SITE SPECIFIC HEALTH AND SAFETY PLAN

Prepared for:

April '90

CHEVRON U.S.A.
FACILITY LOCATED AT:
121 LAKESHORE AVENUE
OAKLAND, CALIFORNIA

Prepared by:

GROUNDWATER TECHNOLOGY, INC.
4041 PIKE LANE, SUITE F
CONCORD, CA 94520
APRIL 10, 1990
PROJECT #203-175-3245

Judy Robbins
Completed by:

Joe Ramage
Project Manager:

Dick Krentz
Health & Safety Manager:

SSP# (2638131)

TABLE OF CONTENTS

INTRODUCTION

Background

Chevron U.S.A. has retained Groundwater Technology, Inc. (GTI) to perform a site assessment/investigation at the facility located at: 121 Lakeshore Avenue, Oakland, CA.

Purpose

The primary purpose of the site safety plan is to provide Groundwater Technology, Inc. field personnel and subcontractors with an understanding of the potential chemical and physical hazards that exist or may arise while the tasks of this project are being performed. Secondarily, the information contained herein will define the safety precautions necessary to respond to such hazards should they occur.

Objective

The primary objective is to ensure the well-being of all field personnel and the community surrounding this site. In order to accomplish this, project staff and approved subcontractors shall acknowledge and adhere to the policies and procedures established herein. Accordingly, all personnel assigned to this project shall read this site safety plan and sign the Agreement and Acknowledgement Statement (Appendix A) to certify that they have read, understood and agreed to abide by its provisions.

Hazard Determination

Serious____ Moderate____ Low__X__ Unknown____

Level of Protection

Modified Level D (see page 18 for further information).

The minimum acceptable level of protection at this site is a Modified Level D, as described in the section entitled "Health and Safety Requirements".

Amendments

Any changes in the scope of this project and/or site conditions must be amended in writing on the Site Safety Plan Amendment Sheet (Appendix B) and approved by the Health and Safety Manager.

Proposed dates of site work: On-going currently

EMERGENCIES

In the event of an accident or emergency situation, immediate action must be taken by the first person to recognize the event. First aid equipment is located on site inside the Groundwater Technology, Inc. vehicle. Notify (1) the Site Safety Officer, and, (2) the Project Manager and the Health and Safety Manager about the situation immediately after emergency procedures are implemented.

Emergency Telephone Numbers:

Immediate Emergencies:

Local Police: 911
State Police: 911
Fire: 911
Ambulance: 911

Medical:

Nearest Hospital: Kaiser Permanente Medical Center
Telephone #: (415) 596-7600
Directions to: Off-site South on Lake Shore, North on Embarcadero, West on West Grand Avenue, South on Harrison.

Back-up Hospital: Highland General Hospital
Telephone #: (415) 437-4148
Directions to: Off-site East on MacArthur Blvd., South on 14th Avenue.

Poison Control Center: (415) 476-6600

Environmental Emergency:

Groundwater Technology, Inc.: (415) 671-2387
Regional EPA Office: (415) 974-8131
National Response Center: (800) 424-8802
(EPA 24-Hotline)

Encountering Hazardous Situations (requiring evacuation)

Personnel encountering a hazardous situation shall **instruct others on site to evacuate the vicinity IMMEDIATELY** and call the (1) Site Safety Officer (2) the Project Manager (3) the Health and Safety Manager for instructions.

The site must not be re-entered until the situation has been corrected (i.e. appropriate back-up help, monitoring equipment, personal protective equipment is at the site).

Usual Procedures for Injury

1. Call for ambulance/medical assistance, if necessary. Notify the receiving hospital of the nature of physical injury or chemical overexposure. If a telephone is not available, transport the person to the nearest hospital.

2. Send/take this site safety plan with the attached Material Safety Data Sheet (MSDS) to medical facility with the injured person.

3. If the injury is minor, proceed to administer first aid.

4. Notify the Site Safety Officer, Project Manager, and Health and Safety Manager of all accidents, incidents, and near miss situations.

5. Complete the Accident/Incident/Near Miss Form found in Appendix H.

Emergency Treatment

When transporting an injured person to a hospital, bring this site safety plan to assist medical personnel with diagnosis and treatment. In all cases of chemical overexposure, follow standard procedures as outlined below for poison management, first aid, and, if applicable, cardiopulmonary resuscitation. Four different routes of exposure and their respective first aid/poison management procedures are outlined below:

1. Ingestion:

   Transport the person to the nearest medical facility immediately, or call the poison control center at: **(415) 476-6600**.

2. Inhalation/Confined Space:

   DO NOT ENTER A CONFINED SPACE TO RESCUE A PERSONAL HO HAS BEEN OVERCOME UNLESS PROPERLY EQUIPPED AND A STANDBY PERSON IS PRESENT.

3. Inhalation/Other:

   Move the person from the contaminated environment. Initiate CPR if necessary. Call, or have someone call, for medical assistance. Refer to MSDS for additional specific information. If necessary, transport the victim to the nearest hospital as soon as possible.

4. Skin Contact:

   Wash off skin with a large amount of water immediately. Remove any contaminated clothing and rewash skin. Transport person to a medical facility if necessary.

5. Eyes:

   Hold eyelids open and rinse the eyes immediately with copious amounts of water for 15 minutes. If possible, have the person remove his/her contact lenses (if worn). Never permit the eyes to be rubbed. Transport person to a hospital as soon as possible.

SITE CHARACTERIZATION

A. SITE DESCRIPTION:

- Client Name: Chevron U.S.A.

  Location of site: 121 Lakeshore Ave., Oakland, CA

- Client contact person(s):

  Name: John Randal Telephone: (415) 671-2387

- Topography of area surrounding the site:

  Hilly X Flat X Hummocky _____ Marshy _____

  Mountainous _____ Other _____

- Area affected:

  Urban X Rural ___ Residential ___ Industrial ___

  Commercial X Other _____

- Types of bodies of water bordering the site, if any:

  Stream ___ River ___ Pond ___ Lake X Bay ___

  Ocean ___ Other _____ None ___

- Properties bordering the site:

  North:
  Name: 580 Freeway

  South:
  Name: Commercial

  East:
  Name: Residential

  West:
  Name: Park

B. BACKGROUND:

- History and nature of problem: GTI conducted assessment work and installed treatment system in 1980-81. Site has been inactive since 1981. Free product has been observed in some on-site wells and adjacent property has reported gasoline vapors in basement.

- Are our services being provided as a consequence of orders from local, state, or federal officials?

Yes___ No_X_

C. ON-SITE WORK PLANS:

- Project Objectives: At present, assess groundwater on and off site, destroy on-site wells.

- Work tasks (with proposed timetables):

Task 1: Drilling/Soil Boring

- 2 months (1 week of Ops)

Task 2: Groundwater sampling

- 1 month (1 day of work)

Task 3: Well point survey w/mobile lab

- 3 days of field work (conducted lastly)

Task 4:

Task 5:

Task 6:

Task 7:

Task 8:

Task 9:

- Non-chemical hazards:

  confined space___ drill rig X noise___ traffic X

  underground utilities X overhead lines X backhoe___

  other construction equipment___ poisonous insects_____

  poisonous animals___ dangerous animals___ ticks_____

  high crime area X slip/fall hazards___ welding_____

  heat/cold stress___ excavation >5ft___ trench >4ft___

  leaking containers X electrical X hot surface____

  low light conditions___ liftting hazard___

  other_____

  _____

- If confined space entry was checked above, of what type is the confined space?

  shed___ subsurface vault___ manhhole___ basement____

  trench___ excavated pit___ other_____

- Chemicals utilized to perform on-site tasks (include chemicals used to maintain equipment):

  TSP soap, extraction chemical for mobile lab, Gas for steam cleaner

- Safety engineering controls incorporated into the design of remediation system(s), if applicable:

  _____

  _____

  _____

HAZARD EVALUATION

The potential for unknown hazards cannot be eliminated. Hazards can exist for all exposure routes such as inhalation, dermal contact, ingestion, and eye contact.

The following are potential site hazards and the corresponding procedures for hazard reduction:

	POTENTIAL HAZARDS		PROCEDURES FOR HAZARD REDUCTION
1.	Volatilization of organic vapors during all operations can pose a potential hazard via the inhalation of vapors.	1.	The ambient air within the work area and in all confined spaces must be monitored prior to entry with an Ionization Detector. Depending on organic vapor air concentrations, a respirator may need to be worn. See page 18 for action level and page 17 for monitoring procedures. Workers should stand upwind of the source of contamination whenever possible, regardless of the air concentrations.
2.	Skin and eye contact with the separate-phase petroleum and hydro-contaminated groundwater and/or soil may occur during well installation, well development, well gauging, and soil and water sampling.	2.	Use of approved gloves and goggles will be required when potential skin and eye contact with contaminated substances is apparent.

	POTENTIAL HAZARDS	PROCEDURES FOR HAZARD REDUCTION
3.	Skin and eye contact with hydrochloric acid can occur if and when it is used to preserve groundwater samples.	3. (see 2. above)
4.	Skin and eye contact with methanol, alconox, or other cleaning substances can occur while cleaning sampling equipment.	4. (see 2. above)
5.	Ingestion of petrochemicals can occur by accidental swallowing of contaminated soils, liquids and/or transfer of contaminated particles onto ingestible substances (such as food).	5. Eating, smoking, drinking and/or application of cosmetics is prohibited on site. This minimizes the possibility of exposure to the petrochemicals potentially encountered on site via ingestion.
6.	Atmospheres the contain a level of oxygen greater than 23% pose an extreme fire hazard (the ambient oxygen level is approx. 20.5%). This hazard can be compounded by the fact that the petrochemical vapors typical of gasoline retailing facilities are highly flammable.	6. Personnel encountering atmospheres that contain a level of oxygen greater than 23% must evacuate the site immediately and must notify the Fire Department. (Refer to Page 2 for First Dept. phone#)

POTENTIAL HAZARDS	PROCEDURES FOR HAZARD REDUCTION
7. Existing manholes sub-surface vaults and sheds are **confined spaces** that may lack adequate ventilation and trap organic and/or combustible vapors. To avoid anoxia from the lack of oxygen and/or overexposure to vapors, personnel entering these spaces must follow the procedure for reducing hazards. The confined space must be monitored for (a) oxygen level, (b) flammable vapors, and, (c) toxic vapors.	7. The oxygen in confined spaces must be monitored with an oxygen meter prior to entry. If oxygen monitoring indicates that the level of oxygen is less than 19.5%, personnel entering such spaces must wear an air-supplying respirator. Oxygen monitoring should be conducted at the top, middle, and bottom of the confined space. The presence or absence of explosive vapors must be determined before entering any confined space. If the explosi-meter readings are greater than 20% of the Lower Explosive Limit (LEL), confined spaces must not be entered and the First Dept. should be notified. Note that the accuracy of explosimeters is compromised when used in atmospheres that contain less than 19.5% oxygen. For monitoring toxic vapors, which are organic in nature (i.e. gasoline, diesel), a PID or FID may be appropriate. Toxic vapors may also be detected by utilizing color-detector tubes (Draeger, Sensidine, etc...).

POTENTIAL HAZARDS	PROCEDURES FOR HAZARD REDUCTION
7. Confined spaces cont.	7. The buddy system must be utilized when working within a confined space (i.e. if the entry requires the person's head to be below ground level or the person is working in a manhole or other space in which an exit is restricted or not easily accessible. Note: Entry into shallower vaults will not require the buddy system if the atmosphere meets GTI criteria (see page 18) via the one of the following means: (1) installation of a ventilation system (2) manhole cover has been removed 5 minutes prior to entering the space. In both cases, air monitoring is required continuously.

POTENTIAL HAZARDS	PROCEDURES FOR HAZARD REDUCTION
8. Physical hazards in general such as: a) vehicular traffic	a) All employees performing job duties on this site will be required to wear a fluorescent safety vest. Each person whose job duties involve work on this site will be issued an individual safety vest which is to be worn at all times on site, regardless of work being conducts. Cones with 6 foot flags, barricades, and flagging tape will be mandatory equipment which will be brought onto this site, and utilized in the immediate area where the following work is being performed: *Drilling: cones with 6 foot flags, barricades, flagging tape. *Well Maintenance: cones with 6 foot flags *Well Gauging: cones with 6 foot flags *Sampling: cones with 6 foot flags *Aquifer Test: cones with 6 foot flags *Gallery Installation: cones with 6 foot flags, barricades, flagging tape. *System Installation: cones with 6 foot flags, barricades, flagging tape. *Vault Work: cones with 6 foot flags, barricades

POTENTIAL HAZARDS	PROCEDURES FOR HAZARD REDUCTION
c) slippery surfaces	c) Use of approved skid-proof boots shall be required.
d) noise	d) Approved ear plugs/muffs shall be made available for noisy work operations such as drilling.
e) contaminated surfaces	e) Contact with contaminated surfaces, or surfaces suspected of being contaminated, should be avoided. This includes working through, kneeling or placing equipment in puddles, mud, or discolored surfaces, or on drums or other containers.
f) exposure: Heat Stress	f) Provide plenty of liquids to replace loss of body fluids. Appropriate liquids should consist of juices, juice products, and water. Establish a work schedule that will provide sufficient rest periods for cooling down. As the temperature increases, more frequent and longer rest periods are required. Provide adequate shelter against heat and direct sunlight for the protection of personnel. The use of cooling devices may be needed to aid natural body ventilation. The use of long underwear designed to "wick" away perspiration may also be utilized.

POTENTIAL HAZARDS	PROCEDURES FOR HAZARD REDUCTION
Heat Stress types:	
Heat Rash:	result of continuous exposure to heat, humid air, and chafing clothing. Heat rash is uncomfortable and decreases the ability to tolerate heat.
Heat Cramps:	result of the inadequate replacement of body electrolytes lost through perspiration. Signs include: severe spasms and pain in the extremities and abdomen.
Heat Exhaustion:	result of increase stress on the vital organs of the body in the effort to meet the body's cooling demands. Signs include shallow breathing; pale, cool, moist skin, profuse sweating, dizziness.
Heat Stroke:	result of an overworked cooling system. Heat stroke is the most serious form of heat stress. Body surfaces must be cooled and medical help must be obtained immediately to prevent severe injury and/or death. Signs include red, hot, dry skin; absence of perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma; and death.

POTENTIAL HAZARDS	PROCEDURES FOR HAZARD REDUCTION
g) exposure Cold Stress	g) Establish a work schedule that will provide sufficient rest periods for warming-up. As the temperature drops, more frequent and longer rest periods are required. Provide adequate thermal protective clothing.
h) other hazards	h) - avoid standing near the edge of the excavation - look for falling objects, slipping and tripping hazards (Visqueen sheets used to hold excavated soil can be slippery) - secure the site with fences and post warning signs to prevent the exposure of unauthorized, unprotected people to site hazards - for protection from head injuries (i.e. falling objects), hard hats must be worn by all personnel whenever construction type activities are taking place (i.e. drilling, excavation, trenching).

Gas/Vapor Monitoring Procedures

The greatest potential hazards to safety and health at this site include:

1) Exposure to chemical vapors - through inhalation

2) Exposure to chemical contamination - through skin contact and ingestion

3) Fire hazards due to flammable vapors

Ongoing air monitoring during project tasks will provide data to ensure that vapor concentrations are within acceptable ranges and will provide adequate selection criteria for respiratory and dermal protection.

* If PID/FID readings exceed 100ppm, an air-purifying respirator with organic vapor cartridges must be worn by all site workers within any area where monitoring results exceed 100ppm.

* If PID/FID readings exceed 750ppm, level B protection will be required. Personnel must leave the site immediately and contact the Site Safety Officer or the Health and Safety Manager for further instructions.

* Respirator cartridges will be changed once per day as a minimum. This can be accomplished at the end of the work day during respirator decontamination. If odor breakthrough is detected while wearing the respirator or breathing becomes difficult, change cartridges immediately.

MSDS INFORMATION

Material Safety Data Sheets (MSDS) on all chemical substances encountered at the site shall be made available to all personal (including subcontractors) working at the site. These MSDS's shall be enclosed within this site safety plan in Appendix E.

For emergency situations not specifically addressed by this site safety plan, refer to MSDS recommendations for action information.

GASOLINE CONTAMINATION ACTION LEVELS

NOTE: The information in this chart applies only if the only on-site chemical is gasoline

GASOLINE PEL = 300ppm **GTI ACTION LEVEL = 100ppm**

ACTION LEVELS/LEVEL OF PERSONAL PROTECTIVE EQUIPMENT (ppe)

Air Monitoring Instrument	D	C	B
PID/FID	<100ppm	100-750ppm	>750ppm
O_2	19.5-23%	19.5-23%	<19.5%

SITE SHALL BE EVACUATED IF O_2 > 23% OR LEL > 20%

If conditions require Level B personal protective measures and the appropriate Level B equipment is unavailable, site personnel should evacuate immediately. See Appendix D for personal protective equipment (PPE) level guidance.

PETROCHEMICALS OF CONCERN

Health Effects:

Potential effects of any exposure are dependant on several factors such as: toxicity of substance, timeframe of exposure, concentration of substance producing the exposure, general health of person exposed, and individual use of hazard reduction methods.

Gasoline

Gasoline is a complex mixture of hydrocarbons and additives. Chronic exposures or exposures to a high concentration of gasoline vapor may cause unconsciousness, coma and possibly death from respiratory failure. Exposure to low concentrations of gasoline vapor may produce flushing of the face, slurred speech, and mental confusion (see chart of properties, page 21 for further explanation).

Gasoline constituents can be divided into five major groups: alkanes, alkenes, cycloalkenes, aromatics, and additives. The aromatics are the constituents generally regarded to be of the greatest toxic concern. The major aromatics in gasoline are benzene, toluene, and xylene. Of these, benzene is considered to be the most potent. All of these chemicals can also irritate the skin if repeated or prolonged skin exposure occurs.

Benzene

Benzene can ether the body through inhalation, ingestion, and skin contact. Studies have noted that chronic exposure to benzene vapor can produce neurotoxic and hemopoietic (blood system) effects. Other effects can include headache, dizziness, nausea, convulsions, coma, and possible death if exposure is not reversed. The most significant chronic effect of benzene is bone marrow toxicity. Although the cause-effect relationship is not fully understood, it is believed that there might be a strong association between chronic exposures to benzene and the development of leukemia.

Toluene

Inhalation exposure to toluene vapor can produce effects such as central nervous system depression. Depending on exposure factors, signs and symptoms can include headache, dizziness, fatigue, muscular weakness, lack of coordination, drowsiness, collapse, and possible coma. Studies have noted anemia could be a possible effect of chronic exposure to toluene. Toluene can be a skin and mucous membrane irritant and has ben shown to cause liver and kidney damage when overexposure is significant.

Xylene

Depending on exposure factors, inhalation of xylene vapor may produce central nervous system excitation followed by depression. Exposure to xylene vapor can produce dizziness, staggering, drowsiness, and unconsciousness. At very high concentrations, xylene vapor may produce lung irritation, nausea, vomiting, and abdominal pain. Xylene is not known to possess the chronic bone marrow toxicity of benzene, but liver enlargement and nerve cell damage have been noted from chronic overexposure. Ingestion exposures to xylene can produce temporary liver damage and should be avoided.

Ethyl benzene

Ethyl benzene is an eye, mucous membrane, respiratory tract, and skin irritant. High air levels can cause central nervous system depression, sense of chest constriction, headache and dizziness. Skin contact may cause irritation, inflammation and first or second degree burns.

PROPERTIES OF GASOLINE AND SELECT PETROLEUM CHEMICALS

	GASOLINE	BENZENE	TOLUENE	XYLENE	ETHYL BENZENE
CAS Number	8006-61-9	71-43-2	108-88-3	133-20-7	100-41-4
Synonyms	Petrol Motor spirits Benzin	Benzol Phenyl Hydride Coal Naphtha Phene Benxole Cyclohexatrine	Toluol Methylbenzene Phenylmethane Methylbenzene	Xylol Dimethylbenzene	Ethylbenzol Phenylethane EB
Physical Description	Highly flammable, mobile liquid with a characteristic odor.	A clear, volatile colorless, highly flammable liquid with an aromatic odor.	A clear, colorless, noncorrosive liquid.	m-,p-,and o-xylenes are mobile, colorless, flammable liquids.	Colorless liquid with an aromatic odor.
Chemical and Physical Properties					
flash pt.	-45 F	-11 C	4.4 C	4.4 C	59 F
vap. den.	3-4	2.77	3.2	3.2	3.7
vap. pt.	----	74.6mmHG @20 C	28mmHG @25 C	28mmHG @25 C	10mmHG @26 C
LEL	1.4%	1.3%	1.2%	1.2%	1.0%
UEL	7.6%	7.1%	7.0%	7.0%	4.7%
auto ingn.	536-853 F	562 C	536 C	536 C	810 F
Incompatabilities	Strong oxidizing agents: i.e., hydrogen peroxide.	Strong oxidizers, chlorine and bromine with iron	Oxidizing agents, strong acids, bases, and ammonia	Oxidizing agents, strong acids, bases, and ammonia	Oxidizing agents strong acids, bases, ammonia
Permissible Exposure Limits in Air (ppm)					
OSHA PEL	300	1	100	100	100
ACGIH TLV-TWA	300	10	100	100	100

HEALTH AND SAFETY REQUIREMENTS

Medical Monitoring Program

All Groundwater Technology, Inc. field personnel are required to have annual medial evaluations in accordance with the company's Health and Safety Program policy. Additional re-evaluation will be considered in the event of chemical over-exposure while working on this site.

The petrochemicals typical of gasoline retail facilities can affect specific organ systems producing characteristic health effects. The medical evaluation will, therefore, focus on the liver, kidney, nervous system, blood systems, and skin and lung function. Laboratory testing will include complete blood count, and applicable kidney and liver-function tests. Other test include skin examination.

Work Zone Access

Access within a 3-foot radius of any on-site operation is prohibited to all but Groundwater Technology, Inc. field personnel and subcontractors.

Personal Protective Equipment

A. Modified Level D is the minimum acceptable level for this site. Modified Level D provides minimal dermal protection. Respiratory protection is optional unless air monitoring data indicates otherwise.

   Modified Level D includes:

   - coveralls/work uniform
   - Tyvek (optional)
   - Nitrile butyl-rubber or Viton gloves (optional)
   - boots/shoes, leather or chemical resistant, with steel shank and approved toe protection
   - approved safety glasses or chemical splash goggles if the potential for splash exists
   - hard hat
   - reflective traffic vest (if traffic, construction or other related activities are present
   - hearing protection (as appropriate)

B. Additional equipment upgrade: (see Appendix D for further information)

1. Protocols for upgrading:

Once air monitoring data are complete and results are tabulated on the initial site entry, the Site Safety Officer and/or Health and Safety Manager will determine if changes in PPE are needed.

2. Upgraded equipment:

a. Respirators

Respirators with organic vapor cartridges shall be worn by all personnel if ionization detector readings exceed 100ppm. (see page 18 for information)

Note: Reference page 17 for cartridge replacement requirements. Level B must be worn when ionization detector readings exceed 750ppm and/or oxygen levels are less than 19.5%.

b. Other

Tyvek suits and appropriate gloves shall be worn if potential for dermal exposure exists while performing job tasks.

C. First Aid Equipment

Vehicles used for site work will be equipped with a first aid kit and safety equipment including:

- fluorescent vests
- cones and flags
- barricades
- fire extinguisher
- flashlight
- water, suitable for drinking
- portable eye wash
- appropriate emergency bandage material

Decontamination Procedures

All operations conducted at this site have the potential to contaminate field equipment and personal protective equipment (PPE). To prevent the transfer of any contamination to vehicles, administrative areas, and other personnel, the following procedures must be followed:

1. Whenever possible, field equipment should be decontaminated with a solution of Alconox or Green Soap and thoroughly rinsed with water prior to leaving the site. This must be done outside a 5ft. radius of any work area or the hot zone.

2. Disposable PPE (for example, Tyvek suits, respirator cartridges) must be bagged and disposed of at the site.

Personal Decontamination

LEVEL D - segregated equipment drop
- wash/rinse outer boot (as appropriate)
- wash/rinse chemical resistant outer glove, then remove as appropriate
- remove and throw out inner disposable gloves in designated, lined receptacles

LEVEL C - segregated equipment drop
- wash/rinse outer boots
- wash/rinse chemical resistant outer gloves, then remove tape and gloves
- remove chemical resistant suit (remove by rolling down suit from the inside)
- remove outer boots
- remove first pair(s) of disposable gloves
- remove respirator, hard hat/faceshield and properly dispose of cartridges; wash respirator
- remove last pair of disposable gloves

LEVEL B - segregated equipment drop
- wash/rinse outer boots
- wash/rinse chemical resistant outer gloves
- cross hotline (into clean area) and change air tanks, the redress or
- cross hotline (into clean area)
- remove SCBA, if worn over the chemical resistant suit
- if SCBA is worn under the suit, remove the chemical resistant suit, then the SCBA
- remove hard hat

Drilling Procedures

A digsafe number must be obtained prior to drilling from appropriate agency. A metal detector should be used before drilling on a site to determine presence of subsurface metal tanks and/or drums.

During the drilling operation, two persons (one designated as "driller" and the other as "helper") must be present at all times. The helper (whether Groundwater Technology, Inc. personnel or subcontractors) must be instructed as to the whereabouts of the emergency shut-off switch. Every attempt must be made to keep unauthorized personnel from entering the work area. If this is not possible, the operation should be shut down until the area is cleared. The Site Safety Officer or the Field Team Leader has the authority and responsibility to shut down the drilling operations whenever a hazardous situation is deemed present.

The mast of the drilling rig should maintain a preferred clearance of 20 feet from any overhead electrical cables with 10 feet being the minimum clearance. All drilling operations will cease immediately during any hazardous weather conditions.

Hard hats shall be worn at all times.

Electrical Equipment and Ground Fault Circuit Interrupters

All electrical equipment and power cables used in and around wells or structures containing petrochemical contamination must be explosion-proof and/or intrinsically-safe and equipped with a three-wire ground lead, that has been rated as explosion-proof for hazardous atmospheres (Class 1 Div 1&2). In accordance with OSHA 29 CFR 1926.404, approved ground fault circuit interrupters (GFCI) must be utilized for all 120 volt, single-phase, 15 and 20 amp receptacle outlets on the site which are in use by employees and which are not part of the permanent wiring as defined by the NEC 1987. Receptacle on the ends of extension cords are not part of the permanent wiring and therefore, must be protected by GFCI's whether or not the extension cord is plugged into permanent wiring.

The GFCI is a fast-acting circuit breaker which senses small imbalances in the circuit caused by current leakage to ground, and in a fraction of a second shuts of the electricity. However, the GFCI will not protect the employee from line-to-line contact hazards such as a person holding two "hot" wires or a hot and neutral wire in each hand. The GFCI does provide protection against the most common form of electrical shock hazard - the ground fault. It also provides protection against fires,k overheating, and destruction of wire insulation.

GFCI's can be used successfully to reduce electrical hazards on construction sites. Tripping of GFCI's, interruption of current flow, is sometimes caused by wet connectors and tools. It is good practice to limit exposure of connectors and tools to excessive moisture by using watertight or sealable connectors. Providing more GFCI's on shorter circuits can prevent tripping caused by the cumulative leakage from several tools or by leakages from extremely long circuits. (Adapted from OSHA 3007; Ground-Fault Protection on Construction Sites-1987).

Fire Prevention

During equipment operation, periodic vapor-concentration measurements should be taken with an explosimeter or combustimeter. If at any time the vapor concentrations exceed 20% of LEL, the Site Safety Officer, or designated field worker, should immediately shut down all operations.

Only approved metal can will be used to transport and store flammable liquids.

All gasoline and diesel-driven engines requiring refueling must be shut down and allowed to cool before filling.

Smoking is not allowed during any operations within the work area is which petroleum products or solvents in free-floating, dissolved or vapor forms, or other flammable liquids may be present.

No open flame or spark is allowed in any area containing petroleum products, or other flammable liquids.

General Health

Medicine and alcohol and increase the effects of exposure to toxic chemicals. Unless specifically approved by a qualified physician, prescription drugs should not be taken by personnel assigned or operations where the potential for absorption, inhalation, or ingestion or toxic substances exists.

Drinking and riving is prohibited at any time. Driving at excessive speeds is always prohibited.

Skin abrasions must be thoroughly protected to prevent chemicals from penetrating the abrasion.

It is recommended that contact lenses not worn by persons working on the site.

Employee Training

All GTI employees with the potential for hazardous exposures are required to participate in an initial minimum of 40 hours of training to recognize, evaluate, and control worksite hazards. three days of supervised field-train is also included within the initial training program. Project manager level and above must also participate in an additional eight-hour supervisory training course. One employees have received the above training they receive a certificate of completion and are scheduled for an eight hour refresher training session within one year of their initial training. GTI training includes specific details on the following:

- regulatory requirements
- confined space entry
- respiratory protection
- hazard communication
- decontamination procedures
- incident command system
- first aid/CPR
- air monitoring
- Toxicology
- Prop. 65 (California)
- fire technology
- personal protective equipment

PROJECT PERSONNEL

Groundwater Technology, Inc. will oversee and act accordingly during all phases of the project. The following management structure will be instituted for the purpose of successfully and safely completing this project.

Project Manager: Joe Ramage

The Project Manager will be responsible for implementing the project and obtaining any necessary personnel or resources for the completion of the project. Specific duties will include:

- coordinating the activities of all subcontractors, including their signed acknowledgment of this Site Safety Plan (see Appendix A)
- selecting a Site Safety Officer and field personnel for the work to be undertaken on site
- ensuring that the tasks assigned are being completed as planned and are kept on schedule
- providing authority and resources to ensure that the Site Safety Officer is able to implement and manage safety procedures
- preparing reports and recommendations about the project to client and affected Groundwater Technology, Inc. personnel
- ensuring that all persons allowed to enter the site (i.e., EPA, contractors, state officials, visitors) are made aware of the potential hazards associated with the substances know or suspected to be on site, and are knowledgeable as the on-site copy of the specific site safety plan
- ensuring that the Site Safety Officer is aware of all of the provisions of this site safety plan and is instructing all personnel on site about the safety practices and emergency procedures defined in the plan, and,
- ensuring tat the Site Safety Officer is making an effort to monitor site safety, and has designated a Field Team Leader to assist with the responsibility when necessary

Health and Safety Manager: Dick Krentz

The Health and Safety Manager shall be responsible for the overall coordination and oversight of the site safety plan. Specific duties will include:

- approving the selection of the types of personal protective equipment (PPE) to be used on site for specific tasks
- monitoring the compliance activities and the documentation processes undertaken by the Site Safety Officer
- evaluating weather and chemical hazard information and making recommendations to the Project Manager about any modifications to work plans or personal protection levels in order to maintain personnel safety
- coordinate upgrading or downgrading PPE with Site Safety Officer, as necessary, due to changes in exposure levels, monitoring results, weather, other site conditions
- approving all field personnel working on site, taking into consideration their level of safety training, their physical capacity, and their eligibility to wear the protective equipment necessary for their assigned tasks; (i.e. respirator fit testing results)
- overseeing the air-monitoring procedures as they are carried out by site personnel for compliance with all company health and safety policies

Site Safety Officer: Joe Ramage

The Site Safety Officer shall be responsible for the implementation of the site safety plan on site. Specific duties will include:

- monitoring the compliance of field personnel for the routine and proper use of the PPE that has been designated for each task
- routinely inspecting PPE and clothing to ensure that it is in good condition and is being stored and maintained properly
- stopping work on the site or changing work assignments or procedures if any operation threatens the health and safety of workers or the public
- monitoring personnel who enter and exit the site and all controlled access points
- reporting any signs of fatigue, work-related stress, or chemical exposures to the Project Manager and/or Health and Safety Manager within 24 hours
- dismissing field personnel from the site if their actions or negligence endangers themselves, co-workers, or the public, and reporting the same to the Project Manager and/or Regional Safety Director within 24 hours
- reporting any accidents or violations of the site safety plan to the Project Manager and/or Regional Safety Director within 24 hours
- knowing emergency procedures, evacuation routes and the telephone numbers of the ambulance, local hospital, poison control center, fire and police departments
- ensuring that all project-related personnel have signed the personnel agreement and acknowledgments form contained in this site safety plan
- coordinate upgrading and downgrading of PPE with the Health and Safety Manager, as necessary, due to changes in exposure levels, monitoring results, weather, and other site conditions
- perform air monitoring with approved instruments in accordance with requirements stated in this Site Safety Plan (see monitoring procedures on page 17 for specific information)

Field Team Leaders: Glen L. Mitchell

In the event that the Project Manager and the Site Safety Officer are not on site, the Field Team Leader will assume all responsibility for enforcing safety procedures.

Medical/Technical Advisors

Frank H. Lawrence, M.D.
ENVIROLOGIC DATA, Portland, Maine.....(207) 773-3020

Marilyn E. Grant, R.N.,B.S.,C.O.H.N.
ENVIROLOGIC DATA, Portland, Maine.....(207) 773-3020

Lori St. Pierre, I.H.I.T.
ENVIROLOGIC DATA, Portland, Maine.....(207) 773-3020

The specific duties of the Medical/Technical Advisors include:

- providing technical input into the design of the site safety plan
- advising worker exposure potential along with appropriate hazard reduction methods
- recommending a suitable medical monitoring program for the site workers

Other Field Personnel

All field personnel shall be responsible for acting in compliance with all safety procedures outlined in this site safety plan. Any hazardous work situations or procedures should be reported to the Site Safety Officer so that corrective steps can be taken. The Health and Safety Manager and/or Site Safety Officer has the authority to halt any operation that does not follow the provisions of this Site Safety Plan.

APPENDIX A

Agreement and Acknowledgement Statement

Site Safety Plan Agreement

GTI personnel have the authority to stop work performed by out subcontractors at this site if any work is not performed in accordance with the requirements of this Site Safety Plan.

All Groundwater Technology, Inc. project personnel and subcontractor personnel are required to sign the following agreement prior to conducting work at the site.

1. I have read and fully understand the Site Safety Plan and my individual responsibilities.

2. I agree to abide by the provisions of the Site Safety Plan.

Name	Signature
Company	Date
Name	Signature
Company	Date
Name	Signature
Company	Date
Name	Signature
Company	Date
Name	Signature
Company	Date

APPENDIX B

Site Safety Plan Amendment Sheet

Project Name:_____

Project Number:_____

Location:_____

Changes in field activities or hazards:

Proposed Amendment:

Proposed by:_____ Date:_____

Approved by:_____ Date:_____
Project Manager

_____ Date:_____
Health & Safety Manager

Declined by:_____ Date:_____

Amendment Number:_____

Amendment Effective Date:_____

APPENDIX C

Explanation of Hazard Evaluation Guidelines

Hazard: Airborne Contaminants

Guideline	Explanation
Threshold Limit Value Time-Weighted Average (TLV-TWA)	The time-weighted average concentration for a normal 8-hour work day and a 40-hour work week, to which nearly all workers may be repeatedly exposed without adverse effect.
Permissible Exposure Limit (PEL)	Time-weighted average concentration similar to (and in many cases derived from) TLV values.
Immediately Dangerous to Life or Health	"IDLH" or "Immediately dangerous to life or health" means any atmospheric condition that poses an immediate threat to life, or which is likely to result in acute or immediate severe health effects. This includes oxygen deficiency conditions.

Hazard: Explosion

Guideline	Explanation
Lower Explosive Limit (LEL)	The minimum concentration of vapor in air below which the propagation of a flame will not occur in the presence of an ignition source.
Upper Explosive Limit (UEL)	The maximum concentration of vapor in air above which propagation of the flame will not occur in the presence of an ignition source.
Flash Point	The lowest temperature at which the vapor of a combustible liquid can be made to ignite momentarily in air.

APPENDIX D

LEVELS OF PERSONAL PROTECTION

LEVEL A

Personal Protection is required. Level A is the area where the highest levels of contamination exist and is designated as the area where maximum respiratory, skin, and eye protection are required. An area may be designated a Level A when:

- Atmospheres have the potential to be Immediately dangerous to Life and Health (IDLH).
- Atmospheric sampling indicates (1) toxic contaminant concentrations capable of being absorbed in toxic quantities through the eyes or skin or (2) corrosive levels that could destroy skin surfaces.
- Skin contact with extremely hazardous substances (known or suspected) is possible.

Equipment Ensemble:

Recommended	Protection Provided
* pressure demand, full-face SCBA or pressure-demand supplied-air respirator with escape SCBA	The highest available level of respiratory, skin, and eye protection
* fully-encapsulating, chemical-resistant suit.	
* inner chemical-resistant gloves	
* chemical-resistant boots/shoes	
* hard hat	
* two-way radio communications	

Optional:
* cooling unit
* long cotton underwear
* coveralls
* disposable gloves and boot covers

LEVEL B

Personal protection is required. Level B is the area where maximum respiratory protection is required, however, there is a low probability of dermal toxicity. An area may be designated as Level B when:

- Atmospheric concentrations or toxic contaminants are known to be greater than the protection factors supplied by air-purifying respirators or when atmospheric concentrations or oxygen are less than 19.5%.
- Contamination of small areas of exposed skin by dermal toxic materials is unlikely.

Equipment Ensemble:

Recommended	Protection Provided
* pressure-demand, full-face SCBA or pressure-demand supplied air respirator with escape SCBA * chemical resistant clothing (overalls and long-sleeve jacket; hooded, one-or two-piece chemical splash suite; disposable chemical-resistant one-piece suite) * inner and out chemical resistant gloves * chemical-resistant safety boot/shores * hard hat * two-way radio communications	The same level of respiratory protection but less skin protection than Level A. It is the minimum level recommended for initial site entries until the hazards have been further identified.

Optional:
* coveralls
* disposable boot covers
* face shield
* long cotton underwear

LEVEL C

Personal protection is required. Level C is the area were respiratory protection of a lesser degree than the criteria established for Levels A or B is required, and the probability of skin contamination by dermal toxic materials in unlikely. An area may be designed as Level C when:

- Monitored levels of air contamination do not exceed the protection factors afforded by air-purifying respirators.
- Air contaminants have good warning properties.
- Contaminants are not known to be absorbed through, or toxic to, skin surface.
- A reliable history of prior site entries exists without indications of acute or chronic health effects.

Equipment Ensemble:

Recommended	Protection Provided
* air-purifying respirator	the same level of skin protection as Level B, but a lower level of respiratory protection.
* chemical-resistant clothing (overalls and long sleeved jacket; hooded, one-or two-piece chemical splash suit, disposable chemical-resistant one-piece suit	
* inner and other chemical-resistant gloves	
* hard hat	

Optional:
* coveralls
* disposable boot covers
* face shield
* escape mask
* long cotton underwear

LEVEL D

Personal protection if required. Level D is the area where respiratory protection is not a requirement. An area may by designated as Level D when:

- No hazardous airborne contaminants are known to be present, and the potential for a release of such hazards is low.
- Work operations preclude the splashing of hazardous/toxic materials on body surfaces.
- There are no Level A zones within the same exclusion area.

Equipment Ensemble:

Recommended	Protection Provided
* coveralls	no respiratory protection. Minimal skin protection.
* Tyvek (optional)	
* Nitrile or Viton gloves (optional)	
* boots/shoes, leather or chemical resistant, with steel shank and approved toe protection	
* approved industrial safety glasses or chemical splash goggles	
* hard hat	

APPENDIX E

Site Maps

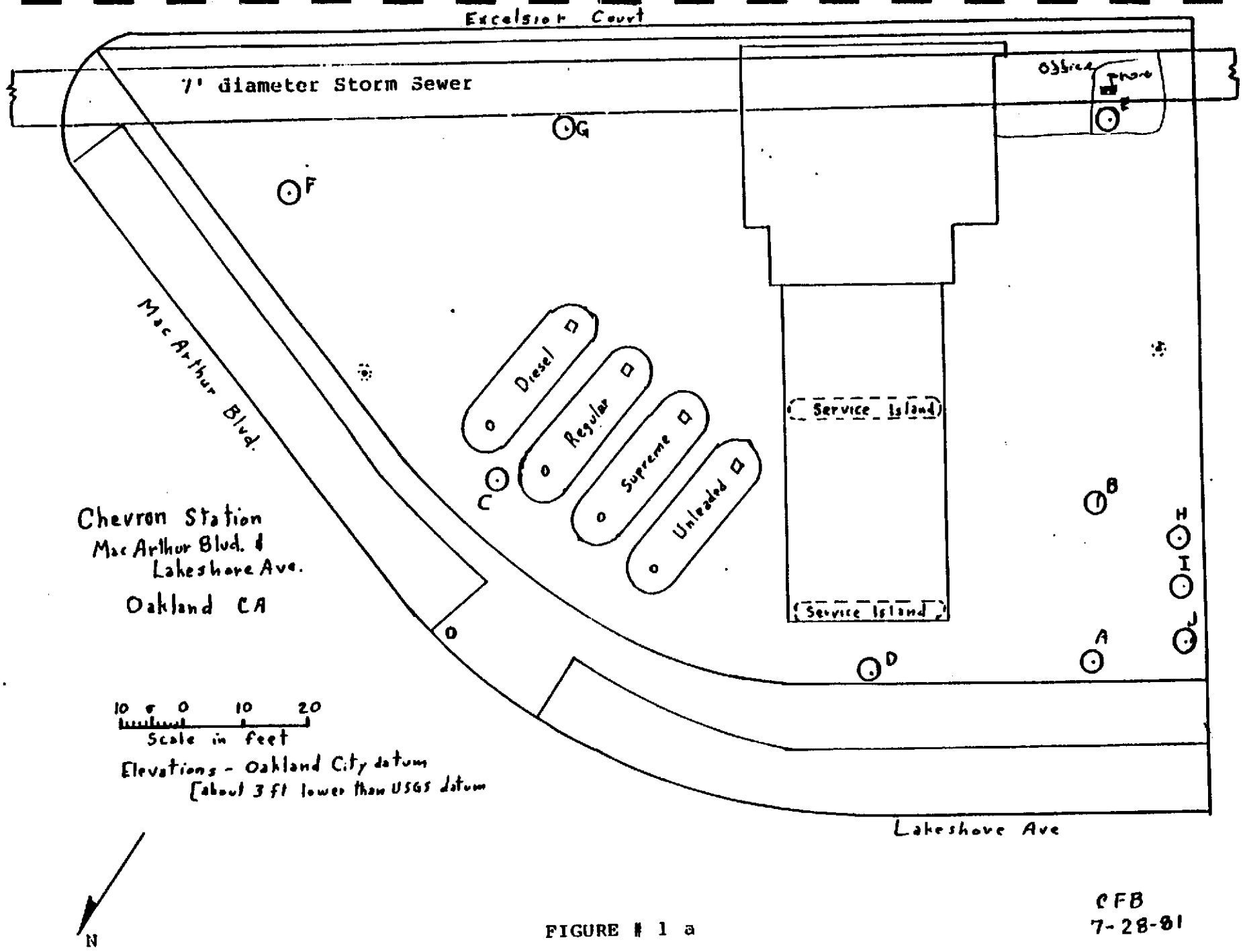
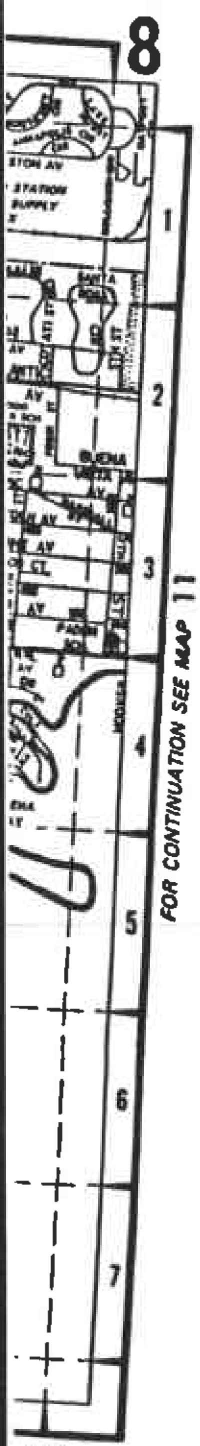
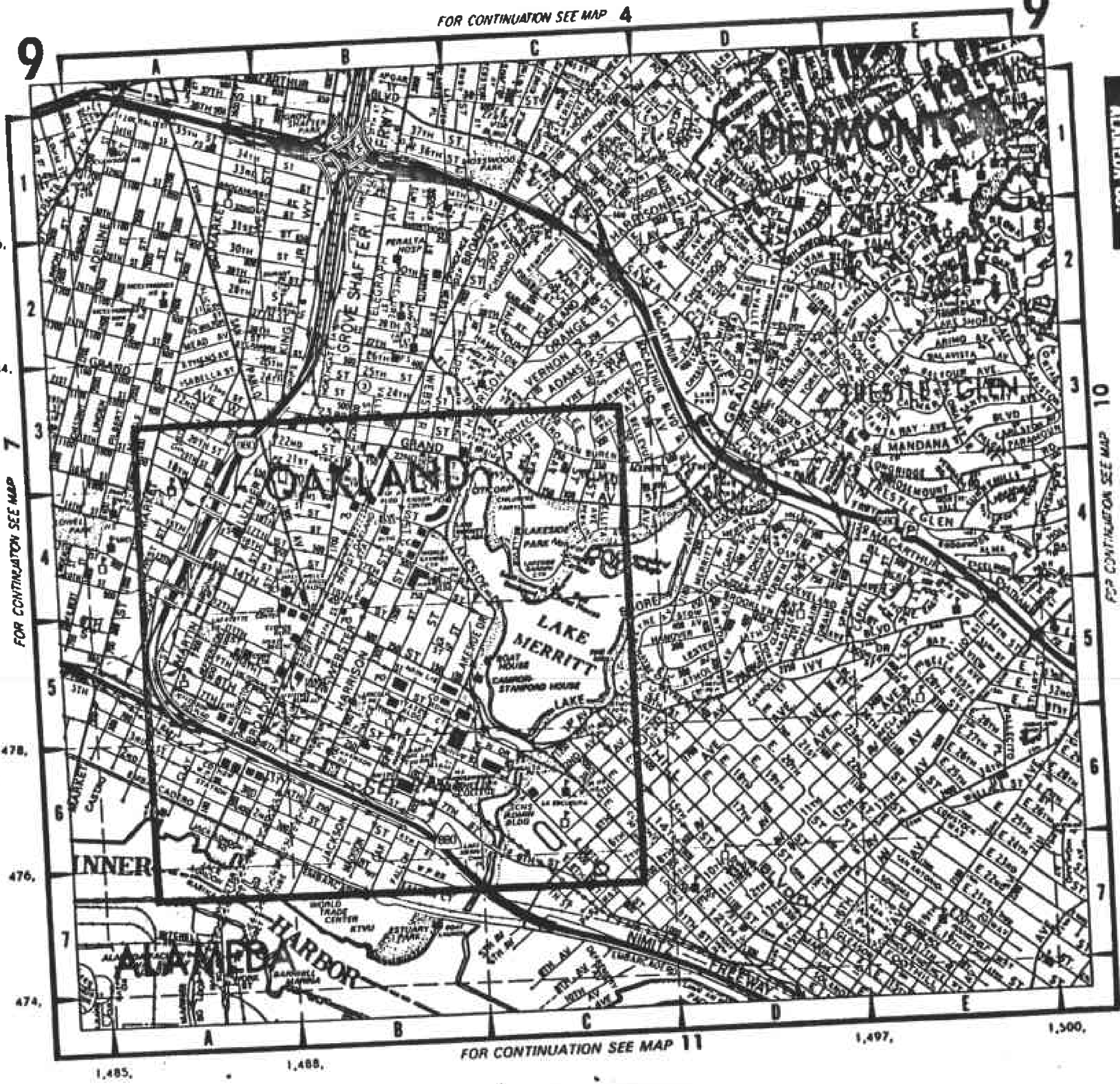


FIGURE # 1 a

CFB
7-28-81





APPENDIX F

Material Safety Data Sheets
(MSDS)

GASOLINE

MATERIAL SAFETY DATA SHEET

Prepared by Envirologic Data
Portland, ME (207) 773-3020
May 1985

EMERGENCY TELEPHONE NUMBER: Massachusetts Poison Information Center
Boston, MA 1-800-682-9211

SECTION I. IDENTIFICATION

Material Name: Gasoline
Synonyms: Petrol, motor spirits, benzin.
CAS No.: 8006-61-9
Molecular Formula: C_5H_{12} to C_9H_{20}

SECTION II. FIRST AID PROCEDURES AND EMERGENCY TREATMENT

In all cases of poisoning, follow standard procedures for poison management, first aid, and cardiopulmonary resuscitation. Whenever transporting a poisoned person to a hospital, bring the container, label, or other information concerning the product (without delaying transport) to assist medical personnel with diagnosis and treatment. Four different routes of exposure and their respective first aid/poison managements are outlined below:

Ingestion:

- Dilute the poison by offering and encouraging the person to drink one or two glassfuls of water or milk. Do not use carbonated fluids. Do not attempt to make the person vomit.
- Call the Massachusetts Poison Information Center (1-800-682-9211). If you cannot reach the Poison Information Center, call or take the person to the nearest hospital emergency department.
- Notify your supervisor or health and safety officer of this or any poison exposure.

Inhalation:

- Stop exposure by moving person from contaminated area to clean air area.
- Call the Massachusetts Poison Information Center (1-800-682-9211).
- Have someone call a rescue unit or medical professional.
- If necessary, transport person to an emergency medical facility promptly.

Skin:
- o Wash off skin immediately with a large amount of water; use soap if available.
- o Remove any contaminated clothing and rewash skin.
- o Call the Massachusetts Poison Information Center (1-800-682-9211).
- o Transport person to a medical facility as necessary.

Eyes:
- o Gently rinse eye immediately, using large amounts of water, for fifteen minutes, if possible, with eyelids held open.
- o If possible, have person remove contact lenses if worn; never permit the eyes to be rubbed.
- o Call the Massachusetts Poison Information Center (1-800-682-9211).
- o Transport person to an emergency medical facility promptly as necessary.

SECTION III. ACUTE TOXICITY

ELD Rating
(Oral Toxicity): 2
Toxic Effect Levels:
Inhalation man LC_{LO} 900 ppm (for 1 h)
Inhalation mammal LC_{LO} 30,000 ppm (for 5 min)
Signs and Symptoms
Ingestion: Burning of mouth, throat and stomach, inebriation, vomiting, dizziness, fever, drowsiness, confusion. Aspiration during vomiting may cause accumulation of fluid in the lungs, rapid breathing or death.
Inhalation: Burning of nose and throat, drowsiness, dizziness, nausea, numbness, headache, inebriation, central nervous system depression.
Skin: Itching, burning, irritation, blistering.
Eyes: Irritation.
Exposure Limits
OSHA Standard(s): None
NIOSH Recommended Limit(s): None
ACGIH Recommended Limit(s): 300 ppm, 8-h TLV-TWA
500 ppm, STEL

SECTION IV. LONG-TERM ORGANISM THREAT POTENTIAL

Carcinogenicity
IARC, NTP/NCI, CAG, RTECS: No indication of carcinogenic effects was found in standard references.
Mutagenicity
IARC, RTECS: No indication of mutagenic effects was found in standard references.
Teratogenicity
IARC, RTECS: No indication of teratogenic effects was found in standard references.

Reproductive Effects
IARC, RTECS: No indication of reproductive effects was found in standard references.

SECTION V. CHRONIC TOXICITY
Repeated or prolonged exposure may cause drying, dermatitis, and allergenic sensitivity.

SECTION VI. PHYSICAL DATA

Molecular weight: Not available
Boiling Point (at 760 mm Hg): 38-204°C (100-400°F)
Melting Point (at 760 mm Hg): Not available
Vapor Pressure (mm Hg) [at -12.6°C (9.32°F)]: 100
Vapor Density (Air=1): 3-4
Specific Gravity (water=1): 0.8
Percent Volatile By Volume: ~ 100
Evaporation Rate (butyl acetate =1): 1.1+
Solubility in Water: Insoluble
Solvent Solubility: Soluble in absolute alcohol, ether, chloroform, benzene.
Appearance and Odor: Clear volatile liquid with characteristic odor.

SECTION VII. FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): -43 to -38°C (-45 to -36°F) (Closed cup)
Extinguisher Media: Dry chemical, carbon dioxide, foam.

	Lower	Upper
Flammable Limits in Air, percent by vol.:	1.4	7.6

Autoignition Temperature: 280-456°C (536-853°F)
NFPA Fire Hazard: 3
Special Fire Fighting Procedures: Firefighters should wear self-contained breathing apparatus with full facepiece operated in positive pressure mode and full protective clothing.
Unusual Fire and Explosion Hazards: HIGHLY FLAMMABLE. Fumes may travel great distances to source of ignition and flash back.

SECTION VIII. REACTIVITY DATA

Stability: Stable in closed containers at room temperature under normal storage conditions.
NFPA Reactivity: 0
Incompatibilities (Materials to Avoid): Strong oxidizing agents.
Hazardous Decomposition Products: When heated to decomposition may release toxic vapors and gases of hydrocarbons, carbon monoxide, and carbon dioxide.
Hazardous Polymerization: Does not occur.

SECTION IX. SPILL, LEAK OR DISPOSAL PROCEDURES

Actions To Take in Case of Spills or Leaks: Restrict from areas of spills or leaks persons not wearing protective equipment and clothing. Eliminate sources of ignition. Ventilate area. Inform supervisor or health and safety officer of any spill or leak. While protecting against eye and skin contact and inhalation of vapors, contain spill. Prevent leakage into confined spaces or sewer drains. Where feasible, absorb liquid with vermiculite, sand, or other non-combustible absorbent material. Collect in suitable container and cover.

Disposal Methods: Federal laws and regulations impose highly specific requirements for disposal of toxic and otherwise hazardous materials. Consult with your supervisor or health and safety officer regarding the proper, legal disposal procedures for this substance. Do not dispose of potentially toxic or otherwise hazardous substances without appropriate authorization. Prior to receiving institutional authorization, it may be necessary to store spilled materials. To do so safely, carefully label containers of materials, store in a cool, dry location, and maintain security of the storage area until official guidance is obtained.

SECTION X. SPECIAL PROTECTION INFORMATION

Respiratory Protection: Only NIOSH or MSHA approved equipment should be used.

>300 ppm: Organic vapor canister gas mask or supplied air or self-contained respirator with full facepiece.

Ventilation: Provide adequate explosion-proof general ventilation and local exhaust ventilation to meet TLV recommendations.

Protective Clothing or Equipment:

- To prevent repeated or prolonged skin contact with liquid chemicals, use impervious clothing, gloves, face shields (eight-inch minimum), splash-proof safety goggles, and other appropriate protective clothing.
- Place clothing contaminated with liquids in closed containers for storage until clothing can be discarded or decontaminated. If the clothing is to be laundered or otherwise cleaned to remove the chemical, the person(s) performing the operation should be informed of the chemical's hazardous properties and of ways to minimize exposure.
- A safety shower should be provided within the immediate work area for emergency use where liquids may contact the employee's body.
- An eyewash fountain should be provided within the immediate work area for emergency use where liquids may contact the employee's eyes.

SECTION XI. SPECIAL PROCEDURES AND PRECAUTIONS

Procedures and Precautions to be Taken in Handling and Storing: Store in closed containers in cool, dry, well-ventilated area away from heat,

sources of ignition, and oxidizing agents. Do not smoke in areas of handling and storage. Electrically bond and ground containers for transfers to prevent sparks.

Other Precautions: Wash hands before eating, smoking or using toilet facilities. Contact lenses should not be worn when working with this chemical.

BENZENE

MATERIAL SAFETY DATA SHEET

Prepared by Envirologic Data
Portland, ME (207) 773-3020
September 1984

EMERGENCY TELEPHONE NUMBER: Massachusetts Poison Information Center
Boston, MA 1-800-682-9211

SECTION I. IDENTIFICATION

Material Name: Benzene
Synonyms: Benzol; phenyl hydride; cyclohexatrine
CAS No.: 71-43-2
Molecular Formula: C_6H_6

SECTION II. FIRST AID PROCEDURES AND EMERGENCY TREATMENT

In all cases of poisoning, follow standard procedures for poison management, first aid, and cardiopulmonary resuscitation. Whenever transporting a poisoned person to a hospital, bring the container, label, or other information concerning the product (without delaying transport) to assist medical personnel with diagnosis and treatment. Four different routes of exposure and their respective first aid/poison managements are outlined below:

Ingestion:

- Dilute the poison by offering and encouraging the person to drink one or two glassfuls of water or milk. Do not use carbonated fluids. Do not attempt to make the person vomit.
- Call the Massachusetts Poison Information Center (1-800-682-9211). If you cannot reach the Poison Information Center, call or take the person to the nearest hospital emergency department.
- Notify your supervisor or health and safety officer of this or any poison exposure.

Inhalation:
- o Stop exposure by moving person from contaminated area to clean air area.
- o Call the Massachusetts Poison Information Center (1-800-682-9211).
- o Have someone call a rescue unit or medical professional.
- o If necessary, transport person to an emergency medical facility promptly.

Skin:
- o If material is a powder, brush away using a cloth.
- o Wash off skin immediately with a large amount of water; use soap if available.
- o Remove any contaminated clothing and rewash skin.
- o Call the Massachusetts Poison Information Center (1-800-682-9211).
- o Transport person to a medical facility as necessary.

Eyes:
- o Gently rinse eye immediately, using large amounts of water, for fifteen minutes, if possible, with eyelids held open.
- o If possible, have person remove contact lenses if worn; never permit the eyes to be rubbed.
- o Call the Massachusetts Poison Information Center (1-800-682-9211).
- o Transport person to an emergency medical facility promptly as necessary.

SECTION III. ACUTE TOXICITY

ELD Rating (Oral Toxicity): 2

Oral human TD_{LO}	130 mg/kg
Inhalation human LC_{LO}	20,000 ppm for 5 min
Inhalation human TC_{LO}	100 ppm
Unknown* man LD_{LO}	194 mg/kg
Oral rat LD_{50}	4,894 mg/kg
Oral mouse LD_{50}	4,700 mg/kg

*Exposure route not reported

Signs and Symptoms

Ingestion: Irritation of mouth, throat, and stomach. See inhalation for other symptoms.

Inhalation: Lethargy, headaches, decreased cell counts, bronchitis, pneumonia, and collapse.

Skin: Irritation

Eyes: Irritation

Exposure Limits

OSHA Standard(s): 10 ppm, 8-h TWA
25 ppm, Ceiling
50 ppm, Peak 10 min in any 8 h

NIOSH Recommended Limit(s): 10 ppm, Ceiling in 1 h

ACGIH Recommended Limit(s): 10 ppm, 8-h TLV-TWA
25 ppm, STEL

SECTION IV. LONG-TERM ORGANISM THREAT POTENTIAL

Carcinogenicity
IARC: Limited evidence of carcinogenic effects in animals. Sufficient evidence of carcinogenic effects in humans.
NTP/NCI: NTP/NCI has reported carcinogenic effects.
CAG: CAG has reported carcinogenic effects.
RTECS: Carcinogenic by RTECs criteria based on cases of leukemia in humans and rats. Carcinogenic by RTECs criteria in mice.

Mutagenicity
IARC: Not mutagenic in bacteria, yeast, insects, or mouse lymphoma cells. Chromosomal anomalies in humans, rats, and mice were observed.
RTECS: Positive mutagenic responses in bacteria, mice, rats, and rabbits were observed. DNA damage and chromosomal breaks in humans were observed.

Teratogenicity
IARC: Tail abnormalities, cleft palate, and absence of the lower jaw were defects observed in mice. Brain and skeletal defects in rats were observed. Other studies did not show teratogenic effects.
RTECS: Abnormalities of the musculoskeletal system and other effects on the newborn were observed in rats and mice.

Reproductive Effects
IARC: Alteration of estrus cycles in rats was observed. Increased testicular weight and degeneration of the seminiferous tubules in rats, guinea pigs, and rabbits were observed. Fetotoxicity in rats and mice were observed.
RTECS: Fetotoxicity, post-implantation mortality, and extra embryonic structures in rats and mice were observed. Pre-implantation mortality, fetal death, and other fetal effects in mice were observed.

SECTION V. CHRONIC TOXICITY

Appetite loss, weight loss, fatigue, muscle weakness, headaches, dizziness, nervousness, irritability, anemia, irreversible blood changes, and damage to the heart and liver.

SECTION VI. PHYSICAL DATA

Molecular weight: 78.12
Boiling Point (at 760 mm Hg): 80°C (176°F)
Melting Point (at 760 mm Hg): 5.5°C (42°F)
Vapor Pressure (mm Hg) [at 20°C (68°F)]: 74.6
Vapor Density (Air=1): 2.77
Specific Gravity (water=1): 0.879
Percent Volatile By Volume: 100
Evaporation Rate (butyl acetate =1): 1
Solubility in Water: Soluble
Solvent Solubility: Miscible with alcohol, chloroform, ether, carbon disulfide, carbon tetrachloride, glacial acetic acid, acetone, oils.
Appearance and Odor: Clear, colorless, flammable liquid with an odor threshold of 5 ppm.

SECTION VII. FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): -11°C (12°F) (closed cup)
Extinguisher Media: Water fog, carbon dioxide, dry chemical, foam

	Lower	Upper
Flammable Limits in Air, percent by vol.:	1.3	7.1

Autoignition Temperature: 80°C (176°F)
NFPA Fire Hazard: 3
Special Fire Fighting Procedures: Use blanketing technique to smother fire. Water stream will scatter fire. Water spray may be used to cool fire-exposed containers. Firefighters should wear self-contained breathing apparatus and protective clothing.
Unusual Fire and Explosion Hazards: Explosive and flammable mixtures with air may be formed at room temperature. In a fire situation it is a severe explosion hazard. Vapors may flow a distance along surfaces to ignition sources and flash back.

SECTION VIII. REACTIVITY DATA

Stability: Stable under normal conditions of handling and storage.
NFPA Reactivity: 0
Incompatibilities (Materials to Avoid): Strong oxidizers such as ozone, permanganate, sulfuric or nitric acids, potassium peroxide, and sodium peroxide.
Hazardous Decomposition Products: Oxides of carbon and nitrogen
Hazardous Polymerization: Does not occur

SECTION IX. SPILL, LEAK OR DISPOSAL PROCEDURES

Actions To Take in Case of Spills or Leaks: Restrict from areas of spills or leaks persons not wearing protective equipment and clothing. Eliminate sources of ignition. Ventilate area. Inform supervisor or health and safety officer of any spill or leak. While protecting against eye and skin contact and inhalation of vapors, take the following steps:

- Solid: Shovel or sweep solid into suitable container, and cover.
- Liquid: Contain spill. Prevent leakage into confined spaces or sewer drains. Where feasible, absorb liquid with paper towels, vermiculite, sand, or other non-combustible absorbent material. Collect in suitable container and cover.
- Gas: Ventilate area to keep gas concentration below flammability limit. Stop the gas flow. If leak cannot be stopped, move container to safe place in open air and allow to empty.

Disposal Methods: Federal laws and regulations impose highly specific requirements for disposal of toxic and otherwise hazardous materials. Consult with your supervisor or health and safety officer regarding the proper, legal disposal procedures for this substance. Do not dispose of potentially toxic or otherwise hazardous substances without appropriate

authorization. Prior to receiving institutional authorization, it may be necessary to store spilled materials. To do so safely, carefully label containers of materials, store in a cool, dry location, and maintain security of the storage area until official guidance is obtained.

SECTION X. SPECIAL PROTECTION INFORMATION

Respiratory Protection: Only NIOSH or MSHA approved equipment should be used. Minimum respiratory equipment required for vapor:

≤50 ppm: For short periods, canister or cartridge type respirators with full facepiece.

For emergencies or when concentration is unknown, self-contained breathing apparatus should be used.

Ventilation: Provide general and local exhaust ventilation to comply with TLV requirements.

Protective Clothing or Equipment:

- To prevent repeated or prolonged skin contact with liquid and solid chemicals, use impervious clothing, gloves, face shields (eight-inch minimum), splash-proof safety goggles, and other appropriate protective clothing.
- Place clothing contaminated with liquids or solids in closed containers for storage until clothing can be discarded or decontaminated. If the clothing is to be laundered or otherwise cleaned to remove the chemical, the person(s) performing the operation should be informed of the chemical's hazardous properties and of ways to minimize exposure.
- A safety shower should be provided within the immediate work area for emergency use where liquids may contact the employee's body.
- An eyewash fountain should be provided within the immediate work area for emergency use where liquids or solids may contact the employee's eyes.

SECTION XI. SPECIAL PROCEDURES AND PRECAUTIONS

Procedures and Precautions to be Taken in Handling and Storing: Store in well-ventilated area away from oxidizing agents and sources of heat and ignition.

Other Precautions: Use extreme caution when handling this chemical. It has been shown to cause cancer in humans. Do not smoke in areas of use.

MATERIAL SAFETY DATA SHEET

GENIUM PUBLISHING CORPORATION
1145 CATALYN STREET
SCHENECTADY, NY 12303-1836 USA
(518) 377 8855

GENIUM PUBLISHING CORP

No. 333

ETHYL BENZENE

Date August 1978

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: ETHYL BENZENE
OTHER DESIGNATIONS: Phenylethane, Ethylbenzol, $C_2H_5C_6H_5$, CAS# 000 100 414
MANUFACTURER: Available from several suppliers.

SECTION II. INGREDIENTS AND HAZARDS	%	HAZARD DATA
Ethyl Benzene	ca 100	8-hr TWA 100 ppm*
*Current OSHA permissable exposure level. A Standard was proposed by OSHA in October 1975 which includes an action level of 50 ppm, and detailed requirements of monitoring, medical surveillance, employee training, etc., when exposure exceeds 50 ppm. It has not yet issued as a legal requirement.		Human, inhalation: TCLo 100 ppm for 8 hr (irritation) Rat, Oral LD_{50} 3500 mg/kg

SECTION III. PHYSICAL DATA

Boiling point at 1 atm, deg C	136	Specific gravity 20/4C	0.867
Vapor pressure at 25.9 C, mm Hg	10	Volatiles, %	ca 100
Vapor density (Air=1)	3.66	Evaporation rate (BuAc=1)	<1
Water solubility at 20 C Wt. %	0.015	Melting point, deg C	-95
		Molecular weight	106.16

Appearance & Odor: Clear, colorless liquid with an aromatic hydrocarbon odor.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air Volume %	LOWER	UPPER
59 F (15 C) (closed cup)	810 F (432 C)		1.0	6.7

Extinguishing media: Carbon dioxide, dry chemical or "alcohol" foam. A water spray may be ineffective to put out fire, but may be used to cool fire-exposed containers. A stream of water can spread fire of burning liquid.

This is a flammable liquid (OSHA Class IB) which can readily form explosive mixtures with air, especially when heated. Heavier-than-air vapors can flow along surfaces to reach distant ignition sources, and then flash back. Firefighters should use self-contained breathing equipment and eye protection to fight fires in enclosed places.

SECTION V. REACTIVITY DATA

This material is stable in storage in closed containers at room temperature. It does not polymerize.

This flammable material should be kept separated from oxidizing agents, strong acids and bases and ammonia. Thermal-oxidative degradation can produce toxic products, including carbon monoxide.

NO. 325

SECTION VI. HEALTH HAZARD INFORMATION

TLV 100 ppm

Excessive exposure to vapors will irritate the eyes and mucous membranes of the upper respiratory tract. Sustained high levels can produce headache, depression of the central nervous system, narcosis and coma.

Liquid contact is irritating to the eyes and irritation and defatting to the skin, leading to dermatitis on prolonged or repeated exposures. Ingestion may lead to aspiration of liquid into the lungs small amounts of aspirated ethyl benzene cause extensive edema and hemorrhage of lung tissue. FIRST AID:

Eye contact: Wash eyes well with plenty of running water. Get medical help if irritation persists.

Skin contact: Wash exposed areas of skin. Promptly remove contaminated clothing.

Inhalation: Remove victim to fresh air. Restore breathing if necessary. Get medical help for serious exposure.

Ingestion: Get prompt medical help! (The danger of aspirating ethyl benzene into the lungs indicates medical direction before inducing vomiting.)

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Personnel involved in leak or spill control and clean-up must use protective equipment to avoid inhalation of vapors and contact with liquid. Eliminate ignition sources. Provide maximum explosion-proof ventilation.

Pick-up spilled material for recovery or disposal. Absorb with sand, etc. for disposal in a sanitary landfill or with paper towels or cloths for burning. Water can be used to flush liquid away from sensitive areas to special catch basins or ground, but not to sewer or surface water.

DISPOSAL: Scrap material can be burned in approved incinerators in accordance with Federal, State and local regulations.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide expolosion-proof general and local exhaust ventilation to meet TLV requirements. Approved respirators must be available for non-routine or emergency use. A full face respirator with organic vapor cartridge can be used up to 1000 ppm; a gas mask with organic vapor canister can be used up to 5000 ppm· a self-contained respirator is needed for high and unknown concentrations of vapor.

Use impervious gloves and clothing and a face shield to prevent repeated or prolonged contact with the liquid. Where splashing is possible chemical goggles should be used. Clothing contaminated with ethyl benzene should be promptly removed and not reused until free of the contaminant.

Exposures above the action level, liquid contact, or working where fire and explosion hazards exist may require instituting employee training, medical surveillance, vapor concentration monitoring, record keeping, etc. when the proposed standard issues.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store this material in tightly closed containers in cool, well-ventilated areas, away from oxidizing agents, heat and sources of ignition. Use non-sparking tools around this material. Containers must be electrically bonded and grounded for transfers of liquid. Use safety cans for small amounts. No Smoking! where this material is stored or used.

Screen workers for history of kidney, liver, skin and lung problems which could give increased sensitivity and risk in ethyl benzene exposure.

Avoid breathing of vapors and contact with liquid. Do not ingest. Chronic properties are not fully known; use with care.

DATA SOURCE(S) CODE: 2-9, 11, 13

APPROVALS: MIS, CRD J. M. Nielsen

Industrial Hygiene and Safety

Corporate Medical Staff G. F. Mattson M.D.

TOLUENE

MATERIAL SAFETY DATA SHEET

Prepared by Envirologic Data
Portland, ME (207) 773-3020
Revised September 1986

EMERGENCY TELEPHONE NUMBER: Pittsburgh Poison Information Center
Children's Hospital of Pittsburgh
Pittsburgh, PA (1-412--581-6669)

SECTION I. IDENTIFICATION

Material Name: Toluene
CAS No.: 108-88-3
Synonyms: Toluol; methylbenzene; methacide; phenylmethane; methylbenzol
Molecular Formula: $C_6H_5CH_3$

SECTION II. FIRST AID PROCEDURES AND EMERGENCY TREATMENT

In all cases of poisoning, follow standard procedures for poisoning, first aid, and cardiopulmonary resuscitation. Whenever transporting a poisoned person to a hospital, bring the container, label, or other information concerning the product (without delaying transport) to assist medical personnel with diagnosis and treatment. Four different routes of exposure and their respective first aid/poison managements are outlined below:

Ingestion:

- o Dilute the poison by offering and encouraging the person to drink one or two glassfuls of water or milk. Do not use carbonated fluids. Do not attempt to make the person vomit.
- o Call the Pittsburgh Poison Information Center (1-412-681-6669). If you cannot reach the Poison Information Center, call or take the person to the nearest hospital emergency department.
- o Notify your supervisor or health and safety officer of this or any poison exposure.

Inhalation:

- o Stop exposure by moving person from contaminated area to clean air area.

- o Call the Pittsburgh Poison Information Center (1-412-681-6669).
- o Have someone call a rescue unit or medical professional.
- o If necessary, transport person to an emergency medical facility promptly.

Skin:

- o Wash off skin immediately with a large amount of water; use soap if available.
- o Remove any contaminated clothing and rewash skin.
- o Call the Pittsburgh Poison Information Center (1-412-681-6669).
- o Transport person to a medical facility as necessary.

Eyes:

- o Gently rinse eye immediately, using large amounts of water, for fifteen minutes, if possible, with eyelids held open.
- o If possible, have person remove contact lenses if worn; never permit the eyes to be rubbed.
- o Call the Pittsburgh Poison Information Center (1-412-681-6669).
- o Transport person to an emergency medical facility promptly as necessary.

SECTION III. ACUTE TOXICITY

Exposure Routes: Primary routes of exposure are via inhalation of vapors and contact with liquid in skin and eyes.

Toxic Effect Levels:

Inhalation human TC_{LO}	200 ppm
Inhalation human TC_{LO}	100 ppm
Oral rat LD_{50}	5,000 mg/kg
Inhalation rat LC_{LO}	4,000 ppm (for 4 h)
Inhalation mouse LC_{50}	5,320 ppm (for 8 h)

Signs and Symptoms:

Ingestion: Irritation of the digestive tract; central nervous system depression, headache, dizziness, fatigue, muscular weakness, incoordination, collapse and coma.

Inhalation: Headache and slight drowsiness at 100 ppm, fatigue, nausea and itching skin at 100-200 ppm, anesthetic effects and respiratory tract and eye irritation above 200 ppm.

Skin: Irritation.

Eyes: Irritation, reversible corneal burns.

Exposure Limits:

OSHA standard(s):	200 ppm, 8-h TWA 300 ppm, Ceiling 500 ppm, Peak for 10 min
NIOSH recommended limit(s):	100 ppm, TWA 200 ppm, Ceiling for 10 min
ACGIH recommended limit(s):	100 ppm, 8-h TLV-TWA 150 ppm, STEL

SECTION IV. LONG-TERM ORGANISM THREAT POTENTIAL

Carcinogenicity IARC, NTP/NCI, CAG, RTECS: No indication of carcinogenicity was found in standard references.

Mutagenicity
IARC: IARC Monographs have not reported mutagenic effects.
RTECS: Positive mutagenic reponses were observed in bacteria and in rat cells

Teratogenicity
IARC: IARC Monographs have not reported teratogenic effects.
RTECS: Developmental abnormalities in the musculoskeletal system of rats and in the craniofacial region of mice have been observed.

Reproductive Effects
IARC: IARC Monographs have not reported reproductive effects.
RTECS: Fetotoxicity was observed in rats and mice, and fetal death was observed in mice.

SECTION V. CHRONIC TOXICITY

Possible dermatitis, drying, and cracking of the skin may result from repeated or prolonged skin contact. Liver and kidney injury may occur after prolonged exposure.

SECTION VI. PHYSICAL DATA

Molecular weight: 92.1
Boiling Point (at 760 mm Hg): 110.6°C (231°F)
Melting Point (at 760 mm Hg): -95°C (-139°F)
Vapor Pressure (mm Hg) [at 20°C (68°F)]: 22
Vapor Density (Air=1): 3.14
Specific Gravity (water=1): 0.866
Percent Volatile By Volume: 100
Evaporation Rate (butyl acetate =1): 2.24
Solubility in Water: 0.05 g/100g of water, at 20°C (68°F)
Solvent Solubility: Soluble in acetone, miscible in absolute alcohol, ether, and chloroform.
Appearance and Odor: Water white liquid with a characteristic aromatic odor, whose recognition threshold (unfatigued) is 2-5 ppm (100 percent of test panel). Odor detection is unsatisfactory for safety because of fatigue.

SECTION VII. FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 4°C (40°F) (closed cup)
Extinguisher Media: CO_2, dry chemical, foam, water fog.

Flammable Limits in Air, percent by vol.:	Lower	Upper
	1.27	7.1

Autoignition Temperature: 480°C (896°F)
NFPA Fire Hazard: 3
Special Fire Fighting Procedures: Self-contained breathing apparatus and eye protection should be worn.
Unusual Fire and Explosion Hazards: At room temperature toluene emits vapors that can form flammable mixtures with air. When exposed to heat and flame it is a dangerous fire hazard and a moderate explosion

hazard. Vapors can flow along surfaces to distant ignition sources, then flash back.

SECTION VIII. REACTIVITY DATA

Stability: Stable under normal storage conditions and handling.
NFPA Reactivity: 0
Incompatibility (Materials to Avoid): Strong oxidizing agents, sparks or open flames. Nitric acid and toluene, especially when combined with sulfuric acid, will produce nitrated compounds which are dangerously explosive.
Hazardous Decomposition Products: Oxides of carbon and nitrogen.
Hazardous Polymerization: Does not occur.

SECTION IX. SPILL, LEAK OR DISPOSAL PROCEDURES

Actions To Take in Case of Spills or Leaks:
Restrict from areas of spills or leaks persons not wearing protective equipment and clothing. Eliminate sources of ignition. VEntilate area. Inform supervisor or health and safety officer of any spill or leak. While protecting against eye and skinn contact and inhalation of vapors, take the following steps:

- o Liquid: Contain spill. Prevent leakage into confined spaces or sewer drains. Where feasible, absorb liquid with vermiculite, sand, or other non-combustible absorbent material. Contaminated absorbent material should be stored away from sources of heat and ignition.
- o Vapor: Ventilate area to keep vapor concentration below lower flammability limit.

Disposal Methods:

- o Small quantities: dispose of absorbed material, i.e. vermiculite, dry sand, earth or a similar material in a secured sanitary landfill or atomize in a suitable combustion chamber.
- o Large quantities: dispose via a licensed waste disposal company. Follow federal, state and local regulations.

SECTION X. SPECIAL PROTECTION INFORMATION

Respiratory Protection: Only NIOSH or MSHA approved equipment should be used. Minimum respiratory protection required for vapor:
>200 and ≤500 ppm: Chemical cartridge respirator with organic vapor cartridge(s); or supplied air respirator; or self-contained breathing apparatus.
≤1000 ppm: Chemical cartridge respirator with full face-piece and organic vapor cartridge(s).
≤2000 ppm: Gas mask with chin-style or front- or back-mounted organic vapor canister; or supplied-air respirator with full facepiece, helmet or hood; or self-contained breathing apparatus with full facepiece.
>2000 ppm or entry and escape from unknown concentrations: Self contained breathing apparatus with full facepiece operated in

pressure demandor other positive pressure mode; or combination respirator which includes Type C supplied-air respirator with full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.

Ventilation: Provide general dilution or local exhaust ventilation to comply with OSHA Standards. Ventilation fans and other electrical service must be nonsparking and explosion proof. Exhaust hoods should have >100 LFM face velocity and be designed to capture heavy vapors.

Protective Clothing or Equipment:

- To prevent repeated or prolonged skin contact with the liquid, use impervious clothing, gloves, face shields, (eight-inch minimum), splash-proof safety goggles, and other appropriate protective clothing.
- Place clothing contaminated with the liquid in closed containers for storage until it can be discarded or until provision is made for the removal of the chemical from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the chemical, the person performing the operation should be informed of the chemical's hazardous properties and ways to minimize exposure.
- A safety shower should be provided within the immediate work area for emergency use where liquid may contact the employees body.
- An eyewash fountain should be provided within the immediate work area for emergency use where the liquid may contact the employee's eyes.

SECTION XI. SPECIAL PROCEDURES AND PRECAUTIONS

Procedures and Precautions to be Taken in Handling and Storing: Store in cool, clean, well-ventilated area away from sources of heat and ignition and away from oxidizing agents. Use nonsparking tools and safety cans for handling small amounts. Use ground and bond metal containers for liquid transfers to prevent static sparks and protect contaniers from physical damage.

Other Precautions: Do not wear contact lenses or smoke in areas of storage or use. Avoid contact with skin and eyes. Alcohol use may aggravate the narcotic and blood effects.

DISCLAIMER: This document is based upon information obtained from numerous sources. Every reasonable effort has been made to provide reliable data and information; however, Envirologic Data cannot assume responsibility for the quality or validity of laboratory studies or other data reported in the literature or for the consequences of their use.

0066X

XYLENE

MATERIAL SAFETY DATA SHEET

Prepared by Envirologic Data
Portland, ME (207) 773-3020
Revised January 1986

EMERGENCY TELEPHONE NUMBER: Pittsburgh Poison Information Center
Children's Hospital of Pittsburgh
Pittsburgh, PA 1-412-681-6669

SECTION I. IDENTIFICATION

Material Name: Xylene
Synonyms: Dimethylbenzene; xylol
CAS No.: 1330-20-7
Molecular Formula: $C_6H_4(CH_3)_2$

SECTION II. FIRST AID PROCEDURES AND EMERGENCY TREATMENT

In all cases of poisoning, follow standard procedures for poison management, first aid, and cardiopulmonary resuscitation. Whenever transporting a poisoned person to a hospital, bring the container, label, or other information concerning the product (without delaying transport) to assist medical personnel with diagnosis and treatment. Four different routes of exposure and their respective first aid/poison managements are outlined below:

Ingestion:

- Dilute the poison by offering and encouraging the person to drink one or two glassfuls of water or milk. Do not use carbonated fluids. Do not attempt to make the person vomit.
- Call the Pittsburgh Poison Information Center (1-412-681-6669). If you cannot reach the Poison Information Center, call or take the person to the nearest hospital emergency department.
- Notify your supervisor or health and safety officer of this or any poison exposure.

Inhalation:

- Stop exposure by moving person from contaminated area to clean air area.
- Call the Pittsburgh Poison Information Center (1-412-681-6669).
- Have someone call a rescue unit or medical professional.
- If necessary, transport person to an emergency medical facility promptly.

Skin:
- o If material is a powder, brush away using a cloth.
- o Wash off skin immediately with a large amount of water: use soap if available.
- o Remove any contaminated clothing and rewash skin.
- o Call the Pittsburgh Poison Information Center (1-412-681-6669).
- o Transport person to a medical facility as necessary.

Eyes:
- o Gently rinse eye immediately, using large amounts of water, for fifteen minutes, if possible, with eyelids held open.
- o If possible, have person remove contact lenses if worn; never permit the eyes to be rubbed.
- o Call the Pittsburgh Poison Information Center (1-412-681-6669).
- o Transport person to an emergency medical facility promptly as necessary.

SECTION III. ACUTE TOXICITY

Exposure Routes: The primary routes of exposure are inhalation of vapor and direct skin or eye contact with the liquid.

Toxic Effect Levels:

Inhalation human TC_{LO}	200 ppm
Inhalation man LC_{LO}	10,000 ppm (for 6 h)
Oral rat LC_{50}	4,300 mg/kg
Inhalation rat LC_{50}	5,000 ppm (for 4 h)

Signs and Symptoms

Ingestion: Burning sensation in the mouth and throat. Other symptoms are the same as those for inhalation (see below), except that lung congestion will not usually develop.

Inhalation: Irritation of the eyes, nose, and throat. At concentrations above 200 ppm nausea, vomiting, abdominal pain, dizziness, staggering, drowsiness, severe breathing difficulties, and unconsciousness may occur. Vapor levels above 200 ppm may have an anesthetic effect.

Skin: Irritation and defatting.

Eyes: Irritation at concentrations of 200 ppm.

Exposure Limits

OSHA Standard(s): 100 ppm, 8-h TWA (skin)*

NIOSH Recommended Limit(s): 100 ppm, 8-h TWA
200 ppm, Ceiling (for 10 min)

ACGIH Recommended Limit(s): 100 ppm, 8-h TLV-TWA
150 ppm, STEL

*Skin absorption may contribute to overall exposure.

SECTION IV. LONG-TERM ORGANISM THREAT POTENTIAL

Carcinogenicity

IARC, NTP/NCI, CAG, RTECS: No indication of carcinogenic effects was found in standard references.

Mutagenicity
IARC: IARC Monographs have not reported mutagenic effects.
RTECS: Mutagenic response in yeast.
Teratogenicity
IARC: IARC Monographs have not reported teratogenic effects.
RTECS: Teratogenic effects in mice and rats.
Reproductive Effects
IARC: IARC Monographs have not reported reproductive effects.
RTECS: Reproductive effects in mice.

SECTION V. CHRONIC TOXICITY

Reversible damage to the kidneys and liver may occur from exposure to high concentrations.

SECTION VI. PHYSICAL DATA

Molecular weight: 106.2
Boiling Point (at 760 mm Hg): 144.4°C (292°F) (o)*
138.9°C (282°F) (m)*
138.3°C (281°F) (p)*
Melting Point (at 760 mm Hg): -25°C (-12°F) (o)
-48°C (-54°F) (m)
13°C (55°F) (p)
Vapor Pressure (mm Hg) [at 20°C (68°F)]: 7(o), 9(m), 9(p)
Vapor Density (Air=1): 3.7
Specific Gravity (water=1): 0.88(o), 0.86(m), 0.86(p), mixture about 0.86
Percent Volatile By Volume: ~ 100
Evaporation Rate (butyl acetate =1): 0.7 (o, m, p)
Solubility in Water: 0.00003 g/100 g of H_2O, at 20°C (68°F) (o, m, p).
Solvent Solubility: Miscible with absolute alcohol, ether, and other organic liquids.
Appearance and Odor: Colorless or light colored aromatic liquid with an unfatigued odor threshold of 0.3 ppm in air. Para-xylene may be a crystal at low temperatures.

*o = ortho isomer, m = meta isomer, p = para isomer

SECTION VII. FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 27.2 to 32°C (81 to 90°F) (closed cup)
Extinguisher Media: Foam, carbon dioxide, dry chemical.

	Lower	Upper
Flammable Limits in Air, percent by vol.:	1.0 to 1.1	6 to 7

Autoignition Temperature: 465 to 530°C (869 to 986°F)
NFPA Fire Hazard: 3
Special Fire Fighting Procedures: Firefighters should use self-contained breathing apparatus with a full facepiece operated in pressure-demand or positive-pressure mode.
Unusual Fire and Explosion Hazards: When exposed to heat or flame, xylene is a significant fire and explosion hazard. Vapors may travel a distance along surfaces to ignition sources and then flash back.

SECTION VIII. REACTIVITY DATA

Stability: Stable in closed containers at room temprature.
NFPA Reactivity: 0
Incompatibilities (Materials to Avoid): Can form explosive mixtures with air. Xylene should be kept away from sources of heat and ignition and strong oxidizing agents.
Hazardous Decomposition Products: Degradation in air due to heat may yield toxic vapors and gases, including carbon monoxide and oxides of nitrogen.
Hazardous Polymerization: Does not occur.

SECTION IX. SPILL, LEAK OR DISPOSAL PROCEDURES

Actions To Take in Case of Spills or Leaks: Restrict from areas of spills or leaks persons not wearing protective equipment and clothing. Eliminate sources of ignition. Ventilate area. Inform supervisor or health and safety officer of any spill or leak. While protecting against eye and skin contact and inhalation of vapors, take the following steps:

- Solid: Shovel or sweep solid into suitable container, and cover.
- Liquid: Contain spill. Prevent leakage into confined spaces or sewer drains. Where feasible, absorb liquid with paper towels, vermiculite, sand, or other non-combustible absorbent material. Collect in suitable container and cover.

Disposal Methods: Federal laws and regulations impose highly specific requirements for disposal of toxic and otherwise hazardous materials. Consult with your supervisor or health and safety officer regarding the proper, legal disposal procedures for this substance. Do not dispose of potentially toxic or otherwise hazardous substances without appropriate authorization. Prior to receiving institutional authorization, it may be necessary to store spilled materials. To do so safely, carefully label containers of materials, store in a cool, dry location, and maintain security of the storage area until official guidance is obtained.

SECTION X. SPECIAL PROTECTION INFORMATION

Respiratory Protection: Only NIOSH or MSHA approved equipment should be used. Minimum respiratory equipment required for vapor:
>100 and ≤1,000 ppm: Chemical cartridge respirator with full facepiece and organic vapor cartridge(s).
≤5,000 ppm: Gas mask with chin-style or front- or back-mounted organic vapor canister; or supplied-air respirator with full facepiece, helmet, or hood; or self-contained breathing apparatus with full facepiece.
≤10,000 ppm: Type C supplied-air respirator with full facepeice operated in pressure-demand or other positive pressure mode or with full facepiece, helmet or hood operated in continous-flow mode.

>10,000 ppm or entry and escape from unknown concentrations: Self-contained breathing apparatus with full facepiece operated in pressure-demand or other positive pressure mode: or combination respirator including Type C supplied-air respirator with full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.

Ventilation: Provide general and local exhaust ventilation to comply with OSHA standards. For exhaust hood, use >100 lfm face velocity.

Protective Clothing or Equipment:

- To prevent repeated or prolonged skin contact with liquid and solid chemicals, use impervious clothing, gloves, face shields (eight-inch minimum), splash-proof safety goggles, and other appropriate protective clothing.
- Place clothing contaminated with liquids or solids in closed containers for storage until clothing can be discarded or decontaminated. If the clothing is to be laundered or otherwise cleaned to remove the chemical, the person(s) performing the operation should be informed of the chemical's hazardous properties and of ways to minimize exposure.
- A safety shower should be provided within the immediate work area for emergency use where liquids may contact the employee's body.
- An eyewash fountain should be provided within the immediate work area for emergency use where liquids or solids may contact the employee's eyes.

SECTION XI. SPECIAL PROCEDURES AND PRECAUTIONS

Procedures and Precautions to be Taken in Handling and Storing: Store in a well-ventilated area in closed containers away from sources of heat and ignition and strong oxidizing agents. Protect containers from physical damage. Electrically ground metal containers when transferring liquid. Detached storage is preferable.

Other Precautions: Do not smoke in areas of use or storage. Wash hands before eating, smoking, or using toilet facilities.

0733X

APPENDIX G

OSHA Inspection Procedures

IMMEDIATE OSHA INSPECTION STEPS

- Identify the Inspector.

  (a) Ask to see credentials.
  (b) Write down the relevant information, including the inspector's name, agency affiliation, address, telephone number and the statutory authority under which the inspection is being conducted.
  (c) If any doubts, *call* OSHA office to verify the visit.
  (d) If inspection occurs at a project site, ask for written certification of medical monitoring (including respiratory evaluation) and for 40 hour hazardous waste training certification. *No one* may venture out of the clean zone without it. ***DOUBLE CHECK*** it with his/her office if in doubt.

- Notify the Health and Safety Manager and Project Manager **immediately; they must be present for the opening meeting and inspection.**

- The Project Manager should notify the District Manager.

- The Health and Safety Manager should notify Corporate Health and Safety (ELD).

- Take notes on:

  (a) What is said
  (b) What is seen
  (c) Who spoke to whom
  (d) Any sample or copies taken
  (e) Any corrective actions done in the inspector's presence (do whenever possible)
  (f) Any activity, including where, when, who, and what
  (g) Any other occurrence, even if seemingly minor

- When in doubt on any question, ***do not bluff an answer.*** Ask the inspector to put the question in writing, addressed to company counsel. Never lie, even by omission; jail can be the penalty.

- If inspection occurs on site, carefully review the Site Safety Plans with the Inspector. Remind him that GTI is not the property owner.

- If inspection occurs at an office, have accident reports, OSHA 200 logs ready at all times for inspection. Always make sure OSHA poster is visible. If employees report to a site (not the office), an OSHA poster must be present.

- Determine the scope of the inspection: Ask the OSHA inspector what areas of the company activity are of interest and the reason for the inspection. Discover what has triggered the inspection. If complaints initiated the inspection, find out specifically what they were.

APPENDIX H

Accident Reporting Form

GROUNDWATER TECHNOLOGY, INC.

Accident/Incident (near miss) Report

Employee's Name:_____ D.O.B._____
Address:_____ D.O.H._____
SS#_____
Job Title:_____ Supervisor's Name:_____
Office Location:_____
Location at Time of Incident:_____
Date/Time of Incident:_____

Describe clearly how the accident occurred:_____

Was incident: Physical_____ Chemical_____
Parts of body affected_____ Exposure: Dermal_____
right left Inhalation_____
Ingestion_____

Witnesses: 1)_____ 2)_____

Conditions/acts contributing to this incident_____

Managers must complete this section:
Explain specifically the corrective action you have taken to prevent a recurrence:_____

Did injured go to doctor:_____ Where:_____
When:_____
Did injured go to hospital:_____ Where:_____
When:_____

Signatures:

_____	_____	_____
Employee	Reporting Manager	Health & Safety Manager
_____	_____	_____
Date	Date	Date

This form must be completed and returned to Health and Safety Manager within 5 working days. The manager will forward a copy to Corporate Health and Safety Director at ELD.

[illegible]

APPENDIX I

Vapor Monitoring Form

GROUNDWATER TECHNOLOGY, INC.

PROJECT NAME _____

PROJECT NUMBER _____

DATE OF SAMPLING _____

CONTAMINANTS _____

RESULTS OF VAPOR MONITORING

TIME	IONIZATION DETECTOR READING			EXPLOSIMETER READING		RADIATION MONITOR READING	LOCATION	PURPOSE	INITIALS
	FID	10.2eV PID	11.7eV PID	% LEL	% O_2	mR/hr			

APPENDIX J

Instrument Calibration Log

GROUNDWATER TECHNOLOGY, INC.

INSTRUMENT CALIBRATION LOG

DATE	INSTRUMENT	TEST GAS	ppm	READING	ADJUSTED?	SIGNATURE
					YES NO	
					YES NO	
					YES NO	
					YES NO	
					YES NO	
					YES NO	
					YES NO	
					YES NO	
					YES NO	
					YES NO	
					YES NO	
					YES NO	

PAGE _____