



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

OFFICE OF CHEMICAL SAFETY  
AND POLLUTION PREVENTION

March 10, 2015

Carrie Link  
Regulatory Manager  
Marrone Bio Innovations  
1540 Drew Avenue  
Davis, California 95618

Subject: Non-PRIA (Pesticide Registration Improvement Act) Labeling and Formulation Amendment – Minor Formulation Amendment, Response to a term of registration, and submission of a Final Printed Label  
Product Name: Zequanox  
EPA Registration Number: 84059-15

Type of Application	Date of Original Application	OPP Decision Number
Minor formulation amendment	9/7/2012	469682
Response to a Term of Registration	9/24/2012	470863
Final Printed Label	7/17/2014	493581

Dear Ms. Link:

The U.S. Environmental Protection Agency (EPA) has reviewed your request to amend the subject product registration, which included the following changes:

Confidential Statement of Formula (CSF):

The submission dated September 7, 2012 (OPP Decision No. 469682) initiated a series of minor formulation amendments which concluded with the following CSFs:

- Basic CSF dated 12/2/2014
- Alternate CSF #1 dated 12/2/2014
- Alternate CSF #2 dated 2/9/2015
- Alternate CSF #3 dated 2/9/2015

The amended Confidential Statements of Formula (CSFs) referred to above, submitted in connection with registration under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended, are acceptable. All previously submitted Zequanox CSFs have been superseded by the CSFs listed above. Copies have been placed in the file jacket for this registration.

Master Label:

The master label for this product was amended, in part to conform to the CSF amendments and storage stability/corrosion characteristics data. Additional changes and corrections were made during the review process. The U.S. Environmental Protection Agency (EPA) has reviewed your request to amend the subject product registration, which included the following changes to the product label:

- The active ingredient statement has been revised to read “Killed *Pseudomonas fluorescens* strain CL145A cells and spent fermentation media.”
- The “If swallowed” first aid statement has been revised to conform to the Label Review Manual.
- The address of the registrant has been updated.
- The directions for use have been clarified.
- The container handling statements have been revised in accordance with container size and composition.
- Changes required by the review of the storage stability and corrosion characteristics data have been incorporated into the label.
- The registrant’s website, information email address and telephone number have been added.

Should you wish to retain a reference to your company’s website, then please be aware that the website becomes labeling under FIFRA and is subject to review by the EPA. If the website is false or misleading, the product will be considered to be misbranded and sale or distribution of the product is unlawful under FIFRA section 12(a)(1)(E). 40 CFR § 156.10(a)(5) lists examples of statements the EPA may consider false or misleading. In addition, regardless of whether a website is referenced on your product’s label, claims made on the website may not substantially differ from those claims approved through the registration process. Therefore, should the EPA find or if it is brought to our attention that a website contains false or misleading statements or claims substantially differing from the EPA-approved registration, the website will be referred to the EPA’s Office of Enforcement and Compliance Assurance.

Storage Stability and Corrosion Characteristics Data:

These data have been reviewed and were found upgradable. The CSF and label were revised accordingly and found acceptable.

Final Printed Label:

Additionally, the final printed labels submitted 2/27/15 (received and pin punched 3/2/15) in connection with registration under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), as amended, are acceptable. The final printed labeling has been reviewed and placed in our files.

This approval does not affect any other terms or conditions that were previously imposed on this registration. You continue to be subject to existing terms or conditions on your registration and any deadlines connected with them.

A stamped copy of the master labeling is enclosed for your records. This labeling supersedes all previously accepted labeling.

Your release for shipment of this product constitutes acceptance of these terms. If these terms are not complied with, this registration will be subject to cancellation in accordance with FIFRA section 6.

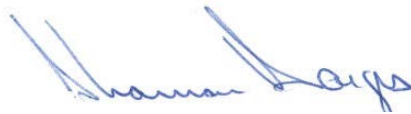
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EPA Reg. No. 84059-15

OPP Decision Nos. 469682, 470863, 493581

If you have any questions, please contact Ann Sibold of my team by phone at (703) 305-6502 or via email at [sibold.ann@epa.gov](mailto:sibold.ann@epa.gov).

Sincerely,

A handwritten signature in blue ink, appearing to read "Shannon Borges".

Shannon Borges, Team Leader  
Microbial Pesticides Branch  
Biopesticides and Pollution  
Prevention Division (7511P)  
Office of Pesticide Programs

Enclosure

# MBI-401 SDP

**ACCEPTED**

03/10/2015

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

84059-15

## MASTER LABEL

**Sublabel A: Enclosed or Semi-Enclosed Systems**  
**Sublabel B: Open Water Use for Recreational and**  
**Environmental Rehabilitation**  
**Optional Label Claims**

EPA Reg. No.: 84059-15

EPA Est. No.: XXXXX-XX-XXX

**Sublabel A: Enclosed or Semi-Enclosed Systems**

# MBI-401 SDP

**For Biological Quagga and Zebra Mussel Control  
For Use in Enclosed or Semi-Enclosed Systems**

(Alternate Brand Name: ZEQUANOX®, ZEQUANOX® CS)

**ACTIVE INGREDIENT:**

Killed *Pseudomonas fluorescens* strain CL145A cells  
and spent fermentation media ..... 50.00%

**OTHER INGREDIENTS:** ..... 50.00%

**TOTAL:** ..... 100.00%

**KEEP OUT OF REACH OF CHILDREN  
CAUTION**

<b>FIRST AID</b>	
<b>If swallowed</b>	<ul style="list-style-type: none"><li>• Call poison control center or doctor immediately for treatment advice.</li><li>• Have 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>
<b>If on skin or clothing</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>If in eyes</b>	<ul style="list-style-type: none"><li>• Hold eye open and rinse slowly and gently with water for 15 – 20 minutes.</li><li>• Remove contact lenses, 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>HOTLINE NUMBER</b>	
Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-222-1222 for emergency medical treatment information.	

**EPA Reg. No.:** 84059-15

**EPA Est. No.:** XXXXX-XX-XXX

**(Batch)(Lot) No.:** XXXX

**Net Weight:** 22 lbs (10 kg), 40 lb (18 kg), 220 lb (100 kg)

**Use by:** (6 months after date of manufacture)

**Manufactured for:**

Marrone Bio Innovations, Inc.

1540 Drew Ave.

Davis, CA 95618 USA

info@marronebio.com

Patent No. 6,194,194; Canada Patent No. 2,225,436

**MBI-401 SDP**; EPA Reg. No. 84059-15

MASTER LABEL – February 9, 2015

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## PRECAUTIONARY STATEMENTS

**HAZARDS TO HUMANS AND DOMESTIC ANIMALS – CAUTION:** Harmful if swallowed or absorbed through skin. Causes moderate eye irritation. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco or using the toilet. Remove and wash contaminated clothing before reuse.

Mixers/loaders and applicators must wear a dust/mist filtering respirator meeting NIOSH standards of at least N-95, R-95, or P-95. Repeated exposure to high concentrations of microbial proteins can cause allergic sensitization. Follow the manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables are available, use detergent and hot water. Keep and wash PPE separately from other laundry.

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

## DIRECTIONS FOR USE

It is a violation of federal law to use this product in a manner inconsistent with its labeling. For any requirements specific to your State or Tribe, consult the state or tribal agency responsible for pesticide regulation. This label must be in the possession of the user at the time of pesticide application.

*This product kills/controls invasive zebra and quagga mussels (*Dreissena polymorpha* and *Dreissena bugensis*).*

### Product Information

Mode of Action: Zebra and quagga mussels filter the product out of water and process the active ingredient as a food source. When the zebra and quagga mussels digest the product, the active ingredient disrupts the epithelial cells lining their digestive system causing mussel mortality.

Effects of treatment are visible within a few days of treatment with full effect occurring over 3-21 days following application. Since MBI-401 SDP efficacy is dependent on zebra and quagga mussel feeding activity and metabolism, which is affected by such factors as water temperature and mussel breeding activity, site assessments must be conducted to ensure appropriate timing of product application. Mussel activity is highest in waters above 15°C (61°F).

### Use Restrictions

Do not use chlorinated water to prepare application mixture. When mixing with other products, follow the most restrictive of the labeling limitations and precautions of all products used in mixtures. Use a jar test to confirm physical compatibility before mixing with other products. Conduct a "jar test" for compatibility by mixing each component in proportion in a clear glass jar. Close the jar and agitate the mixture until evenly dispersed. Mixture with other products is

acceptable if the mixture remains dispersed after agitation. Product must be applied within one hour of wetting. Do not reapply more frequently than once every two weeks.

### **Application Instructions**

Apply MBI-401 SDP to enclosed or semi-enclosed systems with defined inlets and/or outlet.

### **Application locations include the following:**

Treatment area must be in recirculating and once through cooling water systems, cooling towers, raw water intake systems and structures, screening bays, pumping systems, service water systems, process water systems, dust suppression water transport equipment and systems, cooling ponds, lagoons, spillways or lagoons, disposal wells, drinking water supply infrastructure, drinking water treatment infrastructure, waste water and waste collection and disposal, water conveyance systems, water transfer systems, water storage systems, water storage chambers, wet wells, tanks, ponds, lagoons, pipe systems, general plumbing and equipment, irrigation systems, hydraulic seal water and lubrication systems, heat exchangers, air handlers, evaporative coolers, hydro power turbine pits and generation equipment, transportation and shipping canals, irrigation and drainage canals, shipping canal locks, firefighting water transportation equipment, fire suppression systems, livestock watering systems, systems associated with the following industries and commercial activities: power generation, forest products, pulp and paper, food and beverage, apparel textile and clothing, metals processing and mining, automotive, oil gas and petrochemical, chemical manufacturing, electronic, water purification (other restrictions may apply), water monitoring and control, water supply, water transport, water conveyance, water storage, water banking, water and waste water treatment, aquaculture, shipping, or golf courses.

## **STATIC WATER VOLUME TREATMENTS: SURFACE OR INJECTED APPLICATIONS**

For quagga and zebra mussel control in static water (quiescent) infested with zebra and/or quagga mussels, MBI-401 SDP must be applied to the surface or injected below the water surface. Treatment area must be an enclosed or semi-enclosed system with a defined inlet and/or outlet. MBI-401 SDP is wetted in accordance with instructions below and applied as a product solution for treatment of an identified volume of water (treatment area). Application of MBI-401 SDP assumes treatment of the entire volume of water in a treatment area unless the product is applied and/or contained in a manner that localizes treatment to a targeted sub-volume of water. Treatment of a volume of water within a water body (a sub-volume) must be performed with a containment or barrier system capable of maintaining product at treatment concentrations within the treated sub-volume for desired treatment periods. Effects of treatment are visible within a few days of treatment with full effect occurring over 3-21 days. Since MBI-401 SDP efficacy is dependent on zebra and quagga mussel feeding activity and metabolism, which is affected by such factors as water temperature and mussel breeding activity, site assessments must be conducted to ensure appropriate timing of product application.

### **Determining Water Volume**

Measure length (L), width (W), and average depth (D) in feet (ft) or meters (m) and calculate volume using one of the following formulas:

Square/Rectangular:

$L \text{ (ft)} \times W \text{ (ft)} \times D \text{ (ft)} \times 7.5 = \text{Gallons}$

$L \text{ (m)} \times W \text{ (m)} \times D \text{ (m)} \times 1000 = \text{Liters}$

Circular/Elliptical:

$L \text{ (ft)} \times W \text{ (ft)} \times D \text{ (ft)} \times 5.9 = \text{Gallons}$

$L \text{ (m)} \times W \text{ (m)} \times D \text{ (m)} \times 786 = \text{Liters}$

1 acre-foot of water =

- water measuring 208.7 ft long x 208.7 ft wide x 1 ft deep
- 43,560 cubic feet
- 325,851 gallons
- 2,780,000 pounds

Avg. Length (ft) x Avg. Width (ft) x Avg. Depth (ft) = cubic ft of water

## **APPLICATION**

### **Life Stage Treatment Instructions:**

#### Adult Treatment (entire established population):

The adult treatments kill and/or remove attached adult mussels from infested systems. Adult treatments are conducted at high active ingredient concentrations to manage, (remove, control) all infestations of quagga and zebra mussels up to and including adult mussels. Adult treatments can be followed by juvenile or veliger treatments (see below) to protect facilities and resources sensitive to shell debris and/or the presence of adult quagga and zebra mussels from new growth mussel accumulation. For adult treatments, do not exceed the maximum application rate of 0.013 oz of active ingredient (a.i.)/gallon of water (100 mg of active ingredient/L of water) in the treatment area for up to 8 hours in a continuous 24 hour period. Do not exceed 4 treatments per calendar year, occurring no more frequently than once a month.

#### Juvenile Treatment (newly settled mussels):

Juvenile treatments are routine treatments to manage quagga and zebra mussel populations at a sub-adult size. This treatment provides control of juvenile mussels (< 0.2 in or 4 mm in size), keeping the population at a reduced size. Juvenile treatments are performed at lower concentrations, providing mussel population management to facilities and resources that are susceptible to impact from mussel settlement or facilities that choose to perform treatments frequently to control mussel establishment. For juvenile treatments, do not exceed the maximum application rate of 0.0067 oz. of active ingredient/gallon of water (50 mg of active ingredient/L of water) in the treatment area for a maximum of 8 hours of treatment time. Do not reapply more frequently than every 2 weeks.

#### Veliger Treatment (larvae):

Veliger treatments are low concentration treatments that are conducted during the presence of larval quagga and zebra mussels, known as veligers. For veliger treatments do not exceed the maximum application rate of 0.0067 oz of active ingredient/gallon of water (50 mg of active ingredient/L of water) in the treatment area for a maximum of 8 hours of treatment time. Do not reapply more frequently than every 2 weeks.



Application Times and Concentration of MBI-401 SDP Needed to Control Zebra and Quagga Mussels in Static Enclosed and Semi Enclosed Treatment Areas

Type of Use	Treatment Duration and Application Frequency*	Treatment Concentration (oz of active ingredient/gallon of water )	Treatment Concentration (mg active ingredient/L)
Adult	up to 8 hours per 1 month	up to 0.013	up to 100
Juvenile	up to 8 hours per 2 weeks	up to 0.0067	up to 50
Veliger	up to 8 hours per 2 weeks	up to 0.0067	up to 50

\*Application frequency applies to all types of treatments and cannot exceed one treatment of any kind in a two week period.

**Method for Mixing Product Solution:**

MBI-401 SDP is applied as a product solution either to the surface of the water or injected beneath the water surface. Prepare a product solution of MBI-401 SDP by dispensing dry product directly into a raw water filled mixing tank and stirring until product solution is homogenous, or by dispensing product into a mixer that incorporates the product into raw water and dispenses the solution into a mixing tank, tote or appropriate plastic container. To determine appropriate concentration of product solution, see calculation method section below described in “Calculation of Product Solution.”

**Method of Application:**

After mixing product solution, inject the product solution from the mixing tote, tank or other appropriate plastic container directly into a defined static system using a chemical metering pump or other equipment such that the volume of applied product solution can be measured. For treatment of defined static systems, the total amount of product must be applied to the water body within a maximum of one hour after the product solution is prepared. Apply with equipment that will provide even distribution within the desired treatment area. Apply the product solution to achieve a maximum concentration based on life stage treatment instructions. Mix the product solution into the water body utilizing hydraulic, pneumatic or mechanical agitation during application and during treatment duration. Monitor treatment concentration before, during and after application by monitoring the turbidity of the treated water volume. See below description of this monitoring method “Product Concentration Measurement in Treated System.” If turbidity readings exceed target turbidity or turbidity associated with maximum label or pre-notification intended use, applicator must adjust chemical metering equipment or shut down application system entirely to prevent exceeding the expected environmental concentration upon discharge. Mix and disperse product solution into full volume of water, adjusting in-situ mixers if necessary. Add more product solution if turbidity readings return below target turbidity.

Surface Applications: Apply the product solution on the water surface from a structure edge bordering the treatment water body, shore, or a properly equipped boat.

Subsurface Applications: Apply the product solution into the water via an injection system.

**Maximum Rate of Application:**

See life stage treatment instructions for maximum treatment concentrations and frequencies.

**Calculation of Product Amount Required for Treatment:**

To calculate the amount of product required for a treatment, multiply target treatment concentration (mg a.i./L or oz a.i./gal) by total volume of water to be treated (liters or gallons).

Convert to kilograms by dividing mg amount by 1,000,000. Convert to pounds by dividing ounces amount by 16. Multiply this figure by 2 to account for the 50% inert ingredients.

**Calculation of Product Solution:**

For all applications, prior to product application, dilute MBI-401 SDP into a double contained plastic mixing tank, tote, or similar container appropriate for use in chemical application in aquatic environments. Mix product and water at a rate of 2.2 lbs (or 1 kg) of dry MBI-401 SDP per 1.3 to 2.6 gallons (5 to 10 L) of non-chlorinated water to achieve a product solution of 26.6 to 13.3 oz MBI-401 SDP/gallon (200 to 100 g MBI-401 SDP/L) or, since MBI-401 SDP is 50% active ingredient, 13.3 - 6.7 oz of active ingredient/gallon of water (100 - 50 g of active ingredient/L of water). See above section titled "Method for Mixing Product Solution" for mixing instructions to prepare product solution.

**Product Concentration Measurement in Treated System:**

Prior to treatment, collect sample of water to be treated, and portion three 16.9 oz (500 mL) (replicate) samples of water to be treated into clean plastic cups. Apply appropriate volume of product solution to untreated water samples to reach target treatment concentration.

Determine appropriate concentration to apply using  $C_1V_1=C_2V_2$  equation in which  $C_1$  is equal to the target treatment concentration,  $V_1$  is the 16.9 oz (500mL) contained in each sample,  $C_2$  is equal to the concentration of the product solution (see results of calculations from above section "Calculation of Product Solution," and then solve equation for  $V_2$ , which is the volume of the product solution that should be applied to each 16.9 oz (500mL) water sample.

Mix samples by stir bar or other appropriate tool until product solution is dispersed and sample is homogenous. Collect turbidity readings from each of the 3 samples, and average readings. This average turbidity is the target turbidity associated with the target application concentration of MBI-401 SDP, and turbidity is thereby used during a treatment to determine when target concentration is reached. The correlation for a maximum turbidity to the maximum application concentration for a treatment should also be determined prior to treatment.

**Post Treatment:**

Immediate subsequent treatment (for other purposes such as purification) and use of water after an MBI-401 SDP treatment must consider residual MBI-401 SDP particulate, including filtration or flocculation to remove from the water depending on the intended subsequent treatment or use. See directions or standards associated with the subsequent treatment for requirements.

Use of infrastructure after a treatment must be prefaced with rinsing post treatment to remove residual MBI-401 SDP particulate if particulate impacts use.

**Limitations on Discharge of Treated Water:**

At the determination of the NPDES permitting authority, additional site-specific discharge restrictions will apply when discharging MBI-401 SDP into receiving waters. Particular attention will be given to the level and dynamics of dilution of MBI-401 SDP into the receiving waters of the site, the presence of potentially sensitive aquatic species and their location relative to the dilution of MBI-401 SDP in the receiving waters of the site, and other factors considered relevant by the NPDES permitting authority that could impact aquatic species present at the proposed site, as required under the NPDES permitting process. Marrone Bio Innovations will provide the permitting agency with information related to sensitive species in the state or region.

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**FLOWING WATER TREATMENTS: SURFACE OR INJECTED APPLICATIONS**

For quagga and zebra mussel control in flowing water, MBI-401 SDP must be applied to the surface or injected below the water surface. Treatment area must be an enclosed or semi-enclosed system with a defined inlet and/or outlet. MBI-401 SDP is wetted in accordance with instructions below and applied as a product solution for treatment of an identified flow rate (treated flow, as defined below). Application of MBI-401 SDP assumes treatment of the body of water flowing through an enclosed or semi-enclosed space as well as the enclosures containing the treated system that are in contact with the treated waters for the duration of treatment. Effects of treatment are visible within a few days of treatment with full effect occurring over 14-21 days.

### **Determining Flow**

Accurate flow information is required to determine appropriate application rates. Record the average flow rate within the system to be treated during a time similar to the projected treatment period in gallons per minute.

Flow rate information can be found on pipe specific flow meters, SCADA systems or by calculation:

Flow rate (gallons/minute) = volume of water (gallons) / time (minutes)

Flow rate (liters/sec) = volume of water (liters) / time (sec)

## **APPLICATION**

### **Life Stage Treatment Instructions:**

#### Adult Treatment (entire established population):

The adult treatments kill and/or remove attached adult mussels from infested systems. Adult treatments are conducted at high active ingredient concentrations to manage, (remove, control) all infestations of quagga and zebra mussels up to and including adult mussels. Adult treatments can be followed by juvenile or veliger treatments (see below) to protect facilities and resources sensitive to shell debris and/or the presence of adult quagga and zebra mussels from new growth mussel accumulation. For adult treatments, do not exceed the maximum application rate of 0.013 oz of active ingredient (a.i.)/gallon of water (100 mg of active ingredient/L of water) in the treatment area for up to 8 hours in a continuous 24 hour period. Do not exceed 4 treatments per calendar year, occurring no more frequently than once a month.

#### Juvenile Treatment (newly settled mussels):

Juvenile treatments are routine treatments to manage quagga and zebra mussel populations at a sub-adult size. This treatment provides control of juvenile mussels (< 0.2 in or 4 mm in size), keeping the population at a reduced size. Juvenile treatments are performed at lower concentrations, providing mussel population management to facilities and resources that are susceptible to impact from mussel settlement or facilities that choose to perform treatments frequently to control mussel establishment. For juvenile treatments, do not exceed the maximum application rate of 0.0067 oz. of active ingredient/gallon of water (50 mg of active ingredient/L of water) in the treatment area for a maximum of 8 hours of treatment time. Do not reapply more frequently than every 2 weeks.

#### Veliger Treatment (larvae):

Veliger treatments are low concentration treatments that are conducted during the presence of larval quagga and zebra mussels, known as veligers. For veliger treatments do not exceed the

maximum application rate of 0.0067 oz of active ingredient/gallon of water (50 mg of active ingredient/L of water) in the treatment area for a maximum of 8 hours of treatment time. Do not reapply more frequently than every 2 weeks.

Application Times and Concentration of MBI-401 SDP Needed to Control Zebra and Quagga Mussels in Static Enclosed and Semi Enclosed Volumes

Type of Use	Treatment Duration and Application Frequency*	Treatment Concentration (oz of active ingredient/gallon of water )	Treatment Concentration (mg active ingredient/L)
Adult	up to 8 hours per 1 month	up to 0.013	up to 100
Juvenile	up to 8 hours per 2 weeks	up to 0.0067	up to 50
Veliger	up to 8 hours per 2 weeks	up to 0.0067	up to 50

\*Application frequency applies to all types of treatments and cannot exceed one treatment of any kind in a two week period.

**Method for Mixing Product Solution:**

MBI-401 SDP is applied as a product solution either to the surface of the water or injected beneath the water surface. Prepare a product solution of MBI-401 SDP by dispensing dry product directly into a raw water filled mixing tank and stirring until product solution is homogenous, or by dispensing product into a mixer that incorporates the product into raw water and dispenses the solution into a mixing tank, tote or appropriate plastic container. To determine appropriate concentration of product solution, see calculation method section below described in “Calculation of Product Solution.”

**Method of Application:**

After mixing product solution, inject the product solution from the mixing tote, tank or other appropriate plastic container directly into the flowing system using a chemical metering pump or other equipment such that the volume of applied product solution can be measured. Apply with equipment that will provide even distribution within the desired treatment area. Apply the product solution to achieve a maximum concentration based on life stage treatment instructions. Monitor treatment concentration before, during, and after application by monitoring the turbidity of the treated water downstream of application. See below description of this monitoring method “Product Concentration Measurement in Treated System.” If turbidity readings exceed target turbidity or turbidity associated with maximum label or pre-notification intended use, applicator must adjust chemical metering equipment immediately or shut down application system entirely to prevent exceeding the expected environmental concentration upon discharge.

Surface Applications: Apply the product solution on the water surface from a structure bordering the treatment water body, shore, or a properly equipped boat.

Subsurface Applications: Apply the product solution into the water via an injection system.

**Maximum Rate of Application:**

See life stage treatment instructions for maximum treatment concentrations and frequencies.

**Calculation of Product Amount Required for Treatment:**

To calculate the amount of product required for a treatment, first determine the total volume of water to be treated (liters or gallons) by multiplying the flow rate (L/sec or gal/min) by the total duration of the treatment. Then multiply the total volume of water to be treated by the target treatment concentration (mg a.i./L or oz a.i./gal). Convert to kilograms by dividing mg amount by

1,000,000. Convert to pounds by dividing ounces amount by 16. Multiply final figure by 2 to account for the 50% inert ingredients.

#### **Calculation of Application Rate:**

To calculate the application rate, multiply the target concentration (first convert mg a.i./L to g a.i./L or use oz a.i./gal) by the flow rate of the body of water to be treated (L/sec or gal/min), and then divide by the concentration of the product solution (g a.i./L or oz /gal).

#### **Calculation of Product Solution:**

For all applications, prior to product application, dilute MBI-401 SDP into a double contained plastic mixing tank, tote, or similar container appropriate for use in chemical application in aquatic environments. Mix product and water at a rate of 2.2 lbs (or 1 kg) of dry MBI-401 SDP per 1.3 to 2.6 gallons (5 to 10 L) of non-chlorinated water to achieve a product solution of 26.6 to 13.3 oz MBI-401 SDP/gallon (200 to 100 g MBI-401 SDP/L) or, since MBI-401 SDP is 50% active ingredient, 13.3 to 6.7 oz of active ingredient/gallon of water (100 - 50 g of active ingredient/L of water). See above section titled "Method for Mixing Product Solution" for mixing instructions to prepare product solution.

#### **Product Concentration Measurement in Treated System:**

Prior to treatment, collect sample of water to be treated, and portion three 16.9 oz (500 mL) (replicate) samples of water to be treated into clean plastic cups. Apply appropriate volume of product solution to untreated water samples to reach target treatment concentration.

Determine appropriate concentration to apply using  $C_1V_1=C_2V_2$  equation in which  $C_1$  is equal to the target treatment concentration,  $V_1$  is the 16.9 oz (500mL) contained in each sample,  $C_2$  is equal to the concentration of the product solution (see results of calculations from above section "Calculation of Product Solution," and then solve equation for  $V_2$ , which is the volume of the product solution that should be applied to each 16.9 oz (500mL) water sample.

Mix samples by stir bar or other appropriate tool until product solution is dispersed and the sample is homogenous. Collect turbidity readings from each of the 3 samples, and average the readings. This average turbidity is the target turbidity associated with the target application concentration of MBI-401 SDP, and turbidity is thereby used during a treatment to determine when target concentration is reached. The correlation for a maximum turbidity to the maximum application concentration for a treatment should also be determined prior to treatment.

#### **Post Treatment:**

Immediate subsequent treatment (for other purposes such as purification) and use of water after an MBI-401 SDP treatment must consider residual MBI-401 SDP particulate, including filtration or flocculation to remove from the water depending on the intended subsequent treatment or use. See directions or standards associated with the subsequent treatment for requirements.

Use of infrastructure after a treatment must be prefaced with rinsing post treatment to remove residual MBI-401 SDP particulate if particulate impacts use.

#### **Limitations on Discharge of Treated Water:**

At the determination of the NPDES permitting authority, additional site-specific discharge restrictions will apply when discharging MBI-401 SDP into receiving waters. Particular attention will be given to the level and dynamics of dilution of MBI-401 SDP into the receiving waters of the site, the presence of potentially sensitive aquatic species and their location relative to the

dilution of MBI-401 SDP in the receiving waters of the site, and other factors considered relevant by the NPDES permitting authority that could impact aquatic species present at the proposed site, as required under the NPDES permitting process. Marrone Bio Innovations will provide the permitting agency with information related to sensitive species in the state or region.

### **STORAGE AND DISPOSAL**

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

**Pesticide Storage:** Store in original container at 4°C (39°F). Store for up to 6 months after date of manufacture.

**Pesticide Disposal:** To avoid wastes, use all material in this container by application according to label directions. If wastes cannot be avoided, offer remaining product to a waste disposal facility or pesticide disposal program (often such programs are run by state or local governments or by industry).

**Container Handling: Non-refillable container. Do not reuse or refill this container.**

*(For plastic lined paper bags, all sizes)*

Completely empty bag into application equipment by shaking and tapping sides and bottom to loosen clinging particles. Then, offer for recycling if available, or dispose of empty bag in a sanitary landfill or by incineration. Do not burn unless allowed by state and local ordinances.

*(For plastic bag lined pails, all sizes)*

Completely empty bag into application equipment by shaking and tapping sides and bottom to loosen clinging particles. Then, offer for recycling if available, or dispose of empty bag in a sanitary landfill or by incineration. Do not burn unless allowed by state and local ordinances.

Triple rinse pail and offer for recycling if available, or puncture and dispose of empty pail in a sanitary landfill.

**Container Handling: Refillable container. Refill this container with MBI-401 SDP only. Do not reuse this container for any other purpose.**

*(For drums with inner plastic coating, all sizes)* Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller. To clean the container before refilling or final disposal, empty the remaining contents from this container into application equipment or mix tank. Fill the container about 10 percent full with water. Agitate vigorously or recirculate water with the pump for 2 minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times." After cleaning for final disposal, offer for recycling if available or reconditioning if appropriate or puncture and dispose of in a sanitary landfill or by other procedures approved by state and local authorities.

### **WARRANTY**

To the extent consistent with applicable law, the seller makes no warranty, expressed or implied, of merchantability, fitness or otherwise concerning use of this product. To the extent

consistent with applicable law, the user assumes all risks of use, storage or handling that are not in strict accordance with the accompanying directions.

Made in the U.S.A.

U.S. Patent No. 6,194,194

Canada Patent No. 2,225,436

Zequanox® is a registered trademark of Marrone Bio Innovations, Inc.

Marrone Bio Innovations' name and logo are registered trademarks of Marrone Bio Innovations, Inc.

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**Sublabel B: Open Water Use for Recreational  
and Environmental Rehabilitation**

# MBI-401 SDP

## For Use in Biological Quagga and Zebra Mussel Control In Open Waters for Recreational and Environmental Rehabilitation

(Alternate Brand Name: ZEQUANOX®, ZEQUANOX® ENV)

**ACTIVE INGREDIENT:**

Killed *Pseudomonas fluorescens* strain CL145A cells  
and spent fermentation media ..... 50.00%

**OTHER INGREDIENTS:** ..... 50.00%

**TOTAL:** ..... 100.00%

**KEEP OUT OF REACH OF CHILDREN  
CAUTION**

FIRST AID	
<b>If swallowed</b>	<ul style="list-style-type: none"><li>• Call poison control center or doctor immediately for treatment advice.</li><li>• Have 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>
<b>If on skin or clothing</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>If in eyes</b>	<ul style="list-style-type: none"><li>• Hold eye open and rinse slowly and gently with water for 15 – 20 minutes.</li><li>• Remove contact lenses, 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>
HOTLINE NUMBER	
Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-222-1222 for emergency medical treatment information.	

**EPA Reg. No.:** 84059-15  
**EPA Est. No.:** XXXXX-XX-XXX  
**(Batch)(Lot) No:** XXXX

**Net Weight:** 22 lbs (10 kg), 40 lb (18 kg), 220 lb (100 kg)

**Use by:** (6 months after date of manufacture)

**Manufactured for:**  
Marrone Bio Innovations, Inc.  
1540 Drew Ave.  
Davis, CA 95618 USA  
info@marronebio.com  
Patent No. 6,194,194; Canada Patent No. 2,225,436



## PRECAUTIONARY STATEMENTS

**HAZARDS TO HUMANS AND DOMESTIC ANIMALS – CAUTION:** Harmful if swallowed or absorbed through skin. Causes moderate eye irritation. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco or using the toilet. Remove and wash contaminated clothing before reuse.

Mixers/loaders and applicators must wear a dust/mist filtering respirator meeting NIOSH standards of at least N-95, R-95, or P-95. Repeated exposure to high concentrations of microbial proteins can cause allergic sensitization. Follow the manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables are available, use detergent and hot water. Keep and wash PPE separately from other laundry.

**ENVIRONMENTAL HAZARDS:** This product can be toxic to both fish and bivalve larvae/juveniles and applications should not occur during critical breeding seasons. For direct application to open water, consult your local state fish and game agency before applying this product to public waters. Permits may be required before treating such waters.

Do not discharge effluent containing this product or apply this product into lakes, streams, ponds, estuaries, oceans, or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge or application. 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.

### DIRECTIONS FOR USE

It is a violation of federal law to use this product in a manner inconsistent with its labeling. For any requirements specific to your State or Tribe, consult the state or tribal agency responsible for pesticide regulation. This label must be in the possession of the user at the time of pesticide application.

*This product kills/controls invasive zebra and quagga mussels (*Dreissena polymorpha* and *Dreissena bugensis*).*

### Product Information

Mode of Action: Zebra and quagga mussels filter the product out of water and process the active ingredient as a food source. When the zebra and quagga mussels digest the product, the active ingredient disrupts the epithelial cells lining their digestive system causing mussel mortality. Effects of treatment are visible within a few days of treatment with full effect occurring over 3-21 days following application. Since MBI-401 SDP efficacy is dependent on zebra and quagga mussel feeding activity and metabolism, which is affected by such factors as water temperature and mussel breeding activity, site assessments must be conducted to ensure appropriate timing of product application. Mussel activity is highest in waters above 15°C (61°F).

### Use Restrictions

Do not use chlorinated water to prepare application mixture. When mixing with other products, follow the most restrictive of the labeling limitations and precautions of all products used in mixtures. Use a jar test to confirm physical compatibility before mixing with other products.

Conduct a “jar test” for compatibility by mixing each component in proportion in a clear glass jar. Close the jar and agitate the mixture until evenly dispersed. Mixture with other products is acceptable if the mixture remains dispersed after agitation. Product must be applied within one hour of wetting. Do not reapply more frequently than once every two weeks.

### **Application Instructions**

Apply MBI-401 SDP to listed water locations and/or sites infested with listed mussels.

### **Application locations include the following:**

Lakes, reservoirs, ponds, lagoons, streams, rivers, creeks, shorelines, wetlands, swamps, aqueducts, fish ladders, fish transfer water and equipment, water transfer equipment, recreational facilities, marina structures, marina equipment, bilge pumps, watercraft maintenance facilities, watercraft hulls, watercraft engine cooling systems, watercraft plumbing systems, watercraft launch facilities, watercraft moorings, watercraft ballast systems, swimming platforms, docks, piers, pylons, bulkheads, seawalls, submerged riprap, buoys, water intakes, ballast water, bait tanks, live wells, spawning locations, habitat protection/restoration, ornamental ponds, decorative water features and fountains inclusive of supply systems, bridges, submerged infrastructure and improvements, dive sites, archeological sites, fire suppression systems

## **STATIC WATER VOLUME TREATMENTS: SURFACE OR INJECTED APPLICATIONS**

Application Instructions: For quagga and zebra mussel control in static water (quiescent) infested with zebra and/or quagga mussels, MBI-401 SDP must be applied to the surface or injected below the water surface. MBI-401 SDP is applied as a product solution for treatment of an identified volume of water (treatment area). Treatments must not exceed 50% of the total volume of water within a water body per treatment.

### **FOR FACILITIES AND INFRASTRUCTURE IN OPEN WATER SYSTEMS:**

Apply MBI-401 SDP to facilities and infrastructure within an open water system including a lake or pond. For treatment of a volume of water within a water body (a sub-volume) a containment or barrier system, or an application manner that localizes treatment, must be used to maintain product at treatment concentrations for desired treatment periods. In applications targeting benthic surfaces, either a containment system or an application manner that localizes treatment must be used. For recreational and environmental rehabilitation uses, do not enter or fish in sites treated with MBI-401 until treatment site barriers are removed or twelve (12) hours after treatment.

### **FOR RECREATIONAL SITE MANAGEMENT AND RESTORATION:**

Use MBI-401 SDP to manage populations of quagga and/or zebra mussels at recreational sites such as shoreline, beaches, swimming facilities, and boating facilities. For treatment of a volume of water within a water body (a sub-volume) a containment or barrier system, or an application manner that localizes treatment, must be used to maintain product at treatment concentrations for desired treatment periods. In applications targeting benthic surfaces, either a containment system or an application manner that localizes treatment must be used. For recreational and environmental rehabilitation uses, do not enter or fish in sites treated with MBI-401 until treatment site barriers are removed or twelve (12) hours after treatment.

## **FOR AQUATIC HABITAT MANAGEMENT AND RESTORATION:**

Apply MBI-401 SDP to habitat locations that have been degraded by the establishment of quagga and zebra mussels. Apply MBI-401 SDP to the following locations: spawning gravels and native mussel beds as directed to manage establishment and impacts of quagga and zebra mussels. Application of MBI-401 SDP must be scheduled to times that minimize exposure of sensitive species during spawning.

### **Determining Water Volume**

Measure length (L), width (W), and average depth (D) in feet (ft) or meters (m) and calculate volume using one of the following formulas:

Square/Rectangular:

$L(\text{ft}) \times W(\text{ft}) \times D(\text{ft}) \times 7.5 = \text{Gallons}$

$L(\text{m}) \times W(\text{m}) \times D(\text{m}) \times 1000 = \text{Liters}$

Circular/Elliptical:

$L(\text{ft}) \times W(\text{ft}) \times D(\text{ft}) \times 5.9 = \text{Gallons}$

$L(\text{m}) \times W(\text{m}) \times D(\text{m}) \times 786 = \text{Liters}$

1 acre-foot of water =

- water measuring 208.7 ft long x 208.7 ft wide x 1 ft deep
- 43,560 cubic feet
- 325,851 gallons
- 2,780,000 pounds

Avg. Length (ft) x Avg. Width (ft) x Avg. Depth (ft) = cubic ft of water

## **APPLICATION**

### **Life Stage Treatment Instructions:**

#### **Adult Treatment (entire established population):**

The adult treatments kill and/or remove attached adult mussels from infested systems. Adult treatments are conducted at high active ingredient concentrations to manage (remove, control) all infestations of quagga and zebra mussels up to and including adult mussels. Adult treatments must be followed by juvenile or veliger treatments (see below) to protect facilities and resources sensitive to shell debris and/or the presence of adult quagga and zebra mussels from new growth mussel accumulation. For adult treatments do not exceed the maximum application rate of 0.013 oz of active ingredient/gallon of water (100 mg of active ingredient/L of water) in treatment areas for up to 8 hours in a continuous 24 hour period. Do not exceed 4 treatments per calendar year, occurring no more frequently than once a month.

#### **Juvenile Treatment (newly settled mussels):**

Juvenile treatments are routine treatments to manage quagga and zebra mussel populations at a sub-adult size. This treatment provides control of juvenile mussels (< 0.2 in or 4 mm in size), keeping the population at a reduced size. Juvenile treatments are performed at lower concentrations, providing mussel population management to facilities and resources that are

susceptible to impact from mussel settlement or facilities that choose to perform treatments frequently to control mussel establishment. For Juvenile treatments do not exceed the maximum application rate of 0.0067 oz. of active ingredient/gallon of water (50 mg of active ingredient/L of water) in treatment areas for a maximum of 8 hours of treatment time. Do not reapply more frequently than every 2 weeks.

Veliger Treatment (larvae):

Veliger treatments are low concentration treatments that are conducted during the presence of larval quagga and zebra mussels, known as veligers. For veliger treatments do not exceed the maximum application rate of 0.0067 oz of active ingredient/gallon of water (50 mg of active ingredient/L of water) in treatment areas for a maximum of 8 hours of treatment time. Do not reapply more frequently than every 2 weeks.

Application Times and Concentration of MBI-401 SDP Needed to Control Zebra and Quagga Mussels in Open Waters

Type of Use	Treatment Duration and Application Frequency*	Treatment Concentration (oz of active ingredient/gallon of water )	Treatment Concentration (mg active ingredient/L)
Adult	up to 8 hours per 1 month	up to 0.013	up to 100
Juvenile	up to 8 hours per 2 weeks	up to 0.0067	up to 50
Veliger	up to 8 hours per 2 weeks	up to 0.0067	up to 50

\*Application frequency applies to all types of treatments and cannot exceed one treatment of any kind in a two week period.

**Method for Mixing Product Solution:**

MBI-401 SDP is applied as a product solution either to the surface of the water or injected beneath the water surface. Prepare a product solution of MBI-401 SDP by dispensing dry product directly into a raw water filled mixing tank and stirring until product solution is homogenous, or by dispensing product into a mixer that incorporates the product into raw water and dispenses the solution into a mixing tank, tote or appropriate plastic container. To determine appropriate concentration of concentrated product solution, see calculation method section below described in “Calculation of Product Solution.”

**Method of Application:**

After mixing product solution, inject the product solution from the mixing tote, tank or other appropriate plastic container directly into a defined static system using chemical metering pump or other equipment such that the volume of applied product solution can be measured. For treatment of defined static systems, the total amount of product must be applied to the water body within a maximum of one hour after the product solution is prepared. Apply with equipment that will provide even distribution within the desired treatment area. Apply the product solution to achieve a maximum concentration based on life stage treatment instructions. Mix the product solution into the treated water body utilizing hydraulic, pneumatic or mechanical agitation during application and during treatment duration. Monitor treatment concentration before, during and after application by monitoring the turbidity of the treated water volume. See below description of this monitoring method “Product Concentration Measurement in Treated System.” If turbidity readings exceed target turbidity or turbidity associated with maximum label or pre-notification intended use, applicator must adjust chemical metering equipment or shut down application system entirely to prevent exceeding the expected environmental concentration upon discharge. Mix and disperse product solution into full volume of water, adjusting in-situ mixers if necessary. Add more product solution if turbidity readings return below target turbidity.

Surface Applications: Apply the product solution on the water surface from a structure edge bordering the treatment water body, shore, or a properly equipped boat.

Subsurface Applications: Apply the product solution into the water via an injection system.

**Maximum Rate of Application:**

See life stage treatment instructions for maximum treatment concentrations and frequencies.

**Calculation of Product Amount Required for Treatment:**

To calculate the amount of product required for a treatment, multiply target treatment concentration (mg a.i./L or oz a.i./gal) by total volume of water to be treated (liters or gallons). Convert to kilograms by dividing mg amount by 1,000,000. Convert to pounds by dividing ounces amount by 16. Multiply this figure by 2 to account for the 50% inert ingredients.

**Calculation of Product Solution:**

For all applications, prior to product application, dilute MBI-401 SDP into a double contained plastic mixing tank, tote, or similar container appropriate for use in chemical application in aquatic environments. Mix product and water at a rate of 2.2 lbs (or 1 kg) of dry MBI-401 SDP per 1.3 to 2.6 gallons (5 to 10 L) of non-chlorinated water to achieve a product solution of 26.6 to 13.3 oz MBI-401 SDP/gallon (200 to 100 g MBI-401 SDP/L) or, since MBI-401 SDP is 50% active ingredient, 13.3 to 6.7 oz of active ingredient/gallon of water (100 - 50 g of active ingredient/L of water). See above section titled “Method for Mixing Product Solution” for mixing instructions to prepare product solution.

**Product Concentration Measurement in Treated System:**

Prior to treatment, collect sample of water to be treated, and portion three 16.9 oz ( 500 mL) (replicate) samples of water to be treated into clean plastic cups. Apply appropriate volume of product solution to untreated water samples to reach target treatment concentration.

Determine appropriate concentration to apply using  $C_1V_1=C_2V_2$  equation in which  $C_1$  is equal to the target treatment concentration,  $V_1$  is the 16.9 oz (500mL) contained in each sample,  $C_2$  is equal to the concentration of the product solution (see results of calculations from above section “Calculation of Product Solution,” and then solve equation for  $V_2$ , which is the volume of the product solution that should be applied to each 16.9 oz (500mL) water sample.

Mix samples by stir bar or other appropriate tool until product solution is dispersed and sample is homogenous. Collect turbidity readings from each of the 3 samples, and average readings. This average turbidity is the target turbidity associated with the target application concentration of MBI-401 SDP, and turbidity is thereby used during a treatment to determine when target concentration is reached. The correlation for a maximum turbidity to the maximum application concentration for a treatment should also be determined prior to treatment.

**Post Treatment:**

Use of infrastructure after a treatment must be prefaced with rinsing post treatment to remove residual MBI-401 SDP particulate if particulate impacts use.

**Limitations on Discharge of Treated Water:**

At the determination of the NPDES permitting authority, additional site-specific discharge restrictions will apply when discharging MBI-401 SDP into receiving waters. Particular attention will be given to the level and dynamics of dilution of MBI-401 SDP into the receiving waters of

the site, the presence of potentially sensitive aquatic species and their location relative to the dilution of MBI-401 SDP in the receiving waters of the site, and other factors considered relevant by the NPDES permitting authority that could impact aquatic species present at the proposed site, as required under the NPDES permitting process. Marrone Bio Innovations will provide the permitting agency with information related to sensitive species in the state or region.

## **FLOWING WATER TREATMENTS: SURFACE OR INJECTED APPLICATIONS**

For quagga and zebra mussel control in flowing water infested with zebra and/or quagga mussels, MBI-401 SDP must be applied to the surface or injected below the water surface. Apply MBI-401 SDP as a product solution as described below for treatment of an identified flow rate (treated flow). Effects of treatment are visible within a few days of treatment with full effect occurring over 14-21 days.

### **FOR FACILITIES AND INFRASTRUCTURE IN OPEN WATER SYSTEMS:**

Apply MBI-401 SDP to infested facilities and infrastructure within a flowing open water system. Application of MBI-401 SDP assumes treatment of the full flow of water within the treated system unless the product is applied and/or contained in a manner that localizes treatment to a specific flow of water. In applications targeting benthic and other surfaces, a containment or barrier system, or an application manner that localizes treatment, must be used to maintain product at treatment concentrations for desired treatment periods. For recreational and environmental rehabilitation uses, do not enter or fish in sites treated with MBI-401 until treatment site barriers are removed or twelve (12) hours after treatment.

### **FOR RECREATIONAL SITE MANAGEMENT AND RESTORATION:**

Use MBI-401 SDP to manage populations of quagga and/or zebra mussels at recreational sites such as shoreline, beaches, swimming facilities, and boating facilities. Application of MBI-401 SDP assumes treatment of the full flow of water within the treated system unless the product is applied and/or contained in a manner that localizes treatment to a targeted flow of water. In applications targeting benthic and other surfaces, a containment or barrier system, or an application manner that localizes treatment, must be used to maintain product at treatment concentrations for desired treatment periods. For recreational and environmental rehabilitation uses, do not enter or fish in sites treated with MBI-401 until treatment site barriers are removed or twelve (12) hours after treatment.

### **FOR AQUATIC HABITAT MANAGEMENT AND RESTORATION:**

Apply MBI-401 SDP to habitat locations that have been degraded by the establishment of quagga and zebra mussels. Apply MBI-401 SDP to locations such as spawning gravels and native mussel beds as directed to manage establishment and impacts of quagga and zebra mussels. Application of MBI-401 SDP assumes treatment of the full flow of water within the treated system unless the product is applied and/or contained in a manner that localizes treatment to a targeted flow of water. In applications targeting benthic and other surfaces, a containment or barrier system, or an application manner that localizes treatment, must be used to maintain product at treatment concentrations for desired treatment periods. Do not enter or fish in sites treated with MBI-401 until treatment site barriers are removed or twelve (12) hours after treatment. Application of MBI-401 SDP must be scheduled to times that minimize exposure of sensitive species during spawning.

## **Determining Flow**

Accurate flow information is required to determine appropriate application rates. Record the average flow rate during the projected treatment period.

Select a cross section of the flowing body of water. Divide the surface width into 3 equal sections and determine depth of water and velocity of water at the center of each section. Determine the velocity by dropping at the section midpoint a float attached to no less than 10 feet (3 meters) of loose lightweight line. Record the time it takes for the float to travel the full distance of the line. Take three readings from each section midpoint.

To calculate the flow rate use the following formula (metric):

$$F = \frac{W \times D \times L \times C}{T}$$

Where F = flow rate (m<sup>3</sup>/sec), W = width of flowing body of water (m), D=mean depth (m), L= mean distance traveled by float (m), C= constant (0.8 for rough bottoms and 0.9 for smooth bottoms), and T=mean time for float to reach end of line (sec).

To calculate the flow rate use the following formula (U.S. Standard):

$$F = \frac{W \times D \times L \times C}{T}$$

Where F = flow rate (ft<sup>3</sup>/sec), W = width of flowing body of water (ft), D=mean depth (ft), L= mean distance traveled by float (ft), C= constant (0.8 for rough bottoms and 0.9 for smooth bottoms), and T=mean time for float to reach end of line (sec).

## **APPLICATION**

### **Life Stage Treatment Instructions:**

#### **Adult Treatment (entire established population):**

The adult treatments kill and/or remove attached adult mussels from infested systems. Adult treatments are conducted at high active ingredient concentrations to manage (remove, control) all infestations of quagga and zebra mussels up to and including adult mussels. Adult treatments must be followed by juvenile or veliger treatments (see below) to protect facilities and resources sensitive to shell debris and/or the presence of adult quagga and zebra mussels from new growth mussel accumulation. For adult treatments do not exceed the maximum application rate of 0.013 oz of active ingredient/gallon of water (100 mg of active ingredient/L of water) in the treated flow for up to 8 hours in a continuous 24 hour period. Do not exceed 4 treatments per calendar year, occurring no more frequently than once a month.

#### **Juvenile Treatment (newly settled mussels):**

Juvenile treatments are routine treatments to manage quagga and zebra mussel populations at a sub-adult size. This treatment provides control of juvenile mussels (< 0.2in or 4 mm in size), keeping the population at a reduced size. Juvenile treatments are performed at lower concentrations, with more frequent treatments, providing mussel population management to facilities and resources that are susceptible to impact from mussel settlement or facilities that choose to perform treatments frequently to control mussel establishment. For juvenile treatments do not exceed the maximum application rate of 0.0067 oz. of active ingredient/gallon

of water (50 mg of active ingredient/L of water) in the treated flow for a maximum of 8 hours of treatment time. Do not reapply more frequently than every 2 weeks.

Veliger Treatment (larvae):

Veliger treatments are low concentration treatments that are conducted during the presence of larval quagga and zebra mussels, known as veligers. For Veliger treatments do not exceed the maximum application rate of 0.0067 oz of active ingredient/gallon of water (50 mg of active ingredient/L of water) in the treated flow and a maximum of 8 hours of treatment time. Do not reapply more frequently than every 2 weeks.

Application Times and Concentration of MBI-401 SDP Needed to Control Zebra and Quagga Mussels in Open Waters

Type of Use	Treatment Duration and Application Frequency*	Treatment Concentration (oz of active ingredient/gallon of water )	Treatment Concentration (mg active ingredient/L)
Adult	up to 8 hours per 1 month	up to 0.013	up to 100
Juvenile	up to 8 hours per 2 weeks	up to 0.0067	up to 50
Veliger	up to 8 hours per 2 weeks	up to 0.0067	up to 50

\*Application frequency applies to all types of treatments and cannot exceed one treatment of any kind in a two week period.

**Method for Mixing Product Solution:**

MBI-401 SDP is applied as a product solution either to the surface of the water or injected beneath the water surface. Prepare a product solution of MBI-401 SDP by dispensing dry product directly into a raw water filled mixing tank and stirring until product solution is homogenous, or by dispensing product into a mixer that incorporates the product into raw water and dispenses the solution into a mixing tank, tote or appropriate plastic container. To determine appropriate concentration of product solution, see calculation method section below described in “Calculation of Product Solution.”

**Method of Application:**

After mixing product solution, inject the product solution from the mixing tote, tank or other appropriate plastic container directly into the flowing system using chemical metering pump or other equipment such that the volume of applied product solution can be measured. Apply with equipment that will provide even distribution within the desired treatment area. Apply the product solution to achieve a maximum concentration based on life stage treatment instructions. Monitor treatment concentration before, during and after application by monitoring the turbidity of the treated water downstream of application. See below description of this monitoring method “Product Concentration Measurement in Treated System.” If turbidity readings exceed target turbidity or turbidity associated with maximum label or pre-notification intended use, applicator must adjust chemical metering equipment immediately or shut down application system entirely to prevent exceeding the expected environmental concentration upon discharge.

Surface Applications: Apply the product solution on the water surface from a structure edge bordering the treatment water body, shore or a properly equipped boat.

Subsurface Applications: Apply the product solution into the water via an injection system.

**Maximum Rate of Application:**

See life stage treatment instructions for maximum treatment concentrations and frequencies.



**Calculation of Product Amount Required for Treatment:**

To calculate the amount of product required for a treatment, first determine total volume of water to be treated (liters or gallons) by multiplying the flow rate (L/sec or gal/min) by the total duration of the treatment. Then multiply the total volume of water to be treated by the target treatment concentration (mg a.i./L or oz a.i./gal). Convert to kilograms by dividing mg amount by 1,000,000. Convert to pounds by dividing ounces amount by 16. Multiply final figure by 2 to account for the 50% inert ingredients.

**Calculation of Application Rate:**

To calculate the application rate, multiply the target concentration (first convert mg a.i./L to g a.i./L or use oz a.i./gal) by the flow rate of the body of water to be treated (L/sec or gal/min), and then divide by the concentration of the product solution (g a.i./L or oz /gal).

**Calculation of Product Solution:**

For all applications, prior to product application, dilute MBI-401 SDP into a double contained plastic mixing tank, tote, or similar container appropriate for use in chemical application in aquatic environments. Mix product and water at a rate of 2.2 lbs (or 1 kg) of dry MBI-401 SDP per 1.3 to 2.6 gallons (5 to 10 L) of non-chlorinated water to achieve a product solution of 26.6 to 13.3 oz MBI-401 SDP/gallon (200 to 100 g MBI-401 SDP/L) or, since MBI-401 SDP is 50% active ingredient, 13.3 to 6.7 oz of active ingredient/gallon of water (100 - 50 g of active ingredient/L of water). See above section titled, "Method for Mixing Product Solution" for mixing instructions to prepare product solution.

**Product Concentration Measurement in Treated System:**

Prior to treatment, collect sample of water to be treated, and portion three 16.9 oz (500 mL) (replicate) samples of water to be treated into clean plastic cups. Apply appropriate volume of product solution to untreated water samples to reach target treatment concentration.

Determine appropriate concentration to apply using  $C_1V_1=C_2V_2$  equation in which  $C_1$  is equal to the target treatment concentration,  $V_1$  is the 16.9 oz (500mL) contained in each sample,  $C_2$  is equal to the concentration of the product solution (see results of calculations from above section "Calculation of Product Solution," and then solve equation for  $V_2$ , which is the volume of the product solution that should be applied to each 16.9 oz (500mL) water sample.

Mix samples by stir bar or other appropriate tool until product solution is dispersed and sample is homogenous. Collect turbidity readings from each of the 3 samples, and average readings. This average turbidity is the target turbidity associated with the target application concentration of MBI-401 SDP, and turbidity is thereby used during a treatment to determine when target concentration is reached. The correlation for a maximum turbidity to the maximum application concentration for a treatment should also be determined prior to treatment.

**Post Treatment:**

Use of infrastructure after a treatment must be prefaced with rinsing post treatment to remove residual MBI-401 SDP particulate if particulate impacts use.

**Limitations on Discharge of Treated Water:**

At the determination of the NPDES permitting authority, additional site-specific discharge restrictions will apply when discharging MBI-401 SDP into receiving waters. Particular attention will be given to the level and dynamics of dilution of MBI-401 SDP into the receiving waters of

the site, the presence of potentially sensitive aquatic species and their location relative to the dilution of MBI-401 SDP in the receiving waters of the site, and other factors considered relevant by the NPDES permitting authority that could impact aquatic species present at the proposed site, as required under the NPDES permitting process. Marrone Bio Innovations will provide the permitting agency with information related to sensitive species in the state or region.

### **STORAGE AND DISPOSAL**

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

**Pesticide Storage:** Store in original container at 4°C (39°F). Store for up to 6 months after date of manufacture.

**Pesticide Disposal:** To avoid wastes, use all material in this container by application according to label directions. If wastes cannot be avoided, offer remaining product to a waste disposal facility or pesticide disposal program (often such programs are run by state or local governments or by industry).

**Container Handling: Non-refillable container. Do not reuse or refill this container.**

*(For plastic lined paper bags, all sizes)*

Completely empty bag into application equipment by shaking and tapping sides and bottom to loosen clinging particles. Then, offer for recycling if available, or dispose of empty bag in a sanitary landfill or by incineration. Do not burn unless allowed by state and local ordinances.

*(For plastic bag lined pails, all sizes)*

Non-refillable container. Do not reuse or refill this container. Completely empty bag into application equipment by shaking and tapping sides and bottom to loosen clinging particles. Then, offer for recycling if available, or dispose of empty bag in a sanitary landfill or by incineration. Do not burn unless allowed by state and local ordinances.

Triple rinse pail and offer for recycling if available, or puncture and dispose of empty pail in a sanitary landfill.

**Container Handling: Refillable Container. Refill this container with MBI-401 SDP only. Do not reuse this container for any other purpose.**

*(For drums with inner plastic coating, all sizes)*

Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller. To clean the container before refilling or final disposal, empty the remaining contents from this container into application equipment or mix tank. Fill the container about 10 percent full with water. Agitate vigorously or recirculate water with the pump for 2 minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times." After cleaning for final disposal, offer for recycling if available or reconditioning if appropriate or puncture and dispose of in a sanitary landfill or by other procedures approved by state and local authorities.

## **WARRANTY**

To the extent consistent with applicable law, the seller makes no warranty, expressed or implied, of merchantability, fitness or otherwise concerning use of this product. To the extent consistent with applicable law, the user assumes all risks of use, storage or handling that are not in strict accordance with the accompanying directions.

Made in the U.S.A.

U.S. Patent No. 6,194,194

Canada Patent No. 2,225,436

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<b>OPTIONAL LABEL CLAIMS:</b>
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- Biopesticide
- Molluscicide
- Treats/controls zebra and quagga mussels
- Treats/controls zebra and quagga mussel populations
- Treats/controls invasive mussels
- For listed invasive mussel control
- A treatment for the control of listed (dreissenid) (zebra and quagga) mussels in enclosed and semi-enclosed systems
- Biological molluscicide
- Bio-based molluscicide
- Biological aquatic molluscicide
- Biorational control product for zebra and quagga mussels
- To manage/control listed invasive mussels [populations]
- A treatment for the control of problems associated with listed mussel infestations
- A treatment for the control of problems associated with listed invasive mussel infestations
- A treatment for the management of problems associated with quagga and zebra mussel infestations
- A treatment for the management of problems associated with listed mussel infestations
- A treatment for the management of problems associated with listed invasive mussel infestations
- Treats/controls zebra and quagga mussels
- Treatment of veligers prevents the spread of quagga and zebra mussels.
- Treatment for open water
- Benthic treatment
- Infrastructure treatment
- For Early Detection and Rapid Response Situations
- For Aquatic Invasive Species (AIS) Rapid Response Situations
- For treating lakes, rivers, streams, and reservoirs
- For treating man-made and natural water bodies