Workshop: Bioremediation: Doing it Nature's Way

Presenter: Derk Maat M. Eng., P. Eng.

Bioremediation as defined by the speaker, Derk Maat, is the process by which bacteria are used to break down contaminants. With increased concern on the part of municipal councils on how to effectively regain the use of contaminated sites or brown fields, bioremediation has come to the fore as a practical way of attaining this goal. Specialized, contaminant−specific bacteria are able to digest the unwanted chemical, breaking it down into less harmful sub−units. Fuel spills, for instance, are broken down to carbon dioxide and water. These end−products are safe, leaving behind a healthy soil. For the bacteria to feed effectively on the contaminant in question, ideal microbiological conditions must be maintained. Monitoring and maintenance of variables including pH, temperature and moisture are necessary to ensure the viability of the bio−system.

Maat explained that while bacteria are very good at breaking down specific compounds, they are not the only treatment method used in remediating a brown field property. Specialized microbes are first isolated from the site and cultured in a laboratory. These microbes are then applied en masse to the affected area with no health risk to the environs. Often, other chemicals are added to assist the bacteria with their task. Surfactants allow the suspension to stick to soil particles, nutrients give the required amount of minerals and other foodstuffs necessary for maintenance the bacterial colony and the addition of oxygen prevents unfavourable anaerobic conditions. When their task is complete, these microbes die off and breakdown to become a part of the soil. In some cases, such as heavy metals, microbial treatment is not appropriate and a host of chemicals is employed to fix these metals into the soil, preventing them from further leaching into the soil and along the water table.

The work done by Maat's company, Hobbes−Miller−Maat Inc. Environmental Technology Systems, may take place either in situ or ex situ. In situ projects have pipes drilled into the ground. Pipelines allow for the delivery of nutrients, and oxygen while still other pipes capture gases in order to return them to the ground for treatment. Ex situ projects are typified by a biopile. The affected area is dug up and the earth moved into a pile. This pile is treated before being returned to the site. Treatment with either method may last more than a year and while the cost is high, the benefit of reclaiming a previously unclean site brings benefits in terms of health costs and economic spin−offs.

A case study cited during the course of the workshop, sheds light on the problem faced by a small town in the Bow River watershed. High concentrations of creosote left a 27−hectare site with contaminated soil and a plume of creosote that threatened the water supply. Maat highlighted the problems faced by the remediation process from the disagreement between the involved parties as to who will pick up the tab to the legal logistics involved in creating new testing protocol. While this site has yet to be fully remediated it is his hope that the parties involved will soon be able to come to an agreement to protect the watershed and restore, to a large extent the health of the contaminated area.

Reporter: Rosanna Hessels