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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, DC 20460

OFFICE OF CHEMICAL SAFETY  
AND POLLUTION PREVENTION

March 1, 2012

Sherman Wang  
W&W Marketing Corporation  
Tianjin Industrial Import & Export Co.  
2522 Malt Avenue  
Commerce, CA 90040

Cc: Sherri Gray, Sherri Gray Consulting

Subject: Superchlo  
EPA Registration Number: 71674-1  
Letter Date: December 1, 2011  
EPA Receipt Date: December 5, 2011

Dear Mr. Wang:

The following amendments, submitted in connection with registration under section of the federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended, are acceptable with conditions listed below.

Proposed amendments:

Registrant is adding many use sites in accordance with the RED for sodium & calcium hypochlorite and other previously-registered sodium & calcium hypochlorite products. New use sites include spas, potable water disinfection, sewage treatment, industrial water process systems, food-contact and non-food-contact hard nonporous surface sanitization, dialysis machines, laundry sanitization, beverage and food-processing plants, aquacultural and agricultural premises, and raw food commodities. The RED did not require any further data for sodium & calcium hypochlorite use at these sites.

Registrant also submitted an alternate CSF for a solid form of the formerly solely granular product. Registrant has indicated that the 3" tablets and 1" sticks are made of compacted granules of Superchlo and no additional ingredients have been added.

Comments and conditions:

Revise the label as follows:

- Move Storage and Disposal language to the end of Directions for Use (last page of

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label)

- Change "non-household/non-residential" to "commercial" in Storage and Disposal section (currently pages 2 & 3)
- Add the phrase "Do not contaminate food, feed, or water by storage and disposal" directly under the Storage and Disposal header
- Replace "should" with "must" throughout label as marked on pages 5, 7 through 11, 15 through 21, 23, and 25.
- On page 4, change "Tanks should not be entered until the chlorine residual is below 3 ppm" to "Do not enter tank until the chlorine residual is below 3 ppm."
- Correct typo of "until" on page 6.
- On page 17, under Wineries, change sentence "After a run and before refilling tanks, they should be thoroughly disinfected with calcium hypochlorite" to "After a run and before refilling tanks, thoroughly disinfect with calcium hypochlorite."

General comments:

The CSF dated 2/21/12 is acceptable. A stamped copy of the label with comments is enclosed. Submit one copy of your final printed labeling before distributing or selling the product bearing the revised labeling. This amendment and a copy of this letter have been placed in this product's file for future reference.

Should you have any questions or comments concerning this letter, please contact Eliza Blair via email at [blair.eliza@epa.gov](mailto:blair.eliza@epa.gov) or by telephone at (703) 308-7279.

Sincerely,

*Monisha Hartis*  
 Monisha Hartis  
 Product Manager (32)  
 Regulatory Management Branch II  
 Antimicrobials Division (7510P)

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ACCEPTED  
with COMMENTS  
EPA Letter Dated:  
MAR - 1 2012

# Superchlo

[Dry Granular Chlorinating Granules][3" Tablets][1" Sticks]

Under the Federal Insecticide,  
Fungicide, and Rodenticide Act as  
amended, for the pesticide,  
registered under EPA Reg. No.

ACTIVE INGREDIENT:	
Calcium Hypochlorite.....	67%
OTHER INGREDIENTS.....	33%
TOTAL.....	100%

71674-1

**KEEP OUT OF REACH OF CHILDREN**

## DANGER

### FIRST AID

**IF SWALLOWED:** Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person.

**IF ON SKIN OR CLOTHING:** Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

**IF INHALED:** Move person to fresh air. If person is not breathing, call 911 or an ambulance, and then give artificial respiration, preferably mouth-to-mouth if possible. Call a poison control center or doctor for further treatment advice.

**IF IN EYES:** Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment.

Note to Physician: Probable mucosal damage may contraindicate the use of gastric lavage.

IN CASE OF MEDICAL EMERGENCY CALL 1-800-535-5053.

(See additional precautions on side panel.)

Manufactured by:  
Tianjin Industrial Import & Export Company  
6 You Yi Road, Tianjin 300074  
P.R. China

Imported by:  
W & W Marketing Corporation  
2522 Malt Avenue  
Commerce, CA 90040, USA

EPA REGISTRATION NO. 71674-1      EPA ESTABLISHMENT NO. 71674-CHN-001

BATCH NO.:

[NET CONTENTS: 100 LBS][Each tablet weighs 200.0 grams (7.0 ounces)][Each stick weighs 311.8 grams (11.0 ounces)]

**PRECAUTIONARY STATEMENTS  
HAZARDS TO HUMANS AND DOMESTIC ANIMALS  
DANGER**

Highly corrosive. Causes skin and eye damage. May be fatal if swallowed. Do not get in eyes, on skin or on clothing. Wear goggles or face shield and rubber gloves when handling this product. Irritating to nose and throat. Avoid breathing dust. Remove and wash contaminated clothing before reuse.

**ENVIRONMENTAL HAZARDS**

This pesticide is toxic to fish and aquatic organisms. For packages 50 pounds or more, do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or public waters unless this product is 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 sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA.

**PHYSICAL OR CHEMICAL HAZARDS**

**STRONG OXIDIZING AGENT:** Mix only with water. Use clean dry utensils. Do not add this product to any dispensing device containing remnants of any other product. Such use may cause a violent reaction leading to fire or explosion. Contamination with moisture, organic matter or other chemicals will start a chemical reaction and generate heat, chlorine gas (and possible fire and explosion). In case of contamination or decomposition, do not reseal container. If possible, isolate container in open air or well ventilated area. Flood area with large volumes of water, if necessary.

**STORAGE AND DISPOSAL**

**STORAGE:** Keep this product dry in a tightly closed container, when not in use. Store in a cool, dry, well ventilated area away from heat or open flame. In case of decomposition, isolate container (if possible) and flood area with large amounts of water to dissolve all material before discarding this container.

**DISPOSAL:**

*{Household/residential instructions}*

Nonrefillable container. Do not reuse or refill this container.

If empty: Place in trash or offer for recycling, if available.

If partly filled: Call your local solid waste agency for disposal instructions. Never place unused product down any indoor or outdoor drain.

*{Non-household/non-residential residue removal instructions for rigid nonrefillable containers equal to or less than 50 lbs}*

Nonrefillable container. Do not reuse or refill this container. Clean container promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container ¼ full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. Offer for recycling, if available.

*{Non-household/non-residential residue removal instructions for rigid nonrefillable containers greater than 50 lbs.}*

Nonrefillable container. Do not reuse or refill this container. Clean container promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container ¼ full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times. Offer for recycling, if available.

**DIRECTIONS FOR USE**

It is a violation of federal law to use this product in a manner inconsistent with its labeling.

**SWIMMING POOL WATER DISINFECTION**

For a new pool or spring start-up, superchlorinate with 10 to 20 oz. of product for each 10,000 gallons of water to yield 5 to 10 ppm available chlorine by weight. Check the level of available chlorine with a test kit. Adjust and maintain pool water pH to between 7.2 to 7.6. Adjust and maintain the alkalinity of the pool between 50 to 100 ppm. To maintain the pool, add manually or by a feeder device 2 oz. of this product for each 10,000 gallons of water to yield an available chlorine residual between 0.6 to 1.0 ppm by weight. Stabilized pools should maintain a residual of 1.0 to 1.5 ppm available chlorine. Test the pH, available chlorine residual and alkalinity of the water frequently with appropriate test kits. Frequency of water treatment will depend upon temperature and number of swimmers.

Every 7 days, or as necessary, superchlorinate the pool with 10 to 20 oz. of product for each 10,000 gallons of water to yield 5 to 10 ppm available chlorine by weight. Check the level of available chlorine by weight. Check the level of available chlorine with a test kit. Do not reenter pool until the chlorine residual is between 1.0 to 3.0 ppm. At the end of the swimming pool season or when water is to be drained from the pool, chlorine must be allowed to dissipate from treated pool water before discharge. Do not chlorinate the pool within 24 hours prior to discharge.

WINTERIZING POOLS – While water is still clear & clean, apply 0.6 oz. of product per 1,000 gallons, while filter is running, to obtain a 3 ppm available chlorine residual, as determined by a suitable test kit. Cover pool, prepare heater, filter and heater components for winter by following manufacturer’s instruction.

**SPAS, HOT TUBS, IMMERSION TANKS, etc.**

**Spas / Hot-tubs:** Apply 0.5 oz. of this product per 500 gallons of water to obtain a free available chlorine concentration of 5 ppm, as determined by a suitable chlorine test kit. Adjust and maintain spa/hot-tub water pH to between 7.2 and 7.8. Some oils, lotions, fragrances, cleaners, etc. may cause foaming or cloudy water as well as reduce the efficiency of the product. To maintain the water, apply 0.5 oz. of product per 500 gallons of water over the surface to maintain a chlorine concentration of 5 ppm. After each use, shock treat with 1.5 oz. of this product per 500 gallons of water to control odor and algae. During extended period of disuse, add 1.5 oz. of product daily per 500 gallons of water to maintain a 3 ppm chlorine concentration.

**Hubbard and Immersion Tanks:** Add 0.5 oz. of this product per 100 gallons of water before patient use to obtain a chlorine residual of 25 ppm, as determined by a suitable test kit. Adjust and maintain the water pH to between 7.2 and 7.6. After each use drain the tank. Add 0.5 oz. to a bucket of water and circulate this solution through the agitator of the tank for 15 minutes and then rinse out the solution. Clean tank thoroughly and dry with clean cloths.

**Hydrotherapy Tanks:** Add 1 oz. of this product per 1,000 gallons of water to obtain a chlorine residual of 1 ppm, as determined by a suitable chlorine test kit. Tanks should not be entered until the chlorine residual is below 3 ppm. Adjust and maintain the water pH to between 7.2 and 7.6. Operate tank filter continuously. Drain tank weekly, and clean before refilling.

**Other Uses:** Calcium Hypochlorite is also used in the sanitization of water systems, municipal water mains, sewage and industrial waste treatment, pulp bleaching, sanitization in the food industry, restaurants, dairies, and hospital, odor and taste control in potable water systems, algae control in industrial cooling water systems, and general industrial sanitizations. For specific literature on these and other accepted uses, write to the address on the front label.

**DISINFECTION OF DRINKING WATER (POTABLE WATER)**

**PUBLIC WATER SYSTEMS**

**Public Systems:** Mix a ratio of 1 oz. of this product to 6,000 gallons of water. Begin feeding this solution with a hypochlorinator until a free available chlorine residual of at least 0.2 ppm and no more than 0.6 ppm is attained throughout the distribution system. Check water frequently with a chlorine test kit. Bacteriological sampling must be conducted at a frequency no less than that prescribed by the National Primary Drinking Water Regulations. Contact your local Health Department for further details.

**New Tanks, Basins, etc.:** Remove all physical soil from surfaces. Place 4 oz. of this product for each 5 cubic feet of working capacity (500 ppm available chlorine). Fill to working capacity and allow to stand for at least 4 hours. Drain and flush with potable water and return to service.

**New Filter Sand:** Apply 16 oz. of this product for each 150 to 200 cubic feet of sand. The action of the product dissolving as the water passes through the bed will aid in sanitizing the new sand.

**Reservoirs – Bacterial control:** Contamination of reservoirs is an ever-present possibility. In order to keep reservoir water bacteriologically acceptable, it is necessary to test regularly and chlorinate sufficiently to maintain a residual of 0.2 ppm free available chlorine. This is equivalent to 1.2 oz. of calcium hypochlorite per 30,000 gallons of water after chlorine demand has been satisfied. Where contamination is caused by overflowing streams, establish hypochlorinating stations upstream of the reservoir. Chlorinate the inlet water until the entire reservoir attains a 0.2 ppm available residual as determined by a chlorine test kit. Where contamination is from surface drainage, apply sufficient calcium hypochlorite directly to the reservoir to attain a 0.2 ppm available chlorine residual in all parts of the reservoir. Daily testing ~~should~~ be accomplished away from the water inlet. If samples must be taken near the inlet, allow them to stand at least 20 minutes before testing. Also, remember that chlorine demand will be higher during periods of heavy rainfall and extreme dryness or heat. Continuous feeding of calcium hypochlorite at the input source is usually the most effective means of maintaining an adequate chlorine residual. When you apply granular calcium hypochlorite to surface water, take care to reach all parts of the reservoir with equal amounts of the product so that distribution is complete and equal throughout.

**New and Newly Cleaned Reservoirs:** New or recently cleaned reservoirs must be completely disinfected with calcium hypochlorite before use. Spray all parts and surfaces with a 0.5%, 5,000 ppm solution (1 oz. calcium hypochlorite to 1 gallon of water). When the reservoir is filled, chlorinate as described above. NOTE: As a safety precaution, do not store calcium hypochlorite solution. When mixed, use immediately.

**Mains:** Thoroughly flush section to be sanitized by discharging from hydrants. Permit a water flow of at least 2.5 feet per minute to continue under pressure while injecting this product by means of a hypochlorinator. Stop water flow when a chlorine residual test of 50 ppm is obtained at the low pressure end of the new main section after a 24 hour retention time. When chlorination is completed, the system must be flushed free of all heavily chlorinated water.

**New Wells:** Flush the casing with a 50 ppm available chlorine solution of water containing 1 oz. of this product for each 100 gallons of water. The solution ~~should~~ be pumped or fed by gravity into the well after thorough mixing with agitation. The well ~~should~~ stand for several hours overnight under chlorination. It may then be pumped until a representative raw water sample is obtained. Bacterial examination of the water will indicate whether further treatment is necessary.

**Existing Equipment:** Remove equipment from service, thoroughly clean surfaces of all physical soil. Sanitize by placing 4 oz. of this product for each 5 cubic feet capacity (approximately 500 ppm available chlorine). Fill to working capacity and let stand at least 4 hours. Drain and place in service. If the previous treatment is not practical, surfaces may be sprayed with a solution containing 1 oz. of this product for each 5 gallons of water (approximately 1,000 ppm available chlorine). After drying, flush with water and return to service.

**Reservoirs/Algae Control:** Rapid algae growth in reservoirs is an indication of increased chlorine demand. When algae become a problem, special action is necessary. There are several methods of treatment. One of these is to hypochlorinate streams feeding the reservoir. Suitable feeding points must be selected on each stream at least 50 yards upstream from the point of entry

into the reservoir. Continuous chlorination is usually effective in destroying algae where a sufficient amount of sanitizer is fed to produce a chlorine residual of 0.2 to 0.5 ppm free available chlorine. Where continuous feeding is not possible, scheduled, intermittent feeding should be practiced. In doing so, broadcast calcium hypochlorite evenly over the surface of the reservoir, taking special care to treat shallows and edges. As it descends, the product dissolves, distributing a chlorinating action to all depths. Introduce a sufficient amount of calcium hypochlorite to provide a residual of from 0.2 to 1.5 ppm for up to 24 hours.

**Small Treatment Plants:** Granular calcium hypochlorite may be used as a disinfectant in water treatment plants when the system is too small to use gas chlorination equipment or to supplement well or reservoir chlorination. Please refer to the treatment instructions at the beginning of this section under "Public Systems."

**Small Treatment Plants/Algae Control:** Treatment plants also rely on granular calcium hypochlorite to add in algae control. As algae may be the source of many objectionable odors, cause mud balls and slime in filters, pipes and pumps, as well as reduce pipeline capacity, its control through chlorination is an important factor. The presence of algae is often indicated by a slimy, gelatinous film on the inside of pumps, lines and mixers, etc. It may be eliminated by adding a sufficient quantity of calcium hypochlorite to the forebay or pump well to obtain a 5.0 to 10.0 ppm residual chlorine reading after 20 minutes contact time. The dosage necessary to provide this reading will vary with conditions, i.e. hot weather will increase the need for treatment. Algae control must be verified by testing.

### **INDIVIDUAL SYSTEMS**

**Dug Wells:** Upon completion of the casing (lining) wash the interior of the casing (lining) with a 100 ppm available chlorine solution using a stiff brush. This solution can be made by thoroughly mixing 1 oz. of this product into 40 gallons of water. After covering the well, pour the sanitizing solution into the well through both the pipe sleeve opening and the pipeline. Wash the exterior of the pump cylinder also with the sanitizing solution. Start pump and pump water until strong odor of chlorine in water is noted. Stop pump and wait at least 24 hours. After 24 hours flush well until all traces of chlorine have been removed from the water. Contact your local Health Department for further details.

**Drilled, Driven & Bored Wells:** Run pump until water is as free from turbidity as possible. Pour a 100 ppm available chlorine sanitizing solution into the well. This solution can be made by thoroughly mixing 1 oz. of this product into 40 gallons of water. Add 5 to 10 gallons of clean, chlorinated water to the well in order to force the sanitizer into the rock formation. Wash the exterior of pump cylinder with the sanitizer. Drop pipeline into well, start pump and pump water until strong odor of chlorine in water is noted. Stop pump and wait at least 24 hours. After 24 hours, flush well until all traces of chlorine have been removed from the water. Deep wells with high water levels may necessitate the use of special methods for introduction of the sanitizer into the well. Consult your local Health Department for further details.

After the initial treatment, feed calcium hypochlorite into the intake line of the well pump. This also helps keep any filters free of slime. Automatic hypochlorinating equipment for this purpose



is readily available and easy to use. If it is not possible to locate a feed at the intake line, feed calcium hypochlorite anywhere in the well pump discharge line. Feed sufficient calcium hypochlorite to produce a free chlorine residual of at least 0.2 ppm and no more than 0.6 ppm after a 20-minute contact period. Regular testing is necessary and a record of test readings should be kept.

**Flowing Artesian Wells:** Artesian wells generally do not require disinfection. If analyses indicate persistent contamination, the well ~~should~~ be disinfected. Consult your local Health Department for further details. After initial treatment, follow the practice of maintaining a free chlorine residual of 0.2 ppm to 0.6 ppm in the water outlets after a minimum of 20-minute contact period as directed previously.

**Private Storage Tanks:**

**Bacteria Control:** Contamination of tanks is an ever-present possibility. In order to keep potable tank water bacteriologically acceptable, it is necessary to test regularly and chlorinate sufficiently to maintain a residual of 0.2 ppm free available chlorine. This is equivalent to 0.2 oz. of calcium hypochlorite per 5,000 gallons of water after chlorine demand has been satisfied. Where contamination is caused by water supply sources, establish hypochlorinating solutions upstream of the tank. Chlorinate the inlet water until the entire tank attains a 0.2 ppm available chlorine residual as determined by a chlorine test kit. Daily testing ~~should~~ be accomplished away from the water inlet. If samples must be taken near the inlet, allow them to stand at least 20 minutes before testing. Also, remember that chlorine demand may be higher during periods of heavy rainfall and extreme dryness or heat. Continuous feeding of calcium hypochlorite at the input source is usually the most effective means of maintaining an adequate chlorine residual. When applying granular calcium hypochlorite to the water surface in the tank, take care to reach all parts of the tank with equal amounts of the product so that distribution is complete and equal throughout.

**EMERGENCY DISINFECTION**

When boiling of water for 1 minute is not practical, water can be made potable by using this product. Prior to addition of the sanitizer, remove all suspended material by filtration or by allowing it to settle to the bottom. Decant the clarified, contaminated water to a clean container and add 1 grain of this product to 1 gallon of water. One grain is approximately the size of the letter "O" in this sentence. Allow the treated water to stand for 30 minutes. Properly treated water ~~should~~ have a slight chlorine odor, if not, repeat dosage and allow the water to stand an additional 15 minutes. The treated water can then be made palatable by pouring it between clean containers for several times.

**Emergency Disinfection After Floods:**

**Wells:** Thoroughly flush contaminated casing with a 500 ppm available chlorine solution. Prepare this solution by mixing 1 oz. of this product with 10 gallons of water. Backwash the well to increase yield and reduce turbidity, adding sufficient chlorinating solution to the backwash to produce a 10 ppm available chlorine residual, as determined by a chlorine test kit. After the turbidity has been reduced and the casing has been treated, add sufficient chlorinating solution to

produce a 50 ppm available chlorine residual. Agitate the well water for several hours and take a representative water sample. Re-treat well if water samples are biologically unacceptable.

**Reservoirs:** In case of contamination by overflowing streams, establish hypochlorinating stations upstream of the reservoir. Chlorinate the inlet water until the entire reservoir obtains a 0.2 ppm available chlorine residual, as determined by a suitable chlorine test kit. In case of contamination from surface drainage, apply sufficient product directly to the reservoir to obtain a 0.2 ppm available chlorine residual in all parts of the reservoir.

**Basins, tanks, flumes, etc.:** Thoroughly clean all equipment, then apply 4 oz. of product per 5 cubic feet of water to obtain 500 ppm available chlorine, as determined by a suitable test kit. After 24 hours, drain, flush, and return to service. If the previous method is not suitable, spray or flush the equipment with a solution containing 1 oz. of this product for each 5 gallons of water (1,000 ppm available chlorine). Allow water to stand for 2 to 4 hours, then flush and return to service.

**Filters:** When the sand filter needs replacement, apply 16 oz. of this product for each 150 to 200 cubic feet of sand. When the filter is severely contaminated, additional product should be distributed over the surface at the rate of 16 oz. per 20 square feet. Water should stand at a depth of 1 foot above the surface of the filter bed for 4 to 24 hours. When filter beds can be backwashed of mud and silt, apply 16 oz. of this product per each 50 square feet, allowing the water to stand at a depth of 1 foot above the filter sand. After 30 minutes, drain water to the level of the filter. After 4 to 6 hours, drain and proceed with normal backwashing.

**Distribution system:** Flush repaired or replaced section with water. Establish a hypochlorinating station and apply sufficient product until a consistent available chlorine residual of at least 10 ppm remains after a 24-hour retention time. Use a chlorine test kit.

#### **Emergency Disinfection After Fires**

**Cross connections or emergency connections:** Hypochlorination or gravity feed equipment must be set up near the intake of the untreated water supply. Apply sufficient product to give a chlorine residual of at least 0.1 to 0.2 ppm at the point where the untreated supply enters the regular distribution system. Use a chlorine test kit.

#### **Emergency Disinfection After Droughts**

**Supplementary water supplies:** Gravity or mechanical hypochlorinate feeders must be set up on a supplementary line to dose the water to a minimum chlorine residual of 0.2 ppm after a 20-minute contact time. Use a chlorine test kit.

**Water shipped in by tanks, tank cars, trucks, etc.:** Thoroughly clean all containers and equipment. Spray a 500 ppm available chlorine solution and rinse with potable water after 5 minutes. This solution is made by mixing 0.6 oz. of this product for each 5 gallons of water. During the filling of the containers, dose with sufficient amounts of this product to provide at least a 0.2 ppm chlorine residual. Use a chlorine test kit.

**Emergency Disinfection After Main Breaks**

**Mains:** Before assembly of the repaired section, flush out mud and soil. Permit a water flow of at least 2.5 feet per minute to continue under pressure while injecting this product by means of a hypochlorinator. Stop water flow when a chlorine residual test of 50 ppm is obtained at the low-pressure end of the new main section after a 24-hour retention time. When chlorination is completed, the system must be flushed free of all heavily chlorinated water.

**SEWAGE TREATMENT USES**

**SEWAGE & WASTEWATER EFFLUENT TREATMENT:**

The disinfection of sewage effluent must be evaluated by determining the total number of coliform bacteria and/or fecal coliform bacteria, as determined by the Most Probable Number (MPN) procedure, to ensure that chlorinated effluent has been reduced to or below the maximum permitted by the controlling regulatory jurisdiction.

On the average, satisfactory disinfection of secondary waste water effluent can be obtained when the chlorine residual is 0.5 ppm after 15 minutes contact. Although the chlorine residual is the critical factor in disinfection, the importance of correlating chlorine residual with bacterial kill must be emphasized. The MPN of the effluent, which is directly related to the water quality standards requirements, should be the final and primary standard and the chlorine residual should be considered an operating standard valid only to the extent verified by the coliform quality of the effluent.

The following are critical factors affecting waste water disinfection:

1. **Mixing:** It is imperative that the product and the waste water be instantaneously and completely flash mixed to assure reaction with every chemically active soluble and particulate component of the waste water.
2. **Contacting:** Upon flash mixing, the flow through the system must be maintained.
3. **Dosage/Residual Control:** Successful disinfection is extremely dependent on response to fluctuating chlorine demand to maintain a predetermined, desirable chlorine level. Secondary effluent should contain 0.2 to 1.0 ppm chlorine residual after a 15 to 30 minute contact time. A reasonable average of residual chlorine is 0.5 ppm after 15 minutes contact time.

**Effluent slime control:** Apply a 100 to 1,000 ppm available chlorine solution at a location which will allow complete mixing. Prepare this solution by mixing 2 to 20 oz. of this product with 100 gallons of water. Once control is evident, apply a 15 ppm available chlorine solution. Prepare this solution by mixing 0.3 oz. of this product with 100 gallons of water.

**Filter Beds – Slime Control:** Remove the filter from service, drain it to a depth of 1 foot above the filter sand, and add 16 oz. of this product per 20 square feet evenly over the surface. Wait 30

minutes before draining water to a level that is even with the top of the filter. Wait for 4 to 6 hours before completely draining and backwashing the filter.

#### **B.O.D. REDUCTION:**

B.O.D., or Biochemical Oxygen Demand, is the quantity of oxygen required to oxidize the polluting substance to a biochemically inert material. As little as 1 ppm of chlorine may bring about a reduction of 2 to 3 ppm in B.O.D. Calcium hypochlorite for this purpose may be added at virtually any point in the system. To achieve maximum results in terms of desirable aerobic action and retardation of anaerobic decomposition, hypochlorination should be complete. The treatment will still be of value, however, even if the amount of calcium hypochlorite applied is less than the total amount which could be utilized.

#### **ODOR CONTROL:**

The most offensive odor encountered in sewage treatment is due to hydrogen sulfide. It is caused by the sulphate-splitting bacteria normally present in sewage. Hydrogen sulfide can be very effectively controlled by calcium hypochlorite hypochlorination of the fresh sewage, which destroys the sulfide-producing bacteria. If the treatment of fresh sewage is not practical, calcium hypochlorite may be added at any point where the odors become objectionable. The amount required will, however, be increased, as the available chlorine in calcium hypochlorite will react not only with the hydrogen sulfide, but also with other bacteria and organic material. For a sulfide reduction of 1 ppm, from 8 to 10 ppm of available chlorine probably will be required.

#### **AID IN FLOCCULATION:**

The value of calcium hypochlorite's available chlorine as an aid in flocculation is due primarily to its oxidizing power – a property which is of particular value in sewage treatment because there is almost no oxygen in sewage. Hypochlorination with calcium hypochlorite is particularly helpful when iron salts are used as the primary flocculent. Ferric iron, in the absence of oxygen, tends to revert to ferrous iron, which is of little value as a precipitant. Calcium hypochlorite supplies sufficient oxygen to retard or prevent this change. It should be used just before the primary flocculent in a proportion of 3 to 5 ppm.

#### **NON-FOOD INDUSTRIAL WATER USES**

##### **COOLING TOWER/EVAPORATIVE CONDENSER WATER; PULP AND PAPER MILL PROCESS WATER SYSTEMS:**

##### **Slug Feed Method**

**Initial dose:** When system is noticeably fouled, apply 10 to 20 oz. of this product per 10,000 gallons of water in the system to obtain 5 to 10 ppm available chlorine. Repeat until control is achieved.

**Subsequent dose:** When microbial control is evident, add 2 oz. of this product per 10,000 gallons of water in the system daily, or as needed to maintain control and keep the chlorine residual at 1 ppm. Badly fouled system must be cleaned before treatment is begun.

**Intermittent Feed Method**

**Initial dose:** When system is noticeably fouled, apply 10 to 20 oz. of this product per 10,000 gallons of water in the system to obtain 5 to 10 ppm available chlorine. 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.

**Subsequent dose:** When microbial control is evident, add 2 oz. of this product per 10,000 gallons of water in the system to obtain a 1 ppm residual. 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 system must be cleaned before treatment is begun.

**Continuous Feed Method**

**Initial dose:** When system is noticeably fouled, apply 10 to 20 oz. of this product per 10,000 gallons of water in the system to obtain 5 to 10 ppm available chlorine.

**Subsequent dose:** Maintain this treatment level by starting a continuous feed of 1 oz. of this product per 3,000 gallons of water lost by blowdown to maintain a 1 ppm residual. Badly fouled system must be cleaned before treatment is begun.

**Briquettes or Tablets**

**Initial dose:** Initially slug dose the system with 10 oz. of this product per 10,000 gallons of water in the system. Badly fouled system must be cleaned before treatment is begun.

**Subsequent dose:** When microbial control is evident, add 2 oz. of this product per 10,000 gallons of water in the system daily, or as needed to maintain control and keep the chlorine residual at 1 ppm. Badly fouled system must be cleaned before treatment is begun.

**COOLING TOWER AND HEAT EXCHANGE SURFACE**

A clogged or fouled system should be mechanically cleaned to remove all physical soil prior to beginning treatment. Initially, treat by adding enough calcium hypochlorite to provide 10 ppm available chlorine (2 oz. per 1,000 gallons) as a shock dosage and circulate it thoroughly through the system. Then, for continuous preventive control of algae and slime growth, regularly add enough calcium hypochlorite to the recirculation system to maintain a free chlorine residual between 0.5 and 1.0 ppm. Other water condition factors, such as pH, should be controlled as recommended by the equipment manufacturer.

Tianjin calcium hypochlorite can serve an important role in control of Legionella bacteria in cooling water towers. A concentration of 2 ppm free available chlorine has been shown to be capable of killing free *Legionella pneumophila* bacteria. Legionella bacteria can, however, survive chlorination when shielded inside amoebae, other protozoa or slime, so it is important to have an overall Legionella control strategy that includes controlling the growth of these other organisms and microbial communities and limiting the supply of micronutrients that sustain such microbial growth. Regular chlorination with calcium hypochlorite can help to limit the supply of assimilable organic carbon (AOC) in the water. These recommendations are based on best practices from the industry, but are presumptive in nature. Tianjin calcium hypochlorite have not been tested for effectiveness against Legionnaires Disease Bacteria (LDB). There is no evidence that chemical treatment will control the growth of LDB under actual operating conditions, reduce transmission of LDB, or prevent Legionnaires' Disease.

**INSTITUTIONAL, COMMERCIAL, AND HOME USES:**

**FOOD CONTACT-SANITIZATION**

**SANITIZATION OF NONPOROUS FOOD CONTACT SURFACE**

**RINSE METHOD AND IMMERSION METHOD**

A solution of 100 ppm available chlorine may be used in the sanitizing solution if a chlorine test kit is available. Solutions containing an initial concentration of 100 ppm available chlorine must be tested and adjusted periodically to ensure that the available chlorine does not drop below 50 ppm. Prepare a 100 ppm sanitizing solution by thoroughly mixing 1 oz. of this product with 40 gallons of water. If no test kit is available, prepare a sanitizing solution by thoroughly mixing 1 oz. of this product with 20 gallons of water to provide approximately 200 ppm available chlorine by weight. Clean equipment [*For Rinse Method add:* surfaces] in the normal manner. [*For Rinse Method state:* Prior to use, rinse all surfaces thoroughly with the sanitizing solution, maintaining contact with the sanitizer for at least 2 minutes.] [*For Immersion Method state:* Prior to use, immerse equipment in the sanitizing solution for at least 2 minutes and allow the sanitizer to drain.] If solution contains less than 50 ppm available chlorine, as determined by a suitable test kit, either discard the solution or add sufficient product to reestablish a 200 ppm residual. Do not rinse equipment with water after treatment and do not soak equipment overnight. Sanitizers used in automated systems may be used for general cleaning but may not be reused for sanitizing purposes.

**FLOW/PRESSURE METHOD AND CLEAN-IN-PLACE METHOD**

[*For Flow/Pressure Method start statement with:* Disassemble equipment and thoroughly clean after use.] [*For Clean-In-Place Method start statement with:* Thoroughly clean equipment after use.] Assemble equipment in operating position prior to use. Prepare a volume of a 200 ppm available chlorine sanitizing solution equal to 110% of volume capacity of the equipment by mixing the product in a ratio of 1 oz. product with 20 gallons of water. Pump solution through the system until full flow is obtained at all extremities, the system is completely filled with the sanitizer and all air is removed from the system. Close drain valves and hold under pressure for at least [*Flow/Pressure Method:* 2 minutes.] [*Clean-In-Place Method:* 10 minutes] to ensure contact with all internal surfaces. Remove some cleaning solution from drain valve and test with a chlorine test kit. Repeat entire cleaning/sanitizing process if effluent contains less than 50 ppm available chlorine.

**SPAY/FOG METHOD**

Preclean all surfaces after use. Use a 200 ppm available chlorine solution to control bacteria, mold or fungi and a 600 ppm solution to control bacteriophage. Prepare a 200 ppm sanitizing solution of sufficient size by thoroughly mixing the product in a ratio of 1 oz. product with 20 gallons of water. Prepare a 600 ppm solution by thoroughly mixing the product in a ratio of 3 oz. product with 20 gallons of water. Use spray or fogging equipment which can resist hypochlorite solutions. Always empty and rinse spray/fog equipment with potable water after use. Thoroughly spray or fog all surfaces until wet, allowing excess sanitizer to drain. Vacate area for at least 2 hours. Prior to using equipment, rinse all surfaces treated with a 600 ppm solution with a 200 ppm solution.

**SANITIZATION OF POROUS FOOD CONTACT SURFACES**

**RINSE METHOD** – Prepare a 600 ppm solution by thoroughly mixing 3 oz. of this product with 20 gallons of water. Clean surfaces in the normal manner. Rinse all surfaces thoroughly with the 600 ppm solution, maintaining contact for at least 2 minutes. Prepare a 200 ppm sanitizing solution by thoroughly mixing 1 oz. of this product with 20 gallons of water. Prior to using equipment, rinse all surfaces with a 200 ppm available chlorine solution. Do not rinse and do not soak equipment overnight.

**IMMERSION METHOD** – Prepare a 600 ppm solution by thoroughly mixing, in an immersion tank, 3 oz. of this product with 20 gallons of water. Clean equipment in the normal manner. Prepare a 200 ppm sanitizing solution by thoroughly mixing 2 oz. of this product with 10 gallons of water. Prior to using, immerse equipment in the 200 ppm sanitizing solution for at least 2 minutes and allow the sanitizer to drain. Do not rinse and do not soak equipment overnight.

**SPRAY/FOG METHOD** – Preclean all surfaces after use. Prepare a 600 ppm available chlorine sanitizing solution of sufficient size by thoroughly mixing the product in a ratio of 3 oz. product with 20 gallons of water. Use spray or fogging equipment which can resist hypochlorite solutions. Always empty and rinse spray/fog equipment with potable water after use. Thoroughly spray or fog all surfaces until wet, allowing excess sanitizer to drain. Vacate area for at least 2 hours. Prior to using equipment, rinse all surfaces with a 200 ppm available chlorine solution. Prepare a 200 ppm sanitizing solution by thoroughly mixing 1 oz. of this product with 20 gallons of water.

**NON-FOOD CONTACT-SANITIZATION****SANITIZATION OF NONPOROUS NON-FOOD CONTACT SURFACES**

**RINSE METHOD** – Prepare a sanitizing solution by thoroughly mixing 1 oz. of this product with 20 gallons of water to provide approximately 200 ppm available chlorine by weight. Clean equipment surfaces in the normal manner. Prior to use, rinse all surfaces thoroughly with the sanitizing solution, maintaining contact with the sanitizer for at least 2 minutes. Do not rinse equipment with water after treatment and do not soak the equipment overnight.

**IMMERSION METHOD** – Prepare a sanitizing solution by thoroughly mixing, in an immersion tank, 1 oz. of this product with 20 gallons of water to provide approximately 200 ppm available chlorine by weight. Clean equipment in the normal manner. Prior to use, immerse equipment in the sanitizing solution for at least 2 minutes and allow the sanitizer to drain. Do not rinse equipment with water after treatment.

**SPRAY/FOG METHOD** – Preclean all surfaces after use. Prepare a 200 ppm available chlorine sanitizing solution of sufficient size by thoroughly mixing the product in a ratio of 1 oz. product with 20 gallons of water. Use spray or fogging equipment which can resist hypochlorite solutions. Prior to using equipment, thoroughly spray or fog all surfaces until wet, allowing excess sanitizer to drain. Vacate area for at least 2 hours.

**SANITIZATION OF POROUS NON-FOOD CONTACT SURFACES**

**RINSE METHOD** – Prepare a sanitizing solution by thoroughly mixing 3 oz. of this product with 20 gallons of water to provide approximately 600 ppm available chlorine by weight. Clean equipment surfaces in the normal manner. Prior to use, rinse all surfaces thoroughly with the sanitizing solution, maintaining contact with the sanitizer for at least 2 minutes. Do not rinse equipment with water after treatment and do not soak equipment overnight.

**IMMERSION METHOD** – Prepare a sanitizing solution by thoroughly mixing, in an immersion tank, 3 oz. of this product with 20 gallons of water to provide approximately 600 ppm available chlorine by weight. Clean equipment in the normal manner. Prior to use, immerse equipment in the sanitizing solution for at least 2 minutes and allow the sanitizer to drain. Do not rinse equipment with water after treatment.

**SPRAY/FOG METHOD** – After cleaning, sanitize non-food contact surfaces with 600 ppm available chlorine by thoroughly mixing the product in a ratio of 3 oz. of this product with 20 gallons of water. Use spray or fogging equipment which can resist hypochlorite solutions. Always empty and rinse spray/fog equipment with potable water after each use. Prior to using equipment, thoroughly spray or fog all surfaces until wet, allowing excess sanitizer to drain. Vacate area for at least 2 hours.

**NON-FOOD CONTACT – DISINFECTION**

**DISINFECTION OF NONPOROUS NON-FOOD CONTACT SURFACES**

**RINSE METHOD** – Prepare a disinfecting solution by thoroughly mixing 3 oz. of this product with 20 gallons of water to provide approximately 600 ppm available chlorine by weight. Clean equipment surfaces in the normal manner. Prior to use, rinse all surfaces thoroughly with the disinfecting solution, maintaining contact with the solution for at least 10 minutes. Do not rinse equipment with water after treatment and do not soak equipment overnight.

**IMMERSION METHOD** – Prepare a disinfecting solution by thoroughly mixing, in an immersion tank, 3 oz. of this product with 20 gallons of water to provide approximately 600 ppm available chlorine by weight. Clean equipment in the normal manner. Prior to use, immerse equipment in the disinfecting solution for at least 10 minutes and allow the solution to drain. Do not rinse equipment with water after treatment.

**CONTROLLING MOLD OR MILDEW:**

Calcium hypochlorite solutions containing 5,000 ppm available chlorine will destroy mold and nonresidual mildew that grow in storage rooms and other areas within 10 to 15 minutes contact time. Brush or spray all precleaned walls, floors, ceilings and shelves with the solution. Rinse all metal surfaces immediately after treatment to prevent corrosion.

**BATHROOMS:**

Calcium hypochlorite solutions containing 5,000 ppm available chlorine will sanitize and deodorize toilets, shower rooms, urinals, drains and other bathroom facilities. Toilets, shower



rooms, urinals and drains ~~should~~ be cleaned and sprayed or flushed with the calcium hypochlorite solution on a regular basis. After treatment, let stand 10 minutes and rinse exposed metal surfaces with potable water to prevent corrosion. For toilet bowls, add 1 tablespoon of dry calcium hypochlorite to the residual water and swab.

**SANITIZING DIALYSIS MACHINES:**

Flush dialysis equipment thoroughly with water prior to sanitizing. Thoroughly dissolve 7 oz. of the product in 60 gallons of water to obtain at least a 600 ppm available chlorine solution. Use this solution in the hemodialysate system immediately allowing a minimum contact time of 15 minutes at 20 degrees C. Thereafter, drain the system of the sanitizing solution and thoroughly rinse with potable water. Discard and do not reuse the spent sanitizer. Rinsate must be monitored with a suitable test kit to ensure that no available chlorine remains in the system. This product is ~~recommended~~ for decontaminating single and multipatient hemodialysate systems. This product has been shown to be an effective disinfectant (virucide, fungicide, bactericide, pseudomonicide) when tested by AOAC and EPA test methods. This product may not totally eliminate all vegetative microorganisms in hemodialysate delivery systems due to their construction and/or assemble, but can be relied upon to reduce the number of microorganisms to acceptable levels when used as directed. This product ~~should~~ be used in a disinfectant program that includes bacteriological monitoring or the hemodialysate delivery system. This product is not recommended for use in hemodialysate or reverse osmosis (RO) membranes. Consult the guidelines for hemodialysate systems that are available from the Hepatitis Laboratories, CDC, Phoenix, AZ 85021.

**ASPHALT OR SEALED WOOD ROOFS AND SIDINGS:**

To control fungus and mildew, first remove all physical soil by brushing and hosing with clean water, and apply a 5,000 ppm available chlorine solution. Mix 1 oz. of this product per gallon of water and brush or spray roof or siding. After 30 minutes, rinse by hosing with clean water.

**LAUNDRY SANITIZER**

**HOUSEHOLD LAUNDRY SANITIZERS:**

**In Soaking Suds** – thoroughly mix 1 tablespoon of this product to 10 gallons of wash water to provide 200 ppm available chlorine. Wait 5 minutes; then add soap or detergent. Immerse laundry for at least 11 minutes prior to starting the wash/rinse cycle.

**In Washing Suds** – thoroughly mix 1 tablespoon of this product to 10 gallons of wash water containing clothes to provide 200 ppm available chlorine. Wait 5 minutes; then add soap or detergent and start the wash/rinse cycle.

**COMMERCIAL LAUNDRY SANITIZERS:**

Wet fabrics or clothes should be spun dry prior to sanitization. Thoroughly mix 1 oz. of this product with 20 gallons of water to yield 200 ppm available chlorine. Promptly after mixing the sanitizer, add the solution into the prewash prior to washing fabrics/clothes in the regular wash cycle with a good detergent. Test the level of available chlorine, if solution has been allowed to stand. Add more of this product if the available chlorine level has dropped below 200 ppm.

**BEVERAGE PLANTS**

**BREWERIES**

Calcium hypochlorite solutions enable breweries to prevent bacterial growth and assure the purity and fresh taste of their products on a continuing basis. As a general sanitizer, calcium hypochlorite is doubly effective because of its dissolving action on beer stone, proteins, slime, yeast and other matter commonly found in brewery lines, tanks, hoses, etc. To prepare a stock cleaning and sanitizing solution, add 5 pounds of calcium hypochlorite to 3 gallons of warm water in a 20-gallon container. Introduce 3 pounds of soda ash and stir until dissolved. Dilute this mixture with cold water to make 15 gallons of solution, then add 5 pounds of caustic soda beads by following directions of that product. Stir to dissolve and allow to stand. When diluted 1-to-10 with water, this solution is an excellent cleaner/sanitizer for piping and equipment, steel, glazed tile and concrete vats.

**Fermenting Tubs-Cypurs:** Clean and inse the tub thoroughly to remove all traces of oil, then fill with 200 ppm available chlorine solution to sanitize. Allow to stand 10-12 hours.

**Washing Equipment:** Sanitize the washing equipment by first thoroughly cleaning, then flushing all surfaces with calcium hypochlorite solution containing 200 ppm available chlorine.

**Malting Areas:** Floors and walls around malt tanks ~~should~~ be thoroughly washed once a week to prevent mold formation and odor. After cleaning, flush both floors and walls with a solution containing 0.25% (2,500 ppm) available chlorine.

**Aging Cellars:** Spray the concrete walls of aging cellars regularly with a calcium hypochlorite solution 0.5% (5,000 ppm) available chlorine to destroy existing mold and mildew and prevent odor.

**Pasteurizers:** Slime and odors that develop in pocket-type pasteurizers can be controlled with regular use of a 1% (10,000 ppm) available chlorine solution fed into the pasteurizer water supply by a hypochlorinator. A feed rate which provides a dosage of 0.5 to 1.0 ppm available chlorine at the overflow is required for optimum results. After draining and cleaning pasteurizers, the hypochlorinator ~~should~~ be used to provide fresh refill water with the proper chlorine residual.

**Grain Steep Tanks:** Calcium hypochlorite is a highly effective sanitizer in controlling mold growth in humid malt house conditions. Steep tanks ~~should~~ be cleaned first, then sprayed with a 1.5 to 2.0% (15,000 to 20,000 ppm) available chlorine solution. Allow to stand 30 minutes. The walls of concrete germination compartments ~~should~~ also be cleaned and treated as above. The perforated metal floors of germination compartments ~~should~~ be sprayed with high-pressure water for thorough cleaning and then covered at a rate of 0.15 oz. of dry calcium hypochlorite per square foot of wet floor. (A clean, dry, uncontaminated broadcaster or spreading device may be used effectively.) Allow the coating to stand for 30 minutes; rinse thoroughly with potable water before putting equipment in service.

**Water Supplies:** Calcium hypochlorite solutions containing 1% (10,000 ppm) available chlorine will properly sanitize plant water used to produce beer. The calcium hypochlorite solution must be introduced into the water supply by a hypochlorinator. An available chlorine residual of 0.2 to 0.6 ppm must be maintained throughout the system at all times. Be sure to dechlorinate the water before it is used to process beer.

## **CARBONATED BEVERAGE PLANTS**

**Water Supplies:** Available plant water supplies used to produce carbonated beverages may be properly sanitized by introducing solution of 1% (10,000 ppm) available chlorine. The solution should be introduced by a hypochlorinator and adjusted to supply an available chlorine residual of 0.2 to 0.6 ppm at all times. Be sure to dechlorinate the water before it is used to process beverages.

**Manufacturing Equipment:** The use of calcium hypochlorite is a reliable and economical way to sanitize equipment and control the quality and taste of carbonated beverages. Before bottling operations start up, feed a 200 ppm available chlorine solution through all pumps, lines and fillers to eliminate bacteria. Clean surfaces before treatment. After each bottling operation, thoroughly spray syrup tanks with 200 ppm available chlorine solution, and let stand for 30 minutes.

## **CIDER PLANTS**

Even when stored under cold conditions, sweet cider is particularly susceptible to fungus growth, which causes spoilage. As a preventive, sanitize each cask for a period of two minutes with a 200 ppm available chlorine solution, before use. Clean thoroughly first, then rinse each cask with the solution.

## **WINERIES**

**Plant Sanitation:** Calcium hypochlorite will sanitize and prevent contamination in wineries to ensure product quality. Following each run, clean the entire plant area and its equipment. Immediately before the next run, sanitize with calcium hypochlorite as follows: Rinse nonporous wall surfaces, floors and equipment with a calcium hypochlorite solution containing 500 ppm available chlorine. Let stand for 10 minutes. Porous surfaces (wood, concrete, etc.) should be scrubbed or sprayed with a 1,000 ppm available chlorine solution. Let stand 10 minutes. Storage vessels, fermenting vats, casks, presses and grape crushers should be cleaned of physical soil thoroughly before treatment. Rinse or spray with calcium hypochlorite solution containing 200 ppm available chlorine. Let stand 10 minutes.

**Mold Control:** Mold growth should be treated on discovery with calcium hypochlorite to prevent further spreading. Spray the affected surfaces with a calcium hypochlorite solution providing 0.5% (5,000 ppm) available chlorine. Heavy growth may require scrubbing and/or repeated applications.

**Storage and Filling Tanks:** Disinfect storage and filling tanks with calcium hypochlorite to maintain a high level of product quality. After a run and before refilling tanks, they should be thoroughly disinfected with calcium hypochlorite. For wooden or nonporous tanks, first pre-clean then fill with calcium hypochlorite solutions containing 600 ppm available chlorine. Solutions should stand for at least 10 minutes. Then, rinse tanks with potable water for a period of 2 minutes immediately before refilling. Unused tanks and vats should be kept sanitized with calcium hypochlorite. Fill each with water and dry calcium hypochlorite to obtain a residual of approximately 15 ppm available chlorine. Test every week and repeat treatment if residual falls below 2 ppm.

**Press Cloths:** Press cloths contaminated with bacteria or organic matter must be treated with calcium hypochlorite solutions to neutralize microorganisms and prevent spreading. After use, wash cloths thoroughly, then soak as follows: For every 100 pounds dry weight of the cloth, add 2 oz. dry calcium hypochlorite to 60 gallons of water. Soak for 15 minutes.

### **GRAPE JUICE PLANTS**

Sanitize equipment and problem areas of grape juice plants using the same treatment procedures recommended for wineries.

### **FOOD PROCESSING PLANTS**

#### **CANNERIES**

Hot, freshly-packed cans are often cooled by immersion in cold water. This creates a partial vacuum in the container which may allow the cooling water to enter through seams or pin holes. If bacteria are present in the water, contents may become contaminated and spoil. Calcium hypochlorite solutions providing 1% (10,000 ppm available chlorine should be fed into cooling tanks or channels by an elevated tank to provide a concentration of 2 ppm available chlorine. The flow may be controlled with a non-corroding valve or a pinch-stop on a rubber hose. Feed points should be located to provide uniform distribution of solution throughout the entire system. Long and narrow tanks may require the solution to be fed at two points to ensure proper distribution. Test the cooling water for available chlorine. If a residual of 2 ppm is present throughout the system, the water is properly sanitized. Test for available chlorine every hour until dosage requirements are established. Thereafter, check every 2 or 3 hours to ascertain that an available chlorine residual of 2 ppm is maintained throughout the cooling system.

**Water Supplies:** One percent chlorine solutions will effectively purify the water supply in canneries. Feed the solution into the water supply by a hypochlorinator on the intake side of the pump. An available chlorine residual of 0.2 to 0.6 ppm must be maintained throughout the water distribution system to assure adequate purification. Regular testing should be initiated to assure proper chlorine residuals are present at all times.

**Wastes:** Solutions containing 1,000 ppm available chlorine control odors from dry food waste disposed in dumps or collecting points. Accumulations of waste should be sprayed or soaked with calcium hypochlorite solution daily to eliminate odors. Calcium hypochlorite solutions applied by continuous treatment to maintain a residual of 15 to 25 ppm will control odors in food waste being removed by water suspension.

### **MEAT AND POULTRY PLANTS**

**For use in federally inspected meat and poultry plants.**

#### **Chlorinating potable water treatment compounds.**

Chlorine may be present in processing water of meat and poultry plants at concentrations up to 5 parts per million calculated as available chlorine. Also, chlorine may be present in poultry chiller intake water, and in carcass wash water at concentrations up to 50 ppm calculated as available chlorine. Chlorine must be dispensed at a constant and uniform level and the method or system must be such that a controlled rate is maintained.

**Cooling and retort water treatment compounds.**

This product may be added to water used to heat and cool containers of meat and poultry products to prevent staining of containers and to control corrosion and deposit formation on surfaces of processing equipment. The amount used should be the minimum sufficient for the purpose.

Calcium hypochlorite solutions providing 1% (10,000 ppm) available chlorine should be fed into tanks or channels by an elevated tank to provide a concentration of 2 ppm available chlorine. The flow may be controlled with a noncorroding valve or a pinch-stop on a rubber hose.

Feed points should be located to provide uniform distribution of solution throughout the entire system. Long and narrow tanks may require the solution to be fed at two points to ensure proper distribution.

Test the water for available chlorine. If a residual of 2 ppm is present throughout the system, the water is properly sanitized.

Test for available chlorine every hour until dosage requirements are established. Thereafter, check every 2 to 3 hours to ascertain that an available chlorine residual of 2 ppm is maintained throughout the system.

**This product may be used for treating boilers, steam lines, and/or cooling systems where neither the treated water nor the steam produced may contact edible products. This does not include compounds added to water used to heat and cool containers of meat and poultry products.**

A clogged or fouled system should be mechanically cleaned to remove all physical soil prior to beginning treatment. Initially, treat by adding enough calcium hypochlorite to provide 10 ppm available chlorine (2 oz per 1,000 gallons) as a shock dosage and circulate it thoroughly through the system.

Then, for continuous preventative control of algae and slime growth, regularly add enough calcium hypochlorite to the recirculation system to maintain a 1.0 ppm free chlorine residual.

Other water condition factors, such as pH, should be controlled as recommended by the equipment manufacturer.

**Sanitization, Disinfection and Odor Control:**

An effective general sanitizer or disinfectant, calcium hypochlorite solutions also provide odor control in meat processing plants.

**Killing Rooms:** Disinfect the entire killing room with calcium hypochlorite solution to prevent the contamination of meat and the development of offensive odors. Scrub all walls and floors completely. Spray thoroughly with a solution containing 5,000 ppm available chlorine. Drains and traps through which blood passes should be flushed thoroughly with water and flushed with

solution containing 5,000 ppm available chlorine. Allow this solution to stand overnight, then flush.

**Inedible Rooms:** Solutions containing 1,000 ppm available chlorine will properly disinfect inedible rooms, prevent odors and improve the handling qualities of hides and other marketable items. Thoroughly clean inedible rooms on a regular basis. After cleaning, spray the tank house, the press rooms and the hide rooms generously with the calcium hypochlorite solution.

**Edible Rooms:** Calcium hypochlorite solutions containing 1,000 ppm available chlorine will disinfect and control bacteria in refrigerating, curing, and processing areas to prevent taste and color problems in products. Thoroughly clean all edible rooms on a regular basis. After cleaning, room surfaces and equipment should be sprayed well with 1,000 ppm solution for 10 minutes. Rinse with 200 ppm available chlorine solution for a period of 2 minutes.

**Equipment and Utensils:** To prevent contamination, sanitize all equipment and utensils that came in contact with meat with a solution containing 200 ppm available chlorine. Clean equipment and utensils thoroughly, removing all fat and grease. Spray or rinse with solution. Let stand 2 minutes.

**Locker Rooms, Elevator Pits and Toilets:** Disinfect and deodorize locker rooms, elevator pits and toilets with a calcium hypochlorite solution containing 5,000 ppm available chlorine. Locker rooms, shower rooms, toilets, urinals and drains should be cleaned, then sprayed or flushed with the solution on a regular basis. After treatment, let stand 10 minutes, then rinse exposed surfaces with potable water to prevent corrosion. Add 1 level tablespoon of calcium hypochlorite to the residual water of toilet bowls and swab.

#### **DAIRY INDUSTRIES (Creameries, Ice Cream Factories, Cheese Factories, and Milk Plants)**

Calcium hypochlorite solutions provide an effective, economical method of sanitizing processing equipment and problem areas in creameries, ice cream factories, cheese factories and milk plants. To prevent contamination of the product, apply calcium hypochlorite solutions to every surface the product will touch.

**Pressure Sanitizing Equipment:** Pressure is commonly used to sanitize closed systems, such as fluid milk cooling and handling equipment. The pressure method is also appropriate for sanitizing weight tanks, coolers, short-time pasteurizers, pumps, homogenizers, fillers, sanitary piping and fittings, and bottle and can fillers. Immediately after use, clean all equipment thoroughly, then place back in operating position. Prepare a sufficient amount of a calcium hypochlorite solution containing 200 ppm available chlorine to fill the equipment. (Allow a 10% excess for waste.) Pump the calcium hypochlorite solution through the system until it is filled and air is excluded. Close final drain valves and hold the system under pressure 2 minutes to ensure proper contact with all surfaces. Drain the solution.

**Spray Sanitizing Equipment:** A spray (or fog) method is generally used to sanitize large, nonporous surfaces which have been freed of physical soil and thoroughly cleaned. It is appropriate for batch pasteurizers, holding tanks, weigh tanks, tank trucks and cars, vats, tile walls, ceilings and floors. Prepare a solution containing 200 ppm available chlorine. Use pressure spraying or fogging equipment types of spraying equipment, empty and rinse thoroughly with fresh water immediately following treatment. Heavily spray or fog all surfaces the product will contact. All surfaces, corners and turns must be thoroughly coated. Allow excess solution to drain off, then place in service.

**Water Supplies:** Calcium hypochlorite solutions containing 1% (10,000 ppm) available chlorine will disinfect water supplies used in the production of dairy products. The solution should be prepared using the following procedure: Mix 3.75 pounds of calcium hypochlorite into a 30-gallon plastic container 1/3 full of warm water. Add 3 pounds of light solda ash, stir thoroughly and dilute to 30 gallons. Add this solution to the water supply and let stand 20 minutes. The water supply has been sanitized when a 0.2 ppm of available chlorine is present.

**General Sanitizing:** Sanitize plant floors, walls and ceilings, and control odors in refrigerated areas and on drain platforms with a 1,000 ppm calcium hypochlorite solution. Flush or swab surfaces generously with solution. Allow to stand 2 minutes.

**Controlling Mold and Mildew:** Control mold and nonresidual mildew that often grows in cheese aging rooms, storage rooms and other areas with a calcium hypochlorite solution of 5,000 pm available chlorine. Brush or spray all precleaned walls, floors, ceilings and shelves with the solution. Then, rinse all metal surfaces immediately to prevent corrosion.

**Wastes:** Calcium hypochlorite solutions containing 15 to 25 ppm available chlorine provide odor control of dairy plant waste. An overflow-type retention basin, flume or outfall of sufficient length is necessary to provide required contact time and mixing. For continuous treatment, calcium hypochlorite is introduced by a hypochlorinator capable of feeding the solution in proportion to waste flow. The hypochlorinator should be located near the point where waste leaves the plant building, followed by baffles for agitation. Batch waste should be impounded and treated with calcium hypochlorite solution which provides a residual of 15 to 25 pm available chlorine.

**FOOD PROCESSING/PACKING**

**Fruit & Vegetable Washing:** Thoroughly clean all fruits and vegetables in a wash tank. Thoroughly mix 1 oz of this product in 200 gallons of water to make a sanitizing solution of 25 ppm available chlorine. After draining the tank, submerge fruit or vegetable for two minutes in a second wash tank containing the recirculating sanitizing solution. Spray rinse vegetables with the sanitizing solution prior to packaging.

**Commodity Fruit & Vegetable Treatment:** Wash fruit and vegetables to remove organic matter, then treat as noted below.

**Recommended Levels and Use Dilutions for Available Chlorine  
(This table is for 67% - 73% nominal available chlorine products)**

Commodity	Usage Dilution dry oz. added to 250 gal. of water	(ppm) Available Chlorine	Contact Time
Apple	7.7 - 10.3	150 - 200	45-90 sec. (dump tank) 5-15 sec. (spray)
Artichoke	5.1 - 7.7	100 - 150	5-15 sec. (spray)
Asparagus	6.4 - 7.7	125 - 150	5-15 sec. (spray) 20-30 min. (hydrocooler)
Brussels Sprouts	5.1 - 7.7	100 - 150	5-15 sec. (spray)
Carrots	5.1 - 10.3	100 - 200	1-5 min. (dump tank) 1-5 min. (flume)

Cauliflower	15.4 – 20.5	300 – 400	5-15 sec. (spray)
Celery	5.1 – 5.7	100 – 110	5-15 sec. (spray)
Cherry	3.9 – 5.1	75 – 100	5-15 sec. (spray)
Chopped Cabbage <sup>1</sup>	4.1 – 5.1	80 – 100	5-15 sec. (spray)
Chopped Lettuce <sup>1</sup>	4.1 – 5.1	80 – 100	5-15 sec. (spray)
Citrus Fruits	1.3 – 10.3	40 - 75 30 - 50 100 - 200	5-15 sec. (spray) 2-3 min. (dump tank) 3-5 min. (drench)
Cucumbers	15.4 – 18.0	300 – 350	5-15 sec. (spray)
Green onions	3.9 – 6.2	75 – 120	5-15 sec. (spray)
Melons	5.1 – 7.7	100 – 150 30 – 75	5-15 sec. (spray) 20-30 min. (hydrocooler)
Peaches, Nectarines and Plums	2.6 – 5.1	50 – 100	5-15 sec. (spray)
Pears (without buffer)	10.3 – 15.4	200 – 300	2-3 min. (dump tank)
Peppers	15.4 – 20.5 5.1 – 6.9	300 – 400 100 – 135	5-15 sec. (spray) 2-5 min. (dump tank)
Potatoes	3.3 – 6.4	65 – 125	2-5 min. (dump tank)(30- 100 ppm) 2-5 min. (flume)(200-300 ppm) 5-30 sec. (spray)(100-200 ppm)
Radishes	5.1 – 7.7	100 – 150	5-15 sec. (spray)
Stone fruit	1.5 – 3.9	30 – 75	20-30 min. (hydrocooler)
Tomatoes	15.4 – 18.0	300 – 350	2-3 min. (tank)(200-350 ppm) 5-15 sec. (spray)(100-150 ppm)
Spinach	4.1 – 5.1	80 – 100	5-15 sec. (spray)
Broccoli	15.4 – 20.5	300 – 400	5-15 sec. (spray)
Pecans	50	1,000	10 minutes

<sup>1</sup>After treatment the adhering water must be removed by a centrifugation process.

**Pecan Cracking And Bleaching:** Prepare a 1,000 ppm available chlorine soaking solution by adding 1 oz. of this product for each 5 gallons of water to obtain a 1,000 ppm available chlorine content. Soak for a minimum of 10 minutes. After removal, age pecans for 24 hours. Before bleaching, pecans are placed in a rotary cleaner where they are washed, drained, and soaked in a 2% sulfuric acid bath at 80 to 90 degrees F for one minute. Transfer to a solution containing 107 oz. of this product for each 100 gallons of water (5,000 ppm). After 4 to 8 minutes, they are drained and washed in a 1% sulfuric acid bath at 80 to 90° F. They are then dried.

#### Shell Egg Cleaning

Wash eggs promptly after gathering. Water with an iron content in excess of 2 ppm shall not be used unless equipment capable of removing the excess iron is installed on the water system. Wash water temperature should be 90° F or higher. Maintain the wash water at a temperature



which is at least 20° F warmer than the temperature of the eggs to be washed. Spray rinse washed eggs with warm potable water containing an approved sanitizing compound. Eggs should be reasonably dry before casing or breaking.

**Shell Egg Destainers**

The destainer solution must be at least 20° F warmer than the eggs with a minimum solution temperature of 90° F. Total elapsed time in the destainer solution may not exceed 5 minutes. Eggs are to be rewashed and spray rinsed after destaining. Destainer solution should be replaced daily or whenever it becomes dirty. Destaining is to be done after initial washing has been completed. It is recommended that all eggs be shell protected after they have been destained.

**Food Egg Sanitization:** Thoroughly clean all eggs. Thoroughly mix 0.8 oz. of this product with 20 gallons of warm water to produce a 200 ppm available chlorine solution. The sanitizer temperature should not exceed 130° F. Spray the warm sanitizer so that the eggs are thoroughly wetted. Allow the eggs to thoroughly dry before casing or breaking. Do not apply a potable water rinse. The solutions should not be reused to sanitize eggs.

**AQUACULTURE USES**

**Fish Ponds:** Remove all fish from ponds prior to treatment. Thereafter, thoroughly mix 20 oz. of this product for each 10,000 gallons of pond water to obtain 10 ppm available chlorine. Repeat the treatment if the available chlorine level is below 1 ppm after 5 minutes. Return fish to the pond after the available chlorine level reaches zero.

**Fish Pond Equipment:** Thoroughly clean all equipment prior to treatment. Thoroughly mix 0.8 oz. of this product to 20 gallons of water to obtain 200 ppm available chlorine. Porous equipment should soak for one hour.

**Maine Lobster Equipment:** Remove lobster, seaweed, etc. from ponds prior to treatment. Drain the pond and thoroughly mix 1,200 oz. (77 pounds) of this product to each 10,000 gallons of water to obtain at least 600 ppm available chlorine. Apply so that all barrows, gates, rocks and dam are treated with the product. Permit high tide to fill the pond and then close gates. Allow water to stand 2 to 3 days until the available chlorine level reaches zero. Open the gates and allow two tidal cycles to flush the pond before returning lobsters to the pond.

**Conditioning Live Oysters (Not for Use in California):** Thoroughly mix 1 oz. of this product to 10,000 gallons of water at 50 to 70° F to obtain 0.5 ppm available chlorine. Expose the oysters to this solution for at least 15 minutes, monitoring the available chlorine level so that it does not fall below 0.05 ppm. Repeat the entire process if the available chlorine level drops below 0.05 ppm or the temperature falls below 50° F.

**Control of Scavengers in Fish Hatchery Ponds:** Prepare a solution containing 200 ppm of available chlorine by mixing 0.4 oz. of product with 10 gallons of water. Pour into drained pond potholes and repeat if necessary. Do not put desirable fish back into refilled ponds until chlorine residual has dropped to 0 ppm, as determined by a test kit.

**Boat Bottoms (Not for Use in California):**

**Boat Hulls:** To control slime on boat hulls, sling a plastic tarp under the boat, retaining enough water to cover the fouled bottom area. Do not allow additional water to entire enclosed area. This envelope should contain approximately 500 gallons of water for a 14 foot boat. Add 3.5 oz. of this product to the enclosed water to obtain a 35 ppm available chlorine concentration. Leave immersed for 8 to 12 hours. Repeat if necessary. Do not discharge the solution until the free available level has dropped to 0 ppm, as determined by a test kit.

**Artificial Sand Beaches:**

To sanitize the sand, spray a 500 ppm available chlorine solution containing 0.1 oz of this product per gallon of water at frequent intervals. Small areas can be sprinkled with a watering can.

**AGRICULTURAL USES:**

**FARM PREMISES**

Remove all animals, poultry, and feed from premises, vehicles, and enclosures. Remove all litter and manure from floors, walls and surfaces of barns, pens, stalls, chutes, and other facilities occupied or traversed by animals or poultry. Empty all troughs, racks and other feeding and watering appliances. Thoroughly clean all surfaces with soap or detergent and rinse with water. To disinfect, saturate all surfaces with a solution of at least 1,000 ppm available chlorine for a period of 10 minutes. A 1,000 ppm solution can be made by thoroughly mixing 2 oz. of this product with 10 gallons of water. Immerse all halters, ropes, and other equipment used in handling and restraining animals or poultry, as well as cleaned forks, shovels and scrapers used for removing litter and manure. Ventilate the buildings, cars, boats and other closed spaces. Do not house livestock or poultry or employ equipment until chlorine has been dissipated. All treated feed racks, mangers, troughs, automatic feeders, fountains and waterers must be rinsed with potable water before reuse.

**POULTRY PLANTS**

**Poultry Drinking Water:** Spray or flush with a solution containing 1.0 oz. of this product for every gallon of water (5,000 ppm). Treat poultry drinking water to a dosage of 1 to 5 ppm available chlorine by adding 0.2 to 1 oz. of this product per 1,000 gallons of water.

**HARVESTED POTATOES/SWEET POTATOES**

**Post-Harvest Protection-Harvest Potatoes:** Potatoes can be sanitized after cleaning and prior to storage by spraying with a sanitizing solution at a level of 1 gallon of sanitizing solution per tons of potatoes. Thoroughly mix 1.0 oz. of this product to 10 gallons of water to obtain 500 ppm available chlorine.

**Post-Harvest Roots-Harvested Sweet Potatoes:** To control and reduce the spread of soft rot-causing organisms in water and on sweet potatoes (*Ipomoea batatas*), spray or dip the potatoes with a 150 to 500 ppm solution for 2 to 5 minutes. Thoroughly mix 0.3 to 1.0 oz. of this product

per 10 gallons of water to obtain this solution. Monitor the chlorine concentration and change the solution after one hour or as needed.

### **BEE CELLS AND BOARDS**

Disinfect leaf cutting bee cells and bee boards by immersion in a solution containing 1 ppm available chlorine for 3 minutes. Allow cells to drain for 2 minutes and dry for 4 to 5 hours, or until no chlorine odor can be detected. This solution is made by thoroughly mixing ¼ teaspoon of this product to 200 gallons of water. Bee domiciles are disinfected by spraying with a 0.1 ppm solution until all surfaces are thoroughly wet. Allow the domicile to dry until all chlorine odor has dissipated.

### **MUSHROOMS**

To control bacteria blotch (*Pseudomonas toloasii*), apply a 100 to 200 ppm solution prior to watering mushroom production surfaces. This solution may be made by mixing 0.2 to 0.4 oz. of this product with 10 gallons of water. First application should begin when pins form, and thereafter between breaks on a need basis depending on the occurrence of bacterial blotch. This product may be applied directly to pins to control small infection foci. Apply 1.5 to 2.0 oz. per square foot of growing space.

### **SEEDS**

**Seeds (for planting):** To control bacterial spot (*Xanthomonas vesticatoris*) on pimento seeds, initially remove moist seeds from ripe fruits. To control surface fungi and bacteria on tomato seeds, initially wash seeds. Immediately soak seeds in 39,000 ppm solution for 15 minutes with continuous agitation. After treatment, rinse seeds in potable water for 15 minutes. Dry seeds to normal moisture. Make this solution by mixing 8 oz. of this product with 1 gallon of water.