

Zebra Mussel Control – 16 Years of Ozone Treatment at Lennox GS

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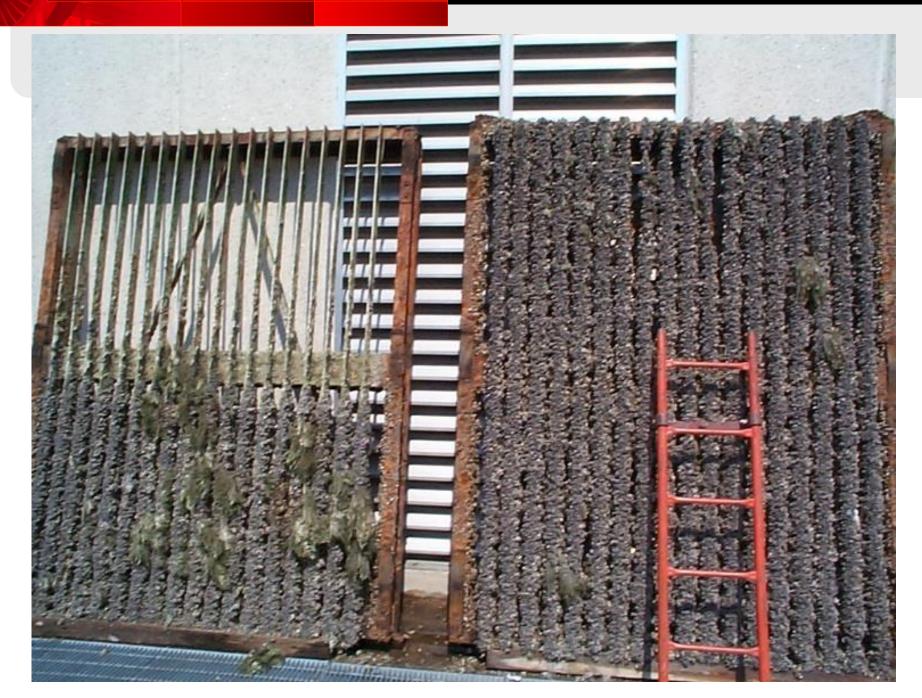
Overview

- How did we get to ozone.
- Ozone Pilot Program (and beyond).
- 2017 ozone study.











How did we get to ozone

• 1992-2000 Sodium Hypochlorite

"The use of sodium hypochlorite is considered an interim means of offsetting the accumulation of zebra mussels in water supply piping"

OPG Chlorine Reduction Program

Pilot ozone system installed in the summer of 2000.



Ozone Pilot program

- Initial capital cost of \$620K with annual operating cost of \$140K.
- Continuous injection rate of 500ppb with residual of 100-200ppb throughout piping system.
 - Pilot study showed 98-100% mortality of adult mussels after several weeks of exposure.
- Several operational issues with the system.
- Short half life of ozone makes it environmentally friendly downstream.

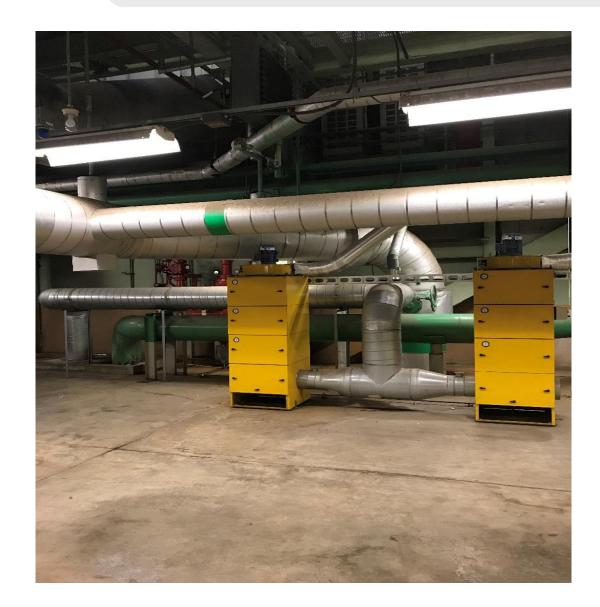


Ozone Regulatory Requirements

- Provincial Environmental Approvals:
 - Air discharged from ozone destruction unit
 - Effluent discharged from CCW channel
 - Discharge limit of 10ppb, objective of 2ppb
 - » In situ toxicity testing
 - » Requirement for Tempering Water Pumps
 - Annual performance report to ministry
- Pest Management Regulatory Agency
 - Ozone is considered a Pesticide in Canada



Ozone Occupational Issues







Dosing Strategy

 Over the past several years, the dose rate has been dropped to approximately 250ppb.

The problem with this strategy is that it hasn't been backed by scientific research....



2017 Ozone Study – RNT Consulting

- Are we doing anything with current dosing rate of 250ppb to deter mussels?
- Prior to system start up, veligers / juvenile mussels were observed on settlement plates in bio-box.
- After 2 months of intermittent injection, no settlement observed in bio-box with 30% mortality of adult mussels near injection point.
- Bio-box further downstream showed no adult mortality.



2017 Ozone Study – RNT Consulting

 Massive settlement has been observed in the forebay during the same time period in 2017.

So.....

 Preliminary results indicate that lower dosage rate can be an effective treatment strategy to prevent veliger settlement.



Summary

- No matter the system, continual improvement will be required.
 - Make decisions based on science where possible.
- Engage and <u>educate</u> your regulators early when planning your treatment strategy.
- Ozone is expensive to operate. The real benefit of an ozone system is the ENVIRONMENT.

