

Title: VOC Contamination at Selected Wisconsin Landfills - Sampling Results and Policy Implications (Study No. 5)

Investigators: Principal Investigator

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Objectives: To determine the extent of volatile organic compound (VOC) contamination at small- to medium-sized municipal and industrial landfills in Wisconsin, and the effects of site conditions and the usefulness of inorganic parameters in predicting VOC presence. The policy objectives include a review of other state's VOC monitoring and development of a VOC monitoring policy for Wisconsin.

Background/Need: This study is a continuation of a previous study entitled, "Volatile Organic Compounds in Groundwater and Leachate at Wisconsin Landfills," which evaluated the need for routine VOC sampling at landfills of various designs.

Methods: 19 municipal landfills and 6 industrial solid waste landfills were selected to represent as many different kinds of natural attenuation solid waste landfills as possible across the state. 103 wells were sampled and analyzed for VOCs and inorganic parameters.

Results: Monitoring wells at municipal landfills had more VOCs in each well than did monitoring wells at industrial landfills. The contaminants which exceeded Wisconsin groundwater standards most frequently were also the most toxic. Benzene and vinyl chloride were detected the most frequently and also found in high concentration. VOC contamination was mainly found to occur downgradient. No consistent correlation existed between site conditions and VOC contamination. Inorganic parameters were found particularly useful in predicting VOC contamination.

Conclusions: Landfills with natural attenuation designs are more likely to have VOC contamination in groundwater than those designed with containment and leachate collection. Municipal waste sites in Wisconsin are more likely to be contaminated by VOCs than industrial waste sites. VOC contamination is more likely with waste volumes greater than 50,000 cubic yards.

Recommendations/Implications: The investigator recommends that solid waste facilities be required to establish background VOC levels at all groundwater monitoring wells, and to monitor leachate and collection lysimeter samples annually and selected groundwater points at shorter time spans with increasing storage capacities. Additional research is suggested for VOC analysis concerning statistical analysis of duplicate samples, inorganic relationships, the presence of solid waste sites, verification by repeat sampling, the effect of different well gradients and groundwater contamination from landfills based on a random selection of sites.

Availability of Report: Copies of this report are available from:

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Technical Report 26

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