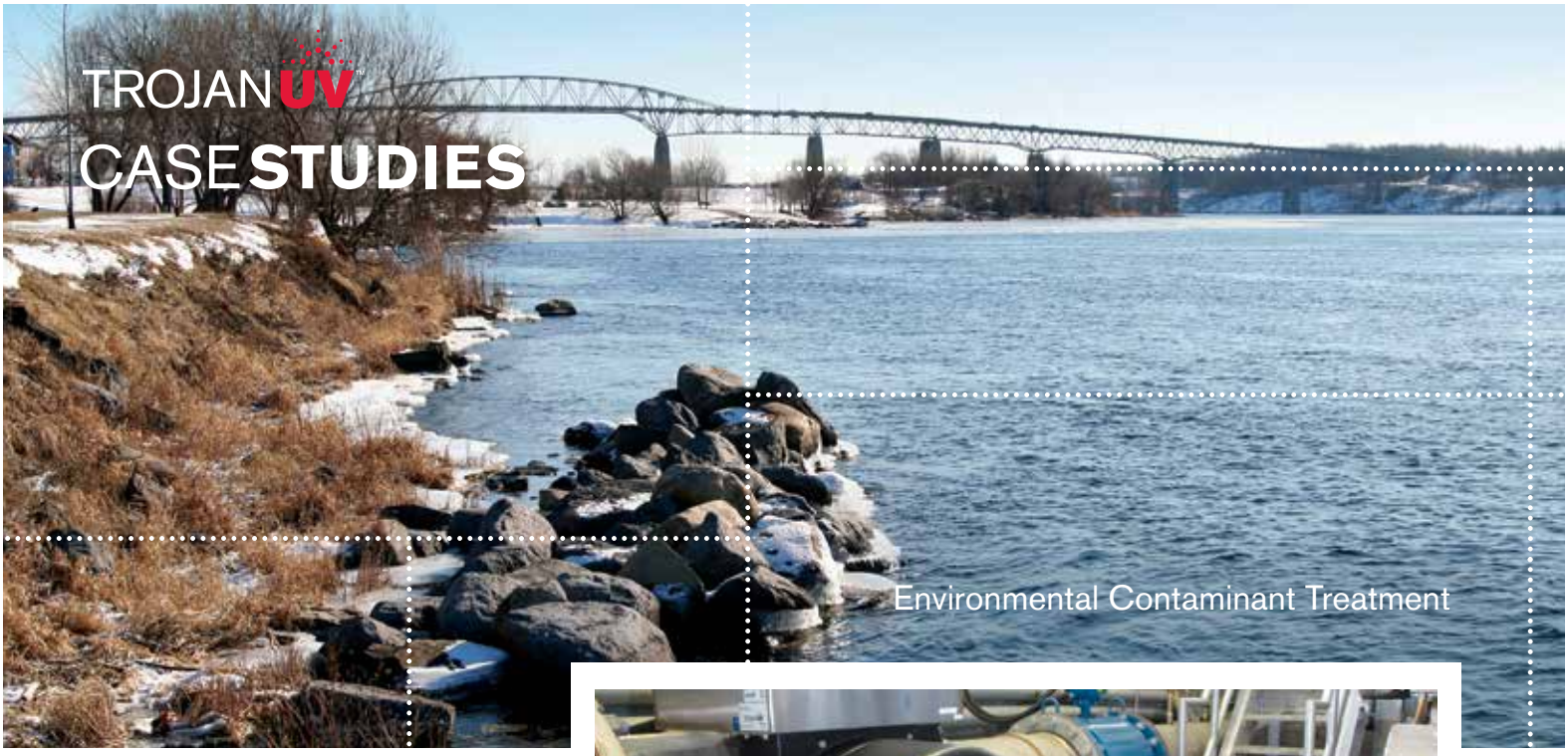
TROJANUV

CASE STUDIES



Environmental Contaminant Treatment

Treating Trace Contaminants and Disinfecting with UV in Drinking Water

Taste and Odor Treatment at **CORNWALL, ONTARIO** with UV-Oxidation

Cornwall is a city of nearly 50,000 people in Ontario, Canada. It is located on the St. Lawrence River (pictured above), approximately 1,000 miles from the Atlantic Ocean and 125 miles from Lake Ontario.

The city draws its drinking water from the St. Lawrence, a reliable and generally good-quality source. However, in the late summer and early fall, dying algae from algae blooms during the warmest months often leave an earthy and musty taste in the water. The city's treatment process, consisting of coagulation, sedimentation, and granular activated carbon filtration, was at times unable to remove sufficient quantities of geosmin and 2-methylisoborneol (MIB), the compounds responsible for the difficult-to-treat taste and odor (T&O) problem. Carbon treatment required large amounts of carbon, frequent change-outs (due to rapid break-through of T&O compounds) and was unable to completely treat the T&O problem.

Concurrently, Cornwall had a need to meet additional disinfection rules set forth by the Ontario Ministry of the Environment. These rules were developed to protect the public from chlorine-resistant pathogens. The existing chlorine disinfection system was inadequate to meet the new rules. As a result, the city made the decision to install UV disinfection to accomplish 1-log inactivation of *Giardia* and earn additional disinfection credit.

THE TROJANUV SOLUTION

In the summer of 2004, the City of Cornwall, Ontario selected the TrojanUVSwift™ECT to meet their disinfection requirements and to treat the intermittent T&O problem. The completed system consists of:

- Four 24" TrojanUVSwiftECT chambers placed downstream of the mixed-media filters
- Storage tanks engineered specifically for hydrogen peroxide and with secondary containment
- Electronically-controlled hydrogen peroxide metering pumps (primary and secondary)
- A performance guarantee
- Ongoing supply of NSF or drinking water-grade hydrogen peroxide, delivered as needed
- A patented control system that optimizes the UV-oxidation process in real time

Completed in 2006, the TrojanUVSwiftECT operates in two Modes: **Disinfection-Only** Mode and **Disinfection + Taste & Odor Control** mode. In Disinfection-Only Mode, the UV system operates at lower energy levels sufficient for inactivation of microorganisms, including chlorine-resistant *Cryptosporidium* and *Giardia*. This is the normal operating mode for year-round drinking water treatment. While in this mode, only a fraction of the

CASE STUDIES

total UV lamps and/or chambers installed are operated, thereby keeping the operating costs at a minimum while meeting disinfection requirements.

During a T&O event, the UV system mode changes from Disinfection-Only Mode to Disinfection + Taste & Odor Control Mode. In this mode, additional UV lamps or chambers are energized and hydrogen peroxide is dosed into the water upstream of the UV system. The combination of UV and hydrogen peroxide initiates a powerful oxidation reaction that destroys T&O-causing chemicals without forming harmful by-products such as bromate.

FULL SCALE SYSTEM

SYSTEM DESIGN PARAMETERS

- PEAK FLOW CAPACITY: 26.4 million gallons per day (4,164 m^3/hr)
- DESIGN INFLUENT GEOSMIN CONCENTRATION: 50 ppt
- DESIGN GEOSMIN REDUCTION: > 1-log
- DISINFECTION REQUIREMENT: Minimum dose of 40 mJ/cm^2 (> 1-log of *Giardia* inactivation)

PROVEN PERFORMANCE

Performance testing was performed to verify the effectiveness of the UV-oxidation system. Geosmin was spiked upstream of the TrojanUVSwiftECT system and the control system automatically controlled the hydrogen peroxide dosing. **Figure 1** illustrates the effectiveness of the UV-oxidation process at Cornwall. The TrojanUVSwiftECT was able to achieve a 1-log reduction of geosmin while meeting their disinfection requirements.

ALGAL TOXIN TREATMENT

Algae blooms that create T&O compounds can also create algal toxins that can have harmful effects on human health. The best known and most widely regulated algal toxin is microcystin. This toxin affects the body's ability to produce proteins and exposure ultimately results in liver damage. In addition, it can result in tumor promotion.

The UV-oxidation process also treats algal toxins. As seen in **Figure 2**, microcystin is more readily treated than T&O compounds. As a result, the UV-oxidation solution represents a multi-barrier approach in which a single treatment system provides disinfection, T&O treatment and algal toxin treatment.

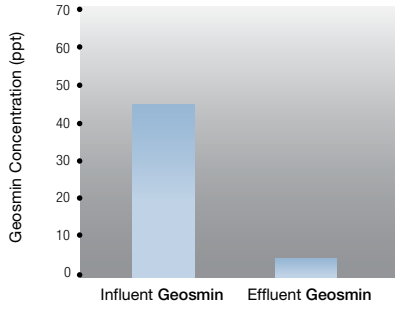


Figure 1. The concentration of geosmin was measured at the influent and the effluent of the TrojanUVSwiftECT system at Cornwall. The system demonstrated it could successfully meet the 1-log reduction requirement.

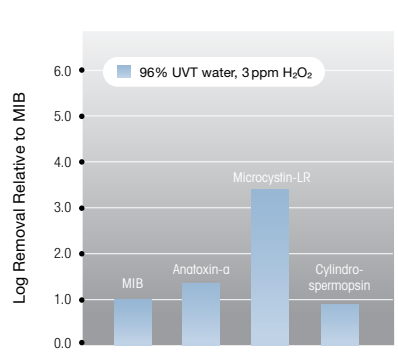


Figure 2. The predicted log removal of contaminants, under identical conditions, is illustrated above. Removal of taste and odor compounds such as MIB by UV-oxidation also results in removal of algal toxins such as microcystin.

Head Office (Canada)
3020 Gore Road London, Ontario, Canada N5V 4T7
Telephone: (519) 457-3400 Fax: (519) 457-3030

Trojan Technologies Deutschland GmbH
Aschaffenburger Str. 72, 63825 Schöllkrippen, Germany
Telephone: +49 (0) 6024 6347580 Fax: +49 (0) 6024 6347588

www.trojanuv.com

For a list of our global offices, please visit **trojanuv.com/contactus**.

TROJAN UV™
A TROJAN TECHNOLOGIES BUSINESS