FAIRMOUNT
Water Solutions

MACROLITE®

Case Study Marmora and Lake Township

Halfway between Toronto and Montreal, the small Canadian community of Marmora and Lake Township is reaping the full benefits of Macrolite® Engineered Ceramic Media. Macrolite® has allowed an expansion of the community's water supply using a facility that is smaller and less costly, yet has improved water quality and safety.

Located about two hours northeast of Toronto, the community of 3,900 relies on surface water obtained from nearby Crowe Lake, part of the Crowe River system that flows southward over Precambrian Shield rock in heavily wooded terrain. With changes in weather, the Crowe experiences significant changes in flow and water quality. The most significant problem is high organic color, caused by tannins and lignin, which are common when woodlands drain over rocky terrain that prevents surface absorption. While color levels range from as low as 1.0 TCU to as high as 60 TCU, the plant typically has an influent color of approximately 40 TCU. Average raw water turbidity is 4.0 NTU. Marmora had been treating this surface water with a manually-operated diatomaceous earth system that had a high failure rate. It was also falling behind the growing community's demand for treated water, so the community opted to build a new facility.

THE CHALLENGE:

The decision to replace the water treatment system brought some exceptional challenges. The community's wastewater treatment system had limited capacity and would not be upgraded concurrently with the water supply system. So, the new system also needed to minimize backwash effluent even as it increased treated water capacity. At the same time, it would need to be able to deal with the potential for excursions to very high color levels in the raw water. This level of color can present aesthetic problems, and even more important, it can cause safety problems. When water containing high levels of organics is disinfected, it can form Trihalomethanes (THMs), which are known carcinogens.

"Macrolite® easily handles our variations in raw surface water quality, and has consistently been giving us excellent drinking water quality for over five years."

JAMES NICOLSON, FACILITIES OPERATOR,
MARMORA WATER TREATMENT PLANT

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THE SOLUTION:

In 2006, Marmora built a new treatment facility incorporating Macrolite® Engineered Ceramic Media to help minimize facility cost while boosting capacity and performance. Marmora contracted with the Greer Galloway Group, Inc., an Ontario-based engineering and planning firm, to design two parallel packaged filtration plants with flocculation, clarification, dual media filtration, polishing filtration, and disinfection. The flocculant employed is alum, in the range of 140 to 200 mg/l. The two primary filter media beds are each 126 ft^2 dual-layer units using Macrolite® media. Each bed uses an 8" bottom layer of Macrolite® M1 for fine filtration and a 16" top layer of coarser, but less dense Macrolite® M4 material for bulk solids removal. Each treatment train can provide up to 800 gpm.

The Marmora Water Treatment Plant includes two 126 ft^2, 800 gpm treatment trains, each using Macrolite® Engineered Ceramic Media to provide an average effluent turbidity of < 0.1 NTU, even through significant changes in raw surface water quality.

RESULTS:

Compared to the old diatomaceous earth system, the Macrolite® Engineered Ceramic Media allowed a significant throughput capacity increase without increasing backwash effluent volume; this has been a critically important step in minimizing load to the community's existing waste treatment system. The Macrolite® media also allowed a 50% reduction in overall filter area, reducing the size and cost of the new filter plant. Operating throughput is significantly enhanced; while normal gravity filtration units operate at about 2.5 gpm/ft^2, the new filtration units run at 6.0 gpm/ft^2. And while throughput is significantly increased, the Macrolite® Engineered Ceramic Media is doing an outstanding job in turbidity reduction, even during high color excursions. While Ontario regulations require effluent turbidity to be < 0.3 NTU in > 95% of all readings, the plant has easily surpassed this quality level with average readings of <0.1 NTU.

The Marmora facility provides an excellent illustration of the ability of Macrolite® Engineered Ceramic Media to filter better in less space than conventional media. And the payoffs are reduced costs, less waste treatment load, and better water for the community.

"To keep up with rising demand from the community, we needed to increase filtration throughput, but not at the expense of higher turbidity readings. Macrolite® let us accomplish that on a smaller plant footprint while we minimized backwash effluent loading on the waste water treatment plant."

TONY GUERRERA, P. ENG.,
THE GREER GALLOWAY GROUP, INC.

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