



US Army Corps
of Engineers
Waterways Experiment
Station

Zebra Mussel Research

Technical Notes

Section 3 — Control Strategies

Technical Note ZMR-3-10

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Use of Reduced Pressure to Accelerate Death of Zebra Mussels

- Background and purpose** Zebra mussels (*Dreissena polymorpha*) spend their adult lives attached to hard substratum such as rock and cobble, as well as concrete, iron, polyvinyl chloride, plastic, and fiberglass. Piping systems at public and private facilities that use raw water are particularly susceptible to zebra mussel infestations. For example, fire prevention systems associated with navigation locks that use raw, untreated water are likely to be infested with zebra mussels. Once the piping system is fouled, mechanical cleaning or other removal techniques are necessary. An economically efficient technique for cleaning pipes is desirable.
- The purpose of this technical note is to describe the use of reduced pressure to speed zebra mussel mortality in closed pipes.
- Additional information** This technical note was written by Dr. Tiao J. Chang, Ohio University, and Dr. Andrew C. Miller, U.S. Army Engineer Waterways Experiment Station (WES). For additional information, contact Dr. Miller (WES), (601) 634-2141. Dr. Ed Theriot, WES, (601) 634-2678, is the Manager of the Zebra Mussel Research Program.
- Description** Zebra mussels can be killed by removing all water, and exposing them to the atmosphere for 7 to 10 days at temperatures above 15 °C. This method was recommended for eliminating zebra mussels from pipes associated with locks, dams, and other facilities along inland waterways (Miller and others 1992). Laboratory tests done at WES demonstrated that it took only 2 to 3 days to kill zebra mussels exposed to a vacuum pressure of 14 to 15 pounds per square inch (psi), whether they were in air or under water (Lei 1992). Additional tests showed that a vacuum pressure of 14 to 15 psi will reduce the dissolved oxygen in the water to practically zero (Figure 1). Therefore, the use of a vacuum technique, in conjunction with dewatering and exposure to the atmosphere, will increase mortality rates of zebra mussels in closed pipes.
- Recommendation** It is recommended that a zebra mussel-infested pipe be partially drained, tightly sealed, and then subjected to a continuous vacuum pressure of 15 psi for 3 days. After this time the pipe should be backflushed to remove dead mussels. For a long pipe, dividing the pipe into sections should increase the efficiency of this method.

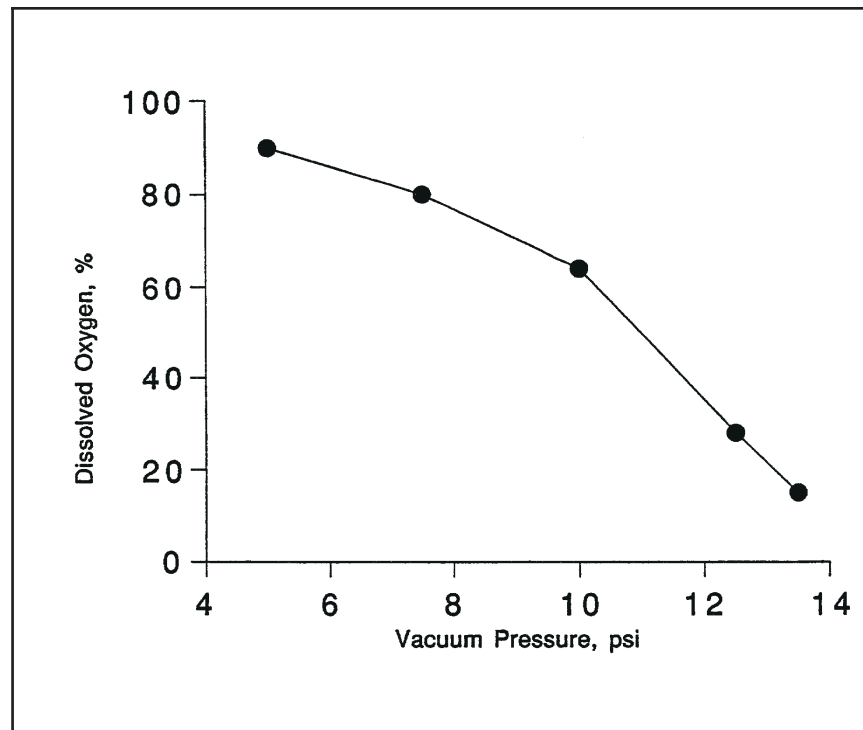


Figure 1. Relation between dissolved oxygen and vacuum pressure

Almost any commercially made vacuum-producing pump could be used to maintain the required reduced pressure in a partially drained pipe. A wet-vacuum pump is recommended because it can handle a mixture of air and water. The selection of a vacuum pump depends mainly on the volume of air in the partially drained pipe.

- References** Lei, J. 1992. "Use of Decreased Air Pressure Under Laboratory Conditions to Increase Zebra Mussel Mortality," Technical Note ZMR-2-13, Zebra Mussel Research Program, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.
- Miller, A. C., Payne, B. S., Neilson, F., and McMahon, R. F. 1992. "Control Strategies for Zebra Mussel Investigations at Public Facilities," Technical Report EL-92-25, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.