

# ZEBRA MUSSEL CONTROL PROJECT VE STUDY

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In the late 1980's zebra mussels were found in the Great Lakes and began multiplying into a nuisance by forming colonies that fouled the water and clogged inlet and outlet pipes and other structures like screens and racks at all kinds of plant facilities.

The City of New York responded to this alert by starting an Action Plan in 1992 for its extensive watershed upstate. The Action Plan was followed by parallel efforts to design a control strategy and to develop an EIS to study potential environmental impacts of the various chemicals used for control. The resulting plan included proposed actions at more than 15 sites throughout the watershed. In total, the project as it was originally designed, was estimated to cost approximately \$21.7 million. The designers performed a risk analysis to rank the sites as to higher or lower risk, using likelihood of introduction as a controlling risk. They had also given weight to the importance of each site within the water system, the potential impact of zebra mussels on each facility, as well as water conditions (biology) and physical factors such as flow conditions and substrate type.

When this project was selected for a VE study, it was nearing design completion, but had been on hold for 3 years. The VE study, conducted by MENG Design/Analysis for the City of New York brought together a team of extremely knowledgeable zebra mussel experts and supporting design personnel. The team included an aquatic biologist, an ecological risk analyst, an environmental scientist, a Water Treatment Facility operator who was a veteran of the zebra mussel infestation in the Great Lakes and a chemical specialist. They brought the latest technology and experience in the field to share with the City and its designers, and this expertise proved pivotal to the success of this study.

In the East of Hudson Watershed, water conditions were more favorable for zebra mussels. The control measures proposed include chlorination with dechlorination, deoxygenation, and mechanical scrubbing. These facilities would therefore get a more aggressive approach to zebra mussel control, including expansion or improvement to existing chlorine facilities, and installation of pumps, piping and diffusers at some new locations. In addition, the Department of Environmental Protection (DEP) would construct a Zebra Mussel Response Facility to house personnel, trucks and chemicals.

For most of the facilities West of the Hudson River, the project design involved a “monitor and be prepared” contingency plan with some interim control measures such as:

- Mechanical scrubbing of trashracks, inlets and outlets.
- Steamcleaning of boats in the watershed
- Injection of sodium hypochlorite at intakes
- Sodium bisulfite dechlorination

The VE Team reviewed the planning documents and design and approached the risk analysis of high and medium risk sites differently. The fundamental question they asked was not about the risk of zebra mussel introduction or survival, but whether or not conditions were favorable for reproduction. This would control whether or not the mussels would become a nuisance or an environmental problem.

The slight change in approach downgraded the risk for several sites resulting in a \$1.6 million cost reduction. The experts also informed the City that certain materials like copper coating were found to prevent zebra mussels from adhering to screens and racks. This would avoid the need for chlorination at several sites and reduce costs by \$5.5 million. Other accepted VE ideas improved the chlorine dispersion or diffusion for more efficient chemical usage and had some initial additional cost but an overall life-cycle cost reduction.

The conclusion of this VE study was to reassure the City that the contingency plan for the low risk sites was in place on paper but need not be implemented until, and only if, conditions which presently discourage infestation at these sites should change. This avoids approximately \$8.6 million in construction of chemical storage and injection points. At the medium or higher risk sites, alternative strategies like anti-fouling coatings, interchangeable screens, mechanical scrubbing and rotation and air drying of screens, can possibly avoid or minimize the use of chemicals.

The team provided the City with the confidence to employ a phased approach at these higher risk sites, starting with the non-chemical control mechanisms. There will be sufficient time to add more extensive controls (chlorination and dechlorination), since the zebra mussels take several years to become troublesome, and the designs are already completed.

The VE study resulted in \$10.7 million in cost reductions and taught the City to feel less alarmed for the safety of the watershed, since water quality chemistry and flow conditions at most sites will deter zebra mussel multiplication.