GeoConvention 2015
GEOSCIENCE
new horizons
Telus Convention Centre • 4-8 May 2015 • Calgary, AB Canada

Developing a Local-Scale, Integrated Surface Water and Groundwater Management Plan for Water Sourcing for Unconventional Projects

Soren J Poschmann, P.Geol.
Sean M Sullivan, M.Sc., P.Eng.
Matrix Solutions Inc.

Summary

Unconventional oil and gas operators are increasingly tasked with developing local-scale, project-specific water management plans to progress projects from exploration to pilot to full development phases. These water management plans should include both short and long-term surface water and groundwater sourcing assessments as well as a description of baseline and operational monitoring initiatives. Regional-scale water source assessments have been completed for much of the Montney and Duvernay resource areas, but local-scale work is required to create a comprehensive, project-specific water sourcing strategy to progress projects to the point at which water wells are installed, surface water diversion points are planned and diversion licenses are in place.

Regional-scale streamflow assessments provide an indication of the deliverability of major streams, but are limited in their application to minor streams or lakes that are highly influenced by local hydrologic and shallow hydrogeologic conditions. These lakes and minor streams may represent the optimum water source option for a given project, however, the risk associated with their seasonal hydrologic nature can be offset with optimally sized storage reservoirs. Lakes are generally considered lower risk options and are therefore preferred by regulators, but regional streamflow data is inadequate for characterizing lake-specific water level regimes necessary for licensing. Minor streams are considered higher environmental risk options that would therefore require site-specific hydrometric and aquatic data collection. Baseline and operational monitoring of these lakes and minor streams may be a larger initial investment but can reduce operational costs by minimizing water transport and by remotely controlling diversion schemes.

Groundwater exploration for unconventional projects is applied to the project scale by using existing regional data and screening aquifers for the highest potential for being a viable water source for the project. From the intial screening process, candidate aquifers can be further examined by determining local-scale aquifer characteristics such as pressure, permeability and salinity. From this data, aquifer deliverablity and well network sizes can be determined, and the feasibility of utilizing these aquifers relative to project specific demands, economics and stakeholder concerns can be evaluated. Aquifers deeper than 150 meters, whether they are saline or non-saline, are preferred targets for industrial use as

they are not commonly exploited for domestic use. However, field testing of these types of aquifers can be expensive. If candidate aquifers of this type are identified,an economical initial testing program can often be designed using existing shut-in cased oil and gas wells. Data collected during these testing programs can be used to further refine aquifer deliverability predictions, confirm aquifer chemistry, and support the design of a detailed water well drilling, testing and licensing program.

Using the knowledge gained from the surface water and groundwater evaluation exercises, a comprehensive, integrated water management plan can be developed that best supports the project water demands over time. Surface water has shown to be the preferred option for short term water supply in the Montney and Duvernay resource areas, however seasonal demands and stakeholder concerns can be potentially offset with production from groundwater. An integrated water management plan is key to developing water security for unconventional oil and gas projects.