



Proactive Water Communication by Oil and Gas Producers in the Lochend Area

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Summary

Oil and gas operators in Canada prioritize water resource management through the proactive approach of many industry producers. Baseline Water Resource Inc. (Baseline Water) conducted a regional hydrogeological/hydrological study in the Lochend Industry Producers Group (LIPG) oil and gas operating field northwest of Calgary, Alberta. This study is an example of how landowner concerns regarding potential water quality impacts due to hydraulic fracturing can be addressed cooperatively. The study objective was to characterize regional hydrogeology and provide a baseline of natural variation in groundwater chemistry. LIPG practices include offering landowners pre-drilling quality and quantity (yield) tests on water wells within 400 metres of hydraulic fracturing activity. The study consisted of 323 water well and 29 spring tests in an area encompassing six townships. Additionally, long term groundwater quality monitoring was performed at one location for a duration of two years coinciding with oil and gas development and production.

Groundwater from the shallow Paskapoo Formation sandstone aquifer is the primary water source for local landowners. Indicators of potential groundwater impacts from oil and gas activity may include elevated chloride and Total Dissolved Solids (TDS) concentrations and/or the presence of hydrocarbons. The groundwater quality results were comparable to regional background groundwater chemistry and demonstrate natural variation. The data may serve as a baseline for comparison with future water quality analyses. Results of the long-term groundwater quality monitoring at a single domestic water well indicated no adverse impacts from adjacent oil and gas operations. Study findings were used to prepare communication documents to facilitate water quality discussions between LIPG and private landowners. Stakeholder communication and engagement are paramount to expediting project timelines and improving public perception of the oil and gas industry.

Introduction

Public awareness of environmental concerns regarding hydraulic fracturing has increased substantially within the last decade. Many landowners are concerned about potential impacts to their local groundwater supply. The aquifer may support a family's agricultural livelihood, or act as a domestic water supply. Many oil and gas producers are proactive in addressing aquifer protection by voluntarily offering Baseline Water Well Tests to characterize aquifer quality prior to hydraulic fracturing. One challenge the oil and gas industry faced was communicating water resource management work. Landowners, shareholders and the public often show interest in involvement, but are unsure how to access information.

The LIPG recognized the significance of water communication and has taken action to engage landowners. Baseline Water assisted the LIPG in developing plain english documents for public communication and hosted numerous resident town-hall meetings. One of the most useful communication tools was the development of a scaled block diagram containing true geology,

groundwater chemistry, aquifer and aquitard depths and the depth location of hydraulic fracturing operations. The block diagram served as a visual aid that facilitated discussion between landowners, LIPG, and technical scientists. The LIPG approaches water resource management on a play-based scale and serves as an example to the oil and gas industry of how to cooperatively engage the public in the protection of Alberta's water resources.

Theory and/or Method

In partnership with the Lochend Industry Producer's Group (LIPG), Baseline Water performed a regional hydrogeologic study of the Lochend oil field, completed over 350 water well and spring tests, and conducted a two year groundwater monitoring study to assess the potential for long term adverse effects to a groundwater aquifer adjacent to hydraulic fracturing activity.

Based on results of the regional studies and geologic data, a three-dimensional block diagram was developed using ArcGIS 3D Analyst. Graphic designers converted the model into a more realistic representation of the subsurface.

Examples

Below are examples of the ArcGIS model and final block diagram for public communication.

Figure 1: ArcGIS 3D Analyst Model

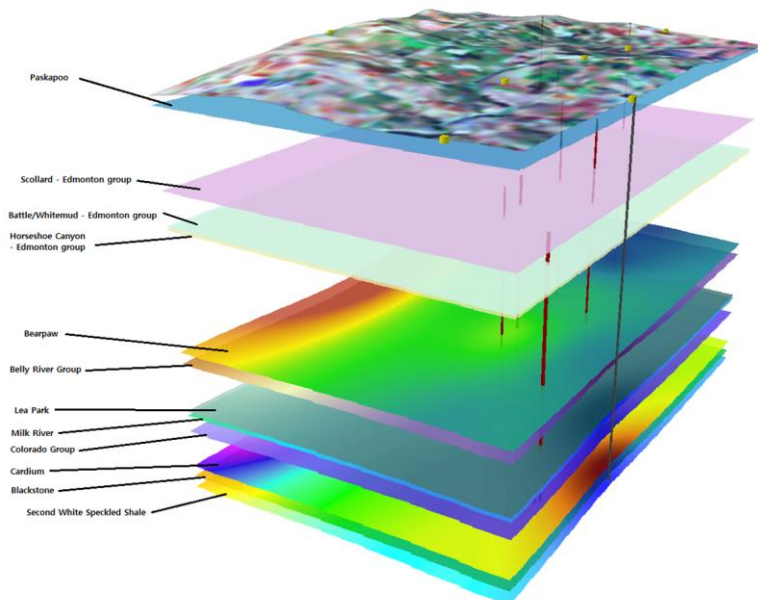
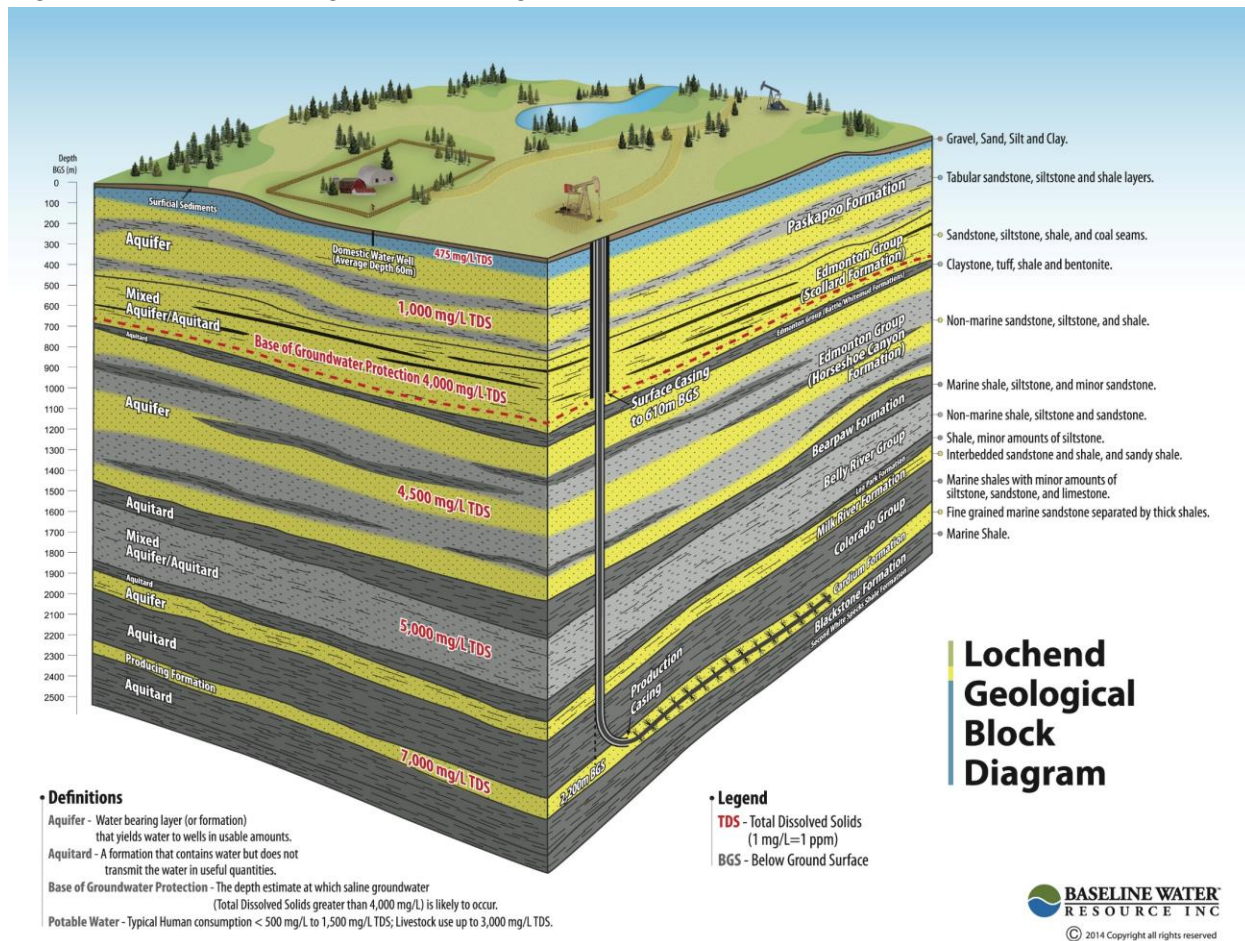


Figure 2: Lochend Geological Block Diagram



Conclusions

Baseline Water has performed hundreds of baseline water well tests within the Lochend field. There is an abundance of geologic and hydrogeologic information. A challenge of play-based water resource management is compiling extensive data into a useable form. The LIPG sought to open up communication with landowners and the public, therefore, tools were necessary to facilitate discussion. Public interest and awareness of water quality issues is on the rise. The LIPG's management of the Lochend field is a good example of cooperative engagement with landowners and showcases Alberta's energy industry in a positive manner. The LIPG continues to be a leader in public engagement and goes above and beyond with environmental protection.

Acknowledgements

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