND LUNG NEOPLASMS IN MICE.

FIRST AID- REMOVE BY GASTRIC LAVAGE OR EMESIS. MAINTAIN BLOOD PRESSURE AND AIRWAY. GIVE OXYGEN IF RESPIRATION IS DEPRESSED. DO NOT PERFORM GASTRIC LAVAGE OR EMESIS IF VICTIM IS UNCONSCIOUS. GET MEDICAL ATTENTION IMMEDIATELY. (DREISBACH, HANDBOOK OF POISONING, 11TH ED.) ADMINISTRATION OF GASTRIC LAVAGE OR OXYGEN SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY SECTION

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES IN A CLOSED CONTAINER. UNINHIBITED MATERIAL, ON HEATING OR EXPOSURE TO LIGHT, MAY DECOMPOSE OR POLYMERIZE, RELEASING HYDROGEN CHLORIDE.

INCOMPATIBILITIES:

TRICHLOROETHYLENE:

ALKALI: FORMS EXPLOSIVE MIXTURE.
ALUMINUM + DILUTE HYDROCHLORIC ACID: VIOLENT POLYMERIZATION.
ALUMINUM: VIOLENT DECOMPOSITION MAY OCCUR.
BARIUM: POSSIBLE DETONATION.
BERYLLIUM: FORMS IMPACT-SENSITIVE MIXTURE.
BORON: FORMS EXPLOSIVE OR IGNITABLE COMPOUND.
1-CHLORO-2,3-EPOXYPROPANE: FORMS EXPLOSIVE MIXTURE.
2,4-BIS(4(2',3'-EPOXYPROPOXY)PHENYL)PROPANE: FORMS EXPLOSIVE MIXTURE.
DI-2,3-EPOXYPROPYL ETHER OF 1,4-BUTANEDIOL: FORMS EXPLOSIVE MIXTURE.
EPOXIDES: POSSIBLE EXPLOSION.
LITHIUM: FORMS IMPACT-SENSITIVE MIXTURE.
MAGNESIUM: FORMS IMPACT-SENSITIVE MIXTURE.
METALS (POWDERED): FORMS EXPLOSIVE OR IGNITABLE COMPOUND.
MONO-2,3-EPOXYPROPYL ETHER OF 1,4-BUTANEDIOL: FORMS EXPLOSIVE MIXTURE.
NITROGEN TETRAOXIDE: FORMS EXPLOSIVE MIXTURE.
OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.
OXYGEN (LIQUID): EXPLODES WHEN INITIATED WITH A BLASTING CAP.
OXYGEN (GAS): EXPLODES UNDER PRESSURE AT ROOM TEMPERATURE.
PERCHLORIC ACID: VIOLENT REACTION.
POTASSIUM: FORMS EXPLOSIVE CHLOROACETYLENES.
POTASSIUM HYDROXIDE: FORMS EXPLOSIVE DICHLOROACETYLENE WHEN HEATED.
SODIUM: FORMS EXPLOSIVE CHLOROACETYLENES.
SODIUM HYDROXIDE: FORMS EXPLOSIVE CHLOROACETYLENES.
TITANIUM: FORMS IMPACT-SENSITIVE MIXTURE.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE HIGHLY TOXIC FUMES OF PHOSGENE, TOXIC AND CORROSIVE FUMES OF CHLORIDES, AND OXIDES OF CARBON.

POLYMERIZATION:

MAY POLYMERIZE WHEN CATALYZED BY ALUMINUM CHLORIDE IN A SELF-SUSTAINING REACTION WHICH MAY DEVELOP TEMPERATURES UP TO 1350 C. A STABILIZER IS REQUIRED TO PREVENT POLYMERIZATION WHEN HEATED OR EXPOSED TO SUNLIGHT.

STORAGE-DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

STORAGE

STORE IN A COOL, DRY, WELL-VENTILATED LOCATION, AWAY FROM ANY AREA WHERE THE FIRE HAZARD MAY BE ACUTE (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

DISPOSAL

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40CFR 262. EPA HAZARDOUS WASTE NUMBER U228.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. CONTAINER MAY EXPLODE IN HEAT OF FIRE.

SPILLS AND LEAKS

SOIL-RELEASE:

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

AIR-RELEASE:

APPLY WATER SPRAY TO KNOCK DOWN AND REDUCE VAPORS. KNOCK-DOWN WATER IS CORROSIVE AND TOXIC AND SHOULD BE DIKED FOR CONTAINMENT.

WATER-SPILL:

USE ACTIVATED CARBON TO ABSORB SPILLED SUBSTANCE THAT IS DISSOLVED.

USE SUCTION HOSES TO REMOVE TRAPPED SPILL MATERIAL.

USE MECHANICAL DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

THE CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) PROHIBITS CONTAMINATING ANY KNOWN SOURCE OF DRINKING WATER WITH SUBSTANCES KNOWN TO CAUSE CANCER AND/OR REPRODUCTIVE TOXICITY.

OCCUPATIONAL-SPILL:

SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND, EARTH OR OTHER ABSORBENT MATERIAL. FOR

LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA! KEEP UNNECESSARY PEOPLE AWAY.

REPORTABLE QUANTITY (RQ): 1000 POUNDS
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT SECTION

VENTILATION:
PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

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

TRICHLOROETHYLENE:
AT ANY DETECTABLE CONCENTRATION:
ANY SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE AND OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULLFACE-PIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE-ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACKMOUNTED ORGANIC VAPOR CANISTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

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

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

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

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

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

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE. CONTACT LENSES SHOULD NOT BE WORN.

AUTHORIZED BY- OCCUPATIONAL HEALTH SERVICES, INC.

CREATION DATE: 10/24/84

REVISION DATE: 04/12/89

NOTICE

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ATTN: SAFETY DIRECTOR
O'BRIEN & GERE ENGINEERS INC
1304 BUCKLEY ROAD
SYRACUSE NY 13221

DATE: 06/01/87
CUST # 921564 P.O. # A1257

M A T E R I A L S A F E T Y D A T A S H E E T PAGE: 1

IDENTIFICATION

PRODUCT # 26608-6 NAME: COPPER, POWDER, -40 MESH, 99.5%
CAS # 7440-50-8

TOXICITY HAZARDS

RTECS # GL5325000

COPPER

REVIEWS, STANDARDS, AND REGULATIONS

ACGIH TLV-TWA 1 MG(CU)/M3 (DUST AND MISTS) 851A8 5,146,86
ACGIH TLV-TWA 0.2 MG/M3 (FUME) 851A8 5,146,86
MSHA STANDARD-AIR:TWA 0.1 MG/M3 (FUME,DUSTS & MISTS) DTLVS* 3,59,71
EPA TSCA CHEMICAL INVENTORY, 1986
EPA TSCA SECTION 8(E) STATUS REPORT 8EHQ-068C-0345
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, DECEMBER 1986
NIOSH ANALYTICAL METHODS: SEE COPPER, 7029; WELDING AND BRAZING FUME,
7200; ELEMENTS, 7300
MEETS CRITERIA FOR PROPOSED OSHA MEDICAL RECORDS RULE FEREAC 47,30420,
82

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

HEALTH HAZARD DATA

ACUTE EFFECTS

MAY BE HARMFUL BY INHALATION, INGESTION, OR SKIN ABSORPTION.
MAY CAUSE SKIN IRRITATION.

CAUSES EYE IRRITATION.

MATERIAL IS IRRITATING TO MUCOUS MEMBRANES AND UPPER
RESPIRATORY TRACT.

EXPOSURE CAN CAUSE:

DAMAGE TO THE LUNGS
STOMACH PAINS, VOMITING, DIARRHEA.

BLOOD EFFECTS

FIRST AID

CONTAMINATION OF THE EYES SHOULD BE TREATED BY IMMEDIATE AND PROLONGED
IRRIGATION WITH COPIOUS AMOUNTS OF WATER.

IN CASE OF CONTACT, IMMEDIATELY WASH SKIN WITH SOAP AND COPIOUS
AMOUNTS OF WATER.

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

CALL A PHYSICIAN.

REMOVE AND WASH CONTAMINATED CLOTHING PROMPTLY.

PHYSICAL DATA

SPECIFIC GRAVITY: 8.940

FIRE AND EXPLOSION HAZARD DATA

EXTINGUISHING MEDIA

DRY CHEMICAL POWDER.

USA
Aldrich Chemical Co., Inc.
940 West Saint Paul Avenue
Milwaukee, Wisconsin 53233
Telephone: (414) 273-3850
TWX: (910) 262-3052 Aldrichem MI
Telex: 26 843 Aldrich MI
FAX: (414) 273-4979

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6 Rue Caporal Claes
B-1030 Brussels
Telephone: (02) 2428750
Telex: 62302 Alchem B

France
Aldrich-Chimie S.a.r.l.
27, Fossé des Treize
F-67000 Strasbourg
Telephone: (88) 327010
Telex: 890076 Aldrich F
FAX: (88) 75 12 83

Japan
Aldrich Japan
Kyodo Bldg. Shinkanda
10 Kanda-Mikuracho
Chiyoda-Ku, Tokyo
Telephone: (03) 258-0155
FAX: (03) 258-0157

United Kingdom
Aldrich Chemical Co., Ltd.
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Gillingham, Dorset SP8 4JL
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Telex: 417238 Aldrch G
FAX: (07476) 3779

West Germany
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Telephone: (07329) 87-0
Telex: 714838 Aldri D
FAX: (07329) 87-39



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M A T E R I A L S A F E T Y D A T A S H E E T

PAGE: 2

CATALOG # 26608-6

NAME: COPPER, POWDER, -40 MESH, 99.5%

SPECIAL FIRE FIGHTING PROCEDURES

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

FLAMMABLE SOLID.

UNUSUAL FIRE AND EXPLOSION HAZARDS

THIS MATERIAL, LIKE MOST MATERIALS IN POWDER FORM, IS CAPABLE OF CREATING A DUST EXPLOSION.

EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

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

INCOMPATIBILITIES

STRONG ACIDS

STRONG OXIDIZING AGENTS

MAY DISCOLOR ON EXPOSURE TO AIR AND MOISTURE.

HALOGENS

ACID CHLORIDES

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS

TOXIC FUMES

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

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

EVACUATE AREA.

WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY

RUBBER GLOVES.

SWEEP UP, PLACE IN A BAG AND HOLD FOR WASTE DISPOSAL.

USE NONSPARKING TOOLS.

AVOID RAISING DUST.

VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

WASTE DISPOSAL METHOD

MATERIAL IN THE ELEMENTAL STATE SHOULD BE RECOVERED FOR REUSE OR RECYCLING.

OBSERVE ALL FEDERAL, STATE & LOCAL LAWS.

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

CHEMICAL SAFETY GOGGLES.

RUBBER GLOVES.

SAFETY SHOWER AND EYE BATH.

NIOSH/MSHA-APPROVED RESPIRATOR.

MECHANICAL EXHAUST REQUIRED.

DO NOT GET IN EYES, ON SKIN, ON CLOTHING.

AVOID PROLONGED OR REPEATED EXPOSURE.

WASH THOROUGHLY AFTER HANDLING.

AIR-SENSITIVE.

IRRITANT.

STORE UNDER NITROGEN.

FLAMMABLE.

KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME.

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

ADDITIONAL INFORMATION

VIOLENT REACTION MAY OCCUR WITH ACETYLENE, AMMONIUM NITRATE, BROMATES, CHLORATES, IODATES, CHLORINE, CHLORINE TRIFLUORIDE, ETHYLENE OXIDE, FLUORINE, HYDROGEN PEROXIDE, HYDRAZINE MONONITRATE, HYDROGEN SULFIDE, HYDRAZOIC ACID, LEAD AZIDE, POTASSIUM PEROXIDE, SODIUM AZIDE, AND SODIUM PEROXIDE. REACTION OF COPPER WOOL, TRICHLOROACETIC ACID IN DIMETHYL SULFOXIDE IS VERY EXOTHERMIC.

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

USA
Aldrich Chemical Co., Inc.
940 West Saint Paul Avenue
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Telephone: (414) 273-3850
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MAR 7 1980

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1387

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing,
Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME MALLINCKRODT, INC.		EMERGENCY TELEPHONE NO. 606/987-7000
ADDRESS (Number, Street, City, State, and ZIP Code) P.O. Box M, Paris, Kentucky 40361		
CHEMICAL NAME AND SYNONYMS ZINC DUST		TRADE NAME AND SYNONYMS
CHEMICAL FAMILY Element	FORMULA Zn	

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					
HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES				%	TLV (Units)

SECTION III - PHYSICAL DATA

Melting Point (°F)	786	SPECIFIC GRAVITY (H ₂ O=1)	7.14
Boiling Point (°F)	1665	PERCENT VOLATILE BY VOLUME (%)	
VAPOR PRESSURE (mm Hg.) @ 487°C	1 mm	EVAPORATION RATE (_____ = 1)	
VAPOR DENSITY (AIR=1)			
SOLUBILITY IN WATER	Insoluble	M.P.	420°C
APPEARANCE AND ODOR	Bluish-gray odorless powder.		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	Not available.	FLAMMABLE LIMITS	LeI	UeI
EXTINGUISHING MEDIA	Smother with suitable powder for Class D fires. (Special mixtures of dry chemicals.)			
SPECIAL FIRE FIGHTING PROCEDURES	Wear self-contained breathing apparatus. (Decomposition fumes are highly toxic.)			

HAZARD INFORMATION: FIRE AND EXPLOSION HAZARDS
Forms explosive mixtures with air. Bulk dust in damp state may heat spontaneously on exposure to air. Contact with acids and alkali hydroxides result in evolution of hydrogen. See SECTION VI and IX.

(Continued on reverse side)

Form OSHA-20
Rev. May 72

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE Nuisance dust - 15 mg./M³ (as total dust)

EFFECTS OF OVEREXPOSURE
A mild skin irritant. Inhalation of dust may cause pulmonary problems.

EMERGENCY AND FIRST AID PROCEDURES
Eyes: Wash with flowing water for 15 minutes. Consult physician. Skin: Wash areas of contact with soap and water. Inhalation: Remove from area of exposure and consult physician.

SECTION VI - REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID High temperatures, moisture.
	STABLE	X	

INCOMPATIBILITY (Materials to avoid)
Alkali hydroxides and acids (liberates hydrogen), sulfur.

HAZARDOUS DECOMPOSITION PRODUCTS
Highly toxic fumes.

HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Sweep up; dispose of in an approved landfill.

WASTE DISPOSAL METHOD

Same as above.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)
NIOSH approved dust respirator.

VENTILATION	LOCAL EXHAUST	SPECIAL
	MECHANICAL (General) X	OTHER

PROTECTIVE GLOVES Yes	EYE PROTECTION Goggles
--------------------------	---------------------------

OTHER PROTECTIVE EQUIPMENT
Full clothing.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
Protect from physical damage and moisture. Store in a cool, drv, ventilated place.

OTHER PRECAUTIONS
Separate from acids, halogenated hydrocarbons and strong alkali hydroxides.

Field sampling plan

FIELD SAMPLING PLAN

**Pre-design Investigations
United Plating Site #4-47-018
Schenectady, New York**

New York State Department of
Environmental Conservation

December 2000

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1. Introduction

1.1. General plan

This field sampling plan (FSP) for the United Plating site contains the procedures for implementing pre-design field investigations described in the NYSDEC-approved work plan dated December 5, 2000. This FSP provides detailed procedures for collecting environmental samples including equipment and personnel requirements, drilling techniques, and equipment decontamination procedures.

1.2. Reconnaissance activities

Reconnaissance activities will precede drilling and sampling at the site to provide additional information for safe site access. Underground utilities, including electric, telephone, cable TV, sewers, water, etc., will be identified prior to drilling or sampling. Public and privately owned utilities will be located by contacting responsible agencies by phone at least 48 hours prior to field activities so their underground utilities can be marked at the site. Other potential on-site hazards such as sharp objects, overhead power lines, and building hazards will be identified during the site reconnaissance visit. On-site and off site utilities, to the extent possible, will be identified for the health and safety of field personnel and to prevent damage to underground utilities during intrusive activities. Coordination with the Underground Facilities Protective Organization (UFPO) and NYSDEC personnel for clearance of subsurface utilities and other services is included in this task.

1.3. Sub-surface soil sampling

Soil samples will be obtained continuously using 4 ½-inch hollow stem auger drilling methods. Continuous split-spoon samples will be collected at 2-ft intervals from the ground surface to the bottom of the boring according to ASTM Method D-1586 in advance of the hollow stem augers. Soil samples will be logged on-site. Boring logs describing

subsurface materials encountered in each of these borings will be prepared by the on-site geologist or hydrogeologist. Descriptions of soil sample texture, composition, color, consistency, moisture content and recovery will also be recorded. Soil samples from these borings will be screened for the presence of VOCs using a portable photoionization detector (PID), as appropriate.

1.4. Sample and field equipment handling

Inspect the equipment to ensure that it is in working order and decontaminate sampling equipment, as appropriate. Note and replace any equipment or materials that are in short supply or are showing indication of wear.

Upon receipt of the sampling containers from the laboratory, inventory the containers to make sure appropriate containers were delivered, check if preservatives have been added, if necessary, and assess the general condition of containers.

Samples will be handled and standard chain of custody procedures will be applied according to procedures presented in the QAPP. Upon collection, samples will be placed in appropriate containers. Samples will be assigned a sample designation identifying sample location, date, and time. Each sample collected for the United Plating Site pre-design investigation will be identified with a unique sample identification (sample ID). Labeled sample containers will be chilled to approximately 4°C, and transported to the analytical laboratory for analysis within 48 hours of sample collection except coolers containing hexavalent chromium analyses. Hexavalent chromium samples require analysis within 24 hours.

For each sample collected, field notes will be completed by field personnel to document details of the sampling event. Photographs of the site taken during the pre-design investigation will include date, and time.

In addition to the sample identification, each sample container will be labeled with the following information:

- site name
- date and time of sample collection
- analysis requested
- client name

All information should also be entered in the field notes in waterproof ink. Sample container labels should be completed with ink containing no organic solvents. Specific details on chain-of-custody protocols and shipping requirements are provided in the QAPP.

1.5. Sample location coordinates

Each of the newly-installed soil borings will be surveyed for horizontal and vertical control and will be incorporated into a Site base map. Existing monitoring wells will be surveyed to the nearest 0.01 feet at the top of the wells riser pipe (measuring point) and top of protective steel casing. Ground surface at each location will be surveyed to the nearest 0.1 feet.

1.6. Equipment decontamination procedures

The drilling program will include decontamination procedures to minimize the potential for introducing contaminants into the borehole or transferring contaminants across the Site.

Prior to sampling, non-dedicated equipment will be washed with potable water and a detergent (such as Alconox). The sampling equipment will then be rinsed with potable water followed by a reagent-grade methanol or isopropanol rinse and finally a deionized water rinse. Additionally, equipment used to collect samples for metals analysis will receive a nitric acid rinse following the deionized water

Reusable, non-dedicated, field equipment (i.e., bowls, spoons, augers, bailers, and filtering equipment) will be cleaned before sampling at each station. Equipment cleaning will consist of a 6-step sequential rinse process:

1. Soapy water rinse and scrubbing with non-phosphate detergent (such as Alconox)
2. Rinse with tap water
3. Rinse with 10% nitric acid
4. Rinse with laboratory reagent water
5. Rinse with methanol or isopropanol
6. Final rinse with deionized water

If samples are not to be analyzed for metals, steps 3 and 4 are not required. Equipment cleaning may take place at the sampling location as long as liquids are contained in pails, buckets, etc. Between rinses, equipment may be placed on polyethylene sheeting. At no time will washed equipment be placed directly on the ground. Equipment will be wrapped in polyethylene plastic or aluminum foil when not in use.

1.7. Health and safety

Health and safety issues associated with this project are addressed in the Health and Safety Plan (HASP) developed for this program. The HASP includes guidance on the use of a respirator for field sampling activities.

2. Handling of investigation-derived materials (waste management plan)

2.1. General

The pre-design activities will produce investigation-derived materials (IDM), including the following:

- Drill cuttings;
- Decontamination fluids and soil which may settle out of such fluids;
- Personnel protective equipment (PPE) and associated debris resulting from the execution of field activities.

The management of these materials is discussed below.

2.1.1. Drill cuttings

Drill cuttings derived from each soil boring will be mixed with bentonite and returned to the borehole from which the material came.

2.1.2. Decontamination fluids

Decontamination fluids will be discharged to the ground surface next to the soil boring location

2.1.3. PPE and associated debris

Used PPE and other associated debris (e.g., ground plastic, tubing, etc.) will be containerized in plastic bags. At the conclusion of field activities, these materials will be transported off-site for disposal at an appropriate facility.

Soil boring log form and protocols

Follow these instructions to complete this form:

1. Descriptive information:

- Color name, Munsell Color Chart, of the logged interval or sample
- Color notation including chroma, hue, value, and qualifiers
- Mottling with abbreviations, descriptors, and criteria for descriptions of mottles. Table 301-1 lists these terms.

Table 301-1. Descriptors for mottling.

Abundance	Size	Contrast
f: few (<2%)	fine (<5 mm)	faint
c: common (2%-20%)	medium (5-5 mm)	distinct
m: many (>20%)	coarse (>15 mm)	prominent

2. Degree of saturation (dry, damp, moist, wet, saturated or combinations). Note depth to ground water table, if observed.
3. Description of density. Count the blows of each 12-inch increment of the split spoon (ASTM-1586-84). Use the values in Table 301-2 to describe the density.

Table 301-2. Terms to describe density.

Cohesive clays		Non-cohesive granular soils	
0-2	very soft	0-3	very loose
2-4	soft	4-9	loose
5-7	firm	10-29	medium dense
8-15	stiff	30-49	dense
16-29	hard	50-80	very dense
30-49	very hard	80+	extremely dense
50-80	extremely hard		

4. Soil description according to Modified Wentworth Scale, Burmister System, ASTM's Unified Soil Classification System (USC), and by structure. These descriptions are listed below.

Modified Wentworth Scale

Geologists typically use the values listed in Table 301-3 to reckon grain sizes.

Table 301-3. Grain size scales - Modified Wentworth Scale.

Grade limits		Grade names	
mm	mm		
4096		very large	
2048		large	
1024		medium	boulders
512		small	
256			
128		large	cobbles
		small	gravel
64			
		very coarse	
32		coarse	
16		medium	pebbles
8		fine	
4		very fine	
2			

Table 301-3. Grain size scales - Modified Wentworth Scale (Continued).

Grade limits		Grade names		
mm	mm			
		very coarse		
1		coarse		
½	0.5	medium	sand	<i>sand</i>
1/4	0.250	fine		
1/8	0.125	very fine		
1/16	0.062			
		coarse		
1/32	0.031	medium		
1/64	0.016	fine	silt	
1/128	0.008	very fine		
1/256	0.004	coarse		<i>mud</i>
		medium		
1/512	0.002	fine	clay size	
1/1024	0.001	very fine		
1/2048	0.0005			
1/4096	0.00025			

Source: Ingram. Cited by AGI data sheet 29.1.

Burmister System

When using the Burmister System, the soil components are described with the terms in Table 301-4.

Table 301-4. Grain size scales - Burmister System.

Soil component	Sieve limit	
	Upper	Lower
Gravel		
coarse	3 inch	1 inch
medium	1 inch	3/8 inch
fine	3/8 inch	No. 10 (2.0 mm)
Sand		
coarse	No. 10 (2.0 mm)	No. 30 (0.590 mm)
medium	No. 30 (0.590 mm)	No. 60 (0.250 mm)
fine	No. 60 (0.250 mm)	No. 200 (0.074 mm)
Silt	No. 200	0.005 mm
Clay	0.005 mm to	0.001 mm
Colloids	finer than 0.001 mm	

Descriptive Terminology

The soils are to be described in the logs according to the criteria listed here. The principal constituents are to be written in capital letters. Other constituents are to be preceded by the descriptive terminology presented in Table 301-5 to denote the percentage by weight of each component.

Table 301-5. Descriptive terminology.

Descriptive terms	Range of proportion
Trace	1-10%
Little	10-20%
Some	20-35%
And	35-50%

ASTM Unified Soil Classification

Coarse grained soils include clean gravels and sands and silty or clayey gravels and sands with more than 50% retained on the No. 200 sieve. Table 301-6 presents the grade limits and grade names used by engineers according to ASTM standards D422-63 and D643-78.

Table 301-6. Grain size scale used by engineers.

Grade limits		Grade names	
mm	inch	U.S. standard sieve series	
305	12.0		boulders
			cobbles
76.2	3.0	3.0 inch	gravel
4.75	0.19	No. 4	medium sand
2.00	0.08	No. 10	
0.425		No. 40	silt
0.074		No. 200	
0.005			clay size

Source: AGI data sheet 29.2

Table 301-7 shows the USC symbols and typical names of coarse grained soils.

Table 301-7. Coarse grained soils: USCS symbols and typical names.

GW	Well graded gravels, gravel-sand mixtures, little or no fines
GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
GM	Silty gravels, gravel-sand-silt mixtures
GC	Clayey gravels, gravel-sand-clay mixtures
SW	Well graded sands, gravelly sands, little or no fines
SP	Poorly graded sands, gravelly sands, little of no fines
SM	Silty sand, sand-silt mixtures
SC	Clayey sands, sand-clay mixtures

Fine grained soils include inorganic and organic silts and clays, gravelly, sandy, or silty clays and clayey silts with more than 50% passing the No. 200 sieve. Table 301-8 shows the USC symbols and typical names of fine grained soils.

Table 301-8. Fine grained soils: USCS symbols and typical names.

ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
OL	Organic silts and organic silty clays of low plasticity
MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
CH	Inorganic clays of high plasticity (residual clays), fat clays
OH	Organic clays of medium to high plasticity, organic silts
Pt	Peat and other highly organic soils

5. Table 301-9 presents soil descriptors.

Table 301-9. Soil descriptors.

- **Calcareous** containing appreciable quantities of calcium carbonate
- **Fissured** containing shrinkage cracks, often filled with fine sand or silt, usually more or less vertical
- **Interbedded** containing alternating layers of different soil types
- **Intermixed** containing appreciable, random and disoriented quantities of varying color, texture or constituency
- **Laminated** containing thin layers of varying color, texture or constituency
- **Layer thickness** greater than 3 inches
- **Mottled** containing appreciable random speckles or pockets of varying color, texture or constituency
- **Parting** paper thin
- **Poorly graded (well sorted)** primarily one grain size, or having a range of sizes with some intermediate size missing
- **Slickensided** having inclined planes of weakness that are slick and glossy in appearance and often result in lower unconfined compression cohesion
- **Split graded** containing primarily two predominant grain sizes with intermediate sizes missing
- **Varved** sanded or layered with silt or very fine sand (cyclic sedimentary couplet)
- **Well graded (poorly sorted)** containing wide range of grain sizes and substantial amounts of all intermediate particle sizes.
- **Modifiers** predominant type, 50% to 100%
 - Modifying type, 12% to 50%
 - With, 5% to 12%
 - Trace, 1% to 5%

6. Table 301-10 presents the terms used to denote the various degrees of plasticity of soil that passes the No. 200 sieve.

Table 301-10. Plasticity.

Descriptive term	Degree of plasticity	Plasticity index range
SILT	none	non-plastic
Clayey SILT	slight	1-5
SILT & CLAY	low	5-10
CLAY & SILT	medium	10-20
Silty CLAY	high	20-40
CLAY	very high	over 40