

2000 Acute Screening and Definitive, Chronic Testing with Motor Gasoline

In accordance with the Canada-wide Accord on Environmental Harmonization, a research program was initiated to produce data essential to the development of Canada-wide standards for petroleum hydrocarbon (PHC)-contaminated soil. As part of this research, the University of Guelph, ESG International Inc., the Canadian Petroleum Products Institute and CRESTech formed an alliance to develop an ecotoxicity program using standardized biological test methods to assist with the management of the risk associated with PHC-contamination, mainly additive-free motor gasoline (mogas). The overall aim of the project was to provide quality toxicity estimates to satisfy existing data gaps for the future development of scientifically- defensible, risk-based, soil quality guidelines for the protection of environmental health.

The project was divided into two phases. Phase I was designed to determine the toxicity of mogas to a battery of terrestrial test-species comparable to those being used to describe the toxicity of four fractions (F1:>C5-nC10; F2:nC10-nC16; F3:>nC16-nC34; F4: comprises all hydrocarbons ?C35) of crude oil in soil. In addition, the toxicity of the mogas mixture would be compared with that which might be represented by the toxicity of F1 and F2 (in part), and the benzene, toluene, ethylbenzene, xylene (BTEX) compounds, for which data are available, in order to develop a predictive model. Phase II examines the implications of sequestration on bioavailability and whole-mixture toxicity of mogas in soil.

The battery of test organisms used included four plant species and two species of soil invertebrates, earthworms and springtails. The Environmental Technology Group (ETG) of the

Imperial Oil Research Department provided the regular unleaded gasoline. The samples were taken during late April/early May, 1999, from each of the following Ontario refineries and blended:

1. Imperial Oil – Sarnia
2. Imperial Oil – Nanticoke
3. Shell – Sarnia
4. Sunoco – Sarnia
5. PetroCan – Oakville

The results of the Phase I toxicity tests with mogas are summarized and presented in the following sections of this report. The report has been divided into two sections. The first section comprises the results of the acute screening toxicity tests. Included in the first section is an investigation of alternative test soil preparation methodologies in order to minimize losses due to the volatilization of the low-end carbon components of mogas. The proposed approaches to minimize this loss included the application of mogas at concentrations sufficiently high to accommodate the percent loss during test soil preparation; the modification of test soil preparation methods; and, the modification of current 'open' test units. The second section consists of the results of the longer-term definitive plant or chronic invertebrate tests. The toxicity tests were conducted from May 1999 – January 2000.