

Thinking out of the box and using household UV system in a municipal application

By Pritish Roy and Ryan Polito

Sunderland is a small community, located 49 kilometres north of Lake Ontario, in the Township of Brock in the Regional Municipality of Durham. The Sunderland Water Supply System, one of the oldest in the Region, has been serving drinking water to the community for more than five decades. To comply with the latest provincial drinking water regulation, O. Reg. 170/03, the Region is currently undertaking upgrades to the facility.

The current facility consists of two groundwater wells: Well No. 1 and Well No. 2. Both the wells are located on the south side of River Street and on the east side of the Beaver River. Well No. 1 is housed in the main pump house and Well No. 2 is housed in a second smaller pump house. The main pump house consists of a pump room and a chemical storage room. Prior to the upgrade work, the well water was only disinfected with sodium hypochlorite and then discharged through a 200 mm diameter water main towards the town, which is located to the west of the facility.

The required upgrades were initially identified through the First Engineers Report and a subsequent Preliminary Investigation Report and included:

- Sodium hypochlorite system improvement.
- Provision of chlorine contact time in accordance with MOE regulation, by means of an in-ground contact tank.

However, the Hydrogeological Report, prepared to confirm that the wells' groundwater was not under the direct influence of surface water, identified a shallow and thin aquifer protective layer. It was determined that subsurface construction in the area would risk compromising this thin protective layer. Therefore, the chlorine contact tank construction had to be abandoned. The use of a UV system as the primary disinfectant was considered instead, in combination with chlorine to provide residual in the distribution system.

However, this introduced other technical difficulties. The UV transmittance of the well water ranged from 85% (Well No. 2) to 91% (Well No. 1) under the worst condition. Another limitation was the fact that all new equipment had to be



Hallett 30 UV units at Sunderland Water Supply System.

housed in the existing building to avoid excavation at the site.

At the time of the design, the one UV unit that could handle and was validated for such low transmittance levels was UV Pure's Hallett System.

To get the project under way, R.V. Anderson Associates Limited had to solve two problems:

- Obtain an MOE approval for the proposed upgrades.
- Solve the problem of how to fit the new equipment into the limited existing facilities.

To solve the first problem, in communication with MOE, a pilot-testing program was set up and executed for the Hallett 30 UV Pure unit. Based on the results, a consent was obtained from the MOE to proceed with the design.

The second problem was resolved by designing a system where the Hallett units would be connected in parallel, in two banks (six per bank), one for each well pump. The piping and the equipment were laid out for an "L" shape, wrapped

along two walls of the former chemical room. Then a prefabricated building on a concrete pad was specified for the new chemical storage.

The construction work for Sunderland Water Supply System upgrades was commenced in March, 2007 and was successfully completed in June, 2007 by Peak Engineering & Construction Ltd. The work included replacement of Well No. 1 Pump, new stainless steel piping and valves, disinfection using Hallett 30 UV units, new sodium hypochlorite feed system, MCC, and prefabricated building to store chemicals. The construction work was carried out as planned without any interruption in water supply using the existing system. The plant is now operational and supplying water to the Sunderland community with the upgraded equipment.

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