MATERIAL SAFETY DATA SHEET **ISSUED: 10/23/97**

CHLORINE **REVISED: 11/01/99**

SECTION I - PRODUCT IDENTIFICATION

Westlake CA&O
2468 Industrial Parkway
P O Box 527
Calvert City, KY 42029

Telephone No.: (270) 395-4151
Transportation Emergency No.:
CHEMTREC: (800) 424-9300
Medical Emergency No.:
POISON CENTER: (216) 379-8562

Chemical Family: Halogen
Chemical Name/Synonyms: Chlorine
Trade Mark: None
Formula: Cl_2; (Cl-Cl)
C.A.S. Registry No.: 7782-50-5
TSCA Inventory Status: All ingredients are listed on the USEPA's TSCA inventory
Canadian Domestic Substances List Status: All ingredients have been nominated or are eligible for inclusion.
Workplace Hazardous Materials Information System (WHMIS) Classification: C,E
Product Use: Various Applications
SARA 313 Information: This product contains a toxic chemical or chemicals subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

SECTION II - HAZARDOUS INGREDIENTS

Hazard Summary Statement: WARNING! HIGHLY TOXIC. CORROSIVE. May be fatal if inhaled. Strong oxidizer. Most combustibles will burn in chlorine as they do in oxygen. Read entire Material Safety Data Sheet (MSDS).

Material	C.A.S. Number	Amount in Product	ACGIH TLV-TWA	OSHA PEL-TWA
Chlorine [1,2,4,5,6]	7782-50-5	> 99.5%	0.5 ppm 1 ppm short term exposure limit (STEL)	1 ppm - ceiling

N.A. - Not Applicable **N.E. - Not Established**

Legislative Footnotes

[1]Ingredient listed on SARA Section 313 List of Toxic Chemicals.

[2]Ingredient listed on the *Pennsylvania Hazardous Substances List.*

[3]Ingredient listed on the California listing of *Chemicals Known to the State to Cause Cancer or Reproductive Toxicity.*

[4]Ingredient listed on the *Massachusetts Substance List.*

[5]*Workplace Hazardous Materials Information System* ingredient found on the Ingredient Disclosure List - Canada.

[6]Ingredient listed on the *New Jersey Right to Know Hazardous Substance List.*

Notes:

TLV-TWA - Threshold Limit Value - Time Weighted Average guideline for concentration of the chemical substance in the ambient workplace air. (The skin notation calls attention to the skin as an additional significant route of absorption of the listed chemical.) American Conference of Governmental Industrial Hygienists (ACGIH).

OSHA PEL - OSHA Permissible Exposure Limit, 8-hour TWA. 29 CFR 1910.1000, Transitional Limits column, Table Z-1-A, Table Z-2, and Table Z-3.

SECTION III - PHYSICAL DATA

Appearance: Greenish-yellow gas or amber liquid
Odor: Pungent, suffocating bleach like odor
Percent Volatiles: >99.5
Solubility in Water: Slight
Physical State: Gas (liquid under pressure)

Specific Gravity: Dry Gas (2.48 @ 0°C)
Liquid (1.47 @ 0/4°C)
Melting Point: -101°C (-150°F)
Molecular Weight: 70.9
Vapor Pressure: 73 psia @ 50°F
Vapor Density: 2.5 (Air=1)

SECTION IV - FIRE & EXPLOSION HAZARD DATA

Flash Point: Test is not applicable to gases. Not combustible. Chlorine can support combustion and is a serious fire risk.

Flammable Limits in Air: Not Applicable

Note:

Flash Point: The lowest initial temperature of air passing around the specimen at which sufficient combustible gas is evolved to be ignited by a small external pilot flame.

Extinguishing Media: For small fires use dry chemical or carbon dioxide. For large fires use water spray, fog or foam.

Special Firefighting Procedures: Wear full face positive pressure self-contained breathing apparatus (SCBA). Wear full protective gear to prevent all body contact (moisture or water and chlorine can form hydrochloric and hypochlorous acids which are corrosive). Personnel not having suitable protection must leave the area to prevent exposure to toxic gases from the fire. Use water to keep fire-exposed containers cool (if containers are not leaking). Use water spray to direct escaping gas away from workers if it is necessary to stop the flow of gas. In enclosed or poorly ventilated areas, wear SCBA during cleanup immediately after a fire as well as during the attack phase of firefighting operations.

Unusual Fire and Explosion Hazards: Chlorine and water can be very corrosive. Corrosion of metal containers can make leaks worse. Although non-flammable, chlorine is a strong oxidizer and will support the burning of most combustible materials. Flammable gases and vapors can form explosive mixtures with chlorine. Chlorine can react violently when in contact with many materials and generate heat with possible flammable or explosive vapors. Chlorine gas is heavier than air and will collect in low-lying areas.

Explosive Characteristics: Containers heated by fire can explode.

SECTION V - Reactivity

Stability: Stable

Hazardous Polymerization: Will not occur.

Hazardous Decomposition Products: Hydrogen chloride may form from chlorine in the presence of water vapor.

CAUTION! Oxidizer. Extremely reactive.

Incompatibility (Materials to Avoid): Chlorine is extremely reactive. Liquid or gaseous chlorine can react violently with many combustible materials and other chemicals, including water. Metal halides, carbon, finely divided metals and sulfides can accelerate the rate of chlorine reactions. Hydrocarbon gases, e.g., methane, acetylene, ethylene or ethane, can react explosively if initiated by sunlight or a catalyst. Liquid or solid hydrocarbons, e.g., natural or synthetic rubbers, naphtha, turpentine, gasoline, fuel gas, lubricating oils, greases or waxes, can react violently. Metals, e.g., finely powdered aluminum, brass, copper, manganese, tin, steel and iron, can react vigorously or explosively with chlorine. Nitrogen compounds, e.g., ammonia and other nitrogen compounds, can react with chlorine to form highly explosive nitrogen trichloride. Non-metals,

e.g., phosphorous, boron, activated carbon and silicon can ignite on contact with gaseous chlorine at room temperature. Certain concentrations of chlorine-hydrogen can explode by spark ignition. Chlorine is strongly corrosive to most metals in the presence of moisture. Copper may burn spontaneously. Chlorine reacts with most metals at high temperatures. Titanium will burn at ambient temperature in the presence of dry chlorine.

SECTION VI - HEALTH HAZARD DATA

Threshold Limit Value: See Section II.

Primary Routes of Exposure: Inhalation, skin and eye contact.

Effects of Overexposure:

Acute: Low concentrations of chlorine can cause itching and burning of the eyes, nose, throat and respiratory tract. At high concentrations chlorine is a respiratory poison. Irritant effects become severe and may be accompanied by tearing of the eyes, headache, coughing, choking, chest pain, shortness of breath, dizziness, nausea, vomiting, unconsciousness and death. Bronchitis and accumulation of fluid in the lungs (chemical pneumonia) may occur hours after exposure to high levels. Liquid as well as vapor contact can cause irritation, burns and blisters. Ingestion can cause nausea and severe burns of the mouth, esophagus and stomach.

Chronic: Prolonged or repeated overexposure may result in many or all of the effects reported for acute exposure (including pulmonary function effects).

Emergency and First Aid Procedures:

Inhalation (of process emissions): Take proper precautions to ensure rescuer safety before attempting rescue (wear appropriate protective equipment and utilize the "buddy system"). Remove source of chlorine or move victim to fresh air. If breathing has stopped, trained personnel should immediately begin artificial respiration or, if the heart has stopped, cardiopulmonary resuscitation (CPR). Avoid mouth-to-mouth contact. Oxygen may be beneficial if administered by a person trained in its use, preferably on a physician's advise. Obtain medical attention immediately.

Eye Contact: Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for at least 20 minutes while the eyelid(s) are open. Take care not to rinse contaminated water into the non-affected eye. If irritation persists, obtain medical attention immediately.

Skin Contact: As quickly as possible, flush contaminated area with lukewarm, gently running water for at least 20 minutes. Under running water, remove contaminated clothing, shoes, and leather watchbands and belts. If irritation persists, obtain medical attention immediately. Completely decontaminate clothing, shoes and leather goods before re-use, or, discard.

Ingestion: Not an anticipated hazard.

SECTION VII - SPILL & LEAK PROCEDURE

Steps to be taken in case material is released or spilled: Restrict access to the area until completion of the cleanup. Issue a warning: POISON GAS. DO NOT TOUCH SPILLED LIQUID. Do no use water on a chlorine leak (corrosion of the container can occur, increasing the leak). Shut off leak if safe to do so. Wear NIOSH/MSHA-approved, self-contained, full-face, positive pressure respirator and full protective clothing capable of protection from both liquid and gas phases. Persons without suitable respiratory and body protection must leave the area.

The following evacuation guide was developed by the U.S. Department of Transportation (DOT): Spill or leak from a smaller container or small leak from a tank - isolate in all directions 250 feet. Large spill from a tank or from a number of containers - first, isolate 520 feet in all directions; secondly, evacuate in a downwind direction 1.3 miles wide and 2.0 miles long. Keep upwind from leak. Vapors are heavier than air and pockets of chlorine are likely to be trapped in low-lying areas. Use water spray on the chlorine vapor cloud to reduce vapors. Do not flush into public sewer or water systems. Chlorine can be neutralized with caustic soda or soda ash. Alkaline solutions for absorbing chlorine can be prepared as follows:

For 100 pound containers: 125 lbs. of caustic soda and 40 gallons of water
For 2,000 pound containers: 2,500 lbs. of caustic soda and 800 gallons of water
For 100 pound containers: 300 lbs. of soda ash and 100 gallons of water
For 2,000 pound containers: 6,000 lbs. of soda ash and 2,000 gallons of water

CAUTION: Observe appropriate safety precautions for handling alkaline chemicals. Heat will be generated during the neutralization process.

Waste Disposal Method: Due to its inherent properties, hazardous conditions may result if the material is managed improperly. It is recommended that any containerized waste chlorine be managed as hazardous waste in accordance with all applicable federal, state, and local health and environmental laws and regulations.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation: Effective exhaust ventilation should always be provided to draw fumes or vapors away from workers to prevent routine inhalation. Ventilation should be adequate to maintain the ambient workplace atmosphere below the legislated levels listed in Section II.

Respiratory Protection: Use NIOSH approved acid gas cartridge or canister respirator for routine work purposes when concentrations are above the permissible exposure limits. Use full facepiece respirators when concentrations are irritating to the eyes. A cartridge-type escape respirator should be carried at all times when handling chlorine for escape only in case of a spill or leak. Re-enter area only with NIOSH approved, self-contained breathing apparatus with full facepiece. The respiratory use limitations made by NIOSH or the manufacturer must be observed. Respiratory protection programs must be in accordance with 29 CFR 1910.134.

Eye/Face Protection: Non-ventilated chemical safety goggles or a full face shield.

Skin Protection: Wear impervious gloves, coveralls, boots and/or other resistance protective clothing. Safety shower/eyewash fountain should be readily available in the work area. Some operations may require the use of an impervious full-body encapsulating suit and respiratory protection.

Note: Neoprene, polyvinyl chloride (PVC), Viton, and chlorinated polyethylene show good resistance to chlorine.

Additional: Do not eat, drink or smoke in work areas. Maintain good housekeeping.

SECTION IX - SPECIAL PRECAUTIONS

Material Handling: Do not use near welding operations, flames or hot surfaces. Move cylinders by hand truck or cart designed for that purpose. Do not lift cylinders by their caps. Do not handle cylinders with oily hands. Secure cylinders in place in an upright position at all times. Do not drop cylinders or permit them to strike each other. Leave valve cap on cylinder until cylinder is secured and ready for use. Close all valves when not in actual use. Insure valves on gas cylinders are fully opened when gas is used. Open and shut valves at least once a day while cylinder is in use to avoid valve "freezing". Use smallest possible amounts in designated areas with adequate ventilation. Have emergency equipment for fires, spills and leaks readily available. Wash thoroughly after handling product. Provide a safety shower/eyewash station in handling area. An emergency contingency program should be developed for facilities handling chlorine.

Storage: Store in steel pressure cylinders in a cool, dry area outdoors or in well-ventilated, detached or segregated areas of noncombustible construction. Keep out of direct sunlight and away from heat and ignition sources. Cylinder temperatures should never exceed 51°C (125°F). Isolate from incompatible materials. Store cylinders upright on a level floor secured in position and protected from physical damage. Use corrosion resistant lighting and ventilation systems in the storage area. Keep cylinder valve cover on. Label empty cylinders. Store full cylinders separately from empty cylinders. Avoid storing cylinders for more than six months. Comply with applicable regulations for the storage and handling of compressed gases.

SECTION X - HAZARD CODES

NFPA
(National Fire Protection Association)

Health:	4
Flammability:	0
Reactivity:	0
Special:	OXY

HMIS
(Hazardous Materials Identification System)

Health:	3
Flammability:	0
Reactivity:	0
Personal Protection:	X*

Key:
0 = Insignificant
1 = Slight
2 = Moderate
3 = High
4 = Extreme

* See MSDS for specified protection

SHIPPING INFORMATION

IDENTIFICATION - DOMESTIC TRANSPORTATION

Proper Shipping Name (172.101(c)): **Chlorine**
(Technical Name(s)) 172.203(k): **N/A**
Hazard Class 172.101(d): **2.3**
UN/NA# 172.101(e): **UN 1017**
Haz. Substance 171.8: **RQ (Chlorine)**
Reportable Quantity (Appendix A to 172.101): **10 LB**
Inhalation Hazard 172.2a(b): **Zone B, Poison-Inhalation Hazard, Marine Pollutant**
Package Code 172.101(f): **N/A**
Placarded: **Poison Gas**

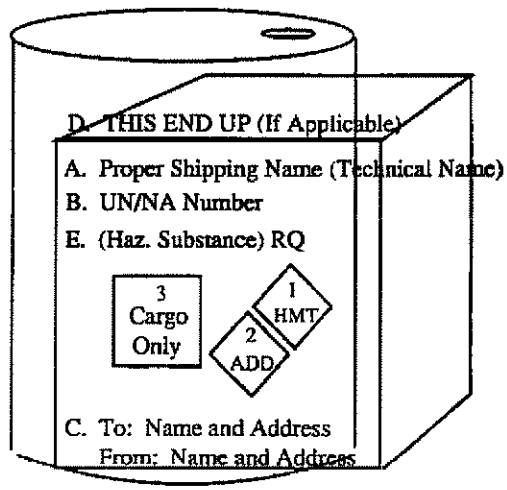
PACKAGING (Part 173)

- Packaging Section (172.101(i)) - Col. 8(a): None
  Col. 8(b): 173.304
  Col. 8(c): 173.314, 173.315

- General Packaging Section - General 173.24 Hazard Class: **POISON GAS**

MARKING

A. Proper Shipping Name (172.301(a)) (Technical Name) (172.301(b))
B. UN/NA Number (172.301(a))
C. Name & Address (172.301(d))
D. THIS END UP (172.312(a))
E. Hazardous Substance RQ (Name) (172.324)
ORM Designation (172.316(a))
Inhalation Hazard (172.313(a))



DOMESTIC LABELING
1. HMT LABELS (172.400)
2. Additional SubsidiaryHazard (172.402(a)):
8 (Corrosive)

DANGEROUS GOODS DETERMINATION (38th Edition) IATA

- Air Transport of This Material if Forbidden (Passenger and Cargo)

USER'S RESPONSIBILITY

This bulletin cannot cover all possible situations which the user may experience during processing. Each aspect of the user's operation should be examined to determine if, or where, additional precautions may be necessary. All health and safety information contained within this bulletin should be provided to the user's employees or customers. Westlake CA&O Corporation must rely upon the user to utilize this information to develop appropriate work practice guidelines and employee instructional programs for his or her operation.

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