Groundwater Research in Treaty 8 Territory

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Introduction

We are writing to you from the University of British Columbia, which sits on the traditional, ancestral, and unceded territory of the Musqueam First Nation. We are the Energy and Environment Research Initiative (EERI), a group of groundwater researchers led by Dr. Roger Beckie.

We conduct research on the groundwater in relation to oil and gas development in the northeastern region of BC, within the territories of Treaty 8 First Nations. We recognize the history of these traditional and ancestral lands, and make this acknowledgement as an act of reconciliation and gratitude to those whose territory we work on and visit.

Our Research

Groundwater and fugitive methane

Our research goal is to examine groundwater quality on a regional scale. In particular, we:

- Emphasize determining **methane** distribution, concentration, and origin in shallow groundwater, and
- Assess potential impacts from oil and gas development

It has been found that in generally rare cases, methane from oil and gas wells can escape the wellbore, and move to other places in the subsurface or to the atmosphere. There is a lot that we don't know about what we call 'fugitive methane', including how much it occurs and what its impacts are. Methane itself is nontoxic, but it is a greenhouse gas once emitted to the atmosphere and it can affect groundwater quality through changes in the subsurface environment. We want to figure out how methane moves in the subsurface, how much may reach the atmosphere, and what the effects to groundwater may be.

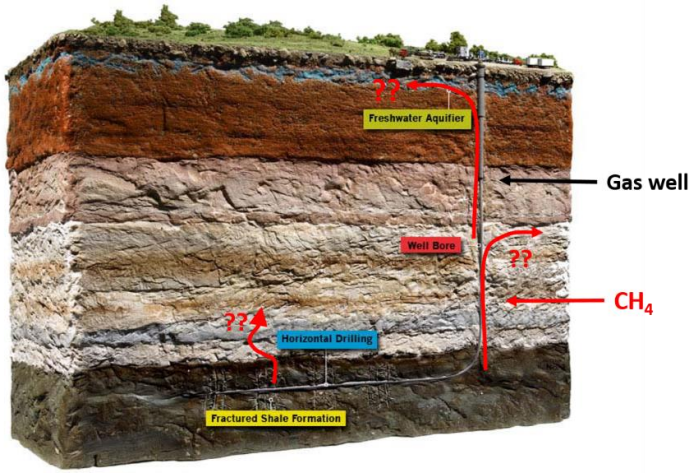

Diagram of hypothetical methane (CH_4) escaping from a wellbore.

Monitoring regional groundwater quality

We used a purpose-built groundwater monitoring well network to look at regional groundwater quality in the Peace Region. Twenty-nine groundwater wells were installed in and around the towns of Fort St. John, Dawson Creek, Chetwynd, and Hudson's Hope. Some wells were intentionally placed close to oil and gas wells, and some were located far away. We took water samples from these wells to understand the chemistry and dissolved gas content. We also sampled domestic wells in the area.

Installation of a groundwater monitoring well

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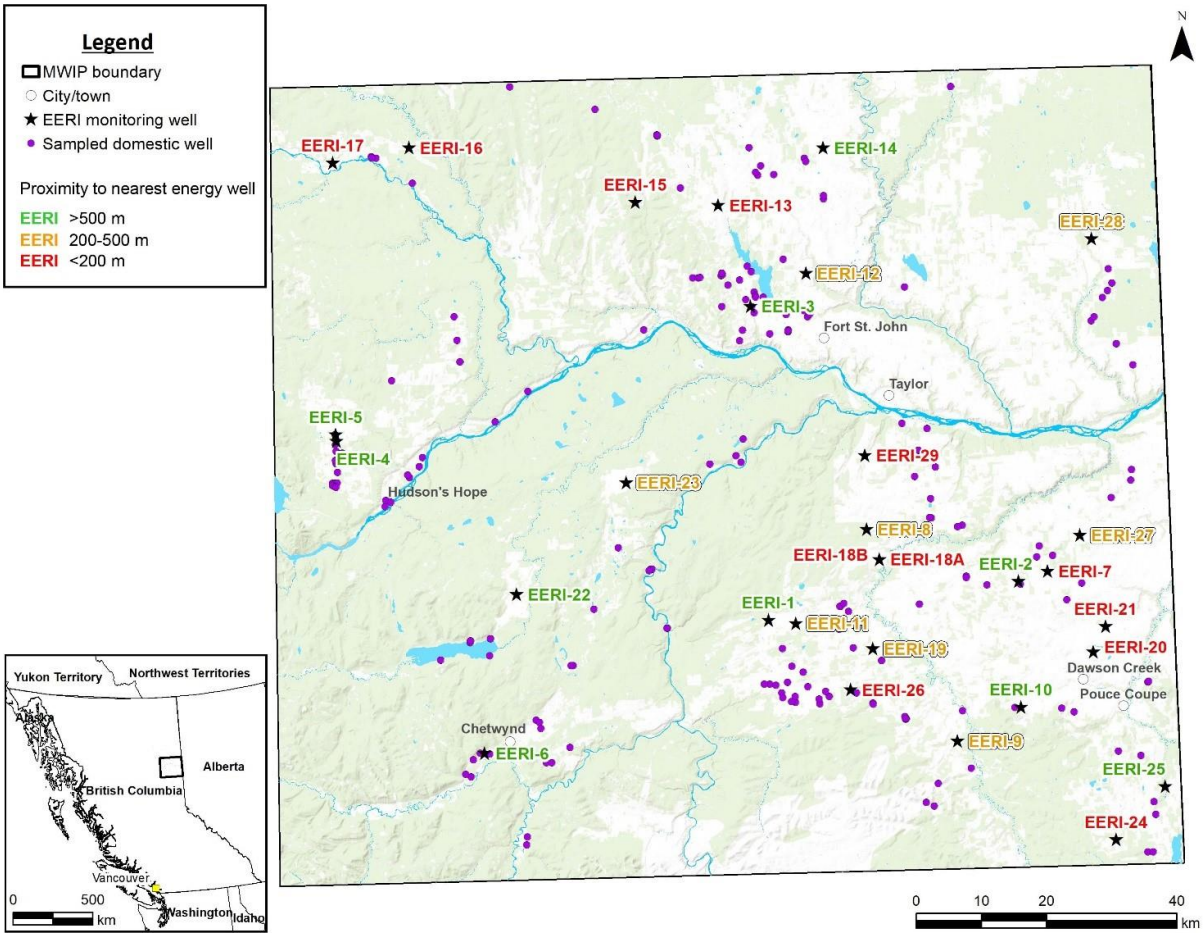
What We Found

The map below shows the locations of the EERI groundwater monitoring network wells (labelled EERI) and domestic wells that we sampled too (purple dots). The red EERI labels indicate close proximity to oil and gas wells, while yellow and green EERI labels indicate locations farther away from oil and gas wells. Some of our main findings include:

- Methane from natural gas is ubiquitous in groundwater, mostly at very low concentrations.
- There is no correlation between the amount of dissolved methane in the groundwater and proximity to oil and gas wells.
- Only one EERI well showed signs of potential gas leakage from a nearby oil and gas well (EERI 16).
- Overall, we found that discrete events of gas leakage can occur, but it is not a pervasive issue in the study area.
- The domestic supply well for the town of Hudson's Hope showed high levels of naturally-occurring methane, determined to be sourced from natural coal bed methane.



Map of the regional groundwater monitoring well network (EERI labels), showing how close groundwater wells were to oil and gas wells (red labels indicate closest, within 200 meters, while green mean farthest, at least 500 meters away). The purple dots show locations of domestic groundwater wells, which were also sampled.

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Going Forward

One thing we have learned about groundwater in the Peace Region is that in most regions it moves quite slowly through the subsurface and evolves relatively slowly – decades and longer timescales. To capture changes in quality and quantity it is important to monitor groundwater over the long term. The EERI groundwater monitoring well network will allow continued monitoring, and we welcome any groups or organizations to contact us to use these wells for monitoring and data gathering purposes.

Contact Us

Please contact us if you would like to discuss any aspect of this research or have any questions. Thank you!

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