

## Eco-Friendly Scale-Control System Also Controls Zebra Mussels

Written by Special to Maintenance Technology  
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**Hydroelectric plants are just one type of operation that has been seeking an effective and acceptable solution to this sticky fluid-handling scourge.**

A study undertaken by Aquatic Sciences, Inc., an international underwater inspection service, demonstrated that the Scalewatcher Electronic System can control infestations of zebra mussels in pipes and water inlets. The system, recognized for its ability to control formation of calcium scaling in piping without the use of harsh chemicals, is based on a design from the Netherlands, and is used throughout the world. The Aquatic Sciences research was carried out over a six-week period along the Welland Canal in Southern Ontario where mussel densities exceed 20,000 per square meter. In the test, the Scalewatcher System reduced the amount of mollusks by 97%.

### **Scaling solution led to fix for Zebra mussels**

The impact of zebra mussels extends from the Great Lakes watershed to the mouth of the Mississippi River. The mussels affect industry and small-volume water users by clogging pipes and intake structures. Industries in infected areas regularly treat the water with oxidants, heat or molluscides to eradicate zebra mussels from the service water system. Environmental and health concerns, however, have resulted in increased regulations and lower discharge limits for chemical treatment. This has helped underscore the need for alternative methods to control infestations.

Used extensively in industry to control fouling resulting from the build-up of scale, the Scalewatcher system works by producing a frequency-modulated waveform. This creates an induced electric field inside the pipe that promotes crystal growth of the scaling minerals in the water instead of on pipewalls. As the crystals remain within the flow of the water, they no longer contribute to the build-up of hard pipewall deposits. The process also softens existing scale layers, which are removed from the system by the water flow.

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Crustaceans and zebra mussels are similar in the way they use calcium—a *key component of pipe scaling*. They both convert calcium in a free ion form to calcium carbonate to construct their shell or exoskeleton. When a plant in Japan discovered that Scalewatcher controlled not only heat-exchanger scaling but crustaceans in piping systems using natural water sources, the manufacturer embarked on its research mission.

### The research

ASI's study was established to determine if the Scalewatcher system inhibits zebra mussel settlement compared with a control system. Using a research trailer, ASI installed a 200-gal. head tank filled with canal water at one end of the trailer. Pipes carrying water through the trailer were split into test and control sections. The test section was connected to a Scalewatcher system. Scalewatcher electrical leads were attached to the pipe, which was connected to a test chamber with culture plates that could measure zebra mussel settlement. The control section also flowed into a test chamber.

At the end of the test, the density of the zebra mussels on the area treated by the Scalewatcher unit was one-tenth that of the control. The Scalewatcher unit controlled two types of zebra mussel—*pediveliger* and *juvenile*—which suggested to ASI that the system may change chemical partitioning of calcium in the water and cause settling larvae to perceive an unsuitable environment. These mussels would remain in the water column, but pass through the system despite the presence of a suitable substrate.

### The real world

Southern Vietnam's laly hydroelectric plant, the second-largest in the country, is located in a hard-water area. It faces the challenges of mussel and scale buildup inside heat exchangers, condensers, compressors and piping used to cool generators. Most of its equipment is water-cooled and has faced serious problems because water taken from the river contains both dissolved minerals and zebra mussels. In hot water, the minerals turn into hard scale and adhere inside heat exchangers.

When Scalewatcher was requested recently to descale the plant's equipment, an experiment involving the cooling-line system's two separate 12" lines was conducted. Before installation of Scalewatcher, the existing scale was visible inside both lines. Thick zebra layers adhered outside the pipes—and *many of the facility's 115 water-supply lines were blocked*. A Scalewatcher unit series 4LM was installed on one of these lines.

After four months of operation, the experiment showed that the line with Scalewatcher had no scale and that the number of zebra mussels was reduced considerably. On the line without

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Scalewatcher, scale was visible, with calcium thickness layers nearly ¼" thick. Plant management credited Scalewatcher for the line's absence of new scale and for removing old scale. More Scalewatcher units were then requested to be installed on equipment having regular trouble with scale. **MT**

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