



# Keele Valley Landfill Site Geotechnical Engineering & Hydrogeology Design

## Geographical location

City of Vaughan (Maple), Ontario

## When it began or was completed

The former sand and gravel pit was purchased by Metro Toronto in 1983. Construction of the clay liner and leachate collection system commenced in 1983 and was completed in 1994. Landfilling operations began in 1983 and the site was closed in 2002.

## Why a Canadian geotechnical achievement?

Geotechnical engineering and hydrogeology were extremely important in the design and construction of the Keele Valley Landfill Site (KVLS) to prevent leachate contamination of the underlying Oak Ridges Moraine aquifers. Design and staged construction of a 1.2 m thick compacted clay till liner (permeability  $<1 \times 10^{-8}$  cm/s) provided the necessary barrier to leachate contaminant migration.

During operation, the KVLS was the largest landfill in Canada, and one of the largest in North America. The 376 ha site included a fill area of 99 ha and a total capacity of approximately 33 million  $m^3$ . The KVLS was one of Canada's first fully engineered landfill sites. Engineered components included a compacted clay till liner, a leachate collection system (French drains and HDPE pipes), a landfill gas collection/utilization system, a final cover and an extensive monitoring system. The performance and integrity of the clay till liner was monitored by numerous devices installed within, below and above the liner. The interaction between the landfill leachate and the liner was analyzed in a liner-leachate compatibility testing program involving both field and laboratory testing.

Experience gained at the KVLS fostered research in the design of clayey barrier systems for many other waste disposal facilities, and the development of the Ontario Landfilling Standards – O. Reg. 232/98.

## Submitted by

David Staseff (Ministry of Transportation Ontario), on behalf of the many geotechnical engineers and hydrogeologists involved in the project.

## Key References

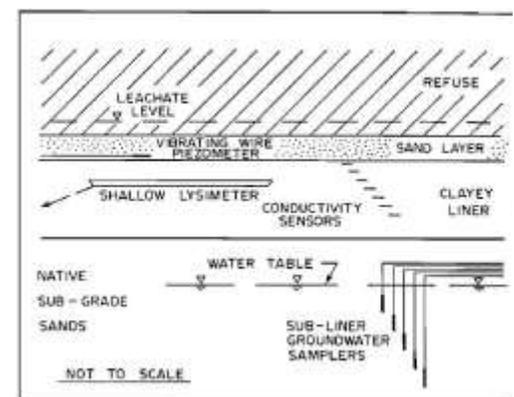
King, KS, Quigley, RM, Fernandez, F, Reades, DW and Bacopoulos, A. 1993. **Hydraulic conductivity and diffusion monitoring of the Keele Valley Landfill Liner, Maple, Ontario.** Canadian Geotechnical Journal, Vol 30, pp 124-134.

Many other papers that reference the KVLS are included in the Canadian Geotechnical Journal.

## Photograph and Figure



Aerial view of the Keele Valley Landfill Site taken in the mid-1980s.



Liner performance instrumentation (from King et al, 1993).