

PROJECT DESCRIPTION

Characterization Restoration **Hydrogeology** **Modeling** Risk analysis
 Drinking Water Treatment System **Research and development**

CONCEPTION AND INSTALLATION OF A DRINKING WATER TREATMENT SYSTEM AT NAPIERVILLE, QUEBEC

Parameters of Concern: Hardness, Turbidity, Total Dissolved Solids, Sulphates, Calcium, Iron, Manganese

Project Duration: 2002-2004

Performance: Once completed the municipality will have access to potable water of good quality that meets Quebec and Canadian standards

Cost: \$2 100 000

Client: Municipality of Napierville



Issue

The municipality of Napierville gets its supply of drinking water from pumping wells installed in a limestone bedrock aquifer. Unfortunately, the natural quality of the groundwater pumped from this aquifer is one of the poorest in Québec. This is primarily due to the presence of high concentrations of sulphates, hardness, turbidity, and total dissolved solids (TDS). Over time, a deterioration of the water quality is commonly observed, which results in the forced abandonment of the pumping wells after a number of years. Connecting to an alternative water supply source, which are located five to ten kilometres away, would result in infrastructural costs that can not be justified for a population of about 3,300 residents.

Work Performed

Given the significant cost of this project to the municipality, a request for a financial grant was prepared. The technology chosen to address this type of problem has rarely been used in Quebec and has never been used to address a groundwater geochemistry as complex as the one at Napierville. To properly address this complexity and to answer several other concerns, a research project was performed which involved the National Centre in Electrochemistry and Environmental Technologies (NCEET) of Shawinigan College. The research project involved the performance of several experiments on the Napierville groundwater, which investigated the oxidizing potential of dissolved iron and evaluated the appropriateness of two types of membranes for sulphate removal. Technical training was given by specialists from France and Quebec to professionals and technicians from TechnoRem in order to ensure that they were familiar with the latest

developments in membrane technology. Treatment pilot tests were performed to complete the characterization of the geochemistry of the groundwater and to select the most appropriate treatment methodology. Based upon the results of laboratory tests, in situ pilot tests and mathematical modeling, the treatment train selected includes: 1) iron and manganese removal, as well as the reduction of the turbidity, using green sand filters (with permanganate), and 2) the partial removal of sulphate, calcium, TDS and hardness using membranes (nanofiltration). The construction of the treatment building as well as the commencement of full scale operation of the water treatment system are expected to be completed by the middle of 2004, following the completion of the technical plans, specifications, tender documents and a pilot test.

Results

The application for financial aid from "Infrastructures Québec" was approved. The laboratory and the in-situ pilot tests were successfully completed during the spring and the summer of 2002. The full-scale treatment system should be operational by the summer of 2004. This system will ensure the provision of high quality drinking water to the residents of Napierville far into the future.