

# Risks and Mitigations for Hydraulic Fracturing Wastewater Disposal Operations in Western Canada

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In Western Canada, most hydraulic fracturing wastewater is disposed of in deep injection wells. Risks associated with wastewater disposal include groundwater contamination and generation of induced seismic events. This study focuses on quantifying the volume, chemical composition, and locations of injected wastewater to mitigate the risks of current disposal practices. Wastewater is defined as a mixture of flowback fluids and produced waters that cannot be recycled. Improved understanding of the risks is necessary to enhance sustainable management of wastewater in hydraulic fracturing operations. Wastewater has high total dissolved solids (TDS) and salinity that cannot always be handled by treatment facilities. It may also contain hazardous compounds, including methane, synthetic organic compounds, and radioactive materials. Wastewater can be partially treated and recycled to reduce the amount of both freshwater demands and wastewater to be disposed of.

This study also investigates the threshold at which wastewater can no longer be recycled and, therefore, needs to be disposed of (in deep injection wells). Hydraulic fracturing wastewater can contaminate groundwater from surface tank leaks, transportation spills and leakage associated with injection wells. To prevent shallow aquifer contamination from upward transport of injected saline fluids, it is critical to avoid migration pathways for the wastewater, such as faults and imperfectly sealed boreholes. Important factors for safe wastewater disposal include characteristics of the wastewater, injected volumes, the local geology and the proximity to vulnerable geological structures. A monitoring program for groundwater quality, wellbore casing integrity, and disposal injection procedures is recommended for sustainable management of wastewater.

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