Developments in Near-Surface Geophysics

Over the past decades, the Government of Canada has been involved in the development of instrumentation and techniques directed toward the application of geophysics to near-surface problems. Such problems include

- prospecting and evaluating groundwater resources in glacial deposits
- detecting natural and anthropogenic contaminants within rocks and sediments in both permafrost and nonpermafrost environments
- selecting radioactive waste disposal sites in granite rock
- characterizing permafrost and ground-ice for arctic pipeline routing and for construction both on land and beneath the seafloor
- mapping unstable ground associated with landslides in soils
- estimating earthquake-induced ground motion amplification and susceptibility to ground failure of thick soil sites in urban environments.

World leadership in some areas of near-surface geophysics research by the Government of Canada includes ground-probing radar design, high resolution seismic profiling techniques, and borehole geophysics equipment designs and techniques.

These and other techniques and equipment have been specifically designed to provide an accurate three-dimensional framework for applied near-surface environmental, engineering, and groundwater geoscientific studies mentioned above, and most are available through technology transfer to the Canadian geophysical instrumentation and service industry.

The Government of Canada maintains close links with universities as well as companies in order to continue developing leading-edge geophysical technologies and to provide state-of-the-art advice, baseline standards, and testing services.

thereby providing valuable information for decisions relating to land and resource management. The Metals in the Environment Research Network, a network of Canadian universities, governments, and industry, was recently established to further foster and coordinate research on how metals move and transform within the environment and how they can affect ecosystems and human health.

By providing information about natural and anthropogenic contributions of metals and toxic substances to the environment, the earth sciences contribute to the assessment of the environmental impacts of current and future developments, including mineral and energy exploration and development projects. An example of the application of this knowledge is the assessment of the potential for storage of nuclear and other wastes in geological containers.

The earth sciences contribute to the tracking of the short- and long-range transport of pollutants in the atmosphere. For example, it is possible to differentiate natural and human sources of air pollutants