



[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	6-4 – Groundwater analysis and nuclide migration and diffusion analysis
Submitted by	Candu Energy Inc., SNC-Lavalin, Atomic Energy of Canada Ltd., Canadian Nuclear Partners
<p><u>Groundwater Modeling</u></p> <p>1. Overview of Technologies (features, specifications, functions, owners, etc.)</p> <p>The Candu consortium is familiar and regularly uses the various readily available 3 D groundwater flow and contaminant transport modeling packages such as MODFLOW, FEFLOW, PHAST and HYDRUS. However the complexity of groundwater flow regimes at the site is likely to require a highly tailored site specific solution.</p> <p>We are proposing the following:</p> <p>Technology No. 1: <i>In-house three-dimensional (3D) modeling software package</i> – this has been adapted to examine radio-nuclide fate and transport for several uranium mine decommissioning projects. Modeling work has included incorporation of many complex boundary conditions such as: open pits; underground workings; tailings facilities and many and varied seepage areas and many geological layers.</p> <p>The advantages of this technology are:</p> <ol style="list-style-type: none"> a) It can be used to model groundwater flow and contaminant transport in aquifers with complex boundary conditions. <p>It is a model that is supported by SNC personnel that have been involved in developing and calibrating the software.</p> <p>2. Notes (Please provide following information if possible)</p> <ul style="list-style-type: none"> - <i>Technology readiness level (including cases of application, not limited to nuclear industry, time line for application)</i> <p>The software has been used for open pit mine decommissioning with adjacent radioactive waste rock piles, the use of deep slurry walls to halt or limit subsurface water flow, and the use of barrier systems to prevent or limit infiltration or inadequate drainage during precipitation events. SNC has some of Canada's foremost groundwater experts in the areas of aqueous geochemistry, groundwater and contaminant evaluation, and the analytic and numerical simulation of groundwater flow and contaminant transport. In addition, the consortium includes world-class expertise in the understanding and modeling of radioactive species. Specific projects include the decommissioning of a very large uranium mine in northern Saskatchewan. The modeling included the open pit where the uranium was mined, the radioactive waste rock pile and the underground portion of the uranium mine. This multi-year effort involved saturated and unsaturated modeling of over 40 geological layers over a large regional area. The modeling involved prediction of radioactive particles, nickel and other contaminants. We have also been</p>	



involved in a large number of smaller uranium mine projects in northern Saskatchewan, and the modeling of radioactive-contaminant movement at OPG and AECL sites.

- *Challenges*

These technologies are limited by:

- Limitations and quality of hydro-geological geophysical data.

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

Any intellectual property issues associated with use of the software can be readily resolved via commercial terms of engagement.