
EXECUTIVE SUMMARY

The Minnies Pit Landfill is owned by the District of Mission and is located on Dewdney Trunk Road near Stave Falls, approximately 15 km northwest of the Mission urban area. The landfill was built in 1973 on the site of a formal gravel pit.

In January 2006, during a very wet rainy period, a plume of brown water was observed migrating from Ephemeral Creek to Brown Creek and then into Hayward Lake. The brown water was caused by leachate (landfill contaminated water) breakouts at the landfill. The District retained Golder Associates Ltd to complete a Screening Level Human Health Risk Assessment (SLHHRA), whose purpose was to determine whether or not the leachate would cause health concerns for people who use Hayward Lake for swimming and for drinking water.

The District of Mission took a significant number of water samples in and around the leachate breakout areas immediately following the breakout event.

The SLHHRA is comprised of the following:

- A summary of available site data following the landfill leachate breakout (from ECL Envirowest Consultants Ltd. [Envirowest] and the District of Mission);
- Evaluation of the data quality and a determination as to whether or not additional sampling was required to complete a thorough assessment;
- Identification of what type of human contact should be assessed (e.g., swimming and consumption);
- Outlining the relevant human exposure pathways;
- Screening level estimates of risk; and,
- Risk characterization. Methodology used in this SLHHRA follows that accepted both nationally (e.g., BC Ministry of the Environment, Health Canada, Canadian Council of Ministers of the Environment [CCME]) and internationally (US Environmental Protection Agency [USEPA], World Health Organization [WHO]).

The Fraser Health Authority and members of the public have expressed concern as to whether all potential parameters that could reasonably be present in leachate have been analyzed for in surface water. To address this concern, additional surface water and sediment samples were collected on April 24, 2006 from the locations on the landfill where “worst-case” conditions would be expected (i.e., the settling pond and leachate

breakout locations). This was done to determine whether it was possible that additional parameters might be impacting the Hayward Lake Reservoir or could impact the reservoir in a future scenario. The majority of the additional parameters measured were found to be below analytical method detection limits. Metals were detected at elevated concentrations in these sediments. Metals, particularly iron and manganese, are the primary contaminants resulting from the Mission Landfill leachate breakout. These have been analyzed in surface water throughout the landfill and leachate breakout areas as well as Blind Slough and the drinking water intakes on the Hayward Lake Reservoir.

The human exposure pathways assessed were ingestion of drinking water and direct contact with water and sediment resulting in incidental ingestion or dermal (skin) contact. Mechanisms of contact were wading and swimming for infants, toddlers, children, adolescents, and adults.

The results of the SLHRA indicate that the vast majority of the measured chemicals did not pose any potential human health risks (a SLHRA can only determine that a potential risk either does not exist or may exist). Possible risks were determined for up to two substances, dibenzo(a,h)anthracene and manganese, as follows:

Substance	Exposure	Receptors	Estimated Risk / Benchmark	Comments
Dibenzo(a,h)anthracene	Wading	Recreational Users	2.1 in 100,000 / 1 in 100,000	Lifetime weighted average (assumes 1 hour per day of exposure for entire lifetime). This is deemed highly conservative since the landfill is a secure site with restricted access.
Manganese	Swimming	Recreational Users	1.6/1	Toddler (assumes toddler spends 1 hour per day in the landfill sediment) This is also deemed highly conservative since the landfill is a secure site with restricted access.

It is noted that the possible human health risk is considered to be low because the highest exceedances of the conservative screening benchmarks were found for dibenzo(a,h)anthracene which is not present at detectable concentrations in the surface water or sediment at the Mission landfill or leachate breakout points. However, detection limits were elevated as sample dilution was required to account for the presence of organic material in the samples. The detection limits for dibenzo(a,h)anthracene were an ten times higher at the landfill (*e.g.* the settling pond) than at the leachate breakout points. As a result, one-half of the value of the elevated detection limit found at the settling pond was used to calculate risks to recreational users of Blind Slough. This is a conservative

assumption which is typical of those utilized in this type of study. It should be noted that if risks to recreational users were calculated using the detection limits found at the leachate breakout points, dibenzo(a,h)anthracene would not pose an unacceptable risk. It should also be noted that there are no recreational users of the settling pond at the landfill, which has restricted site access.

The elevated risk estimate associated with a toddler exposed to manganese is the result of the use of sediment samples collected from the landfill settling pond and leachate breakout points to estimate the exposure to recreational users. While these sediment samples have shown that the correct parameters were analyzed in the sampling program, the use of these samples to assess beach exposure is highly conservative. In other words, the risk estimated for the toddler exposed to manganese is based on the assumption that the toddler has extended contact with the elevated manganese concentrations in the sediment from the landfill settling pond, which is located in a restricted area. The sediment samples were collected to ensure that preliminary investigations had focused on the correct contaminants of potential concern and to evaluate the presence of other unknown substances potentially impacting the drinking water supply.

Given the high level of conservatism of the different components of the SLHHRA, many of which are additive, and the relatively low exceedances of the conservative screening benchmarks, our professional judgment is that it is highly unlikely that human health risks presently exist due to Mission landfill leachate breakout in early February 2006. Additional studies to further assess the potential risk are not considered essential (*e.g.*, lower detection limits for dibenzo(a,h)anthracene). However, some additional monitoring of the BC Hydro Recreational and Ruskin Drinking Water Intakes may be required to ensure that aesthetic parameters which could cause an objectionable taste or appearance of the drinking water are not exceeded. A few confirmatory sediment samples may also be required if visible staining (*e.g.*, from iron) is observed in the vicinity of the beach at the BC Hydro Recreational area. These confirmatory samples should be analyzed for metals in order to refine risk estimates associated with wading.