



[Form 2 (to be reported to Committee on Countermeasures for Contaminated Water Treatment and to be disclosed to public)]

Technology Information	
Area	6 - Understanding the Groundwater Flow
Title	6-1 – Method to collect data required to investigate groundwater flow
Submitted by	Candu Energy Inc., SNC-Lavalin, Atomic Energy of Canada Ltd., Canadian Nuclear Partners
<p><u>Hydro-Geological Survey Technologies</u></p> <p>1. Overview of Technologies (features, specifications, functions, owners, etc.)</p> <p>We are proposing a combination of the following technologies:</p> <p><u>Technology No. 1:</u> Aerial survey to determine first-order electrical resistivity/conductivity: aerial reconnaissance using frequency or time-domain electromagnetic technologies coupled with high-resolution seismic profiling can be used to obtain resistivity/conductivity depth models. This will be done beyond the lateral extents of the site, and is useful for the offshore area of the subject site.</p> <p>The advantages of this technology are:</p> <ol style="list-style-type: none"> Aerial survey work will not require any ground based activities. Very quick method to obtain required data. <p><u>Technology No. 2:</u> High-resolution geophysical subsurface profiling: non-invasive technologies at the surface, including frequency and time-domain electromagnetic systems used to obtain high-resolution seismic reflection profiling, electrical resistivity tomography and self-potential, done at proximal line spacings at both onshore and offshore locations.</p> <p>The advantages of this technology are:</p> <ol style="list-style-type: none"> Non – invasive technique. Relatively quick method to obtain required data (could be completed with a few days). <p><u>Technology No. 3:</u> Borehole geophysical and wireline logging: wireline logging and other borehole techniques to determine fracture/discontinuity, vertical and horizontal seepage paths, flow velocity of water ingress/egress, temperature, porosity, density, self-potential, permeability, resistivity, natural gamma radiation, pressuremeter, televiwer and water pressure packer testing. For seismic profiling, borehole techniques such as suspension logging, vertical seismic profiling, and spectral gamma ray measurement for nuclides can be used.</p> <p>The advantages of this technology are:</p> <ol style="list-style-type: none"> Existing boreholes can be also be utilized. 	



2. Notes (Please provide following information if possible)

- *Technology readiness level (including cases of application, not limited to nuclear industry, time line for application)*

The Candu consortium will partner with Fugro GeoServices to deliver these technologies. It is the integration of the technologies and data interpretation that will determine the quality of the hydro-geological model provided. Fugro GeoServices have a strong track record characterizing nuclear and other energy sector sites using geophysical investigations coupled to intrusive programs integrated within a 3D GIS framework. In addition, the consortium includes world-class expertise from AECL and OPG in the understanding and modeling of radioactive species. Geophysical methodologies applied from airborne platforms, at the ground surface and within boreholes play a key role in the construction of geotechnical, geological and hydro-geological models.

- *Challenges*

For Technology No.1:

- Noise / interference from surface infrastructure;
- Access limitations due to radiation levels or no-fly conditions; and
- Surface obstructions, noise interference and presence of subsurface acoustic impedance contrasts for seismic techniques.

For Technology No.2:

- Depth and resolution-limited systems;
- Access limitations due to radiation levels and surface infrastructure obstructions;
- Noise interference and presence of subsurface acoustic impedance contrasts for seismic techniques; and
- For offshore work, ocean conditions and possible high radiation zones preventing access.

For Technology No.3:

- Access limitations due to radiation levels; and
- Data quality in poor borehole conditions.

- *Others (referential information on patent if any)*

No specific patent issues.