



October 29, 2007

Job No.: 0585,002.07

Blank Family Trust
% Mrs. Muriel T. Blank
1164 Solano Avenue #406
Albany, CA 94706

**Workplan: Soil and Groundwater Investigation
1538 - 1540 Solano Avenue
Albany, California**

Dear Mrs. Blank:

Please accept this as Edd Clark & Associates, Inc.'s (EC&A's) Workplan for a Preliminary Site Investigation (PSI) of the property at 1530 - 1540 Solano Avenue (site) in Albany, California (Figure 1). The results of a Phase I Environmental Site Assessment (ESA) conducted in June 2007 by EC&A for 1530, 1532, 1534, 1538 and 1540 Solano Avenue indicates that historical uses of the site were such that soil and/or groundwater at this location may be impacted by fuel hydrocarbons (FHCs) and/or dry cleaning fluids. This Workplan was prepared, at the request of the Blank Family Trust, to assess soil and groundwater conditions in the vicinity of a former automotive service station and existing dry cleaner facility. A Site Safety Plan (SSP) is included herein.

PROPOSED SCOPE OF WORK

Work proposed for this PSI includes the following activities.

- Preparation and submittal of a boring permit application to the ACPWA with the appropriate fee;
- Advancement of five exploratory soil borings;
- Collection of soil samples from the borings for chemical analyses and evaluation of soil lithology;
- Collection of grab-groundwater samples from the borings for chemical analyses; and
- Preparation of a report summarizing the work completed and presenting conclusions and recommendations regarding site conditions.

SITE DESCRIPTION

The site is on the east side of the city of Albany, California, and occupies the southwest corner of the intersection of Solano and Peralta Avenues. Solano Avenue slopes down to the west from the

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Berkeley Hills to a location near East Shore Highway 80 and San Francisco Bay. Topographic maps of the area indicate a generally westerly or southwesterly surface gradient in the site vicinity. The groundwater-flow direction is likely also generally westerly, toward San Francisco Bay.

The portion of the site that is presently occupied by a 7-Eleven store (1540) and Clean Living Cleaners (1538) was occupied by a residence in 1929 and a different residence and an automotive service station structure as early as 1939. Reverend (Rev.) Deborah Blank, a member of the Blank Family Trust, stated that her father bought this property in about 1956, and the service station continued in operation at this location between 1950 and 1959. Reportedly, one underground storage tank (UST) for gasoline was removed from this property when the service station structure was razed in about 1960. The June 2007 ESA revealed no regulatory agency records or other evidence of appropriate abandonment and/or removal of the UST.

HYDROGEOLOGY

The subject property is located within the California geomorphic province known as the Coast Ranges. This province is a geologically complex and seismically active region characterized by sub-parallel northwest-trending faults, mountain ranges and valleys. Prevalent bedrock in the area consists of the Jurassic-Cretaceous Franciscan Complex originally deposited in a marine environment. Extensive folding and faulting during late Cretaceous through early Tertiary geologic time created complex geologic conditions that underlie the highly varied topography typical of the region. In valleys, the bedrock is covered by alluvial soils.

According to U.S. Geologic Survey (USGS), Geologic Map and Map Database of the Oakland Metropolitan Area, Alameda, Contra Costa and San Francisco Counties, California, R.W. Graymer, 2000, the site is underlain by Quaternary (Pleistocene) age alluvial fan and fluvial deposits (Qpaf). The nearest major fault is the Hayward Fault Zone, approximately 2/3 of a mile to the northeast. The San Andreas fault zone is located approximately 18 miles to the southwest.

Reportedly, the surface soils on the subject property include Tierra loam. These soils are clayey, have a high water table, or are shallow to an impervious layer. They have very slow infiltration rates, have a high corrosion potential and bedrock is deeper than 60 inches.

PROPOSED PRELIMINARY SITE INVESTIGATION

The purpose of the proposed PSI is to evaluate soil and groundwater conditions in the vicinity of the former automotive service station and existing dry cleaner. The proposed scope of work includes the advancement and logging of five exploratory borings, collection and laboratory analyses of soil

and groundwater samples from the borings, evaluation of the data, and preparation of a summary report. The proposed work will be performed in the following tasks.

Task 1 - Project Management, Acquisition of Permits and Utility Location

EC&A will prepare and submit to the ACPWA a soil boring permit application, the appropriate fee, and a copy of this workplan and SSP. Proposed boring locations will be marked by EC&A personnel and cleared by Underground Service Alert North at least 48 hours (two business days) prior to drilling at the site. In addition, due to the number of underground utilities associated with commercial land use, EC&A will use a private underground utility locator service to identify these facilities on the site. The ACPWA will be notified at least 48 hours prior to commencement of field work.

Task 2 - Soil Boring Advancement and Sample Collection

EC&A personnel will direct the advancement of one exploratory soil boring (B-1) in the patio area adjacent to the crawl space beneath the dry cleaning facility. The dry cleaning machine is located approximately 10 ft to the east and 10 ft above proposed boring B-1, at Clean Living Cleaners. Four exploratory soil borings (B-2 through B-5) will be advanced in the vicinity of the area formerly occupied by the automotive service station (Figure 2). EC&A anticipates that the borings will be drilled to 20 ft to 25 ft below ground surface (bgs), or to the depth necessary for grab-groundwater sample collection. The borings will be drilled using a truck-mounted drill rig (B-2 through B-5) and a portable drill rig (B-1), both equipped with 4-inch-outside-diameter, solid-stem augers.

Clear Heart Drilling, Inc., of Santa Rosa, California, will provide drilling services. The drilling will be performed under the technical direction of an EC&A field geologist who will classify the soils encountered, maintain a log of the lithology and assist in obtaining soil and groundwater samples. The field work will be performed under the supervision of a California Professional Geologist. EC&A will field screen the breathing zone continuously and the collected soil samples for organic vapors with a photoionization detector (PID). In addition, a combustible gas indicator will be operated continuously during drilling.

Soil Sampling Procedures

Soil samples will be collected from each boring at a minimum of every 5 ft, at any change in lithology, any obviously contaminated soil, and at the approximate soil/groundwater interface. Soil samples will be collected using a split-spoon sampling apparatus containing 2-inch-diameter by 6-inch-long brass or stainless steel liners. When a boring is advanced to the selected sampling depth, the drill rods will be removed and the sampler lowered into the bottom of the hole and driven approximately 18 inches into soil ahead of the auger with a 140-pound, drill-rig-operated hammer. The sample tube ends will be sealed with Teflon™ squares and plastic end caps. Soil samples will be selected for laboratory analyses based on field screening (odor, staining, etc.) and PID measurements. Soil samples submitted for laboratory analyses will be labeled, logged on a chain-of-custody form and placed on ice for transport to a State-certified laboratory.

Groundwater Sampling Procedures

A grab-groundwater sample will be collected from each boring as soon as possible after drilling is complete. Each groundwater sample will be collected by lowering a new disposable bailer into new, temporary slotted well screen that has been placed in the boring without sandpack, or directly in to the open borehole if the boring appears stable. Groundwater will be transferred from the bailer to the appropriate laboratory-supplied, sterile sample containers, labeled, logged on a chain-of-custody form and placed on ice for transport to a State-certified laboratory.

Equipment Cleaning Procedures and Waste Containment

In order to minimize the possibility of cross-contamination, all downhole drilling and sampling equipment will be appropriately cleaned prior to use. The augers will be steam cleaned before drilling commences and between borings. The soil- and water-sampling equipment will be either steam cleaned or washed in a soap-and-water solution and double rinsed with tap water before samples are collected.

Drill cuttings from the soil borings and rinse water from decontamination procedures will be contained in appropriately labeled DOT 17H 55-gallon drums. The drums will be sealed and stored onsite pending later disposal. A composite soil sample will be collected from the soil drums, and an aliquot water sample collected from the decontamination water drums; the samples will be submitted for chemical analyses in order to evaluate disposal options.

Soil Boring Abandonment

Following sample collection, the borings will be backfilled by tremie grouting to within 1 ft of the ground surface. The remainder of each boring will be capped with asphalt or cement to match surrounding grade.

Task 3 - Sample Analyses

The soil samples from B-2 through B-5 will be analyzed for total petroleum hydrocarbons (TPH) as gasoline (g), TPH as diesel (d), TPH as motor oil (mo), benzene, toluene, ethylbenzene and xylenes (BTEX) and methyl tert-butyl ether (MTBE) by Analytical Methods SW8015Cm/8015C/8021B. The soil samples from B-1 will be analyzed for halogenated volatile organic compounds (HVOCs) by Analytical Method 8010.

Grab-groundwater samples from B-2 through B-5 will be analyzed for TPHg, TPHd, TPHmo, BTEX and MTBE by Analytical Methods SW8015Cm/8015C/8021B. The grab-groundwater sample from B-1 will be analyzed for HVOCs by Analytical Method 8010. EC&A anticipates that up to three soil samples and one grab-groundwater sample from each boring will be submitted to the laboratory for chemical analyses.

If TPH analyses indicate the presence of non-target peaks, or if significant concentrations of MTBE are detected in any of the grab-groundwater samples from borings B-2 through B-5, the samples will

be analyzed for full scan volatile organic compounds (VOCs) by Analytical Method SW8260B (basic target list). In addition, if significant concentrations of MTBE are detected in soil samples from B-2 through B-5, those samples will be analyzed for full scan VOCs by Analytical Method SW8260B (basic target list).

Task 4 - Report Preparation

Following receipt of the results of laboratory analyses of the soil and grab-groundwater samples, EC&A will prepare a brief written report summarizing the work performed. The report will contain a description of investigation activities, logs of the borings, results of analyses of the samples, and conclusions and recommendations regarding site conditions.

SITE SAFETY PLAN

Work will be performed in accordance with the appended SSP (Appendix A). The SSP identifies potentially hazardous chemicals that may be encountered during the investigation, describes precautionary measures to be taken when in the presence of these chemicals, and contains a map to the nearest hospital.

SCHEDULE

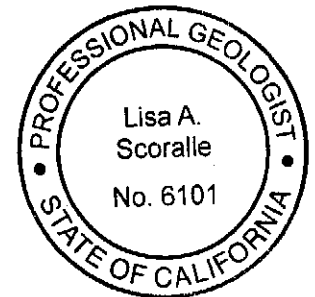
EC&A anticipates implementing the scope of work within about three weeks following receipt of the required permit from the ACPWA (pending drilling subcontractor availability).

Thank you for choosing EC&A to provide environmental consulting services on this project. Please call Edd Clark, Project Manager, or Etta Jon (E.J.) VandenBosch if you have any questions regarding the proposed scope of work.

Sincerely,

Etta Jon VandenBosch
Etta Jon (E.J.) VandenBosch
Environmental Scientist

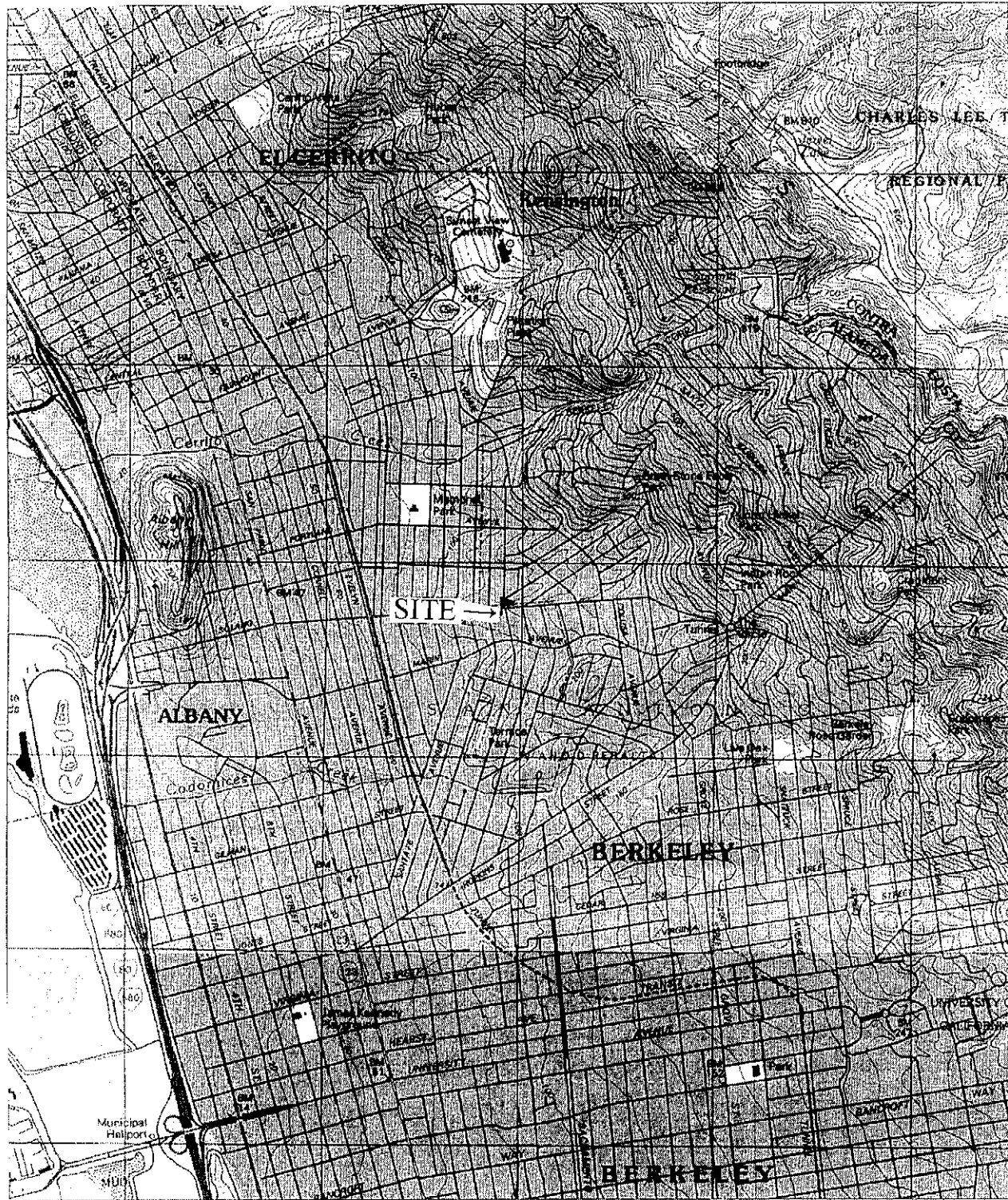
Lisa A. Scorallo
Lisa Scorallo, PG #6101
Project Geologist



- Attachments: Figure 1 - Site Location Map
Figure 2 - Site Map with Proposed Boring Locations

Appendix A - Site Safety Plan

cc: Rev. Deborah Blank
Ms. Marcia Kelly



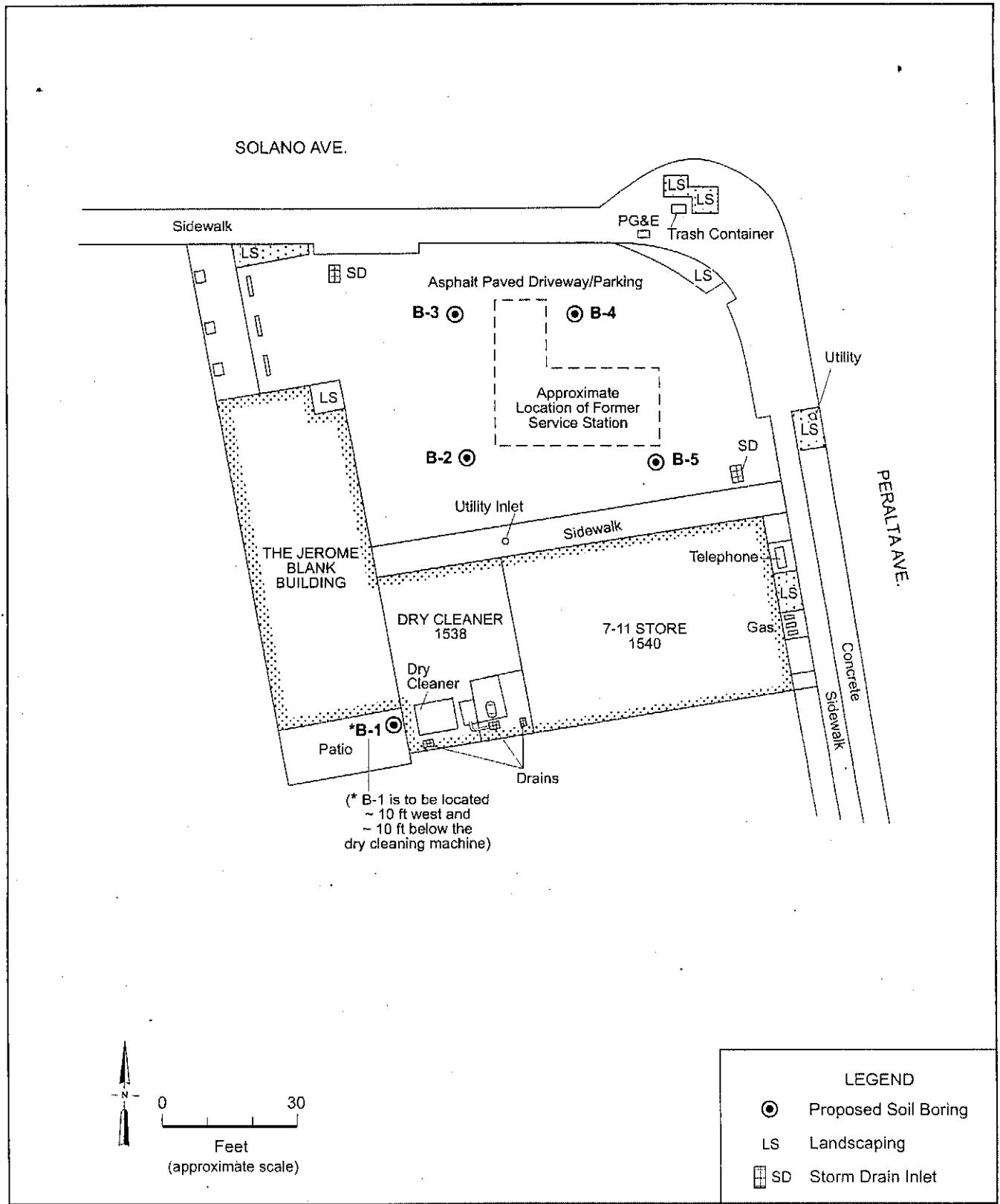
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EDD CLARK & ASSOCIATES, INC.
 ENVIRONMENTAL CONSULTANTS

Site Location Map
 1538-1540 Solano Avenue
 Albany, California

FIGURE
 1



EDD CLARK & ASSOCIATES, INC.
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SITE PLAN
with Proposed Boring Locations
Blank Property
1538 - 1540 Solano Avenue
Albany, California

FIGURE
2

JOB NUMBER	0585,002.07	REVIEWED BY	EC&A, E.J. VandenBosch	DATE	October 2007	REVISED	
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TRACE #4661R/5/260c007

Appendix A
Site Safety Plan

A. GENERAL INFORMATION

Site Location: 1538 - 1540 Solano Avenue, Albany, California

Plan Prepared By: _____ Date: October 25, 2007
Etta Jon VandenBosch, Environmental Scientist

Facility Description: Clean Living Cleaners (1538) and 7-Eleven Convenience Store (1540)

Objective(s): Advance five exploratory soil borings to ~20-25 feet below ground surface (bgs), collect soil and grab-groundwater samples from the borings, grout the borings.

Background Review: Complete: Preliminary:

Documentation/Summary: Overall Hazard: Serious: Moderate: Low: Unknown:

Unusual Features (power lines, terrain, utilities, etc.): Underground utilities.

STATUS: Active: Inactive: Unknown:

HISTORY: (Agency Action, Complaints, Injuries, etc.) A dry cleaner has occupied the 1538 portion of the site since at least 1960. An automotive service station was formerly located on the 1540 portion of the site; reportedly, an underground storage tank (UST) for gasoline was removed from this property when the service station structure was razed in about 1960. The results of a Phase I Environmental Site Assessment (ESA) conducted in June 2007 by EC&A for 1530, 1532, 1534, 1538 and 1540 Solano Avenue indicates that historical uses of the site were such that soil and/or groundwater at this location may be impacted by fuel hydrocarbons (FHCs) and/or dry cleaning fluids. The Blank Family Trust has requested that EC&A conduct a site investigation to assess soil and groundwater conditions in the vicinity of the former gasoline service station and existing dry cleaner.

B. SITE WASTE CHARACTERISTICS/DISPOSAL

Waste Type(s): Liquid: (water) Solid: (soil) Sludge: Gas: (vapors)

Characteristic(s): Corrosive: Ignitable: Radioactive: Volatile:
Toxic: Reactive: Unknown Other (name): Flammable:

INVESTIGATION-DERIVED MATERIAL DISPOSAL: Soil from borings and water from equipment decontamination will be placed in properly labeled and secured DOT 17H 55-gallon drums. Waste disposal will be based on the analytical laboratory results of the investigation.

C. HAZARD EVALUATION

Chemical Name	Description	Threshold Limit Values (TLVs)		Persons Exposed and Potential Routes of Exposure	Symptoms of Acute Exposure	TLV Basis
		8-hr TLV	Short-term Exposure Limit (STEL)			
Benzene	Carcinogen, aromatic HC	0.5 ppm	2.5 ppm	Inhalation, dermal	Headache, dizziness	Cancer
Toluene	Aromatic HC	50 ppm	—	Inhalation, dermal	Headache, dizziness	Central nervous system (CNS), irritation
Ethylbenzene	Aromatic HC	100 ppm	125 ppm	Inhalation, dermal	Headache, dizziness	Irritation, CNS
Xylenes	Aromatic HC	100 ppm	150 ppm	Inhalation, dermal	Headache, dizziness	Irritation
Gasoline	Flammable liquid	300 ppm	500 ppm	Inhalation, dermal	Headache, dizziness	Irritation, CNS
Diesel	Flammable liquid	pending	—	Inhalation, dermal, ingestion	Headache, dizziness, eye/skin irritation	---
Tetrachloroethene (PCE)	Chlorinated hydrocarbon; Colorless liquid with a mild chloroform-like odor	25 ppm	100 ppm	Inhalation, dermal Ingestion	Eye, nose, throat, skin irritation, nausea, flushed face, vertigo	Irritation; CNS
Trichloroethene (TCE)	Chlorinated hydrocarbon; Colorless liquid (unless dyed blue) with a chloroform-like odor	50 ppm	100 ppm	Inhalation, dermal Ingestion	Headache, vertigo, visual disturbance, nausea	CNS; headache; liver

LEVEL OF PROTECTION: Equipment to protect the body from contact with chemical hazards has been categorized by the Environmental Protection Agency into levels A, B, C, & D. Level A equipment is used when the highest level of protection is needed; Level D equipment is used when minimum protection is needed. The chemical hazard associated with petroleum hydrocarbons and is typically low and Level D protection (see equipment list below) is adequate. For the dry cleaning solvent PCE and its breakdown products TCE, 1,2-DCE and vinyl chloride, the chemical hazard is high. In case of contamination, an upgrade to Level C protection equipment may be required. Level C and D equipment are listed below.

Level C Equipment: NIOSH/MSHA approved air purifying respirator, chemical resistant clothing, chemical resistant inner and outer gloves, chemical resistant boots with steel toe and shank, safety glasses and hard hat.

Level D Equipment: Coveralls, gloves, chemical resistant boots or shoes with steel toe and shank, safety glasses or chemical splash goggles, and hard hat. Tyvex coveralls and Solvex or equivalent gloves are recommended.

EQUIPMENT REQUIRED FOR THIS PROJECT: Normal work clothing may be worn with the following additions:

Excavations: Wear neoprene boots if walking in the excavation or in or around waste soils. Wear a hard hat when near excavation equipment.

Drilling: Wear a hard hat when near the drill rig. A ventilator is required during drilling of the dry cleaner boring location. Field personnel are required to have Level C protection equipment available during drilling.

Soil Sampling: Chemical-resistant gloves are required when sampling.

Groundwater Sampling: Chemical-resistant gloves are required when sampling.

No smoking is allowed in the drilling locations. A First Aid Kit, fire extinguisher, ~~and~~ combustible gas indicator and PID are also required. The PID is to be used to monitor air in breathing zone. Continuous monitoring in the breathing zone is required. X
R

Dry cleaner location: Readings above 1 ppm are cause for concern. Continuous readings of 1 ppm or greater above background in the breathing zone require an upgrade to Level C, including use of full or half-face respirator with volatile organic vapor/acid gas cartridges or equivalent. Continuous readings of 5 ppm or greater in the breathing zone requires stopping the work. (15)

Former fuel station: Readings above 5 ppm are cause for concern. Continuous readings of 5 ppm or greater above background in the breathing zone require an upgrade to Level C, including use of full or half-face respirator with volatile organic vapor/acid gas cartridges or equivalent. Continuous readings of 50 ppm or greater in the breathing zone requires stopping the work.

The combustible gas indicator and PID are to be used continuously during all drilling activities. If more than 10 percent of the lower explosive limit (LEL) is measured in the drilling area proceed with caution. If more than 50 percent LEL is measured in the drilling area, provide ventilation of the area.

DECONTAMINATION PROCEDURES:

Personal: Remove gloves, wash hands; clean boots in decontamination area.

Equipment: Steam cleaning of all excavation and drilling equipment in the decontamination area. TSP wash of sampler between samples.

FIRST AID: Consultant's vehicle has a first aid kit.

WORK LIMITATIONS (time of day, weather, heat/cold, stress): None

E. EMERGENCY INFORMATION

LOCAL RESOURCES:

Ambulance: 911

Poison Control Center: 911

Police: 911

Fire Department: 911

Explosives Unit: 911

Hospital Emergency Room:

Alta Bates Summit Medical Center
2450 Ashby Avenue
Berkeley, California 94705
(510) 204-4444

Agency Contact: N/A

SITE RESOURCES:

Water Supply: Onsite

Telephone: Onsite

Radio: None

Other:

EMERGENCY CONTACT:

Name: EJ VandenBosch

Cell: (707) 484-1329

Name: Edd Clark

Cell: (707) 484-7441

EC&A: (707) 792-9500

Name: Sandy Hryciuk

Phone: (510) 841-0929

EMERGENCY ROUTE: See Figure H

MSDS Number: T0767 * * * * * Effective Date: 08/16/05 * * * * * Supercedes: 05/08/03

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865



Mallinckrodt
CHEMICALS



24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response In Canada
CANUTEC: 613-996-6565

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-552-2537) for assistance.

TETRACHLOROETHYLENE

1. Product Identification

Synonyms: ethylene tetrachloride; tetrachloroethene; perchloroethylene; carbon bichloride; carbon dichloride

CAS No.: 127-18-4

Molecular Weight: 165.83

Chemical Formula: Cl₂C:CCl₂

Product Codes:

J.T. Baker: 9218, 9360, 9453, 9465, 9469

Mallinckrodt: 1933, 8058

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Tetrachloroethylene	127-18-4	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Poison)

Flammability Rating: 0 - None

Reactivity Rating: 1 - Slight

Contact Rating: 2 - Moderate (Life)

Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES

Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:

Irritating to the upper respiratory tract. Giddiness, headache, intoxication, nausea and vomiting may follow the inhalation of large amounts while massive amounts can cause breathing arrest, liver and kidney damage, and death. Concentrations of 600 ppm and more can affect the central nervous system after a few minutes.

Ingestion:

Not highly toxic by this route because of low water solubility. Used as an oral dosage for hookworm (1 to 4 ml). Causes abdominal pain, nausea, diarrhea, headache, and dizziness.

Skin Contact:

Causes irritation to skin. Symptoms include redness, itching, and pain. May be absorbed through the skin with possible systemic effects.

Eye Contact:

Causes irritation, redness, and pain.

Chronic Exposure:

May cause liver, kidney or central nervous system damage after repeated or prolonged exposures. Suspected cancer risk from animal studies.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance. The use of alcoholic beverages enhances the toxic effects.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:

Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of

water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

Wash skin with soap or mild detergent and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:

Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

5. Fire Fighting Measures

Fire:

Not considered to be a fire hazard but becomes hazardous in a fire situation because of vapor generation and possible degradation to phosgene (highly toxic) and hydrogen chloride (corrosive). Vapors are heavier than air and collect in low-lying areas.

Explosion:

Not considered to be an explosion hazard. Containers may explode when involved in a fire.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire. Water spray may be used to keep fire exposed containers cool.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Store in a cool, dry, ventilated area away from sources of heat or ignition. Isolate from

flammable materials. Protect from direct sunlight. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL):

100 ppm (TWA), 200 ppm (ceiling),

300 ppm/5min/3-hour (max)

-ACGIH Threshold Limit Value (TLV):

25 ppm (TWA), 100 ppm (STEL); listed as A3, animal carcinogen

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Clear, colorless liquid.

Odor:

Ethereal odor.

Solubility:

0.015 g in 100 g of water.

Specific Gravity:

1.62 @ 20C/4C

pH:

No information found.

% Volatiles by volume @ 21C (70F):

100

Boiling Point:

121C (250F)

Melting Point:

-19C (-2F)

Vapor Density (Air=1):

5.7

Vapor Pressure (mm Hg):

18 @ 25C (77F)

Evaporation Rate (BuAc=1):

0.33 (trichloroethylene = 1)

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage. Slowly decomposed by light. Deteriorates rapidly in warm, moist climates.

Hazardous Decomposition Products:

Carbon dioxide and carbon monoxide may form when heated to decomposition. Hydrogen chloride gas and phosgene gas may be formed upon heating. Decomposes with moisture to yield trichloroacetic acid and hydrochloric acid.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Strong acids, strong oxidizers, strong alkalis, especially NaOH, KOH; finely divided metals, especially zinc, barium, lithium. Slowly corrodes aluminum, iron and zinc.

Conditions to Avoid:

Moisture, light, heat and incompatibles.

11. Toxicological Information

Oral rat LD50: 2629 mg/kg; inhalation rat LC50: 4100 ppm/6H; investigated as a tumorigen, mutagen, reproductive effector.

-----\Cancer Lists\-----

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Tetrachloroethylene (127-18-4)	No	Yes	2A

12. Ecological Information

Environmental Fate:

When released into the soil, this material is expected to quickly evaporate. When released into the soil, this material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into water, this material is not expected to biodegrade. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals.

Environmental Toxicity:

The LC50/96-hour values for fish are between 1 and 10 mg/l. The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TETRACHLOROETHYLENE

Hazard Class: 6.1

UN/NA: UN1897

Packing Group: III

Information reported for product/size: 20L

International (Water, I.M.O.)

Proper Shipping Name: TETRACHLOROETHYLENE

Hazard Class: 6.1

UN/NA: UN1897

Packing Group: III

Information reported for product/size: 20L

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----				
Ingredient	TSCA	EC	Japan	Australia
Tetrachloroethylene (127-18-4)	Yes	Yes	Yes	Yes

-----\Chemical Inventory Status - Part 2\-----				
Ingredient	Korea	--Canada--		
		DSL	NDSL	Phil.
Tetrachloroethylene (127-18-4)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----				
Ingredient	-SARA 302-		-----SARA 313-----	
	RQ	TPQ	List	Chemical Catg.
Tetrachloroethylene (127-18-4)	No	No	Yes	No

-----\Federal, State & International Regulations - Part 2\-----			
Ingredient	CERCLA	-RCRA-	-TSCA-
		261.33	8(d)
Tetrachloroethylene (127-18-4)	100	U210	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

WARNING:

THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2[Z]

Poison Schedule: None allocated.

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 2 Flammability: 0 Reactivity: 0

Label Hazard Warning:

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

Label Precautions:

Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.

Label First Aid:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities

of water. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 3, 11.

Disclaimer:

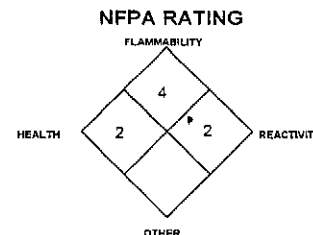
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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)



MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards



PART I What is the material and what do I need to know in an emergency?

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS: **VINYL CHLORIDE - CH₂CHCl**
 Document Number: P-0067

PRODUCT USE: For general analytic/synthetic chemical uses.

SUPPLIER/MANUFACTURER'S NAME: **MESA Specialty Gases & Equipment**
ADDRESS: 3619 Pendleton Avenue, Suite C
 Santa Ana, CA 92704

BUSINESS PHONE: 1-714-434-7102
EMERGENCY PHONE: INFOTRAC: 1-800-535-5053

DATE OF PREPARATION: November 20, 1997
FIRST REVISION: January 23, 1998

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA		IDLH ppm	OTHER
			TLV ppm	STEL ppm	PEL ppm	STEL ppm		
Vinyl Chloride	75-01-4	> 99.9%	5, A1 (Confirmed Human Carcinogen)	NE	1	5, C (15 minutes)	NE	NIOSH: Carcinogen; Reduce exposure to lowest feasible level. Carcinogen: IARC-1; MAK-A1; NTP-1; OSHA-X; NIOSH-X
Maximum Impurities		< 0.1%	None of the trace impurities in this mixture contribute significantly to the hazards associated with the product. All hazard information pertinent to this product has been provided in this Material Safety Data Sheet, per the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200) and State equivalent standards.					

NE = Not Established

C = Ceiling Limit

See Section 16 for Definitions of Terms Used

NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: Vinyl Chloride is a colorless, liquefied, toxic, flammable gas with a sweet, ethereal odor. Vinyl Chloride is a known human carcinogen and is toxic by all routes of exposure. Contact with the skin and eyes will result in irritation. Inhalation of Vinyl Chloride may produce symptoms of drowsiness, blurred vision, staggering gait and tingling and numbness in the extremities. Contact with the liquid may result in frostbite. Both the liquid and gas pose a serious fire hazard when accidentally released. Vinyl Chloride polymerizes readily when exposed to air, sunlight, heat or oxygen and so can form dangerous explosive air/gas mixtures. Flame or high temperature impinging on a localized area of the cylinder of Vinyl Chloride can cause the cylinder to rupture without activating the cylinder's relief devices. Provide adequate fire protection during emergency response situations.

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE:

The most significant routes of overexposure for Vinyl Chloride are by inhalation or skin and eye contact. The following paragraphs describe symptoms of exposure by route of exposure.

INHALATION: Vinyl Chloride acts as a general anesthetic in concentrations over 500 ppm. Overexposure to low levels of Vinyl Chloride will result in dizziness, light-headedness, euphoria, nervousness, drowsiness, headache, blurred vision, impaired hearing and confusion. Acute exposures to 1000 ppm will slowly produce symptoms such as staggering gait and tingling in the hands and feet. Overexposure to extremely high concentrations (greater than 70,000 ppm) of Vinyl Chloride may cause unconsciousness and death, with possible liver, spleen, and kidney damage.

SKIN CONTACT: The gas is mildly irritating to exposed skin. Accidental spraying of the liquid gas may cause burns from freezing, due to rapid evaporation.

EYE CONTACT: Vinyl Chloride gas is mildly irritating to the eyes. Accidental spraying of the liquid into the eye(s) may cause burns from freezing, due to rapid evaporation.



OTHER POTENTIAL HEALTH EFFECTS: Contact with liquid or rapidly expanding gases (which are released under high pressure) may cause frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after such contact can quickly subside.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Overexposure to Vinyl Chloride may cause the following health effects:

ACUTE: The most significant hazard associated with Vinyl Chloride is inhalation of vapors, which can produce symptoms of central nervous system depression, such as dizziness, light-headedness, headache, nervousness confusion and impairment of vision and hearing. Overexposure to extremely high concentrations may cause unconsciousness and death, with possible liver, spleen, and kidney damage. Contact with liquid or rapidly expanding gases may cause frostbite.

CHRONIC: Long-term exposure to low levels of Vinyl Chloride causes angiosarcoma of the liver, which is a rare form of liver cancer. Chronic exposure to Vinyl Chloride has been associated with cancers of the brain, lungs and blood-forming and lymphatic systems. In the past, chronic exposure to high levels of Vinyl Chloride has resulted in acro-osteolysis (a type of degenerative bone disease) and reports of increased frequency of chromosomal changes. These symptoms have been reduced significantly due to current stringent handling procedures. Refer to Section 11 (Toxicology Information) of this MSDS for additional information.

TARGET ORGANS: Central nervous system, liver, spleen, kidneys, respiratory system and, potentially, the reproductive system.

HAZARDOUS MATERIAL INFORMATION SYSTEM			
HEALTH		(BLUE)	2
FLAMMABILITY		(RED)	4
REACTIVITY		(YELLOW)	2
PROTECTIVE EQUIPMENT			X
EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8
For routine industrial applications			

See Section 16 for Definition of Ratings

PART II *What should I do if a hazardous situation occurs?*

4. FIRST-AID MEASURES

RÉSCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO VINYL CHLORIDE WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus and Fire-Retardant Personal Protective equipment should be worn. Adequate fire protection must be provided during rescue situations.

Remove victim(s) to fresh air, as quickly as possible. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary.

SKIN EXPOSURE: Immediately flush affected area with water for at least 15 minutes. If areas of the skin are burned and contaminated clothing adheres to them, gently cut clothing away. Contact with the liquid or rapidly expanding gases can cause frostbite. In the event of frostbite, medical attention must be sought. Frozen tissue is painless and appears waxy, with a possible yellow color. Frozen tissue will become swollen, painful and prone to infection when thawed. If the frozen part of the body has been thawed by the time medical attention has been obtained, cover the area with a dry sterile dressing and a large bulky protective covering.

EYE EXPOSURE: In the event of contact with the eyes, flush the affected eye(s) with running water for at least 15 minutes. Victims of eye exposure should be taken to medical attention immediately.

5. FIRE-FIGHTING MEASURES

FLASH POINT (Open Cup): -77.8°C (-108°F)

AUTOIGNITION TEMPERATURE: 472.0°C (881.6°F)

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): 4.0%

Upper (UEL): 22.0%

FIRE EXTINGUISHING MATERIALS: Extinguish Vinyl Chloride fires by shutting off the source of the gas. Care must be taken with the use of water as Vinyl Chloride reacts to water; water spray should be used to cool fire-exposed containers, structures and equipment. Use carbon dioxide, foam or dry chemicals as extinguishing media, if possible.

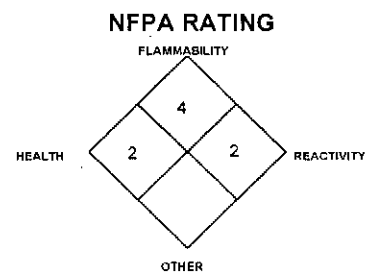
UNUSUAL FIRE AND EXPLOSION HAZARDS: Extremely flammable gas. Very dangerous fire hazard when exposed to heat, flame or powerful oxidizers. If stored for prolonged periods of time in the absence of sufficient polymerization inhibitor, dangerous peroxide compounds may form by oxidization with atmospheric oxygen in the presence of various contaminants. Contact with metals such as copper, aluminum and certain catalytic impurities can cause violent polymerization. Explosion hazard in confined spaces. During a fire, toxic gases (i.e. hydrogen chloride, carbon dioxide, carbon monoxide, and traces of phosgene) may be produced. Water spray should be used with care, as Vinyl Chloride reacts with water. **See Section 16 for Definition of Ratings**

DANGER! Fires impinging (direct flame) on the outside surface of unprotected cylinders of Vinyl Chloride can be very dangerous. Exposure to fire could cause a catastrophic failure of the cylinder releasing the contents into a fireball and explosion of released gas. The resulting fire and explosion can result in severe equipment damage and personnel injury or death over a large area around the cylinder. For massive fires in large areas, use unmanned hose holder or monitor nozzles; if this is not possible, withdraw from area and allow fire to burn.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Static discharge may cause Vinyl Chloride to ignite explosively.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Because of the potential for a BLEVE, evacuation of non-emergency personnel is essential. If the flow of gas cannot be stopped, it is better to allow the gas to burn rather than form potentially explosive air/gas hazard. If the fire is extinguished before the flow of gas can be stopped, the gas can explosively re-ignite. If water is not available for cooling or protection of cylinder exposures, evacuate the area. Refer to the North American Emergency Response Guidebook (Guide #116P) for additional information.



6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Evacuate immediate area. Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a gas release, clear the affected area, protect people, and respond with trained personnel.

Eliminate any possible sources of ignition, and provide maximum explosion-proof ventilation. If the gas is leaking from cylinder or valve, contact the supplier. Adequate fire protection must be provided. Use only non-sparking tools and equipment during the response.

Minimum Personal Protective Equipment should be **Level B: fire-retardant protective clothing, gloves and Self-Contained Breathing Apparatus**. Use only non-sparking tools and equipment.

Locate and seal the source of the leaking gas. Protect personnel attempting the shut-off with water-spray. Allow the gas to dissipate. Combustible gas concentration must be below 10% of the LEL (4%) prior to entry. Monitor the surrounding area for combustible gas levels and oxygen level. The atmosphere must have levels of Vinyl Chloride below those listed in Section 2 (Information and Composition on Ingredients) and at least 19.5 percent oxygen before personnel can be allowed in the area without Self-Contained Breathing Apparatus. Attempt to close the main source valve prior to entering the area. If this does not stop the release (or if it is not possible to reach the valve), allow the gas to release in-place or remove it to a safe area and allow the gas to be released there.

THIS IS AN EXTREMELY FLAMMABLE GAS, WHICH IS ALSO TOXIC AND A KNOWN HUMAN CARCINOGEN. Protection of all personnel and the area must be maintained.

PART III *How can I prevent hazardous situations from occurring?*

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting Vinyl Chloride IN YOU. Do not eat or drink while handling chemicals. Be aware of any signs of exposure as indicated in Section 2 (Composition and Information on Ingredients); exposures to fatal concentrations of Vinyl Chloride could occur rapidly.

NOTE: Refer to the OSHA Vinyl Chloride Standard (29 CFR 1910.1017) for specific requirements associated with the use of this gas. The Action Level for Vinyl Chloride is 0.5 ppm. In workplaces where employees are exposed above the Action Level, the OSHA requirements for monitoring, establishment of regulated areas, methods of compliance, respiratory protection, emergency response protocol, medical surveillance, training, and record-keeping must be followed.

STORAGE AND HANDLING PRACTICES: Entrances to regulated areas (as defined by the OSHA Vinyl Chloride Standard) must be posted with legible signs which reads as follows:

**CANCER-SUSPECT AGENT AREA
AUTHORIZED PERSONNEL ONLY**

Vinyl Chloride should be used in a well-ventilated area, preferably in a hood with forced ventilation. Store in cool, dry, well-ventilated area, away from sources of heat, ignition and direct sunlight. Do not allow area where cylinders are stored to exceed 52°C (125°F). Cylinders should be separated from oxygen cylinders, or other oxidizers, by a minimum distance of 20 ft., or by a barrier of non-combustible material at least 5 ft. high, having a fire-resistance rating of at least 0.5 hours. Isolate from other incompatible chemicals (refer to Section 10, Stability and Reactivity).

Storage areas must meet national electrical codes for Class 1 Hazardous Areas. Post "No Smoking or Open Flames" signs in storage or use areas. Consider installation of leak detection and alarm for storage and use areas. Have appropriate extinguishing equipment in the storage area (i.e. sprinkler system, portable fire extinguishers). This gas is heavier than air and will accumulate in low areas. Do not store below ground level.

Steel is recommended for all piping, storage tanks and equipment used with Vinyl Chloride. Copper and its alloys and aluminum should never be used in equipment used with Vinyl Chloride due to the potential for violent polymerization with these materials.

Keep the smallest amount on-site as is necessary. Full and empty cylinders should be segregated. Use a first-in, first-out inventory system to prevent full containers from being stored for long periods of time.

7. HANDLING and STORAGE (Continued)

STORAGE AND HANDLING PRACTICES (continued): Use non-sparking ventilation systems, approved explosion-proof equipment, and appropriate electrical systems. Electrical equipment used in gas-handling operations, or located in storage areas, should be non-sparking or explosion proof. Use a check valve in the discharge line to prevent hazardous backflow. Never tamper with pressure relief devices in valves and cylinders.

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: Protect cylinders against physical damage. Use a check valve or trap in the discharge line to prevent hazardous backflow. Cylinders should be stored upright and be firmly secured to prevent falling or being knocked over. Cylinders can be stored in the open, but in such cases, should be protected against extremes of weather and from the dampness of the ground to prevent rusting. Never tamper with pressure relief devices in valves and cylinders. Electrical equipment should be non-sparking or explosion proof. The following rules are applicable to work situations in which cylinders are being used:

Before Use: Move cylinders with a suitable hand-truck. Do not drag, slide or roll cylinders. Do not drop cylinders or permit them to strike each other. Secure cylinders firmly. Leave the valve protection cap, if provided, in-place until cylinder is ready for use.

During Use: Use designated CGA fittings and other support equipment. Do not use adapters. Do not heat cylinder by any means to increase the discharge rate of the product from the cylinder. Use check valve or trap in discharge line to prevent hazardous backflow into the cylinder. Do not use oils or grease on gas-handling fittings or equipment.

After Use: Close main cylinder valve. Replace valve protection cap, if provided. Mark empty cylinders "EMPTY".

NOTE: Use only DOT or ASME code containers. Earth-ground and bond all lines and equipment associated with Vinyl Chloride. Close valve after each use and when empty. Cylinders must not be recharged except by or with the consent of owner. For additional information refer to the Compressed Gas Association Pamphlet P-1, *Safe Handling of Compressed Gases in Containers*. Additionally, refer to CGA Bulletin SB-2 "Oxygen Deficient Atmospheres".

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Purge gas handling equipment with inert gas (i.e. nitrogen) before attempting repairs.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation. A hood with forced ventilation is preferred, due to the significant toxicity and flammability hazards of Vinyl Chloride. Installation of automatic monitoring equipment to detect the level of Vinyl Chloride and potentially explosive air-gas mixtures is highly recommended.

RESPIRATORY PROTECTION: Maintain exposure levels of Vinyl Chloride below the levels listed in Section 2 (Composition and Information on Ingredients) and oxygen levels above 19.5% in the workplace. During an emergency situation, before entering the area, check for flammable gas level as well as oxygen-deficient atmospheres. Use supplied air respiratory protection if Vinyl Chloride levels exceed exposure limits and if oxygen level is below 19.5% or during emergency response to a release of Vinyl Chloride. If respiratory protection is required, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), or equivalent State standards. The following are NIOSH recommendations for respiratory protection for concentration of Vinyl Chloride in air.

CONCENTRATION

AT ANY DETECTABLE CONCENTRATION:

RESPIRATORY EQUIPMENT

Positive pressure, full-facepiece Self-Contained Breathing Apparatus (SCBA) or positive pressure, full-facepiece Supplied Air Respirator (SAR) with an auxiliary positive pressure SCBA.

ESCAPE:

Gas mask with canister to protect against Vinyl Chloride, or escape-type SCBA.

NOTE: Follow the specific respiratory selection guidelines of the OSHA Vinyl Chloride Standard in regulated areas (as defined by 29 CFR 1910.1017).

EYE PROTECTION: Splash goggles or safety glasses and face shield when handling the liquid or gas.

HAND PROTECTION: Wear leather gloves when handling cylinders of Vinyl Chloride. Chemical resistant gloves should be worn when using Vinyl Chloride.

BODY PROTECTION: Use body protection appropriate for task. Chemical resistant material is recommended for protection against contamination with Vinyl Chloride. Safety shoes are recommended when handling cylinders. Response to leaks requires the use of fire retardant clothing. Transfer of large quantities under pressure may require protective equipment appropriate to protect employees from gas spraying, as well as fire-retardant items.

9. PHYSICAL and CHEMICAL PROPERTIES

GAS DENSITY @ 21.1°C (70°F) and 1 atm: 0.160 lb/ft³ (2.56 kg/m³)
LIQUID DENSITY @ 21.1°C (70°F) and 1 atm: 56.71 lb/ft³ (908.41 kg/m³)
SPECIFIC GRAVITY @ 15°C (59°F) air = 1: 1.74
EVAPORATION RATE (nBuAc = 1): Not applicable.
FREEZING/MELTING POINT @ 1 atm: -153.9°C (-457°F)
EXPANSION RATIO: Not applicable.
SOLUBILITY IN WATER wt/wt @ 1 atm/25°C (77°F): 0.00114
COEFFICIENT WATER/OIL DISTRIBUTION: Log K_{ow} = 0.6 (calculated).

BOILING POINT @ 1 atm: -13.4°C (7.93°F)
pH: Not applicable.
VAPOR PRESSURE @ 21.1°C (70°F) psig: 35.3
ODOR THRESHOLD: 2000 ppm
SPECIFIC VOLUME (ft³/lb): 6.25

APPEARANCE AND COLOR: Colorless gas with a sweet, ethereal odor.

HOW TO DETECT THIS SUBSTANCE (warning properties): The odor is not a reliable warning property. In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation.

10. STABILITY and REACTIVITY

STABILITY: Stable with polymerization inhibitor. Without an inhibitor, storage for prolonged periods of time can form potentially hazardous peroxides by oxidization with atmospheric oxygen in the presence of a variety of contaminants.

DECOMPOSITION PRODUCTS: Decomposition products of Vinyl Chloride include the following toxic gases: carbon monoxide, carbon dioxide and hydrogen chloride gas and trace amounts of phosgene.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Vinyl Chloride is incompatible with strong oxidizers, copper and its alloys, aluminum, certain catalytic impurities, oxides of nitrogen. Vinyl Chloride can react violently with all these materials.

HAZARDOUS POLYMERIZATION: Hazardous polymerization can occur in the presence of air, sunlight or heat. Vinyl Chloride can cause violent polymerization in the presence of strong oxidizers. Vinyl Chloride also polymerizes violently upon contact with copper and its alloys, aluminum and certain catalytic impurities.

CONDITIONS TO AVOID: Contact with incompatible materials and exposure to heat, sparks and other sources of ignition. Cylinders exposed to high temperatures or direct flame can rupture or burst.

PART IV *Is there any other useful information about this material?*

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following information is for Vinyl Chloride (gas).

Microsomal Mutagenicity Assay-Salmonella typhimurium 1 pph

Cytogenetic Analysis-Human: HeLa cell 10 mmol/L

Inhalation-Man TCLO: 30 mg/m³ (5 years male): Reproductive effects

Inhalation-Man TCLO: 200 ppm/14 years: Carcinogenic effects,

Oral-Rat TDLo: 1 ppm/4 hours and 3463 mg/kg/52 weeks, intermittent: Carcinogenic effects

Inhalation-Rat TCLO: 10,000 ppm/4 hours (12-18 days preg): Carcinogenic effects, Teratogenic effects

Intraperitoneal-Rat TDLo: 21 mg/kg/65 weeks, intermittent: Equivocal tumorigenic agent

Subcutaneous-Rat TDLo: 21 mg/kg/6765 weeks, intermittent: Equivocal tumorigenic agent

Oral-Rat LD₅₀: 500 mg/kg

Inhalation-Mouse TCLO: 50 ppm/30 weeks: Carcinogenic effects

Inhalation-Hamster TCLO: 50 ppm/4H/30 weeks: Carcinogenic effects

Inhalation-Rat TC: 50 ppm/7H/26 weeks: Carcinogenic effects

Inhalation-Rat TC: 100 ppm/7H/26 weeks: Carcinogenic effects

Inhalation-Mouse TC: 50 ppm/47 weeks: Carcinogenic effects

Oral-Rat TD: 34 g/kg/3 years, Intermittent: Carcinogenic effects

Inhalation-Mouse TC: 50 ppm/6H/4 weeks: Carcinogenic effects

Inhalation-Mouse TC: 50 ppm/4H/30 weeks: Carcinogenic effects

Inhalation-Rat TC: 250 ppm/2 Years, Intermittent: Carcinogenic effects

Inhalation-Human TC: 300 mg/m³/ weeks: Carcinogenic effects, Blood effects

Inhalation-Rat TC: 5 ppm/4H/52 weeks: Carcinogenic effects

Inhalation Rat TC: 50 ppm/6H-43 weeks: Carcinogenic effects

SUSPECTED CANCER AGENT: Vinyl Chloride is a known human carcinogen, which is listed by the following agencies: IARC-1 (Carcinogenic to Humans); MAK-A1(Capable of Inducing Malignant Tumors/Human Evidence); NTP-1 (Known to be a Carcinogen); OSHA-X (Carcinogen); ACGIH-A1 (Confirmed Human Carcinogen); NIOSH-X (Carcinogen); Cal-OSHA (Carcinogen).

IRRITANCY OF PRODUCT: Vinyl Chloride can be mildly irritating to eyes and skin. Contact with the liquid or rapidly expanding gases can cause frostbite to exposed tissue.

SENSITIZATION TO THE PRODUCT: Vinyl Chloride is not known to be a sensitizer to humans upon prolonged or repeated contact.

11. TOXICOLOGICAL INFORMATION (Continued)

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of Vinyl Chloride on the human reproductive system.

Mutagenicity: Human mutation data are reported for Vinyl Chloride.

Embryotoxicity: There is insufficient evidence currently available to categorize Vinyl Chloride as embryotoxic to humans.

Teratogenicity: There is insufficient evidence currently available to categorize Vinyl Chloride as teratogenic to humans.

Reproductive Toxicity: Vinyl chloride is reported to produce adverse effects on the human reproductive system (i.e. changes in spermatogenesis).

A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Conditions relating to the target organs may be aggravated by overexposures to Vinyl Chloride. See Section 3 (Hazard Identification) for information on these conditions.

RECOMMENDATIONS TO PHYSICIANS: Administer oxygen, if necessary. Treat symptoms and eliminate exposure. Refer to the OSHA Vinyl Chloride Standard (29 CFR 1910.1017; paragraph K and Appendix A) for specific information on Medical Surveillance requirements (i.e. for the general physical exam, medical history, serum specimens, specific tests, and re-examination protocol).

BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, Biological Exposure Indices (BEIs) are not applicable for Vinyl Chloride.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: This gas will be dissipated rapidly in well-ventilated areas. There are limited data indicating the Vinyl Chloride is resistant to biodegradation in aerobic systems. Evaporation half-life from water is 0.45-2.5 hours.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: This gas can be harmful to animal life. Suspected toxic effects on a variety of test animals during clinical studies indicate adverse effects on the central nervous system and liver. Plants may be damaged by frost produced in the presence of rapidly expanding gases. Additional data on the effects of Vinyl Chloride on plants are available as follows:

Increased production of hydrogen peroxide in germinating seeds exposed to Vinyl Chloride gas decreased their sulfhydryl content and thereby produced adverse effects and abnormalities in growth. Threshold levels of Vinyl Chloride were greater than 200 ppm and saturation level was 1000 ppm.

EFFECT OF CHEMICAL ON AQUATIC LIFE: The effect of Vinyl Chloride effects on aquatic life is not fully known. The following data are available for Vinyl Chloride.

Estimated Bioconcentration Factor of 7. Reported water solubility of 2,700 mg/L. Based on the BCF, Vinyl Chloride is not expected to significantly bioconcentrate in aquatic organisms.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Return cylinders with residual product to MESA Specialty Gases & Equipment. Do not dispose of locally.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

<u>PROPER SHIPPING NAME:</u>	Vinyl chloride, inhibited
<u>HAZARD CLASS NUMBER and DESCRIPTION:</u>	2.1 (Flammable Gas)
<u>UN IDENTIFICATION NUMBER:</u>	UN 1086
<u>PACKING GROUP:</u>	Not Applicable
<u>DOT LABEL(S) REQUIRED:</u>	Flammable Gas (Note: Per the requirements of the OSHA Vinyl Chloride Standard, 29 CFR 1910.1017, the additional legend "Cancer-Suspect Agent" must be applied near the label or placard).

11. TOXICOLOGICAL INFORMATION (Continued)

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 116P

MARINE POLLUTANT: Vinyl Chloride is not classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

15. REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS: Vinyl Chloride is subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act, as follows:

COMPONENT	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Vinyl Chloride	NO	YES	YES

U.S. SARA THRESHOLD PLANNING QUANTITY: Not applicable.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Vinyl Chloride = 1 lb.

CANADIAN DSL INVENTORY: Vinyl Chloride is listed on the DSL Inventory.

U.S. TSCA INVENTORY STATUS: Vinyl Chloride is listed on the TSCA Inventory.

OTHER U.S. FEDERAL REGULATIONS: Vinyl Chloride is regulated under 28 CFR 1910.1017 (OSHA Vinyl Chloride Standard). Vinyl Chloride is subject to the reporting requirements of Section 112(r) of the Clean Air Act. The Threshold Quantity for this gas is 10,000 pounds. Depending on specific operations involving the use of Vinyl Chloride, the regulations of the Process Safety Management of Highly Hazardous Chemicals may be applicable (29 CFR 1910.119). Under this regulation Vinyl Chloride is listed in Appendix A of this Standard and the threshold quantity for Vinyl Chloride is 15,000 pounds.

U.S. STATE REGULATORY INFORMATION: Vinyl Chloride is covered under specific State regulations, as denoted below:

<p>Alaska - Designated Toxic and Hazardous Substances: Vinyl Chloride.</p> <p>California - Permissible Exposure Limits for Chemical Contaminants: Vinyl Chloride.</p> <p>Florida - Substance List: Vinyl Chloride.</p> <p>Illinois - Toxic Substance List: Vinyl Chloride.</p> <p>Kansas - Section 302/313 List: Methyl Chloride.</p> <p>Massachusetts - Substance List: Vinyl Chloride.</p>	<p>Michigan - Critical Materials Register: Vinyl Chloride.</p> <p>Minnesota - List of Hazardous Substances: Vinyl Chloride.</p> <p>Missouri - Employer Information/Toxic Substance List: Vinyl Chloride.</p> <p>New Jersey - Right to Know Hazardous Substance List: Vinyl Chloride.</p> <p>North Dakota - List of Hazardous Chemicals, Reportable Quantities: Vinyl Chloride.</p>	<p>Pennsylvania - Hazardous Substance List: Vinyl Chloride.</p> <p>Rhode Island - Hazardous Substance List: Vinyl Chloride.</p> <p>Texas - Hazardous Substance List: Vinyl Chloride.</p> <p>West Virginia - Hazardous Substance List: Vinyl Chloride.</p> <p>Wisconsin - Toxic and Hazardous Substances: Vinyl Chloride.</p>
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CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): Vinyl Chloride is on the Proposition 65 lists. **WARNING:** Contains a chemical known to the State of California to cause cancer.

LABELING:

DANGER:

CANCER SUSPECT AGENT.

FLAMMABLE LIQUID AND GAS UNDER PRESSURE.
CAN FORM EXPLOSIVE MIXTURES WITH AIR.
MAY CAUSE LIVER, KIDNEY, SPLEEN AND OTHER ORGAN DAMAGE.
MAY CAUSE IRRITATION TO EYES, SKIN, AND MUCOUS MEMBRANES.
MAY CAUSE FROSTBITE.

Do not breathe gas.
Do not get liquid in skin, in eyes, or on clothing.
Keep away from heat, flames, and sparks.
Store and use with adequate ventilation in closed systems.
Cylinder temperature should not exceed 52°C (125°F).
Close valve after each use and when empty.
Use in accordance with the Material Safety Data Sheet.

15. REGULATORY INFORMATION (Continued)

LABELING (continued):

NOTE:

Suck-back into cylinder may cause rupture.
Always use a back flow preventative device in piping.

FIRST-AID:

IF INHALED: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

IN CASE OF CONTACT, immediately flush eyes or skin with water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse. (Discard contaminated shoes)

IN CASE OF FROSTBITE, obtain immediate medical attention.

DO NOT REMOVE THIS PRODUCT LABEL.

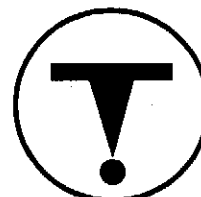
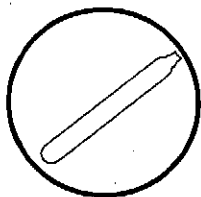
CANADIAN WHMIS SYMBOLS:

Class A: Compressed Gas.

Class B1: Flammable Gas

Class D1B: Materials Causing Immediate and Serious Toxic Effects

Class D2A: Other Toxic Material



16. OTHER INFORMATION

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof MESA Specialty Gases & Equipment assumes no responsibility for injury to the vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, MESA Specialty Gases & Equipment assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

CAS #: This is the Chemical Abstract Service Number which uniquely identifies each constituent. It is used for computer-related searching.

EXPOSURE LIMITS IN AIR:

ACGIH - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits.

TLV - Threshold Limit Value - an airborne concentration of a substance which represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour **Time Weighted Average (TWA)**, the 15-minute **Short Term Exposure Limit**, and the instantaneous **Ceiling Level**. Skin absorption effects must also be considered.

OSHA - U.S. Occupational Safety and Health Administration.

PEL - Permissible Exposure Limit - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL which was vacated by Court Order.

IDLH - Immediately Dangerous to Life and Health - This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury. **The DFG - MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). **NIOSH** issues exposure guidelines called **Recommended Exposure Levels (RELs)**. When no exposure guidelines are established, an entry of **NE** is made for reference.

HAZARD RATINGS:

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM: Health Hazard: 0 (minimal acute or chronic exposure hazard); 1 (slight acute or chronic exposure hazard); 2 (moderate acute or significant chronic exposure hazard); 3 (severe acute exposure hazard; onetime overexposure can result in permanent injury and may be fatal); 4 (extreme acute exposure hazard; onetime overexposure can be fatal). Flammability Hazard: 0 (minimal hazard); 1 (materials that require substantial pre-heating before burning); 2 (combustible liquid or solids; liquids with a flash point of 38-93°C [100-200°F]); 3 (Class IB and IC flammable liquids with flash points below 38°C [100°F]); 4 (Class IA flammable liquids with flash points below 23°C [73°F] and boiling points below 38°C [100°F]). Reactivity Hazard: 0 (normally stable); 1 (material that can become unstable at elevated temperatures or which can react slightly with water); 2 (materials that are unstable but do not detonate or which can react violently with water); 3 (materials that can detonate when initiated or which can react explosively with water); 4 (materials that can detonate at normal temperatures or pressures).

NATIONAL FIRE PROTECTION ASSOCIATION: Health Hazard: 0 (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); 1 (materials that on exposure under fire conditions could cause irritation or minor residual injury); 2 (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); 3 (materials that can on short exposure could cause serious temporary or residual injury); 4 (materials that under very short exposure could cause death or major residual injury). Flammability Hazard and Reactivity Hazard: Refer to definitions for "Hazardous Materials Identification System".

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the **National Fire Protection Association (NFPA)**. Flash Point - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. Autoignition Temperature: The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:

Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD₅₀** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC₅₀** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m³** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Data from several sources are used to evaluate the cancer-causing potential of the material. The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. **IARC** and **NTP** rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TD₀₁**, **LDLo**, and **LDo**, or **TC**, **TC₀₁**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause death. **BEI** - Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

REGULATORY INFORMATION:

This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. **Superfund Amendments and Reauthorization Act (SARA)**; the Canadian Domestic Substances List (DSL); the U.S. Toxic Substance Control Act (TSCA); Marine Pollutant status according to the **DOT**; California's Safe Drinking Water Act (**Proposition 65**); the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund); and various state regulations. This section also includes information on the precautionary warnings which appear on the material's package label.

Directions

Distance

Total Est. Time: 13 minutes

Total Est. Distance: 3.80 miles



1: Start out going EAST on SOLANO AVE toward PERALTA AVE.

<0.1 miles



2: Turn RIGHT onto PERALTA AVE.

0.1 miles



3: Turn LEFT onto MARIN AVE.

0.4 miles



4: Turn RIGHT onto THE ALAMEDA.

0.2 miles



5: THE ALAMEDA becomes MARTIN LUTHER KING JR WAY.

2.1 miles



6: Turn LEFT onto ASHBY AVE / CA-13.

0.7 miles



7: End at **2450 Ashby Ave**
Berkeley, CA 94705-2067, US

Total Est. Time: 13 minutes

Total Est. Distance: 3.80 miles

