

A New Natural Pesticide for the Control of Destructive Mussels

Product Description

Zequanox™ is a patented, natural, biodegradable product used to control two invasive mussel species—quagga and zebra. Highly specific and deadly only to these organisms, Zequanox was derived from a ubiquitous, naturally occurring soil micro-organism. Zequanox has been proven to be of minimal risk for native, non-target species and to humans.

Features and Benefits

Environmentally Friendly	<ul style="list-style-type: none"> ✓ Usable without special permits ✓ Non-toxic to native aquatic life and fish ✓ Minimal use restrictions
Proven Effective	<ul style="list-style-type: none"> ✓ Reliably kills quagga and zebra mussels ✓ Known dosage and treatment duration ✓ Effective at all organism life stages
Simple Administration	<ul style="list-style-type: none"> ✓ Short treatment duration ✓ Non-disruptive to facility operations
Cost Effective	<ul style="list-style-type: none"> ✓ No up-front capital costs or long-term power costs ✓ Compatible with existing equipment ✓ Non-corrosive, non-damaging to equipment ✓ Predictable results

General Application Description

Zequanox Protective is a technical solution to prevent juvenile mussel settlement and infestation. Used during the season when juvenile quagga and zebra mussels (*Dreissena polymorpha*, *Dreissena bugensis*, respectively) are most active, Zequanox is a “green” treatment that controls these invasive pests.

Zequanox Protective is the treatment of choice for facilities without massive mussel infestation. After assessing facility conditions, prior treatment methods, and the threat and consequences of mussel infestation, MBI scientists develop a facility-specific program to address your needs for mussel control. The goal of Zequanox Protective is to prevent mussel settlement and the resultant infestation that occurs once these prolific organisms gain a foothold.

Treatment with Zequanox Protective is effective at preventing juvenile planktonic, or “veliger”, mussels from settling. The settling, or attaching themselves in large masses to submerged objects in water, begins the destructive infestation process. Rapid reproducers tolerant of diverse ecosystems, mussel populations grow explosively clogging pipes and internal operating structures of water-using facilities. The time for treatment is before mussels cause massive damage.

Physical removal of mussels is difficult and expensive and can interfere with facility operations. Currently available commercial products to treat mussels are hazardous, detrimental to aquatic life and applied with many restrictions. Existing biocides are nonselective treatments lethal to mussels, but often at the cost of native beneficial species and ecosystems.

General Application Description (Continued)

Treatment with Zequanox Protective is simple and nondisruptive to facility operations. Typically only six hours in duration, we employ a chemical metering pump and injection probe to deliver Zequanox from a feed tank. The natural product is injected near the entrance of an enclosed intake structure or cooling water system. After 24 hours from application, the active ingredient in Zequanox (dead cells) naturally degrades.

Supporting Data

Zequanox is a new, all natural pesticide derived from a specific strain of the benign microorganism *Pseudomonas fluorescens* (Pf-CL145A). Discovered and patented by a research team led by Dan Molloy at the New York State Museum (NYSM), this ubiquitous species of soil microbe is found at the roots of a common aquatic plant. The Zequanox formulation comprises dead cells that are not genetically modified.

The *Pseudomonas fluorescens* strain is highly lethal to two subspecies of invasive mussels, producing >90% adult mussel kill and 100% larval kill in laboratory studies. Mussels consume Pf-CL145A as a food source and compounds within the cells disrupt the target mussel's digestive system. Ecotoxicological studies have confirmed that Zequanox meets the lowest risk categorization for nontarget aquatic organisms including native mussel species and fish. Toxicity testing of Zequanox also demonstrates that the product is of minimal risk to humans.

Zequanox is significantly less restrictive to other molluscicides on the market today.

For more information on Zequanox contact:

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Marrone Bio Innovations holds four patents for Zequanox. Marrone Bio Innovations, Inc. (MBI) discovers, develops, and markets natural products for pest, weed, and plant disease management. MBI was founded by experienced entrepreneur Pam Marrone, PhD who has successfully discovered, developed, and launched several microbial pesticide products. The company screens microbial strains for their pesticidal properties and also licenses technology and products for exclusive development and commercialization. MBI has a team of experienced scientists – microbiologists, natural product chemists, and agricultural scientists.



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