W92312D

DRAFT
HEALTH AND SAFETY PLAN

PHASE 1 LAGOON AND SURFICIAL SOIL SAMPLING

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

NEW HAMPSHIRE PLATING SITE
MERRIMACK, NEW HAMPSHIRE

HALLIBURTON NUS Environmental Corporation
and
Badger Engineers, Inc.

EPA Work Assignment No. 33-1LG1
EPA Contract No. 68-W8-0117
HNUS Project No. 0772

November 1992

HALLIBURTON NUS
Environmental Corporation

HALLIBURTON NUS Environmental Corporation ENVIRONMENTAL TECHNOLOGIES GROUP	ARCS I DRAFT HEALTH AND SAFETY PLAN NEW HAMPSHIRE PLATING SITE MERRIMACK, NEW HAMPSHIRE	Number W92312D	Page 1 of 1
		Date 11/16/92	Revision 0
		Applicability Project Specific	
		Prepared R. Palermo	
Subject CONTROLLED/RESTRICTED COPY ASSIGNMENT		Approved G. Gardner	

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Robert S. Palermo
Project Manager

George D. Gardner, P.E.
Program Manager

DRAFT HEALTH AND SAFETY PLAN
NEW HAMPSHIRE PLATING COMPANY, MERRIMACK, NEW HAMPSHIRE

SITE:	New Hampshire Plating Company
ACTION:	Draft Health and Safety Plan for HNUS/BEI Personnel
HNUS PROJECT NO.:	0768/0772
LOCATION:	Merrimack, New Hampshire Wright Street
DATE PREPARED:	November 16, 1992
WORK DATES:	November 16, 1992 - September 1, 1993
PREPARED BY:	Robert Palermo/Dennis Dumont, Badger Engineers, Inc. (BEI)

APPROVALS:

The following signatures constitutes approval of this Health and Safety Plan. This plan should not be deviated from without prior written or verbal approval.

REVIEWED AND APPROVED BY: Janet Pallow 11/16/92
HNUS Health and Safety Officer (date)

REVIEWED AND APPROVED BY: _____ _____
BEI Health and Safety Officer (date)

REVIEWED AND APPROVED BY: R PALERMO 11/16/92
BEI Project Manager (date)

HEALTH & SAFETY BRIEFING

I agree to follow the Health and Safety Plan (HASP) and have been briefed on the work activities I will be performing.

Name: ____________________ Name: ____________________

Signature: ____________________ Signature: ____________________

Date: ____________________ Date: ____________________

Name: ____________________ Name: ____________________

Signature: ____________________ Signature: ____________________

Date: ____________________ Date: ____________________

Name: ____________________ Name: ____________________

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1.0 INTRODUCTION

This document has been prepared to outline requisite health and safety procedures for HNUS/BEI field personnel participating in the Remedial Investigation/Feasibility Study (RI/FS) activities on the New Hampshire Plating Company (NHPC) Superfund site. This plan serves to outline waste products and chemical compounds of concern which may be present on-site. Health and safety hazards specific to the proposed RI/FS work are described accordingly in the following sections.

2.0 SITE DESCRIPTION AND BACKGROUND

The NHPC site is located on Wright Avenue in Merrimack, New Hampshire. The site consists of a single building, a parking lot and a lagoon system. The lagoon system was used by the New Hampshire Plating Company to dispose of their plating solutions. The facility has been inactive since 1985.

Between 1962 and November 1985, the New Hampshire Plating Company (NHPC) provided electroplating services to various local industries. The metals used in the process included gold, silver, tin, copper, nickel, cadmium, chromium, iron, lead, manganese and zinc. Process waste included cyanide and various volatile organic compounds. All aspects of the operations were conducted in the

12,500 square foot building. Waste plating bath solutions were gravity discharged into a waste lagoon located approximately 325 feet north of the building (Lagoon 1). The overflow from this half-acre primary lagoon passed into two secondary lagoons (Lagoons 2 and 3). Acids, cyanide waste, metal bath solutions and solvents such as trichloroethylene, toluene and acetone were discharged into the lagoon system on a daily basis throughout the operating life of the plant. The rate of discharge was from 35,000 to 60,000 gallons per day. Records indicate that solvent use was discontinued at the site during the latter part of the 1970's.

As a result of various studies performed at the site, it has been determined that lagoon soil and sludge contained concentrations of metals and cyanide well above background levels. The following contaminants have been identified in the sludge or soil in the lagoons: cadmium, chromium, copper, gold, iron, lead, manganese, nickel, silver, tin, zinc and cyanide. In addition to the above contaminants the following have also been identified in the groundwater: arsenic, barium, selenium, benzene, bromodichloromethane, carbon tetrachloride, chloroform, dibromochloromethane, 1,1-dichloroethane, 1,2-dichloroethylene, dichloromethane, ethylbenzene, mercury, tetrachloroethylene, toluene, trichloroethane, trichloroethylene, 1,1-dichloroethene and xylene.

2.1 Previous Removal Actions Undertaken on the NHPC Site

In 1987, the New Hampshire Department of Environmental Service (NH DES) conducted a removal action at the NHPC facility. The action included treatment of the primary lagoon with lime and a solution of chlorine in an effort to increase the pH of the lagoon contents, thereby decreasing the mobility of metal ions and decreasing the leach rate of the metals into the underlying soil and groundwater. These efforts were an attempt to minimize further soil contamination until a more permanent treatment solution could be implemented.

In June 1987, the NH DES contracted Clean Harbors, Inc. to remove waste materials from the NHPC building. Various plating bath solutions, cyanide salts and other materials used in the electroplating process which were stored in tanks, drums and jars were removed from the building. Sludge material and other sediment which had accumulated on the floors of the plating rooms were also removed and disposed of at off site facilities. Sections of the building were cleaned with sandblasting grit followed by a chlorine/water solution rinse. In addition, soil samples were collected from beneath the cement floor at five different locations.

On May 4, 1990, the U.S. EPA Technical Assistance Team (TAT) entered the building to collect soil samples from the areas previously sampled and to collect samples for asbestos analysis. During the sample collection, the building was screened for volatile organic compounds (VOCs) and combustible gases. No levels of VOC above background levels were detected and oxygen levels were within normal ranges.

The U.S. EPA Region I Emergency Planning and Response Branch (EPRB) began an investigation for a removal action in September of 1989. In order to obtain technical guidance, the On-Scene Coordinator requested assistance from the U.S. EPA Environmental Response Team (ERT) in Edison, New Jersey. In October of 1989, ERT personnel conducted land surveys of the site, collected soil/sludge samples to determine the extent of contamination and investigated treatability options. An ecological assessment was also conducted by ERT to assess the various habitats on the site and to determine the impact of the soil contamination to ecosystems on-site.

The EPRB conducted a limited removal action on-site which involved the excavation of soil and sediment from the lagoons. Approximately 13,600 tons of excavated material was solidified on-site in an ash mortar mix. This soil was encapsulated on-site, to the rear of the NHPC building, in a high density polyethylene (HDP) envelope. Additional material (approximately 861 tons) was

excavated and sent off site for disposal. Approximately 5,600 cubic yards of material excavated from the third lagoon was placed in the southern section of the Lagoon 1. A HDP cap and two feet of clean fill was placed over the soil as a cover. Most of the heavily contaminated lagoon soils were removed during the removal action. However, the removal action did not fully excavate the entire volume of soil necessary to complete the intended removal action.

2.2 RI/FS Site Activities

The current work effort involves investigating the volume of sludge material left in place and/or remaining on-site. This Health and Safety Plan (HASP) addresses the following RI/FS site activities:

- Site walk over
- Sampling the groundwater from monitoring wells located on and around the NHPC site
- Building evaluation
- Lagoon soil sampling
- Sampling surface water, sediment and surficial soils
- Soil boring/Monitoring well installation.
- Standing water removal (pump test)
- Surveying of wells

3.0 KEY PERSONNEL

Personnel supporting site activities are listed below and are identified by their respective project roles:

ROLE/ ASSIGNMENT	NAME	TELEPHONE NUMBER
EPA Remedial Project Manager (RPM)	Richard Goehlert	1-617-573-5742
NH DES Remedial Project Manager	Michael Robinette	1-603-574-9639
BEI Project Manager (PM)	Robert Palermo	1-617-494-7527
BEI Health and Safety Manager (HSM)	Dennis Dumont	1-617-494-7231
BEI Site Safety Officer (SSO)	Michael Gray	1-617-494-7951
BEI Work Party	Kathleen Donovan	1-617-494-6217
BEI Work Party	Dean Gouveia	1-617-494-6223
BEI Work Party	Michael Lotti	1-617-494-6218

4.0 DISCUSSION OF CHEMICAL DATA

Chemical data for contaminants which may be encountered during the conduct of the RI/FS are listed in Appendix A. These contaminants include several heavy metals and low levels of volatile organic compounds (VOCs) used by the NHPC.

Organic and inorganic compounds identified by various media sampling are tabulated on the attached tables in Appendix B titled Chemical Hazards Summary Data. This information was obtained from the R.F. Weston Safety Plan prepared for the NHPC site for U.S. EPA. This data contains information on Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs), Immediately Dangerous to Life or Health (IDLH) concentrations, ionization potentials, and chemical physical properties of compounds known to be present on-site.

The R.F. Weston Site Safety Plan dated 23 May 1990 provides additional site characterization and pertinent health and safety information regarding the NHPC site. This document was reviewed and utilized to the extent feasible to develop the BEI Site Specific HASP.

During the former removal action R. F. Weston conducted a discrete air sampling program to measure airborne concentrations of cyanide,

cadmium and chromium at locations around the site perimeter and within the lagoon area. Review of this data indicates that airborne concentrations of these heavy metals were below their respective PELs, and should not pose an inhalation hazard for personnel supporting the upcoming RI/FS field activities (see Appendix A for sampling results and Appendix B for contaminant PELs).

Monitoring for VOCs also took place during the removal action. VOCs were not detected in the workers breathing zone when monitoring was performed with a photoionization detector (PID).

Analyses of groundwater samples collected from monitoring wells on and around the NHPC site indicate that chlorinated hydrocarbons are present in groundwater at concentrations ranging from 5 to 1,260 parts per billion (ppb). These concentrations should not pose an inhalation hazard in excess of a PEL for personnel supporting the RI/FS field activities.

In summary the likelihood for inhalation exposure exceeding American Conference Of Industrial Hygienists (ACGIH) Threshold Limit Values-Time Weighted Averages (TLV-TWAs), Short Term Exposure Limits (STEL), OSHA PELs or other exposure indices appears remote. The concentrations of volatile organic compounds found on-site in soil and groundwater are not at concentrations to pose an

inhalation hazard to workers working outside. Monitoring during previous site work for VOCs with a photoionization detector, Hydrogen Cyanide (HCN) gas with Draeger Tubes and a HNC detector and toxic heavy metals (by NIOSH Methods) supports this determination.

5.0 SITE HAZARDS

The VOCs and heavy metals identified on-site do not pose any unusual flammable or reactive hazards. A review of the chemical data indicates that VOCs, cyanide and heavy metals identified on the site should not pose an inhalation hazard for field activities planned during the conduct of the RI/FS. However, VOCs heavy metals and cyanide may enter the body by several routes of exposure. These being inhalation, ingestion, absorption through dermal tissue and skin and eye contact.

The lagoon soil sampling is the field activity with the greatest potential for exposure to VOCs and heavy metals. Since the lagoon soil is extremely moist and/or saturated with water it is unlikely that contaminants will become airborne as a particulate. Several of the VOCs identified on-site have moderate to high vapor pressures (VP) (i.e., 1,1-Dichloroethylene VP=591) indicating a greater potential to exist as a vapor at standard temperature and pressure (STP). Considering that the field work is to be conducted

outdoors and that the concentrations of the most volatile compounds are relatively low (5 ppb to 1,260 ppb) the likelihood for exposure to VOCs at an unsafe concentration is remote.

The primary worker hazard associated with the RI/FS field activities is skin absorption and skin and eye contact of soils and groundwater containing heavy metals and VOCs. This will be addressed by the use of protective equipment (i.e., gloves, boots and disposable suits). On-site personnel will also decontaminate their equipment before leaving the site.

5.1 Toxicity Assessment

The following toxicity assessment profiles describe the acute and chronic health effects for compounds identified on-site. This information is also helpful in recognizing the clinical symptoms that may result from exposure to these compounds. The profiles described below address most of the organic and inorganic compounds found on-site.

Arsenic

Elemental arsenic has 3 common forms; silver-grey and metallic looking, yellow and black. Other common arsenic compounds are

white solids. The TLV for arsenic and arsenic compounds is .2 mg/m³. Arsenic is a suspected carcinogen.

Health Hazards

The most sensitive areas to arsenic exposure are the mucous membranes, eyes, nose, mouth, lungs and ears. Symptoms of exposure of these areas are itching and watering. Contact with skin should be avoided. Incidents of acute (short term) inhalation have led to coughing, chest pain, giddiness, headache and weakness leading to nausea and diarrhea. Chronic (long term) inhalation can lead to weight loss, nausea and diarrhea. In extreme cases, numbness and loss of coordination in the hands and feet can occur.

Note that inhalation causes deposition of arsenic compounds (and any other dust) on the mucous membranes, which could later be swallowed, entering the GI tract.

Barium

Barium is a silver-white metal. Other common barium compounds are white amorphous solids. The TLV for barium and its compounds is .5 mg/m³, and the IDLH is 250 mg/m³.

Health Hazards

Exposure to barium compounds can come through inhalation of dusts or skin or eye contact. Exposure leads to irritation of skin, eyes, nose, or throat. When ingested, as through swallowing phlegm, barium compounds increase the contractility of both voluntary and involuntary muscles. This could lead to a reduction in heart rate.

Bromodichloromethane

Bromodichloromethane (BDCM) is an odorless, volatile liquid. This substance, along with dibromochloromethane, trichloroethane, chloroform and tribromomethane are commonly grouped together as total trihalomethanes (TTHM), which are regulated in drinking water.

Health Hazards

BDCM is strongly suspected to be carcinogenic. No exposure limits in air have been established.

Cadmium

Cadmium is a bluish/white metal. It is commonly found in elemental form or as an oxide, a chloride, bromide or acetate. It is extremely corrosion resistant, which accounts for its wide use in industry. It is commonly applied by electroplating. The TLV for Cadmium is 0.05 mg/m³.

Health Hazards

The primary route of entry is through the respiratory tract. Cadmium causes irritation of the nose and throat. Once absorbed, it has a long half-life and is retained in the kidneys and liver. Symptoms of acute exposure include coughing, chest pain, chills, shortness of breath and weakness. Chronic exposure may lead to a loss of the sense of smell, ulcerations of the nose, shortness of breath and kidney damage. Exposure to Cadmium has been linked to an increased incidence of prostate and renal cancer. This effect is greatly enhanced when the subject is a cigarette smoker.

Chromium

Chromium is present in many forms. The most common is chromium trioxide, also called chromic acid, used in chrome plating and aluminum anodizing operations. It has a dark red color, and is a

powdered solid. Other forms are sodium dichromate, a red-orange solid, and potassium chromate, a yellow solid. The most common form of chromium is the +6 oxidation state. Most toxicological data collected deals with this form, as indications are that the +2 and +3 forms are less toxic.

Health Hazards

Some chromium (+6) compounds are known carcinogens. Chromium trioxide and sodium dichromate, both mentioned above, are known to be non-carcinogenic. Potassium chromate is suspected to be non-carcinogenic. It is recommended that if the identity of the chromium compounds is unknown, that they are treated as carcinogens. The TLV for all chromium compounds is 50 mg/m³.

The route of exposure for chromium compounds is inhalation with concomitant ingestion or skin absorption. Acute effects of inhalation are severe irritation of the throat, nose, and lungs. Chromium trioxide can cause serious eye damage. If ingested, chromate and dichromate can cause vomiting and more serious stomach and kidney problems. Chromium compounds can cause vomiting and more serious stomach and kidney problems. Chromium compounds can cause ulceration of the skin. Chronic effects can include ulceration of the nasal septum and respiratory effects which resemble asthma. Liver damage with yellow jaundice is possible.

Skin rashes can occur because chromate breakdown fat tissues. Increased incidence of lung cancer can occur as a result of exposure to calcium, lead, and zinc chromate.

Copper

Copper is reddish brown metal and many copper compounds are bluish or greenish. Most are also odorless. Copper is an excellent conductor of electricity. Copper compounds are used as insecticides, algicides, fungicides, and pigments. The TLV is 1 mg/m^3.

Health Hazards

Copper and its compounds can gain entry into the body through inhalation and skin absorption. Copper salts irritate skin, causing itching and dermatitis, and cause corneal ulcers, cloudiness and conjunctivitis if absorbed into the eyes. Acute exposure to airborne copper causes symptoms similar to a common cold, chills and stuffiness. Small amounts of copper salts induce vomiting, so it is unlikely serious poisoning would occur. Chronic exposure could lead to discoloration of the skin and hair.

Dibromochloromethane

Dibromochloromethane (DBCM) is a clear, odorless, volatile liquid. Its presence in drinking water is regulated, and it is grouped with similar chemicals as total trihalomethanes (TTHMs). See also BDCM. The presence of the TTHMs in the drinking water is a by-product of the chlorination process, and they can be removed by activated charcoal filters. The TLV is 200 ppm.

Health Hazards

Little toxicity data is available on DBCM, but it is a suspected mutagen, and possibly carcinogenic.

Ethylbenzene

Ethylbenzene (EB) is a colorless liquid with a pungent aromatic odor. It is a common industrial solvent, often found with xylene, and is a major component of gasoline. The TLV is 100 ppm and the IDLH level is 2000 ppm.

Health Hazards

Routes of exposure for EB include inhalation, ingestion and eye and skin contact. Symptoms of acute exposure include irritation of the

eyes, nose, throat, and skin. Higher concentrations can lead to weakness, drowsiness, and dizziness. Chronic exposure can lead to a skin rash, since EB is a defatting agent. Persons with impaired pulmonary function may risk aggravation of their condition.

Gold

Certain gold compounds, such as gold chloride, can cause dermatitis. Metallic gold normally does not cause any health problems.

Chronic exposure to gold ores has led to a lung disease resembling bronchitis in some miners. In general, contact with ores, chlorides and other gold salts can cause skin rashes and possibly edema (excess fluid in the body).

Iron

The most common iron compounds are iron dust and iron oxide. The TLV for iron oxide is 5 mg/m³. There are no limits yet for other iron compounds.

Health Hazards

The route of entry of iron products into the body is through inhalation of dust. Inhalation of iron oxide fumes or dust can cause respiratory irritation and can lead to benign pneumoconiosis (a lung disease).

Lead

Lead and other inorganic lead compounds are widely used in industry. The materials include metallic lead, lead salts and lead oxides. These compounds have various appearances, and are frequently white, powdery solids. The TLV for lead compounds is 0.05 mg/m³.

Health Hazards

Lead compounds can enter the body through inhalation/ingestion of dusts or fumes and skin and eye contact. Early symptoms of lead exposure are muscle fatigue and aching, headache and digestive problems such as nausea and constipation. Later symptoms include abdominal cramping, severe constipation and characteristic "wrist drop" (weakness of grip), and "lead line" on the gums. Other symptoms include anemia and weakness. Effects of the central nervous system are brought about by inhalation of large quantities

of lead. These include severe headache, convulsions, coma, and delirium. Kidney function can also be adversely affected.

Manganese

Manganese (Mn) is a reddish grey to silvery soft metal. It is used in drycell batteries and as an oxidizing agent. The TLV is 1 mg/m^3 and the IDLH is 10,000 mg/m^3.

Health Hazards

Mn can enter the body through inhalation/ingestion and to a lesser extent through skin absorption. Once in the blood stream, Mn accumulates in the spleen, liver, and certain nerve cells of the brain or spinal cord. Susceptibility to contamination varies widely among individuals. Symptoms of early stages resemble drunkenness: apathy, headache followed by unaccountable laughter, euphoria and hallucinations. Later speech disturbance, excessive salivation, and tremors of the arms or legs may occur.

Mn contamination is not fatal, but is debilitating.

Mercury

Mercury and organic and inorganic mercuric compounds are widely used in industry. Metallic mercury and its salts are used as plating agents, and organic mercury compounds are used in mildew proofing. The TLV for mercury is .05 mg/m³ and the IDLH is 28 mg/m³.

Health Hazards

Mercury can enter the body through ingestion, inhalation and skin and eye contact. Mercury is a skin and mucous irritant. Acute exposure to high levels of vapors can cause bronchitis. Chronic exposure produces a plethora of symptoms that vary among individuals, but four classic symptoms exist: gingivitis, sialorrhea (excess salivation), increased irritability and muscular tremors. These symptoms may not be present concurrently.

Nickel

Nickel (Ni) is used in alloys (stainless steel). Ni is widely used in plating due to its corrosion resistance. The TLV for Ni is 1 mg/m³.

Health Hazards

Nickel is a known carcinogen. Routes of entry include inhalation of dusts or fumes and eye and skin contact. Exposure can cause "nickel itch" and conjunctivitis. Chronic exposure to dusts cause increased levels of lung and nasal passages. The latency period averages around 25 years. Effects on the coronary muscles, brain and liver tissues have been seen in animal studies.

Selenium

Selenium (Se) exists in three forms: red, amorphous powder; grey; and red crystals. It is used in electronic applications, alloys, and is often present with copper gold, nickel, and silver. The TLV for Se is .2 mg/m^3 and the IDLH is 100 mg/m^3.

Health Hazards

Selenium compounds are aggressive skin irritants, causing blisters and dermatitis. It has been known to cause "pink-eye", and irritation of the upper respiratory tract.

The most striking aspect of Se exposure is a garlic smell on the breath. Also, workers may observe a metal taste in their mouth.

Other effects include pallor, irritability and giddiness. Most major organs are not seriously affected by Se exposure.

Silver

Silver is a lustrous metal used for aesthetic value; and also because of its high electronic currently carrying ability. The TLV for silver dusts and soluble compounds is 0.01 mg/m³.

Health Hazards

Silver is an irritant of the skin, eyes and intestinal tract. Skin discoloration and "pink-eye" have been observed. The danger with silver compounds is that they accumulate in the body. Silver can cause pneumonoconiosis.

Tin

Tin and tin compounds are used in brass, solder, pewter and in plating. The TLV for tin compounds is 2.0 mg/m³ and the IDLH is 400 mg/m³.

Health Hazards

Tin salts are irritants to the skin and mucous membranes. They can be found in very acidic or basic forms depending on the solution used. Tin compounds can irritate the lungs, causing pneumoconiosis, but severe permanent damage is unlikely.

Zinc

Zinc is used in galvanizing, operations and is corrosion and weather resistant. The TLV for zinc compounds is 5 mg/m³.

Health Hazards

Zinc compounds can be corrosive to the skin and mucous membranes. Skin can become sensitized to zinc compounds.

Inorganic Cyanide

The most common inorganic cyanide are potassium cyanide (KCN) and sodium cyanide (NaCN). Both are white solids with a faint almond odor. The TLV is 5 mg/m³, and IDLH is 50 mg/m³.

Health Hazards

Routes of exposure include inhalation, skin absorption and ingestion. The effects of exposure are weakness, headaches, confusion, nausea, eye and skin irritation and slow gasping respiration.

5.2 Biological Hazards

Poison Ivy (Rhus Radicans)

Poison Ivy is found throughout the site. It is recommended that all personnel walking through the site wear a minimum of a tyvek to avoid skin contact.

Contact with Poisonous Plants

1. Characteristic Reactions

   The majority of skin reactions following contact with offending plants are allergic in nature and are characterized by:

   a. General symptoms of headache and fever
   b. Itching

c. Redness

d. A rash

Some of the most common and most severe allergic reactions result from contact with plants of the poison ivy group including poison oak and poison sumac. Such plants produce severe rash characterized by redness, blisters, swelling, and intense burning and itching. The victim also may develop a high fever and may be very ill. Ordinarily, the rash begins within a few hours after exposure, but may be delayed for 24 to 48 hours.

2. Distinguishing Features of Poison Ivy Group Plants

The most distinctive features of poison ivy and poison oak are their leaves, which are composed of three leaflets each. Both plants also have greenish-white flowers and berries that grow in clusters.

3. First Aid

a. Remove contaminated clothing; wash all exposed areas thoroughly with soap and water, followed by rubbing alcohol.

b. Apply calamine or other soothing skin lotion if the rash is mild.

c. Seek medical advice if a severe reaction occurs, or if there is a known history of previous sensitivity.

Ticks

The site is heavily infested with ticks. It is highly recommended that all personnel walking throughout the site wear a minimum of a paper tyvek and latex boot covers. The ticks will standout against the light colors. A tick repellent or insect repellent containing DEET is also suggested.

Ticks can transmit germs of several diseases, including Rocky Mountain spotted fever, a disease that occurs in the eastern portion of the United States as well as the western portion and Lyme disease. Ticks adhere tenaciously to the skin or scalp. There is some evidence that the longer an infected tick remains attached, the greater the chance that it will transmit disease.

First Aid

a. Cover the tick with heavy oil (mineral, salad, or machine) to close its breathing pores. The tick may disengage at once; if not, allow the oil to remain in place for a half hour. Then carefully (slowly and gently) remove the tick with tweezers, taking care that all parts are removed. If possible, do not kill the tick before it has been removed.

b. With soap and water, thoroughly but gently scrub the area from which the tick has been removed, because disease germs may be present on the skin, also wipe the bite area with an antiseptic. (Although use of tweezers for removal of a tick and application of heat to the tick's body, as by a lighted cigarette, often have been attempted, these methods may leave tick parts in the wound or may injure the skin).

c. If you have been bitten, place the tick in a jar labeled with the date, location of the bite and location acquired. If any symptom appears, such as expanding red rash, contact a physician immediately.

Lyme Disease

Lyme Disease may cause a number of medical conditions, including arthritis, that can be treated if you recognize the symptoms early and see your doctor. Early signs may include a flu-like illness, and expanding skin rash, and joint pain. If left untreated, Lyme disease can cause serious nerve or heart problems as well as a disabling type of arthritis.

You are more likely to spot early signs or symptoms of Lyme disease rather than see the tick or its bite. That's because the tick is so small (about the size of head on a common pin or a period on this page and a little larger after they fill with blood), you may miss it or signs of a bite. But, it's also easy to miss early symptoms of Lyme disease.

In its early stage, Lyme disease may be a mild illness with symptoms like the flu. It can include a stiff neck, chills, fever, sore throat, headaches, fatigue, and joint pain. But this flu-like illness is usually out of season, commonly happening between May and October when ticks bite.

Most people develop a large, expanding skin rash around the area of the bite. Some people may get more than one rash. The rash may feel hot to the touch and may be painful. Rashes vary in size,

shape, and color, but often look like a red ring with a clear center. The outer edges expand in size. It's easy to miss the rash and the connection between the rash and a tic bite. The rash develops from three days to as long as a month after a tick bite. Almost one third of those with Lyme disease never get the rash.

Joint or muscle pain may be another early sign of Lyme disease. These aches and pains may be easy to confuse with the pain that comes with other types of arthritis. However, unlike many other types of arthritis, this pain seems to move or travel from joint to joint.

In later stages, Lyme disease may be confused with other medical problems. These problems can develop months to years after the first tick bite.

Early treatment of Lyme disease symptoms with antibiotics can prevent the more serious medical problems of later stages. If you suspect that you have symptoms of Lyme disease, contact your doctor.

Lyme disease can cause problems with the nervous system that look like other diseases. These include symptoms of stiff neck, severe headache, and fatigue usually linked to meningitis. They may also include pain and drooping of the muscles on the face, called Bell's

palsy. Lyme disease can also mimic symptoms of multiple sclerosis or other types of paralysis.

Lyme disease can also cause serious but reversible heart problems, such as irregular heartbeat. Finally, Lyme disease can result in disabling, chronic type of arthritis that most often affects the knees. Treatment is more difficult and less successful in later stages. Researchers think these more serious problems may be linked to how the body's defense or immune system responds to the infection.

5.3 Physical Hazards

The primary physical hazards associated with investigation work described in this Health and Safety Plan are described below.

NHPC Building:

1. The structural integrity of the building itself is questionable. The roof support system is believed to be in poor condition. Process equipment and debris are believed to be present and scattered inside the building.

2. Upon entering the building and conduct of the survey no effort will be made to move, disturb or relocate any

equipment. The roof support system will be examined immediately upon entering the building. The Site Safety Officer and Project Manager will determine if a safety hazard exists. If upon visual examination, at any time during the conduct of the survey, it is determined that the building can not be safely surveyed, the building survey will be terminated immediately.

Other hazards stem from use of and/or working around heavy equipment during the conduct of the field investigation. These physical hazards include working around drilling and excavation equipment. The procedures to be followed to safeguard on-site personnel during use of this equipment are outlined as follows:

Drilling Operations:

1. On-site personnel will position themselves free and clear of rotating and/or advancing downhole equipment (i.e., spinning augers, casing, etc.) during active drilling.

2. Hard hats and safety glasses and/or goggles will be worn when working around drilling equipment. Contaminated drilling fluids and soil cuttings may escape as the borehole is being advanced. Hydraulic lines have also been known to burst during cold weather conditions. Hard

hats and safety glasses will provide adequate body protection from these hazards.

3. When monitoring drilling operations, stand at least three (3) feet from the drilling rig boom, maintaining eye contact and line of sight with the rig operator whenever possible.

Backhoe Operations:

1. On-site personnel shall position themselves in front of the backhoe during active excavation operations. Hand signals should be identified and used during excavation operations.

2. Hard hats and safety glasses and/or goggles will be worn when working around excavation equipment. Steel toe and steel shank work boots are required when crushing or puncture hazards are present. Steel toe work boots provide protection from rolling and falling objects which may be stockpiled near the excavation site.

3. When monitoring excavation operations, stand at least six (6) feet beyond the maximum reach of the excavator arm. Maintain eye contact and line of sight with the operator

whenever possible. Do not approach the backhoe when the equipment is being operated. Signal the operator to power down the backhoe prior to approaching the equipment. The operator's line of sight is limited by several factors. Do not assume that the operator knows your location at all times.

6.0 PLANNED SITE ACTIVITY

The personnel listed below will support the RI/FS field activities. The Site Activity/Task column indicates the activity or activities personnel are expected to perform. The "Approved Up To Level" column indicates the level of protection the individual is approved by BEI to perform based on their training, physician recommendations, and work experience. Only certain BEI personnel are approved to perform work beyond Level B (i.e., Level A work). The Contingency Level column defines the level of protection the individual will be required to work in for their assigned Site Activities. For example, the contingency level D/C indicates that the individual will initiate the site activity in Level D and may be required to upgrade to Level C based on monitoring results and other health and safety requirements discussed in this HASP. The Approved column signifies approval by the BEI HSM for the individual to perform the specified site activity. The Y symbol

indicates that the individual has been authorized by the BEI HSM to perform this work.

SITE ACTIVITY BREAKDOWN

Personnel	Site Activity/Task	Approved Up To Level	Contingency Level	Approved (Y/N)
Rob Palermo	1,2,4-8	B	D/C	Y
	3		B/C	Y
Kathleen Donovan	1,2,4-8	B	D/C	Y
	3		B/C	Y
Mike Gray	1,2,4-8	B	D/C	Y
	3		B/C	Y
Dean Gouveia	1,2,4-8	B	D/C	Y
Michael Lotti	1,2,4-8	B	B/C	Y

Note: All personnel identified above are health and safety trained and participate in a medical monitoring program according to OSHA requirements outlined in 29 CFR 1910.120.

The following site activity/task will be performed by the personnel listed above. The following description is provided for the activity/task listed under the Site Activity/Task column referenced above.

Task	Site Activity/Task Description
1	Site Walk Over: The site walk over will be over the entire site but is a non-intrusive effort. No sampling and/or direct contact with contaminated material is expected.
2	Groundwater Sampling: Sample the monitoring wells located on and around the NHPC site. Work involves collecting groundwater samples for CLP SAS/RAS analysis for hazardous substance list compounds. Three well volumes will be purged from the wells using submersible and hand operated pumps.
3	Building Evaluation: The evaluation of the NHPC building is a non-intrusive effort to determine if waste and process material remain in the building and to evaluate the extent of contamination residing in the building. No sampling and/or direct contact with contaminated materials or process waste is expected.
4	Lagoon Soil Sampling: The Phase I efforts require the collection of shallow surficial soil samples immediately below the clean fill in the four

lagoons. In Phase II of this task, soil borings will be completed to a maximum depth of 13 feet within the lagoons. Split-spoon soil samples will be collected at 3-foot intervals, below the clean fill.

5 Surface Water, Sediment, and Surficial Soil Sampling: Collect surface water and sediment samples from the Merrimack River and Horseshoe Pond, located immediately east and south from the NHPC site. Surficial soil samples will be collected from on-site locations in the vicinity of the NHPC building and lagoons.

6 Soil Boring/Monitoring Well Installation: A total of 30 soil borings will be completed on and around the site. Twenty-four of the soil borings will be completed as off-site monitoring wells. Six borings will be completed around the NHPC building.

7 Standing Water Removal: Standing water in lagoon 2 and 3 will be removed prior to sample collection. High-flow gasoline powered centrifugal pumps will be used to evacuate the standing water from one location to another.

8 Surveying of Wells: A Top-of-casing elevation survey will be performed to establish groundwater elevations at the site. Lateral locations of the new wells will also be surveyed.

7.0 ANTICIPATED AREAS OF CONTAMINATION AND IMPACTED MEDIA

Contamination is expected to be encountered in the following media:

Soil Surficial soil/sludge was not completely remediated from the lagoon area. Sludge contains heavy metals (chrome, lead, cadmium, and possibly low concentrations of volatile organic compounds, etc.).

Air Airborne particulate matter containing heavy metals may be a concern if vegetative cover does not exist in areas where contamination may be present. Most of the contaminated soil in the lagoon area is saturated with water. Prior sampling results for metals indicates that airborne emissions of particulate matter have not been a problem to date at the site (see attached data in Appendix A).

Airborne particulate matter containing heavy metals may be a concern in the NHPC building. Previous activities

in the building included the removal of process waste and plating solutions, dust and sediment, as well as, sandblasting and rinsing sections of the building walls with a water and chlorine solution.

Water — Groundwater may contain residual concentrations of heavy metals and volatile organic compounds. It is not anticipated that compounds will be present in groundwater at elevated levels.

The standing water in the lagoons is not believed to be contaminated.

Comments — Exposure concerns should be minimal for site activities. Site has already been partially remediated. Some contamination is still present on-site in the former lagoon area but lagoons are covered and VOCs concentrations are believed to be low (5 - 1,260 ppb range). Sludge material and other sediments which accumulated on the floors of the plating rooms, as well as plating solutions, were removed and disposed of off-site. Skin and eye contact will be a concern for workers supporting the surface water, groundwater, sediment and soil sampling. Protective clothing will be utilized during all sampling and drilling activities.

8.0 AIR MONITORING INSTRUMENTATION

On-site air quality monitoring will be performed in the breathing zone for the volatile organic compounds. Air monitoring will involve the use of portable instruments in the areas where the RI/FS tasks are performed.

The following equipment shall be used for air monitoring; portable photoionization detector (PID), O_2/Combustible Gas Meter (CGM) and a Drager Bellows Pump. Table 8-1 below identifies monitoring required by Site Activity/Task. The PID and O_2/CGM will be used, maintained and calibrated in accordance to the manufacturer's instructions. Instruction log books are maintained by HNUS/BEI and will be signed out and brought into the field for use and reference. The Drager pump is not calibrated, but will be checked prior to field use for leakage according to the manufacturer's instructions.

8.1 Air Monitoring Procedures

During all site activities, the breathing zone will be monitored for organic vapors using a portable PID, equipped with a 10.6 or 11.7 electron volt (eV) lamp. Respiratory action levels based on the results of the air monitoring program for VOCs are discussed in Section 8.1.1.

TABLE 8-1
INSTRUMENT MONITORING REQUIREMENTS
FOR RI/FS FIELD ACTIVITIES

Site Activity/Task	Instrument Monitoring Required
1 - Site Walk Over	PID
2 - Groundwater Sampling	PID and Drager
3 - Building Evaluation	PID, O2/CGM and Drager
4 - Lagoon Soil Sampling	PID
5 - Surface Water, Sediment and Surficial Soil Sampling	PID
6 - Soil Boring/Monitoring Well Installation	PID and Drager
7 - Standing Water Removal	PID
8 - Surveying Of Wells	PID

Notes: PID = Photoionization Detector with 10.6 or 11.7 electron volt lamp
O2/CGM = Oxygen and Combustible Gas Meter
Drager = Drager Tubes For Hydrogen Cyanide

For the building evaluation, the breathing zone will be monitored for hydrogen cyanide (HCN), in addition to organic compounds. Monitoring locations are discussed in Section 9.0. Drager detection tubes with a detection sensitivity of 2 to 30 ppm will be used. These tubes do not have known interference problems with other chemicals that may have been present in the building during its operation. If no HCN is detected, then personnel within the building during the evaluation survey will downgrade to Level C. If at any time during the building survey the concentration of HCN exceeds background or 1 ppm, the building will be evacuated. Level B will be required to complete the survey and/or reenter the building.

Oxygen concentrations and Lower Explosive Limits (LEL) will also be monitored during the building survey using the O_2/CGM. The O_2/CGM meter reads the percent of LEL on a scale of 0 to 100%. The LEL is the minimum concentration of gas mixture in air that will ignite or combust if an ignition source is applied. Acceptable O_2 concentrations are between 19.5 and 22%, and LEL measurements less than 15% of the scale reading. If the oxygen concentration falls below 19.5 percent or if the LEL reading exceeds 15 percent, the work area will be evacuated immediately. Work will not continue and the building will not be reentered until the condition is reevaluated by the BEI HSM and PM.

8.1.1 Respiratory Protection Action Levels

The following action levels for HNUS/BEI personnel have been established based on the lowest TLV/PELs for volatile organic compounds (VOCs) known to exist at the NHPC site. The action levels will be used as the basis for upgrading personal protection equipment for on-site personnel. Air purifying respirators will not be used if hydrogen cyanide gas is present. Level B protection employing the use of a Self Contained Breathing and/or Dual Purpose Apparatus will be required if HCN is present during site monitoring.

The Maximum Use Concentration (MUC) for Air Purifying Respirators used below in Level C (MUC=50 PPM) was calculated by multiplying the respirator Protection Factor (PF=50) times the lowest TLV/PEL of the VOC believed to be present on-site (TLV/PEL=1 PPM for Benzene).

During intrusive activities (i.e., drilling, soil sampling) the atmosphere will be surveyed in the breathing zone at a minimum of once every 15 minutes and then continuously if intermittent readings are detected. During non-intrusive activities (i.e., site walk over, well survey) the breathing zone will be surveyed at a minimum of once every 30 minutes. Upon detection of a contaminant in the breathing zone, the breathing zone will be surveyed until

contaminant levels return to background levels. Upon detection of noxious odors, the breathing zone will be surveyed.

Intermittent readings are defined as contaminant levels that are detected more than once in the breathing zone on the PID within a 60 minute time period. Continuous contaminant readings are defined as a sustained reading above established background levels for five minutes or more.

Level D

No form of respiratory protection is required:

- When no intermittent readings are detected in the breathing zone on the portable survey instrument above established background levels. These instruments include the photoionization detector, O2/CGM and Drager Tubes for HCN when required. Care should be taken by the user of the monitoring instrument not to include contaminant readings from exhaust of machinery and petroleum powered equipment in the area (i.e., drilling rigs).

- When no uninterrupted continuous contaminant readings of VOCs are detected in the breathing zone greater than the established background levels.

Level C

Full-face air-purifying respirator (APR) equipped with MSA Combination Cartridges (GMC-H) is required:

- When intermittent readings on the PID are greater than established background readings, but less than 50 ppm.

- When uninterrupted continuous contaminant readings of VOCs are detected in the breathing zone greater than established background levels, but less than 15 ppm.

- When the presence of airborne particulate matter and dust are observed in the breathing zone of site personnel. The appropriate cartridges MSA GMC-H have been chosen to allow for protection from both airborne particulate matter and VOC's.

- At any time workers detect noxious odors or if there is a concern for ones personal health and safety.

Level B

Self-Contained and/or Dual Purpose Breathing Apparatus (SCDPBA) is required:

- When intermittent readings detected on the PID are greater than 50 ppm, but less than 1,000 ppm. If levels exceed 1,000 ppm, leave the area and notify the FOL, HSM and the PM.

- When uninterrupted continuous contaminant readings (i.e. sustained over a 5 minute period) of VOCs are detected in the breathing zone greater than 15 ppm, but less than 500 ppm. If levels exceed 500 ppm, leave area and contact the field operations leader and project manager.

- If levels exceed 1,000 ppm, leave area and notify BEI HSM and PM.

Level B will also be required when any one of the following conditions exist:

- Available APR does not efficiently filter out known site contaminants.

- When the atmosphere contains less than 19.5% oxygen as measured with the O2/CGM.

- When contaminant concentrations exceed Immediately Dangerous to Life or Health (IDLH) values listed in Appendix B.

Level B will be the highest level of protection worn by HNUS/BEI personnel at the NHPC site.

9.0 HEALTH AND SAFETY REQUIREMENTS FOR RI/FS SITE ACTIVITY/TASK

Standard operating procedures and health and safety measures will be followed by all on-site personnel supporting the RI/FS field activities. The levels of protection will be upgraded based on the results of monitoring and/or conditions as described in Section 8.1.1. of this HASP. The levels of protection referenced below and requisite personal protective equipment (PPE) are described below on Table 9-1 for the various field activities.

9.1 Standard Safety Practices

Standard work practices are to be followed throughout the execution of the field work. The following requirements apply:

- Eating, drinking, chewing gum, or smoking is not permitted on-site.

- Personnel working around heavy equipment will use hand signals to communicate with equipment operators.

TABLE 9-1
LEVELS OF PROTECTION FOR
PERSONAL PROTECTION EQUIPMENT (PPE)
RI/FS FIELD ACTIVITIES
NEW HAMPSHIRE PLATING COMPANY SITE
MERRIMACK, NEW HAMPSHIRE

LEVEL B

Level B PPE includes all the equipment listed for Level D and the following:

- Open circuit, positive pressure-demand Self Contained and/or Dual Purpose Breathing Apparatus (SCDPBA),
- Two-way radio communication.

LEVEL C

In addition to those items listed for Level D, Level C PPE includes:

- MSA Full Face Ultra twin respirator with GMC-H combination cartridges,
- Two-way radio communication.

LEVEL D

- Hard hat (to be worn during lagoon sampling, building evaluation, soil boring and monitoring well installation activities),
- Steel toe/steel shank boots,
- Outer disposable latex boots,
- Outer Neoprene or Nitrile gloves,
- Inner vinyl/latex gloves,
- Polyethylene Tyvek Suits,
- Wrists and ankle openings taped,
- Safety goggles/glasses (to be worn during groundwater sampling).

- If during the conduct of the field investigation an unforseen condition develops (i.e., utility or drums are encountered) all work will stop and the BEI HSO and PM will be contacted immediately.

- BEI personnel will receive a health and safety briefing before performing any work on-site. Personnel will be trained and actively enrolled in a medical monitoring program in compliance with OSHA 29 CFR 1910.120.

- Additional information regarding site conditions and/or contamination encountered during the conduct of the RI by on-site personnel will be communicated to the HSO and PM immediately. This information may be used to reevaluate safety measures and levels of protection previously established for site work.

- Negative pressure tests (NPTs) will be performed on Air Purifying Respirators before the the respirator is donned. NPTs are performed with the respirator on and properly adjusted. NPTs are performed by sealing off both inhalation valves by placing the palm of both hands over the left and right filter cartridge slot face openings. Negative pressure inside the respirator will

result from normal inhalation. While blocking the filter cartridge slot face openings inhale and hold breath for approximately six (6) seconds. Respirator will collapse inwardly and maintain its position. If respirator does not collapse attempt to readjust the harness strap adjustments and try the NPT again. Do not use the respirator unless the NPT is successful.

- Hearing protection will not be required during the conduct of the RI/FS field activities. The noise levels are not expected to exceed the OSHA eight (8) hour exposure limit of 90 dB(A) on the A scale.

- No drilling or excavation will be performed within 20 feet of over head powerlines. All underground utilities will be positively identified and marked on the site prior to drilling or excavating.

- A copy of the attached OSHA poster must be permanently posted at each work site.

9.2 Health and Safety Measures

The following health and safety measures have been established for personnel supporting the field investigation under this RI. These

measures are task specific and describe safety equipment and procedures to be followed during the conduct of the work. Personnel must also be aware of emergency evacuation procedures for the Jones Chemical Company situated adjacent to the NHPC site. These procedures are described in Section 11.6 and pertain to all of the RI/FS site activities/tasks (Tasks 1-8) noted below. Prior to the initiation of any work on-site the procedures described in Section 11.6 must be addressed.

Task 1 (Site Walk Over)

Personal protection equipment (PPE) for this activity will consist of disposable outer boots and inner latex or vinyl gloves. Do not attempt to disturb soil and/or collect any samples. The building is not to be entered as part of the site walk over.

Task 2 (Groundwater Sampling)

At a minimum, level D PPE (Table 9-1) will be worn during this task. Well air headspace will be screened with a photoionization detector for the presence of volatile vapors and/or gases immediately upon removal of the well security casing cover. HCN measurements using Drager tubes will be taken from the workers breathing zone at Monitoring Well OHM-1 located on the south side of Lagoon 1.

Task 3 (Building Evaluation)

For the initial reconnaissance, personnel entering the building will be suited in Level B (see Table 9-1). At least two people will enter the building in Level B, maintaining radio contact with personnel outside the building, via two-way radios. At least one person will remain outside the building prepared to enter the building in Level B, if required. The atmosphere in the Main Shop area, former laboratory area and dock area will be analyzed for cyanide using Drager tubes and for oxygen (O_2) and combustible levels using an O_2/Combustible Gas Meter (CGM). If no cyanide is detected and the O_2/CGM levels are within acceptable limits (i.e. O_2 concentration between 19.5% and 22% and the Lower Explosive Limit (LEL) is less than 15% of scale reading), then personnel will downgrade to Level C. Oxygen and combustible levels are to be monitored periodically while the building is being surveyed. If the O2/CGM and HCN readings are not maintained while in Level C (as described above) the building will be evacuated. If the building is reentered it will be performed in Level B.

Task 4 (Lagoon Soil Sampling)

At a minimum, level D PPE is required during the lagoon soil sampling.

Task 5 (Surface Water, Sediment and Surficial Soil Sampling)

At a minimum, level D PPE will be worn when on-site work is conducted. The breathing zone will be monitored with a photoionization detector for the presence of VOCs.

Task 6 (Soil Boring/Monitoring Well Installation)

At a mimimum, level D PPE will be worn during the soil boring/monitoring well installation program. The breathing zone will be monitored with a photoionization detector for the presence of VOCs. HCN measurements using Drager tubes will be taken from the workers breathing zone during drilling of soil borings BEI-1B and BEI-2B located around the NHPC building. HCN measurements will be taken from the worker's breathing zone when the borings have advanced to a depth of approximately four (4) feet.

Task 7 (Standing Water Removal)

At a minimum, level D PPE will be worn during this field activity.

Task 8 (Surveying of Wells)

Wear disposable outer boots and disposable inner latex or vinyl gloves. Disposable coveralls, taped to boots, are recommended for protection from tick bites.

9.3 Site Control Measures

Various activities will be undertaken in each of the separate work areas. Each location will involve a separate site set-up. The exclusion zone will be designated as the specific sampling, drilling, or other such work location. During drilling work, this area will be designated by the use of ropes, flagging, or cones to control pedestrian traffic and the entrance of unauthorized personnel. Each work location will also contain a personnel decontamination station, as part of the contamination reduction corridor (CRC). The Support Zone, where the administrative, communications, and other support services will be based, will be on a controlled area off the site or on the far end away from site contamination. An area shall also be designated for heavy equipment decontamination.

10.0 DECONTAMINATION

Disposable personal protection equipment (PPE) will be collected and discarded in a plastic trash bag and disposed of without any restrictions. Decontamination is not required for Level D. Level D PPE will be disposed of in plastic trash bags. Bagging of instruments in transparent plastic bags will not be required. The decontamination procedure for Level B and C is as follows;

Station 1 Equipment Drop:

Deposit equipment used (sampling devices, monitoring instrumentation, radios, etc.) on plastic drop cloth. Electronic instruments will be cleaned in the field by wiping off the instrument's outer surface with a moist paper towel. Sampling equipment will be decontaminated by using Alconox, water, Methanol and water as described in the Sampling and Analysis Plan (SAP) for the planned site activities.

Station 2 Outer garment, boots and glove wash:

Scrub outer garments, boots and gloves with water and alconox solution. Rinse with clean water.

Station 3 — Outer boot and glove removal:

Remove tape around boots and gloves and deposit in trash bag, if used. Remove outer boots and glove and deposit in trash bag.

Station 4 — Respirator and SCBA removal, if used:

For SCBA - While still wearing facepiece, disconnect facepiece breathing tube from the regulator, remove backpack and place on table. Close off tank cylinder valve and disconnect high pressure air hose from cylinder valve and proceed to next station.

For APR - Remove cartridges and deposit in plastic zip lock bag.

Station 5 — Outer garment and inner glove removal:

Remove disposable suit and inner gloves and place in trash bag.

Station 6 — Facepiece removal, if APR or SCBA worn:

Remove facepiece or APR and rinse in potable water. The facepiece or APR is to be disassembled and sanitized at the HNUS warehouse according to the manufacturer's instructions.

Station 7 Field wash:

Using a water and alconox solution, wash hands and face. Rinse with clean water and dry with paper towels.

Decon water used to clean equipment will be disposed of on-site.

11.0 EMERGENCY RESPONSE PROCEDURES

If any unforeseen condition is encountered at the site, the BEI HSO and PM should be contacted immediately. The first concern during any emergency is the safety and health of the work party. The first action taken should address this concern. It is essential that site personnel be prepared in the event of an emergency. Emergency situations that may be encountered at the NHPC site may take the form of; illnesses or injuries, chemical exposure, releases of harmful contaminants, or sudden changes in the weather. The following sections outline the general procedures for emergencies. Emergency information should be posted as appropriate.

11.1 Personnel Roles and Lines of Authority

The BEI Field Operations Leader (FOL) shall be responsible for the overall direction and implementation of this emergency plan, and for overall coordination of any emergency response actions.

The BEI Site Safety Officer (SSO) shall serve as assistant and alternate to the FOL and shall provide health and safety input during emergencies.

The FOL or alternate is responsible for notifying the appropriate outside emergency assistance, as needed. Emergency information is provided below.

11.2 Emergency Contacts for the New Hampshire Plating Company Site

Fire:	Merrimack (603) 424-5557 or 911
Police:	Merrimack (603) 424-2222 or 911
Ambulance:	Merrimack Ambulance Service (603) 424-2222 or 911

Hospital #1: St. Joseph's Emergency in Merrimack, Open from 0900-2100 hrs, 365 days a year.

Address: 383 Daniel Webster Highway (Route 3), Merrimack, New Hampshire

Telephone: (603) 424-4632 Chemical Trauma Capabilities? Yes

Hospital #2: Nashua Memorial Hospital

Address: 8 Prospect Street, Nashua, New Hampshire

Telephone: (603) 883-5521 Chemical Trauma Capabilities? Yes

Directions from the Site to Hospital #1 (see Appendix C):

Exit the site and take a right onto Wright Avenue. At the end of Wright Avenue take a left onto Daniel Webster Highway (Route 3). The hospital is immediately on the right.

Directions from the Site to Hospital #2 (see Appendix C):

Exit the site and take a right onto Wright Avenue. At the end of Wright Avenue take a left onto Daniel Webster Highway (Route 3) and follow into Nashua. Take the second left (Prospect Street) after passing Rte. 111.

Poison Control Center: 1-800-562-8236

Additional Emergency Numbers

National Response Center	800-424-8802
Center for Disease Control	404-488-4100 (24 hr)
U.S. EPA Region I	617-223-7265 (24 hr)
AT&F (Explosives Information)	800-424-9555
Chemtrec	800-424-9300
New Hampshire Department of Environmental Services	603-271-3503 1-800-852-3411 (after hours)
EPA Environmental Response Team	201-321-6660
Badger Project Manager (Robert Palermo)	617-494-7527
Badger Deputy Project Manager (Phoebe Call)	617-494-7833
Badger Environmental Health and Safety Manager (Dennis Dumont)	617-494-7231

ARCS I Health and Safety Officer 508-658-7899
(Janet Pillion)

11.3 Site Security and Control

Site control will be employed during site activities to prevent or reduce the migration of potentially contaminated materials and to prevent the entry of unauthorized personnel into the work area. The site will be secured by locking the fence gates after leaving the site. During work at the NHPC site the gate will be closed but not fully secured by a lock.

If HNUS/BEI or equipment are exposed to contamination, the project team shall ensure that proper decontamination procedures are followed. All decontamination liquids shall be contained to prevent migration outside the decontamination area.

11.4 Response Procedures

The information provided in this subsection is presented as a guideline to assist the FOL and SSO in a safe and effective response to anticipated site emergencies. This information is in no way designed to take the place of reasonable decisions based on incident-specific information.

11.4.1 First Priority

Prevent further injury or illness by:

- Protecting response personnel
- Isolating the scene to authorized personnel only
- Rescuing the injured party
- Notifying outside emergency assistance

11.4.2 Second Priority

Provide first-aid to those persons with life-threatening injuries or illnesses.

11.4.3 Third Priority

Alleviate the immediate hazards associated with the area of concern.

11.4.4 Fourth Priority

Provide first-aid to those persons with non-life threatening injuries or illnesses and further efforts to alleviate the hazards.

11.4.5 Last Priority

Complete an incident report, critique the response and prevent recurrence.

All persons with known or suspected chemically related injuries or illnesses shall be immediately examined by a licensed physician.

11.5 Decontamination and First-Aid

Decontamination of injured or ill personnel shall consist of removing contaminated PPE. If worker's clothing is grossly contaminated, remove them to prevent chemical exposures and wrap the injured party in a blanket.

First-aid shall be conducted by trained personnel.

11.6 Emergency Evacuation Procedures for Jones Chemical Company

The Jones Chemical Company is located adjacent to the NHPC site to the north and west. As part of the RI/FS field activities, groundwater and surficial soil samples may be collected at the Jones Chemical Company site. All personnel the area should be aware of their chemical usage. The three common chemicals

encountered at the Jones Chemical site are chlorine, sulfur dioxide and ammonia. Attached to this HASP, in Appendix E, are safety rules and OSHA worker information concerning the potential chemical hazards which may exist at the Jones Chemical site.

HNUS/BEI field personnel will sign in at the Jones Chemical office during any visit to the NHPC site and/or to the Jones Chemical property. This must be done so that, in the event of a chlorine leak, Jones Chemical personnel are aware that HNUS/BEI personnel are on-site. Since chlorine can be lethal at very low concentrations, HNUS/BEI field personnel are required to bring Air Purifying Respirators (APR) with chlorine cartridges (MSA GMC-H) or obtain a mouthpiece APR with chlorine cartridges from the Jones Chemical Company. The respirators are to be used for escape purposes only.

Prior to any site activities, the BEI Field Operations Leader (FOL) will determine an evacuation area to go to in the event of a release from the Jones property. This area is to be located 90° from the direction of the wind (i.e., crosswind). There are windsocks and flags on the Jones property which will indicate wind direction. Jones Chemical personnel should be consulted to determine if there is a prevailing wind direction.

In the event of a chlorine leak, sirens will sound. Don the APR and **evacuate the area immediately**, as the cartridges do not provide for long term protection. Do not take the time to put equipment away or lock the on-site gates. Go to the pre-designated evacuation area and remain there until all on-site personnel have arrived at that location. The Field Operations Leader (FOL) will identify personnel missing and immediately notify local emergency response personnel as to who may still be present on-site.

APPENDIX A

APPENDIX A

CONSTITUENTS DETECTED AT THE NEW HAMPSHIRE PLATING COMPANY SITE

"DRAFT"

AFTER ACTION REPORT
NEW HAMPSHIRE PLATING COMPANY SITE
MERRIMACK, NEW HAMPSHIRE

February 27, 1989 Through February 5, 1992

Prepared For:

U.S. Environmental Protection Agency
Emergency Planning and Response Branch
60 Westview Street
Lexington, MA 02173

CONTRACT NO. 68-WO-0036

TAT 01-N-01025

TDD NO. 01-9010-07M

Prepared By:

ROY F. WESTON, INC.
Technical Assistance Team
Region I

May 1992

"DRAFT"

TABLE 2

AIR MONITORING SUMMARY DATA
NEW HAMPSHIRE PLATING COMPANY SITE
MERRIMACK, NEW HAMPSHIRE

JUNE 13, 1990 - NOVEMBER 16, 1990

Station Number or Location	Sample Number	Chain of Custody Number	Date Collected	RESULTS		
				Total Cyanide	Cadmium	Chromium
				(mg/M3)	(mg/M3)	(mg/M3)
	A-001	86747	06/13/90	< 0.00001	—	—
	A-003	86747	06/13/90	< 0.00001	—	—
	A-005	86747	06/13/90	—	< 0.00058	< 0.00233
	A-006	86747	06/13/90	—	< 0.00059	< 0.00235
	A-007	86747	06/13/90	< 0.00001	—	—
	A-008	86747	06/13/90	< 0.00001	—	—
	A-009	86747	06/13/90	—	< 0.00040	< 0.00140
	A-010	86747	06/13/90	< 0.00001	—	—
	A-011	86747	06/13/90	—	< 0.00040	< 0.00160
	A-012	86747	06/13/90	< 0.00001	—	—
	A-013	86748	06/13/90	—	< 0.00034	< 0.00137
	AP-014	86748	06/13/90	< 0.00001	—	—
	AP-015	86748	06/13/90	—	< 0.00090	< 0.00350
	AP-017	86748	06/13/90	—	< 0.00810	< 0.03220
	A-018	86748	06/13/90	—	< 0.00030	< 0.00120
	A-024	86748	06/13/90	—	< 0.00025	< 0.00100
	A-025	86748	06/13/90	< 0.00500	—	—
	AP-026	86750	06/14/90	—	0.00100	0.00110
	AP-027	86750	06/14/90	< 0.00001	—	—
	AP-028	86750	06/14/90	—	< 0.00020	< 0.00100

NOTES: Locations of perimeter and floating air monitoring stations are depicted in Figure 4.

P = Permanent perimeter station
F = Floating Station
RT = Personnel Station
CAT-225 = Moving station inside lagoon system
CAT-936 = Moving station inside and outside of lagoon system
— = Not Analyzed
[BLANK] = No station number or location assigned

"DRAFT"

TABLE 2 (continued)

AIR MONITORING SUMMARY DATA
NEW HAMPSHIRE PLATING COMPANY SITE
MERRIMACK, NEW HAMPSHIRE

JUNE 13, 1990 - NOVEMBER 16, 1990

Station Number or Location	Sample Number	Chain of Custody Number	Date Collected	RESULTS		
				Total Cyanide (mg/M3)	Cadmium (mg/M3)	Chromium (mg/M3)
	AP-029	86750	06/14/90	< 0.000004	---	---
	A-033	86750	06/14/90	0.00001	---	---
	A-034	86750	06/14/90	---	< 0.00030	< 0.00120
	A-035	86750	06/14/90	< 0.00001	---	---
	A-036	86750	06/15/90	---	< 0.00030	< 0.00120
	A-037	86750	06/15/90	< 0.00001	---	---
	A-038	86750	06/15/90	< 0.00001	< 0.00000	---
	A-039	86782	06/15/90	---	< 0.00030	< 0.00120
	AP-040	86782	06/15/90	---	< 0.00030	< 0.00130
	AP-041	86781	06/15/90	---	< 0.00090	< 0.00130
	AP-042	86781	06/15/90	---	< 0.00030	< 0.00130
	AP-043	86781	06/15/90	< 0.00002	---	---
	A-044	86781	06/15/90	< 0.00001	---	---
	A-045	86781	06/15/90	---	< 0.00040	< 0.00160
	A-046	86781	06/15/90	---	< 0.00031	< 0.00120
	A-047	86781	06/15/90	< 0.00001	---	---
	A-048	86781	06/15/90	0.00001	---	---
	A-049	86781	06/15/90	---	< 0.00035	< 0.00140
	A-050	86782	06/15/90	---	< 0.00025	< 0.00100
	A-051	86782	06/15/90	< 0.00500	---	---
CAT-225	A-052	86775	06/18/90	---	< 0.00100	< 0.00100
CAT-225	AP-053	86775	06/18/90	< 0.01000	---	---
	AP-054	86775	06/18/90	---	< 0.00100	< 0.00100
PUGMILL	AP-055	86775	06/18/90	< 0.01000	< 0.00000	---
P4	A-056	86775	06/18/90	---	< 0.00100	< 0.00100
P4	A-057	86775	06/18/90	< 0.01000	---	---
P1	A-058	86775	06/18/90	< 0.01000	---	---
P1	A-059	86775	06/18/90	---	< 0.00100	< 0.00100
P3	A-060	86775	06/18/90	< 0.00100	---	---
P2	A-061	86775	06/18/90	< 0.01000	---	---

Explanation of codes can be found on page one of this table.

TABLE 2 (continued)

"DRAFT"

AIR MONITORING SUMMARY DATA
NEW HAMPSHIRE PLATING COMPANY SITE
MERRIMACK, NEW HAMPSHIRE

JUNE 13, 1990 - NOVEMBER 16, 1990

Station Number or Location	Sample Number	Chain of Custody Number	Date Collected	RESULTS		
				Total Cyanide	Cadmium	Chromium
				(mg/M3)	(mg/M3)	(mg/M3)
P3	A-062	86776	06/18/90	—	< 0.00100	< 0.00100
P2	A-063	—	06/19/90	— SAMPLE FELL OFF —		
	AP-064	86777	06/19/90	—	< 0.00100	< 0.00100
CAT-225	AP-065	86777	06/19/90	—	< 0.00100	< 0.00100
P4	A-066	86777	06/19/90	—	< 0.00100	< 0.00100
P1	A-067	86777	06/19/90	—	< 0.00100	< 0.00100
P3	A-068	86777	06/19/90	< 0.01000	—	—
F1	A-069	86777	06/19/90	—	< 0.00100	< 0.00100
F2	A-070	86777	06/19/90	< 0.01000	—	—
P3	A-071	86777	06/19/90	—	< 0.00100	—
P2	A-072	86777	06/19/90	< 0.01000	—	—
P2	A-073	86777	06/19/90	—	< 0.00200	< 0.00200
P1	A-074	86778	06/19/90	< 0.01000	—	—
P4	A-075	86778	06/19/90	< 0.01000	—	—
F2	A-076	86779	06/21/90	0.01000	—	—
F2	A-077	86779	06/21/90	—	< 0.00200	< 0.00200
CAT-225	AP-078	86779	06/21/90	—	< 0.00200	< 0.00200
P2	A-079	86779	06/21/90	—	—	< 0.00200
P2	A-080	86779	06/21/90	—	—	< 0.00200
P2	A-082	86780	06/22/90	—	< 0.00200	< 0.00200
F2	A-083	86780	06/22/90	—	< 0.00200	< 0.00200
F2	A-084	86780	06/22/90	< 0.01000	—	—
P2	A-085	86780	06/22/90	< 0.01000	—	—
F2	A-086	51547	06/25/90	—	< 0.00200	< 0.00200
F2	A-087	51547	06/25/90	—	< 0.00200	< 0.00200
P2	A-088	51547	06/25/90	< 0.01900	—	—
P2	A-089	51547	06/25/90	—	< 0.00200	< 0.00200
CAT-225	AP-090	51547	06/25/90	< 0.01500	—	—
P2	A-092	51547	06/26/90	—	< 0.00300	< 0.00300
F2	A-093	51547	06/26/90	< 0.02300	—	—

Explanation of codes can be found on page one of this table.

TABLE 2 (continued)

"DRAFT"

AIR MONITORING SUMMARY DATA
NEW HAMPSHIRE PLATING COMPANY SITE
MERRIMACK, NEW HAMPSHIRE

JUNE 13, 1990 - NOVEMBER 16, 1990

Station Number or Location	Sample Number	Chain of Custody Number	Date Collected	RESULTS		
				Total Cyanide (mg/M3)	Cadmium (mg/M3)	Chromium (mg/M3)
F2	A-094	51548	06/27/90	—	< 0.00600	< 0.00600
F2	A-095	51548	06/27/90	< 0.06300	—	—
P2	A-096	51548	06/27/90	—	< 0.00700	< 0.00700
P2	A-097	51548	06/27/90	< 0.06900	—	—
F2	A-099	51549	06/28/90	< 0.01300	—	—
F2	A-100	51549	06/28/90	—	< 0.00100	< 0.00100
F2	A-100R	51550	06/28/90	—	< 0.00030	< 0.00120
P2	A-101	51549	06/28/90	—	< 0.00100	< 0.00100
P2	A-101R	51550	06/28/90	—	< 0.00030	< 0.00130
P2	A-102	51549	06/28/90	< 0.01500	—	< 0.00000
CAT-225	AP-103	51549	06/28/90	< 0.01400	—	—
CAT-225	AP-103R	51550	06/28/90	< 0.00100	—	—
P2	A-106	86773	07/11/90	—	< 0.00100	< 0.00100
P2	A-107	86773	07/11/90	0.01400	—	< 0.00000
F8	A-108	86773	07/11/90	—	< 0.00100	< 0.00100
F9	A-109	86773	07/11/90	< 0.01300	—	< 0.00000
P2	A-111	51546	07/13/90	—	< 0.00100	< 0.00100
P2	A-112	51546	07/13/90	< 0.01400	—	—
F6	A-113	51546	07/13/90	—	< 0.00100	< 0.00100
P3	A-114	—	07/13/90	— PUMP FAILURE —		
F8	A-115	51546	07/13/90	0.01700	—	—
F9	A-116	51546	07/13/90	—	< 0.00100	< 0.00100
CAT-225	AP-117	51546	07/13/90	—	< 0.00200	< 0.00200
PUGMILL	AP-118	51546	07/13/90	< 0.01000	—	—
P2	A-120	69155	07/17/90	—	< 0.00100	< 0.00100
F7	A-121	69155	07/17/90	—	< 0.00100	< 0.00100
F6	A-122	69155	07/17/90	0.01800	—	—
F6	A-123D	69155	07/17/90	—	< 0.00100	< 0.00100
F5	A-124	69155	07/17/90	0.03200	—	—
CAT-225	AP-125	69155	07/17/90	0.02000	—	—

Explanation of codes can be found on page one of this table.

TABLE 2 (continued)

"DRAFT"

AIR MONITORING SUMMARY DATA
NEW HAMPSHIRE PLATING COMPANY SITE
MERRIMACK, NEW HAMPSHIRE

JUNE 13, 1990 - NOVEMBER 16, 1990

Station Number or Location	Sample Number	Chain of Custody Number	Date Collected	RESULTS		
				Total Cyanide	Cadmium	Chromium
				(mg/M3)	(mg/M3)	(mg/M3)
LAGOON 3	AP-126	69155	07/17/90	—	< 0.00100	< 0.00100
F5	A-128	—	07/18/90	— PUMP FAILURE —		
F6	A-129D	69147	07/18/90	0.01700	—	—
F7	A-130	69147	07/18/90	0.01500	—	—
P2	A-131	69147	07/18/90	0.02400	—	—
F6	A-132	69147	07/18/90	—	< 0.00100	< 0.00100
LAGOON 3	AP-133	69147	07/18/90	< 0.01300	—	—
CAT-225	AP-134	69147	07/18/90	—	< 0.00100	< 0.00100
P2	A-137	69158	07/20/90	—	< 0.00100	< 0.00100
P2	A-138	69158	07/20/90	0.02500	—	—
F8	A-139	69158	07/20/90	—	< 0.00100	< 0.00100
F9	A-140	69158	07/20/90	—	< 0.00100	< 0.00300
F10	A-141	69158	07/20/90	0.02600	—	—
RT	AP-143	69158	07/20/90	—	< 0.00100	< 0.00100
P2	A-145	69156	07/25/90	—	< 0.00200	< 0.00200
P2	A-146	69156	07/25/90	0.02600	—	—
F8	A-147	69156	07/25/90	—	< 0.00200	< 0.00200
F9	A-148	69156	07/25/90	0.02200	—	—
RT	AP-149	69156	07/25/90	—	< 0.00200	< 0.00200
CAT-225	AP-150	69156	07/25/90	0.01800	—	—
P2	A-152	69159	08/01/90	—	< 0.00100	< 0.00100
F9	A-153	69159	08/01/90	—	< 0.00100	< 0.00100
F10	A-154	69159	08/01/90	< 0.01000	—	—
F6	A-156	69159	08/01/90	—	< 0.00100	< 0.00100
F7	A-157	69159	08/01/90	< 0.01000	—	—
CAT-225	AP-158	69159	08/01/90	< 0.02000	—	—
RT	AP-159	69159	08/01/90	—	< 0.00100	< 0.00100
F8	A-161	69160	08/02/90	< 0.01000	—	—
P2	A-162	69160	08/02/90	< 0.01000	—	—
F7	A-163	69160	08/02/90	—	< 0.00100	< 0.00100

Explanation of codes can be found on page one of this table.

TABLE 2 (continued)

"DRAFT"

AIR MONITORING SUMMARY DATA
NEW HAMPSHIRE PLATING COMPANY SITE
MERRIMACK, NEW HAMPSHIRE

JUNE 13, 1990 - NOVEMBER 16, 1990

Station Number or Location	Sample Number	Chain of Custody Number	Date Collected	RESULTS		
				Total Cyanide	Cadmium	Chromium
				(mg/M3)	(mg/M3)	(mg/M3)
F9	A-164	69160	08/02/90	---	< 0.00100	< 0.00100
CAT-225	AP-165	69160	08/02/90	< 0.01000	---	---
PUGMILL	AP-166	69160	08/02/90	---	< 0.00100	< 0.00100
P2	A-168	69154	08/09/90	---	< 0.00100	< 0.00100
P2	A-169	69154	08/09/90	< 0.00900	---	---
P2	A-170	69154	08/09/90	< 0.00800	---	---
F11	A-171	69154	08/09/90	---	< 0.00100	< 0.00100
F9	A-172	69154	08/09/90	< 0.00900	---	---
F5	A-173	69154	08/09/90	---	< 0.00100	< 0.00100
RT	AP-174	69154	08/09/90	< 0.03000	---	---
CAT-225	AP-175	69154	08/09/90	---	< 0.00200	< 0.00200
P2	A-177	69153	08/10/90	< 0.01000	---	---
P2	A-178	69153	08/10/90	---	< 0.00100	< 0.00100
F11	A-179	69153	08/10/90	< 0.01000	---	---
F11	A-180	69153	08/10/90	< 0.01000	---	---
F11	A-181	69153	08/10/90	---	< 0.00100	< 0.00100
F5	A-182	69153	08/10/90	---	< 0.00100	< 0.00100
F9	A-183	69153	08/10/90	< 0.03000	---	---
RT	AP-185	69153	08/10/90	---	< 0.00300	< 0.00300
P2	A-187	69148	08/13/90	---	< 0.00200	< 0.00200
F9	A-189	69148	08/13/90	---	< 0.00100	< 0.00100
F11	A-192	69148	08/13/90	---	< 0.00100	< 0.00100
CAT-225	AP-194	69148	08/13/90	---	< 0.00100	< 0.00100
P2	A-196	69179	08/14/90	---	< 0.00200	< 0.00200
F5	A-199	69179	08/14/90	---	< 0.00200	< 0.00200
F11	A-202	69179	08/14/90	---	< 0.00200	< 0.00200
CAT-936	AP-203	69179	08/14/90	---	< 0.00200	< 0.00200
P2	A-206	69178	09/11/90	---	< 0.00100	< 0.00100
F8	A-207	69178	09/11/90	< 0.15000	---	---
F9	A-208	69178	09/11/90	---	< 0.00100	< 0.00100

Explanation of codes can be found on page one of this table.

TABLE 2 (continued)

"DRAFT"

AIR MONITORING SUMMARY DATA
NEW HAMPSHIRE PLATING COMPANY SITE
MERRIMACK, NEW HAMPSHIRE

JUNE 13, 1990 - NOVEMBER 16, 1990

Station Number or Location	Sample Number	Chain of Custody Number	Date Collected	RESULTS		
				Total Cyanide (mg/M3)	Cadmium (mg/M3)	Chromium (mg/M3)
F10	A-209	69178	09/11/90	< 0.25000	---	---
RT	AP-210	69178	09/11/90	---	< 0.00100	< 0.00100
C-936	AP-211	69178	09/11/90	< 0.39000	---	---
P2	A-213	69166	09/12/90	---	---	---
F10	A-214	69166	09/12/90	---	< 0.00100	< 0.00100
F8	A-215	69166	09/12/90	---	< 0.00200	< 0.00200
F7	A-216	69166	09/12/90	---	< 0.00200	< 0.00200
F9	A-217	69166	09/12/90	< 0.15000	---	---
CAT-225	AP-218	69166	09/12/90	---	< 0.00100	< 0.00100
RT	AP-219	69166	09/12/90	< 0.15000	---	---
P2	A-221	69176	09/17/90	< 0.28000	---	---
F9	A-222	69176	09/17/90	---	< 0.00300	< 0.00300
F10	A-223	69176	09/17/90	< 0.26000	---	---
F8	A-224	69176	09/17/90	---	< 0.00300	< 0.00300
F7	A-225	69176	09/17/90	< 0.28000	---	---
RT	AP-227	69176	09/17/90	---	< 0.00300	< 0.00300
P2	A-229	69177	09/18/90	---	< 0.00100	< 0.00100
F9	A-230	69177	09/18/90	< 0.13000	---	---
F8	A-231	69177	09/18/90	< 0.13000	---	---
F7	A-232	69177	09/18/90	---	< 0.00100	< 0.00100
F12	A-233	69177	09/18/90	---	< 0.00100	< 0.00100
F10	A-234	69177	09/18/90	---	< 0.00100	< 0.00100
RT	AP-235	69177	09/18/90	< 0.16000	---	---
P2	A-237	69174	09/19/90	0.01200	---	---
F9	A-238	69174	09/19/90	---	< 0.00100	< 0.00100
F10	A-239	69174	09/19/90	0.01500	---	---
F7	A-240	69174	09/19/90	< 0.01300	---	---
F8	A-241	69174	09/19/90	---	< 0.00100	< 0.00100
F12	A-242	69174	09/19/90	0.01100	---	---
RT	AP-243	69174	09/19/90	---	< 0.00100	< 0.00100

Explanation of codes can be found on page one of this table.

TABLE 2 (continued)

"DRAFT"

AIR MONITORING SUMMARY DATA
NEW HAMPSHIRE PLATING COMPANY SITE
MERRIMACK, NEW HAMPSHIRE

JUNE 13, 1990 - NOVEMBER 16, 1990

Station Number or Location	Sample Number	Chain of Custody Number	Date Collected	RESULTS		
				Total Cyanide	Cadmium	Chromium
				(mg/M3)	(mg/M3)	(mg/M3)
P2	A-245	69175	09/20/90	---	< 0.00100	< 0.00100
F9	A-246	69175	09/20/90	0.01200	---	---
F8	A-247	69175	09/20/90	0.01200	---	---
F10	A-248	69175	09/20/90	---	< 0.00100	< 0.00100
F13	A-249	69175	09/20/90	---	< 0.00100	< 0.00100
F7	A-250	69175	09/20/90	---	< 0.00100	< 0.00100
F12	A-251	69175	09/20/90	---	< 0.00100	< 0.00100
F12	A-252	69175	09/20/90	---	< 0.00100	< 0.00100
CAT-225	AP-253	69175	09/20/90	0.01400	---	---
P2	A-256	69173	09/21/90	0.01500	---	---
F7	A-257	69173	09/21/90	0.01100	---	---
F8	A-258	69173	09/21/90	---	< 0.00100	< 0.00100
F9	A-259	69173	09/21/90	---	< 0.00100	< 0.00100
F10	A-260	69173	09/21/90	0.01400	---	---
F12	A-261	69173	09/21/90	0.02700	---	---
F13	A-262	69173	09/21/90	< 0.01100	---	---
F13	A-263	69173	09/21/90	0.03200	---	---
RT	AP-264	69173	09/21/90	0.02900	---	---
CAT-225	AP-265	69173	09/21/90	---	< 0.00100	< 0.00100
F7	A-269	69168	09/24/90	0.02600	---	---
F8	A-270	69168	09/24/90	---	< 0.00100	< 0.00100
F9	A-271	---	09/24/90	--- PUMP FAILURE ---		
F10	A-272	69168	09/24/90	0.01100	---	---
F12	A-273	69168	09/24/90	0.02800	---	---
F13	A-274	69168	09/24/90	< 0.01100	---	---
	AP-275	69168	09/24/90	0.01200	---	---
F10	A-276	69168	09/24/90	0.01400	---	---
CAT-225	A-277	69168	09/24/90	---	< 0.00100	< 0.00100
P2	A-279	86601	09/24/90	0.01200	---	---
F7	A-280	86601	09/25/90	< 0.01000	---	---

Explanation of codes can be found on page one of this table.

TABLE 2 (continued)

"DRAFT"

AIR MONITORING SUMMARY DATA
NEW HAMPSHIRE PLATING COMPANY SITE
MERRIMACK, NEW HAMPSHIRE

JUNE 13, 1990 - NOVEMBER 16, 1990

Station Number or Location	Sample Number	Chain of Custody Number	Date Collected	RESULTS		
				Total Cyanide	Cadmium	Chromium
				(mg/M3)	(mg/M3)	(mg/M3)
F8	A-281	86601	09/25/90	—	< 0.00100	< 0.00100
F9	A-282	86601	09/25/90	—	< 0.00100	< 0.00100
F13	A-283	86601	09/25/90	< 0.01200	—	—
F13	A-284	86601	09/25/90	< 0.01700	—	—
RT	AP-285	86601	09/25/90	< 0.01700	—	—
F11	A-287	86601	09/25/90	< 0.01700	—	—
CAT-225	AP-288	86601	09/25/90	—	< 0.00100	< 0.00100
P2	A-291	86609	09/27/90	< 0.00800	—	—
F7	A-292	86609	09/27/90	< 0.00800	—	—
F8	A-293	86609	09/27/90	—	< 0.00100	< 0.00100
F9	A-294	86609	09/27/90	—	< 0.00100	< 0.00100
F13	A-295	86609	09/27/90	< 0.01400	—	—
F13	A-296	86609	09/27/90	< 0.00800	—	—
CAT-225	AP-297	86609	09/27/90	< 0.00800	—	—
RT	AP-298	86609	09/27/90	< 0.00600	—	—
F11	A-299	86609	09/27/90	< 0.01000	—	—
F12	A-303	86611	09/28/90	—	< 0.00100	< 0.00100
P2	A-304	86611	09/28/90	< 0.00800	—	—
F13	A-305	86611	09/28/90	---	---	---
F13	A-306	86611	09/28/90	< 0.00800	---	---
CAT-225	AP-307	86611	09/28/90	< 0.00800	—	—
RT	AP-308	86611	09/28/90	< 0.00800	—	—
CAT-225	AP-309	86611	09/28/90	---	< 0.00100	< 0.00100
P2	A-314	69152	10/03/90	---	< 0.00100	< 0.00100
F12	A-315	69152	10/03/90	< 0.00900	—	—
F13	A-316	69152	10/03/90	---	< 0.00100	< 0.00100
F13	A-317	69152	10/03/90	< 0.00900	---	---
WT	AP-318	69152	10/03/90	0.01100	---	---
CAT-225	AP-319	69152	10/03/90	---	< 0.00100	< 0.00100
PUGMILL	AP-320	69152	10/03/90	---	< 0.00100	< 0.00100

Explanation of codes can be found on page one of this table.

TABLE 3

"DRAFT"

Summary of Volatile Organic Compounds in Groundwater
From Samples Collected June 18 - 22, 1990
New Hampshire Plating Company Site
Merrimack, New Hampshire

Monitoring Well	Compounds						
	Methylene Chloride	1,1-Dichloroethene (7)	1,1-Dichloroethane (-)	Total 1,2-Dichloroethene (-)	Chloroform (100)	1,1,1-Trichloroethane (200)	Trichloroethene (5)
(J) MW-1	BDL	BDL	BDL	BDL	47	BDL	BDL
(J) MW-2	BDL	BDL	BDL	BDL	33	5	BDL
(J) MW-2D	BDL	BDL	BDL	9	19	43	BDL
(J) MW-3	BDL	BDL	BDL	BDL	BDL	BDL	BDL
(J) MW-4	BDL	BDL	BDL	BDL	13	BDL	BDL
(J) MW-4D	BDL	BDL	BDL	9	28	24	BDL
(J) MW-5	BDL	BDL	BDL	BDL	44	BDL	BDL
B-3D	BDL	BDL	BDL	BDL	BDL	BDL	BDL
B-6	BDL	BDL	BDL	BDL	38	16	17
B-7S	BDL	BDL	8	113	6	BDL	49
B-7D	BDL	BDL	BDL	BDL	9	8	11
B-8S	BDL	BDL	BDL	BDL	BDL	6	BDL
B-8D	BDL	BDL	BDL	BDL	37	12	13
B-10S	BDL	BDL	BDL	BDL	BDL	BDL	BDL
B-12D	BDL	BDL	BDL	33	27	109	400(1)
MW-1	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-2	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-3	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-4	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-5	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-101	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-102S	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-102D	BDL	BDL	BDL	BDL	BDL	BDL	BDL

NOTES:

Results expressed as micrograms per liter (ug/l)
Samples analyzed by Chemserve (Milford, NH)
Samples analyzed using EPA Method 624
( ) = Maximum Contaminant Level
** = Maximum Contaminant Level Goal*
--- = No MCL Established
BDL = Below Detection Limit (5ug/l)

(J) = Monitoring Wells on Jones Chemical, Inc. Site
(1) = Detection Limit - 25 ug/l
(2) = Detection Limit - 50 ug/l
S = Shallow Well of Monitoring Well Couplet
D = Deep Well of Monitoring Well Couplet
R = Bedrock Well

TABLE 3 *(Continued)*

"DRAFT"

Summary of Volatile Organic Compounds in Groundwater
From Samples Collected June 18 - 22, 1990
New Hampshire Plating Company Site
Merrimack, New Hampshire

Monitoring Well	*Compounds*						
	Methylene Chloride	*1,1-Dichloroethene (7)*	*1,1-Dichloroethane (-)*	*Total 1,2-Dichloroethene (-)*	*Chloroform (100)*	*1,1,1-Trichloroethane (200)*	*Trichloroethene (5)*
MW-102R	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-104S	BDL	36	32	12	7	87	1260(2)
MW-104D	BDL	BDL	BDL	BDL	BDL	42	BDL
MW-105	5	13	BDL	BDL	123	465(1)	92
MW-106	BDL	BDL	BDL	BDL	BDL	6	82
MW-106R	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-107	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-108S	BDL	5	31	BDL	12	191	106
MW-108D	BDL	BDL	BDL	BDL	BDL	15	8
MW-109S	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-109D	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-109R	BDL	BDL	BDL	BDL	BDL	BDL	BDL
OHM-1	BDL	BDL	BDL	6	9	171	9
OHM-2	BDL	78	167	5	17	350(1)	56
OHM-3	BDL	38	192	12	5	72	108
W-1	BDL	5	55	7	6	92	180
W-2	BDL	BDL	BDL	12	BDL	BDL	BDL
MW-8R	BDL	BDL	BDL	BDL	BDL	11	21

NOTES:

Results expressed as micrograms per liter (ug/l)
Samples analyzed by Chemserve (Milford, NH)
Samples analyzed using EPA Method 624
( ) = Maximum Contaminant Level
** = Maximum Contaminant Level Goal*
--- = No MCL Established
BDL = Below Detection Limit (5ug/l)

(J) = Monitoring Wells on Jones Chemical, Inc. Site
(1) = Detection Limit - 25 ug/l
(2) = Detection Limit - 50 ug/l
S = Shallow Well of Monitoring Well Couplet
D = Deep Well of Monitoring Well Couplet
R = Bedrock Well

Summary of Volatile Organic Compounds in Groundwater
From Samples Collected June 18 - 22, 1990
New Hampshire Plating Company Site
Merrimack, New Hampshire

DRAFT"

Monitoring Well	Compounds						
	Methylene Chloride	1,1-Dichloroethene (7)	1,1-Dichloroethane (-)	Total 1,2-Dichloroethene (-)	Chloroform (100)	1,1,1-Trichloroethane (200)	Trichloroethene (5)
(J) MW-1	BDL	BDL	BDL	BDL	47	BDL	BDL
(J) MW-2	BDL	BDL	BDL	BDL	33	5	BDL
(J) MW-2D	BDL	BDL	BDL	9	19	43	BDL
(J) MW-3	BDL	BDL	BDL	BDL	BDL	BDL	BDL
(J) MW-4	BDL	BDL	BDL	BDL	13	BDL	BDL
(J) MW-4D	BDL	BDL	BDL	9	28	24	BDL
(J) MW-5	BDL	BDL	BDL	BDL	44	BDL	BDL
B-3D	BDL	BDL	BDL	BDL	BDL	BDL	BDL
B-6	BDL	BDL	BDL	BDL	38	16	17
B-7S	BDL	BDL	8	113	6	BDL	49
B-7D	BDL	BDL	BDL	BDL	9	8	11
B-8S	BDL	BDL	BDL	BDL	BDL	6	BDL
B-8D	BDL	BDL	BDL	BDL	37	12	13
B-10S	BDL	BDL	BDL	BDL	BDL	BDL	BDL
B-12D	BDL	BDL	BDL	33	27	109	400(1)
MW-1	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-2	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-3	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-4	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-5	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-101	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-102S	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-102D	BDL	BDL	BDL	BDL	BDL	BDL	BDL

NOTES:

Results expressed as micrograms per liter (ug/l)
Samples analyzed by Chemserve (Milford, NH)
Samples analyzed using EPA Method 624
( ) = Maximum Contaminant Level
** = Maximum Contaminant Level Goal*
--- = No MCL Established
BDL = Below Detection Limit (5ug/l)

(J) = Monitoring Wells on Jones Chemical, Inc. Site
(1) = Detection Limit - 25 ug/l
(2) = Detection Limit - 50 ug/l
S = Shallow Well of Monitoring Well Couplet
D = Deep Well of Monitoring Well Couplet
R = Bedrock Well

TABLE 4 *(Continued)*

"DRAFT"

Summary of Metals and Cyanide in Groundwater
From Samples Collected June 18-22, 1990
New Hampshire Plating Company Site
Merrimack, New Hampshire

Monitoring Well	Compounds										
	Cyanide (200)	Arsenic (50)	Cadmium (10)	Chromium (50)	Copper (1000)	Iron (300)	Lead (50)	Manganese (500)	Mercury (2)	Silver (100)	Zinc (5000)
MW-107	<20	<10	<10	<40	<30	130	<5	50	<0.5	<40	<10
MW-108S	<5	<10	112	38	9	330	<5	130	<0.5	<40	60
MW-108D	<20	27	<10	<40	<30	640	<5	50	<0.5	<40	20
MW-109S	<20	<10	<10	<40	<30	1340	<5	250	<0.5	<40	80
MW-109D	<20	<10	<10	<40	<30	350	<5	380	<0.5	<40	40
MW-109R	<20	<10	<10	<40	<30	<40	<5	30	<0.5	<40	30
OHM-1	40	20	60	40	<30	4090	<5	30	<0.5	<40	170
OHM-2	<20	28	380	<40	<30	40	<5	80	<0.5	250	330
OHM-3	<20	34	390	<40	<30	270	<5	170	<0.5	100	70
W-1	<20	<10	210	<40	<30	90	<5	100	<0.5	60	40
W-2	<20	<10	<10	<40	<30	70	<5	630	<0.5	180	50
MW-8R	<20	11	<10	<40	<30	<40	<5	260	<0.5	<40	10

Notes:

Results expressed as micrograms per liter (ug/l)

Samples analyzed by Chemserve (Milford, NH)

( ) = Maximum Contaminant Level

— = No MCL Established

N = None Detected

S = Shallow Well of Monitoring Well Couplet

D = Deep Well of Monitoring Well Couplet

R = Bedrock Well

* = *Total Chromium*

** = *Total Cyanide*

Samples collected for metals analysis were field filtered.

(J) = Jones Chemical, Inc.

< = Less than

TABLE 4

"DRAFT"

Summary of Metals and Cyanide in Groundwater
From Samples Collected June 18-22, 1990
New Hampshire Plating Company Site
Merrimack, New Hampshire

Monitoring Well	Compounds										
	Cyanide (200)	Arsenic (50)	Cadmium (10)	Chromium (50)	Copper (1000)	Iron (300)	Lead (50)	Manganese (500)	Mercury (2)	Nickel (100)	Zinc (500)
(J) MW-1	<20	54	<10	<40	<30	300	<5	<30	<0.5	<40	50
(J) MW-2	<20	<10	<10	<40	<30	60	<5	<30	<0.5	<40	50
(J) MW-2D	40	<10	<10	<40	<30	11,000	<5	840	<0.5	<40	40
(J) MW-3	<20	<10	<10	<40	<30	50	<5	40	<0.5	<40	160
(J) MW-4	<20	<10	<10	<40	<30	70	<5	30	<0.5	<40	10
(J) MW-4D	<20	<10	<10	<40	<30	3300	<5	1380	<0.5	<40	70
(J) MW-5	<20	<10	<10	<40	<30	40	<5	40	<0.5	40	60
B-3D	<20	17	20	<40	<30	<40	<5	60	<0.5	<40	30
B-6	<20	<10	<10	<40	<30	80	<5	120	<0.5	<40	50
B-7S	90	<10	<10	310	<30	160	<5	120	<0.5	140	40
B-7D	<20	23	<10	<40	<30	50	<5	<30	<0.5	<40	<10
B-8S	<20	17	<10	<40	<30	<40	<5	<30	<0.5	<40	<10
B-8D	<20	<10	<10	<40	<30	<40	<5	130	<0.5	<40	10
B-10S	<20	<10	<10	<40	<30	150	<5	6360	<0.5	<40	<10
B-12D	230	37	1	6	8	180	<5	120	<0.5	<40	10
MW-1	<20	<10	<10	<40	<30	40	<5	70	<0.5	<40	20
MW-2	<20	<10	<10	<40	<30	<40	<5	<30	<0.5	<40	80
MW-3	<20	<10	<10	110	<30	460	<5	<30	<0.5	<40	100
MW-4	<20	15	<10	<40	<30	60	<5	<30	<0.5	50	40
MW-5	<20	<10	30	100	<30	40	<5	<30	<0.5	40	80
MW-101	<20	<10	<10	<40	<30	80	<5	80	<0.5	<40	40
MW-102S	<20	19	<10	<40	<30	70	<5	<30	<0.5	<40	20
MW-102D	<20	<10	<10	<40	<30	130	<5	30	<0.5	<40	30
MW-102R	<20	<10	<10	<40	<30	<40	<5	<30	<0.5	<40	20
MW-104S	<20	<10	<40	<40	<30	2500	<5	1120	<0.5	<40	<30
MW-104D	<5	<10	3	30	8	170	<5	<30	<0.5	<40	40
MW-105	<20	16	<10	<40	<30	180	<5	40	<0.5	<40	10
MW-106	<5	13	2	17	11	150	<5	40	<0.5	<40	50
MW-106R	<20	14	<10	<40	<30	160	<5	50	<0.5	<40	10

Notes:

Results expressed as micrograms per liter (ug/l)

Samples analyzed by Chemserve (Milford, NH)

( ) = Maximum Contaminant Level

— = No MCL Established

N = None Detected

S = Shallow Well of Monitoring Well Couplet

D = Deep Well of Monitoring Well Couplet

R = Bedrock Well

* = Total Chromium

** = Total Cyanide

Samples collected for metals analysis were field filtered.

(J) = Jones Chemical, Inc.

< = Less than

APPENDIX B

APPENDIX B

CHEMICAL HAZARD SUMMARY DATA

3.4 CHEMICAL HAZARDS SUMMARY TABLE

Previous sampling and analytical data have indicated that the following chemical hazards, either documented or potential, exist at the site. Detailed hazard information for these chemicals is found in Appendix C.

Contaminant (synonyms)	TLV/PEL ppm	IDLH ppm	IP ev	Physical Characteristics	Route of Exposure	First Aid	BP °F	Flash Point°F	LEL %	55°F mm Vapor Pressure	Extinguishing Methods	Flammability *
Arsenic	200 ug/m³	Ca	--	Appearance and odor vary	Inh Ing Abs Con	Wash, irrigate immed.	1134	---	---	---	Foam CO_2 Dry chemical	NA
Barium	0.5 mg/m³	250 mg/m³	--	Appearance and odor vary	Inh Ing Con	**	2984	---	---	---	Foam CO_2 Dry chemical	NA
Benzene	1 ppm	Ca	9.25	Colorless liquid Aromatic odor	Inh Ing Con Abs	**	176	12	1.3	75	Foam CO_2 Dry chemical	3
Bromodichloro-methane	Na	Na	--	Colorless liquid	Inh Ing Abs	**	194	---	---	50	Fire extinguisher fluid ingredient	NA
Cadmium	0.05 mg/m³	Ca	--	Appearance and odor vary	Inh Ing	wash, irr. immed. seek medical attent.	1409	---	---	0	Foam CO_2 Dry chemical	NA
Carbon Tetra-chloride	5	Ca	11.28	Colorless liquid ether odor	Eye skin breath swallow	Irr. immed. soap wash medical atten. immed.	170	none	---	91	---	0
Chlorodibro-momethane	200	Na	--	Colorless to pale yellow liquid	Inh Ing Abs Con	**	248	---	---	NA	---	0

* 0 - Material will not burn.
1 - Material must be preheated before ignition can occur.
2 - Material must be moderately preheated before ignition can occur.
3 - Material that can be ignited under almost all normal temperature conditions.
4 - Very flammable gases or very volatile flammable liquid.
NA - Not Available

** Eye - Irrigate immediately.
Skin - Soap flush immediately.
Breath - Artificial respiration.
Swallow - Medical attention immediately.

3.4 CHEMICAL HAZARDS SUMMARY TABLE (CONT'D)

Previous sampling and analytical data have indicated that the following chemical hazards, either documented or potential, exist at the site. Detailed *hazard information for these chemicals is found in Appendix C.*

Contaminant (synonyms)	TLV/PEL ppm	IDLH ppm	IP ev	Physical Characteristics	Route of Exposure	First Aid	BP °F	Flash Point°F	LEL %	55°F mm Vapor Pressure	Extinguishing Methods	Flammability *
Chloroform	10	Ca	11.42	Colorless liquid sweet odor	Eye skin breath swallow	Wash immed. art. resp. med. atten.	142°	none	---	160	---	0
Chromium	0.05 mg/m³	500 mg/ m³	--	Steel gray lustrous metal	Inh Ing	Irr. immed. wash art. resp.	4790°	---	---	0	---	0
Copper	1 mg/m³	Na	--	Reddish odorless metal	Inh Ing Con	**	4700	---	---	0	---	0
1,1-dichloro-ethane	100	4000	11.06	Colorless liquid chloroform odor	Inh Ing Con	**	135	17°	6	182	Alcohol foam water,foam, CO_2 dry chemical	3
1,2-Dichloro-ethylene	200	4000	9.65	Colorless liquid ether odor	Inh Ing Con	**	113-140	36-39	9.7	180-265	Dry chemical foam CO_2	3
Dichloro-methane	50	Ca	11.35	Colorless liquid odor like chloroform	Inh Ing Con	**	104	---	12	400	Dry chemical foam CO_2	1
Ethylbenzene	100	2000	8.76	Colorless liquid aromatic odor	Inh Ing Con	**	277	59	1.0	7.1	Water spray CO_2, dry chemical foam	3

* 0 - Material will not burn.
1 - Material must be preheated before ignition can occur.
2 - Material must be moderately preheated before ignition can occur.
3 - Material that can be ignited under almost all normal temperature conditions.
4 - Very flammable gases or very volatile flammable liquid.
NA - Not Available

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Skin - Soap flush immediately.
Breath - Artificial respiration.
Swallow - Medical attention immediately.

3.4 CHEMICAL HAZARDS SUMMARY TABLE (CONT'D)

Previous sampling and analytical data have indicated that the following chemical hazards, either documented or potential, exist at the site. Detailed hazard information for these chemicals is found in Appendix C.

Contaminant (synonyms)	TLV/PEL ppm	IDLH ppm	IP ev	Physical Characteristics	Route of Exposure	First Aid	BP °F	Flash Point °F	LEL %	55°F mm Vapor Pressure	Extinguishing Methods	Flammability *
Gold	Na	Na	Na	Yellow solid	---	---	4890	---	---	---	---	0
Iron	5 mg/m³	Na	---	Silver white or gray	Inh	Art. resp.	5432	---	---	0	---	0
Lead	0.05 mg/m³	Na	---	Bluish-white silver gray metal	Inh Ing Con	**	3164	---	---	0	Water spray foam, CO_2	1
Manganese	1 mg/mg³	10,000 mg/m³	---	Gray solid	Inh Ing	Breath Shallow	3806	---	---	0	Water spray foam, CO_2	1
Mercury	0.05 mg/m³	28 mg/m³	---	Silver	Inh Abs Con	**	674	---	---	.0012	---	0
Nickel	1 mg/m³	Ca	---	Varies	Inh Ing Con	Skin Breath Swallow	4950	---	---	0	---	0
Selenium	0.2 mg/m³	100 mg/m³	---	Brownish red liquid	Inh Ing Abs Con	**	1274	---	---	.001	---	0
Silver	0.01 mg/m³	Na	---	Varies	Inh Ing Con	**	3632	---	---	0	---	0

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1 - Material must be preheated before ignition can occur.
2 - Material must be moderately preheated before ignition can occur.
3 - Material that can be ignited under almost all normal temperature conditions.
4 - Very flammable gases or very volatile flammable liquid.
NA - Not Available

** Eye - Irrigate immediately.
Skin - Soap flush immediately.
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Swallow - Medical attention immediately.

3.4 CHEMICAL HAZARDS SUMMARY TABLE (CONT'D)

Previous sampling and analytical data have indicated that the following chemical hazards, either documented or potential, exist at the site. Detailed hazard information for these chemicals is found in Appendix C.

Contaminant (synonyms)	TLV/PEL ppm	IDLH ppm	IP ev	Physical Characteristics	Route of Exposure	First Aid	BP °F	Flash Point °F	LEL %	55°F mm Vapor Pressure	Extinguishing Methods	Flammability *
Tetrachloro-ethylene	50	Ca	9.32	Colorless liquid chloroform odor	Inh Ing Con	**	250	None	---	14	---	0
Tin	2 mg/m³	400 mg/m³	---	Almost silver white	Inh Ing Con Abs	**	4544	---	---	Na		---
Toluene	100	2000	8.82	Colorless liquid benzene odor	Inh Ing Con Abs	**	231°	40°	1.2	22	CO_2 dry chemical foam	3
1,1,1-trich-loroethane	350	1000	11.25	Colorless liquid sweet odor	Inh Ing Con Abs	**	165	NA	8	127	Dry chemical foam CO_2	2
1,1,2-Trich-loroethylene	50	Ca	9.47	Colorless liquid chloroform odor	Inh Ing Con	**	188	90	8	58	Water fog	1
1,1-Dichloro-ethylene	5	ND	---	Colorless liquid	Inh Ing Con Abs	**	89	0	7.3	591	CO_2, dry chemical foam	2

* 0 - Material will not burn.
1 - Material must be preheated before ignition can occur.
2 - Material must be moderately preheated before ignition can occur.
3 - Material that can be ignited under almost all normal temperature conditions.
4 - Very flammable gases or very volatile flammable liquid.
NA - Not Available

** Eye - Irrigate immediately.
Skin - Soap flush immediately.
Breath - Artificial respiration.
Swallow - Medical attention immediately.

3.4 CHEMICAL HAZARDS SUMMARY TABLE (CONT'D)

Previous sampling and analytical data have indicated that the following chemical hazards, either documented or potential, exist at the site. Detailed hazard information for these chemicals is found in Appendix C.

Contaminant (synonyms)	TLV/PEL ppm	IDLH ppm	IP ev	Physical Characteristics	Route of Exposure	First Aid	BP °F	Flash Point°F	LEL %	55°F mm Vapor Pressure	Extinguishing Methods	Flammability *
Xylenes	100	1000	8.56	Colorless liquid aromatic odor	Inh Ing Abs Con	**	284	90	1.1	6.72	CO_2, dry chemical foam	3
Zinc	5 mg/m³	ND	---	Bluish-white	Inh	Art. resp.	1666	---	---	---	Dry Chemical	1
Hydrogen cyanide	10	50	13.69	Colorless or pale blue liquid or gas with a bitter almond odor	Eye Skin Breath Swallow	Irr. immed. water flush immed. Art. resp/amyl nitrite pearls med. atten. immed.	79	0	5.6	620	CO_2, dry chemical alcohol foam	4
Cyanides (as CN)	5 mg/m³	50 mg/m³	---	Various color solids faint almond odor	Inh Abs Ing Con	**	---	---	---	= 0		

* 0 - Material will not burn.
1 - Material must be preheated before ignition can occur.
2 - Material must be moderately preheated before ignition can occur.
3 - Material that can be ignited under almost all normal temperature conditions.
4 - Very flammable gases or very volatile flammable liquid.
NA - Not Available

** Eye - Irrigate immediately.
Skin - Soap flush immediately.
Breath - Artificial respiration.
Swallow - Medical attention immediately.

APPENDIX C

APPENDIX C

SITE LOCUS MAP

FIGURE 1
SITE LOCATION MAP
NEW HAMPSHIRE PLATING COMPANY
MERRIMACK, NEW HAMPSHIRE

USGS SOUTH MERRIMACK QUAD

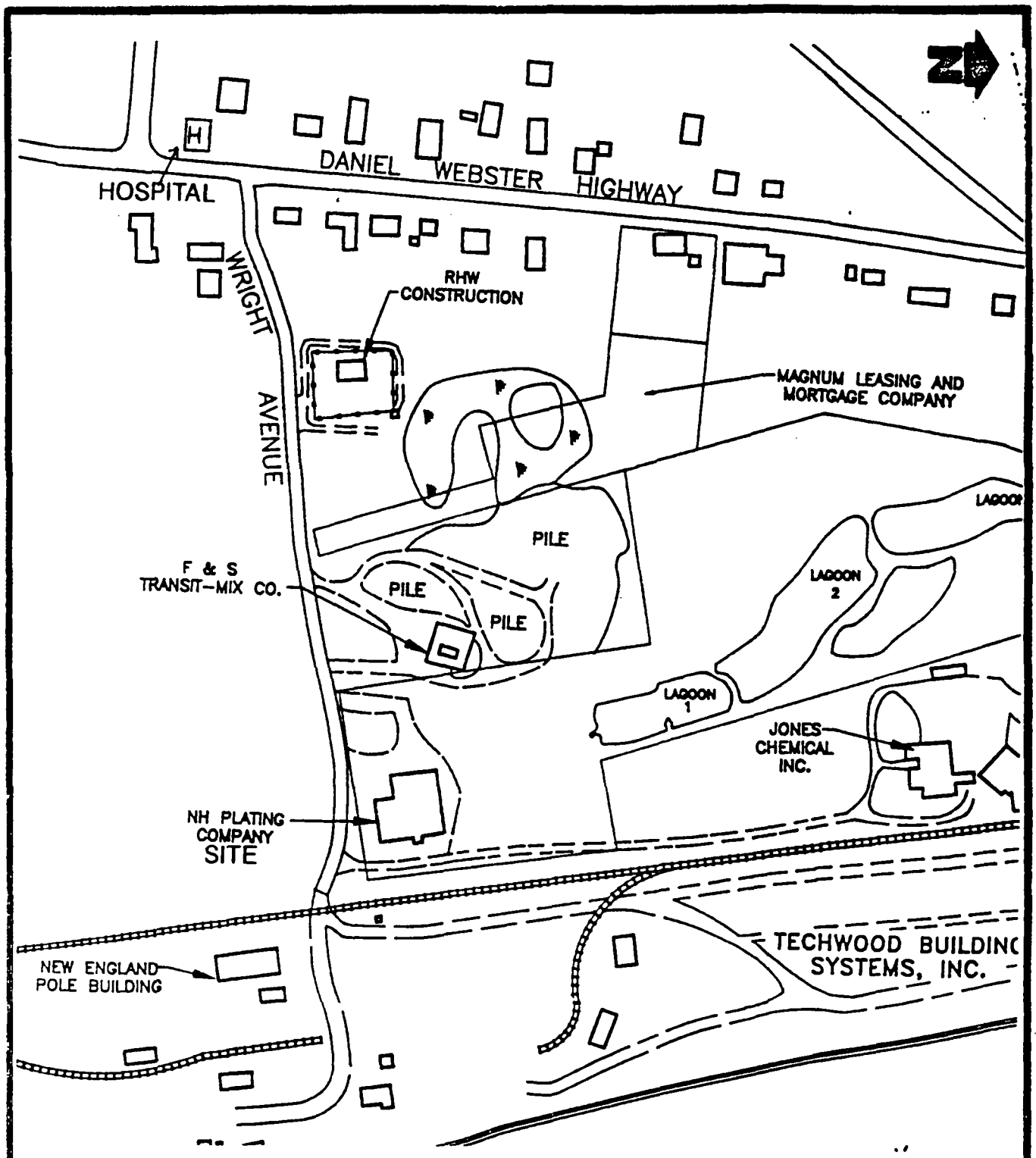
WESTON
MANAGERS DESIGNERS/CONSULTANTS

DRAWN EJB	DATE 1/90	PCS # 2357
APPROVED	DATE 1/31/90	TDD # 01891204

APPENDIX D

APPENDIX D

HOSPITAL ROUTE MAP



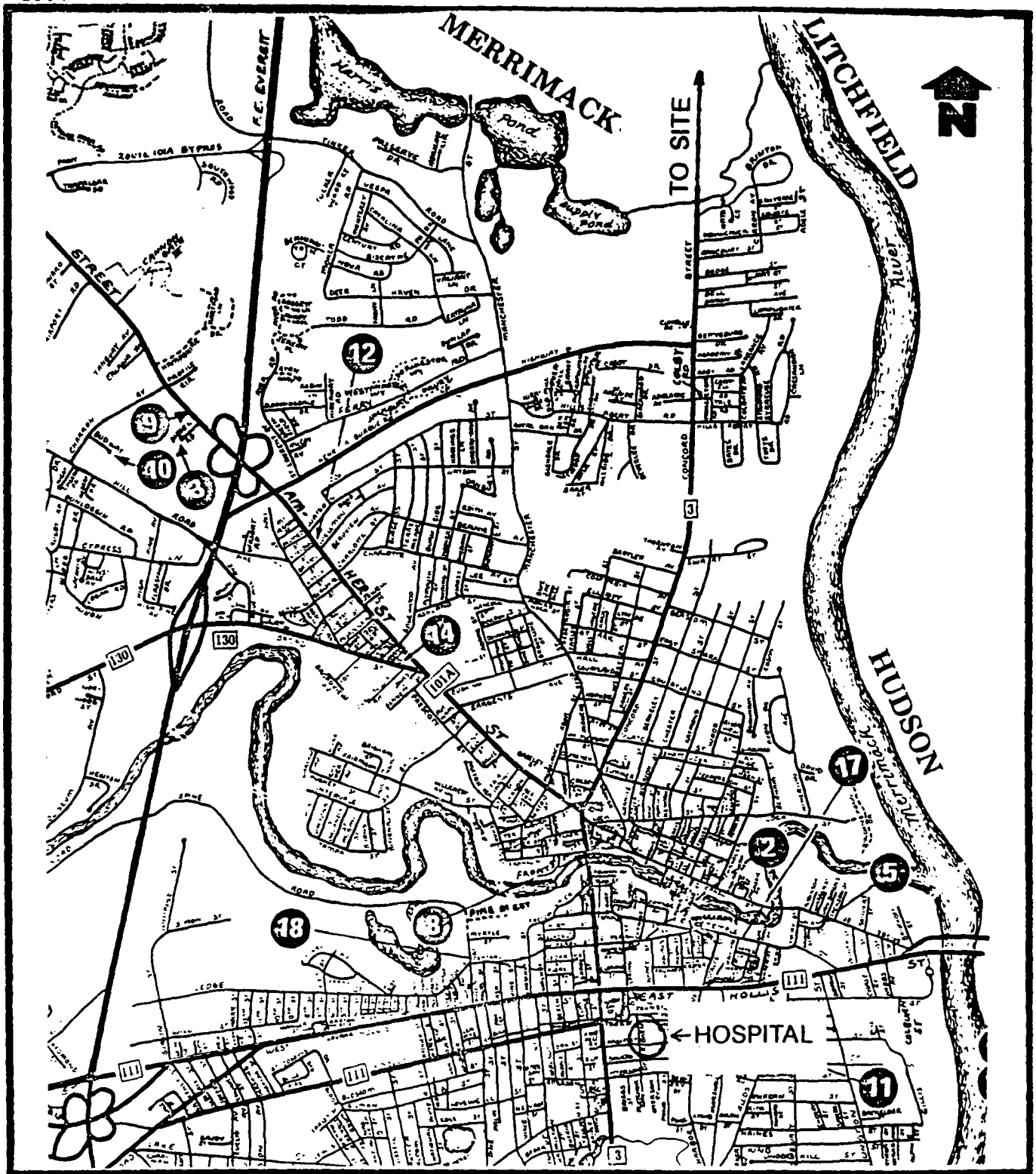
HOSPITAL LOCATION MAP FOR NH PLATING COMPANY

ST. JOSEPH'S HOSPITAL

MERRIMACK, NH

WESTON
MANAGERS DESIGNERS/CONSULTANTS

DRAWN	DATE	PCS #
C. CATERINO	4/30/90	2488
APPROVED	DATE	TDD #
D. Morris	5/31/90	01-9001-11B



HOSPITAL LOCATION MAP FOR NH PLATING COMPANY

NASHUA MEMORIAL HOSPITAL

MERRIMACK, NH

WESTON
MANAGERS DESIGNERS/CONSULTANTS

DRAWN C. CATERINO	DATE 5/1/90	PCS # 2488
APPROVED S. Morris	DATE 5/21/90	TDD # 01-9001-118

APPENDIX E

APPENDIX E

JONES CHEMICAL COMPANY - SAFETY RULES

E. Visitors Policy

PURPOSE: To standardize the procedures for welcoming visitors to our facilities.

DEFINITION: The term "visitor" refers to all persons not currently employed at your branch. This includes: an employee's family, relatives and friends, non-branch truck drivers, vendors, non-branch salesmen, government officials, insurance inspectors, outside contractors, tour groups, off-duty employees, and Jones Chemicals, Inc. personnel from headquarters or other branches.

PROCEDURE:

1. A sign shall be erected in a prominent position at the main entrance to the branch. This sign is to contain the following information:

STOP
EMPLOYEES ONLY

ALL OTHERS SIGN IN AT
OFFICE BEFORE ENTERING

This visitors' sign shall have a white background with the word "STOP" in six inch (6") RED letters, and all other words in four inch (4") BLACK letters.

3. Each branch shall maintain a visitors' sign-in book in the front office at the reception desk. The Visitor Log sheets supplied by the Safety Department shall be used to record the date, name & company of visitor, purpose of visit, time in/out, etc. (see form attached).

4. All visitors will be issued a "visitor pass" that is to be displayed at all times. Please refer to the Security Manual , Section IV, for details on Visitor Passes. The issuance and return of this pass shall be noted on the Visitor Log.

5. Visitor Safety Rules (below) shall be posted at the reception area and a copy given to all visitors.

6. All visitors who will be entering the plant, warehouse or yard areas shall be informed of our Visitor Safety Rules (below).

7. All visitors entering the plant, warehouse or yard areas will be issued the required personal protective equipment: side-shield safety glasses or goggles, escape-type respirator and bump cap. In addition, these visitors must be instructed in the use of this personal protective equipment before entering these areas.

8. Contract personnel shall be accounted for daily by their supervisor. He/she shall present a list of personnel on site to the branch's Office Manager. The contractor's supervisor shall also be responsible for the training and personal protective equipment of his/her personnel.

9. All persons are to sign out upon leaving the plant and return all safety equipment issued. If the safety equipment is not returned, the individual will be invoiced for it.

10. No one is to drive into the plant to visit any employee on the job without first signing in. This includes salesmen, wives picking up paychecks, ex-wives and babysitters.

11. In the event of any emergency, these rules do not apply to Emergency Response Personnel. When an emergency occurs, the Office Manager shall account for all visiting personnel in the plant (see Section XIII, "Plant Emergency Evacuations" for details).

12. Visitors entering the plant, warehouse or yard must be informed of the hazardous chemicals on site (chlorine, sulfur dioxide and/or ammonia).

13. Visitors entering the plant, warehouse or yard area must be informed of the proper evacuation procedures including the location of windsocks, the designated safe areas, emergency notification system(s), etc. (refer to the Section XIII for details).

JONES
CHEMICALS

VISITOR LOG

DATE	NAME & COMPANY	PURPOSE OF VISIT	TIME IN	TIME OUT	SAFETY RULES/EQUIP. EXPLAINED	PPE ISS.	PPE RET.	VISITOR PASS NUMBER	VISITOR PASS RETURNED

SF II 8.1

F. Visitor Safety Rules

1. All visitors must register at the office prior to entering the plant, yard or warehouse. This includes completing the Visitor Log, receiving a visitor pass and instructions concerning the following Visitor Safety Rules.

2. The speed limit in the plant and yard shall not exceed 5 m.p.h.

3. Visitors are not allowed in the facility unless accompanied by an employee.

4. Visitors may not transfer any chemicals from one container to another while on the premises.

5. Smoking is prohibited in the plant, warehouse or yard unless otherwise designated.

In addition to these general safety rules, visitors that enter the plant, warehouse or yard must comply with the following rules.

6. All visitors entering the plant, warehouse or yard areas will be issued the required personal protective equipment: side-shield safety glasses or goggles, escape-type respirator and bump cap. In addition, visitors must be instructed in the use of this personal protective equipment before entering these areas.

7. Visitors entering the plant, warehouse or yard must be informed of the hazardous chemicals on site (chlorine, sulfur dioxide and/or ammonia).

8. Visitors entering the plant, warehouse or yard area must be informed of the proper evacuation procedures including the location of windsocks, the designated safe areas, emergency notification system(s), etc.

9. To eliminate unnecessary exposure, plant, warehouse and yard visitors must be properly attired, i.e., no shorts, tank tops, or sandals. Proper footwear must be worn at all times. If a driver is not dressed properly, then he/she must remain in their vehicle during loading and unloading.

10. Drivers must remain with their vehicles while loading and unloading. If a vehicle is in a position to be loaded, the wheels must be chocked and a trailer jack installed, if necessary.

HAZARD COMMUNICATION

Table of Contents

A. GENERAL INFORMATION: This section is specific as to the person or persons responsible for emergency coordination, labeling, maintaining MSDS, employee training and informing contractors. It also gives the location of the Hazard Communication Program and MSDS at your workplace.

B. INTRODUCTION: We want you to be safe and healthy; there are hazards and risks in the workplace; training is required each year by us and by OSHA.

C. SUMMARY: Report accidents and injuries promptly; always read and follow label directions; every hazardous material has a Material Safety Data Sheet (MSDS)--you can get a copy from your supervisor; do not allow any chemical to spill or leak on the ground; if you wouldn't put it in your mouth, don't put it on the ground.

D. PERSONAL PROTECTIVE EQUIPMENT: When working in the plant, warehouse or yard you must wear a bump cap, side shield eye protection and safety shoes; you must also carry a personal escape respirator; failure to wear this equipment will result in disciplinary action, which may include dismissal. Facial hair that prevents proper fit of respiratory protection is forbidden.

E. LABELING/COLOR CODING: All hazardous materials must be labeled. Labels contain handling, storage, use, safety, and disposal information. Pipes are color coded to identify the material inside. Cylinders, ton containers, drums and bottles are also color coded to minimize the risk of filling the wrong container.

F. PHYSICAL HAZARDS: Broken glass, ruptured drums, rolling tons, fires and explosions are some of the physical hazards you may encounter in the plant. Keep the work area neat, clean and orderly.

G. HEALTH EFFECTS: Toxic chemicals can harm you. The extent depends on length of exposure, amount you come in contact with, individual response to the chemical, and how the material gets in or on you.

H. FILLING CONTAINERS: Use the proper color coded DOT specified drum/container. Be sure each container is properly labeled. Be sure eye wash fountain and safety shower located nearby are working.

I. SODIUM HYPOCHLORITE (bleach): Bleach is a strong oxidizer -- store away from combustibles (wood, paper, oil) which may initiate a fire. Bleach should not be mixed with acids or ammonia.

J. ACIDS/ALKALIS: pH indicates strength of acid/alkali. A ph of less than 7 is acid; a pH of greater than 7 is alkali; a pH of 7 is neutral, like drinking water. When diluting an acid or alkali, always add the acid or alkali slowly to the water.

K. CHLORINE: Chlorine is toxic. In the event of a leak, notify nearby personnel, follow the branch evacuation plan, and move cross wind to get out of the cloud.

L. SOLVENTS: Know the solvent you are working with. They usually evaporate quickly, are colorless and often odorless. All solvents are potentially dangerous.

M. SWIMMING POOL PRODUCTS: Keep hypochlorites away from combustibles. Don't store hypochlorites near isocyanurates.

N. DETECTION OF CHEMICALS: Chlorine, sulfur dioxide, and aqua ammonia are all packaged in ton containers and cylinders. When the pressure on the containers is released, a suffocating, irritating odor becomes present.

O. EVACUATION PLAN: Each branch has an evacuation plan in the event of fires, explosions, or releases of hazardous chemicals. Follow the plan for your branch in the event of an emergency.

P. TOXICITY SUMMARY

Q. TRAINING:

1. Lesson Plan: Hazard Communication
2. Lesson Plan: Material Safety Data Sheets
3. Quiz

R. CONTRACTOR'S STATEMENT

A. GENERAL INFORMATION

In order to comply with the Occupational Safety and Health Standard, 1910.1200, Hazard Communication, the following written Hazard Communication Program has been established for Jones Chemicals, Inc.

All divisions and sections of the company are included within this program. The written program will be available in the main office for review by any interested parties, during the hours of 8:00 a.m. and 5:00 p.m. .

Jones Chemicals will meet the requirements of this rule as follows:

1. Emergency Coordinator

James S. Weglicki is the Emergency Coordinator at this facility. The emergency Coordinator or his designate should be contacted immediately in the event of any chemical spill, release or fire.

2. Container Labeling

The Safety Coordinator will verify that all containers received or used will:

- Be clearly labeled as to the contents.
- Note the appropriate hazard warning.
- List the name and address of the manufacturer/importer/ or responsible party.

It is the policy of Jones Chemicals that no container will be released for use until the above data is verified.

The supervisor in each department will ensure that all secondary containers (i.e. paint buckets, process chemicals) are labeled with either an extra copy of the original manufacturer's label or with the Jones Chemicals label. For help with labeling please see Section E, LABELING/COLOR CODING.

3. Material Safety Data Sheets (MSDS)

Copies of MSDS's for all hazardous chemicals to which employees of Jones Chemicals may be exposed will be kept in the main office and breakroom. MSDSs will be available to all employees in their work area for review during each work shift. If MSDSs are not available or new chemicals in use do not have MSDS, please immediately contact Roger Costain.

4. Employee Training and Information

It is the responsibility of the Branch Manager to ensure that training is conducted and documented. Prior to starting work, each new employee of Jones Chemicals, Inc. will attend a health and safety orientation and will receive information and training on the following:

- An overview of the requirements contained in the Hazard Communication Standard.
- Chemicals present in their workplace operations.
- Location and availability of our written hazard Program
- Physical and health effects of the hazardous chemicals.
- Methods and observation techniques used to determine the presence or release of hazardous chemicals in the work area.
- How to lessen or prevent exposure to these hazardous chemicals through usage of control/work practices and personal protective equipment.
- Steps the company has taken to lessen or prevent exposure to these chemicals.
- Safety emergency procedures to follow if they are exposed to these chemicals.
- How to read labels and review MSDSs to obtain appropriate hazard information.

After attending the training class, each employee will sign a form to verify that s/he attended the training, received written materials, and understood Jones Chemicals' policies on Hazard Communication.

Prior to a new hazardous chemical being introduced into any section of Jones Chemicals, each employee of that section will be given information as outlined above. Roger Costain is responsible for ensuring that MSDSs on the new chemical(s) are available.

5. List of Hazardous Chemicals

The following is a list of all known Hazardous Chemicals used by employees of Jones Chemicals, Inc. at the Merrimack Branch. Further information on each noted chemical can be obtained by reviewing Material Safety Data Sheets located in the main office and breakroom.

Hazardous Chemical	Work Process or Storage Area
Acetone	Flammable storage cabinet/storage room
Acetylene	Maintenance shop
Absorbent	Warehouse, main plant
Algaecide	Warehouse
Aluminum sulfate	Warehouse
Ammonium Hydroxide (Aqua Ammonia)	Main plant, Plant yard, Warehouse
Calcium Chloride	Warehouse
Calcium Hydroxide (Hydrated Lime)	Warehouse, Main plant
Carbon Dioxide	E.N.S. Building
Chlorine	Rail siding, Main Plant/yard, Warehouse
Compressor Oil	Compressor room, flammable storage room
Diatomaceous Earth(D.E)	Warehouse
Ferric Chloride	Plant yard, warehouse
Hazorb	Warehouse
Hydrochloric Acid (Muriatic Acid)	Plant yard, warehouse, main plant
Hydrofluosilicic Acid (H.F.S. Acid)	Plant yard, warehouse, main plant
Hypochlorite Solution (Bleach, Sunny Sol "150")	Main plant/yard, warehouse

Hazardous Chemical	Work Process or Storage Area
Nitric Acid	Plant yard, warehouse, main plant
Nitrogen	Valve room
Oxygen	Maintenance shop
Paint	Main plant, falmmable storage room/cabine
Paint Thinner	Flammable storage room/cabinet
Potassium Carbonate	Warehouse
Potassium Permanganate	Warehouse
Rodine 213	Flammable storage room
Sodium Carbonate (Soda Ash)	Warehouse, main plant
Sodium Fluoride	Warehouse
Sodium Hydroxide	Railsiding, main plant/yard, warehouse
Sodium Metabisulfite	Warehouse
Sodium Silicofluoride	Warehouse
Sodium Sulfite	Warehouse
Sulfur Dioxide	Main plant/yard
Sulfuric Acid	Main plant/yard, warehouse

LABORATORY CHEMICALS:

Acetic Acid	Bleach platform
Barium Chloride	Bleach platform
Buffer Solution	E.N.S. Building
Hydrogen Peroxide	Bleach platform, E.N.S. Building, warehous
Phenophalein Solution	Bleach platform
Potassium Iodide	Bleach PLatform
Sodium Thiosulfate	Bleach Platform

BOILER TREATMENT CHEMICALS:

Confidence 10-C	Boiler Room

6. Hazardous Non-routine Tasks

Periodically, employees are required to perform hazardous nonroutine tasks. Prior to starting work on such projects, each affected employee will be given information by their supervisor about hazardous chemicals to which they may be exposed during such activity.

This information will include:

- Specific chemical hazards.
- Protective/safety measures the employee can take.
- Measures the company has taken to lessen the hazards including ventilation, respirators, presence of another employee, and special procedures.

Examples or nonroutine tasks performed by employees of this company:

Task	Hazardous Chemicals or Conditions
Vessel Entry	Tank sludge Oxygen deficient Environment
Repackage off-spec. materials	Material being replaced
Spill, cleanup and neutralization	Material spilled or neutralized material

7. Chemicals in Unlabeled Pipes

Work activities may be performed by employees in areas where chemicals are transferred through unlabeled piped.

Prior to starting work in these areas, the employee shall contact Roger Costain for information regarding:

- The chemical in the pipes.
- Potential hazards.
- Safety precautions which should be taken.

8. Informing Contractors

It is the responsibility of Jack Bieniek to provide contractors (with employees) the following information:

- Hazardous chemicals to which they may be exposed while on the job site.
- Precautions the employees may take to lessen the possibility of exposure by usage of appropriate protective measures.

B. INTRODUCTION

There are many hazards in the work place. The purpose of this indoctrination is to make you aware of the possible health and safety hazards from the chemicals we produce and handle. It will be given to each new employee prior to his/her beginning work. Every month there will be a safety meeting for training on specific safety topics. Each year, one monthly training program will be a review of this program to be sure everyone is familiar with it. After the indoctrination you will be tested on your knowledge. This training is required by the Occupational Safety and Health Administration (OSHA). We want to be sure that you know about hazards and risks and how to prevent injury to yourself so you are able to perform your assignments safely. If you have any questions regarding safety, please ask your supervisor.

C. SUMMARY

Jones Chemicals' and affiliates' primary businesses are repackaging chlorine, manufacturing sodium hypochlorite (bleach) and distributing chemicals made by others. Many of these chemicals can present a hazard to you in the workplace because:

1. Quantity of chemicals is greater than normal.
2. Health effects may happen if concentrated product gets on or in you.
3. Reactions with incompatible products could occur causing fires, explosions or releases of hazardous fumes.
4. Harm to environment could occur if chemicals are disposed of improperly.

These same chemicals, when handled and used properly, are beneficial. Chlorine is used to disinfect drinking water; bleach is used to disinfect swimming pool water.

However, you must be aware of the safety precautions that must be taken and what the possible health effects may be to you.

- You must report every accident or injury to your supervisor immediately. Do not delay.

- There must always be two (2) people at the branch when the branch is working. One person is not allowed to work alone.

- Always read and understand product labels carefully in complete detail.

- Obey "No Smoking" restrictions.

- <u>If in doubt, ask</u>.

For every hazardous chemical, the branch has a Material Safety Data Sheet (MSDS) for that chemical. The MSDS describes, among other things, the health effects, fire and explosion hazards, proper handling, storage, and disposal. You may obtain a copy of the MSDS from your supervisor. We recommend that you become familiar with the information in the MSDS for every chemical that you handle. If you need help understanding what the MSDS says, ask your supervisor.

Every hazardous chemical container must have a label. The label will contain information of use, health effects, first aid, proper storage, and disposal. You must always read and follow the label.

In this plant, there is a possibility of exposure to chemicals that are toxic if they get in or on you. To protect against this possibility, follow these guidelines:

- Wash hands before eating; use rubber gloves when handling chemicals. This reduces the possibility of chemicals entering the mouth (oral).

- Wear gloves, use splash apron or "acid" suit when transferring products and use face shield. These steps will reduce the possibility of chemicals getting on your skin (dermal).

- Avoid breathing fumes; use appropriate respiratory protection (inhalation). Carry personal escape respirator.

- Wear side shield eye protection or goggles to reduce the possibility of getting chemicals in the eyes.

- Do not enter any storage tank unless it has been properly ventilated, approved for entry by a supervisor, and another person is there in case help is needed.

Because of all the potential hazards, no chemical should be allowed to escape. Do not discard chemicals by pouring them on the ground, down a drain, or down the sink. Your supervisor has directions for proper disposal. If you see a leak or spill, notify your supervisor promptly so that proper action can be taken without delay. Since the primary concern for many of our products is the corrosive action when it touches human skin, the most important safety consideration is to PREVENT CONTACT with the material.

D. PERSONAL PROTECTIVE EQUIPMENT

For your safety, all employees when working in the plant must wear the following protective equipment:

Bump cap.
Safety shoes.
Side shield safety glasses.
Personal escape respirator.

Failure to wear this protective equipment will result in your being disciplined. This discipline may include dismissal.

You should not wear contact lenses in the plant because fumes may cause eye irritation. You must not wear a beard or have long side burns because facial hair can prevent a gas mask from sealing properly.

E. LABELING/COLOR CODING

A label is any written, printed or graphic material displayed on or affixed to containers holding hazardous materials. A label will contain specific information on the chemical contents, hazardous ingredients, proper and intended use, and hazard warnings against mis-use of the material.

The company has a labeling system for tanks and piping systems. Bulk storage tanks have the chemical product name conspicuously lettered on the sides i.e. SODIUM HYPOCHLORITE, CAUSTIC SODA. Plant piping systems use a color-coding system to identify the material being transported.

To minimize the risk of filling the wrong container, the following color code chart is to be used for materials shipped in containers larger than one (1) gallon from all branches (except branches in California and Nevada):

CHLORINE - cylinders & tons	Silver
SODIUM HYPOCHLORITE (bleach) - drums, carboys, delboys	Green
ANHYDROUS AMMONIA - cylinders & tons	Metallic Blue
AQUA AMMONIA - drums, carboys, delboys	Blue
SULFUR DIOXIDE - cylinders & tons	Yellow
SULFURIC ACID - drums, carboys, delboys	Yellow

HYDROCHLORIC (muriatic) ACID - drums, carboys, delboys	Orange
SODIUM HYDROXIDE (Caustic Soda) - drums	Black
HYDROFLUOSILICIC ACID - drums, carboys, delboys	Red
FERRIC CHLORIDE SOLUTION - drums, carboys, delboys	Brown
PHOSPHORIC ACID - drums, carboys	Black & White

NITRIC ACID - is shipped in stainless steel drums, kegs and bombs, which need not be painted.

In the Torrance, California branch, the following color code is to be used for materials shipped in containers larger than one (1) gallon:

SODIUM HYPOCHLORITE (Bleach)	White
SULFURIC ACID	Yellow
MURIATIC ACID	Green
CAUSTIC SODA	Gray
PHOSPHORIC ACID	Red
NITRIC ACID	Blue

Other solvents such as Toluol, mineral spirits, acetone, alcohols, etc., are shipped in black steel drums with the contents stenciled on the top and side as well as the contents label and the hazardous material label (FLAMMABLE) if required.

Note these charts do not apply to products packaged in one (1) gallon polyethylene containers.

When packaging products in one (1) gallon containers, muriatic acid must be packaged in red containers, hypochlorite solution (bleach) in clear containers, and algaecide which we package in blue containers. All branches must follow this policy except branches in California and Nevada. In California and Nevada, muriatic acid is packaged in clear containers and hypochlorite solution in yellow containers, which has an embossed label.

Proper caps must also be used on one (1) gallon containers. Vented caps (white) must be used on hypochlorite solution containers and unvented caps (black) must be used on muriatic acid and algaecide containers. These caps must be childproof and leakproof. To assure this, plant personnel must tightly secure these caps when applying then on containers.

REV 12/18/90

F. PHYSICAL HAZARDS

There are many physical hazards you may encounter in the plant. You should be aware of broken or shattered glass which could be very dangerous if you come in contact with it. Cylinders and ton containers are also hazardous if they fall or roll onto you. This could result in broken bones. you should also be aware of ruptured drums which may splatter chemicals. Other possible hazards are fires and explosions. In order to minimize fires and explosions, smoking is prohibited in most plant areas.

For a fire to occur, three (3) things must be present:

1. A fuel source: flammable liquid (methanol, gasoline), flammable solids (sodium hydrosulfite), combustible liquids (kerosene, mineral spirits (naphtha), fuel gases (propane for forklifts), natural gas, wood or textiles (fabrics, cloth).

2. An oxygen source: air, chemicals with oxygen in their formula, oxidizers (nitric acid, calcium hypochlorite) and peroxides.

3. An ignition (heat) source: smoking, and electrical spark for faulty electrical wiring, heat build up from a chemical reaction.

The following chart lists some common flammable liquids and their flash point. The flash point is the minimum temperature of the liquid at which it gives off vapor sufficient to form an ignitable mixture if an ignition source were brought near the liquid surface.

Flammable Liquid	Flash Point (degrees F)
Gasoline	-45
Acetone	0
Benzene	+12
VM & P Naphtha	+20
Methyl Ethyl Ketone	+30
Toluene	+40
Methanol	+52
Xylene	+77

At room temperature (68°F), all of the above except Xylene would produce vapors sufficient to form an ignitable mixture if an ignition source were brought near the liquid.

An explosion could also occur when flammables (like grease) are mixed with oxidizers (like pool chemicals). In general, oxidizers must never be stored next to flammables, and waste oxidizers (calcium hypochlorite) must never be discarded into drums that contain or formerly contained flammable or combustible materials.

G. HEALTH EFFECTS

The health effects of a chemical are described by the term "toxicity". The toxicity of a chemical is usually determined by experiments with laboratory animals. The results of the laboratory tests are then used to predict the possible effect on humans. In order to understand toxicity you must know some definitions.

TOXICITY is the ability to cause harm. It depends on several things:

- Exposure: how long you are in contact with the substance.

- Dose: how much you come in contact with.

- Species: each species (mouse, rat, human) has a different response.

- Absorption: How the material gets in or on you.

    1. Oral - eating or drinking.
    2. Dermal - on the skin.
    3. Inhalation - in lungs.
    4. Eyes.
    5. Combination of above.

Exposure is usually broadly classified as acute (short term) or chronic (long term). Because of this, toxicity is also broadly classified as acute toxicity (any poisonous effect produced within a short period of time following exposure, usually up to 24-96 hours, resulting in severe biological harm and often death) or chronic toxicity (the property of a substance or mixture of substances to cause adverse effects in an organism upon repeated or continuous exposure over a period of at least 1/2 the life time of that organism).

Even toxic chemicals that might cause severe health problems will not injure you if you are not exposed. To be affected, you must be exposed to a chemical in a dose (quantity) that is enough to harm you or that gets into the body (absorption) by a route that can harm you. (The property of a substance or mixture of substances to cause adverse effects in an organism upon repeated or continuous exposure over a period of at least 1/2 the lifetime of that organism).

At this time, most of the toxicity testing that has been done was short term to determine acute health effects. Possible long term effects of low exposure may not be known. For this reason you should observe all safety precautions at all times.

The results of the testing are summarized in the Material Safety Data Sheets (MSDS). At the same time, health professionals have also reviewed the data and established guides for the workplace. Two of the more important abbreviations that you may see on an MSDS are LD50 and TLV. An explanation of LD50 and TLV follows.

1. LD50 - Lethal Dose Fifty - a calculated dose of a substance which is expected to cause the death of 50% of an entire defined experimental animal population. LD50 is determined from the level of exposure to the substance by any type of absorption other than inhalation of a significant number of that population.

2. TLV - Threshold Limit Value - The TLV is an American Conference of Governmental Industrial Hygienists (ACGIH) recommended concentration of a substance to which most workers can be exposed without adverse effect. The TLV may be expressed as a time-weighted average (TWA), as a short term exposure limit (STEL), or as a ceiling value (C). The TWA is for a normal 8-hour workday or 40-hour work week. The STEL is the maximum concentration to which workers can be exposed to during a 15 minute period, provided no more than four excursions per day are permitted, with at least 60 minutes between exposure periods and provided the daily TWA is not also exceeded. The C is the concentration that should not be exceeded even instantaneously. The notation "(skin)" indicates that even though the air concentration may be below the limit value, significant additional exposure to the skin may be dangerous.

For example, chlorine has a Threshold Limit Value - Time Weighted Average (TLV-TWA) of one part per million (1 ppm); the short term exposure limit (STEL) is 3 ppm. Ammonia has a TLV-TWA of 50 ppm but a STEL has not been established. Sulfur dioxide has an OSHA TLV-TWA of 5 ppm.

Some TLV's are recommended for classes of substances rather than for individual compounds. These classes may be based on certain chemical or physical properties, such as solubility, that have not been determined for all potential members of the class.

Chemicals used for disinfection of water (chlorine, bleach, calcium hypochlorite) are classified by the Environmental Protection Agency (EPA) as pesticides. The wording of pesticide labels is regulated separately from OSHA under the Federal Insecticide, Fungicide and Rodeticide Act (FIFRA). It includes information on health hazards as well as handling, use and disposal information.

For reference, tables that summarize this toxicity information are attached.

When chemicals get into the air, special instruments are required to accurately measure the concentration.However, many of the chemicals Jones Chemicals handles have distinctive odors at low levels that can help alert you to potential danger.

H. FILLING CONTAINERS

1. Many chemicals are delivered in tank trucks or tank cars. The contents may be transferred from the truck or tank car to storage tanks or directly into smaller containers.

2. Every chemical must be placed in the proper container. Some chemicals can destroy metal or react with other chemicals. Similarly, some chemicals can destroy plastic containers. The Department of Transportation (DOT) container specification is usually embossed on the container.

3. When filling containers, you must prevent or stop any leaks, spills, or releases. Put catch buckets under hose connections. Watch filling speed to allow time to turn hose off.

4. Always read the label on the container. Never reuse a container unless it has been thoroughly cleaned.* Always be sure the proper label is on the container at all times.

5. Most chemicals can be harmful. Some typical effects include:

   Chemical burns: from splashes into eyes or on skin.
   Lung damage: from inhaling vapors.
   Digestive tract damage: from ingesting chemicals.

6. You can protect yourself from these hazards by doing the following:

   a. Filling drums/unloading containers.

   * Before filling a drum or unloading a container, make sure that the eyewash and safety shower located nearby are operating.

   * Use the proper color coded and DOT specified drum/container.

   * Wear splash apron or rain suit.

   * Wear face shield over safety goggles or sideshield safety glasses.

   * Wear rubber gloves and boots.

   b. If a chemical gets in or on you, employ the following first aid:

   Eyes: hold eyelid open and flush with water for 15 minutes in the eyewash fountain.
   Skin: flush the affected area with cold water.
   Inhalation: move to fresh air immediately.
   Clothes: remove clothes and flush area with cold water.
   Swallowing: consult MSDS.

7. Do not overfill containers. Containers should be filled to a pre-determined level to allow for expansion of the liquid.

8. Additional information for each chemical is contained on the Material Safety Data Sheet (MSDS) for that product. You can obtain a copy of the MSDS for each hazardous chemical from your supervisor.

* Consult your supervisor to find out if and how drums are cleaned at your branch location.

I. SODIUM HYPOCHLORITE SOLUTION (BLEACH)

1. The manufacturing of sodium hypochlorite solution (bleach) involves combining caustic soda (sodium hydroxide; NaOH) and chlorine (Cl_2)

2. If these chemicals are not handled properly, they can be hazardous if they get in or on you. Typical effects include:

   Eye and skin damage from splashing.
   Lung damage from inhalation.
   Digestive tract damage from ingestion.

3. You can protect yourself from these hazards by doing the following:

   a. Filling drums/unloading containers:

   (1) Before filling a drum or unloading a container, make sure the safety shower and eyewash fountain located nearby are operating.
   (2) Use the proper color coded and DOT specified drum/container.
   (3) Read the label carefully.
   (4) Wear splash apron.
   (5) Wear face shield over safety goggles or sideshield safety glasses.
   (6) Wear rubber gloves and boots.
   (7) Use a certified gas mask with canister for chlorine if fumes are present.

b. If some of the bleach gets in or on you, employ the following first aid:

Eyes: hold eyelid open and flush with cold water for at least 15 minutes in the eyewash fountain.
Skin: flush the affected area with cold water.
Inhalation: move to fresh air immediately.
Clothes: remove clothes and flush area with cold water.
Swallowing: consult MSDS.

4. Hypochlorite solution is a strong oxidizer. Contact with combustible (wood, paper, oil) may initiate or promote fires and explosions. To prevent contact, they must be kept apart from each other when in storage.

5. Contact with some chemicals produces hazardous decomposition products. Contact with acid releases chlorine gas. Burning of hypochlorite solution produces hydrochloric acid. Mixing hypochlorite solution with ammonia will release hazardous gases irritating to eyes, lungs and mucous membranes.

6. Bleach can cause harm to the environment. Report all leaks and spills to your supervisor immediately.

7. Additional information for bleach is contained on the Material Safety Data Sheet (MSDS) for that product. You can obtain a copy of the MSDS from your supervisor.

J. ACIDS/ALKALIS

1. Many products in the plant are strong acids or alkalis. Examples include:

ACIDS: Sulfuric, nitric, hydrochloric (muriatic), hydrofluosilicic (HFS).

ALKALIS: Caustic soda, (sodium hydroxide, lye), caustic potash (potassium hydroxide), ammonium hydroxide (aqua ammonia), calcium hydroxide (lime), sodium hypochlorite (bleach).

2. The indication of relative strength of these materials as acids or alkalis is measured by pH. The term pH refers to a range that goes from 0 to 14. A pH of less than 7 is acid; a pH of greater than 7 is alkaline. Wastewater with a pH of 7 is neutral, about that of most drinking water. A pH reading of less than or equal to 2 or greater than or equal to 12.5 constitutes hazardous waste and MUST be treated with care.

3. Even when diluted with water, acids and alkalis can hurt you. Typical effects include:

Chemical burns from splashing.
Lung damage from inhalation.
Digestive tract damage from ingestion.

4. You can protect yourself from these hazards by doing the following:

a. Filling drums/unloading containers:

(1) Before filling a drum or unloading a container, make sure the safety shower and eyewash fountain located nearby are operating.
(2) Use the proper color coded and DOT specified drum/container.
(3) When filling a container, be sure you have the correct label.
(4) Know the acid/alkali you are working with: read the label carefully.
(5) Wear splash apron or "acid" suit.
(6) Wear face shield over safety goggles or sideshield safety glasses.
(7) Wear rubber gloves and boots.
(8) Use a gas mask with proper canister if fumes are present.

b. If an acid or alkali gets in or on you, employ the following first aid:

Eyes: hold eyelid open and flush with cold water for at least 15 minutes in the eyewash fountain.
Skin: Flush the affected area with cold water.
Inhalation: move to fresh air immediately.
Clothes: remove clothes and flush area with cold water.
Swallowing: consult MSDS.

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c. When diluting an acid or alkali, never add water to the acid or alkali. Always add the acid or alkali slowly to the water. The reason for this is that if water is added to an acid or alkali, it will get hot and may splash back on you.

5. Acids must not be mixed with alkalis except under controlled conditions. To prevent mixing, they must be kept apart form each other when in storage. Mixing an acid with an alkali produces significant amounts of heat which results in splattering of solutions and may ignite nearby chemicals or other combustible such as paper, wood or oils.

6. A special kind of controlled mixing is called "neutralization". When an acid like hydrochloric is mixed with lime under the proper conditions, the resulting mixture is water and salt (calcium chloride). We normally use lime to neutralize acids because the calcium salt produced when lime is used is often less soluble and the heat produced is less than when stronger alkalis, like caustic soda, are used.

7. Some chemicals react violently with acids or alkalis. Sometimes very toxic fumes may be released. For example, if an acid comes in contact with cyanides, deadly cyanide gas will be given off.

8. Acids and alkalis can cause harm to the environment. Report all leaks and spills to your supervisor immediately.

9. Additional information for each acid or alkali is contained on the Material Safety Data Sheet (MSDS) for that product. You can obtain a copy of the MSDS for each hazardous chemical from your supervisor.

K. CHLORINE

1. Chlorine is delivered in railroad tank cars; fifty-five (55) or ninety (90) tons per car. The chlorine is then repackaged into cylinders and ton containers or used to make sodium hypochlorite (bleach).

2. The containers used to package chlorine are regulated by the Department of Transportation (DOT).

3. Before filling the containers, all the chlorine must be removed and the inside inspected.

4. Chlorine is toxic. In nature, it does not exist as a gas. It is combined with other chemicals such as sodium which makes sodium chloride (table salt).

5. Chlorine gas has a sharp irritating odor and appears greenish when released. Chlorine liquid rapidly expands to form a gas. As it expands, it becomes very cold.

6. Chlorine can be very harmful even at low concentrations:

   Lung damage from inhalation.
   Eye and skin damage from splashing (liquid form).

7. In the event of a chlorine leak:

   a. Notify other personnel nearby immediately.
   b. Shut off valves if it can be done quickly.
   c. Evacuate the area. (SEE EVACUATION PLAN).
   d. Check wind direction.
   e. Move cross wind to get out of the cloud.

8. Additional information regarding chlorine is contained in the Material Safety Data Sheet (MSDS). You can obtain a copy of the MSDS from your supervisor.

L. SOLVENTS

1. A solvent is any substance - but usually a liquid - that is used to dissolve another substance. All solvents are potentially dangerous, and most are considered hazardous. One big danger with solvents is that they can cause trouble before you realize what is happening. Once released, they evaporate quickly and get into the air. Because they are often *colorless and odorless, you may not know they are* there until it is too late. Below is a list of common solvents you may encounter at Jones Chemicals, Inc.

COMMON ORGANIC SOLVENTS

Methyl alcohol	Toluene
Methyl ethyl ketone	1,1,1 Trichloroethane
Methylene chloride	Trichloroethylene
Mineral spirits	Xylene
Perchloroethylene	Formaldehyde

2. You can protect yourself from exposure to dangerous solvents by doing the following:

   a. Filling containers/unloading containers:

   (1) Before filling a drum or unloading a container, make sure the safety shower and eyewash fountain located nearby are operating.
   (2) Use the proper color coded and DOT specified drum/container.
   (3) Know the solvent you are working with; read labels carefully.
   (4) Wear protective clothing and equipment as prescribed in the MSDS.
   (5) Use proper respiratory protection.
   (6) Do not wear contact lenses; fumes will become trapped between the contact lenses and corneas of your eyes.
   (7) Never smoke, eat or drink around solvents.
   (8) Use the buddy system: never work alone.
   (9) Use common sense.

   b. If a solvent gets on or in you, employ the following first aid:

   Eyes: flush your eyes with lots of cold water.
   Skin: flush with cold water and then wash thoroughly with soap.
   Inhalation: move to fresh air immediately. Artificial respiration may be needed.
   Swallowing: consult MSDS.

3. Solvents can cause harm to the environment. Report all leaks and spills to your supervisor immediately.

4. Additional information about each solvent is contained on the MSDS for that solvent. You can obtain a copy of the MSDS on each solvent from your supervisor.

M. SWIMMING POOL PRODUCTS

Two major types of dry swimming pool products are calcium hypochlorite and chlorinated isocyanurates. Because they are used to disinfect water, they are regulated by the Environmental Protection Agency (EPA) as pesticides.

1. These dry products are generally sold for use in swimming pools. When placed into the pool in the quantities recommended on the label, there is little hazard. However, large quantities are usually stored at the branch, which can create hazards.

2. The hazards of these products include:

   Fire: if in contact with combustible (paper, wood, rags, etc.) or if allowed to get damp.

   Fumes: chlorine given off if mixed with acid. Irritating to skin, eyes and respiratory tract.

3. Calcium hypochlorite must never be mixed with or stored near chlorinated isocyanurates. If these two products are mixed together a very hot fire can occur which cannot be put out by normal means.

4. Calcium hypochlorite and chlorinated isocyanurates must never be stored near or mixed with combustible products such as paper, grease, oil, hydraulic fluid, wood or acids.

5. Do not rely on the brand name on the label. Read the chemical ingredients.

6. The products can cause harm to the environment. Report all leaks or spills to your supervisor immediately.

7. Additional information for each product is contained on the Materials Safety Data Sheet (MSDS) for that product. You can obtain a copy of the MSDS for each hazardous chemical from your supervisor.

N. DETECTION OF CHEMICALS

The three common materials encountered at Jones Chemicals, Inc. are chlorine, sulfur dioxide and anhydrous ammonia. Below is a summary of how to detect these materials.

1. Chlorine:

   - greenish-yellow gas at normal temperatures
   - amber colored liquid at low temperatures
   - suffocating, pungent odor
   - TLV-TWA: 1 ppm
   - STEL: 3 ppm

2. Sulfur dioxide:

   - colorless gas
   - liquid at low temperatures
   - suffocating, irritating odor
   - TLV-TWA: 5 ppm

3. Anhydrous ammonia:

   - clear liquid at low temperatures
   - colorless gas at moderate temperatures
   - strong, pungent odor
   - TLV-TWA: 50 ppm

These are only a few of the more common types of materials you may be exposed to. For each chemical you work with, consult the corresponding MSDS for appearance and odor characteristics.

O. EVACUATION PLAN

Each branch has an evacuation plan in the event of fires, explosions or releases of hazardous chemicals. You must follow this plan in the event of an emergency.

There are general guidelines which apply to each branch that must be followed:

1. You will be notified by the Branch Manager or Emergency Coordinator that there is an emergency.

2. Proceed to the pre-designated evacuation area depending upon the wind direction. The wind indicator at your branch (windsock, flag, etc.) will tell you which way the wind is blowing. Please move 90° from the direction of the wind (i.e. crosswind).

3. Remain there until otherwise notified.

For further information, consult your supervisor.

P. TOXICITY SUMMARY

ORAL (TC-1)

ute Oral LD 50)	OSHA 1 Classification	FIFRA * Category	Signal Word	Precaution	Probable Lethal Dose 3 in common Measure
mg/kg less	Highly Toxic	I	Danger and Poison	Fatal (poisonous) if swallowed. Do not breathe vapor (dust or spray mist). Do not get in eyes, on skin, or on clothing.	less than 1 teaspoonful
mg/kg - 0 mg/kg	Toxic	II	Warning	May be fatal if swallowed. Do not breathe vapors) dust or spray mist). Do not get in eyes, on skin, or on clothing.	between 1 teaspoonful and 1 ounce
) mg/kg -)0 mg/kg	Not Applicable	III	Caution	Harmful if swallowed. Avoid breathing vapors (dust or spray mist). Avoid contact with skin. eyes or clothing.	between 1 ounce and 1 pint or 1 pound
:ater than)0 mg/kg	Not Applicable	IV	Caution	(No precautionary statements required).	more than 1 pint

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29 CFR, Part 1910.1200, Appendix A
40 CFR, Part 162.10
Based on converting the test result to a 70 kg (154 pound) person assuming one pint liquid is equal to one pound, one ounce fluid equals 480 minims (480 drops) or six (6) teaspoons or two (2) tablespoons.

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DERMAL (TC - 2)

Acute Dermal (LD 50)	OSHA 1 Classification	FIFRA * Category 2	FIFRA * Signal word 2	Precaution	Probable Lethal Dose in Common Measure
200 mg/kg or less	Highly Toxic	I	Danger and Poison	Fatal (poisonous) if absorbed through skin. Do not breathe vapor (dust or spray mist). Do not get in eyes, on skin or on clothing.	about one (1) tablespoon
200 mg/kg - 2000 mg/kg	Toxic	II	Warning	May be fatal if absorbed through the skin. Do not breathe vapors (dust or spray mist). Do not get in eyes, on skin or on clothing.	one tablespoon to four (4) ounces
000 mg/kg - 0,000 mg/kg	Not Applicable	III	Caution	Harmful if absorbed through the skin. Avoid breathing vapors (dust or spray mist). Avoid contact with skin, eyes or clothing.	four (4) ounces to two (2) quarts
reater than 0,000 mg/kg	Not Applicable	IV	Caution	(No precautionary Statements required).	More than two quarts

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. 29 CFR, Part 1910.1200, Appendix A
. 40 CFR, Part 162.10
. Based on converting the test result to a 70 kg (154 pound) person assuming one pint liquid is equal to one pound; one ounce fluid equals 480 minims (480 drops) or six (6) teaspoons or two (2) tablespoons.

SJ III 2

INHALATION (TC - 3)

Acute Inhalation (LC 50)	OSHA 1 Classification	FIFRA * Category 2	FIFRA * Signal Word 2	Precaution
Up to 0.2 mg/liter	Highly Toxic	I	Danger and Poison	Fatal (poisonous) if inhaled. Do not breathe vapors (dust or spray mist). Do not get in eyes, on skin or on clothi
.2 - 2 g/liter	Highly Toxic	II	Warning	May be fatal if inhaled. Do breathe vapors (dust or spray mist). Do not get in eyes, o skin, or on clothing.
- 20 g/liter	Toxic	III	Caution	Harmful if inhaled. Avoid breathing vapors (dust or spr mist). Avoid contact with sk eyes or clothing.
Greater than) mg/liter	Not Applicable	IV	Caution	No precautionary statements required.

NOTES

29 CFR, Part 1910.1200, Appendix A
40 CFR, Part 162.10

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SKIN AND EYE EFFECTS (TC - 4)

OSHA 1 lassification	Eye Effects 2	FIFRA * Skin Effects 2	Category 2	Skin and Eye Local Effects
orrosive: A hemical causes isible destruction f irreversible lterations in iving tissue by hemical action at he sire.	Corrosive; corneal opacity not reversible within 7 days.	Corrosive	I	Corrosive, causes eye and ski damage (or skin irritation). not get in eyes, on skin, or clothing. Wear goggles or fa shield and rubber gloves when handling. Harmful or fatal i swallowed.
	Corneal opacity rever- sible within 7 days; irritation persisting for 7 days.	Severe irritation at 72 hours.	II	Causes eye and skin irritatio Do not get in eyes, on skin, clothing. Harmful if swallov
	No corneal opacity irritation reversible within 7 days.	Moderate irritation at 72 hours	III	Avoid contact with skin, eyes clothing. In case of contact immediately flush eyes or ski with plenty of water. Get me attention if irritation persi
	No irritation	Mild or slight irritation at 72 hours.	IV	No precautionary statements required.

ITES

29 CFR, Part 1910.1200, Appendix A
40 CFR, Part 162.10

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