

# The Modern Practices of Hydraulic Fracturing: A Focus on Canadian Resources

**T**remendous oil and natural gas resource potential has been identified in shale basins across Canada. Resource production from these areas has become economically feasible, principally due to the combination of technological advancements in horizontal drilling and hydraulic fracturing. While hydraulic fracturing of oil and gas wells has been safely used since the 1950s, its widespread use in recent years has emphasized the need to study the potential risks to ground water resources.

Recognizing that protection of drinking water and other environmental resources is essential, the Petroleum Technology Alliance Canada (PTAC) and The Science and Community Environmental Knowledge (SCEK) Fund initiated research into the risks associated with hydraulic fracturing. Research was conducted by ALL Consulting with support provided by the Canadian Association of Petroleum Producers (CAPP) and its member companies, and the Canadian Society for Unconventional Resources (CSUR).

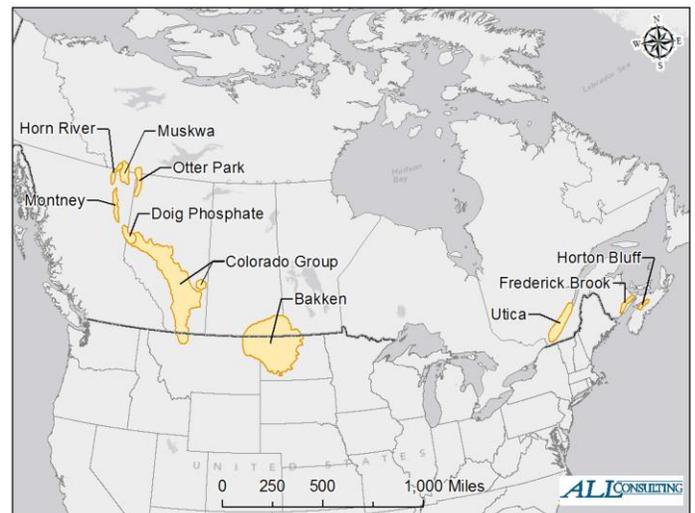
The report on this project was prepared by ALL Consulting, and is intended to serve as a primer on hydraulic fracturing for oil and gas production from shales.

## TOPICS

The primer addresses the following topics:

- Technological Assessment of Hydraulic Fracturing Methods
- Best Management Practices
- Chemical Use in Hydraulic Fracturing
- North American Shale Geology
- Hydraulic Fracturing Regulations
- Major Pathways of Fluid Migration
- Incidents Reported to be Associated with Hydraulic Fracturing

### Canadian Shale Plays



## HYDRAULIC FRACTURING RISK ANALYSIS

In order to assess the potential risks to groundwater associated with hydraulic fracturing, the researchers identified and analyzed the pathways through which contamination could theoretically occur. The analysis in this report considered only the subsurface pathways that would potentially result from the hydraulic fracturing operations, and not those events that may occur in other



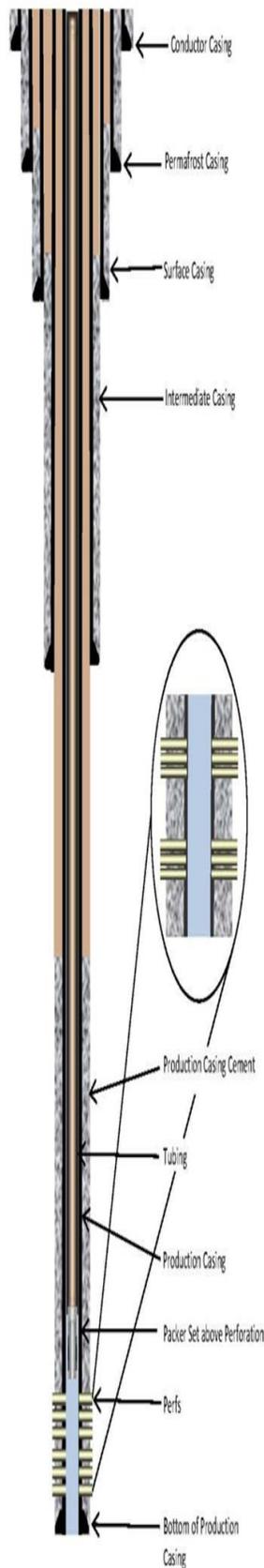
phases of oil and gas development. Five potential pathways were examined:

- Vertical fractures created during hydraulic fracturing.
- An existing conduit (e.g., natural vertical fractures or old abandoned wellbores) providing a pathway for injected fluid to reach a fresh water zone.
- Intrusion into a fresh water zone during hydraulic fracturing based on poor construction of the well being fractured.
- Operating practices performed during well injection.
- Migration of hydraulic fracturing fluids from the fracture zone to a fresh water zone.

Analysis of each of these pathways demonstrates that it is highly improbable that fracturing fluids or reservoir fluids would migrate from the production zone to a fresh water source as a result of hydraulic fracturing.

### KEY FINDINGS

- The regulatory framework in Canada, maintained by the federal, territorial, and provincial authorities, is protective of groundwater and responsibly regulates the construction and stimulation treatment of oil and gas wells.



- The shale gas industry is adequately regulated with the current framework of regulations nationwide.
- Numerous best management practices exist to help mitigate exposure and contamination risks from hydraulic fracturing and related activities.
- Fracturing fluid generally consists of 99.5% water and sand with only 0.5% chemicals.
- The probability of contamination of groundwater during the process of hydraulic fracturing in a properly constructed well is very low to negligible.
- There have been no documented instances of groundwater contamination that resulted from the hydraulic fracturing process.

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The full report is available at:  
 Petroleum Technology Alliance Canada,  
<http://www.ptac.org/>  
 Science Community and Environment Knowledge Fund,  
<http://www.scek.ca/projects/active>

