

## Zebra & Quagga Mussel Research Program

### RESEARCH NOTE

#### *Quagga Mussel Control for Pipes using Water Jetting*

#### Background

Water Jetting is a potentially effective means for removing mussels from infrastructure. Mechanical removal is a common method for dealing with mussels in the east and mid-west. In the Great Lakes region, mussels exhibit limited breeding cycles when water temperatures become suitable. This provides a window of time each year during which maintenance to remove mussels from fouled structures is usually performed. Unfortunately, the quagga mussel breeding cycles in the Lower Colorado River have been observed to be year round. The impact of this is expected to require multiple mechanical cleanings per year. Normally water jetting requires diving contractors using water jetting wands to remove mussels from trash racks or other similar structures. In other cases, multiported water jetting nozzles (Fig. 1) are used to clean smaller diameter pipes and drain lines. While various vendors provide a variety of systems, some systems have been found to be either ineffective or minimally effective for removing mussels.



**Figure 1.** High pressure water jetting nozzle.

#### Project Description

This project was envisioned to demonstrate that high pressure water jetting can be used effectively to remove mussels from an underwater intake pipeline. Davis dam was chosen for the demonstration sight because a heavily fouled domestic water line was readily available during a regularly scheduled unit shutdown down for routine maintenance. The domestic intake is located approximately 80 ft below the water surface inside one of the unit trash racks. Cleanout was performed from the reservoir side requiring divers to insert the water jetting equipment. The demonstration was completed in December 2008.

Prior to water jetting, a camera was inserted into the 10-in-diameter pipe to observe pre-cleanout condition. Heavy mussel settlement, biofouling, and rust nodules were observed over the 105-ft length of pipe. The water jetting system (Fig. 2) consisted of a pumped arrangement that delivered pressures ranging from 5,000-10,000 psi to the nozzle. For this demo, a 10,000 psi pressure setting was used.



**Figure 2.** High pressure water jetting pump.

#### Outcomes

Following water jetting, the pipeline was again inspected (video documentation is available for both pre- and post-cleanout inspections). Figure 3 shows before and after images captured from the video. The results demonstrated this system is highly effective for removal of mussels and other biogrowth. However, there were areas where rust nodules and some minimal biofouling remained. Furthermore, some coating removal was also observed (although it

should be noted that coating failures pre-existed as evident from observed pre-test rust nodules). Nonuniform cleaning and coating removal was observed and is presumably due to nozzle head insertion along the bottom of the pipe rather than along the centerline. A crawler is recommended for use when possible to overcome these deficiencies. Reduced operating pressures may also prevent or limit coatings removal.



**Figure 3.** 10-in domestic water line before and after water jetting.

### Acknowledgements

Thanks to staff from Reclamation's Technical Service Center, Materials Engineering and Research Laboratory in Denver, CO including Coatings Specialist Allen Skaja, PhD ([askaja@do.usbr.gov](mailto:askaja@do.usbr.gov)) and Mechanical Engineer Aaron Muehlberg ([amuehlberg@usbr.gov](mailto:amuehlberg@usbr.gov)); LC Dams Office coordinator Leonard Willett ([lwillett@usbr.gov](mailto:lwillett@usbr.gov)) for support and coordination with Davis dam staff; and

Davis dam management and staff for providing access and support during this demonstration.

### Further Program Information

Curt Brown, PhD  
Director  
Research & Development Office  
[cbrown@do.usbr.gov](mailto:cbrown@do.usbr.gov)

Joe Kubitschek, PhD, PE  
Program Manager  
Technical Director - Engineering  
[jkubitschek@do.usbr.gov](mailto:jkubitschek@do.usbr.gov)

Fred Nibling, MS  
Program Coordinator  
Technical Director – Biology  
[fnibling@do.usbr.gov](mailto:fnibling@do.usbr.gov)

