



R.E.D. FACTS

Chlorine gas

Pesticide Reregistration

All pesticides sold or distributed in the United States must be registered by EPA, based on scientific studies showing that they can be used without posing unreasonable risks to people or the environment. Because of advances in scientific knowledge, the law requires that pesticides which were first registered years ago be reregistered to ensure that they meet today's more stringent standards.

In evaluating pesticides for reregistration, EPA obtains and reviews a complete set of studies from pesticide producers, describing the human health and environmental effects of each pesticide. The Agency imposes any regulatory controls that are needed to effectively manage each pesticide's risks. EPA then reregisters pesticides that can be used without posing unreasonable risks to human health or the environment.

When a pesticide is eligible for reregistration, EPA announces this and explains why in a Reregistration Eligibility Decision (RED) document. This fact sheet summarizes the information in the RED document for reregistration Case 4022, chlorine gas.

Use Profile

Chlorine gas is used in water treatment to disinfect drinking water, swimming pools, ornamental ponds and aquaria, sewage and wastewater, and other types of water reservoirs. Chlorine gas also is used as a disinfectant, microbistat/microbicide and algicide in food processing systems, pulp and paper mill systems, and commercial and industrial water cooling systems. It is used in washing meat, fresh produce and seeds to control decay-causing microorganisms.

Chlorine is formulated as a pressurized gas and distributed in large stationary containers such as tank cars or trucks and 150-pound to 1-ton cylinders. It is intended for use only by trained, experienced personnel, under the supervision of the registrant and in accordance with state and municipal regulatory requirements.

Regulatory History

Chlorine gas was first registered in the U.S. in 1948, as a disinfectant for use in swimming pools, drinking water, cooling towers and sewage systems. In 1976, chlorine gas was classified for general use based on the premise that industrial users already were adequately trained in its use. Chlorine gas was declared exempt from the requirement of a tolerance when used in solution on raw agricultural commodities in 1991 because measurable residues are not expected. EPA required additional generic data in a Data Call-In notice issued in November 1993. Currently, 97 pesticide products containing the active ingredient chlorine gas are registered.

The Food and Drug Administration (FDA) regulates the use of chlorine gas in solution as a food contact surface sanitizer. EPA's Office of Water regulates its use in potable water systems.

Human Health Assessment

Toxicity

In human poisoning incidents involving accidental ingestion of household bleach, chlorine has caused a burning sensation in the mouth and throat, irritation to the digestive tract and stomach, and vomiting. Exposure to chlorine gas causes effects ranging from bronchitis, asthma and swelling of the lungs, to headaches, heart disease and meningitis. Acute exposure causes more severe respiratory and lung effects, and can result in fatalities. More often, however, the effects are not permanent; complete and rapid recovery generally occurs with treatment.

Chlorine disinfectants have been shown to cause occupational dermatitis or irritation of the skin. People who are asthmatic or allergic to chlorine may be at high risk for adverse reactions after inhaling or ingesting chlorine, for example, after drinking treated water.

Technical grade chlorine (gas and liquid) and its byproducts, hypochlorous acid and hypochlorite ions, are highly toxic and corrosive, and have been placed in Toxicity Category I (indicating the highest degree of acute toxicity) for oral, dermal, eye and inhalation effects. EPA waived several acute toxicity studies and all subchronic toxicity studies for chlorine due to its known acute toxicity and corrosiveness.

Review of a 2-year chronic inhalation study showed effects consistent with previous findings. Even the lowest exposures resulted in measurable cell destruction, primarily as pulmonary lesions. Additional long-term testing is not necessary since the likelihood of additional effects being identified for chlorine *per se* is remote.

Diverse results have been reported for chronic exposure to chlorine in drinking water. EPA has classified chlorine as a Group D carcinogen (not classifiable as to human carcinogenicity), based on a 1990 National Toxicology Program (NTP) study. That study showed equivocal evidence of cancer in female rats (increased leukemia) and no evidence in male rats or in male and

female mice. The International Agency for Research on Cancer (IARC) also determined in 1991 that chlorinated drinking water is not classifiable as to human carcinogenicity. Chlorine has not been shown to cause reproductive, developmental or mutagenic effects.

Dietary Exposure

Pursuant to 40 CFR 180.1095, Chlorine gas is exempt from the requirement of a tolerance when used pre- or postharvest on all raw agricultural commodities. Use of chlorine in food processing water systems to prevent decay of raw agricultural commodities may result in residues on treated produce; however, finite residues or residues above naturally occurring background levels are not expected. Similarly, if livestock ingest chlorine-treated water, finite residues or residues above background levels are not expected to occur in meat, milk or eggs.

Chlorine gas used as a food contact surface sanitizer on food, meat or poultry processing premises and equipment is under FDA's regulatory purview. EPA regulates contaminants in drinking water under the Safe Drinking Water Act (SDWA). The Office of Drinking Water has recently established a Maximum Residual Disinfectant Level (MRDL) of 4 mg/L for chlorine. An MRDL is an enforceable Federal Standard.

Occupational and Residential Exposure

Chlorine gas is metered into water through closed systems in manufacturing processes or from large stationary containers such as tank cars, tank trucks and cylinders. Given current use patterns of chlorine gas, there is potential for dermal and inhalation exposure to applicators and other people exposed to chlorinated water including swimmers, bystanders and workers in food processing plants and water/sewage treatment plants.

Occupational exposure guidelines have been established by OSHA and other domestic and foreign sources. Post-application exposure to chlorine while swimming in treated pools is not believed to be significant, if label requirements are followed.

A significant number of accidents and injuries resulting from the use of chlorine gas as a pesticide have been reported by the American Association of Poison Control Centers, the Chlorine Institute, the California Pesticide Illness Surveillance Program and others. In California, most accidents involved maintenance or equipment failure of chlorinator systems. The most common FIFRA use-related exposures occurred at food processing plants. A significant number of the incidents reported were attributed to application error. While there were some residential pool incidents, most occurred in connection with public/commercial pool chlorinator systems. In Florida, four applicators have died as a result of incorrectly applying chlorine gas.

Human Risk Assessment

Risk to the public is not anticipated from consuming food or water treated with chlorine. Although residues may remain on fruits and vegetables as a result of their treatment with chlorine solution, these residues are exempt from tolerance requirements and are not believed to pose risks. Residues above background levels are not expected in meat, milk or eggs as a result of chlorine use in drinking water. Use of chlorine to sanitize food contact surfaces and food processing equipment presumably does not result in residues of concern in foods (this use is under FDA's jurisdiction). EPA's Office of Drinking Water regulates chlorine in drinking water supplies under the SDWA.

The Agency has concluded that there is a need to better characterize the reproductive and developmental risks associated with drinking water in order to assure that children, infants and fetuses not face unreasonable risk from chronic exposure to drinking water byproducts. Because of the high levels of exposure, both in terms of population (greater than 200,000,000) and individual consumption of chlorinated drinking water, it is necessary to assess the associated risks with greater certainty.

Three water treatment byproducts in particular have been identified for which the health effects need to be better characterized. Bromodichloromethane, dichloroacetic acid, and dibromoacetic acid have been identified as having health effects in laboratory studies. Because these compounds are the most common toxicologically significant halogenated hydrocarbons that have not been completely characterized, additional testing on these compounds will improve the Agency's ability to assess chronic risks from drinking water exposure.

EPA has significant concerns about applicator and post-application exposure to chlorine gas because it is highly toxic for all routes of exposure. The greatest risk of poisoning accidents from chlorine is to applicators and bystanders from accidental exposures resulting from use of chlorine gas in public/commercial swimming pools, and to applicators and workers in industrial food settings. Two other uses, pulp/paper mills and cooling towers, also pose a significant risk because of chlorinator system failure and maintenance operations. The reported poisoning incidents strongly suggest that the use of chlorine gas in these situations presents a significant risk of acute toxicity to applicators, other workers and bystanders. To mitigate this risk, EPA is requiring Restricted Use Pesticide classification for the use of chlorine gas in food processing plants, public/commercial swimming pools, pulp/paper mills and cooling towers so that in the future these uses will be limited to trained, certified applicators. In addition, EPA is requiring significant revisions to product labeling through the RED, so labels will contain sufficient specific use information. The labeling improvements are expected to

adequately address the risks associated with water/sewage treatment and residential pool use, which will still be classified as general use.

Environmental Assessment

Environmental Fate

Chlorine hydrolyses in water to form hypochlorite and hypochlorous acid. Hypochlorous acid is an oxidizing agent--it has a sanitizing effect on organic and inorganic contaminants. Disinfection by chlorination is achieved by maintaining a "free residual chlorine" concentration in solution.

When treated effluent is released into receiving waters, free residual chlorine dissipates rapidly (it has a half-life of 1.3 to 5 hours). The ultimate fate of chlorine-containing effluent is site specific, and depends on factors such as the chemical constituents of the receiving waters, their temperature, the dilution ratio and the intensity of sunlight.

Ecological Effects

Studies on lithium hypochlorite were used to satisfy the data requirements for chlorine used as an industrial biocide, since both form hypochlorous acid when dissolved in water.

Lithium hypochlorite is practically non-toxic to birds on a subacute dietary basis. However, chlorine is very highly toxic to fish and freshwater invertebrates.

Ecological Effects Risk Assessment

In receiving waters from facilities using chlorine, if acute levels of concern are exceeded, a significant risk to aquatic organisms and endangered aquatic organisms can be expected. Levels of concern (equaling one-half of the EC₅₀) are 0.009 ppm for aquatic invertebrates, 0.023 ppm for freshwater fish, and 0.013 ppm for estuarine organisms. Levels of concern for endangered species (equaling one twentieth of the EC₅₀) are 0.85 ppb for aquatic invertebrates, 2.3 ppb for freshwater fish, and 1.3 ppb for estuarine invertebrates.

Uses of chlorine that are **not** regulated under the NPDES permit program, including swimming pool, aquaria and indoor use patterns (fruit and vegetable rinsing and food processing), should produce only intermittent discharges of minimal concentration into lakes or streams, resulting in minimal environmental exposure.

Other chlorine uses, including water cooling tower, sewage treatment plant, and pulp and paper mill uses, are included in the NPDES permit programs administered by EPA's Office of Water. Effluent discharges containing chlorine are regulated under NPDES permits to reduce the impact

on water bodies. The maximum concentration of chlorine allowed in each effluent stream is set on a site-specific and use-specific basis, to achieve the lowest possible concentrations of chlorine in each receiving stream. No significant adverse effects to aquatic organisms are anticipated from discharges of chlorine under the NPDES permitting system.

Endangered Species

If acute levels of concern are exceeded in receiving waters from facilities using chlorine, a significant risk to endangered aquatic organisms can be expected. EPA is working with the U.S. Fish and Wildlife Service to develop a program to avoid jeopardizing the continued existence of identified species by the use of pesticides. When this program goes into effect, endangered species labeling may be required.

Additional Data Required

The generic data base for chlorine is substantially complete to characterize acute risks. For the majority of exposure scenarios, enough data exists to adequately characterize chronic risks, also. Regarding the drinking water treatment use, although the quality of data is sufficient to reregister this public health use, there is some uncertainty regarding the health effects of halogenated byproducts that may be present. The Agency will be requiring the submission of reproductive and developmental studies on bromidichloromethane, dichloroacetic acid, and dibromoacetic acid. The Agency also is requiring product-specific data, including product chemistry, as well as revised Confidential Statements of Formula (CSF) and revised labeling for reregistration.

Product Labeling Changes Required

All end-use products containing chlorine must comply with EPA's current regulations and labeling requirements. The table containing the specific labelling requirements is included in the RED document and as a supplement to this Fact Sheet. It specifies detailed labeling requirements and guidance, covering the following areas:

- ! **Use Directions** - The end use label must indicate specific intended uses, and must provide specific directions for each use. Products must be labeled for restricted use sites or general use sites, not both. The standard Precautionary Statements and Statement of Practical Treatment have been reworded (please see the RED).
- ! **Standard Labeling for Chlorine Products** - Please see the RED for exact label language pertaining to:
 - The Restricted Use Pesticide legend and usage paragraphs;
 - Statement of Practical Treatment/First Aid;

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- Precautionary Statements/Hazards to Humans and Domestic Animals (includes Personal Protective Equipment requirements);
 - Environmental Hazards;
 - Chemical and Physical Hazards;
 - Directions for Use;
 - Spill and Leak Procedures;
 - Storage and Disposal;
 - Disposal of Container.

! **Guidance for Specific Directions for Use** - See the RED for guidance and sample directions, including:

- What specific directions for use should include;
- Use directions for swimming pool water treatment products;
- Directions for treating sewage and waste water;
- Directions for control of microbiological slimes in cooling towers or pulp and paper mill process water systems;
- Directions for treatment of municipal water supplies;
- Directions for treating raw fruits and vegetables;
- Directions for various methods used for sanitization of hard, nonporous food contact surfaces;
- Directions for treatment of other hard surfaces.

! **Effluent Discharge Statement** - All end-use (or manufacturing use) products that may be contained in an effluent discharged to the waters of the U.S. or municipal sewer systems must bear the following statement:

"Do not use in facilities discharging directly or indirectly to the estuarine or marine environment."

To reduce environmental risk from chlorinated water discharge and disposal, product labels must include the statements pertaining to effluent discharge under the NPDES permitting system (refer to PR Notice 93-10) and disposal under any applicable federal laws after the above statement.

Regulatory Conclusion

All currently registered pesticide products containing chlorine can be used without causing unreasonable adverse effects to humans or the environment, in accordance with the revised labeling specified in this RED. Therefore, all chlorine products and uses are eligible for reregistration.

Chlorine products registered for use in non-residential swimming pools, pulp and paper mill processes, and industrial food processing plants are being reclassified as Restricted Use Pesticides due to chlorine's extreme acute

toxicity plus many associated human poisoning incidents. These products must bear Restricted Use Pesticide labeling no sooner than October 1, 2000, and no later than April 1, 2001.

Chlorine products registered for drinking water, sewage and wastewater treatment uses and residential pool use will remain classified for general use because few related accidents or incidents have been reported. Additionally for water treatment, applicators already are trained and certified by the states to perform these uses.

Products containing chlorine as the sole active ingredient will be reregistered once the required product-specific data, CSF and revised labeling are received and accepted by EPA. Products containing other active ingredients will be reregistered only after the other active ingredients also are determined to be eligible for reregistration.

For More Information

EPA is requesting public comments on the Reregistration Eligibility Decision (RED) document for Chlorine Gas, during a 60-day time period, as announced in a Notice of Availability published in the Federal Register. To obtain a copy of the RED document or to submit written comments, please contact the Pesticide Docket, Information and Record Integrity Branch, Information Resources Services Division (7502C), Office of Pesticide Programs (OPP), US EPA, Washington, DC 20460, telephone 703-305-5805.

Electronic copies of the RED and this fact sheet are available on the internet. See <http://www.epa.gov/REDS>.

Printed copies of the RED and fact sheet can be obtained from EPA's National Center for Environmental Publications and Information (EPA/NCEPI), PO Box 42419, Cincinnati, OH 45242-0419, telephone 513-489-8190, fax 513-489-8695.

Following the comment period, the Chlorine Gas RED document also will be available from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161, telephone 703-605-6000 or 800-553-6847.

For more information about EPA's pesticide reregistration program, the Chlorine Gas RED, or reregistration of individual products containing chlorine gas, please contact the Special Review and Reregistration Division (7508W), OPP, US EPA, Washington, DC 20460, telephone 703-308-8000.

For information about the health effects of pesticides, or for assistance in recognizing and managing pesticide poisoning symptoms, please contact the National Pesticides Telecommunications Network (NPTN). Call toll-free 1-800-858-7378, between 9:30 am and 7:30 pm Eastern Standard Time, Monday through Friday.

Chlorine Gas RED Fact Sheet Attachment

Table 1: Summary of Required Labeling Changes for Chlorine Gas		
Description	Required Labeling	Placement on Label
Manufacturing Use Products (MUPs)		
Front Panel Labeling (all MUPs)	<p style="text-align: center;">[Place brand name here if desired] "CHLORINE LIQUEFIED GAS UNDER PRESSURE</p> <p style="text-align: center;">ACTIVE INGREDIENT: Chlorine.... ____% INERT INGREDIENTS:..... ____%</p> <p style="text-align: center;">KEEP OUT OF REACH OF CHILDREN</p> <p style="text-align: center;">DANGER</p> <p style="text-align: center;">POISON" ["POISON" must be in red, on a background of distinctly contrasting color.]</p> <p style="text-align: center;">"FATAL IF INHALED. LIQUID CAUSES SEVERE BURNS</p> <p style="text-align: center;">EPA Reg. No. _____ EPA Est. No."</p> <p style="text-align: center;">[Company name and address:] _____ _____ _____</p> <p style="text-align: center;">"NET CONTENTS: _____"</p>	Front panel
Heading: Precautionary Statement (all MUPs)	"PRECAUTIONARY STATEMENTS"	Place directly below "Net Contents:____" Note: If some precautionary statements appear on other panels, the heading :Precautionary Statements" must also be placed above those statements.

Description	Required Labeling	Placement on Label
First Aid or Statement of Practical Treatment or (either heading is acceptable) (all MUPs)	<p>“ FIRST AID:” or “ STATEMENT OF PRACTICAL TREATMENT”</p> <p>“IF INHALED: Remove victim to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. Get medical attention. IF IN EYES: Hold eyelids open and flush with a steady, gentle stream of water for 15 minutes. Get medical attention. IF ON SKIN: Wash with plenty of soap and water while removing contaminated clothing and shoes. Get medical attention.”</p> <p>[If remaining precautionary statements (Hazards to Humans & Domestic Animals, Personal Protective Equipment, Environmental Hazards, and Chemical & Physical Hazards) are not placed on front panel, the following statement is also required.]</p> <p>“See back panel for additional precautions.”</p>	Front Panel below the heading “Precautionary Statements”
Hazards to Humans and Domestic Animals (all MUPs)	<p>“HAZARDS TO HUMANS AND DOMESTIC ANIMALS: DANGER. Fatal if inhaled or absorbed through skin. Corrosive. Causes irreversible eye damage and skin burns. Do not breathe vapors or get in eyes, on skin or clothing. Wear goggles, protective clothing and rubber gloves as discussed below. Wash hands thoroughly with soap and water after handling and before eating, drinking, or using tobacco. Remove contaminated clothing and wash clothing before reuse. Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals.”</p>	Front panel directly below the First Aid Statements or on other panels of the label.
PPE Requirements (all MUPs)	<p>“PERSONAL PROTECTIVE EQUIPMENT: Handlers must wear long-sleeved shirts, long pants, shoes, and socks. In Case of Spill or Leakage: Under normal use-conditions, no protective eyewear, respirator, or gloves are required. However, in case of a spill or leak, handlers must wear chemical-resistant gloves (such as nitrile or butyl) and a full-face canister-style (gas mask) respirator with a canister approved for chlorine (MSHA/NIOSH approval number prefix TC-14G) OR a self-contained breathing apparatus (SCBA) (MSHA/NIOSH approval number prefix TC-13F). Since there is always the possibility of a spill or leak, gloves and a respirator of a type specified above must be available and are required for anyone entering into an affected area in the event of a leak or spill.”</p>	Directly below the Hazards to Humans and Domestic Animals Statement
Environmental Hazards (all MUPs)	<p>“ENVIRONMENTAL HAZARDS: This pesticide is toxic or highly toxic to fish and aquatic invertebrates. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA.</p>	Directly below/after the Personal Protective Equipment Statement
Physical and Chemical Hazards (all MUPs)	<p>“PHYSICAL & CHEMICAL HAZARDS: Chlorine is a non-flammable gas, liquefied, under pressure. Do not drop container. Do not heat container. Keep away from intense heat or open sunlight. Corrosive to most metals in the presence of moisture.”</p>	Directly below/after the Environmental Hazard Statement

Description	Required Labeling	Placement on Label
<p>Directions for use (all MUPs)</p>	<p style="text-align: center;">“DIRECTIONS FOR USE</p> <p>It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Refer to [state the name of the manual being used] for instructions on the required product use and safety procedures. Before working with this product, handlers must be trained how to appropriately use respirators that conform to OSHA requirements (described in 29 CFR Part 1910.134) and how to appropriately handle and use chlorine. This product, including dispensing equipment, must be handled and used in accordance with the practices specified by all applicable product labeling and the [state the name of the manual being used]." Use only in well ventilated areas.</p> <p>Only for formulation into an” [fill blank with Sanitizer, Disinfectant, or the applicable term which describes the type of pesticide uses(s)] “for the following uses(s):” [fill blank only with those uses that are being supported by MP registrant].</p> <p>[Additional optional statement may be placed here as specified above under "Labeling Requirements for Manufacturing-Use Products."]</p> <p>[Note that directions for specific uses are not permitted on MP labels. A product must be labeled as EP or MP, not both.]</p>	<p>Directly below the PRECAUTIONARY STATEMENTS section.</p>
<p>Storage & Disposal (all MUPs)</p>	<p>“STORAGE & DISPOSAL</p> <p>STORAGE: Store cylinders and ton containers in a dry area away from sources of heat and protected from direct sunlight and precipitation. Do not store in excessive heat. Segregate chlorine containers from other compressed gases, and never store near hydrocarbons, finely divided metals, turpentine, ether, anhydrous ammonia, or other flammable materials. All storage containers and cylinders must have a weather resistant label and must not be accessible to the general public. Do not drop container. If container is damaged or leaking, refer to procedures in the [state the name of the manual being used] and/or notify supplier immediately. Do not contaminate water, food, or feed by storage or disposal. Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law.”</p>	

Description	Required Labeling	Placement on Label
Storage & Disposal (Continued) (all MUPs)	<p>“LEAK PROCEDURES: Make daily inspections for leaks. Stop a leak at once, since it will become worse with time.</p> <p>In case of a leak, evacuate everyone from the immediate area. For entry into the affected area to correct problem, wear personal protective equipment (including prescribed respirators) specified in the Hazards to Humans section of this labeling. When possible, move leaking or damaged cylinders outdoors or to an isolated location. Observe strict safety precautions. Work upwind, if possible. Allow any liquid chlorine to evaporate. Only correctly trained and Personal Protective Equipment (PPE)-equipped handlers are permitted to perform such cleanup. Do not permit entry into the leak area by any other person until the chlorine has completely dispersed.</p> <p>DISPOSAL OF CONTAINER: Container is returnable and must be properly identified with return tag and returned as promptly as possible to supplier according to prescribed instructions and practices in the” [state the name of the manual being used]. “All valves must be closed tight and closures or caps secured. It is illegal to ship a leaking chlorine container.”</p>	Place in Storage & Disposal box with Storage statement
End Use Products Intended for Occupational/Commercial Use		
Restricted Use Pesticide (RUP) Statement [required on all RUP products (products used on non-residential swimming pools, industrial food use settings, cooling water towers, and pulp and paper mill process water systems)]	<p style="text-align: center;">“RESTRICTED USE PESTICIDE DUE TO HIGH ACUTE TOXICITY</p> <p>For retail sale to and use only by Certified Applicators or persons under their direct supervision and only for those uses covered by the Certified Applicator’s certification.”</p>	Top of Front Panel and Beginning of Directions for Use
User Statement [required for non-RUP products only (water and sewage treatment, and residential swimming pools)]	“For Use Only By Trained Commercial Applicators”	Top of Front Panel
Brand Name and Chlorine Identification Statement (required for all End Use Products)	<p style="text-align: center;">[Place brand name here if desired] “CHLORINE LIQUEFIED GAS UNDER PRESSURE”</p>	Below/after the RUP or Trained Applicator Statement
Usage Statement (required for all bulk containers such as tank cars, tank trucks, and 1-ton and 150-pound cylinders)	“For use as a” [indicate whichever kind(s) of antimicrobial activity and specific uses(s) your product is registered for, e.g., disinfectant in swimming pools, or as a sanitizer for wash water treatment of food handling premises and equipment (fruit, vegetable, meat, poultry or seafood), or as an algicide and biocide for use in recirculating cooling towers and pulp and papermill process water systems.] “The registrant is solely responsible for the safety of the servicing equipment used with this pesticide, and for the repackaging of this gas from larger containers into portable cylinders. Each repackager must obtain his own EPA Registration Number for this pesticide for this use, and his own EPA Establishment Number from the EPA. Repackers may only dispense this product to portable containers that are appropriately labeled.”	Directly below/after the “Chlorine Identification Statement”

Description	Required Labeling	Placement on Label
Usage Statement for portable containers used by service companies in treating swimming pools or wash water for raw agricultural commodities	“For use as a” [indicate whichever use(s) your product is registered for: disinfectant and algicide] “in” [indicate use, either “servicing swimming pools” or “wash water for raw agricultural commodities”].	Directly below/after the “Chlorine Identification Statement”
Front Panel Labeling (required on <u>all</u> End Use Products)	<p style="text-align: center;">“ACTIVE INGREDIENT: Chlorine....____% INERT INGREDIENTS:.....____% KEEP OUT OF REACH OF CHILDREN DANGER</p> <p style="text-align: center;">[Place skull-and-crossbones close to the word POISON.] POISON” [“POISON” must be in red, on a background of distinctly contrasting color.]</p> <p style="text-align: center;">“FATAL IF INHALED. LIQUID CAUSES SEVERE BURNS</p> <p style="text-align: center;">EPA Reg. No. _____ EPA Est. No. _____”</p> <p style="text-align: center;">[Company name and address:] _____ _____ _____</p> <p style="text-align: center;">“NET CONTENTS: _____”</p>	Front Panel directly below/after Usage Statement
Precautionary Statements Heading required on all End Use Products	“PRECAUTIONARY STATEMENTS”	Front Panel directly below “Net Contents:_____” Place directly below “Net Contents:_____” Note: If some precautionary statements appear on other panels, the heading :Precautionary Statements” must also be placed above those statements.

Description	Required Labeling	Placement on Label
First Aid Heading and Statements (required on all End Use Products)	<p style="text-align: center;">“FIRST AID:”</p> <p>“IF INHALED: Remove victim to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. Get medical attention. IF IN EYES: Hold eyelids open and flush with a steady, gentle stream of water for 15 minutes. Get medical attention. IF ON SKIN: Wash with plenty of soap and water while removing contaminated clothing and shoes. Get medical attention.”</p> <p>[If remaining precautionary statements (Hazard to Humans & Domestic Animals, Personal Protective Equipment, Environmental Hazards, and Chemical & Physical Hazards) are not placed on front panel, the following statement is also required.]</p> <p style="text-align: center;">“See back panel for additional precautions.”</p>	Place directly below the heading “PRECAUTIONARY STATEMENTS” on Front Panel.
Precautionary Statements (required on all End Use Products)	<p style="text-align: center;">“Precautionary Statement” [and signal word] “Danger”</p> <p>“HAZARDS TO HUMANS AND DOMESTIC ANIMALS: DANGER. Fatal if inhaled or absorbed through skin. Corrosive. Causes irreversible eye damage and skin burns. Do not breathe vapors or get in eyes, on skin or clothing. Wear goggles, protective clothing and rubber gloves as discussed below. Wash hands thoroughly with soap and water after handling and before eating, drinking, or using tobacco. Remove contaminated clothing and wash clothing before reuse. Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals.”</p>	May appear on front panel (below the First Aid Statements) or other panels of the label.
PPE Requirements (required on all End Use Products)	<p>“Personal Protective Equipment: Applicators and other handlers must wear long-sleeved shirts, long pants, shoes, and socks”.</p>	Directly below the Hazards to Humans and Domestic Animals Statement.
Leakage Personal Protective Equipment (required for bulk containers)	<p>“IN CASE OF LEAKAGE</p> <p>Under normal use-conditions, no protective eyewear, respirator, or gloves are required. However, in case of a leak, handlers must wear chemical-resistant gloves (such as nitrile or butyl) and a full-face canister-style (gas mask) respirator with a canister approved for chlorine (MSHA/NIOSH approval number prefix TC-14G) OR a self-contained breathing apparatus (SCBA) (MSHA/NIOSH approval number prefix TC-13F). Since there is always the possibility of a leak, gloves and a respirator of a type specified above must be available. Gloves and a respirator are required for anyone entering into an affected area in the event of a leak.”</p>	Directly below the PERSONAL PROTECTIVE EQUIPMENT Statement.

Description	Required Labeling	Placement on Label
Leakage Personal Protective Equipment (required for portable cylinders or containers)	<p>“In Case of Leakage:</p> <p>Under normal use-conditions, no protective eyewear, respirator, or gloves are required. However, in case of a leak, handlers must wear chemical-resistant gloves (such as any waterproof material) and a full-face canister-style (gas mask) respirator with a canister approved for chlorine (MSHA/NIOSH approval number prefix TC-14G). Since there is always the possibility of a leak, gloves and a respirator of a type specified above must be available. Gloves and a respirator are required for anyone entering into an affected area in the event of a leak.”</p>	Directly below/following Personal Protective Equipment Statement.
Environmental Hazards	<p>“ENVIRONMENTAL HAZARDS: This pesticide is toxic or highly toxic to fish and aquatic invertebrates. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA.”</p>	Directly below/following Spillage Personal Protective Equipment Statement.
Physical & Chemical Hazards	<p>“PHYSICAL & CHEMICAL HAZARDS: Chlorine is a non-flammable gas, liquefied, under pressure. Do not drop container. Do not heat container. Keep away from intense heat or open sunlight. Corrosive to most metals in the presence of moisture.”</p>	Directly below/following Environmental Hazards statement.
General Directions for Use (required for all End Use Products)	<p style="text-align: center;">"DIRECTIONS FOR USE</p> <p>It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Refer to [state the name of the manual being used] for instructions on the required product use and safety procedures. Before using this product, handlers must be trained how to appropriately use respirators that conform to OSHA requirements (described in 29 CFR Part 1910.134) and how to appropriately handle and use chlorine. This product, including dispensing equipment, must be handled and used in accordance with the practices specified by all applicable product labeling and the [state the name of the manual being used]." Use only in well ventilated areas.”</p>	Directly below/following the PRECAUTIONARY STATEMENTS section.
Specific Directions for Use (required for all End Use Products)	<p>Specific Directions for Use. The following information must appear on the label or be referred to in supplemental labeling.</p> <ul style="list-style-type: none"> ! An instruction to test the chlorinated water with a test kit to ensure adequate concentration (ppm) of available chlorine or chlorine residual. ! Identification of the type of water, object, or surface to be treated, and the type of area or establishment in which the product is to be used. ! For surface treatments, an instruction for thorough pre-cleaning should be included. ! The recommended concentration (ppm) available chlorine or chlorine residual, and how to prepare it. 	Directly below/following the General Directions for Use statement or attached as supplemental labeling

Description	Required Labeling	Placement on Label
Specific Directions for Use (required for all End Use Products) (continued)	<p>! The method of application (e.g., wipe, rinse, immerse, spray), if not already understood (as in water treatment applications). For surface treatments, the reader must understand that all surfaces must be thoroughly wetted.</p> <p>! The contact time necessary for effectiveness. For surfaces, also indicate any necessary information on a final rinse, and if and how the product should be removed from the surface after the recommended contact time.</p> <p>! For some water treatment applications, a follow-up dosage(s) should be indicated.</p> <p>! For surface treatments, an instruction regarding limitations on re-use of the solution (e.g., whether it may be re-used if it has not become diluted or soiled, and for how many batches or how many days).</p> <p>! Additional instructions or information may be appropriate, or required on a case-by-case basis.</p>	Directly below/following the General Directions for Use statement or attached as supplemental labeling
Specific Directions for Use (required for all products registered for swimming pool water treatment)	<p>(a) The proper range in the concentration (ppm) of chlorine or residual (e.g., available chlorine) and pH to be maintained at all times. The directions should advise users to test the water with test kits to maintain pH and the proper concentration of principle active ingredient or residual.</p> <p>(b) The frequency of treatment required for the maintenance of the desired concentration of chlorine is dependent on bather load, and the concentration should be checked frequently with a test kit.</p> <p>(c) How the product is to be added to the pool (e.g., automatic metering device).</p> <p>(d) The maximum concentration of chlorine or residual allowable in the pool water, following application of the product, before swimmers are allowed to re-enter the pool.</p> <p>(e) Any water quality conditions essential to effective use of the product as a disinfectant (e.g., alkalinity).</p> <p>(f) Treatment procedure(s) for newly filled pools.</p>	Directly below/following the General Directions for Use statement or attached as supplemental labeling
Specific Directions for Use (required for all products registered for Industrial Water Treatment Systems)	<p>(a) <u>General</u>. This section provides labeling guidance for chlorine products intended for control of algal, bacterial, and/or fungal slime in industrial cooling water systems, pulp and paper mills and similar water treatment systems.</p> <p>(b) <u>Label Claims</u>. Broad label claims such as "microbicide", "microbiostat", "slimicide" and "microorganism control" should not be used unless they are modified by:</p> <p>! The names of the types of organisms (algae, bacteria, fungi) for which control is intended. Terms such as "biocide" or "biostat" are generally not acceptable when only microorganism control is intended.</p>	Directly below/following the General Directions for Use statement or attached as supplemental labeling

Description	Required Labeling	Placement on Label
<p>Specific Directions for Use (required for all products registered for Industrial Water Treatment Systems) (continued)</p>	<p>! An identification of the industrial or commercial recirculating water cooling systems (e.g., industrial and/or commercial recirculating cooling water towers, air washers, and/or evaporative condensers) in which the product is intended for use.</p> <p>! An accurate description of the level of activity claimed for each use stated on the label. An acceptable statement for a microbicide would be: "Microbicide for use in industrial recirculating cooling water towers to reduce the number of living algae, bacteria and fungi." An acceptable statement for a "microbistat" would be: "A microbistat (microorganism control) for use in industrial recirculating cooling towers to control the growth of algae, bacteria, and fungi."</p> <p>(c) <u>Special Directions for Use</u>. Directions for general microbial control must include, but are not limited to, the following:</p> <p>! <u>Site of Use</u>. Directions should state where in the system the product is to be applied (e.g., at a point in the system where the product will be uniformly mixed).</p> <p>! <u>Time of Use</u>. Directions should specify when the product should be applied (e.g., when the system is in danger of becoming impaired or after cleaning a system whose efficiency is already impaired).</p> <p>! <u>Dosage</u>. The dosage rate or amount should be specified as volume or weight of chlorine per unit volume of water. The product weight per gallon must be shown on the label, whether the dosage is given as volume or weight.</p> <p>! <u>Method of Application</u>. The method of application or pattern of use must appear on the label and should conform to the instructions provided below for the intermittent or "slug method", the modified intermittent method, or the continuous feed method.</p> <ul style="list-style-type: none"> • <u>Intermittent or Slug Method</u>. The directions should state an initial dosage range of relatively high product concentration to obtain control of obvious microbial contamination. When microbial control is evident, a subsequent dosage regimen of relatively lower product concentration should be stated. The label should state the usual time interval between doses, or include the phrase "as needed to maintain control", or both. The label should not claim maintenance of any particular pesticide concentration. The following is an example of acceptable directions or use: <u>Initial Dose</u>. When the system is noticeably fouled, apply ___ to ___ (volume or unit weight) of (product name or active ingredient) per ___ (unit volume) of water in the system. Repeat until control is achieved. Badly fouled systems must be cleaned before initial treatment. 	<p>Directly below/following the General Directions for Use statement or attached as supplemental labeling</p>

Description	Required Labeling	Placement on Label
<p>Specific Directions for Use (required for all products registered for Industrial Water Treatment Systems) (continued)</p>	<p><u>Subsequent Dose.</u> When microbial control is evident, add ___ to ___ (volume or unit weight) of ___ (product name or active ingredient) per ___ (unit volume) of water in the system every ___ days (weekly), or as needed to maintain control.</p> <ul style="list-style-type: none"> <p><u>Modified Intermittent Method.</u> This method is similar to the intermittent, or slug method, except that the interval between treatments is based on the time for a stated fraction of the system water to be lost by blowdown. This method of application may be accompanied by label claims for the maintenance of the pesticide concentration within a stated maximal and minimal limit. The following is an example of acceptable directions for use:</p> <p><u>Initial Dose.</u> When the system is noticeably fouled, apply ___ to ___ (volume or unit weight) of ___ (product name or active ingredient) per ___ (unit volume) of water in the system. Apply half (or 1/3, 1/4, or 1/5) of this initial dose when half (or 1/3, 1/4, or 1/5) of the water in the system has been lost by blowdown. Badly fouled systems must be cleaned before initial treatment.</p> <p><u>Subsequent Dose.</u> When control of microbial growth is evident, apply ___ to ___ (volume or unit weight) of ___ (product name or active ingredient) per ___ (unit volume of water) in the system. Apply half (or 1/3, 1/4, 1/5) of this initial dose when half (or 1/3, 1/4, 1/5) of the water in the system has been lost by blowdown.</p> <p><u>Continuous Feed Method.</u> The label should specify an initial dose, based on the volume of water in the cooling system, to establish an initial product concentration. For volatile products, continuous feed is based on total makeup water. For non-volatile products, continuous feed is expressed as amount of product to be applied per stated volume of water lost by blowdown. The claim to maintain a pesticide concentration in the system may be made for this method of application. The following is an example of acceptable directions for use:</p> <p><u>Initial Dose.</u> When the system is noticeably fouled, apply ___ (volume or unit weight) of ___ (product name or active ingredient) per (unit volume) of water in the system. Badly fouled systems must be cleaned before initial treatment.</p> <p><u>Subsequent Dose.</u> Maintain this treatment level by starting a continuous feed of ___ (volume or unit weight) of ___ (product name or active ingredient) per ___ (unit volume) of water lost by blowdown.</p> 	<p>Directly below/following the General Directions for Use statement or attached as supplemental labeling</p>

Description	Required Labeling	Placement on Label
Specific Directions for Use (required for products registered for Hard Surface Disinfectants)	<p>General or broad spectrum disinfectants may bear label claims as hard, food-contact surface disinfectants. Use directions must indicate that following the specified contact period, the product should be removed from the treated surfaces with a final sanitizing rinse which may be worded as follows:</p> <p>"CLEANING AND DISINFECTING FOOD PREPARATION AND PROCESSING FACILITIES AND EQUIPMENT: Cover or remove all food and packaging materials. Remove all gross soils. Saturate all surfaces with the use-solution. Scrub to loosen all soils. Allow to soak for (contact time) in a 600 ppm available chlorine solution. Thoroughly rinse all wetted and cleaned surfaces with a final sanitizing rinse solution of 200 ppm available chlorine."</p>	Directly below/following the General Directions for Use statement or attached as supplemental labeling
Specific Directions for Use (required for products registered for Hard Non-Food Contact Surfaces Sanitizers)	<p>A product intended for use on non-food contact surfaces which does not eliminate but significantly reduces the numbers of target microorganisms should be represented and qualified in labeling as being effective at the sanitizing level only. Examples of acceptable label claims are: "Sanitizes", "Significantly reduces", or "Reduces the number of bacteria by 99.9%." Products recommended for use in critical hospital or medical environments that are not effective at the sterilizing or disinfecting level should bear a label disclaimer statement such as: "This product is not a disinfectant or sterilizer."</p>	Directly below/following the General Directions for Use statement or attached as supplemental labeling
Specific Directions for Use (required for products registered for Circulate-In-Place (CIP) Applications)	<p>Label claims for CIP applications as "germicidal" or "disinfecting" are not generally acceptable because these methods have not been shown to be an effective means of disinfecting surfaces in these systems. Representations for CIP applications to sanitize the surfaces of the systems are acceptable.</p>	Directly below/following the General Directions for Use statement or attached as supplemental labeling
Specific Directions for Use (required for products registered for Hard Food Contact Surface Sanitizers)	<p>(a) The major area(s) in which the product is recommended for use (e.g., restaurants, dairies, food processing plants).</p> <p>(b) The identification of the types of hard surfaces, or objects, intended for treatment.</p> <p>(c) The necessity for removal of gross food particles and soil by a pre-flush, or pre-scrape and, when necessary, pre-soak treatment. In addition, instructions must be provided for a thorough washing of the surfaces or objects with a good detergent or compatible cleaner, followed by a potable water rinse prior to application of the sanitizing solution.</p> <p>(d) The recommended use solution and instructions for preparing it. The units of measure (e.g., volume or weight per unit volume of water) to be employed in diluting the product must be given, and must be understandable to the user. The concentration (in parts per million) of available chlorine provided by the recommended use solution should also be given.</p> <p>(e) The method of application (e.g., immersion, flooding, spraying) to wet all surfaces thoroughly. Additional instructions for in-place sanitizing may be required (e.g., filling piping with the sanitizing solution).</p> <p>(f) A contact time of a least 1 minute.</p>	Directly below/following the General Directions for Use statement or attached as supplemental labeling

Description	Required Labeling	Placement on Label
<p>Specific Directions for Use (required for products registered for Hard Food Contact Surface Sanitizers) (continued)</p>	<p>(g) The directions should also indicate if, and how, the product is to be removed from the surfaces after the recommended contact time. Instructions to drain the use solution from the surface and allow to air dry are appropriate for products cleared for use on food contact surfaces under the Federal Food, Drug and Cosmetic Act. However, the recommendation of a potable water rinse after food-contact surfaces have been treated with a sanitizing rinse is not acceptable for products intended for use as a terminal sanitizing rinse.</p> <p>(h) For mechanical operations, the limitation that the prepared use solution may not be re-used for sanitizing but may be re-used for other purposes (e.g., cleaning floors, etc.). For manual operations the label should include a recommendation that a fresh sanitizing solution should be prepared at least daily or more often if the solution becomes diluted or soiled.</p> <p>(i) Additional instructions may be necessary for certain use patterns and/or categories of products to ensure safe and effective use of a product. Such additional instructions may be recommended by the applicant, or required by the Agency, as determined on a case-by-case basis.</p>	<p>Directly below/following the General Directions for Use statement or attached as supplemental labeling</p>
<p>Specific Directions for Use (required for all products registered for Human Drinking Water Treatment)</p>	<p>(a) <u>Public Water Supplies</u>. Municipal drinking water must meet the requirements of the Safe Drinking Water Act (42 U.S.C. 300f). Label claims and directions, as well as testing and performance requirements, must be acceptable to the Office of Drinking Water of the EPA, and appropriate documentation of such acceptance must be submitted.</p> <p>(b) <u>Emergency Water Supplies</u>. This section applies to emergency purification of small quantities of drinking water of questionable potability by the general public in the absence of bacteriological monitoring facilities. The special directions for use of a product intended for field or emergency disinfection of small quantities of drinking water must include the following information:</p> <ul style="list-style-type: none"> ! The effective dosage. ! The water source to be treated (e.g., lake, pond, stream) and its characteristics (e.g., clear, muddy, brackish). ! The exposure time. 	<p>Directly below/following the General Directions for Use statement or attached as supplemental labeling</p>
<p>Specific Directions for Use (required for all products registered for disinfectants for treatment of sewage and wastewater effluent)</p>	<p>The amount of chlorine delivered to treat sewage and wastewater effluent will depend on the flow rate of the water being treated, the number and placement of feed tubes and the outlet weir size opening.</p> <p>Specific use directions must be provided on the label or in collateral literature to enable the user to determine the amount of chlorine to satisfy treatment demands and the appropriate residue levels required for disinfection.</p>	<p>Directly below/following the General Directions for Use statement or attached as supplemental labeling</p>

Description	Required Labeling	Placement on Label
Specific Directions for Use (required for products registered for Sanitizing Use for Fruit and Vegetable Wash Water Treatment must include the following information:	Specific use directions must be provided on the label or in collateral literature to enable the user to determine the amount of chlorine to satisfy treatment demands and the appropriate residual levels required for sanitization.	Directly below/following the General Directions for Use statement or attached as supplemental labeling
Storage & Disposal Heading and Statements (required for all End Use Products)	<p style="text-align: center;">“STORAGE & DISPOSAL</p> <p>STORAGE: Store cylinders and ton containers in a dry area away from sources of heat and protected from direct sunlight and precipitation. Do not store in excessive heat. Segregate chlorine containers from other compressed gases, and never store near hydrocarbons, finely divided metals such as filings or granules, turpentine, ether, anhydrous ammonia, or other flammable materials. All storage containers and cylinders must have a weather resistant label and must not be accessible to the general public. Do not drop container. If container is damaged or leaking, refer to procedures in the [state the name of the manual being used] and/or notify supplier immediately. Do not contaminate water, food, or feed by storage or disposal. Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law.”</p> <p>“LEAK PROCEDURES: Make daily inspections for leaks. Stop a leak at once, since it will become worse with time.</p> <p>In case of a leak, evacuate everyone from the immediate area. For entry into the affected area to correct problem, wear personal protective equipment (including prescribed respirators) specified in the Hazards to Humans section of this labeling. When possible, move leaking or damaged cylinders outdoors or to an isolated location. Observe strict safety precautions. Work upwind, if possible. Allow any liquid chlorine to evaporate. Only correctly trained and PPE-equipped handlers are permitted to perform such cleanup. Do not permit entry into the leak area by any other person until the chlorine has completely dispersed.</p> <p>DISPOSAL OF CONTAINER: Container is returnable and must be properly identified with return tag and returned as promptly as possible to supplier according to prescribed instructions and practices in the” [state the name of the manual being used] “. All valves must be closed tight and closures or caps secured. It is illegal to ship a leaking chlorine container.”</p>	Directly below/following DIRECTIONS FOR USE statements.