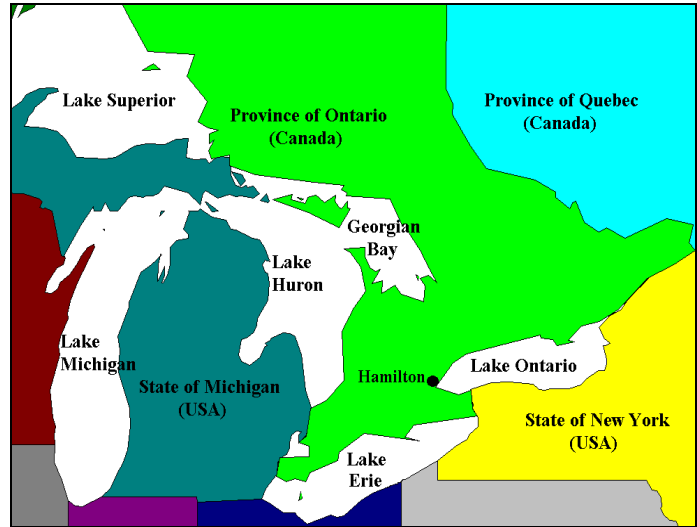




Hamilton Harbour Removal Demonstration (1992)

The Canadian Government, in accordance with the 1987 Canada-USA Water Quality Agreement, launched a \$125-million Great Lakes Action Plan in 1989. As a result, \$55 million was allocated to Environment Canada's Great Lakes 2000 Cleanup Fund which created the Remediation Technologies Program in 1990. This program is designed to demonstrate and assist in the commercialization of innovative technologies for remediation of contaminated sediment.

Following the successful demonstration in Toronto Harbour in June 1992, it was decided that the Cable Arm Environmental Clamshell should be tested in open waters and in a more contaminated area. An area located between Pier 15-16 and Randle Reef in Hamilton Harbour had been identified by different agencies to be heavily contaminated with Polycyclic Aromatic Hydrocarbons (PAHs).



Location of Hamilton relative to the Great Lakes

There were several objectives to this demonstration project. First, to test the applicability of the bucket in an open water environment. Second, to determine if the modifications following the Toronto demonstration enhanced the operation and performance of the bucket. Third, to provide sediment to a biological treatment technology for demonstration purposes. Fourth, to determine the efficiency of the bucket to perform surgical sediment removal with high solids content.

The project was undertaken in early October 1992. A flat deck barge was anchored to Pier 15 to provide a stable anchoring point to the work barges. Due to the success of the working cell used in the Toronto Harbour demonstration, the same system set-up was put in place during this demonstration. Oil booms were secured inside the working cell to prevent gross contamination of the curtain. The dredged sediment were screened to meet the requirements from the biological treatment technology.



Hamilton Harbour demonstration layout

Based on recommendations from the Toronto demonstration and site conditions in Hamilton, the following modifications were made to the bucket :

- neoprene and gasket seals were added to provide a positive seal during closure
- inner side plates were used to reduce the lateral movement of sediment
- an external reeving system was used to eliminate sediment contact
- an epoxy coating was used on the bucket surface to reduce coal tar adhesion.

Independent seal ports were used to maximize solids content for different sediment cuts. Using the lower vent, the maximum capacity was 3.2 m³, allowing sediment removal to a depth of 20 cm. Using the upper vent, the maximum capacity of the bucket was increased to 4.8 m³, allowing removal of 30 cm.

During the demonstration, approximately 150 m³ of material to a depth averaging 34 cm was removed. The results of sludge samples indicated percentages of solids between 44% and 48% (dry basis). The cycle time averaged approximately 2 minutes and 30 seconds. The increased length of time related to positioning of the bucket (slower descent and precision placement) and the pause at the surface for decantation purposes added up to one minute. Again, it is believed that, with proper operator training and use of a positioning system, the cycle time could be reduced to anywhere between 1 minute to 1 minute and 30 seconds, depending on water depth.

Turbidity was generally within the 30% increase from background in concentration except in a few instances where the bucket was overfilled. Background turbidity levels were at 3.0 NTU with levels during the operation at 4.5 NTU.

This demonstration, in conjunction with the Toronto Harbour demonstration, highlighted the fact that the Cable Arm Environmental Clamshell was marketable for environmental use, and could compete with conventional technologies for navigation and recreational dredging projects.



General view of the demonstration

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