

Regional Groundwater Quality Study and Monitoring Network Development: Northern Athabasca Oil Sands (NAOS) Region - Abstract

Randa Sultan, WorleyParsons Infrastructure and Environment

The Alberta Government has initiated a process to better understand the water resources within our province. The over-arching goal of this process is embodied in three desired outcomes of the Water for Life Strategy, which are:

- Safe secure drinking water;
- Healthy aquatic ecosystems; and
- Reliable quality supplies for a sustainable economy.

Over the last decade, development in the NAOS region has reached an unprecedented scale. In response, oil sands developers, regulators, First Nations, and the public have expressed concern for local water resources (both groundwater and surface water). This concern relates to the potential issue of cumulative effects from existing and future developments on regional groundwater quality and surface water features interacting with the groundwater flow systems.

In response to this concern, a project was initiated to review the current state of groundwater quality conditions within the NAOS region and develop a groundwater monitoring network to assess the conditions of the groundwater quality presently and into the future. The intent of establishing a regional network is to gain a better understanding of the complex quality conditions in the region, and resolve any potential cumulative effects that may occur as a result of area activities. The biggest challenge in this process is resolving the scale of area activities with respect to the large study area itself (18,000 km²), and how the various components and resources within this area interact.

As an initial step, nearly 1,500 monitoring wells and over 132,300 pieces of chemical data were reviewed and assessed. Results indicated highly variable baseline quality conditions in the various surficial and bedrock formations. Vulnerability mapping, aquifer classification and future development scenarios identified key areas for further long-term monitoring. A management approach was then developed to provide a means of follow-up on events warranting further scrutiny.

Establishment of the first stage of a regional groundwater monitoring network for the NAOS area was completed in 2009. Evaluation of existing monitoring wells completed in aquifers of interest and prioritized locations revealed a

series of wells available for use in the regional network. Instrumentation and groundwater sampling of key monitoring wells was achieved. Historical records have been analyzed for trends in water levels and groundwater chemistry in aquifers of interest. To further understand regional flow scenarios, isotope samples were collected for age-dating analysis at a select number of locations.

Initial results from this study refine current knowledge of baseline quality conditions, and thus provide context for area activities. Although this is a first step, and the dataset is still imperfect regarding spatial coverage and temporal trends, results from the newly developed regional network will provide the information necessary to assess potential future changes to groundwater in the NAOS area.

Randa Sultan, M.Sc., P.Geol.

Ms. Sultan has a Master of Science degree in hydrogeology from the University of Waterloo, Ontario. She has over eight years experience as a practicing consultant in groundwater resource management and remediation. Her special fields of competence include water supply investigations, extensive drilling experience, aquifer testing, contaminated site assessments, landfill siting investigations, groundwater monitoring and remediation.

Ms. Sultan has been involved in the study of surface water-groundwater interaction, regional groundwater monitoring, groundwater modeling and environmental impact assessments. Her experience encompasses work with the government, oil industry, fertilizer plants, landfills, mining and developments in Alberta, British Columbia and international field sites in the Caribbean, Central and South America.