

WATER AGENCIES' STANDARDS

Design Guidelines for Water and Sewer Facilities

SECTION 12.9 QUAGGA MUSSEL

12.9.1 PURPOSE

The purpose of this section is to provide an overview and general information regarding Quagga Mussels and how it affects the design of untreated water facilities.

12.9.2 STANDARD TERMS AND DEFINITIONS

Wherever terms or pronouns occur in these guidelines or in related documents, the intent and meaning shall be interpreted as described in Standard Terms and Definitions section of the WASDG.

12.9.3 GENERAL

It is the responsibility of the user of these documents to make reference to and/or utilize industry standards not otherwise referenced within this document.

The *Dreissena Rostiformis Bugensis* (Quagga mussel) is a small freshwater bivalve mollusk. Mussels of the genus *Dreissena* (Zebra and Quagga mussels) are invasive species native to the Ukraine and are thought to have been transported to the Great Lakes region in the ballast of the transoceanic ships. The mobility of their veligers (plankton stage) has enabled the Quagga mussels to invade waterways because the veligers float in the water for up to four weeks before they settle and attach to a solid surface.

In untreated or raw water, Quagga mussels are prolific breeders (i.e. capable of exponential growth rates) with a 10 week reproductive cycle. Each adult Quagga mussel is capable of producing one million veligers per breeding cycle creating havoc and destruction to water facilities. In 2007, Quagga mussel infestation has spread throughout the Southwest United States including San Diego County. Quagga mussels have been known to survive in untreated or raw water facilities (pipelines, pump stations, tanks, reservoirs, etc.).

12.9.4 GUIDELINES

The design of water facilities associated with untreated or raw water (to help control Quagga mussel infestation) is subject but not limited to the following:

- A. Accessibility for inspection and maintenance of water facilities
- B. Elimination of water pipeline dead end areas
- C. Facilities for chemical addition
- D. Valve selection (full port valves)
- E. Elimination of zero to low flow areas
- F. A plan for discharging of untreated or raw water to meet current regulatory measures
- G. Test areas to examine growth of Quagga mussels

- H. Parallel Systems
- I. Coatings
- J. Impressed Current

12.9.5 ACCESSIBILITY

Accessibility for inspection and maintenance of water facilities is important to determine the extent of Quagga mussel infestation, for removal of Quagga mussels, and effectiveness of Quagga mussel solutions. Access typically involves manways on pipelines at key locations near valves and facilities. The Owner may require additional manways for inspection of untreated or raw water facilities. Alternatively, robotic cameras may be used to perform inspections in pipelines too small for manned entry.

12.9.6 PIPELINE DEAD END AREAS

When possible or feasible, dead end water mains shall be avoided to prevent a habitat for Quagga mussels. If dead end areas are not avoidable, other measures to help control Quagga mussels mentioned in this section will be required.

12.9.7 FACILITIES FOR CHEMICAL ADDITION

Design of facilities for chemical addition into pipeline is important to help control Quagga mussel infestation. Chemical addition facilities are typically similar to inlet/outlet, test or sample stations.

12.9.8 VALVE SELECTION

Valves for untreated or raw water systems will require full port or heavy duty valves so that it is not easily damaged from Quagga mussel infestation. Where possible, design criteria shall include the ability to fully operate a valve despite infestation on either the valve body or seat.

12.9.9 ZERO TO LOW FLOW AREAS

Zero to low flow areas shall be avoided in the design of the untreated or raw water pipelines to help eliminate Quagga mussel habitat in the pipeline.

12.9.10 DISCHARGE OF UNTREATED OR RAW WATER

Discharge of untreated or raw water shall conform to all Department of Health, City, County, or State regulations. In most cases, a plan and/or permit(s) for the discharge of untreated or raw water will be required by the Agency.

12.9.11 TEST AREAS

Test areas such as removable growth substrates, shall be designed for untreated or raw water pipelines to monitor and/or detect Quagga mussels without the need for a full visual inspection of the pipeline

12.9.12 PARALLEL SYSTEMS

A parallel pipe or device may be required to be installed so that the two can be rotated while the other is cleaned or allow the water to become stagnant and ultimately kill the Quagga mussels. Where parallel systems are not practical, an alternative would be to layout out small diameter piping for rodding or brushing.

12.9.13 COATING

Apply a special coating that has been proven to prevent Quagga mussels from attaching to steel panels and grates.

12.9.14 IMPRESSED CURRENT

Use impressed current cathodic protection (ICCP) system on steel structures that are not coated. Current density of the ICCP shall be high enough to ensure the buildup of calcareous deposits on the surface of the steel structure. The resulting layer of high pH deposits will deter the Quagga mussels from attaching to the steel structure.

12.9.15 REFERENCE

- A. Should the reader have any suggestions or questions concerning the material in this section, please contact one of the agencies listed.
- B. The publications listed below form a part of this section to the extent referenced and is referred to in the text by the basic designation only. Reference shall be made to the latest editions of said publications unless otherwise called for. The following list of publications, as directly referenced within the body of this document has been provided for the user's convenience. It is the responsibility of the user of these documents to make reference to and/or utilize industry standards not otherwise directly referenced within this document.
 - 1. Water Agencies Standards (WAS):
 - a. Design Guidelines
 - b. Standard Specifications
 - c. Standard Drawings
 - d. Approved Materials List for Water Facilities
 - 2. California State Assembly Bill 1683
 - 3. California State Assembly Bill 2065
 - 4. Fish and Game Code Section 2300-2301
 - 5. San Diego Regional Dreissena Mussel Response Control Plan

END OF SECTION