

POLLUTECH

PRESENTATION TO

REGIONAL MUNICIPALITY OF HALTON
PLANNING AND PUBLIC WORKS COMMITTEE
SOLID WASTE MANAGEMENT COMMITTEE

On

The Report By Pollutech Limited
Dealing With Leachate Treatability
And Toxicology For Site D
And Site F (Schedule M)

File No. 3952 (D.86/6)

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Pollutech Limited on behalf of the Regional Municipality of Halton, conducted detailed leachate treatability and toxicity evaluations as part of Halton's submission under the Environmental Protection Act. This work was undertaken to determine whether the leachate could be treated at existing Halton treatment plants and to determine whether or not there would be any potential toxic effect particularly with respect to drinking water, since the treatment plants discharge to Lake Ontario.

The major tasks undertaken by Pollutech during the study as part of this submission were as follows:

- A detailed literature review was undertaken to determine what was reported elsewhere with regards to the quantity and quality of leachates, the treatability of leachates and the health or toxicity impact of leachate.

- Detailed characterization of landfill leachate produced in the Regional Municipality of Halton through collection and analysis of landfill leachate at the closed Oakville site, the closed Georgetown site, the closed Bayview Park site and the operating Burlington landfill site. On the basis of these results a synthesized leachate was prepared, from the existing leachates, to represent the expected leachate.

- Detailed laboratory scale treatability studies were undertaken to determine the impact of the sanitary landfill leachate on three Regional Municipality of Halton Water Pollution Control Plants, giving due consideration to plant operation, effluent quality attainable, trace organic and trace metal contaminants and the impact on the Region's sludge utilization program.
- An ecological assessment was conducted utilizing fish bioassay procedures to compare the effluent from a treatment plant with and without treated leachate.
- Detailed health risk assessments were carried out for the major compounds of an organic or inorganic nature that were identified in the leachate.

As a result of the original work carried out by Pollutech dealing with the raw waste characterization, treatability studies, ecological assessment and the health risk assessment, we have been able to develop a number of clear guidelines for the handling of the leachate from either Site D (Milton) or Site F (Burlington).

The major points from the study leading to these guidelines are as follows:

Characterization of Regional Leachates

Collection and analysis of landfill leachate from four existing landfill sites within the Regional Municipality of Halton provided information on what type of landfill leachate could be expected at varying ages of the landfill sites from within Regional boundaries. The older landfill sites

located in Oakville and Georgetown had not maintained the same level of control on the input of refuse as was being experienced at the existing Burlington landfill site. Therefore, the leachate quality could have significantly different characteristics. Additionally, the Burlington landfill site being an open active site at the time of this study was expected to have significantly higher concentrations of organic and inorganic chemicals representative of a young, active site. Results reported include:

- Collection and analysis of landfill leachate from four existing landfill sites within the Regional Municipality of Halton provided information on what type of landfill leachate could be expected at varying ages of the landfill sites from within Halton's boundaries.
- The analyses of the raw leachate from the four landfills studied to date showed a wide variation in trace organic species present. The major classes of organics isolated were: straight chain chlorinated hydrocarbons; chlorinated benzene derivatives; straight chain organic acids and phthalates.
- The major inorganic species isolated were: zinc, boron, iron, manganese, calcium, silica, magnesium, sodium. Trace amounts of cobalt, aluminum, nickel, chromium, barium, arsenic, antimony and mercury were also detected.

- For organics the Burlington leachate was five times stronger than Bayview leachate and fifteen times stronger than Oakville or Georgetown leachate. Burlington leachate was approximately three times more concentrated relative to the major inorganic species present.

Detailed Treatability Studies

In our Oakville Laboratory we used several physical, chemical and biological treatment procedures to determine the best way to treat the collected leachate. The prime purpose of these tests was to determine whether the leachate can be collected and treated at existing or proposed Regional water pollution control plants, or whether pretreatment or separate treatment of the leachate would be required.

The ultimate aim was to indicate whether the leachate should be pretreated at the landfill site prior to discharge to the sanitary sewer system, whether the leachate could be discharged untreated into the municipal sanitary sewer system for subsequent treatment at Regional facilities, or whether extra facilities are required at the Regional water pollution control plants to handle the leachate. Test results are as follows:

- The bench scale biological treatability study, utilizing the mixture of sanitary sewage and landfill leachate, indicated that a leachate similar in nature to that used in the study could be treated effectively at both the Skyway and Oakville S.W. water pollution control plants at levels as high as 2.5 percent of the hydraulic flow into the water pollution control facility.

- Specific water pollution control plants already receiving sanitary landfill leachate (Skyway) or a mixture of industrial waste (Oakville S.W.) acclimatized more readily to the sanitary landfill leachate.
- Although the effluent quality can be maintained, some modifications to existing operating procedures will be required. These include: providing increased sludge handling and disposal; ensuring adequate aeration is available; implementing solids control and monitoring for sludge settleability.

Health Risk Assessment

On the basis of trace organic and trace metal contaminants found in representative samples of leachate a health risk evaluation was conducted to look at the scenario of raw sewage containing leachate escaping into Lake Ontario in an untreated form. Where a health risk was identified on the basis of untreated leachate, the risk evaluation was also reviewed for leachate treated at the water pollution control plants.

The procedures that were used in assessing the potential health risks consisted of the identification of potential hazards from a selected group of chemicals identified as important components arising from the landfills, the evaluation of the potential exposure levels of human populations to these chemicals, and the estimation of the potential risks of adverse health effects based on the potential hazards and the exposure levels anticipated. The results indicated that:

- As a result of this detailed treatability and toxicity evaluation it became apparent that there would be minimal change in the effluent quality with discharge of

this landfill leachate into the sanitary sewer system for subsequent treatment at select water pollution control plants at acceptable organic loading rates.

- The majority of the contaminants are at acceptable levels in the influent to the treatment plants. Many of the components are not associated with the new leachate but are in the background sewage.

Ecological Assessment

A part of the program carried out by Pollutech staff involved a review of the ecological data provided by other consultants and determination of the impact of the leachate quality on the natural environment in the event of leachate escape from the sanitary landfill site. Results include:

- Testing of leachate for fish toxicity (LC₅₀ bioassays) indicate that a dilution of 270 to 1 would be required for the raw leachate, based on LC₅₀ dilutions of 13.3.
- Provided that the leachate attains adequate biological treatment then the fish bioassay testing indicates that there would be no significant difference between effluent toxicity from the municipal sewage plant effluent with or without sanitary landfill leachates.

SUMMARY

On the basis of all available information from the leachate treatability and toxicology study it became evident that:

- Provided that quantity of leachate flow is regulated within the limits prescribed, there would be no concern with discharge of this landfill leachate into the sanitary sewer system for subsequent treatment at select Regional water pollution control facilities. With such treatment there should be no associated health risks from the effluent from the treatment plant and no associated ecological impacts.
- The loading of leachate to the Regional water pollution control plants should be controlled so that no more than 2.5 percent of the volumetric loading to the plant is from the the leachate.
- The addition of the leachate at any of the treatment plants will result inasmuch as a 100 percent increase in oxygen demand and a 55 to 100 percent increase in sludge production. Routine testing of the leachate impact will be required (i.e. microbiological examination, settling tests) to ensure acceptable full-scale levels of leachate are not exceeded.

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- Providing that loading rates and process operating conditions are controlled, the effluent quality at the water pollution control plants can be kept within Ministry of the Environment guidelines for BOD₅, suspended solids and phosphorus.
- The level of trace organic contaminants in the effluent of the test units did not show a significant increase over that for the control units at levels of leachate addition of 2.5 percent by volume.