Biodegradation of lignite coal tar

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Through the acquisition of a coal carbonizing facility in southern Saskatchewan, Luscar Limited became responsible for the disposal of 8500 m^3 of coal tar on the site. The company has decided to dispose of this material in an economical and environmentally safe manner. CANMET was asked to conduct a feasibility study on the biodegradation of this waste material using a modification of the technology developed for the degradation of refinery slop oils and sludges by a research group within the oil sector.

Initial studies indicated that the coal tar at the periphery of the storage site was intermixed with soil carried in by runoff. Thus about 40% of the waste material is about 75% weathered sandstone silt and soil humus and about 25% coal tar. The remainder is viscous coal tar. Preliminary studies also indicated a substantial population of indigenous bacteria which were capable of degrading the coal tar.

The coal tar sludge was mixed with Oclansorb (a proprietary oil adsorbent) in a ratio of 2:1 by weight and placed in a 7.5 cm x 75 cm column. The column was inoculated with a mixed culture of coal tar-degrading bacteria. Moist air was sparged through the mixture at 3L/min and a nutrient medium was trickled through the mixture at 100 ml/h. Weekly samples were collated for organic extraction, recovery and analysis by gas chromatography. The experiment was terminated after eight weeks at which time about 55% of the coal tar was degraded.