



**SAFRAX TECHNICAL SHEET  
CHLORINE DIOXIDE  
GENERATING TABLETS  
(NORTH AMERICA)**

**Disinfectant/Sanitizer/Tuberculocide/Virucide  
Fungicide/Algaecide/Slimicide/Deodorizer**

Version 2.1 2015



# SAFRAX TECHNICAL SHEET CHLORINE DIOXIDE

## DURING USE (DILUTING, APPLYING, OR WORKING WITH ACTIVATED PRODUCT):

1. Always work in well-ventilated area and avoid inhaling fumes of activated solution.
2. Wear protective gloves if hands will come in contact with high concentration activated solution.
3. Respiratory protection is not required under the limited exposure conditions of most normal use patterns. However, wear a NIOSH/MSHA-approved respirator under the following conditions:
  - a) when applying activated solution with a high-pressure sprayer
  - b) when working with the activated solution for an extended period of time in a closed facility or in a poorly-ventilated area
  - c) when normal work shift duties entail uninterrupted periods of applying the activated solution with mop, sponge, or sprayer
  - d) when opening vessel containing stock activated solution superior at 500 ppm.
  - e) if OSHA inhalation exposure limits are reached or exceeded (please see MSDS).
4. Do not use product in a manner inconsistent with the label.

To Achieve this Concentration of Chlorine Dioxide:	In this volume of Water:		Immerse this amount of Safrax and wait about 1 minute:
	Gallons	Liters	
0.5 ppm	26 Gal	100 L	1 gram
1 ppm	26 Gal	100 L	1 gram
5 ppm	5.28 Gal	20 L	1 gram
5 ppm	26 Gal	100 L	5 grams
5 ppm	264 Gal	1000 L	50 grams
50 ppm	0.5 Gal	2 L	1 gram
50 ppm	5 Gal	20 L	10 grams
50 ppm	26 Gal	100 L	50 grams
100 ppm	0.26 Gal	1 L	1 gram
100 ppm	0.5 Gal	2 L	2 grams
100 ppm	5 Gal	20 L	20 grams
100 ppm	26 Gal	100 L	100 grams
500 ppm	0.26 Gal	1 L	5 grams
500 ppm	0.5 Gal	2 L	10 grams
500 ppm	5 Gal	20 L	100 grams
500 ppm	26 Gal	100 L	500 grams
500 ppm	264 Gal	1000 L	5000 grams
12,500 ppm	1 Gal	3.78 L	500 grams

Company	:	Safrax Inc. 8 The Green, Ste 4000. Dover DE 19901
Product	:	Chlorine Dioxide Releasing/Producing/Generating Tablet
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ATCC (OR OTHER) DESIGNATIONS FOR PATHOGENIC ORGANISMS LISTED ON THE LABELS OF REGISTERED GC PRODUCTS

**—Always Consult Label/Distributor to Verify Concentrations and Contact Times—**

**Bacteria (disinfection claims) 100 ppm/10-minute contact time**

<i>Pseudomonas aeruginosa</i>	ATCC 15442
<i>Staphylococcus aureus</i>	ATCC 6538
<i>Salmonella enterica (choleraesuis)</i>	ATCC 10708
Methicillin-resistant <i>Staphylococcus aureus</i> (MRSA)	ATCC 33592
Vancomycin-resistant <i>Enterococcus faecalis</i> (VRE)	ATCC 51299
<i>Candida albicans</i>	ATCC 10231
<i>Trichophyton interdigitale</i>	ATCC 9533
<i>Listeria monocytogenes</i>	ATCC 19111
<i>Mycobacterium bovis</i> (TB)	BCG (Organon Teknika Corporation)

**\*Viruses (virucidal claims at 100 ppm/10-minute contact time)**

<i>Coronavirus</i>	ATCC VR-740, Strain 229E
<i>Feline Calicivirus</i>	ATCC VR-782, Strain F-9
<i>Hepatitis A virus</i>	Strain HM-175
<i>Human Immunodeficiency Virus type 1 (HIV-1)</i>	Strain HTLV-III <sub>B</sub>
<i>Poliovirus-1</i>	ATCC VR-1000, Strain Brunhilde
<i>Rotavirus</i>	Strain WA
<i>Influenza-A virus</i>	ATCC VR-544, Strain Hong Kong
<i>Rhinovirus type 37</i>	ATCC VR-1147, Strain 151-1
<i>Canine Parvovirus</i>	ATCC VR-2017, Strain Cornell
<i>Adenovirus type 5</i>	ATCC VR-5, Strain Adenoid 75
<i>Herpes Simplex virus type 2</i>	ATCC VR-734, Strain G
<i>Vaccinia virus</i>	ATCC VR-119, Strain WR
<i>Norovirus (feline calicivirus surrogate)</i>	ATCC VR-782, Strain F-9
Pandemic 2009 H1N1 Influenza A virus	Reference <i>Influenza-A virus</i> (above)

**Bacteria (sanitizer claim for hard, non-porous food contact surfaces) 5 ppm/1-minute contact time**

<i>Staphylococcus aureus</i>	ATCC 6538
<i>Escherichia Coli</i>	ATCC 11229
<i>Escherichia coli O157:H7</i>	ATCC 43895
<i>Salmonella typhimurium</i> (MDRS)	CI 01005 (University of Maryland)

**Bacteria (sanitizer claim for hard, non-porous non-food contact surfaces) 20 ppm/5-minute contact time**

<i>Staphylococcus aureus</i>	ATCC 6538
<i>Klebsiella pneumoniae</i>	ATCC 4352
<i>Listeria monocytogenes</i>	ATCC 1911

**Bacteria (disinfection claims) 800 ppm/10-minute contact time**

<i>Carbapenem-resistant Enterobacteriaceae: Klebsiella pneumoniae (CRKP)</i>	ATCC BAA-1705
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- B. To disinfect equipment tops, bench tops, biological hoods, incubators, stainless steel equipment and instruments
- C. To disinfect drinking fountains, chalkboards, chairs, desks, tabletops, kitchens, dishes, silverware, high chairs, toys, other hard, non-porous surfaces in daycares and schools
- D. To disinfect display screens, scales and measures, keyboards, cpr dummies, backboards, aeds, and other hard, non-porous surfaces found in acute care centers, emergency rooms, and ambulances
- E. To disinfect bleachers, lockers, padded mats, weights and weight benches, balls, exercise equipment and other hard, non-porous surfaces found in training rooms, weight rooms, gymnasiums, and other athletic facilities
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- C. disinfectant for beverage and water systems and lines
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- F. Sanitization treatment of stainless-steel transfer lines, hydrocoolers, and pasteurizers
- G. Sanitization treatment of ice-making machinery
- H. To control the buildup of spoilage microbes in process waters for fruits and vegetables and associated tanks, flumes, and lines
- I. application of flume waters for control of slime
- J. To extend shelf-life and freshness of fruits and vegetables in food processing facilities
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- C. In seed-bed soil and planting cubes
- D. In irrigation systems, flood floors, flooded benches, misting systems, humidification systems, recycled water systems and capillary mats
- E. In commercial greenhouses, garden centers and nurseries
- F. To maintain freshness and extend shelf-life for cut flowers
- G. In commercial mushroom growing operations (pre- and post-casing)
- H. Disinfecting and sanitizing in horticultural and hydroponic settings
- I. Application in hydroponic settings
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## 1 - SANITIZER

### FOR HARD, NON-POROUS FOOD CONTACT SURFACES

As a sanitizer for stainless steel and other hard, non-porous food contact surfaces such as tanks, transfer lines and other food processing equipment in food processing plants such as poultry, fish & meat and in restaurants, dairies, beverage and bottling plants, breweries, wineries and commissaries:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Remove all gross food particles and soil prior to sanitizing using a pre-flush, pre-scrape or pre-soak treatment.
3. Clean tank, line or surface thoroughly using a suitable detergent and rinse with clean, potable water before sanitizing.
4. Prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**.
5. To apply: spray, mop, sponge or swab surfaces or fill, flush, immerse or circulate in tanks, lines, and equipment, ensuring the target surfaces remain visibly wet for at least one minute. When applying these solutions using a high-pressure sprayer, wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide.
6. After sanitizing, allow surfaces or equipment to air dry. Do not rinse sanitized surface.

### FOR HARD, NON-POROUS, NON-FOOD CONTACT SURFACES

As a sanitizer for non-porous, non-food contact surfaces and equipment such as sealed concrete and sealed, finished wood, backsplashes, bench and counter tops, stainless steel or hard-surface equipment, glazed tile floors, walls, and ceilings:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Clean all surfaces thoroughly with a suitable detergent and rinse with water prior to sanitizing.
3. Prepare a **20 ppm solution** of **Safrax Chlorine Dioxide**.
4. To apply: spray, mop, sponge or swab onto the surfaces to be sanitized, ensuring the target surfaces remains visibly wet for at least five minutes. When applying these solutions using a high-pressure sprayer, wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide.
5. After sanitizing, allow surfaces or equipment to air dry. Do not rinse sanitized surfaces.

## 2 - DISINFECTANT

To disinfect stainless steel and other hard, non-porous surfaces such as tanks, transfer lines and other food processing equipment in food processing plants such as poultry, fish & meat and in restaurants, dairies, beverage and bottling plants, breweries, wineries and commissaries and to disinfect walls, floors and ceilings:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Remove all gross food particles and soil prior to disinfecting using a pre-flush, pre-scrape or pre-soak treatment.
3. Clean tank, line or surface thoroughly using a suitable detergent and rinse with clean, potable water before disinfecting.
4. Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**.
5. To apply: spray, mop, sponge or swab surfaces or fill, flush, immerse or circulate in tanks, lines, and equipment, ensuring the target surfaces remain visibly wet for at least ten (10) minutes. When applying these solutions using a high-pressure sprayer, wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide.
6. After disinfecting, allow surfaces or equipment to air dry. Do not rinse disinfected surfaces.

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## 3 - DISINFECTANT USES IN MEDICAL AND DENTAL OFFICES, LABORATORIES, HOSPITALS, CLINICS, MORGUES AND INSTITUTIONS

NOTE: This product is not to be used as a terminal sterilant/high-level disinfectant on any surface or instrument that

(1) is introduced directly into the human body, either into or in contact with the blood stream or normally sterile areas of the body or

(2) contacts intact mucous membranes but which does not ordinarily penetrate the blood barrier or otherwise enter normally sterile areas of the body. This product may be used to pre-clean or decontaminate critical or semi-critical medical devices prior to sterilization or high-level disinfection.

### A. To disinfect non-porous, hard surfaces such as stainless steel or hard-surface equipment, glazed tile floors, walls, ceilings, floors, shelves, drawers, door handles, stainless steel cold rooms and walk-in incubators:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Clean all surfaces thoroughly with a suitable detergent and rinse with water prior to disinfection.
3. Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**.
4. Spray, mop or sponge the **100 ppm solution** onto surfaces to be disinfected. All surfaces must be visibly wet for at least ten (10) minutes. When spraying disinfectant solution, use an appropriate spraying device. When applying these solutions using a high-pressure sprayer, wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide.
5. After disinfecting, allow surfaces or equipment to air dry. Do not reuse solution. Do not rinse disinfected surfaces.

### B. To disinfect equipment tops, bench tops, biological hoods, incubators, stainless steel equipment and instruments:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Clean all surfaces thoroughly with a suitable detergent and rinse with water prior to disinfection.
3. Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**.
4. Spray, mop or sponge the **100 ppm solution** onto surfaces to be disinfected. All surfaces must be visibly wet for at least ten (10) minutes. When spraying disinfectant solution, use an appropriate spraying device. When applying these solutions using a high-pressure sprayer, wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide.
5. After disinfecting, allow surfaces or equipment to air dry. Do not reuse solution. Do not rinse disinfected surfaces.

### C. To disinfect drinking fountains, chalkboards, chairs, desks, tabletops, kitchens, dishes, silverware, high chairs, toys, other hard, non-porous surfaces in daycares and schools:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Clean all surfaces thoroughly with a suitable detergent and rinse with water prior to disinfection.
3. Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**.
4. Spray, mop or sponge the **100 ppm solution** onto surfaces to be disinfected. All surfaces must be visibly wet for at least ten (10) minutes. When spraying disinfectant solution, use an appropriate spraying device. When applying these solutions using a high-pressure sprayer, wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide.
5. After disinfecting, allow surfaces or equipment to air dry. Do not reuse solution. Do not rinse disinfected surfaces.

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**D. To Disinfect Display screens, scales and measures, keyboards, CPR dummies, backboards, AEDs, and other hard, non-porous surfaces found in acute care centers, emergency rooms, and ambulances:**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Clean all surfaces thoroughly with a suitable detergent and rinse with water prior to disinfection.
3. Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**.
4. Spray, mop or sponge the **100 ppm solution** onto surfaces to be disinfected. All surfaces must be visibly wet for at least ten (10) minutes. When spraying disinfectant solution, use an appropriate spraying device. When applying these solutions using a high-pressure sprayer, wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide.
5. After disinfecting, allow surfaces or equipment to air dry. Do not reuse solution. Do not rinse disinfected surfaces.

**E. To disinfect bleachers, lockers, padded mats, weights and weight benches, balls, exercise equipment and other hard, non-porous surfaces found in training rooms, weight rooms, gymnasiums, and other athletic facilities:**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Clean all surfaces thoroughly with a suitable detergent and rinse with water prior to disinfection.
3. Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**.
4. Spray, mop or sponge the **100 ppm solution** onto surfaces to be disinfected. All surfaces must be visibly wet for at least ten (10) minutes. When spraying disinfectant solution, use an appropriate spraying device. When applying these solutions using a high-pressure sprayer, wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide.
5. After disinfecting, allow surfaces or equipment to air dry. Do not reuse solution. Do not rinse disinfected surfaces.

**F. To disinfect laboratory equipment surfaces of water baths, Safrax chlorine dioxide can be used in the disinfecting treatment of surfaces of water baths meant for use in laboratories:**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Disconnect water bath from power source and drain bathwater.
3. Scrub hard, nonporous surfaces of bath with soap or other detergent until visible filth is removed. Rinse hard, nonporous surfaces of bath with potable water. Drain bath once more and allow hard, nonporous surfaces to dry. Drain. Allow to air dry just prior to next run start-up.
4. Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**.
5. Spray or sponge activated solution on hard, nonporous surfaces of bath. For spraying applications, wear a NIOSH/MSHA-approved respirator appropriate for use with chlorine dioxide. All surfaces must be visibly wet for at least ten (10) minutes.
6. Allow surfaces to air dry. Do not reuse solution. Do not rinse disinfected surfaces.

**G. To disinfect bathrooms, shower rooms, locker rooms, spas, and laundry rooms, sinks, toilet bowls, toilet seats, toilet handles, empty baths, showers, changing tables, washers, hair dryers, clothes dryers, hand dryers, sinks, faucets and other hard, non-porous surfaces found in bathrooms, shower rooms, locker rooms, spas, and laundry rooms:**

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1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Clean all surfaces thoroughly with a suitable detergent and rinse with water prior to disinfection. Ensure that all surfaces have adequate time to air dry before applying Safrax Chlorine Dioxide Solution.
3. Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**.
4. Spray, mop or sponge the **100 ppm solution** onto surfaces to be disinfected. All surfaces must be visibly wet for at least ten (10) minutes. When spraying disinfectant solution, use an appropriate spraying device. When applying these solutions using a high-pressure sprayer, wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide.
5. After disinfecting, allow surfaces or equipment to air dry. Do not reuse solution. Do not rinse disinfected surfaces.

## Treatment of toilet bowls:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**. Flush toilet and clean toilet bowl thoroughly with a suitable detergent to ensure that bowl is free of urine and gross filth prior to disinfection.
3. Add the solution of **Safrax Chlorine Dioxide** to toilet bowl.
4. Stir water gently for one minute. Let water sit for 20 minutes, then flush toilet.

## H. Use in glove dips and shoes baths (not for use in California). Safrax Chlorine Dioxide can be used to prepare glove dips and shoes/boot baths used for sanitary measures:

### Preparing glove dips:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**.
3. Store solution in open container. Remove visible filth from gloves. Dip gloves in solution. Change solution daily or when solution appears soiled.

### Preparing shoe baths:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**.
3. Place solution on ground in open container. Remove visible filth from footwear. Dip footwear in solution. Change solution daily or when solution appears soiled.

## I. To disinfect floor drains. Safrax Chlorine Dioxide can be used in the daily disinfection of floor drains following drain cleaning processes:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**.
3. Remove drain cover.
4. Stopper drain pipe with an object (such as a disposable cup) to allow the drain basin to fill.
5. Pour approximately 1 gallon of the solution of Safrax Chlorine Dioxide into the stopped drain.
6. Allow solution to stand in drain for 10 minutes. If necessary, gently stir solution around drain basin for 1 minute to prevent heavy soil buildup.
7. Remove stopper from drain.

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## 4 - DISINFECTANT USES IN COMMERCIAL ANIMAL CONFINEMENT FACILITIES.

### A. To disinfect animal confinement facilities such as swine pens, Calf Barns and Kennels:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Remove all animals and feed from facility to be disinfected.
3. Remove all litter and manure from floors, walls and surfaces of barns, pens, stalls, chutes and other structures occupied or traversed by animals.
4. Empty all troughs, racks and other feeding and watering appliances.
5. Prepare a **100 ppm solution** of Safrax Chlorine Dioxide.

#### For general application with sprayer:

6. With soap or detergent, thoroughly clean all surfaces and rinse with water.
7. Using a commercial sprayer, saturate all surfaces with the solution keeping visibly wet for a period of at least ten (10) minutes. When applying these solutions using a high-pressure sprayer, wear a NIOSH/MSHA- approved respirator appropriate for chlorine dioxide.
8. After treatment, ventilate buildings, coops or other enclosed spaces before reentering.

#### As a disinfecting soak:

9. With soap or detergent, thoroughly clean halters, ropes or other types of equipment used in handling and restraining animals and forks, shovels and scrapers used in removing litter and manure. Rinse with water.
10. Fill container or vat with **100 ppm solution** and immerse items for a period of at least ten (10) minutes.
11. Discard solution in sanitary drain or as ordinary non-hazardous waste. Do not reuse solution.

### B. For application in poultry operations:

#### DISINFECTATION TREATMENT OF EGG ROOM (NOT FOR USE IN CALIFORNIA):

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Prepare a **20 ppm solution** of **Safrax Chlorine Dioxide**.
3. Spray solution in a high-pressure sprayer as a prewash to remove gross filth or heavy soil. When applying the solution using a high-pressure sprayer, wear a NIOSH/MSHA-approved respirator appropriate for use with chlorine dioxide.
4. Prepare a **100 ppm solution** of Safrax Chlorine Dioxide.
5. Spray hard non-porous surfaces within the entire area, being sure to cover walls, ceiling, floors, work tables and benches. All hard, non-porous surfaces should be wet for five (5) minutes. Allow surfaces to dry for at least 1 hour before resuming operations. For spraying applications, wear a NIOSH/MSHA-approved respirator appropriate for use with chlorine dioxide. Washing and spraying operations should be conducted once a week, or more frequently in cases of heavy contamination during operations.
6. Allow treated surfaces to air dry and then ventilate the area. Do not rinse treated surfaces. Do not reuse solution.
7. Prepare and place a shoe bath at the entrance to the egg room for use upon entry. Also, prepare and place a hand/glove dip or rinse at the entrance to the egg room for use upon entering and exiting the room. For instruction in the preparation of shoe baths and hand/glove rinses, please refer to the "Use In Glove Dips And Shoe Baths" section of this document. Replace both the shoe bath and the hand/glove dip daily or when solution is soiled. Keep doors to the room closed at all times to prevent bacterial contamination.

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## DISINFECTION TREATMENT OF HATCHING ROOM (NOT FOR USE IN CALIFORNIA):

### Pre-Treatment

1. Separate chicks from Hatch and remove all poultry and feeds from premises.
2. Remove all trash containers with eggshells, down, etc. from the hatching area.
3. Remove all litter and droppings from floors, walls and surfaces of facilities occupied or traversed by poultry.
4. Empty all troughs, racks and other feeding and watering appliances.
5. Thoroughly clean all surfaces with soap or detergent. Rinse surfaces with water.

### Treatment Process

6. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
7. Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**.
8. Spray hard non-porous surfaces within the entire area, being sure to cover walls, ceiling, floors, equipment and benches. All hard, non-porous surfaces should be wet for ten (10) minutes. For spraying applications, wear a NIOSH/MSHA-approved respirator appropriate for use with chlorine dioxide.

### Post-Treatment

9. After treatment, ventilate buildings, coops or other enclosed spaces. Do not house poultry or employ equipment until treatment has been absorbed, set or dried.
10. Thoroughly scrub treated feed racks, troughs, automatic feeders, fountains and waterers with soap or detergent and rinse with potable water before use.
11. Please refer to the "Use in Glove Dips and Shoe Baths" section of this document.

## DISINFECTION TREATMENT OF INCUBATOR ROOM (NOT FOR USE IN CALIFORNIA):

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Before treatment, spray incubator room with a high-pressure water wash. Remove gross filth or soil from all surfaces.
3. Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**.
4. Spray hard non-porous surfaces within the entire area, being sure to cover walls, ceiling, floors, equipment and benches. All hard, non-porous surfaces should be wet for ten (10) minutes. For spraying applications, wear a NIOSH/MSHA-approved respirator appropriate for use with chlorine dioxide. Treat incubator room in this manner once a week.
5. Prepare a **100 ppm solution** of a Safrax Chlorine Dioxide. Mop floors with solution daily.
6. Allow treated surfaces to air dry and then ventilate the area.
7. Prepare and place a shoe bath at the entrance to the egg room for use upon entry. Prepare a hand/glove bath. For instruction in the preparation of shoe baths and hand/glove rinses, please refer to the "Use In Glove Dips And Shoe Baths" section of this document. Replace the shoe bath and the hand/glove dip daily or when a solution is soiled. Keep doors to the room closed at all times to prevent bacterial contamination.
8. Each time eggs are removed from the incubator, submerge eggs in glove dip, then spray with spray bottle. Replace the hand/glove dip daily or when solution is soiled.
9. Do not rinse treated surfaces. Do not reuse solution.

## TREATMENT OF TRAY WASHING ROOM:

### Sanitizing Treatment of Tray Washing Equipment

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1. Activate Safrax Chlorine Dioxide according to "Directions for Use" on package label.
2. Spray the trays, carriages and other working equipment in a tray washing machine with water at a pressure of 300-500 psi to remove gross filth and soil.
3. Prepare a **20 ppm solution** of Safrax Chlorine Dioxide.
4. Spray the trays, carriages and other working equipment in a tray washing machine with **20 ppm** solution for at least 5 minutes.
5. Store treated equipment in a closed area for reuse.

## Disinfectant for Tray Washing Room

6. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
7. Close all doors in the tray washing room to avoid contamination of other hatchery operations. Discard all chick downs, egg shells, and cast-off chicks into the trash barrels and transfer the covered containers to the loading platform for disposal.
8. Spray tray washing room with a high-pressure water wash. Remove gross filth or soil from all surfaces.
9. Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**.
10. Spray hard non-porous surfaces in the tray washing room, being sure to cover walls, ceiling, floors, equipment and benches. All hard, non-porous surfaces should be wet for fifteen (15) minutes. For spraying applications, wear a NIOSH/MSHA-approved respirator appropriate for use with chlorine dioxide. Treat tray washing room in this manner after every use.
11. After treatment, ventilate buildings, coops or other enclosed spaces. Do not rinse treated surfaces. Do not reuse solution. Keep doors to the room closed at all times to prevent bacterial contamination.

## Cleaning the Loading Platform

12. Spray loading platform with a high-pressure water wash to remove gross filth or soil from all surfaces.
13. Scrub loading platform with soap or detergent.
14. Rinse loading platform with water.

## DISINFECTION TREATMENT OF CHICK ROOM, CHICK GRADING BOX, AND SEXING ROOM (NOT FOR USE IN CALIFORNIA):

### Pre-Treatment

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**.
3. Remove all poultry and feeds from premises, trucks, coops and crates.
4. Empty all troughs, racks and other feeding and watering appliances.
5. Remove all litter and droppings from floors, walls and surfaces of facilities occupied or traversed by poultry.
6. Thoroughly clean all surfaces with soap or detergent and rinse with water.

### Treatment Process

7. Spray the solution onto walls, ceilings, floors, and other hard, non-porous surfaces until surfaces are lightly damp. For spraying applications, wear a NIOSH/MSHA-approved respirator appropriate for use with chlorine dioxide. Using a commercial sprayer, saturate all hard, non-porous surfaces. Vacate the premises during this treatment.

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8. Allow treated surfaces to air dry and then ventilate the area. Do not reuse solution. Do not rinse treated surfaces. Keep doors to the room closed at all times to prevent bacterial contamination.

## C. For the sanitization of bottles used to feed calves and other livestock:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Remove any gross food particles and debris from bottle surface prior to sanitizing using a pre-flush, pre-scrape or pre-soak treatment.
3. Clean bottle thoroughly using a suitable detergent and rinse with clean, potable water before sanitizing.
4. Prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**.
5. To apply: spray solution onto surface/inside of bottle. Ensure that the target surfaces remain visibly wet for at least one (1) minute. If applying sanitizer using an existing water supply system, inject the **5 ppm** chlorine dioxide solution into the system using a Dosatron<sup>®</sup> dilution/dispenser, or another dilution/dispersing system. This will sanitize the water system, as well as calf bottles.
6. After sanitizing, allow surfaces or equipment to air dry. Do not reuse solution. Do not rinse sanitized surface.

## D. For the water treatment of poultry drinking water and surfaces in troughs or metering and injection systems (not for use in California). This product will help control microorganisms in drinking water intended for poultry:

### For systems that use automatic, on-demand metering/injection systems designed primarily for poultry (i.e., systems employing nipples or drip wells as the final water delivery device/method, usually situated in enclosed or protected structures):

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Prepare a stock solution of **Safrax Chlorine Dioxide** at a **concentration of 500 ppm**.
3. If activation vessel is different from feeder tank, transfer stock solution (**500 ppm**) to feeder tank. To maintain concentration, ensure that feeder tank is covered.
4. Operate system according to standard operating protocol, using a 1:500-1:100 injection device (one-part solution to 99 parts water) for a concentration of **1-5 ppm**.
5. Using Chlorine Dioxide Test Strips, confirm concentrations of stock solution (500 ppm) and end-use solution up to 5 ppm but not less than an application concentration sufficient to ensure a residual concentration of 0.25 ppm.

Note: Clean and remove accumulations of organic matter in delivery lines on a regular basis. (See, for example, label and technical bulletin instructions for this product under the heading "Sanitization and General Cleaning Applications for Potable Water Systems").

### For trough-based systems:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Prepare a stock solution of **Safrax Chlorine Dioxide** at a **concentration of 500 ppm**.
3. If activation vessel is different from feeder tank, transfer stock solution (500 ppm) to feeder tank. To maintain concentration, ensure that feeder tank is covered.
4. Add chlorine dioxide concentrate at a ratio of 1:500-1:100 to achieve a final use concentration of **1-5 ppm**.
5. Using Chlorine Dioxide Test Strips, confirm concentrations of stock solution (**500 ppm**) and end-use solution up to **5 ppm** but not less than an application concentration sufficient to ensure a residual concentration of **0.25 ppm**.

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Note: Clean and remove accumulations of organic matter in troughs on a regular basis.

**E. Water treatment for the drinking water for livestock, poultry, fur, and wool-bearing animals (not for use in California). This product will help control microorganisms in drinking water:**

**For systems that use automatic, on-demand metering/injection systems designed primarily for livestock, poultry, fur- and wool- bearing animals (i.e., systems employing nipples or drip wells as the final water delivery device/method, usually situated in enclosed or protected structures):**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. If activation vessel is different from feeder tank, transfer stock solution (**500 ppm**) to feeder tank. To maintain concentration, ensure that feeder tank is covered.
3. Operate system according to standard operating protocol, using a 1:100 injection device (one-part solution to 99 parts water) for a concentration of **5 ppm**.
4. Confirm concentrations of stock solution (**500 ppm**) and end-use solution up to **5 ppm** but not less than an application concentration sufficient to ensure a residual concentration of **0.25 ppm** using Chlorine Dioxide Test Strips

**F. To control the buildup of slime and odor-causing bacteria in boiler feed waters:**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**.
3. Feed water should be treated at a rate of **5 ppm** available  $\text{ClO}_2$  and may be injected or applied in batch-loads. Feed water storage tanks should be sufficiently sealed to prevent outside contamination and direct sunlight.
4. Spray solution on all hard, nonporous surfaces in vents or ducts. Allow surfaces to dry for at least thirty minutes (or longer if possible). For all spraying applications, wear a NIOSH/MSHA-approved respirator appropriate for use with chlorine dioxide.
5. After treating, allow surfaces or equipment to air dry. Do not reuse solution. Do not rinse treated surfaces.

**G. For the deodorizing treatment for control of odor and slime-forming bacteria in animal confinement facilities. This product can be used in the cleaning and deodorizing treatment of kennels, pounds, stables, pens, pet houses, and cages:**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Remove all litter and manure from premises and thoroughly clean all surfaces with a suitable soap or detergent and rinse with clean water.
3. Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**.
4. Using activated solution, spray or wipe down all hard, non-porous surfaces. For all spraying applications, wear a NIOSH/MSHA-approved respirator appropriate for use with chlorine dioxide. All surfaces must be visibly wet for at least ten (10) minutes.
5. Allow surfaces to air dry. Do not reuse solution. Do not rinse surfaces.

**H. Use in glove dips and shoes baths (not for use in California). Safrax Chlorine Dioxide can be used to prepare glove dips and shoes/boot baths used for sanitary measures:**

**Preparing glove dips:**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.

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2. Prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**.
3. Store solution in open container. Remove visible filth from gloves. Dip gloves in solution. Change solution daily or when solution appears soiled.

## Preparing shoe baths:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Prepare a **100 ppm solution** of Safrax Chlorine Dioxide.
3. Place solution on ground in open container. Remove visible filth from footwear. Dip footwear in solution. Change solution daily or when solution appears soiled.

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## 5 - DISINFECTANT USES IN FOOD PROCESSING.

**A. As a sanitizer for stainless steel and other hard, non-porous food contact surfaces such as tanks, transfer lines and other food processing equipment in food processing plants and in restaurants, dairies, beverage and bottling plants, and commissaries:**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Remove all gross food particles and soil prior to sanitizing using a pre-flush, pre-scrape or pre-soak treatment.
3. Clean tank, line or surface thoroughly using a suitable detergent and rinse with clean, potable water before sanitizing.
4. Prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**.
5. To apply: spray, mop, sponge or swab surfaces OR fill, flush, immerse or circulate in tanks, lines, and equipment, ensuring the target surfaces remain visibly wet for at least one minute. When applying these solutions using a high-pressure sprayer, wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide.
6. After sanitizing, allow surfaces or equipment to air dry. Do not reuse solution. Do not rinse sanitized surface.

**B. To clean, sanitize or disinfect shell eggs intended for food or food products. This product will help clean or sanitize or disinfect eggshells:**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.

**FOR DISINFECTION AT A CONCENTRATION OF 100 PPM (NOT FOR USE IN CALIFORNIA):**

2. Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**. Minimum contact time is 10 minutes

**FOR SANITIZATION AT A CONCENTRATION OF 5.0 PPM (NOT FOR USE IN CALIFORNIA):**

2. Prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**. Minimum contact time is 5 minutes.

**FOR CLEANING TREATMENT AT A CONCENTRATION OF 3.0 PPM: THIS IS A CLEANING APPLICATION, NON- PUBLIC HEALTH USE:**

2. Prepare a **3 ppm solution** of **Safrax Chlorine Dioxide**. Monitor the microbial content of the water and increase or decrease the addition rate of the activated solution as needed. Use Chlorine Dioxide Test Strips to verify concentration. Minimum contact time is 5 minutes.

**FOR TREATMENT AT ALL CONCENTRATIONS:**

3. Spray eggs thoroughly with activated solution, making sure that surface area is thoroughly wet. Solution should be equal to or warmer than the eggs, but not to exceed 130° F.

Eggs that have been sanitized with this chlorine dioxide compound may be broken in the manufacture of egg products without a prior potable water rinse. Eggs must be reasonably dry before casing or breaking.

**C. Disinfectant for beverage, water systems and lines. To disinfect lines, holding tanks and other equipment used in fountain drink or other beverage preparation, storage, transfer and**

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**dispensing operations or to disinfect the lines and storage tanks of potable water storage systems aboard aircraft, boats and RVs (clean-in-place applications):**

Prior to disinfecting, tanks should be cleaned and then flushed thoroughly with clean, potable water.

## **FOR A TEN (10) MINUTE OR LONGER DISINFECTION**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide** for the entire tank.
3. Run solution through transfer lines and appliances until yellowish solution appears at the outlets. Circulate or let stand in tank and lines for at least ten (10) minutes.
4. Drain tanks and lines.

**D. Uses in industrial fluid lines and systems. This product can be used in the sanitization treatment of milking equipment and pasteurizers, stainless steel transfer lines, hydrocoolers, and ice-making machinery:**

### **Sanitization treatment of milking equipment:**

Prior to sanitization, ensure that milking equipment is adequately cleaned according to manufacturer specifications. Milking equipment should be treated within thirty (30) minutes before each milking cycle.

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Disassemble from milking equipment all parts that require sanitization by-hand.
3. Prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**.
4. Fill basin with solution. Minimum contact time is 5 minutes.
5. Dip parts in solution. Do not rinse.
6. Reattach sanitized parts to milking equipment.
7. Using a dosing pump, cycle **5 ppm solution** of Safrax Chlorine Dioxide through pipeline for 5 minutes immediately before milking cycle. Ensure that the temperature of the solution of Safrax Chlorine Dioxide is between 100°F and 110°F.
8. Fully drain solution from pipeline.

### **Sanitization treatment of stainless-steel transfer lines, hydrocoolers, and pasteurizers:**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Prepare a solution of a suitable detergent. Run solution through lines for preliminary cleaning.
3. Run a rinse of potable water through the line.
4. Prepare a **20 ppm solution** of **Safrax Chlorine Dioxide**.
5. Fill lines with solution. Minimum contact time is 5 minutes.
6. Fully drain solution from lines and allow to air dry before next use.

### **Sanitization treatment of ice-making machinery:**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Disassemble ice-making machinery.
3. Clean parts using a suitable detergent. Rinse parts with potable water and let air dry. Minimum contact time is 5 minutes. Reassemble machinery.

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4. Using a dosing pump, add solution of **Safrax Chlorine Dioxide** directly in accordance with instructions OR prepare a **500 ppm solution** of **Safrax Chlorine Dioxide** to incoming waterline of ice-making machinery ensuring that any residual chlorine dioxide is at or below **0.8 ppm** in accordance with EPA SDWA.
5. Do not reuse solution. Do not rinse treated surfaces.

## E. to control the buildup of spoilage microbes in process waters for fruits and vegetables and associated tanks, flumes, and lines. This product will inhibit spoilage microbial growth in water used to process fruits and vegetables:

1. Replacement and replenishment intervals will vary with microbial challenge presented by fruits and vegetables treated. We recommends a beginning concentration of **5 ppm**, with adjustments to ensure a residual concentration between **0.25 and 5 ppm** depending on microbial challenge and operation-unique factors.
2. Apply chlorine dioxide solution continuously or intermittently to achieve a residual concentration level between **0.25 – 5.0 ppm**.
3. Regularly confirm concentration of process water using Chlorine Dioxide Test Strips

1. At regular intervals or before beginning a shift, clean tanks, flumes, and lines using normal procedures, and follow with potable water rinse. In conditions of severe microbial accumulation (or when slime is visible), it is advisable to treat the thoroughly cleaned system with a treatment before returning the system to normal operation. See "Sanitization and General Cleaning Applications for Water Lines and Tanks in Potable Water Systems" for recommendations on cleaning tanks that are contaminated severely.
2. Determine the number of **Safrax's** tablets/grams necessary based on the capacity of the tank or system, anticipated replenishment/replacement cycle based on expected microbial loads, and specific application method—once-through or recycled. The optimal concentration necessary to ensure a residual concentration of between 0.25 and **5.0 ppm** will vary across operations.
3. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
4. Prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**.
5. Verify concentration of process solution using Chlorine Dioxide Test Strips or other means. Adjust concentration by adding additional water if the concentration is above **5 ppm** or by adding additional tablets if below **5 ppm** (or below desired concentration between **0.25 and 5.0 ppm**).
6. Cover or enclose containers holding solution, and operate normally.
7. Check concentration at regular intervals using test strips or other means (e.g., Oxidation Reduction Potential (ORP) metering) to ensure target concentration is maintained. Replenish solution as necessary to maintain target concentration.
8. At desired intervals, drain system, clean as necessary, and refill with freshly-activated solution.

## F. Application of flume waters for control of slime. This product can be used to treat slime [and other biofilms] in flume waters:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Add **Safrax Chlorine Dioxide** to flume via a dosing pump at a concentration of **50 ppm (50 mg/liter)** and let stand overnight or circulate for 10-15 hours.
3. To prevent slime growth after initial treatment, add **Safrax Chlorine Dioxide** using a dosing pump to the water at a dose of **5.0 ppm (5.0 mg/liter)** chlorine dioxide. Minimum contact time for control of listed pathogenic organisms is 5 minutes.

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4. Drain and rinse flume with clean, potable water before putting system back into use.

**G. Application to extend shelf-life and freshness of fruits and vegetables in food processing facilities. This product will reduce concentrations of spoilage microbes on raw agricultural commodities (RACs) intended for commercial food processing:**

1. Activate **Safrax Chlorine Dioxide** according to “Directions for Use” on the product label.
2. Wash and thoroughly rinse fruits and vegetables with clean, potable water.
3. Prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**.
4. Apply the **5 ppm solution** to fruits and vegetables by: either immersing/dipping in a tank of **5 ppm solution** for 1 minute OR using an application-specific sprayer (the industry standard fan or cone spray nozzle pattern) to cover all surfaces evenly with a **5 ppm spray**; surfaces should remain visibly wet for 1 minute. Replenish immersion solution at the rate of depletion; verify **5 ppm concentration** using Chlorine Dioxide Test Strips.

**H. For use in potato storage facilities as an atmospheric clo2 treatment for potatoes (not for use in California). This product releases chlorine dioxide gas (ClO2) to inhibit or remove odors caused by spoilage growths such as late blight, brown rot, and others on potatoes during their storage and shipment:**

**Directions for Set-Up:**

Treatment MUST take place in a suitable space such storage rooms and shipping containers. Personnel MUST vacate the treatment space during the atmospheric chlorine dioxide treatment process until chlorine dioxide levels are at or below the OSHA **0.1 ppm** TWA level.

**Directions for activation:**

For potato and general atmospheric chlorine dioxide treatment, place a bag of 500g **Safrax Chlorine Dioxide** in one gallon of water.

**FOR TREATMENT OF POTATOES IN AN AREA WITH A STATIC VESSEL OF ACTIVATED ClO2**

1. For best results, wash potatoes thoroughly before use, removing any visible traces of dirt or mold.
2. Activate **Safrax Chlorine Dioxide** according to directions above.
3. Prepare the solution according to the directions in the table below based upon volume of area treated.

The amount of **Safrax Chlorine Dioxide** required for a given stock of potatoes can be calculated as follows:

Volume of potato storage	Gallons of concentrate solution required
0-3,000 ft3	2
3,001-6,000 ft3	3
6,001-12,000 ft3	4
12,001-24,000 ft3	5
24,001-36,000 ft3	6

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4. Immediately place the vessel(s) in the storage area, preferably on top of the potatoes to be treated. If there is one vessel treating the storage area, place it as close to the potatoes as possible. If preparing multiple vessels to treat the storage area, place them at equidistant points around the area.
5. Allow gas to freely migrate across the potatoes' surface. Personnel MUST vacate the treatment space during the treatment process using atmospheric chlorine dioxide treatment process until chlorine dioxide levels are at or below the OSHA **0.1 ppm** TWA level OR wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide. In-air chlorine dioxide levels can be measured with a Model C16 PortaSens II chlorine dioxide gas leak detector or an equivalent measuring instrument.
6. When chlorine dioxide levels are at or below the OSHA **0.1 ppm** TWA level OR after 6 hours, remove the vessel(s) containing generated solution from area and dispose of solution according to instructions on package label or in accordance with federal, state and local law. Rinse vessel thoroughly using potable water.

## FOR TREATMENT OF POTATOES IN AN AREA WITH AN AUTOMATED DISPERSION UNIT

For use only by professional personnel or trained personnel.

### Directions for Application:

1. For best results, wash potatoes thoroughly before use, removing any visible traces of dirt or mold.
2. Activate **Safrax Chlorine Dioxide** according to directions above AND directly inside the Automated Dispersion Unit.
3. Place the Automated Dispersion Unit in the storage area. Unit should be as close to potatoes to be treated as possible. Prepare a **Safrax Chlorine Dioxide** solution according to the directions in the table below. Add to or dilute the concentration of the **Safrax Chlorine Dioxide** solution until the required concentration is achieved in the Automated Dispersion Unit's solution tank. For each application, one **Safrax Chlorine Dioxide** sachet should be used per one gallon of water.

The amount of **Safrax Chlorine Dioxide** required for a given stock of potatoes can be calculated as follows:

Volume of potato storage	Gallons of concentrate solution required
0-3,000 ft <sup>3</sup>	1
3,001-6,000 ft <sup>3</sup>	2
6,001-12,000 ft <sup>3</sup>	3
12,001-24,000 ft <sup>3</sup>	4
24,001-36,000 ft <sup>3</sup>	5

4. Fit top on the Automated Dispersion Unit and power on the unit.
5. Allow gas to freely migrate across the potatoes' surface. Personnel MUST vacate the treatment space during the atmospheric chlorine dioxide process until chlorine dioxide levels are at or below the OSHA 0.1 ppm TWA level OR wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide. In-air chlorine dioxide levels can

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be measured with a Model C16 PortaSens II chlorine dioxide gas leak detector or an equivalent measuring instrument.

6. When chlorine dioxide levels are at or below the OSHA 0.1 ppm TWA level OR after 6 hours, turn off the Automated Dispersion Unit. Remove unit from area rinse the Automated Dispersion Unit solution tank thoroughly using water.

**I. Sanitizing final rinse of pre-cleaned or new returnable or non-returnable containers. This product may be used as a final sanitizing rinse for plastic, glass or metal returnable and non-returnable bottles, cans, caps, kegs, and beverage containers:**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Wash bottles, cans or containers with detergent or cleaning solution and rinse with potable water.
3. Prepare a **30 ppm solution** of **Safrax Chlorine Dioxide**.
4. To apply: rinse interior and exterior surfaces with the **30 ppm solutions** by spraying, sponging, swabbing, or swirling, or immersing in a manner that ensures the target surfaces become visibly wet, for a contact time of 1 minute. (If applying these solutions using a high-pressure sprayer, wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide.)
5. Allow to drain dry.

**For a 5 ppm rinse:**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on the package label.
2. Wash bottles, cans or containers with detergent or cleaning solution and rinse with potable water.
3. Prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**.
4. To apply: rinse interior and exterior surfaces with the **5 ppm solutions** by spraying, sponging, swabbing, or swirling, or immersing in a manner that ensures the target surfaces become visibly wet for a contact time of 1 minute. (If applying these solutions using a high-pressure sprayer, wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide).
5. Allow to drain dry.

**J. Disinfecting, sanitizing/antimicrobial and general cleaning applications in wineries. This product will disinfect, sanitize, and clean winemaking equipment and environmental surfaces in wineries. It is effective against microbes and spoilage organisms on all non-porous surfaces including picking bins, crushers, transfer lines/hoses/pipes, tanks, drains, pumps, presses, de-stemmers, sealed concrete floors and walls, steel cutting boards/surfaces, sumps, valves and tri-clover fittings, pruning shears, and steel wine barrels:**

NOTE: This product does not produce Trichloroanisol (TCA) or precursor Trichlorophenol (TCP) by chemical reaction in red wine or in cooperage oak, and therefore does not contribute to the off odors associated with the former.

**Disinfecting and sanitizing applications for winery equipment and environmental surfaces (including all non-porous materials and surfaces, such as transfer hoses and pipes, and other items listed above):**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.

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2. **Disinfecting Applications:** For disinfecting applications, prepare a **100 ppm** solution of **Safrax Chlorine Dioxide**.  
**Sanitizing Applications on hard, food-contact surfaces:** For sanitizing applications on hard, food-contact surfaces, prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**.  
**Sanitizing Applications on hard, non-food-contact surfaces:** For sanitizing applications on hard, non-food-contact surfaces, prepare a **20 ppm solution** of **Safrax Chlorine Dioxide**.
3. Apply to target surfaces with mop, sponge, or spray OR fill, flush, immerse or circulate in tanks, lines and equipment, ensuring surfaces remain visibly wet for the following contact times:
 

Disinfection ( <b>100 ppm</b> ):	10 minutes
Sanitizing hard food-contact surfaces ( <b>5 ppm</b> ):	1 minute
Sanitizing hard non-food contact surfaces ( <b>20 ppm</b> ):	5 minutes

## Sanitizing and cleaning tanks and associated connections, pipes, and hoses:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Place the tank washer in the middle of the tank with the attached hose extending through the racking door. Cover door with plastic tarp.
3. Place all rubber gaskets inside the tank and leave bottom valve open to drain into tub. NOTE: Ensure man-door on top of tank is closed and bolted.
4. Place 50 gallons of warm (not hotter than 160°F) water into the sump. To water, add:
  - For tanks not heavily soiled: Add 1 scoop (about 2 pounds) of caustic (e.g. 270 Xtra)
  - For heavily soiled tanks: Add one scoop (about 2 pounds) of more aggressive caustic (e.g., 231 Xtra)
5. Turn on the pump and start the tank washer, running solution of caustic for about 20 minutes.
6. Check the inside surfaces of tank visually to ensure they are clean; if not, repeat steps 4-5.
7. Rinse the tank with cold water for 5 minutes.
8. Fill the tub with 50 gallons of warm (100°F or lower) water, and add one scoop (about 2 pounds) of citric acid to tub.
9. Add **Safrax Chlorine Dioxide** stock solution to achieve a **5 ppm concentration** in tank.
10. Start the pump and tank washer, and run citric solution for 20 minutes.
11. Drain tank of citric solution, and rinse with cold water for 5 minutes.
12. Restore system to the operating mode.

**K. Disinfecting, sanitizing/antimicrobial and general cleaning applications in breweries. This product will disinfect, sanitize, and clean brewing equipment and environmental surfaces in breweries. It is effective against microbes and spoilage organisms on all non-porous surfaces including tanks, bins, transfer lines/hoses/pipes, drains, fittings, pumps, sealed concrete floors and walls, steel surfaces, sumps, and valves:**

**Disinfecting and sanitizing applications for brewery equipment and environmental surfaces (including all non-porous materials and surfaces, such as transfer hoses and pipes, and other items listed above):**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. **Disinfecting Applications:** For disinfecting applications, prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**.

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**Sanitizing Applications on hard, food-contact surfaces:** For sanitizing applications on hard, food-contact surfaces, prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**.

**Sanitizing Applications on hard, non-food-contact surfaces:** For sanitizing applications on hard, non-food-contact surfaces, prepare a **20 ppm solution** of **Safrax Chlorine Dioxide**.

3. Apply to target surfaces with mop, sponge, or spray **OR** fill, flush, immerse or circulate in tanks, lines and equipment, ensuring surfaces remain visibly wet for the following contact times:

Disinfection ( <b>100 ppm</b> ):	10 minutes
Sanitizing hard food-contact surfaces ( <b>5 ppm</b> ):	1 minute
Sanitizing hard non-food contact surfaces ( <b>20 ppm</b> ):	5 minutes

**Sanitizing and cleaning tanks and associated transfer lines, hoses, pipes, connections, drains, fittings, and pumps:**

**Use the below protocol in normal CIP protocol for sanitizing step. Use normal volume of solution:**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**.
3. Allow solution to run through CIP system for 5-10 minutes.

**L. Use in glove dips and shoes baths (not for use in California). Safrax Chlorine Dioxide can be used to prepare glove dips and shoes/boot baths used for sanitary measures:**

### **Preparing glove dips:**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**.
3. Store solution in open container. Remove visible filth from gloves. Dip gloves in solution. Change solution daily or when solution appears soiled.

### **Preparing shoe baths:**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**.
3. Place solution on ground in open container. Remove visible filth from footwear. Dip footwear in solution. Change solution daily or when solution appears soiled.

**M. To disinfect floor drains. Safrax Chlorine Dioxide can be used in the daily disinfection of floor drains following drain cleaning processes:**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**.
3. Remove drain cover.
4. Stopper drain pipe with an object (such as a disposable cup) to allow the drain basin to fill.
5. Pour approximately 1 gallon of the solution of **Safrax Chlorine Dioxide** into the stopped drain.
6. Allow solution to stand in drain for 10 minutes. If necessary, gently stir solution around drain basin for 1 minute to prevent heavy soil buildup.
7. Remove stopper from drain.

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## 6 - SANITIZATION AND GENERAL CLEANING APPLICATIONS FOR WATER LINES AND WATER SYSTEMS.

This product will reduce microbial populations in the potable water holding tanks and lines of recreational vehicles (RVs) and boats; in marine and RV wastewater tanks and lines; in fountain drink or other beverage preparation, storage, transfer and dispensing lines and equipment; and in coolers, thermoses, plastic water bottles, and other water- storing and dispensing systems used for picnics, camping, and other recreational activities. In addition, it will clean, eliminate odors, and remove organic matter. These uses must be followed by a potable water rinse.

NOTE: If the tank system is cleaned frequently, then consider the level of contamination to be low to moderate. If the tank system is used heavily, notably fouled, cleaned irregularly, or going into or coming out of overwintering, then consider the tank(s) level of contamination to be high.

1. Based on the judged level of contamination, determine the number of ppm necessary to clean the tanks and lines in the water system.
2. Drain all water tanks completely. Then, refill tanks to approximately 10-20% of capacity with potable water. For example, put 50 gallons (approximately 185 liters) of water in a tank of 500-gallon capacity and 250 gallons (approximately 945 liters) of water in a tank of 2,500-gallon capacity. Immerse the number of **Safrax Chlorine Dioxide** (as determined in step 1 above in the water tank). **Do not add additional water. Do not refill tank. Close the tank.**
3. Circulate the **Safrax Chlorine Dioxide** solution through all lines and within or between tanks using the system's pumps.
4. Run approximately 6 ounces of the **Safrax Chlorine Dioxide** solution through each outlet (faucet, shower etc.) and let the solution stand in the tanks and lines **OVERNIGHT** (approximately 12 hours).
5. The next day, or after twelve hours, flush **Safrax Chlorine Dioxide** solution through all faucets and outlets until the tanks are empty.
6. Refill the tanks with rinse water to approximately 10% of their capacity.
7. Circulate the water and flush rinse water through all faucets and outlets until tanks are empty.
8. Tanks are now cleaned and can be refilled for use or left empty for storage

### A. Potable Water Treatment:

#### Activate Safrax Chlorine Dioxide according to instructions on label:

Chlorine Dioxide is used as an oxidant in drinking water treatment. The required dosages will vary with source water conditions and the degree of contamination present. For most municipal and public potable water systems, a chlorine dioxide residual of up to **0.8 ppm** is sufficient to provide adequate treatment. Residual disinfectant and disinfection byproducts must be monitored as required by the National Primary Drinking Water Regulations (40 CFR Part 141) and state drinking water standards.

### B. Wastewater Treatment:

#### Activate Safrax Chlorine Dioxide according to instructions on label:

Chlorine dioxide is effective as an oxidant in wastewater treatment. The required dosages will vary with water conditions and the degree of contamination present. For most municipal and other wastewater systems, a chlorine dioxide residual concentration of up to **5 ppm** is sufficient to provide adequate treatment. For sulfide odor control, between pH 5-9, a minimum of **5.2 ppm** (wt) of chlorine dioxide should be applied to oxidize 1 ppm of sulfide

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(measured as sulfide ion). For phenol destruction, at pH less than 8, 1.5 ppm chlorine dioxide will oxidize 1 ppm phenol; at pH greater than 10, 3.3-ppm chlorine dioxide will oxidize 1 ppm phenol.

## C. Bacterial Slime Control in Paper Mills (not for use in California):

### Activate Safrax Chlorine Dioxide according to instructions on label:

Chlorine Dioxide generated from sodium chlorite is effective for use in controlling microbiological growth in white paper mill systems. The required dosages will vary with the degree of microbiological and process contamination present. Depending on the specific requirements of the system, sodium chlorite should be applied continuously or intermittently through a chlorine dioxide generating system to achieve a chlorine dioxide residual concentration between **0.1 and 5.0 ppm**. Intermittent treatments should be repeated as often as necessary to maintain control.

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## 7 - GENERAL USE, NON-PUBLIC HEALTH APPLICATIONS

**A. Deodorizing and general cleaning uses for non-potable water applications involving recirculating water systems (e.g., cooling towers, paper mills, and decorative or ornamental fountains):**

**This product will help remove, control and inhibit reemergence of slimes, algae, bacteria, and other organic buildups in recirculating cooling water systems, including cooling towers and decorative or ornamental fountains. It can be used as a periodic treatment or during continuous operations in deodorizing or treatment applications involving algae, or bacteria.**

1. Activate **Safrax Chlorine Dioxide** according to “Directions for Use” on package label.
2. Where possible, pre-clean surfaces prior to application. Flush tanks or water system with clean water.
3. Apply/add the **Safrax Chlorine Dioxide** solution to the tank water or water stream at a point in the system or in a manner which minimizes turbulence and exposure to the air.

**As an initial or remedial treatment for recirculating cooling water systems, water holding tanks and decorative and ornamental fountains:**

- Achieve a **5 ppm residual** chlorine dioxide level. Circulate water in normal operation of the system.
- Repeat daily until desired results are achieved.

**For continuous treatment to inhibit the re-establishment of slime, algae, or bacteria:**

- Achieve approximately **0.5 ppm** residual chlorine dioxide concentration. Circulate water in normal operation of the system.

**Instructions when using a dosing pump as an initial or remedial treatment for recirculating cooling water systems, water holding tanks and decorative and ornamental fountains:**

- Set the dosing pump to achieve a continuous concentration of chlorine dioxide of **5 ppm**. In order to maintain this concentration and the appropriate dosing, consider the volume of water in the system, half-life (makeup/blowdown rate), evaporative rate and windage loss of the system. Circulate water in normal operation of the system.
- Repeat daily until desired results are achieved.

**Instructions when using a dosing pump for continuous treatment to inhibit the re-establishment of slime, algae, or bacteria:**

- Set the dosing pump to achieve a continuous concentration of chlorine dioxide between **0.25 ppm and 0.5 ppm**. In order to maintain this concentration and the appropriate dosing, consider the volume of water in the system, half-life (makeup/blowdown rate), evaporative rate and windage loss of the system.

**For periodic treatment to inhibit the re-establishment of slime, algae, or bacteria:**

- Achieve approximately **0.5 ppm** residual chlorine dioxide concentration. Circulate water in normal operation of the system.
- Repeat weekly or on first indications of increased slime, algae or bacteria.

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**B. General cleaning applications for high-purity and other water systems and associated membranes (e.g., reverse osmosis (ro) and ultra-filter (uf) membranes) (not for use in California):**

**This product will clean high-purity and other water distribution systems by eliminating odors, removing organic matter, and reducing the microbial populations in system components, lines, tanks, and associated RO & UF membranes.**

This product, when used as directed:

- (1) cleans
- (2) removes organic matter
- (3) reduces biological fouling
- (4) eliminates odors
- (5) reduces microbial populations

**NOTE:** Because chlorine dioxide does not ionize and exists as a true gas in aqueous solution, it passes through filtration membranes even at low trans-membrane pressures. This allows both the feed and permeate sides of a membrane to be cleaned simultaneously. Chlorine dioxide's true gaseous state enhances its efficacy and facilitates rapid flush-out from water systems.

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Prepare a **50 ppm solution** of **Safrax Chlorine Dioxide**.
3. Make the typical plumbing or valve setting changes used during normal system cleaning cycle.
  - If applying a 500 ppm solution using a dosing pump set at an injection rate of 10% on the feed line, direct the RO or UF permeate and reject streams to an authorized drain.
  - If applying a 50 ppm solution directly with a self-priming injection pump, the RO or UF permeate and reject streams can be returned to the vessel containing the 50 ppm solution (closed-loop operation).
4. Bypass or shut off process control settings that, during normal production, would normally shut down the RO or UF unit.
5. Remove or bypass activated carbon cartridges. Turn off (or disable) power to any UV lights. Inject 50 ppm solution. Flow rate should be low enough that little or no solids resting in the system are displaced by the feed.
6. Continue injection until the concentration in the product stream is approximately equal to the concentration in the reject stream (with clear flow meters, the distinctive green color of aqueous chlorine dioxide can be observed). Verify product stream and reject stream concentrations are approximately the same using Chlorine Dioxide Test Strips.
7. Discontinue injection once concentrations become nearly equal.
8. Allow a minimum 20-minute static soak. If the system were known to have had a high level of biological contamination, use a 60-minute soak and inject additional chlorine dioxide (as above) about 30 minutes into the soaking period. Re-verify approximate equality of product and reject stream concentrations, as above (instruction number 7). After appropriate soak time, flush the solution from the RO or UF module:
  - Drain (remove) chlorine dioxide solution from break tanks or other holding tanks in the system.
  - Replace the chlorine dioxide solution with potable water.
  - Monitor the product and reject streams for color until both appear to be clear.

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- Check the streams using Chlorine Dioxide Test Strips (Low Range) until both streams register concentrations of 1 ppm or lower.
  - When both streams confirm at concentrations at or below 1 ppm, discontinue flush.
9. Restore system to the operating mode.

## C. Deodorization applications. This product can be used in the treatment of strong odors in confined spaces:

### Deodorization of animal holding rooms, sick rooms, morgues, and work rooms:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Thoroughly clean all surfaces before treatment.
3. **Deodorization Applications.** For deodorization applications, prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**. Spray the solution onto walls, ceilings, floors, and other hard, non-porous surfaces until surfaces are lightly damp. For spraying applications, wear a NIOSH/MSHA-approved respirator appropriate for use with chlorine dioxide.
4. Allow treated surfaces to air dry and then ventilate the area. Do not reuse solution. Do not rinse treated surfaces.

### Deodorization of restrooms/bathrooms, refuse containers, diaper pails, and storage lockers:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Thoroughly clean all surfaces before treatment.
3. **Deodorization Applications.** For deodorization applications, prepare a **50 ppm solution** of **Safrax Chlorine Dioxide**. Spray the solution onto walls, ceilings, floors, and other hard, non-porous surfaces until surfaces are lightly damp. For spraying applications, wear a NIOSH/MSHA-approved respirator appropriate for use with chlorine dioxide.
4. Allow treated surfaces to air dry and then ventilate the area. Do not reuse solution. Do not rinse treated surfaces.

## D. Oil and gas industry applications (not for use in California):

This product can be used in the deodorizing treatment of water used in the hydro testing of pipelines and vessels, pipeline pigging and scraping operations, and treatment of drilling, packer, completion, work over and fracturing fluid.

### For deodorizing treatment of water used in the hydro testing of pipelines and vessels:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Using a dosing pump, add **Safrax Chlorine Dioxide** solution until hydro testing water reaches a concentration of **100 ppm** (required concentration levels vary according to site-specific conditions—monitor the microbial content of the water and increase or decrease the addition rate of the activated solution as needed).

### For cleaning use in pipeline pigging and scraping operations:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Add **Safrax Chlorine Dioxide** solution via a dosing pump to a slug of water immediately following the scraper. Ideally, this water volume can be kept to a minimum and contained between the scraper and a trailing pig.
3. Add activated solution until the water at the discharge point or pig trap reaches a concentration of **100 ppm** chlorine dioxide (required concentration levels vary according to

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site-specific conditions—monitor the microbial content of the water and increase or decrease the addition rate of the activated solution as needed.

## For deodorizing treatment of drilling, packer, completion, work over and fracturing fluids:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Prepare a **100 ppm** solution of **Safrax Chlorine Dioxide**.
3. Add **Safrax Chlorine Dioxide** solution at a point where uniform mixing of the fluids and the activated solution will occur.

## Deodorizing Control in Oil Wells and Petroleum Systems.

For use with **Safrax Chlorine Dioxide**:

Chlorine Dioxide is effective in the remediation of bacteria and sulfide contamination commonly found in oil field production, injection and disposal fluids. The required dosages will vary with process conditions. Chlorine dioxide may be applied either continuously or intermittently into oil well production water as it is separated from the oil or before it is injected into the well. For continuous feeds, chlorine dioxide may be applied at dosages slightly higher than sulfide's oxidative demand as determined by a demand study. For intermittent treatment, chlorine dioxide should be applied at shock dosages from **100-3000 ppm**.

## E. Vehicular applications:

**This product can be used in the deodorizing treatment of vehicle interiors, water used in the washing of vehicles, and transportation, loading, hauling equipment, and other heavy machinery.**

### Deodorizing Treatment of Vehicle Interiors:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Thoroughly clean all surfaces before treatment.
3. **Deodorization Applications.** For deodorization applications, prepare a **100 ppm solution of Safrax Chlorine Dioxide**.
4. Spray the solution onto walls, ceilings, floors, and other hard, non-porous surfaces until surfaces are lightly damp. For spraying applications, wear a NIOSH/MSHA-approved respirator appropriate for use with chlorine dioxide.
5. Allow treated surfaces to air dry and then ventilate the vehicle. Do not reuse solution. Do not rinse treated surfaces.

### Deodorizing Treatment of Vehicle Wash Water (not for use in California):

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Achieve a **5 ppm residual** chlorine dioxide level in the vehicle wash water storage tank.

### Deodorizing treatment of transportation, loading, and hauling equipment:

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Scrub hard, nonporous surfaces with soap or other detergent until visible filth is removed. Rinse hard, nonporous surfaces with potable water.

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3. **Deodorizing and General Cleaning Applications.** For deodorizing and general cleaning applications, prepare a **100 ppm** solution of **Safrax Chlorine Dioxide** solution.
4. Spray all hard, nonporous vehicle surfaces thoroughly. When applying the solution using a high-pressure sprayer, wear a NIOSH/MSHA-approved respirator appropriate for use with chlorine dioxide. All surfaces must be visibly wet for at least ten (10) minutes.
5. After treating, allow surfaces or equipment to air dry. Do not reuse solution. Do not rinse treated surfaces.

## F. Deodorizing treatment of ventilation systems:

**This product can be used for deodorizing applications during the cleaning of ventilation systems:**

Prior to inspecting, cleaning, treating or working on a ventilation system or its components, the system must be turned off or disconnected from any part of the system not isolated. Mechanically clean, vacuum, or blow free of dirt, dust, mold, and debris all duct work using a commercial duct cleaning system or service prior to treatment. The air ducts to be treated must be mechanically sound and free of air leaks.

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Prepare a **20 ppm solution** of activated **Safrax Chlorine Dioxide** solution.
3. Spray solution on all hard, nonporous surfaces in vents or ducts. Allow surfaces to dry for at least thirty minutes (or longer if possible). For all spraying applications, wear a NIOSH/MSHA-approved respirator appropriate for use with chlorine dioxide.
4. After treating, allow surfaces or equipment to air dry. Do not reuse solution. Do not rinse treated surfaces.

## G. Deodorizing applications in humidifiers:

**This product can be used to treat humidifier system water tanks.**

Prior to treatment, completely clean and rinse all tanks, tunnels, conveyor chains, heat exchangers, heat exchange towers, lines, spray bars and nozzles using potable water.

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Empty humidifier water tank and remove filth with a cloth or sponge. Rinse tank with potable water.
3. Prepare a **100 ppm solution** of activated **Safrax Chlorine Dioxide**. Fill basin with solution.
4. Dip parts in activated **Safrax Chlorine Dioxide** solution. Do not rinse treated parts. Allow treated surfaces to air dry. Do not reuse solution. Do not rinse treated surfaces.

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## 8 - PLANT AND CROP APPLICATIONS

Horticultural algacide, and slime remover/inhibiter.

Treats/Controls/Inhibits: **Algae (Phormidium boneri) and ([Penicillium digitatum], [Botrytis sp.], [Fusarium solani], Pythium aphanidermatum, Pythium irregulare, Fusarium oxysporum f. sp. basilicum (Fob)).**

NOTE: Do not use at concentrations higher than those recommended for each application. When applied directly to plants, seeds, cuttings or flowers as directed, **Safrax Chlorine Dioxide** does not cause adverse cosmetic effects, as testing has demonstrated. However, testing has not been performed on EVERY plant species, and users are advised to spot-test **Safrax Chlorine Dioxide** before applying it widely.

Active solution may be irritating if breathed. If applying solution inside greenhouse or enclosed area using a high-pressure sprayer, wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide: after treatment, ventilate greenhouse.

### A. On rooted or unrooted cuttings and cut flowers:

As a dip to control and suppress bacteria [(*Erwinia chrysanthemi*)], algae (such as *Phormidium boneri*) and ([*Penicillium digitatum*, *Botrytis sp.*, *Fusarium solani*]) on rooted or unrooted cuttings and cut flowers:

1. Activate **Safrax Chlorine Dioxide** according to “Directions for Use” on package label.
2. Prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**.
3. Briefly dip cuttings or cut flowers in **5 ppm solution**, ensuring they remain visibly wet with solution for at least one minute.

### B. To maintain freshness and extend shelf-life for cut ornamentals, edibles, and crops (not for use in California):

1. Activate **Safrax Chlorine Dioxide** according to “Directions for Use” on package label.
2. Prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**.
3. Unbundle the crops to preclude bunching, and submerge crops in the **5 ppm** solution or place the crops in cold storage in the **5 ppm** solution of chlorine dioxide. Solution may include 2% sucrose.
4. Refresh solution every 24 hours.

### C. In seed-bed soil and planting cubes:

To control and suppress bacteria [(*Erwinia chrysanthemi*)], including algae (*Phormidium boneri*) and ([*Penicillium digitatum*, *Botrytis sp.*, *Fusarium solani*], *Pythium aphanidermatum*, *Pythium irregulare*, *Fusarium oxysporum f. sp. Basilicum (Fob)*) in seed-bed soil and planting cubes:

1. Activate **Safrax Chlorine Dioxide** according to “Directions for Use” on package label.
2. Prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**.
3. Immerse or drench seed-bed soil or planting cubes and allow to remain visibly wet with solution for ten (10) minutes.

Soil or planting cubes can be seeded or planted immediately after treatment.

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Emergency Number	:	1-800-255-3924
Revision date	:	06/18/2015



# SAFRAX TECHNICAL SHEET CHLORINE DIOXIDE

**For continuous treatment to suppress bacteria and inhibit algae, bioslime, slime, and bacteria at a concentration of 3.0 ppm.**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Using a dosing pump, add activated **Safrax Chlorine Dioxide** to watering system until water reaches a concentration of **3.0 ppm** (required concentration levels vary according to site-specific conditions, monitor the microbial content of the water and increase or decrease the addition rate of **Safrax Chlorine Dioxide** as needed); [higher chlorine dioxide injection rates, such as **3.0ppm** can ensure chlorine dioxide residual of up to **0.8 ppm** is sufficient to provide adequate treatment]. Residual disinfectant and disinfection byproducts must be monitored as required by the National Primary Drinking Water Regulations (40 CFR Part 141) and state drinking water standards.

NOTE: Use Chlorine Dioxide Test Strips to verify concentration at downstream production points. Organic loads vary across water supplies, and will influence injection level necessary to ensure **3.0 ppm** concentrations at emitter hoses, mist nozzles, and drip tubes.

**For continuous treatment to suppress bacteria and inhibit algae, biofilm slime, and bacteria at a concentration of 0.8 ppm.**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Using a dosing pump, add activated **Safrax Chlorine Dioxide** to watering system until water reaches a concentration of **0.8 ppm** (required concentration levels vary according to site-specific conditions, monitor the microbial content of the water and increase or decrease the addition rate of the activated solution as needed); residual disinfectant and disinfection byproducts must be monitored as required by the National Primary Drinking Water Regulations (40 CFR Part 141) and state drinking water standards.

NOTE: Use Chlorine Dioxide Test Strips to verify concentration at downstream production points. Organic loads vary across water supplies, and will influence injection level necessary to ensure **0.8 ppm** concentrations at emitter hoses, mist nozzles, and drip tubes.

**D. In In irrigation systems, flood floors, flooded benches, misting systems, humidification systems, recycled water systems and capillary mats:**

**For removing slime and retarding its reemergence; for deodorizing or treatment applications involving algae (Phormidium boneri) and bacteria [(Penicillium digitatum, Botrytis sp., Fusarium solani,] Pythium aphanidermatum, Pythium irregulare, Fusarium oxysporum f. sp. Basilicum (Fob)); and for continuous treatment to inhibit their re-establishment in irrigation systems, flood floors, flooded benches, misting systems, humidification systems, recycled water systems and capillary mats:**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Pre-clean all surfaces prior to application of deodorizing solution. Sweep and remove all plant debris. Use power sprayer to wash all surfaces to remove loose filth. Scrub surfaces using a suitable soap or detergent to ensure that no filth remains on surfaces.
3. Prepare solutions in concentrations indicated below and ensure surfaces are wetted and remain visibly wet for the times or are applied continuously as noted below.

**AS AN INITIAL OR REMEDIAL TREATMENT TO DISINFECT WATER HOLDING TANKS AND IRRIGATION/TRANSFER LINES (CLEAN-IN-PLACE APPLICATION)**

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# SAFRAX TECHNICAL SHEET CHLORINE DIOXIDE

1. Flush tank thoroughly with clean water. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
2. Prepare a **100 ppm solution** of activated **Safrax Chlorine Dioxide**.
3. Fill tank completely. Run **100 ppm** solution through irrigation/transfer lines and appliances until green solution appears at the outlets. Top-off tank with solution. Circulate or let stand in tank and lines for at least ten (10) minutes.
4. Drain tanks and lines, flush with clean water, and resume normal operation.

## FOR CONTINUOUS TREATMENT TO INHIBIT THE RE-ESTABLISHMENT OF SLIME, ALGAE, AND BACTERIA AT A CONCENTRATION OF 3.0 PPM

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Using a dosing pump, add **Safrax Chlorine Dioxide** tablets to watering system until water reaches a concentration of **3.0 ppm** (required concentration levels vary according to site-specific conditions, monitor the microbial content of the water and increase or decrease the addition rate of the activated solution as needed); higher chlorine dioxide injection rates, such as **3.0 ppm** can ensure chlorine dioxide residual of up to 0.8 ppm is sufficient to provide adequate treatment. Residual disinfectant and disinfection byproducts must be monitored as required by the National Primary Drinking Water Regulations (40 CFR Part 141) and state drinking water standards.

NOTE: Use Chlorine Dioxide Test Strips to verify concentration at downstream production points. Organic loads vary across water supplies, and will influence injection level necessary to ensure 3.0 ppm concentrations at emitter hoses, mist nozzles, and drip tubes.

## FOR CONTINUOUS TREATMENT TO INHIBIT THE RE-ESTABLISHMENT OF SLIME, ALGAE, and BACTERIA AT A CONCENTRATION OF 0.8 PPM

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Using a dosing pump, add **Safrax Chlorine Dioxide tablets** to watering system until water reaches a concentration of **0.8 ppm** (required concentration levels vary according to site-specific conditions—monitor the microbial content of the water and increase or decrease the addition rate of the activated solution as needed); residual disinfectant and disinfection byproducts must be monitored as required by the National Primary Drinking Water Regulations (40 CFR Part 141) and state drinking water standards.

NOTE: Use Chlorine Dioxide Test Strips to verify concentration at downstream production points. Organic loads vary across water supplies, and will influence injection level necessary to ensure **0.8 ppm** concentrations at emitter hoses, mist nozzles, and drip tubes.

### E. In commercial greenhouses, garden centers and nurseries:

**As an algacide and bactericide for treating, preventing, suppressing and controlling horticultural diseases on hard, non-porous surfaces in commercial greenhouses, garden centers and nurseries:**

2. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on package label.
3. Pre-clean all non-plant surfaces prior to application of solution. Sweep and remove all plant debris. Use power sprayer to wash all surfaces to remove loose dirt.
4. Prepare solutions in indicated concentrations and ensure all surfaces are wetted and remain visibly wet for the times noted below.

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# SAFRAX TECHNICAL SHEET CHLORINE DIOXIDE

**As an initial or remedial treatment to kill algae and bacteria on hard non-porous surfaces on equipment, greenhouse structures, glazing, plastic, benches, walkways, floors, walls, fan blades, ventilation ducts, watering systems, coolers and storage rooms:**

- Prepare a **5 ppm solution** of activated **Safrax Chlorine Dioxide**.
- Apply the **5 ppm solution** with mop, sponge or sprayer. When applying these solutions using a high- pressure sprayer, wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide.
- Visibly wet all surfaces and ensure the surfaces remain visibly wet for at least one hour.

Note: Heavy growths of algae or bacteria may require scrubbing to remove dead growth.

**As a weekly preventative treatment to kill, control and suppress bacteria and control and suppress algae on hard non-porous surfaces on equipment, greenhouse structures, glazing, plastic, benches, walkways, floors, walls, fan blades, ventilation ducts, watering systems, coolers and storage rooms:**

- Prepare a **5 ppm solution** of activated **Safrax Chlorine Dioxide**.
- Apply **5 ppm solution** with mop, sponge or sprayer. When applying these solutions using a high-pressure sprayer, wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide. Visibly wet all surfaces and ensure the surfaces remain visibly wet for at least one hour (kill/cidal) and at least one minute (suppression).

**As a dip to control and suppress bacteria [(Erwinia chrysanthemi)] on cuttings and cut flowers:**

1. Activate **Safrax Chlorine Dioxide** according to “Directions for Use” on package label.
2. Prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**.
3. Briefly dip cuttings or cut flowers in **5 ppm solution** and ensure they remain visibly wet with solution for at least one minute.

## **F. To maintain freshness and extend shelf-life for cut flowers:**

1. Activate **Safrax Chlorine Dioxide** according to “Directions for Use” on package label.
2. Prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**.
3. Unbundle the flowers to preclude bunching, and place in vase on display or in cold storage in the **5 ppm solution** of chlorine dioxide. Solution may include 2% sucrose.
4. Refresh solution every 24 hours.

## **G. In commercial mushroom growing operations (pre- and post-casing):**

**As a drench or spray to control and suppress bacteria, and algae in commercial mushroom growing operations (pre- and post-casing) (not for use in California):**

### **PRE-CASING:**

1. Activate **Safrax Chlorine Dioxide** according to “Directions for Use” on the package label.
2. Prepare a **0.8 ppm** solution of **Safrax Chlorine Dioxide**.

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# SAFRAX TECHNICAL SHEET CHLORINE DIOXIDE

3. Drench or spray mushroom beds until all mushrooms are visibly wet with solution. When applying these solutions using a sprayer, wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide.
4. Begin casing mushroom beds.

## POST-CASING:

1. Activate **Safrax Chlorine Dioxide** according to “Directions for Use” on the package label.
2. Prepare a **0.8 ppm** solution of **Safrax Chlorine Dioxide**.
3. Drench or spray mushroom beds until all mushrooms are visibly wet with solution. When applying these solutions using a sprayer, wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide.

Residual disinfectant and disinfection byproducts must be monitored as required by the National Primary Drinking Water Regulations (40 CFR Part 141) and state drinking water standards.

## H. Disinfecting and sanitizing in horticultural and hydroponic settings:

**To disinfect non-porous hard surfaces, including stainless steel, glazed tile, sealed concrete, and sealed, finished wood used in horticultural applications:**

1. Activate **Safrax Chlorine Dioxide** according to “Directions for Use” on the package label.
2. Pre-clean all surfaces prior to application of disinfectant solution. Sweep and remove all plant debris. Use power sprayer to wash all surfaces to remove loose dirt.
3. Prepare solutions in indicated concentrations and ensure surfaces are wetted and remain visibly wet for the times noted below.

### For work areas, benches and evaporative coolers:

- Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**.
- Spray or swab work area and bench surfaces with the **100 ppm** solution before each work period and again after each planting is completed. Spray or swab evaporative cooler surfaces, ensuring visible wetness for at least ten (10) minutes. When applying these solutions using a high-pressure sprayer, wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide.

### For pots, flats, flower buckets and cutting tools for a ten (10) minute or longer disinfection:

- Prepare a **100 ppm solution** of **Safrax Chlorine Dioxide**.
- Brush or wash used pots and flats, and then soak in the **100 ppm solution** for at least ten (10) minutes before reuse. Soak tools with **100 ppm solution** for at least ten (10) minutes. At end of workday, dry and oil tools.

**To sanitize work area non-porous (non-food contact) hard surfaces, hard-surface benches, pots, flats, flower buckets and cutting tools:**

1. Activate **Safrax Chlorine Dioxide** according to “Directions for Use” on the package label.
2. Pre-clean all surfaces prior to application of sanitizing solution. Sweep and remove all plant debris. Use power sprayer to wash all surfaces to remove loose dirt.
3. Prepare a **20 ppm solution** of **Safrax Chlorine Dioxide**.

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- Brush or wash used pots and flats then swab or soak in the **20 ppm solution** for at least five (5) minutes before reuse. Spray, swab or soak tools with **20 ppm solution** for at least five (5) minutes. Spray or swab work area and bench surfaces before each work period and again after each plant is completed. At end of workday, dry and oil tools.

## I. Application in hydroponic settings:

**Treats/Controls/Inhibits: Algae (Phormidium boneri) and Bacteria ([Penicillium digitatum], [Botrytis sp.], [Fusarium solani], Pythium aphanidermatum, Pythium irregulare, Fusarium oxysporum f. sp. basilicum (Fob)).**

NOTE: Do not use at concentrations higher than those recommended for each application. Active solution may be irritating if breathed. If applying in enclosed area or greenhouse using a high pressure sprayer, wear a NIOSH/MSHA-approved respirator appropriate for chlorine dioxide: after treatment, ventilate sprayed area.

**To control and suppress bacteria [(Erwinia chrysanthemi)], including algae (Phormidium boneri); ([Penicillium digitatum, Botrytis sp., Fusarium solani], Pythium aphanidermatum, Pythium irregulare, Fusarium oxysporum f. sp. Basilicum (Fob)) on ornamentals, edibles in hydroponic gardens (not for use in California):**

- Activate **Safrax Chlorine Dioxide** according to “Directions for Use” on the package label.
- Prepare a **10 ppm solution** of **Safrax Chlorine Dioxide**.
- Immerse ornamentals, edibles. Ensure crops are visibly wet with solution for ten (10) minutes.

### **As a dip, spray, or drench at a concentration of 5.0 ppm:**

- Activate **Safrax Chlorine Dioxide** according to “Directions for Use” on the package label.
- Prepare a **5 ppm solution** of **Safrax Chlorine Dioxide**.
- Immerse ornamentals, edibles. Ensure crops are visibly wet with solution for ten (10) minutes.

### **For continuous treatment to suppress bacteria and inhibit algae, bioslime, slime, and bacteria at a concentration of 3.0 ppm:**

- Activate **Safrax Chlorine Dioxide** according to “Directions for Use” on the package label.
- Using a dosing pump, add activated **Safrax Chlorine Dioxide** to watering system until water reaches a **concentration of 3.0 ppm** (required concentration levels vary according to site-specific conditions, monitor the microbial content of the water and increase or decrease the addition rate of the activated solution as needed).

Injection rates, such as **3.0 ppm** can ensure chlorine dioxide residual of up to 0.8 ppm is sufficient to provide adequate treatment. Residual disinfectant and disinfection byproducts must be monitored as required by the National Primary Drinking Water Regulations (40 CFR Part 141) and state drinking water standards.

NOTE: Use Chlorine Dioxide Test Strips to verify concentration at downstream production points. Organic loads vary across water supplies, and will influence injection level necessary to ensure 3.0 ppm concentrations at emitter hoses, mist nozzles, and drip tubes.

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# SAFRAX TECHNICAL SHEET CHLORINE DIOXIDE

**For continuous treatment to suppress bacteria and inhibit algae, bioslime, slime, and bacteria at a concentration of 0.8 ppm:**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on the package label.
2. Using a dosing pump, add activated **Safrax Chlorine Dioxide** to watering system until water reaches a concentration of **0.8 ppm** (required concentration levels vary according to site-specific conditions, monitor the microbial content of the water and increase or decrease the addition rate of the activated solution as needed).

Residual disinfectant and disinfection byproducts must be monitored as required by the National Primary Drinking Water Regulations (40 CFR Part 141) and state drinking water standards.

NOTE: Use Chlorine Dioxide Test Strips to verify concentration at downstream production points. Organic loads vary across water supplies, and will influence injection level necessary to ensure 0.8 ppm concentrations at emitter hoses, mist nozzles, and drip tubes.

## J. Application to control spoilage microbes in agricultural water:

**For continuous treatment to inhibit the re-establishment of slime, algae, and bacteria at a concentration of 3.0 ppm:**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Using a dosing pump, add activated **Safrax Chlorine Dioxide** to watering system until water reaches a concentration of **3.0 ppm** (required concentration levels vary according to site-specific conditions—monitor the microbial content of the water and increase or decrease the addition rate of the activated solution as needed); [higher chlorine dioxide injection rates, such as **3.0 ppm** can ensure chlorine dioxide residual of up to **0.8 ppm** is sufficient to provide adequate treatment]. Residual disinfectant and disinfection byproducts must be monitored as required by the National Primary Drinking Water Regulations (40 CFR Part 141) and state drinking water standards.

NOTE: Use Chlorine Dioxide Test Strips to verify concentration at downstream production points. Organic loads vary across water supplies, and will influence injection level necessary to ensure 3.0 ppm concentrations at emitter hoses, mist nozzles, drip tubes, and other point-of-application.

**For continuous treatment to inhibit the re-establishment of slime, algae, and bacteria at a concentration of 0.8 ppm:**

1. Activate **Safrax Chlorine Dioxide** according to "Directions for Use" on product label.
2. Using a dosing pump, add **Safrax Chlorine Dioxide** to watering system until water reaches a **concentration of 0.8 ppm** (required concentration levels vary according to site-specific conditions—monitor the microbial content of the water and increase or decrease the addition rate of the activated solution as needed); residual disinfectant and disinfection byproducts must be monitored as required by the National Primary Drinking Water Regulations (40 CFR Part 141) and state drinking water standards.

NOTE: Use Chlorine Dioxide Test Strips to verify concentration at downstream production points. Organic loads vary across water supplies, and will influence injection level necessary to ensure 0.8 ppm concentrations at emitter hoses, mist nozzles, drip tubes, and other point-of-application devices.

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