

## TR-153

### Acute and Genetic Toxicity of Municipal Landfill Leachate

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Municipal solid waste (MSW) landfills have been found to contain many of the same hazardous constituents as found in hazardous waste landfills. Because of the large number of MSW landfills, these sites pose a serious environmental threat to groundwater quality. This study was conducted to assess the environmental hazards that materials leaching from four MSW landfills pose to groundwater supplies.

Four leachate and one upgradient groundwater samples were collected from landfills selected to be representative of landfills of differing ages and types of wastes. Each sample was tested through three genetic toxicity bioassays (The Aspergillus diploid assay, the Bacillus DNA repair assay and the Salmonella/microsome assay) to measure the ability of each sample to induce mutations in bacteria, bind to microbial DNA, or cause chromosome damage in diploid fungi. Genetically toxic chemicals may cause cancer, genetic disease, sterility, abortions, heart disease or a variety of other chronic effects. These chronic effects can be subtle and may not appear for decades after exposure.

In addition to the three genetic toxicity assays, each sample was tested in the Microtox test to measure acute toxicity. This assay is a measure of the ability of the sample to cause cell death. Organisms exposed to elevated levels of acute toxins may express the toxic effects through organ dysfunction or the complete death of the organism.

Each sample was chemically analyzed using GC/MS techniques and the chemical concentrations were used to calculate a chemical based risk assessment which is an estimate of the potential carcinogenic health effects associated with the mixture of chemicals in the sample.

All four leachate samples exhibited acute toxicity in the Microtox test. Leachate from landfills representative of both an old unlined landfill which received residential waste and a new operating landfill receiving residential waste contained concentrations of some priority pollutants in excess of promulgated standards for drinking water. Chemical based risk

assessments for these same two leachates showed them to have mean and 98th percentile cancer risks of 1 in a thousand (10-3) which is greater than both leachate from a Superfund landfill and leachate from the Love Canal landfill.

The results of the acute and genetic toxicity bioassays, combined with the chemical analyses and associated cancer risk assessment clearly showed that leachate from municipal solid waste landfills is just as toxic as that which leaches from landfills where residential and hazardous wastes were codisposed.

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