Geoscience BC: Northeast British Columbia Water Studies Partnerships in Water Research with Industry, Government, Universities & Communities for Responsible Natural Gas Development

BACKGROUND

In 2008, the Provincial Government invested over \$5 million in Geoscience BC for geoscience studies supporting timely and efficient appraisal and development of the enormous shale gas resource in Northeast BC.

In 2008, Geoscience BC consulted with industry, including the members of the Horn River Basin Producers Group who prioritized for investigation the deep subsurface aquifers as sources of frac water and subsequent disposal sites for the produced water, to support the emerging Devonian shale gas play in the Horn River Basin. The results of the Horn River Basin Subsurface Aquifer Study were published in April 2009. After the completion of the first HRB study, a group of producing companies approached Geoscience BC to undertake a similar partnership project for assessment of potential water sources and sinks in the Montney play area.

MONTNEY WATER PROJECT OVERVIEW

The Montney Water Project (MWP) was designed to provide a comprehensive inventory of water sources and potential zones for deep geological water disposal sites in the Montney gas play

Phase 1 of the MWP project focused on collecting, analyzing and interpreting available water-related data. This phase included three general topics:

- 1. Surface water
- 2. Shallow subsurface water
- 3. Deep bedrock water and disposal

The surface water component included collection of a variety of publicly available data on components of the hydrologic cycle.

The first priority of the shallow subsurface component was to compile existing surficial mapping and groundwater aquifer data and work towards a drift thickness / bedrock topography map and updates to groundwater aquifer classifications.

The deep bedrock component was designed to assess the availability of non-potable (saline) water hosted in deep aquifers, and the usefulness of these aquifers for disposal of fluids related to natural gas development.



KISKATINAW RIVER WATERSHED The Kiskatinaw River originates in B.C.'s Rocky Mountain foothills at Bearhole Lake and flows into the Peace River just west of the B.C. – Alberta border. The river drains an area roughly 4,100 km² in size. About one-quarter of the watershed is covered by crop or rangeland with the majority of the remaining lands being forested.



A distinguishing feature of the Kiskatinaw watershed is that it contains no major urban centers. The watershed boasts a healthy ranching and farming area with a significant amount of forestry and natural gas exploration and development activity scattered throughout the watershed. The City of Dawson Creek and the Town of Pouce Coupe, just outside the watershed to the east, utilize the Kiskatinaw River for their water supply.

SURFACE WATER

The Peace River flows west to east through the center of the Montney play. Several major tributaries to the Peace also flow through the play, including the Halfway, Moberly, Pine, Kiskatinaw, and Pouce Coupe Rivers. Analysis was performed to characterize the streamflow, climate, water balance, surficial geology and vegetation in each watershed.

STREAMFLOW

The Water Survey of Canada has operated a hydrometric station at Farmington continuously since 1966. This station operates year round, and collects data hourly on the amount of water passing through the river at this point. The amount of discharge can vary greatly for the same month, year to year.

CLIMATE

The Kiskatinaw River watershed receives most of its precipitation as rainfall during the summer. Temperatures range from an average of -13 C in January to +15 C in July.

tion are found moving toward the foothills in the southwest.

Cooler temperatures and more precipita-

WATER BALANCE



STORAGE AND TRANSFER IN THE HYDROLOGIC CYCLE

The major processes by which water moves are precipitation, evaporation, transpiration, and surface and subsurface flow. Water can be stored in lakes, vegetation, soil, or subsurface aquifers.

The Kiskatinaw River watershed on average receives about 60 cm of precipitation per year. Of this, about 45 cm evaporates or is used by vegetation, <5 cm is used or percolates deep into the ground, and <10cm flows out of the watershed in the Kiskatinaw River.







an Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

SURFICIAL MATERIALS AND VEGETATION

The Kiskatinaw River watershed is mostly underlain by glacial till with approximately 25% fine grained glaciolacustrine sediments. Surficial material type is an important component for hydrological modelling. Water infiltrates through these material types at different rates.

The southern portion of the Kiskatinaw River watershed is mostly coniferous forest and wetland, and grades into broadleaf forest and agricultural lands moving northwards. Forested areas in the northern portion of the watershed are mostly restricted to along river valleys, with agricultural land covering the majority of the remainder of the region.



IRFICIAL GEOLOGY KISKATINAW RIVER WATERSH Seologic Survey of Canada



.C. Ministry of Forests, Mines and Land, GeoB





CURRENT RESEARCH IN THE KISKATINAW RIVER WATERSHED

Geoscience BC is leading the Montney Water Project, with a a Technical Advisory Group which include representatives of seven natural gas companies (see logos below), and the B.C. Ministries of Energy, Environment and Healthy Living and Sport, the Northern Health Authority, the B.C. Oil and Gas Commission, the City of Dawson Creek and the Science and Community Environmental Knowledge Fund.

The Montney Water Project is complementary to other work occuring in the Kiskatinaw River watershed, including the following.

KISKATINAW RIVER WATERSHED RESEARCH PROJECT

A collaborative research project currently underway, developed jointly between the City of Dawson Creek, University of Northern British Columbia and Ministry of Environment, with support from Geoscience BC and industry.

The goal is to obtain scientific information necessary to manage the watershed and thereby reduce conflict and uncertainty between water users. Two Ph.D. candidates from UNBC, F. Hirshfield and G. Saha, are conducting the project as part of their Ph.D. dissertations.

MONTNEY WATER PROJECT PARTNERS:



industry, academia, government, First Nations and commun

ties to attract mineral and oil & gas investment to BC.

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