

Pulp Mill Landfill Leachate Treatment — Chemistry and Regulatory Challenges

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The objective of this project was to evaluate the toxicity levels in a former Kraft pulp mill landfill leachate and to treat it to meet permit requirements, including passing an Acute 96 hr LC50 Rainbow Trout bioassay. After the installation of a new treatment plant, the hydraulic flows and composition of the leachate changed. The full-scale treatment system experienced difficulties achieving the removal efficiency of toxic components recorded in the bench scale tests conducted during the design stage. The variability of the leachate concentrations and the potential for additional toxic constituents, other than those typically found in landfill leachate, created an uncertainty in the industry standard treatment processes implemented.

Discharge toxicity testing and a Toxicity Identification (and Reduction) Evaluation (TIE) were employed to determine the additional toxic chemistry of the leachate. Results of the TIE showed that toxicity was linked to rising pH and unionized ammonia during the standard testing conditions (temperature and pH). After attempting to remove the ammonia using chemical treatment techniques, it was determined that approaching the B.C. Ministry of Environment (MOE) regarding the effects of the testing protocol on the discharge sample was warranted.

Outcomes were 1) Design of a modified procedure for the 96 hr LC50 Rainbow Trout toxicity test, 2) Approval by the MOE to use the modified procedure, and 3) Confirmation that the discharge samples passed the modified toxicity test allowing MOE approval of the discharge.

Key Learning Points:

- Managing industrial landfill leachate – toxicity issues and treatments
- Negotiating with regulators when testing procedures are identified to be affecting the sample chemistry

Francisco Perelló, Ph.D., P.Eng.

Dr. Perello has over fifteen years of experience in environmental engineering and industrial operations. He manages a wide range of environmental projects providing expertise in the areas of process engineering, equipment selection, process optimization, commissioning of water, storm water and wastewater treatment facilities, and developing remedial solutions for contaminated sites, hazardous wastes and industrial effluents. Dr. Perello has managed a wide range of projects evaluating and preparing cost-effective solutions for the treatment of groundwater, landfill leachate, storm water, drinking water, industrial wastewater and municipal (sewage) wastewater. He has also developed long-term environmental strategies for various industrial sectors and countries, and conducted environmental audits for industrial facilities.

Richard P Johns, P.Eng.

Mr. Johns provides engineering expertise in wastewater treatment, landfill design, environmental monitoring, and site remediation. He has provided management and technical support for remedial excavations, installation of remedial process equipment, construction of new stormwater and wastewater treatment processes and upgrades to existing treatment systems. He has supervised the construction and installation of remedial systems and organized site monitoring and sampling compliance programs. Since joining Keystone in 2001, Mr. Johns has been primarily involved with site remediation and wastewater management projects at various industrial sites in British Columbia.

Christina J Chan, EIT

Ms. Chan has a civil environmental engineering background, and her working experience includes hydrology, water quality assessment, wastewater treatment, and stormwater management. Her work with Keystone Environmental Ltd. and the Department of Fisheries and Oceans has given her experience in working with Provincial and Federal regulations for contaminated sites and for working in sensitive ecosystems. She has supervised the construction and installation of remedial systems and maintained site monitoring and sampling compliance programs. She has been involved with the design and commissioning of a wastewater treatment plant for a landfill at a former pulp mill for the past 18 months.