

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

MAY 1 1997

Mr. Eliot I. Harrison, Agent  
Lewis & Harrison Consultants In Government Affairs  
122 C Street, N. W.  
Suite 740  
Washington, DC 20001

Dear Mr. Harrison:

Subject: Anthium Dioxide  
EPA Registration No. 9150-2  
Your Amendment Dated January 31, 1996

This is in response to your amendment of a composite master label for the subject product.

The labeling referred to above submitted in connection with registration under the Federal Insecticide, Fungicide, and Rodenticide Act as amended is acceptable subject to the following comment.

The first sentence in the "Environmental Hazards" statement should be changed to read: "This pesticide is toxic to fish and aquatic organisms".

A stamped copy is enclosed for your records. Submit one copy of the final printed label.

If you have any questions, please call Marianne Clark at (703) 308-6381.

Sincerely yours,



Robert S. Brennis  
Acting Product Manager (32)  
Antimicrobial Program Branch  
Registration Division (7504C)

CONCURRENCES

SYMBOL							
SURNAME							
DATE							

2924

# ANTHIUM DIOXCIDE

5% AQUEOUS STABILIZED CHLORINE DIOXIDE  
FOR INSTITUTIONAL OR INDUSTRIAL USE ONLY

Active Ingredient:  
 Chlorine Dioxide ..... 5%  
 Inert Ingredients ..... 95%  
 Total ..... 100%

**KEEP OUT OF REACH OF CHILDREN**

**CAUTION**

**SEE SIDE PANELS FOR ADDITIONAL PRECAUTIONARY STATEMENTS**

ACCEPTED  
with COMMENTS  
in EPA Letter Dated:

E.P.A. REG. NO. 9150-2  
E.P.A. EST. NO. 9150-RI-01

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MAY 1 1997

Under the Federal Insecticide,  
Fungicide, and Rodenticide Act as  
amended, for the pesticide  
registered under EPA Reg. No. 9150-2

INTERNATIONAL DIOXCIDE, INC.  
CLARK, N.J. 07066

## PRECAUTIONARY STATEMENTS HAZARDS TO HUMANS AND DOMESTIC ANIMALS

**CAUTION:** Harmful if swallowed. Avoid direct contact with skin, eyes or clothing.

### STATEMENT OF PRACTICAL TREATMENT

- If Swallowed: Drink promptly a large quantity of water. Do not induce vomiting. Avoid alcohol. Get medical attention.
- If in Eyes: Flush with plenty of water for 15 minutes. Get medical attention.
- If on Skin: Wash with plenty of soap and water. Get medical attention if irritation persists.

**NOTE TO PHYSICIAN:** Probable mucosal damage may contraindicate the use of gastric lavage.

## ENVIRONMENTAL HAZARDS

This product is toxic to fish. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or public waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the EPA.

## CHEMICAL AND PHYSICAL HAZARDS

Stabilized chlorine dioxide is a strong oxidizing agent. Contamination with other materials such as acids, chlorine, organic chemicals, etc., may cause a chemical reaction resulting in evolution of chlorine dioxide gases and heat. Explosion and/or fire could result. Chlorine dioxide is a poisonous explosive gas. Keep all chemical and foreign materials away from this solution.

## STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal. Do not store with easily oxidizable materials, acids, reducers, and combustible material. Avoid heat or freezing conditions. Store upright and do not stack drums over 2 high on pallets or partially filled drums. Use of a drum pump is suggested. Keep drum tightly closed when not withdrawing liquid. In case of spills, dilute with large quantities of water. Do not allow liquid to dry because this could present a fire hazard. Store only in the original container and take care to prevent cross contamination with other pesticides, fertilizer, food and feed.

**EMERGENCY HANDLING:** In case of contamination or decomposition, do not reseal container. Isolate in an open, well ventilated area. Flood with large volumes of water. Cool unopened drums in vicinity by water spray.

**PESTICIDE DISPOSAL:** Waste resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

**CONTAINER DISPOSAL:** Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

**NOTICE:** Seller expressly warrants that the product conforms to its chemical description. There are no warranties associated with the sale of this product either express or implied, including, but not limited to the warranties of fitness for a particular purpose or use.

ACCEPTED  
with COMMENTS  
in EPA Letter Dated:

MAY 11 1997

Under the Federal Insecticide,  
Fungicide, and Rodenticide Act,  
amended for the Pesticide  
registered under EPA Reg. No. 9150-2

**TO CONTROL ODOR AND SLIME FORMING BACTERIA IN COOLING AND WARMING WATERS SUCH AS CANNING RETORT AND PASTEURIZER COOLING WATER, USED TO DECREASE OR INCREASE PACKAGED PRODUCT TEMPERATURE BY IMMERSION IN OR BY SPRAYING WITH THE TREATED PROCESS WATERS**

**Directions for Use:**

- 1) All tanks, tunnels, conveyor chains, heat exchanges, heat exchange towers, lines, spray bars, and nozzles should be thoroughly cleaned when possible, and completely rinsed using clean, potable water prior to treatment.
- 2) Preparation of solution: Water systems including the cooling or warming tanks or spray systems, towers, lines and all water containing parts of the system may be batch loaded at start up with 13 ounces of Anthium Dioxide per one thousand (1000) gallons of potable water (5.0 ppm available  $\text{ClO}_2$ ). To maintain the 5.0 ppm available  $\text{ClO}_2$  in the water system a timed or electronically controlled chemical feed pump or injector system can be used for additions to the system or for treating the make-up water. Make up new Anthium Dioxide solutions daily.

Optional activated solution: If heavy use of cooling or warming water or introduction of additional bacteria loads is expected or if slime buildup is heavy, an additional activation step may be used in preparation of solution.

- 3) Preparation of activated solution: Prepare in a well ventilated area, avoid breathing any fumes which may be produced while crystals are dissolving. For each one thousand (1000) gallons of system water to be treated, measure 13 ounces of Anthium Dioxide and pour into a clean plastic container, pail or drum. To this Anthium Dioxide amount, add food grade citric acid of no less than 99% purity, at the rate of 3.3 ounces (95 grams) crystals per 13 ounces of Anthium Dioxide. Allow five (5) minutes reaction time for crystals to dissolve. Cooling or warming water systems may be batch loaded at start up using 13 ounces of the prepared solution per one thousand (1000) gallons of potable water (5.0 ppm available  $\text{ClO}_2$ ). Batch or timed additions of the prepared solution can be made or an electronically controlled chemical feed pump or injector system can be used for additions of the prepared solution to the process water to maintain 5.0 ppm available  $\text{ClO}_2$ . Make up new Anthium Dioxide solutions daily.

**Note: Chemical feed pumps and injectors must be chlorine resistant for best operation. Available  $\text{ClO}_2$  levels should be confirmed using an International Dioxide chlorine dioxide test kit.**

ACCEPTED  
with COMMENTS  
in EPA Letter Dated:

MAY

Under the Federal Insecticide,  
Fungicide, and Rodenticide Act as  
amended for the pesticide  
registered under EPA Reg. No. 915052

**TO CONTROL THE BUILDUP OF ODOR AND SLIME FORMING BACTERIA IN PROCESS WATERS FOR VEGETABLE RINSES AND ASSOCIATED TANKS, FLUMES AND LINES.**

Directions for Use:

1. All tanks, flumes and lines etc., should be thoroughly cleaned when possible with a suitable detergent and completely rinsed using clean, potable water prior to treatment.
2. Preparation of solution: Chill tanks or vegetable rinse tanks may be batch loaded at start up with 1/3 fl. oz. (10 ml) Anthium Dioxide per twenty five (25) gallons of potable water (5.0 ppm available  $ClO_2$ ). Make up waters should be treated using a chemical feed pump or injector system and applied at the rate of 1/3 fl. oz. twenty five (25) gallons potable water. Make up new Anthium Dioxide solutions daily.

Optional activated solution - if heavy use of rinse water is expected or if slime buildup is extreme, an additional activation step may be used in preparation of solution.

3. Preparation of activated solution: Prepare in a well ventilated area, avoid breathing any fumes which may be produced while crystals are dissolving. For each 25 gallons of rinse water to be used measure and 1/3 oz. (10 ml) of Anthium Dioxide and pour into a clean plastic container containing 1 gallon of water. Activate this solution by:
  - 1) Adding 0.002 grams of Activator C or
  - 2) Adding 2.2 grams of Activator K or
  - 3) Adjusting the pH to 4.0 with acetic acid, citric acid, phosphoric acid, sulfuric acid or hydrochloric acid.

Allow this solution to stand for 15 minutes and then add to 24 gallons of water to give 5 ppm chlorine dioxide. Chill tanks or vegetable rinse tanks may be batch loaded at start up with activated Anthium Dioxide solution with 1/3 fl. oz. (10 ml) per twenty five (25) gallons of potable water (5.0 ppm available  $ClO_2$ ). Make up waters should be treated using a chemical feed pump. In order to insure accurate delivery, a 1 to 10 dilution of the active concentration should be made and the feed rate of 3-1/3 fl. oz. per twenty five (25) gallons should be maintained. Make up fresh Anthium Dioxide solutions daily.

Note: Chemical feed pumps and injectors must be chlorine resistant for best operation. Available  $ClO_2$  levels should be confirmed using an IDI test kit, available from International Dioxide, Inc.

**FOR USE IN THE PREPARATION OF FRUITS AND VEGETABLES TO EXTEND FRESHNESS AND SHELF LIFE.**

Directions for Use:

1. Before treatment, whole fruits and vegetables should be washed and thoroughly rinsed with clean potable water.
2. In a 1 gallon container, add 1/3 fl. oz. (10 ml) of Anthium Dioxide and add 0.002 grams of Activator C or adjust the pH to 4.0 with vinegar. Allow to stand for 15 minutes then add to 24 gallons of water.

**PRE-TREATMENT FOR UNCUT, UNPEELED FRUITS AND VEGETABLES.**

3. Dip produce in treatment solution for about ten (10) to twenty (20) seconds, then follow with a potable water rinse.

**TO CONTROL THE BUILD-UP OF ODOR AND SLIME FORMING BACTERIA IN STAINLESS STEEL TRANSFER LINES AND ON-LINE EQUIPMENT SUCH AS HYDROCOOLERS, PASTEURIZERS AND THE LIKE OVERNIGHT AND OVER WEEKENDS.**

Directions for Use:

1. Clean equipment or line thoroughly using a suitable detergent followed by a clean, potable water rinse before treatment.
2. Preparation and application of solution: For each ten (10) gallons of volume in lines and/or equipment, add 0.5 fl. oz. of Anthium Dioxide (20 ppm available ClO<sub>2</sub>) to potable make up water. Mix and fill lines and equipment overnight. Drain and allow to air dry just prior to next run start-up.

**IN LABORATORIES, HOSPITALS, MORGUES, INSTITUTIONS**

**To Disinfect Non-Porous, Hard Surfaces Such as Tile Floors, Walls and Ceilings and Stainless Steel Cold Rooms and Walk-In Incubators.**

Directions for Use:

1. Clean all surfaces thoroughly with a suitable detergent and rinse with water prior to disinfection.

ACCEPTED  
with COMMENTS  
in EPA Letter Dated:

MAY 1 1997

Under the Federal Insecticide, Fungicide, and Rodenticide Act as amended for the pesticide registered under EPA Reg. 9150-2

2. Preparation of active disinfecting solution: Place 1-1/3 fl. oz. of Anthium Dioxide concentrate in one gallon of water into a clean, plastic pail, and add 1.2 grams of Activator-C. This will yield a working solution containing 500 ppm available chlorine dioxide. Prepare in a well ventilated area, avoid breathing any fumes which may be produced during activation. Allow 15 minutes reaction time and for activator to dissolve completely. As an alternate activation method, adjust the pH of the diluted Anthium Dioxide to 4.0 with acetic, citric, phosphoric, sulfuric or hydrochloric acid, or add 8.6 grams of Activator K.
3. To apply: Activated solutions may be sprayed, mopped or sponged onto surfaces to be disinfected. All surfaces must be thoroughly wetted for at least ten (10) minutes. When spraying disinfectant solutions, use an appropriate spraying device. Active solutions may be irritating when breathed, therefore, always use an applicable NIOSH/MSHA approved respirator appropriate for chlorine dioxide when spraying these solutions. After application, allow to air dry. Treat as required. Always apply freshly made solutions. Never reuse activated solutions.

#### To Disinfect Bench Tops, Biological Hoods, Incubators, Stainless Steel Equipment and Instruments.

##### Directions for Use:

1. Clean all surfaces thoroughly with a suitable detergent and rinse with water prior to disinfection.
2. Preparation of active disinfectant solution: Place 10 ml of Anthium Dioxide concentrate into a clean, plastic pail and add 1 liter of potable water and 0.3 grams of Activator C. Prepare in a well ventilated area, avoid breathing any fumes which may be produced while reacting. Allow fifteen (15) minutes reaction time and for the activator to dissolve completely. This will yield a working solution containing 500 ppm available chlorine dioxide. As an alternate activation method, adjust the pH to 4.0 with acetic, citric, phosphoric, sulfuric or hydrochloric acid, or add 2.4 grams of Activator K.
3. To apply: Activated solutions may be squirted directly onto surfaces from a plastic squeeze bottle or may be used as a soak solution. All contact surfaces must be thoroughly damp for at least ten (10) minutes. Allow to air dry. Activated solutions of Anthium Dioxide, stored in plastic squirt bottles, may be held up to one (1) week before replacement with fresh solution. Soak solutions of Anthium Dioxide should be changed daily.

ACCEPTED  
with COMMENTS  
in EPA Letter Dated:

MAY 1997  
Under the Federal Insecticide,  
Fungicide, and Rodenticide Act as  
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registered under EPA Reg. No. 9150-2

**To Disinfect Water Bath Incubators.**

## Directions for Use:

1. Prior to disinfection, thoroughly clean the reservoir with a suitable detergent and rinse with clean water.
2. Preparation of active disinfectant solution: Place 0.13 fl. oz. of Anthium Dioxide concentrate into a clean glass or plastic container, add one (1) gallon of clean, potable water and add 0.3 grams of Activator-C (50 ppm available chlorine dioxide). Prepare in a well ventilated area, avoid breathing any fumes which may be produced during activation. Allow fifteen (15) minutes reaction time and for activator to dissolve completely. As an alternate activation method, adjust the pH to 4.0 with acetic, citric, phosphoric, sulfuric or hydrochloric acid, or add 8.6 grams of Activator K.
3. To apply: Activated solution should be poured into waterbath reservoir and allowed to stand one (1) hour at room temperature. Drain reservoir and fill with fresh water.

**To Control Odor and Slime Forming Bacteria in Waterbath Incubators.**

## Directions for Use:

1. When using Anthium Dioxide in waterbath incubators, always begin with a freshly cleaned and disinfected reservoir.
2. To apply: Fill waterbath with clean, potable water to near capacity. For each gallon of water add 0.13 oz. Anthium Dioxide (50 ppm available  $\text{ClO}_2$ ) or 1.0 ml Anthium Dioxide per liter of water. When water becomes cloudy, discard water and repeat procedure.

**To Control Odors Resulting from the Sterilization of Spent Biologicals in Steam Autoclaves.**

## Directions for Use:

1. To reduce autoclave odors of used biologicals, Anthium Dioxide should be sprayed or poured directly into the stainless steel autoclave buckets.
2. Preparation of solution: Place 2-2/3 fl. oz. of Anthium Dioxide concentration per gallon of working solutions (1,000 ppm available  $\text{ClO}_2$ ) or 20.0 ml Anthium Dioxide per one (1) liter of water into a clean glass or plastic container and

mix. Dilute concentrate to one (1) gallon clean, potable water per each 2-2/3 oz. or to one (1) liter per each 20.0 ml.

3. To apply: Spray or pour Anthium Dioxide solution into or onto the autoclave buckets just prior to autoclaving.

### To Deodorize Animal Holding Rooms, Sick Rooms, Morgues and Work Rooms.

#### Directions for Use:

1. Rooms to be deodorized should be in a clean condition prior to Anthium Dioxide application.
2. Preparation of solution: Place 2-2/3 fl. oz. Anthium Dioxide concentrate per one (1) gallon of working solution or 20 ml per one (1) liter working solution (1,000 ppm available chlorine dioxide) into a clean glass or plastic container. Dilute concentrate to one (1) gallon clean potable water for each 2-2/3 fl. oz. or to one (1) liter for each 20 ml Anthium Dioxide.
3. To apply: Spray solution using a suitable spraying device onto walls, ceilings and floors; lightly dampening all surfaces. Avoid breathing mist of solutions by using an applicable NIOSH/MSHA approved respirator appropriate for chlorine dioxide. Allow to air dry, then ventilate the area. Treat as required.

### IN ANIMAL REARING & CONFINEMENT FACILITIES

#### To Disinfect Commercial Animal Confinement Facilities such as Poultry Houses, Swine Pens, Calf Barns and Kennels.

#### Directions for Use:

1. Remove all animals and feed from premises, vehicles, enclosures, coops and crates.
2. Remove all litter and manure from floors, walls and surfaces of barns, pens, stalls, chutes and other facilities and fixtures occupied or traversed by animals.
3. Empty all troughs, racks and other feeding and watering appliances.
4. Thoroughly clean all surfaces with soap and detergent and rinse with water.
5. Preparation of active disinfectant solution: Place 1-1/3 fl. oz. Anthium Dioxide concentrate into a clean, plastic pail, add one (1) gallon of clean, potable water and 1.2 grams of Activator-C. Prepare in a well ventilated area. Avoid

breathing any fumes which may be produced or allow fifteen (15) minutes reaction time and for activator to dissolve completely. This will yield a working solution containing 500 ppm of available chlorine dioxide. As an alternate activation method, adjust the pH to 4.0 with acetic, citric, phosphoric, sulfuric or hydrochloric acid, or add 8.6 grams of Activator K.

6. To apply: Using commercial sprayer, saturate all surfaces with the activated Anthium Dioxide solution for a period of ten (10) minutes. Active solutions may be irritating when breathed, therefore, always use an applicable NIOSH/MSHA approved respirator appropriate for chlorine dioxide when spraying these solutions. Immerse all halters, ropes and other types of equipment used in handling and restraining animals as well as forks, shovels and scrapers used for removing litter and manure.
7. After treatment, ventilate buildings, coops or other enclosed spaces and allow to air dry. Repopulate when solution has dried.
8. Thoroughly scrub treated feed racks, troughs, automatic feeders, fountains and waterers with soap or detergent and rinse with potable water before use.

### To Control the Build-up of Odor and Slime Forming Bacteria in Animal Confinement Areas.

#### Directions for Use:

1. Remove all litter and manure from floors, walls and surfaces of barns, pens, stalls, chutes, cases and other facilities and fixtures occupied or traversed by animals. Thoroughly clean all surfaces with soap or detergent and rinse with clean water.
2. Preparation of solution: Place 2-2/3 fl. oz. Anthium Dioxide concentrate per gallon of working solution (1,000 ppm available  $ClO_2$ ) into a clean, plastic pail. Dilute concentrate with one (1) gallon clean, potable water for each 2-2/3 fl. oz. Anthium Dioxide.
3. To apply: Using a commercial sprayer, saturate all surfaces with the Anthium Dioxide solution. When spraying Anthium Dioxide solutions, always use an applicable NIOSH/MSHA approved respirator appropriate for chlorine dioxide to avoid breathing mist.

ACCEPTED  
with COMMENTS  
in EPA Letter D-111

Under the Federal Insecticide,  
Fungicide, and Rodenticide Act as  
amended, this pesticide is  
registered under FIFRA 9150-2

## To Control Animal Odors on Pets and in Litter Boxes, Carpets and Concrete Floors.

### Directions for Use:

1. For litter boxes: Wash out litter boxes with suitable detergent and rinse with clean, potable water. Soak overnight in solution of one (1) oz. Anthium Dioxide per 2-1/2 quarts of water (625 ppm available chlorine dioxide). Add litter, sprinkle surface liberally with Anthium Dioxide solution.
2. For controlling odors in carpets: Add 1-1/4 oz. Anthium Dioxide per gallon (500 ppm available chlorine dioxide) of either rug shampoo mix or 1-1/4 oz. Anthium Dioxide per each gallon of rinse water. Shampoo carpets. Allow to air dry. CAUTION: Anthium Dioxide may bleach some carpets and fabrics, especially if applied on top of another chemical agent. Do not apply until a sample test has been tried and observed for at least 24 hours.
3. For concrete floors: Clean floor thoroughly using a suitable detergent; rinse with clean water. Prepare solution by adding 3-1/4 oz. (1250 ppm available chlorine dioxide) Anthium Dioxide per gallon of water. Mop or spray solution liberally onto floor. Allow to air dry.
4. For animal baths: Wash animal well with appropriate pet shampoo; rinse with clean water. Prepare solution by adding 1/4 oz. Anthium Dioxide (100 ppm available chlorine dioxide) per gallon of water. Rinse animal thoroughly with prepared solution. Allow to air dry. Avoid direct contact with animal's eyes, nose and ears.
5. For treating animal odors with high levels of ammonia: Wash area thoroughly with suitable detergent and rinse with clean water. Preparation of solution: For each gallon of solution, place 1-2/3 oz. Anthium Dioxide into a clean, plastic container. To this concentrate add 1 tablespoon household bleach and allow to react for five (5) minutes. Dilute with 1 gallon clean, potable water. Apply by mopping or spraying solution liberally onto area. Allow to air dry. Additional applications may be necessary.

## IN WATER TREATMENT AND WATER STORAGE SYSTEMS

### To Disinfect Water Storage Systems Aboard Aircraft, Boats, RV's, Off-Shore Oil Rigs, etc.

#### Directions for Use:

1. Prior to disinfection, tanks should be cleaned using a suitable detergent and thoroughly flush with clean, potable water. There is both a ten (10) minute and

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in EPA Letter Dated:

MAY 1997

Under the Federal Insecticide,  
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registered under EPA Reg. No. 9150-2

a one (1) hour disinfection procedure to choose from.

2. Preparation of active solution: For ten (10) minute procedure: Place 1-1/3 fl. oz. of Anthium Dioxide concentrate per gallon of working solution (500 ppm available chlorine dioxide) into a clean plastic container dilute with clean potable water and add 1.2 grams of Activator-C. Prepare in a well ventilated area. Avoid breathing any fumes which may be produced while activator is dissolving. Allow fifteen (15) minutes reaction time and for activator to dissolve completely. As an alternate activation method, adjust the pH to 4.0 with acetic, citric, phosphoric, sulfuric or hydrochloric acid, or add 8.6 grams of Activator K. Pour activated solution into tank, filling the tank completely, at the rate of one gallon for each 1-1/3 fl. oz. Anthium Dioxide. Bleed air out of lines and allow to stand at least ten (10) minutes. Drain tank and lines and flush with potable water. For one (1) hour procedure: Place 1-1/3 fl. oz. of Anthium Dioxide concentrate and ten (10) gallons of water (50 ppm available chlorine dioxide) into a clean plastic container and add 1.2 grams of Activator-C. Prepare in a well ventilated area. Avoid breathing any fumes which may be produced while activator is dissolving. Allow fifteen (15) minutes reaction time and for activator to dissolve completely. As an alternate activation method, adjust the pH to 4.0 with acetic, citric, phosphoric, sulfuric or hydrochloric acid, or add 8.6 grams of Activator K. Pour activated solution into tank and dilute with clean, potable water, filling the tank completely, at the rate of ten (10) gallons for each 1-1/3 fl. oz. Anthium Dioxide. Bleed air out of lines and allow to stand at least one (1) hour. Drain tank and lines then fill with potable water.

### To Control Build-Up of Slime and Odor Causing Bacteria and Enhance the Taste of Stored Potable Water.

#### Directions for Use:

1. Prior to treatment of potable water, thoroughly clean and disinfect the water storage system to ensure a sanitary condition. Thoroughly rinse with clean, potable water.
2. Potable water should be treated at a rate of one (1) fl. oz. Anthium Dioxide per 75 gallons potable water (5 ppm available  $ClO_2$ ) and may be injected or batch treated.
3. Water storage tank should be sufficiently sealed to prevent outside contamination and direct sunlight.
4. Using an IDI test kit, confirm the chemical level to be 5 ppm and check to see this level does not fall below 1 ppm.

ACCEPTED  
with COMMENTS  
to EPA Letter Dated:

Under the Federal Insecticide,  
Fungicide, and Rodenticide Act as  
amended, for the pesticide  
registered under EPA Reg. No. 91502

### To Help Remove Off Odors and Tastes from Municipal Well Waters.

#### Directions for Use:

1. Anthium Dioxide should be injected into the incoming water main using a chemical proportioning pump or injector at a rate of 1.0 fl. oz. Anthium Dioxide per 375 gallons water (1.0 ppm available  $\text{ClO}_2$ ).
2. Confirm pump or injector accuracy using an IDI test kit and adjust accordingly.
3. Anthium Dioxide levels should be checked weekly.

### IN MUSHROOM FACILITIES, SUCH AS MUSHROOM PRODUCTION, SPAWN PRODUCTION, MUSHROOM PROCESSING, AND CANNERY OPERATIONS

#### As a Terminal Sanitizing Rinse for Stainless Steel Tanks, Transfer Lines, On-line Equipment, Picking Baskets, Picking Utensils and Other Food Contact Surfaces.

#### Directions for Use:

1. All gross food particles and soil should be removed prior to sanitizing by use of a pre-flush, pre-scrape or pre-soak treatment.
2. Clean picking baskets, line equipment or other surface thoroughly using a suitable detergent and rinse with clean potable water before sanitizing.
3. Preparation of sanitizing solution: Place 1-1/3 fl. oz. of Anthium Dioxide concentrate into a clean plastic pail or drum, add five (5) gallons of clean potable water and add 1.2 grams of Activator-C. Prepare in well ventilated area. Avoid breathing any fumes which may be produced while activator is dissolving. Allow fifteen (15) minutes reaction time for activator to dissolve completely. This will yield a working solution containing 100 ppm available chlorine dioxide. As an alternate activation method, adjust the pH to 4.0 with acetic, citric, phosphoric, sulfuric or hydrochloric acid, or add 10 grams of Activator K.
4. To apply: Flush picking baskets, line equipment or other food contact surface with active solution making sure surface area is thoroughly wet for at least one (1) minute. After sanitizing drain baskets or equipment and allow to air dry. Treat after each use or production run. Discard solution after each use.

ACCEPTED  
with COMMENTS  
in EPA Letter Dated:

### To Disinfect Walls, Ceilings and Floors.

#### Directions for Use:

1. Before disinfection, all gross filth must be removed from areas to be disinfected and thoroughly cleaned with a suitable detergent followed by a clean, potable water rinse.
2. Preparation of active disinfecting solution: Place 1-1/3 fl. oz. of Anthium Dioxide concentrate per gallon of working solution (500 ppm available chlorine dioxide) into a clean, plastic pail. Add one gallon of clean, potable water and add 1.2 grams of Activator-C. Prepare in well ventilated area, avoid breathing any fumes which may be produced while activator is dissolving. Allow fifteen (15) minutes reaction time for activator to dissolve completely. This will yield a working solution containing 500 ppm of available chlorine dioxide. As an alternate activation method, adjust the pH to 4.0 with acetic, citric, phosphoric, sulfuric or hydrochloric acid, or add 8.6 grams of Activator K.
3. To apply: Spray disinfectant solution onto surface using a suitable spraying device and making sure that the area is thoroughly wet for at least ten (10) minutes. Active solutions may be irritating when breathed, therefore, always use an applicable NIOSH/MSHA approved respirator appropriate for chlorine dioxide when spraying these solutions. After application, allow to air dry. Treat as required. Always apply freshly made solutions. Never reuse activated solutions.

### To Control Mold and Slime Forming Bacteria on Walls, Floors, Ceilings, and Post-Crop Mushroom Growing Surfaces.

#### Directions for Use:

1. Before treatment, all soil and gross filth must be removed from areas to be treated and cleaned with detergent followed by a potable water rinse.
2. Preparation of solution: Place 2-2/3 fl. oz. of Anthium Dioxide concentrate per gallon of working solution (1,000 ppm available  $\text{ClO}_2$ ) into a clean, plastic pail or drum and dilute with clean, potable water.
3. To apply: Drench, spray or fog solution on walls, floors, ceilings and post-crop mushroom growing surface using a suitable watering, spraying or fogging device and making sure all surface areas are wet. During application, area must be closed as tightly as possible and sealed. After spraying or fogging, the area should be opened and aired for one (1) hour before repopulating. Avoid breathing solution mist by use of an applicable NIOSH/MSHA approved

Letter Dated:

respirator appropriate for chlorine dioxide. Avoid contact with food or food contact surfaces. Allow to air dry.

4. Repeat application as needed.

**TO INHIBIT BACTERIAL SLIME FORMING BACTERIAL BUILDUP IN COMMERCIAL WATER FILTRATION SYSTEMS, SAND BEDS, GRAVEL BEDS, CHARCOAL FILTERS AND COOLING WATER SYSTEMS.**

Directions for Use:

**FILTERS:**

- 1) Carefully back-flush filters with potable water where possible to remove any accumulated solid residue and contamination.
- 2) Fill system with potable water and adjust pH to 6.0 with citric acid, phosphoric acid, or acetic acid (vinegar) or equivalent.
- 3) Add 0.8 fl. oz. of Anthium Dioxide per gallon (300 ppm) of filter system volume to the access hatch and circulate the system for 1 hour. Check the pH and bring back to 6.0 if it has drifted. Bring the  $ClO_2$  concentration back to 300 ppm.
- 4) Circulate the solution for 1 additional hour, discharge and then water wash for 30 minutes with potable water to remove the chlorine dioxide.

**COOLING WATER SYSTEMS:**

- 1) Add 1 gallon of Anthium Dioxide per 10,000 gallons of cooling water every week.
- 2) Depending on the degree and type of contamination, addition frequency may be reduced to every 2-3 weeks when contamination is under control.

**IN INDUSTRIAL APPLICATION - TO INHIBIT THE GROWTH OF SLIME AND ODOR CAUSING BACTERIA IN WATER BASED CUTTING OILS**

Directions for Use:

- 1) *Batch Method* - add 32 oz. of Anthium Dioxide per thousand gallons to fresh system and repeat weekly or on first indication of increased bacterial contamination (odor, slime, bacterial count) alkaline systems may require higher concentration of Anthium Dioxide.

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in EPA Letter Dated:

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- 2) *Continuous Method* - Proportion in 2 gallons of Anthium Dioxide per million gallons per day used in the system. Alkaline systems may require higher concentration.
- 3) *Badly Contaminated Systems* - Slug dose system with 10 gallons of Anthium Dioxide per million gal. of cutting oil. Then start the continuous procedure described above.

Adjust quantities in any of the above systems to compensate for levels of contamination, pH, type of contamination etc. as necessary.

### AS A SLIMICIDE IN PAPER MILLS TO PREVENT SLIME, TAR SPOTS, AND PITCH SPOTS IN WHITE WATER SYSTEMS

By maintaining a  $ClO_2$  atmosphere in the white water, the microorganisms cannot produce the nodules which result in slime.

#### Directions for Use:

- 1) If the pH of the white water is below 7.0, add 4-1/2 gallons of Anthium Dioxide per hundred tons of paper produced.
- 2) If the pH of the white water is above 7.0 then add 1/2 gallon of 5% sodium hypochlorite as an activator with each 4-1/2 gallons of Anthium Dioxide.

Continuous proportioning of the Anthium Dioxide feed is recommended for best results. In many cases, the amount can be reduced after the system is clean.

### TO PREVENT CORROSION AND SLIME BACTERIA IN OIL WELLS DURING SECONDARY RECOVERY OPERATIONS

#### Directions for Use:

- 1) Prepare a working solution of 5,000 ppm stabilized chlorine dioxide by diluting each gallon of Anthium Dioxide used to 10 gals. solution with the injection water.
- 2) Proportion 1 part of the above solution into each 150 parts of reinjected acidified (3.0 - 4.0 pH) water.
- 3) Monitor microbial content of the water and increase or decrease the addition rate of the working solution as necessary.

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**IN FOOD PROCESSING PLANTS, (POULTRY, MEAT, FISH), DAIRIES AND BOTTLING PLANTS.**

For use as a terminal food contact surface sanitizing, rinse conforming to 21 CFR 178.1010 paragraph b. 34 and c. 29 not requiring a subsequent potable water rinse.

**Directions for Use:**

- 1) This solution is intended for use as a food contact surface sanitizer for dairies, ice cream factories and food processing plants.
- 2) This solution may be used on hard surfaces such as tables, trays, bins, etc. and the interior or exterior of food processing equipment.
- 3) All equipment should be thoroughly cleaned to remove gross food particles and soil by pre-flush or pre-scrape and where necessary, a pre-soak treatment. The surfaces or objects should then be cleaned with a detergent or cleaner followed by a potable water rinse before application of the sanitizing solution.
- 4) The active biocide in the system is free  $\text{ClO}_2$  even though the stabilized chlorine dioxide at pH 8.5 is mildly bacteriostatic. Free  $\text{ClO}_2$  is released by addition of an activator and/or acidulant. A solution containing 1,000 ppm of total available chlorine dioxide is prepared by adding 1 gal. of Anthium Dioxide per 50 gallons of water and then adding 780 grams (1.71 lbs.) of Activator K per 50 gallons of solution. Allow to stand for 15 minutes after agitation for 5 minutes. As an alternate, this solution can be activated by addition of food grade citric acid, phosphoric acid or acetic acid (vinegar) to the pH to 4.0. Then dilute one part of this solution with 4 parts of water to give 200 ppm of total chlorine dioxide and about 125 ppm free  $\text{ClO}_2$  (30 - 40 ppm free  $\text{ClO}_2$  when acid activation is used.)
- 5) This solution should be allowed to contact all food processing equipment for at least 1 minute but preferably longer by transferring and/or spraying into each food processing vessel. It is essential that the sanitizing solution contact all surfaces to be sanitized. Thus, hard to reach in place equipment, pipes, closed vessels, etc. should be filled with the solution to ensure contact of all surfaces with the sanitizing solution. Use suitable protective breathing apparatus when spraying this solution on external equipment.
- 6) After the required contact time or longer, the solutions are allowed to drain from all surfaces and air dried.
- 7) The above solution may not be reused for sanitizing but may be diluted to 1:5 with water and used for cleaning of walls, floors and drains of the plant.

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## FOR CONTROL OF MOLLUSKS IN ONCE THROUGH WATER COOLING SYSTEMS

### Directions for Use:

- 1) Add 4.0 gallons of Anthium Dioxide to 100 gallons of water and add 1 lb. of Activator C (or 6.9 lbs. of Activator K) to the solution with mild stirring for 15 minutes. This produces an activated solution containing 2000 ppm  $\text{ClO}_2$ . (Use respirator approved for chlorine dioxide use.)
- 2) As an alternate activation method, reduce the pH of the above solution to 3.0 with a mineral or organic acid and allow to slowly stir for 1/2 hour before use.

### Slug Use

Add between 2.5 gallons and 12.5 gallons of the above solution per 1000 gallons of water (5 ppm to 25 ppm).

### Continuous Dose

Add between 0.125 gallon and 1 gallon of the above solution per 1000 gallons of water (0.25 to 2.0 ppm).

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**DISINFECTION OF POULTRY CARCASSES**

Directions for Use:

A) Anthium Dioxide Plus Chlorine (21 CFR Part 173.69)

In order to control the microorganism population in poultry chiller water, one should target the addition of chlorine dioxide at 20-40 ppm level so that a residual of 0.5-3 ppm is measured in the exiting chilled water.

This is easily accomplished by using Anthium Dioxide, a mixture of oxychlorine species which is capable of generating a 95+% yield of  $ClO_2$ , using activation by chlorine which is already available in all poultry chiller water systems. The feed rates of the various streams is set forth below for the reactants, chlorine and Anthium Dioxide.

PPM $ClO_2$	ANTHIUM DIOXIDE FEED RATE	$Cl_2$ FEED RATE LBS./1000GAL	$Cl_2$ PPM
20	0.4gal/1000gal $H_2O$	0.0083	10
30	0.6gal/1000gal $H_2O$	0.01245	15
40	0.8gal/1000gal $H_2O$	0.0166	20

B) Anthium Dioxide Plus Acid (21 CFR Part 173.325)

This antimicrobial agent may be used as a component of (1) a carcass spray or dip solution prior to immersion of the carcass in a rechiller or chiller tank or (2) in a prechiller or chiller solution.

1) When used as a carcass spray or dip solution, dilute 1 gallon Anthium Dioxide to 100 gallons with water. The solution is then acidified to a pH between 2.5 and 2.9 with an acid selected from the following acids: phosphoric, citric, acetic, hydrochloric, lactic, malic or sulfuric. The total available  $ClO_2$  concentration should be maintained between 373 - 894 ppm as determined by an IDI test kit.

2) When used in a prechiller or chiller tank, Anthium Dioxide is diluted 1:1000 (i.e. one gallon of Anthium Dioxide diluted to 1000 gallons with water). This solution is activated by addition of an acid such as phosphoric, citric, acetic, hydrochloric, lactic, malic or sulfuric to a pH of between 2.8 to 3.2. The concentration of total available  $ClO_2$  is maintained between 38 and 112 ppm as determined by an IDI test kit.

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## **ANTHIUM DIOXIDE IN POULTRY HOUSE DISINFECTION**

### **To Control Bacteria, Taste and Odor in the Water Supply System:**

#### **Directions for Use:**

If the water supply is badly fouled with biofilm then add 5.0 ppm of chlorine dioxide to the water supply by adding 1.0 gallon of Anthium Dioxide to each 10,000 gallons of poultry drinking water.

After 24 hours, the addition rate can be reduced to 1.0 ppm chlorine dioxide by adding 1.0 gallon of Anthium Dioxide to each 50,000 gallons of poultry drinking water.

If the micro-biological content of the water is eliminated by this rate of addition, the concentration of chlorine dioxide can be reduced to 0.5 ppm (1.0 gallon of Anthium Dioxide per 100,000 gallons of water). If the micro-biological control is not adequate at the 1.0 ppm chlorine dioxide, then add 1.5 ppm chlorine dioxide to the poultry drinking water (1.0 gallon of Anthium Dioxide per 33,333 gallons of water).

### **To Control Disease, Bacteria and Odor in the Egg Room**

#### **Directions for Use:**

- 1) Wash down the entire egg room with high pressure water containing 20 ppm chlorine dioxide (0.4 gallon Anthium Dioxide diluted to 1000 gallons with water) to remove gross filth or heavy soil.
- 2) Spray the entire area for 5 minutes with a Tri-Jet Fogmaster (or equivalent) with a 1000 ppm solution of chlorine dioxide (1 gallon of Anthium Dioxide diluted to 50 gallons with water), being sure to cover walls, ceiling, floors, work tables and benches. Allow to dry for 1 hour or if possible overnight before resuming operations.

The washing and fogging operations should be conducted once per week (or more frequently in cases of heavy contamination during operations).

- 3) If it is necessary to clean the floors by mopping, then use 390 ppm chlorine dioxide (1 ounce Anthium Dioxide per gallon of water). Allow to dry on the floor.
- 4) A foot bath of 1000 ppm chlorine dioxide (1 gallon of Anthium Dioxide per 50 gallons of water) is placed at the entrance to the egg room. Doors to the room should be kept closed at all times.

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- 5) A hand dip or rinse tank or basin containing 50 ppm of chlorine dioxide (1 gallon of Anthium Dioxide per 1000 gallons of water) is used on entering and exiting the room.

Both the foot bath and hand dip are replaced daily (sooner if traffic is heavy).

- 6) Humidification water is treated with 40 ppm chlorine dioxide (0.8 gallons of Anthium Dioxide per 1000 gallons of water) to prevent the build-up and airborne spread of Legionella and other micro-organisms.
- 7) Provide 20 ppm chlorine dioxide (0.4 gallon Anthium Dioxide per 1000 gallons of water) to the water supply in the egg washing machine.

### To Control Disease, Bacteria and Odor in the Hatching Area.

#### Directions for Use:

- 1) As soon as chicks are separated from Hatch, remove all trash containers with eggshells, down, etc. from the hatching area.
- 2) Remove all poultry and feeds from premises, trucks, coops and crates.
- 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 and rinse with water.
- 6) Spray or fog the entire area for 5 minutes with a 1000 ppm solution of chlorine dioxide (1 gallon of Anthium Dioxide to 50 gallons with water), using a Tri-Jet Fogmaster (or equivalent). Allow a 10 minute contact time.
- 7) Ventilate buildings, coops, and other closed spaces. Do not house poultry or employ equipment until treatment has been absorbed, set or dried.
- 8) Thoroughly scrub treated feed racks, troughs, automatic feeders, fountains and waterers with soap or detergent, and rinse with potable water before reuse.
- 9) All workers in this area should use a hand dip or rinse containing 50 ppm chlorine dioxide (1 gallon of Anthium Dioxide diluted to 1000 gallons with water).

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### To Control Odor, Bacteria and Disease when Separating Chicks in the Chick Room, Chick Grading Box and Sexing Room

#### Directions for Use:

- 1) Remove all poultry and feeds from premises, trucks, coops and crates.
- 2) Remove all litter and droppings from floors, walls and surfaces of facilities occupied or traversed by poultry.
- 3) Empty all troughs, racks and other feeding and watering appliances.
- 4) Thoroughly clean all surfaces with soap or detergent and rinse with water.
- 5) Spray or fog the entire area for 5 minutes with a 1000 ppm solution of chlorine dioxide (1 gallon of Anthium Dioxide to 50 gallons with water), using a Tri-Jet Fogmaster (or equivalent). Allow a 10 minute contact time.
- 6) Ventilate buildings, coops and other closed spaces. Do not house poultry or employ equipment until treatment has been absorbed, set or dried.
- 7) Thoroughly scrub treated feed racks, troughs, automatic feeders, fountains and waterers with soap or detergent, and rinse with potable water before reuse.
- 8) All workers in this area should use a hand dip or rinse containing 50 ppm chlorine dioxide (1 gallon of Anthium Dioxide diluted to 1000 gallons with water).
- 9) After use, wash area with high pressure water to remove gross filth and soil.
- 10) Use a spray bottle containing a solution of 1000 ppm chlorine dioxide (1.0 gallon of Anthium Dioxide diluted to 50 gallons with water) on hands, wire mesh and in empty chick boxes to control contamination and odors from litter.
- 11) To clean the floor by mopping daily, use a solution containing 390 ppm chlorine dioxide (1 ounce Anthium Dioxide per gallon of water). Allow to air dry.

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- 2) Wash the trays, carriages and other working equipment in a tray washing machine with 300-500 psi water to remove gross filth and soil.
- 3) As a final rinse in the tray washing machine, use a solution containing 20 ppm chlorine dioxide (0.4 gallons of Anthium Dioxide diluted to 1000 gallons with water) in high pressure water. Allow the trays, carriers and other working equipment to air dry. The walls, floors and carrying stands must also be sanitized with the same solution. Allow the equipment to air dry. Hold the sanitized equipment in a closed area for reuse.
- 4) Entrance and exit from the tray washing room must be through a foot rinse containing a solution of 1000 ppm chlorine dioxide (1.0 gallon of Anthium Dioxide diluted to 50 gallons with water). The rinse must be at least 1/2 inch deep and should be changed daily unless traffic is heavy.
- 5) After use, the tray washing room is washed with high pressure water to remove gross filth and soil. It is then disinfected by spraying or fogging with a solution containing 1000 ppm chlorine dioxide (1.0 gallon of Anthium Dioxide diluted to 50 gallons with water) for 15 minutes and allowed to air dry. This treatment is repeated after each use of the tray wash room.
- 6) The Loading Platform is washed from time to time to remove gross filth and soil. The trash containers are washed after discarding the contents to remove gross filth and soil. They are then sprayed with a 1000 ppm solution of chlorine dioxide. (1.0 gallon of Anthium Dioxide diluted to 50 gallons with water) and stored.

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