## Seek cheaper fuels For railway diesels



The idea for locomotive propulsion for railways was born in the crude horse-drawn tramways of English mining towns during the early 1800s. Steam locomotives, fuelled by wood, coal or heavy fuel oil, dominated the railways for upwards of a century and a half. Since the mid 1950s, Canadian locomotives have been powered by diesel engines. Because diesel fuel is a major expense in railway operation, a cheaper fuel has been sought since 1958 by the two major Canadian railways in co-operation with the National Research Council of Canada. First, conventional raw crudes were evaluated (1958-1966) and more recently synthetic crude and other products from the Athabasca tar sands.

The tar sands, located in a 34,000 square-mile area of northern Alberta, are estimated to contain recoverable reserves of up to 300 billion barrels of oil. In areas suitable for surface mining, it is believed there are about 86 billion barrels of extractable oil, or twice the volume of proven conventional North American oil reserves. The abundance of this synthetic crude oil and its proximity to Edmonton result in the production of petroleum products suitable for diesel fuels at prices comparatively lower than normal diesel fuel, although the price advantage diminishes the farther one is from Edmonton due to transportation costs. Currently, only the Great Canadian Oil Sands (GCOS), which is extracting 50,000 barrels of Athabasca crude daily, is in production.

The tar sands are mined by conventional open-pit methods at the rate of 110,000 tons per day, and the tar separated from the sand by a hot water process, yielding about 67,000 barrels per day of raw, heavy, viscous tar, having a high sulphur and nitrogen content. By partial thermal decomposition followed by selective hydrogen treatment, three streams, naphtha, kerosene and gas oil are produced. These products are subsequently recombined to give a clear, yellow synthetic ''crude'', very low in sulphur and nitrogen.

The use of synthetic crude oil, and its products as fuels for railway diesel engines, is being investigated by the Sub-Committee on Engine Performance and Operation of the Associate Committee on Railway Problems of the National Research Council of Canada. The Sub-Committee comprises Canadian National, Canadian Pacific and NRC representatives.

"NRC and the railway companies have been studying the use of synthetic crude for diesel propulsion since 1967," says Paul Strigner, a Research Officer with NRC's Division of Mechanical Engineering, Fuels and Lubricants Laboratory. "NRC did laboratory bench tests and analyses of the GCOS crude and then further testing in a stationary General Motors 567-C (12-cylinder, two-stroke) CN locomotive engine. CN also performed laboratory analyses. It was found that the synthetic