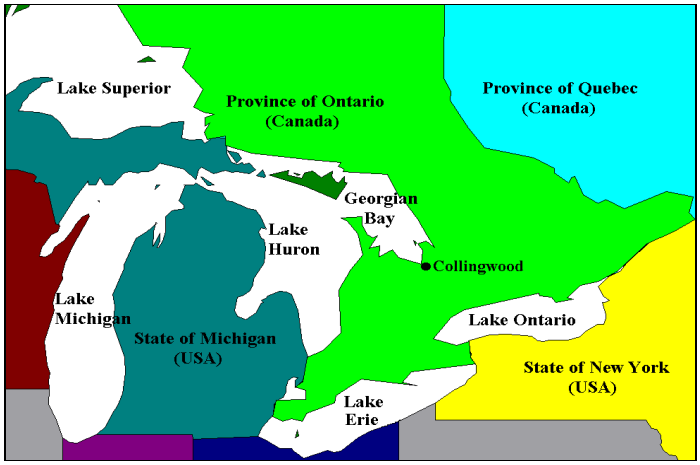
Collingwood Harbour Removal Demonstration (1992)

In 1973, the International Joint Commission identified forty-three Areas of Concern (AOCs) throughout the Great Lakes (26 in the United States, 12 in Canada and five have interconnecting channels) where water quality impairment prevents full beneficial use of ports and/or harbours. In 1994, the number of Canadian AOCs was reduced from 17 to 16 when Collingwood Harbour was delisted, the first AOC to be declared clean in North America.

The Canadian Government, in keeping with the 1987 Canada-U.S.A. Water Quality Agreement, launched a $125 million Great Lakes Action Plan in 1989. From the Action Plan, $55 million was allocated to Environment Canada's Great Lakes 2000 Cleanup Fund. In 1990, the Remediation Technologies Program was created by the Cleanup Fund to seek, demonstrate and assist in the commercialization of innovative technologies for remediation of contaminated sediment.

View of demonstration layout

In the summer of 1991, the Collingwood Harbour



Location of Collingwood relative to the Great Lakes

Remedial Action Plan Team (RAP) approached the Remediation Technologies Program to conduct a sediment removal demonstration/cleanup in Collingwood Harbour. Collingwood Harbour is situated in Georgian Bay on the south shore of Nottawasaga Bay. The selected removal demonstration area, CSL Equity Investments' west slip, is approximately 32 m x 150 m. Water depth ranged from 4.1 m to 6.3 m. These depths generally increased as the location approached the inner harbour. Sediment thickness varied from 0.4 m to 1.8 m, increasing when approaching the inner harbour. The west slip sediments were a greyish mixture of sandy silt with some clay (26 % sand, 64 % silt and 10 % clay). The sediment contained a considerable amount of debris such as welding rods, rivets, bolts, textile material, saturated timbers, steel bars, wedges, etc.

A Pneuma Pump model #150/30 was tested at the selected area. This technology is owned and operated by Voyageurs Marine Construction Co. Ltd. from Dorion, Quebec.

The demonstration took place over nine days in November, 1992. The Pneuma Pump was attached to a crane which was loaded on a flat deck barge. The pump was used on a trailing

mode and a cable winch pulled the barge from the beginning of a sweep to the end. The material was transported through a 15 cm diameter pipeline for a distance of 1.2 km, to a confined disposal facility (CDF) located at the mouth of Collingwood Harbour.

The Remediation Technologies Program of Environment Canada monitored the water quality throughout the demonstration, both inside and outside the confined zones and evaluated the technology.

Results indicated :

- During the nine days the demonstration lasted, the volume of sediment removed from the west slip was estimated at 1,800 m^3
- The pumping rate varied from 20 to 35 m^3/hr of slurry
- The percentage of solids in the slurry varied from 15 to 30% (dry basis)
- The level of turbidity averaged approximately 20 NTU at 10 m in front of the pump, except on three occasions when turbidity reached levels between 50 and 110 NTU
- The average concentration of total suspended solids recorded at 10 m from the pump was approximately 30 mg/L, with a background of approximately 15 mg/L.

Medium and large size debris, remnants of ship building activities, were abundant in the bottom sediment of the working area. Due to this debris, downtimes were numerous (40 % of total time) and sometimes lengthy since cylinder cleanups were required in order to improve pumping efficiency. In fact, as the concentration of debris in the cylinders increased, it was found that the turbidity around the pump increased while the production decreased.

On November 29, 1992, the equipment was transferred from the west slip to the east slip, where approximately 500 m^3 of contaminated sediment was pumped to the CDF. During this whole phase, turbidity and total suspended solids concentration were marginally increased above background levels at 10 m in front of the pump. The pumping rate was between 25 and 45 m^3/hr, while the percentage of solids in the slurry was between 20 and 40%.

On December 11, 1992 when the removal activities were completed in the east slip, the equipment was transferred to the outer harbour. During this phase, a volume of contaminated sediment of approximately 1,800 m^3 was removed. The turbidity and the total suspended solids concentration measured at 10 m from the pump never exceeded 10 NTU and 30 mg/L, respectively. The pumping rate and the percentage of solids in the slurry were comparable to those measured during the east slip portion.

This project showed the great potential of the Pneuma Pump #150/30 for removing contaminated sediment in areas where debris is not abundant.

Divers removing debris manually from the demonstration area

For more information :

Ian Orchard
Remediation Technologies Program
Environment Canada
4905 Dufferin Street
Downsview, Ontario
M3H 5T4
Tel : (416) 739-5874
Fax : (416) 739-4342
e-mail : ian.orchard@ec.gc.ca