

United States  
Environmental Protection  
Agency**Office of Pesticide Programs**

November 21, 2007

James P. Ringo  
Bio-Cide International, Inc.  
2845 Broce Drive  
Norman, OK 73072

Subject: Oxine  
EPA Registration No. 9804-1  
Submission Dated: July 12, 2007  
Receipt Date: July 16, 2007

Dear Mr. Ringo:

The following amendment, submitted in connection with registration under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended, is acceptable with the comments/conditions listed below:

**Conditions**

1. The proposed label claims that the product, Oxine, is an effective disinfectant against *Enterococcus faecalis* [VRE] and *Staphylococcus aureus* [MRSA] on hard, non-porous surfaces for a contact time of 10 minutes. Data provided by the applicant support these claims.
2. On the proposed label, change "tile floors" to "glazed tile floors".
3. ATCC designation numbers, for all organisms listed, must be included in one of the following locations:
  - On the data matrix,
  - On the master label (as optional text) with the listing of the organisms claimed, or
  - As the final page of the master label (as optional text).
4. On the proposed label, the following corrections are required:
  - Change "ClO<sub>2</sub>" to "ClO<sub>2</sub>"
  - Include "for Air Ducts: following "Oxine" in Section 2.1

---

**General Comments**

A stamped copy of the labeling accepted with conditions is enclosed. Submit one copy of your final printed labeling before distributing or selling the product bearing the revised labeling.

2 7 25

Should you have any questions or comments concerning this letter, please contact Wanda Henson at (703) 308-6345.

Sincerely,



Emily H. Mitchell  
Product Manager - Team 32  
Regulatory Management Branch II  
Antimicrobials Division (7510P)

3 7 25

# OXINE®

ACCEPTED  
with COMMENTS  
EPA Letter Dated:

NOV 21 2007

Under the Federal Insecticide,  
Fungicide, and Rodenticide Act as  
amended, for the pesticide,  
registered under EPA Reg. No. 9804-1

**SANITIZER**  
**BACTERIOSTAT/DEODORIZER**

**-ACTIVE OXINE®-**

**STERILANT-DISINFECTANT**

**FUNGICIDAL-BACTERICIDAL-VIRUCIDAL-TUBERCULOCIDAL-SPORICIDAL**

- |                             |                        |
|-----------------------------|------------------------|
| Food Processing Plants      | *Guaranteed Shelf Life |
| Bottling Plants             | *Non-Volatile          |
| Institutional Use           | *Non-Flammable         |
| Animal Confinement          | *Low Corrosion         |
| Medical/Dental Laboratories | *Odor Control          |

This product can be used in Federally Inspected Meat and Poultry Facilities

**KEEP OUT OF REACH OF CHILDREN**  
**CAUTION**

**PRECAUTIONARY STATEMENT: HAZARD TO**  
**HUMANS AND DOMESTIC ANIMALS**

**HARMFUL IF SWALLOWED MAY CAUSE IRRITATION**  
**AVOID CONTACT WITH EYES**

Active Ingredient:

Chlorine Dioxide.....	2.0%
Other Ingredients.....	98.0%
Total.....	100.0%

**STORE IN COOL DARK PLACE-KEEP FROM FREEZING**  
E.P.A. REG. NO. 9804-1 E.P.A. EST. NO. 9804-OK-1

Net Contents:    \_\_\_ 3.25 fl. ozs.    \_\_\_ 16 fl. ozs.    \_\_\_ 32 fl. ozs.    \_\_\_ 1 gallon  
                         \_\_\_ 5 gallons            \_\_\_ 30 gallons            \_\_\_ 55 gallons

Bio-Cide International, Inc  
P.O. Box 722170  
Norman, OK 73070-8644

4 7 25

PROPER ACTIVATION OF OXINE®

MEASURE out the desired volume of Oxine® concentrate into a clean vessel in a well ventilated area. ADD the required amount of activator acid, stir and allow to dissolve for five minutes for citric acid or two minutes for phosphoric acid. Avoid breathing any fumes that may be produced. After appropriate activation time, DILUTE with clean water to your desired final concentration.

<u>CONCENTRATION</u>		<u>OUNCES PER 5 GALLONS</u>		<u>CITRIC ACID</u>
				<u>ACTIVATOR</u>
5	ppm	0.16	fl. oz./5 gallon	0.5g
10	ppm	0.32	fl. oz./5 gallon	1.0g
20	ppm	0.64	fl. oz./5gallon	2.0g
40	ppm	1.28	fl. oz./5gallon	4.0g
50	ppm	1.60	fl. oz./5gallon	5.0g
100	ppm	3.20	fl. oz./5gallon	10.0g
200	ppm	6.40	fl. oz./5gallon	20.0g
500	ppm	16.00	fl. oz./5gallon	50.0g

<u>CONCENTRATION</u>		<u>OUNCES PER 5 GALLONS</u>		<u>33% PHOSPHORIC</u>
				<u>ACID LIQUID</u>
5	ppm	0.16	fl. oz./5 gallon	0.025 fl.oz.
50	ppm	1.60	fl. oz./5gallon	0.25 fl.oz.
100	ppm	3.20	fl. oz./5gallon	0.5 fl.oz.
500	ppm	16.00	fl. oz./5gallon	2.5 fl.oz.

PROPER DILUTION OF OXINE®

Parts Per Million

5	ppm	0.032 fl. oz.	per gallon	or	0.25 ml per liter
10	ppm	0.064 fl. oz.	per gallon	or	0.5 ml. per liter
20	ppm	0.128 fl. oz.	per gallon	or	1.0 ml. per liter
40	ppm	0.256 fl. oz.	per gallon	or	2.0 ml. per liter
50	ppm	0.32 fl. oz.	per gallon	or	2.5 ml per liter
80	ppm	0.512 fl. oz.	per gallon	or	4.0 ml per liter
100	ppm	0.64 fl. oz.	per gallon	or	5.0 ml. per liter
200	ppm	1.28 fl. oz.	per gallon	or	10.0 ml per liter
400	ppm	2.56 fl. oz.	per gallon	or	20.0 ml. per liter
500	ppm	3.2 fl. oz.	per gallon	or	25.0 ml. per liter
1,000	ppm	6.4 fl. oz.	per gallon	or	50.0 ml. per liter
2,500	ppm	16.0 fl. oz.	per gallon	or	125.0 ml. per liter

Parts Per Million

5	ppm	0.16 fl. oz.	per Five (5) gallons	or	1.25 ml per liter
50	ppm	1.6 fl. oz.	per Five (5) gallons	or	12.5 ml per liter
100	ppm	3.2 fl. oz.	per Five (5) gallons	or	25.0 ml. per liter
500	ppm	16 fl. oz.	per Five (5) gallons	or	125.0 ml. per liter

## Alternative Activation

The active biocidal component of Oxine<sup>®</sup> system is free chlorine dioxide. Unactivated Oxine<sup>®</sup> in the neutral to mildly alkaline pH range is bacteriostatic. For higher level microbial control, such as disinfection and sanitation, activation of Oxine<sup>®</sup> is required to generate free chlorine dioxide. The use of citric acid as an activator is specified in most Oxine<sup>®</sup> label applications. Alternatives to citric acid for activation include organic acids, such as acetic acid, and inorganic acids such as phosphoric, hydrochloric, and sulfuric acids. Activation equivalent to that of citric acid may be achieved by adjusting the Oxine<sup>®</sup> solution to pH 2-3 with an alternative acid. The activated Oxine<sup>®</sup> is then diluted to the required use concentration in accordance with label instructions. For food processing applications only food grade activator acids may be used. Bio-Cide International, Inc or your Oxine<sup>®</sup> distributor can guide you in proper activation techniques.

**IN FOOD PROCESSING PLANTS SUCH AS POULTRY, FISH & MEAT, RESTAURANTS, DAIRIES, BOTTLING PLANTS AND BREWERIES**

**1) As a terminal sanitizing rinse for stainless steel and other hard nonporous food contact surfaces such as tanks, transfer lines, recirculation and clean in place (CIP) systems and other food processing equipment in accordance with 21 CFR 178.1010.**

Direction for Use:

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

i) All gross food particles and soil should be removed prior to sanitizing by use of a pre-flush, pre-scrape or pre-soak treatment.

ii) Clean tank, line, or surface thoroughly using a suitable detergent and rinse with clean potable water before sanitizing.

iii) Preparation of sanitizing solutions: Prepare an activated working solution containing 100 ppm available chlorine dioxide according to the activation chart.

iv) To apply: Fill, flush, immerse, circulate or spray tank, line, equipment or food contact surface with active solution making sure surface area is thoroughly wet for at least one minute. After sanitizing drain tank, line or equipment, allow to air-dry. Fresh sanitizing solution should be made up daily.

**2) To disinfect walls, ceilings and floors**

Directions for Use:

i) 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.

ii) Preparation of disinfecting solution: Prepare an activated working solution containing 500 ppm available chlorine dioxide according to the activation chart.

iii) To apply: Spray disinfectant solution onto surface to be disinfected, 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. Never reuse activated solutions.

**3) To disinfect walls, ceilings and floors of poultry processing plants.**

Special Instructions for Inactivating Avian Influenza A.

Kills Avian Influenza A on pre-cleaned environmental surfaces.

Directions for Use:

i) 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.

ii) Preparation of disinfecting solution: Prepare an activated working solution containing 500 ppm available chlorine dioxide according to the activation chart.

iii) To apply: Spray disinfectant solution onto surface to be disinfected, 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. Never reuse activated solutions.

**4) To control the buildup of odor and slime forming bacteria in process waters for vegetable and fruit rinses and associated tanks, flumes and lines.**

Directions for Use:

i) 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

ii) Preparation of solution: Chill tanks or vegetable rinse tanks may be batch loaded at start up. Prepare a non-activated working solution containing 5 ppm available chlorine dioxide according to the dilution chart. 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 and 1/3 fl. oz. per ten (10) gallons should be maintained. Make up fresh solutions daily.

iii) 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.

iv) Preparation of activated solution: Prepare an activated working solution containing 5 ppm available chlorine dioxide according to the activation chart. Chill tanks or vegetable rinse tanks may be batch loaded at start up with activated Oxine® solution at 1/3 fl. oz. per ten (10) gallons of potable water. Makeup waters should be treated using a chemical feed pump. In order to insure accurate delivery, a 1 to 10 dilution of the active concentrations should be made and the feed rate of 3 and 1/3 fl. oz. per ten (10) gallons should be maintained. Make up fresh solutions daily.

(v) After treatment of fruits and vegetable follow with a potable water rinse. NOTE: Chemical feed pumps and injectors must be chlorine resistant for best operation. Available ClO<sub>2</sub> levels should be confirmed using a Bio-Cide test kit, available from your local Oxine® distributor.

**5) For use in the preparation of fruits and vegetables to extend freshness and shelf life.**

**PRE-TREATMENT FOR UNCUT, UNPEELED FRUITS AND VEGETABLES**  
Directions for Use:

i) Before treatment, whole fruits and vegetables should be washed and thoroughly rinsed with clean potable water.

ii) Prepare a non-activated working solution containing 5 ppm available chlorine dioxide according to the dilution chart.

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

**6) To control the buildup of odor and slime forming bacteria in ice making plants and machinery.**

Directions for Use:

i) Ice making machinery should be disassembled and thoroughly cleaned using a suitable detergent followed by a potable water rinse.

ii) Preparation and applications of solutions: The Oxine® solution should be applied to the incoming water line of the ice machine via a chemical feed pump or injector system. Prepare a non-activated working solution containing 20 ppm available chlorine dioxide according to the dilution chart.

NOTE: Chemical feed pumps and injectors must be chlorine resistant for best operation. Available ClO<sub>2</sub> levels should be confirmed using a test kit available from Bio-Cide International, Inc.

**7) As a bacteriostat to treat ice used for icing fish in the round.**

Directions for Use:

i) Oxine® may be batch loaded or metered into makeup water used to produce ice for icing fish in the round. Prepare a non-activated working solution containing 20 ppm available chlorine dioxide according to the dilution chart.

**8) To control odor and slime forming bacteria build-up in commercial water filtration systems, sand beds, gravel beds and charcoal filters, with accessible service hatches.**

Directions for Use:

i) Drain all existing water from sand and carbon filters and rinse once with clean, potable water. Fill sand filter with potable water and adjust pH of water to 6.0 using citric acid or equivalent pH adjuster.

ii) To prepare solution: Measure out two (2) fl. oz. Oxine® concentrate for each gallon of filter system volume (300 ppm available ClO<sub>2</sub>) and add to the sand filter through access hatch. Fill system with clean, potable water and circulate system 30 minutes. Allow system to soak two (2) to three (3) hours. After treatment, drain system and rinse with clean, potable water until residue is no longer detectable using the Bio-Cide test kit and when pH is normal.

**9) To control mold and mildew, odor and slime forming bacteria on walls, floors, and ceilings.**

Directions for Use:

- i) 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.
- ii) Preparation of solution: Prepare a non-activated working solution containing 1,000 ppm available chlorine dioxide according to the dilution chart.
- iii) To apply: spray solutions onto walls, floors, and ceilings using a suitable spraying device making sure all surface areas are damp. Avoid breathing solutions mist by using an applicable NIOSH/MSHA approved respirator appropriate for chlorine dioxide. Avoid contact with food or food contact surfaces. Allow to air dry.
- iv) Repeat application as needed.

**10) 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:

- i) Clean equipment or line thoroughly using a suitable detergent followed by a clean, potable water rinse before treatment.
- ii) Preparation and application of solution: Prepare a non-activated working solution containing 20 ppm available chlorine dioxide according to the dilution chart. Mix and fill lines and equipment overnight. Drain and allow to air dry just prior to next run start-up.

**11) For microbial control in sweetwater cooling systems:**

Directions for Use:

- i) Oxine® may be batch loaded or metered into sweetwater cooling systems. Prepare a non-activated working solution containing 5 ppm available chlorine dioxide according to the dilution chart.
- ii) Oxine® concentrations should be monitored using BCI test kits to maintain a 5.0 ppm concentration

**12) For use as a lube additive to control bacterial slime and odor on moving conveyors and chains in food processing facilities.**

Directions for Use:

- i) Prior to the application of the lube Oxine® mixture, all conveyors, lube lines, spray nozzle heads, conveyor surfaces, and other associated structures should be thoroughly cleaned and sanitized.
- ii) Oxine® should be added to the water dilution step of the lube system just prior to its injections into the distribution system. Addition of the Oxine® into the lube/water mixture should be at the rate of 0.64 fl. oz. to 1.28 fl. oz. per 10 gallons of lube mixture. This will result in a final concentration of between 10 and 20 ppm Oxine® in the lube solution.
- iii) For best results use with natural (fatty acid, soap based) lubricant products. For advice on lube compatibilities contact your BCI distributor.

**13) To control odor and slime forming bacteria in cooling and warming waters, such as canning retort and pasteurizer cooling waters, used to decrease or increase packaged product temperature by immersion in or by spraying with the treated waters.**

Directions for Use

- i) All tanks, tunnels, conveyor chains, heat exchangers, heat exchange towers, lines, spray bars, and nozzles should be thoroughly cleaned, when possible, and completely rinsed using clean, potable water prior to treatment.



ii) 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 batched loaded at start up. Prepare a non-activated working solution containing 5 ppm available chlorine dioxide according to the dilution chart. To maintain the 5.0ppm available chlorine dioxide 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 Oxine® solutions daily.

iii) Preparation of activated solution: Cooling or warming water systems may be batch loaded at start up. Prepare an activated working solution containing 5 ppm available chlorine dioxide according to the activation chart. Batch or timed additions of the prepared solution can be made or a 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 chlorine dioxide.

Note: Chemical feed pumps and injectors must be chlorine resistant for best operation. Available chlorine dioxide levels should be confirmed using a BCI test kit, available from your local Oxine® distributor.

**14) To sanitize clean shell eggs intended for food or food products.**

Directions for Use:

i) Preparation of sanitizing solution: Prepare an activated working solution containing 100-200 ppm available chlorine dioxide according to the activation chart. To prepare a 200 ppm activated solution place 1.28 oz of Oxine® concentrate per gallon of working solution (200 ppm available chlorine dioxide) into a clean, plastic pail and add 3.8 grams (3/4 teaspoon) of Oxine® Activator Crystals or food grade citric acid of no less than 99% purity. Prepare in a well ventilated area. Allow five (5) minutes reaction time for crystals to dissolve completely. To this solution, add one (1) gallon of clean potable water.

ii) Spray eggs thoroughly with activated solution making sure surface area is thoroughly wet for at least one (1) minute and allow to drain. Solution must be equal to or warmer than the eggs, but not to exceed 130°F.

iii) 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. Never reuse activated solutions.

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

**1) 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:

i) All gross food particles and soil should be removed prior to sanitizing by use of a pre-flush, pre-scrape or pre-soak treatment.

ii) Clean picking baskets, line equipment or other surface thoroughly using a suitable detergent and rinse with clean potable water before sanitizing.

iii) Preparation of sanitizing solution: Prepare an activated working solution containing 100 ppm available chlorine dioxide according to the activation chart.

iv) 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.

**2) To disinfect walls, ceilings, and floors.**

Directions for Use:

i) 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.

ii) Preparation of active disinfecting solution: Prepare an activated working solution containing 500 ppm available chlorine dioxide according to the activation chart.

iii) 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.

**3) To control mold and slime forming bacteria on walls, floors, ceilings, and post-crop mushroom growing surfaces.**

Directions for Use:

i) 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.

ii) Preparation of solution: Prepare a non-activated working solution containing 1000 ppm available chlorine dioxide according to the dilution chart.

iii) To apply: Drench, spray or fog solution onto 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 NIOAH/MSHA approved respirator appropriate for chlorine dioxide. Avoid contact with food or food contact surfaces. Allow to air dry.

iv) Repeat application as needed.

**IN POTATO FACILITIES SUCH AS PROCESSING/PACKAGING OPERATIONS, STORAGE SHEDS, STORAGE CELLARS, AND SEED PRODUCTION FACILITIES.**

**1) As a terminal sanitizing rinse for bins, tanks, flume line, on-line equipment, conveyors, seed cutters, and other potato handling equipment.**

i) All gross food particles and soil should be removed prior to sanitizing by use of a pre-flush, pre-scrape or pre-soak treatment.

ii) Clean tank, line, or surface thoroughly using a suitable detergent and rinse with clean potable water before sanitizing.

iii) Preparation of solution: Prepare an activated working solution containing 100 ppm available chlorine dioxide according to the activation chart.

iv) To apply: Fill, flush, immerse, or spray tank, line, equipment or food contact surface with active solution making sure surface area is thoroughly wet for at least one minute. After sanitizing drain tank, line or equipment allow to air dry. Fresh sanitizing solution should be made up daily or more often if solution becomes diluted or soiled.

**2) To disinfect walls, ceilings, floors, planting and harvesting equipment, and truck beds.**

Directions for Use

i) 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.

ii) Preparation of active disinfecting solution: Prepare an activated working solution containing 500 ppm available chlorine dioxide according to the activation chart.

iii) To apply: Spray disinfectant solution onto surface to be disinfected 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. Never reuse activated solutions.

**3) To control the buildup of odor and slime forming bacteria in process waters for potato rinse, associated tanks, flumes and lines.**

Directions for Use:

i) 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.

ii) Preparation of solution: Chill tanks or vegetable rinse tanks may be batch loaded at start up. Prepare a non-activated working solution containing 5 ppm available chlorine dioxide according to the dilution

11 8 25

chart. Make up waters should be treated using a chemical feed pump or injector system. Make up new Oxine<sup>®</sup> solution daily.

iii) Preparation of activated solution: Prepare an activated working solution containing 5 ppm available chlorine dioxide according to the activation chart. Chill tanks or vegetable rinse tanks may be batch loaded at start up with activated Oxine<sup>®</sup> solution. 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 and 1/3 fl. oz. per ten (10) gallons should be maintained. Make up fresh Oxine<sup>®</sup> solutions daily.

NOTE: Chemical feed pumps and injectors must be chlorine resistant for best operation. Available ClO<sub>2</sub> levels should be confirmed using a Bio-Cide test kit available from your local Oxine<sup>®</sup> distributor.

iv) After treatment, the potatoes must be rinsed with potable water.

## IN LABORATORIES, HOSPITALS, MORGUES, INSTITUTIONS

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 bloodstream 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 preclean or decontaminate critical or semi-critical medical devices prior to sterilization or high level disinfection.

**1) Kills HCV, HIV-1, MRSA and VRE on precleaned environmental surfaces/objects previously soiled with blood/body fluids in health care settings or other settings in which there is an expected likelihood of soiling of inanimate surfaces/objects with blood of body fluids, and in which the surfaces/objects likely to be soiled with blood and body fluids can be associated with the potential for transmission of Hepatitis C Virus (HCV), Human Immunodeficiency virus, Type 1 (HIV-1) (associated with AIDS), Methicillin Resistant Staphylococcus aureus (MRSA) and Vancomycin Resistant Enterococcus faecalis (VRE).**

Special Instructions for Cleaning and Decontamination Against HCV and HIV-1 of surfaces/objects Soiled with Blood/Body Fluids:

Personal Protection: Specific barrier protection items to be used when handling items soiled with blood or body fluids are disposable latex gloves, gowns, masks, or eye coverings.

Cleaning Procedure: Blood and other body fluids must be thoroughly cleaned from surfaces and objects before application of the product.

Disposal of Infectious Materials: Blood and other body fluids should be autoclaved and disposed of according to federal, state and local regulations for infectious waste disposal.

Preparation of disinfecting solution: Prepare an activated working solution containing 500 ppm available chlorine dioxide according to the activation chart.

To apply: Spray disinfectant solution onto hard non-porous surface to be disinfected, 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. Never reuse activated solutions.

**2) 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:

i) Clean all surfaces thoroughly with a suitable detergent and rinse with water prior to disinfections.

ii) Preparation of active disinfecting solution: Prepare an activated working solution containing 500 ppm available chlorine dioxide according to the activation chart.

iii) 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.

**3) To disinfect bench tops, biological hoods, incubators, stainless steel equipment and instruments.**

Directions for Use:

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

ii) Preparation of active disinfectant solution: Prepare an activated working solution containing 500 ppm available chlorine dioxide according to the activation chart.

iii) 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 Oxine, stored in plastic squirt bottles, may be held up to one (1) week before replacement with fresh solution. Soak solutions of Oxine® should be changed daily.

**4) To disinfect heat-sensitive, reusable, non-critical medical equipment and other hard, non-porous environmental surfaces found in hospitals, nursing homes, durable medical equipment suppliers, doctor's offices, schools, gymnasiums, homes and animal clinics. Oxine may also be used to decontaminate small medical devices and instruments prior to sterilization or high level disinfection.**

Directions for Use:

- i) **PRECLEAN:** Blood and other body fluids must be thoroughly cleaned from surfaces before application of the disinfectant. Blood and other body fluids should be autoclaved and disposed of according to all applicable federal, state and local regulations for waste disposal.
- ii) **DILUTION:** Add (one)(1) ounce of Oxine® (concentrate) to a (one)(1) quart container and fill with water to make a (625ppm)(working)(dilute) solution.
- iii) **ACTIVATION:** Activate (one)(1) quart of Oxine® (dilute)(solution) by adding (1) teaspoon of activator and immediately mix until activator is dissolved.
- iv) **DISINFECTION:** Immerse equipment completely in Oxine® (solution)(disinfecting solution) for a minimum of five(5) minutes at room temperature (approx. 65-80 degrees Fahrenheit). Solution remains effective for twenty-four (24) hours. Remove equipment from the solution, rinse with potable tap water, gently shake equipment to remove residual water and air dry. Discard solution in drain with running water. Oxine® (disinfecting)(solution) is effective against bacteria including *Mycobacterium tuberculosis*, fungi and viruses including: Poliovirus Type 2, Herpes Simplex Type 1, Coxsackie Virus, Rhinovirus, Cytomegalovirus and Respiratory Syncytial Virus (RSV).

**5) To disinfect water bath incubators.**

Directions for Use:

- i) Prior to disinfection, thoroughly clean the reservoir with a suitable detergent and rinse with clean water.
- ii) Preparation of active solution: Prepare an activated working solution containing 50 ppm available chlorine dioxide according to the activation chart.
- iii) To apply: Activated solution should be poured into water bath reservoir and allowed to stand one (1) hour at room temperature. Drain reservoir and fill with fresh water.

**6) To control odor and slime forming bacteria in water bath incubators.**

Directions for Use:

- i) When using Oxine® in water bath incubators, always begin with a freshly cleaned and disinfected reservoir.
- ii) To apply: Fill water bath with clean, potable water to near capacity. For each gallon of water add 1/3 fl. oz. Oxine® (50 ppm available ClO<sub>2</sub>). When water becomes cloudy, discard water and repeat procedure.

**7) To control odors resulting from the sterilization of spent biologicals in steam autoclaves.**

Directions for Use:

- i) To reduce autoclave odors of used biologicals, Oxine® should be sprayed or poured directly into the stainless steel autoclave buckets.
- ii) Preparation of solution: Prepare a non-activated working solution containing 1,000 ppm available chlorine dioxide according to the dilution chart.
- iii) To apply: Spray or pour Oxine® solution into or onto the autoclave buckets just prior to autoclaving.

**8) To deodorize animal holding rooms, sick rooms, morgues and work rooms.**

Directions for Use:

- i) Rooms to be deodorized should be in a clean condition prior to Oxine® application.
- ii) Preparation of solution: Prepare a non-activated working solution containing 1,000 ppm available chlorine dioxide according to the dilution chart.
- iii) To apply: Spray solution using a suitable spraying device onto walls, ceilings and floor; 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.

**9) Oxine® Sterilant – Oxine® is recommended for use as a disinfectant in schools, hospitals, medical, dental, industrial and institutional facilities to control human-health related micro-organisms on hard, non-porous environmental surfaces and for sterilizing non-critical medical devices, laboratory and other non-medical devices and equipment. Contraindicated for use with metal instruments. Oxine® is sporicidal when objects or surfaces are immersed in a 2000 ppm solution prepared in the following manner.**

- i) **PRECLEAN:** Blood and other body fluids must be thoroughly cleaned with a suitable detergent and rinsed with water before sterilization. Blood and other body fluids should be autoclaved and disposed of according to all applicable federal, state and local regulations for waste disposal.
- ii) **ACTIVATION:** Activate 12.8 fl. Oz. of Oxine® with 76 grams of citric acid and wait 20 minutes. Keep mixture covered during activation.
- iii) **DILUTION:** Add activated Oxine® to a one (1) gallon container and fill with water to prepare one (1) Gallon of use-solution. Avoid breathing fumes.
- iv) **STERILIZATION:** Immerse equipment, small medical devices and instruments to be sterilized for a minimum of two (2) hours at room temperature (approx. 65-80 degrees Fahrenheit). Do not re-use the solution. Discard solution after each use into a drain with running water.

**10) For use in Dental Offices and Laboratories as a dental pumice disinfectant.**

Directions for Use:

- i) Prepare solution in a well ventilated area. To make one liter of solution, pour 25.0 ml of Oxine® concentrate into a clean plastic container. To this, add 22 grams of BCI Activator Crystals and mix slightly, allowing 5 minutes reaction time and for crystals to dissolve. Once solution has yellowed, dilute to one liter with clean potable water (500 ppm available ClO<sub>2</sub>).
- ii) To apply: The working solution can be conveniently contained in a one (1) liter plastic "squeeze" bottle for up to one (1) week. Apply the dry pumice powder exactly as water to produce the pumice slurry. Apply additional working solution as needed to reconstitute dried out slurry to appropriate viscosity. Oxine® will keep pumice slurry thoroughly disinfected. New Oxine® solution should be made up weekly.

**IN ANIMAL REARING AND CONFINEMENT FACILITIES**

**1) To disinfect commercial animal confinement facilities such as poultry houses, swine pens, calf barns and kennels**

Directions for Use:

- i) Remove all animals and feed from premises, vehicles, enclosures, coops and crates.
- ii) 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.
- iii) Empty all troughs, racks and other feeding and watering appliances.
- iv) Thoroughly clean all surfaces with soap or detergent and rinse with water.
- v) Preparation of active disinfecting solution: Prepare an activated working solution containing 500 ppm available chlorine dioxide according to the activation chart.
- vi) To apply: Using commercial sprayer, saturate all surfaces with the activated Oxine<sup>®</sup> 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. After treatment, ventilate buildings, coops, or other enclosed spaces and allow to air dry. Repopulate when solution had dried. Thoroughly scrub treated feed racks, troughs, automatic feeders, fountains and waterers with soap or detergent and rinse with potable water before use.

**2) To disinfect poultry houses**

**Special Instructions for Inactivating Avian Influenza A.**

**Kills Avian Influenza A on pre-cleaned environmental surfaces.**

Directions for Use:

- i) Remove all poultry and feed from premises, vehicles, enclosures, coops and crates.
- ii) Remove all litter and droppings from floors, walls and surfaces of facilities and fixtures occupied or traversed by poultry.
- iii) Empty all troughs, racks and other feeding and watering appliances.
- iv) Thoroughly clean all surfaces with soap or detergent and rinse with water.
- v) Preparation of active disinfecting solution: Prepare an activated working solution containing 500 ppm available chlorine dioxide according to the activation chart.
- vi) To apply: Using commercial sprayer, saturate all surfaces with the activated Oxine<sup>®</sup> 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 equipment used in handling and restraining animals as well as forks, shovels and scrapers used for removing litter and droppings. After treatment, ventilate buildings, coops, or other enclosed spaces and allow to air dry. Repopulate when solution had dried. Thoroughly scrub treated feed racks, troughs, automatic feeders, fountains and waterers with soap or detergent and rinse with potable water before use.

**3) To control the build-up of odor and slime forming bacteria in animal confinement areas.**

Directions for Use:

i) 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.

ii) Preparation of solution: Place 6 ½ fl. oz. Oxine® concentrate into a clean, plastic container. Dilute concentrate with one (1) gallon clean, potable water.

iii) To apply: Using a commercial sprayer, saturate all surfaces with the Oxine® solution. When spraying Oxine solutions, always use an applicable NIOSH/MSHA approved respirator appropriate for chlorine dioxide to avoid breathing mist.

**4) To control animal odors on pets and in litter boxes, carpets and concrete floors.**

Directions for Use:

i) For litter boxes: Wash out litter boxes with suitable detergent and rinse with clean, potable water. Soak overnight in solution of one (1) oz. Oxine® per one (1) quart of water (650 ppm available chlorine dioxide). Add litter, sprinkle surface liberally with Oxine® solution.

ii) For controlling odors in carpets: Add 3 oz. Oxine® per gallon (500 ppm available chlorine dioxide) of rug shampoo mix or 3 oz. Oxine® per each gallon of rinse water. Shampoo carpet. Allow to air dry. CAUTION: Oxine® 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 a least 24 hours.

iii) For concrete floors: Clean floor thoroughly using a suitable detergent; rinse with clean water. Prepare solution by adding 8 oz. (1250 ppm available chlorine dioxide) Oxine® per gallon of water. Mop or spray solution liberally onto floor. Allow to air dry.

iv) For animal baths: Wash animal well with appropriate pet shampoo; rinse with clean water. Prepare solution by adding ¼ oz. Oxine® (80 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.

v) For treating animal odors with high levels of ammonia: Wash area thoroughly with suitable detergent and rinse with clean water. Preparation of solution: Place 4 oz. Oxine® 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.

**5) To control the build up of slime and odor causing bacteria in feed waters.**

Directions for Use:

i) Feed water should be treated at the rate of one (1) fl. oz. Oxine® per 30 gallons of water (5 ppm available chlorine dioxide) and may be injected or batch loaded.

ii) Feed water storage tanks should be sufficiently sealed to prevent outside contamination and direct sunlight.



## IN WATER TREATMENT AND WATER STORAGE SYSTEMS

### 1) To disinfect water storage systems aboard aircraft, boats, RV's, and off-shore oil rigs.

#### Directions for Use:

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

ii) Preparation of active solution: For ten (10) minute procedure: Preparation of active solution: Prepare an activated working solution containing 500 ppm available chlorine dioxide according to the activation chart. Pour activated solution into tank and dilute with clean potable water, filling the tank completely, at the rate of one gallon for each 3 ¼ oz. Oxine®. 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: Preparation of active solution: Prepare an activated working solution containing 50 ppm available chlorine dioxide according to the activation chart. Pour activated solution into tank completely, at the rate of ten (10) gallons for each 3 ¼ fl. oz. Oxine®. Bleed air out of lines and allow to stand at least one (1) hour. Drain tank and lines then fill with potable water.

### 2) To control build-up of slime and odor causing bacteria and enhance the taste of stored potable water.

#### Directions for Use:

i) 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.

ii) Potable water should be treated at a rate of one (1) fl. oz. Oxine® per 30 gallons potable water (5 ppm available ClO<sub>2</sub>) and may be injected or batch treated.

iii) Water storage tank should be sufficiently sealed to prevent outside contamination and direct sunlight.

iv) Using a Bio-Cide test kit, confirm the chemical level to be 5 ppm and check to see this level does not fall below 1 ppm

### 3) To help remove off odors and tastes from municipal well waters.

#### Direction for Use:

i) Oxine® should be injected into the incoming water main using a chemical proportioning pump or injector at a rate of 1.0 fl. oz. Oxine® per 150 gallons water (1.0 ppm available ClO<sub>2</sub>).

ii) Confirm pump or injector accuracy using a Bio-Cide test kit and adjust accordingly.

iii) Oxine® levels should be checked weekly.

18 7 25

## IN INDUSTRIAL APPLICATIONS

### 1) For use as a slimicide in pulp and paper white water systems

#### Directions for Use:

i) For initial start-up or for severe slime contamination Oxine® should be prepared by the addition of eight ounces of citric acid activator per 50 gallons of Oxine® or by addition of other suitable acid to adjust the Oxine® solution to approximately pH 7.0.

ii) The activated Oxine® solution should then be proportioned into the white water system by means of a suitable metering pump at a continuous rate to produce an in-stream concentration of 1.25 – 5.0 ppm. This concentration is obtained by proportioning the Oxine® into the system at a rate of 0.8 to 3.2 fluid ounces per 100 gallons of process water. The system should be monitored by use of a Bio-Cide test kit, or other suitable means, and feed rate adjustments made accordingly. After slime control is established the Oxine® feed rates may be lowered to maintain the desired level of slime control.

### 2) For enclosed and recirculating cooling water systems

#### Directions for Use:

i) Severely fouled systems should be cleaned prior to treatment.

ii) For initial startup or heavy microbial contamination Oxine® should be added to the cooling water system at a rate of one gallon of Oxine® per 4,000 gallons of system water. This is equivalent to 5.0 ppm as available chlorine dioxide. Dosage should be repeated daily until microbial control is achieved.

iii) When microbial contamination is under control the concentration and frequency of treatment may be reduced to levels adequate to maintain the desired level of microbial control.

## Use Directions for Air Ducts

### 1.0 General

Oxine® is designed to be used as one component of a comprehensive HVAC and duct maintenance program. The purpose of such a program is to assure that the HVAC system and ducts function in the manner they were designed to, remain free from mold and other microbial growth and other contamination, and continue in that condition. This product must only be used in only those cases where visible microbial growth has been detected in the system and then only after removing that growth and identifying and correcting the conditions that led to that growth. If you need help in understanding any part of these instructions or have additional questions after reading these instructions, DO NOT APPLY THIS PRODUCT until you have received the answers for all of your questions.

### 2.0 Inspection

Prior to inspecting, cleaning, treating, repairing or otherwise working on a duct section, the HVAC system should be turned off or the section under repair physically isolated from sections in active use.

Prior to any application of Oxine® the system must be inspected for cleanliness and mechanical condition. When initiating any measures to repair, clean or treat ducts and associated HVAC system components, industry standards from the National Air Duct Cleaners Association (NADCA) and other organizations must be followed.

HVAC systems should be routinely inspected for cleanliness by visual means. The NADCA Standard *Assessment, Cleaning and Restoration of HVAC Systems* (ACR 2002 or the latest revision), provides minimum recommended inspection frequency schedules for ducts and other system components. More information on NADCA standards can be obtained from the NADCA web site at [www.nadca.com](http://www.nadca.com)

### 2.1 Cleanliness Inspection

According to NADCA Standards, HVAC system cleaning must be performed when any of the following conditions are found in the cleanliness inspection. If any of these deficiencies are found during inspection, cleaning in accordance with industry standards must be performed prior to the application of Oxine®:

#### 2.1.1 Contamination

- HVAC systems should be operated in a clean condition. If significant accumulations of contaminants or debris are visually observed within the HVAC system, then cleaning is necessary. Likewise, if evidence of microbial growth is visually observed or confirmed by analytical methods, then cleaning is required.
- If the HVAC system discharges visible particulate into the occupied space, or a significant contribution of airborne particles from the HVAC system into the indoor ambient air is confirmed, then cleaning is necessary.
- Heat exchange coils, cooling coils, air flow control devices, filtration devices, and air-handling equipment determined to have restrictions, blockages, or contamination deposits that may cause system performance inefficiencies, air flow degradation, or that may significantly affect the design intent of the HVAC system, require cleaning.
- Drain pans must be free from slime and sludge or other contamination. Badly rusted or corroded drain pans must either be repaired or replaced.
- Fans and fan housings must be free from accumulations of microbial growth and particulate matter.

If you need help in understanding existing industry standards, consult a qualified professional, or consult the information at [www.epa.gov](http://www.epa.gov) (search on "air ducts"). In addition, the following association and society Internet sites should be consulted for information on standards and guidelines they have developed:

- ACCA – [www.acca.org](http://www.acca.org)
- ASHRAE – [www.ashrae.org](http://www.ashrae.org)
- NADCA – [www.nadca.com](http://www.nadca.com)
- NAIMA – [www.naima.org](http://www.naima.org)
- SMACNA – [www.smacna.org](http://www.smacna.org)

**2.2 Mechanical Inspection**

Oxine® must be used only on ducts and other HVAC system components in sound mechanical condition as defined in 2.2.1 and 2.2.2 (below). The HVAC system components must be designed and installed in conformance with industry standards and guidelines. Prior to using the product, inspect the ducts and assure that they are in sound mechanical condition. The following general guidelines, supplemented by industry standards from SMACNA, NAIMA ASHRAE, ACCA and other organizations, must be followed:

**2.2.1 Air Leaks and Mechanical Defects**

The ducts must be free from air leaks and other mechanical defects. Air leaks will promote condensation of water that causes microbial growth.

**2.2.2 Design and Installation**

ASHRAE, SMACNA, NAIMA and other industry organizations have established guidelines and standards for the design and installation of HVAC and duct systems. You should determine that the duct system you wish to treat conforms to industry practice. If you are not knowledgeable of industry guidelines and standards, consult a qualified professional.

In some situations, the inspection may reveal that the duct system or other component is badly damaged or in such poor operating condition that it cannot be corrected through cleaning and/or minor repair. In these situations, the system should be replaced or rebuilt in conformity to the applicable industry standards prior to using Oxine®. Some (but not all) of the conditions that would indicate the need for major repairs or replacement of the system include:

- Improper size of ducts— Ducts must be sized to achieve correct airflow. When air-handling equipment is changed or new inlets or outlets added, the size of all components in the system should be recalculated and replacements made as needed.
- Physical damage — Crushed or deformed air ducts will restrict airflow and may leak (especially at joint areas). Damaged sections should be replaced or if there is extensive damage, the entire system should be replaced.
- Badly corroded metal components including duct sections, housings and cabinets, coil assemblies, drain pans, fans and their housings and heat exchange surfaces.
- Loose, damaged, friable or missing insulation – Insulation is important in preventing moisture condensation and subsequent growth of mold and other organisms. If insulation (either interior or exterior) is damaged, missing or not properly fastened it must be repaired or replaced or the associated duct sections replaced. Air handler, mixing, and VAV box housings are also normally insulated and this insulation should be checked for damage in a like manner.

Removed components that are contaminated with mold and other microbial growth may spread contamination while being removed from the building. To prevent this, smaller items should be placed in

plastic bags that should then be sealed before being removed. Larger items that cannot be safely packaged should be treated before being moved through occupied spaces. An appropriately labeled disinfectant can be used during treatment. Care must be used during treatment to assure that fumes from the agent being used are not released into occupied spaces. Products used should be used according to their label directions. Please contact Bio-Cide International at 800.323.1398 for guidance on the appropriate disinfectant to use for treatment.

**3.0 General Directions for Oxine® Usage**

Oxine® effectively controls by inhibiting growth of odor causing bacteria fungi, and other odor, stain or damage causing organisms in air ducts in residential, commercial, institutional, and industrial buildings. Oxine® also eliminates odors associated with bacteria, mold, mildew, smoke, animals, cooking, spoilage, musty and other odors and removes odor-causing organisms when used as part of such a comprehensive preventative maintenance program in air ducts and other HVAC system components.

Oxine® is a bacteriostat, fungistat (mold and mildew), mildewstat and deodorizer for use in residential, commercial and industrial settings.

Oxine® is formulated for use in ducts and HVAC components including:

- Unlined sheet metal.
- Air supply and return ducts and plenums fabricated with plywood, OSB or other wood like material.
- Flexible air ducts fabricated of metal or plastic.
- Air distribution components such as air handlers, mixing boxes, transfer boxes, transitions, turning vanes, dampers, fans and fan housings and associated components.
- Condensate drain pans.

Follow the directions below for the specific type of duct or component being treated. It is vital that the following directions be carefully read and understood prior to using the product. If you have any questions, need further information, require clarification, or do not understand any of the directions, call Bio-Cide International at 800.323.1398 prior to use.

**3.1 Application Instructions**

i) Preparation of active solution: Place 3 ¼ fl. oz. of Oxine® concentrate into a clean plastic container and add 10 grams of BCI Activator Crystals or food grade citric acid of no less than 99% purity. Prepare in a well ventilated area. Avoid breathing any fumes while the crystals are dissolving. Allow five minutes reaction time. To this solution add one gallon of clean potable water. (500 PPM ClO<sub>2</sub>)

ii) To apply: Prior to application area to be treated must be depopulated. Spray or fog active solution into duct work using a suitable spraying or fogging device (see below). Make sure that the surfaces are thoroughly wet for at least ten (10) minutes. During application, area must be closed as tightly as possible and sealed. Spray areas until thoroughly moist, giving special attention to cracks and crevices. After spraying or fogging, the area should be opened and aired for one (1) hour before repopulating. Active solutions may be irritating when breathed, therefore, always use an applicable NIOSH/ MSHA approved respirator appropriate for chlorine dioxide when fogging or spraying these solutions. After application, allow to air dry. Treat as required. Always apply freshly made solutions:

**3.2 Application Equipment and Devices**

Refer to the precautionary statements for the Personal Protective Clothing and other special instructions that must be followed.

**3.2.1 Brush, Mop or Wipe Application**

Brush, Mop or Wipe Application may be specified by some facility maintenance or remediation plans. These techniques are generally more labor intensive than other methods and are normally used only when specifications require. These methods are suitable only for smooth uniform surfaces. Do not use on porous

or non-uniform surfaces. If in doubt about a given surface, contact Bio-Cide International at 800.323.1398 before proceeding. When using brush or mop application, tools and materials used should be reserved only for application of Oxine<sup>®</sup>, kept clean and protected between uses and replaced when worn or visibly soiled. Natural fiber brushes are preferred although any quality brush is acceptable. Mops types should be those that leave minimal lint behind. Micro-fiber or other non linting cloths are preferable. Where other types of cloths are used, they must be soft enough that they absorb a sufficient quantity of liquid to provide uniform application.

During Brush, Mop or Wipe Application, the applicator must have access to the surfaces being treated. Usually this will require entering the ducts. In such cases, application must start from the point most distant from the point of entry into the duct. The applicator will then work from that point back to the entry point covering a 3 foot length of duct at a time. Apply to the top of the duct first, followed by the sides then the floor of the duct. Overlap applications to assure complete coverage. Cover completely while avoiding runs or pooling.

**3.2.2 Spray or Atomizer Applicators**

Spray application is preferred on large surfaces that are easily accessible (such as in long runs of large diameter ducts, coil assemblies and the interior of cabinets and housings with removable access panels). The spray equipment chosen should provide a consistent fine (10-80 micron) particle size and uniform spray pattern. Powered medium pressure sprayers are preferred.

Pump up garden type sprayers can be used but care must be taken to maintain maximum pressure by pumping frequently and the spray nozzle must be adjusted for the finest spray pattern possible. During application achieve complete uniform coverage. Avoid excessive wetting and do not allow the spray to run or pool.

**3.2.3 ULV or Mist Generating Sprayers**

ULV or mist or other wet small particle application is preferable where surfaces are irregular or less accessible.

Equipment capable of generating particles in the 15 to 60 micron range is most satisfactory. Avoid use of thermal type fog generators. Contact Bio-Cide International at 800.323.1398 for information on other devices.

Generally a fog will carry and provide adequate coverage up to 8 feet from the point of application so adequate penetrations must be cut in the ducts to assure complete coverage without over wetting. SMACNA, NADCA and NAIMA have established standards and guidelines for making and sealing openings in ducts. Operators should be trained on proper application techniques as well as correct duct penetration and sealing procedures using these standards and guidelines. Operators should also carefully read and follow directions for the brand of equipment used. Bio-Cide International personnel should be contacted at 800.323.1398 for information on training for using various types of equipment. Duct penetrations should be properly closed following application, in accordance with industry standards.

**3.2.4 Automated Atomizing or Spray System**

There are a number of automated spraying systems on the market including those that are carried by a "robot" through air ducts. These may provide an excellent option for application of Oxine<sup>®</sup> in parts of air ducts that are difficult to access if they produce the correct spray pattern and application quantity. These devices must be visually monitored using video or other means while applying spray so proper application rate will be maintained.

**3.3 Application Techniques**

Oxine<sup>®</sup> must be applied evenly throughout duct system and over other surfaces that are being treated. Even and uniform application is essential for satisfactory results. The procedures, equipment and techniques described below have been tested and provide the desired results. Other procedures, equipment or techniques may also achieve satisfactory results but should not be used without discussing the specific situation and equipment with a Bio-Cide International Representative who can be reached toll free at 800.323.1398.

**3.3.1 Application from Exterior of the HVAC System**

Oxine® may be sprayed into openings at intervals throughout the duct system or on components that are accessible through removable panels or access doors. Spray into openings every 8 feet at a minimum. Existing supply openings can be used where they provide a clear view of the surfaces being sprayed so that uniform application can be achieved. However, additional penetrations will have to be made as needed, so enough openings will be available to achieve total and uniform coverage. Spray application is not an acceptable technique where openings are greater than 8 feet apart, additional openings cannot be made and properly sealed, and/or the duct geometry does not allow for uniform coverage. In such cases, application from within the HVAC system is necessary (see 3.3.2 below):

**3.3.2 Application from Within the HVAC System**

When Oxine® cannot be sprayed into openings at intervals throughout the duct system, you must gain entry into the system and spray the product onto interior duct and other surfaces until they are thoroughly and uniformly covered using hand or powered spray equipment. This is the most frequently used technique and is the technique of choice for air handlers, other components with access panels or doors and large diameter (generally 20" x 20" minimum) ducts where direct access can be gained to surfaces being treated.

**3.4 Rate of Application**

The recommended rate of application for Oxine® varies depending on the surface being treated. Users of this product must carefully follow the rate of application instructions provided below:

**3.4.1 Bare Metal and Flexible Duct**

Apply until surface is evenly wet. Mist or wipe coverage 1,000 ft<sup>2</sup> per gallon. Spray coverage 500 ft<sup>2</sup> per gallon. If the above application rates result in surface runoff or liquid pooling on the bottom of the duct, lower the application rate until the surface is thoroughly and evenly wet without runoff or pooling. The exception to this is when treating coil assemblies. In this case, the spray should be applied generously until there is runoff into the drain pan so as to penetrate the coil assembly to the greatest possible depth.

**3.4.2 Semi Porous Surfaces such as Concrete or Plaster**

Apply until surface is evenly wet. Mist coverage 500 ft<sup>2</sup> per gallon. Wipe not recommended. Spray coverage 250-ft<sup>2</sup> per gallon. Oxine® must penetrate into surface crevices and irregularities or it will not be effective. Inspect and assure that penetration is satisfactory. It may be helpful to apply half of the quantity needed for full coverage spraying from side to side then repeat the application moving the spray from top to bottom.

**3.5 Frequency of Application**

This product must only be used in those cases where visible microbial growth has been detected in the system and then only after removing that growth and identifying and correcting the conditions that led to that growth. See guidance in sections 2.1 through 2.2.2 for evaluating the need for treatment. Prior to reapplication in such cases, investigate to determine the cause of re-growth and correct that problem prior to re-application. Make sure the reoccurrence of microbial growth does not have another cause such as persistently high humidity, standing water or hidden Leaks.

Prior to reapplication, the interior of the ducts and other surfaces must be inspected and found to be free of accumulated soil. If soil or growth is found, the cause should be determined and corrected and then the ducts cleaned in accordance with accepted industry practice.

**3.6 Returning the System to Operation following Application**

Fans and blowers in the section of duct being treated must be turned off during application of Oxine®. If the system cannot be shut down, the section of duct being treated must be isolated until treatment is complete.

24 8 25

This will prevent the spray of fog from being blown away from the surface that is being treated.

The system can be returned to full operation as soon as treatment is completed or at any time following completion of treatment. Oxine<sup>®</sup> will dry on surfaces within 15 minutes following application. Extended drying time does not have an impact on effectiveness or treatment.

When the above directions are followed properly, there will not be significant concentrations of Oxine<sup>®</sup> released to the spaces served by a system being treated. It is recommended that affected areas of the building be unoccupied during treatment.



**STORAGE AND DISPOSAL**

Do not contaminate water, food, or feed by storage or disposal.

**Product Storage:** Store in a cool, dry, well-ventilated location away from acids, chlorine and chlorine compounds, hypochlorites (bleach), organic solvents, sulfur and sulfite compounds, phosphorus, combustible/flammable materials, and direct sunlight. Keep containers tightly closed when not in use and open carefully to prevent spillage. Storage on wooden floors and pallets is not recommended.

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

**Pesticide Disposal:** Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

**ENVIRONMENTAL HAZARDS**

This pesticide is toxic to fish and aquatic organisms.

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 sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the EPA.

<b>FIRST AID</b>	
<b><i>If inhaled</i></b>	<ul style="list-style-type: none"> <li>- Move person to fresh air.</li> <li>- If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible.</li> <li>- Call a poison control center or doctor for further treatment advice.</li> </ul>
<b><i>If on skin or clothing</i></b>	<ul style="list-style-type: none"> <li>- Take off contaminated clothing.</li> <li>- Rinse skin immediately with plenty of water for 15-20 minutes.</li> <li>- Call a poison control center or doctor for treatment advice.</li> </ul>
<b><i>If in eyes</i></b>	<ul style="list-style-type: none"> <li>- Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lens, if present, after the first 5 minutes, then continue rinsing eye.</li> <li>- Call a poison control center or doctor for treatment advice.</li> </ul>
<b><i>If swallowed</i></b>	<ul style="list-style-type: none"> <li>- Call a poison control center or doctor immediately for treatment advice.</li> <li>- Have a person sip a glass of water if able to swallow.</li> <li>- Do not induce vomiting unless told to do so by a poison control center or doctor.</li> <li>- Do not give anything by mouth to an unconscious person.</li> </ul>
<p>For 24 hour emergency information on this product, call NPIC at 1-800-858-7378 (U.S., Canada, Puerto Rico, Virgin Islands) or 1-703-527-3887 (All Other Areas)</p>	
<p>Have product container or label with you when calling a poison control center or doctor or going for treatment.</p>	