

A Case Study for Water License Renewal Application - Nipisi Enhanced Recovery Project

Craig Robertson, Wiebe Environmental Services Inc.

Darlene Sakires, Canadian Natural Resources Ltd.

Brad Braun, Canadian Natural Resources Ltd.

In 2006 Alberta Environment implemented the requirement for water diversion renewal applications under the *Water Act* to be completed in accordance with the *Water Conservation and Allocation Guideline for Oilfield Injection*. The requirements of the guidelines were a significant departure from previous application requirements. As such it has become onerous for operators of water diversion projects to evaluate and meet the requirements of the new application process.

Canadian Natural Resources Limited (Canadian Natural) recently submitted a renewal application for their existing enhanced oil-recovery maintenance scheme near Nipisi, Alberta.

The application process evaluated requirements of the new guidelines for ten existing permits but also combined the current licenses into one comprehensive diversion. All Nipisi wells are tied into a common gathering system. Due to operational considerations such as fluctuating daily volume requirements, back pressure variation, occasional plant electrical and mechanical concerns or water well equipment problems, rig scheduling, and cost optimization concerns, Canadian Natural needed the flexibility to produce the maximum licensed rates at some wells while others remain shut-in (as standby). Taking into consideration that the water wells are completed in the same aquifer and are located within a relative small area, the maximum annual diversion for the new licence would comprise the sum of individual allocations from each well.

The application was structured into two sections. The general information section included:

- A description of the project and anticipated water use.
- Risk based tier selection.
- A technical assessment of non-saline water use.
- A review of alternate water source, progress towards allocation reduction and selection of alternative water sources and enhanced recovery methods.
- A review of non-water enhanced recovery options.
- An economic assessment of options for non-saline water use.
- An environmental net effects assessment.
- Geological and hydrogeological assessment and characterization of the aquifer.
- Field verified survey.
- Cumulative effects evaluation for existing and proposed diversions.

The individual evaluation for each well included:

- Current licence information.
- Description of aquifer parameters.

- Water-bearing intervals.
- Available E-logs.
- Pump intake depth
- Maximum pumping rate.
- Original and current non-pumping water levels and dates.
- Determine the extent of possible hydraulic relationships between the source aquifer and other local aquifer units, and nearby surface water bodies.
- Pumping test data sufficient to provide a reasonable assessment of required volume, aquifer parameters and Q20, anticipated aquifer drawdown for 1, 5, 10 and 20-years, and effect on the neighbouring water supplies.
- Water quality assessment including a summary of the historical chemical analyses.

An interpretation of available historical and recent data, and conclusions and recommendations for the next licence term for each well was also included.

Craig Robertson, M.Sc., P.Geol., P.Ag.

Craig Robertson is a professional geologist with over thirty three years of experience in ground water resource development, regional flow studies, irrigation and drainage, research, education and training. Craig is the senior manager responsible for technical development and application at Wiebe Environmental Services in Calgary.

Craig received a baccalaureate degree from the University of Lethbridge in 1974 and a Master of Science degree specializing in hydrogeology from the University of Alberta in 1988. His experience in hydrogeology extends over the oil & gas, mining, and agriculture industries where he has coordinated and managed projects across Western Canada, Eastern Europe, Africa and South America.