Summary: Comparative Analysis of the Environmental Impacts of Thermal Treatment and Remote Landfill Disposal on a Lifecycle Basis

The purpose of the Durham/York Residual Waste Study is to find an alternative to the current approach of disposing of residual waste generated in Durham & York Regions in remote landfills in southwestern Ontario and Michigan. After a detailed analysis of various options, a preferred system for processing residential waste has been identified: thermal treatment of mixed solid waste and recovery of energy followed by recovery of materials from ash/char. In order to compare the environmental impacts of thermal treatment with Durham/York's current waste management practice of remote landfill disposal a lifecycle analysis was undertaken. A lifecycle analysis compares the net environmental effects of the two strategies over the longer term. This analysis was made using a model developed with the cooperation of the U.S. Environmental Protection Agency as well as extensive peer review and stakeholder input. It should be noted that this analysis is not intended to provide a complete assessment of the environmental impacts of the residual waste processing systems, but rather to provide a relative comparison of alternatives that can be used as a tool to support the decision making process.

The major assumptions used in the comparison are as follows:

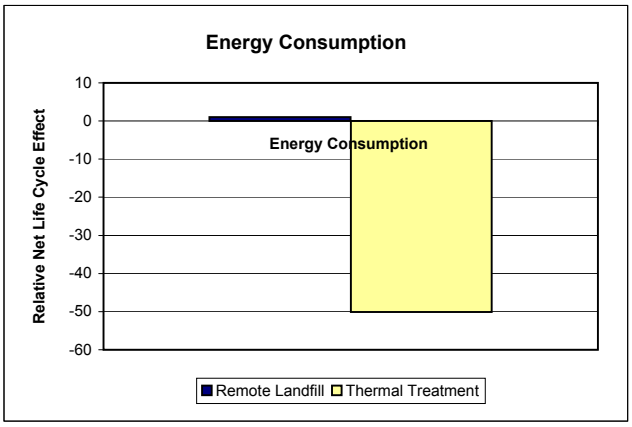
1. The quantity of residual waste is 250,000 tonnes per year, which is the initial quantity of waste approved for consideration in the EA Terms of Reference.
2. A full waste diversion program is in place, achieving 60% diversion initially and increasing to 75% over the life of the facility.
3. The distance from Durham and York Regions to the remote landfill is 300 kilometers (one way) and the distance to the thermal treatment facility is 75 kilometers (one way).
4. The landfill and the thermal treatment facility are both modern, state of the art facilities.
5. Both facilities produce energy. Electricity is generated by utilizing the landfill gases that are collected from the landfill and the combustion of waste in the thermal treatment facility produces steam that also generates electricity.
6. The model considers all residues produced by the combustion and gas cleaning processes.
7. The energy recovered is a credit in the model, since it displaces electricity production in Ontario. As a conservative assumption it was estimated that 45% of Ontario's energy would be generated by nuclear power, 31% by natural gas, and 24% by hydropower based on future generation projections.

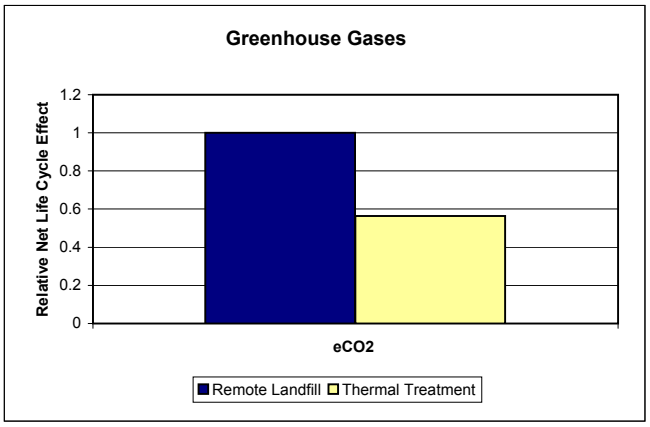
The two systems were analyzed in terms of energy consumption/savings, greenhouse gas emissions, acid gases, pollutants that cause smog, heavy metals, dioxins and emissions to water. The comparison model also took into account net emission reductions, which occurred as a result of reduced energy generation requirements. These lower energy requirements offset emissions that would otherwise be released during the production of electricity. The model also considers the benefits that stem from the recovery of metals in the thermal treatment facility. The recovered metals can be recycled, which offsets the additional energy and environmental effects required to bring new metals to the market.

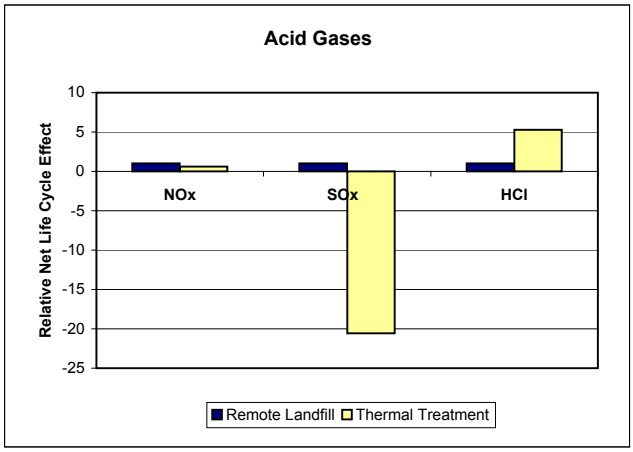
These results show that for the situation in Durham and York Regions, residual waste managed by thermal treatment is better than the remote landfill scenario with respect to energy consumption/generation, emissions to air of greenhouse gases, acid gases, pollutants that cause smog, and emissions to water. The future benefits of thermal treatment over remote landfill are that thermal treatment provides a local source of energy, and generates a greater quantity of energy than remote landfill. Thermal treatment also has a lesser impact on the global and local airsheds since it has lower emissions to air of greenhouse gases, acid gases and smog precursors than the remote landfill scenario. Furthermore thermal treatment has lower emissions to water, therefore reducing the potential impacts on local water resources.

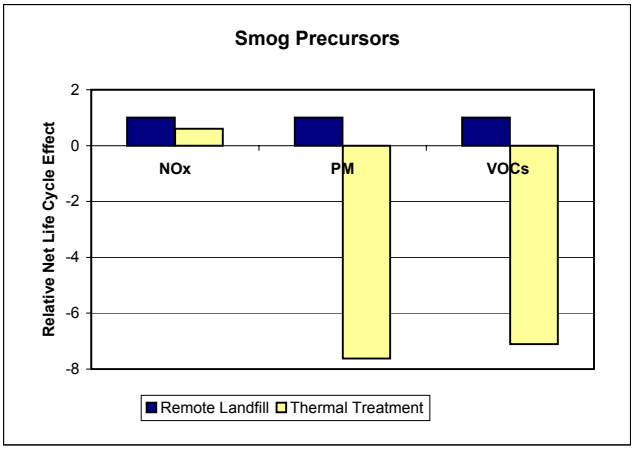
Remote landfill has lower emissions to air than thermal treatment for heavy metals and dioxins. It should be noted that the emissions to air of heavy metals and dioxins from thermal treatment are very small and can be further reduced by modern air pollution control equipment. These emissions are well within the regulatory limits and less than the emissions of these contaminants from many other established industrial sources such as metal refining, wastewater treatment or fossil fuel based electricity generation. Graphs illustrating some of these key findings are attached.

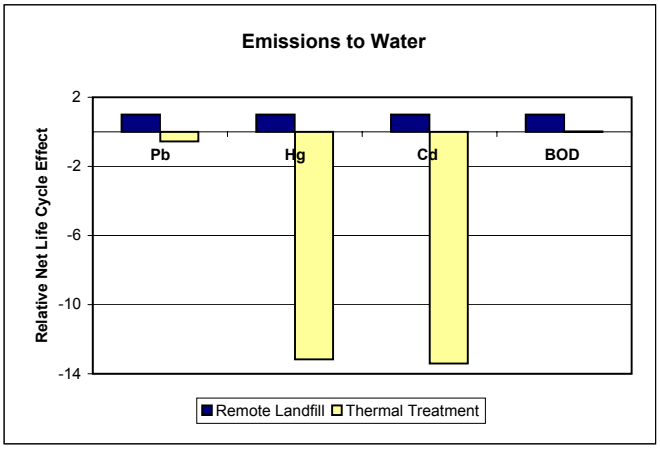
Relative Net Life Cycle Environmental Effects: Thermal Treatment and Remote Landfill











Remote landfill emissions set equal to +1. Negative values for thermal treatment represent a reduction relative to landfill.
e.g. Thermal treatment reduces the emissions of the acid gas SOx - oxides of sulphur - by a factor of more than 20