

ABSTRACT

Jenny, King-Lai Chui, 2002. *Control of Oil Spills in Urban Area.* A thesis presented to Ryerson University in partial fulfillment of the requirements for the degree of Master of Applied Science in the Program of Environmental Applied Science and Management

The City of Toronto has experienced about 300 oil spills per year (Li 1997). Traditionally, the city recommends that businesses and industries practise pollution prevention and install on-site oil separators. Currently, the sizing criteria for these devices are not well defined and the draft code of practices for oil separators by the Canadian Petroleum Product Institute (1994) has not yet been approved by the Ministry of Environment (Li 2000). Thus, the city is currently investigating the possibility of installing oil separators at spill prone sewer outfalls. The new application of oil separators at sewer outfalls requires that the devices be operable under high flow conditions and that their capacity should reflect the land use characteristics in the associated sewershed.

This study has developed an innovative spill control device for the Humber Creek outfall and a Geographic Information System (GIS)-based analysis technique for urban oil spill management. First, a flow diversion structure was designed to capture the dry weather flow at the outfall and to transport the captured flow into an oil/water separator designed in accordance to the American Petroleum Institute's manual (1990). The designs of the flow diversion structure and the oil/water separator were evaluated by a physical model study using the National Water Research Institute's Hydraulics Laboratory at the Canada Centre for Inland Waters in Burlington, Ontario. Then, the GIS-based analysis technique was used to identify potential treatment options for spill-prone sewer outfalls in the Town of Richmond Hill.

It was found that (1) the spill event characteristics should be analyzed in order to develop design criteria for oil spill control systems; (2) the preliminary design of the oil spill control system at Humber Creek was different from the API's methodology; and (3) the physical model investigation confirmed the conveyance capacity of the diversion channel and the general behaviour of the tilted-plate separator.

A database of oil spill records in the Greater Toronto Area from 1988 to 2000 were compiled and geo-referenced. By overlaying the spill characteristics and other GIS data layers, such as woodlots, wetlands and watercourses, spill prone areas were identified. In order to increase the accuracy of the analysis, the percentage of geo-reference oil spill locations should be increased.