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Fracking with Freshwater

How the fracking industry in B.C. is poisoning billions of litres of water every year and how to stop it

Key insights and recommendations

- Oil and gas is the only industry in B.C. that is permitted to extract fresh water, contaminate it, and then dispose of it untreated in a manner that removes it permanently from the water cycle.
- Fracking creates enormous volumes of wastewater which can cause serious harm to people and the environment. In B.C., wastewater is currently disposed of untreated into what the industry calls disposal wells.
- There is no way to frack without poisoning huge amounts of water, and there is no way to clean up or dispose of the wastewater from fracking without putting communities and the environment at risk.
- If completed, the five liquified natural gas (LNG) terminals currently under consideration in B.C. would require the province to more than double its fracked gas production. In turn, this would more than double the industry's demand for freshwater, to at least 10.4 billion litres of water a year, or enough to fill 4,160 Olympic swimming pools.
- Historically the oil and gas industry used relatively little water compared to other industrial users. This changed dramatically in 2005 with the introduction of fracking, but laws and regulations have not yet been updated to reflect this new reality.

Therefore we recommend that the Province of British Columbia:

1. Require the treatment and increased reuse of fracking wastewater to reduce the amount of freshwater used in the process;
2. Improve standards for disposal wells and begin baseline and ongoing testing of water systems impacted by oil and gas;
3. End special treatment for oil and gas by returning the power to issue water licence and permits for the industry to the Water Stewardship Branch; and
4. Charge fracking companies a price for water high enough to encourage the conservation of freshwater.

The fracking industry's water use is projected to double to 10.4 billion litres of water a year.

The B.C. government is allowing the fracking industry to pollute billions of litres of water for mere pennies.

10.4 billion litres of water?

The territories of the Treaty 8 First Nations of British Columbia stretch east from the foothills of the Rockies to the Alberta border and north to Yukon border, and are dotted by tens of thousands of fracking wells and oil and gas sites. Today, as many as nine out of ten of those wells are fracking wells. That number is projected to continue to rise in years to come because almost all new wells that are drilled in the province are fracked.

Unlike conventional gas extraction, fracking uses huge amounts of fresh water. According to industry sources, each fracking well uses between five million and 30 million litres of water.[1] That is because fracking uses horizontal drilling coupled with a mixture of water, chemicals, and sand, which is pumped underground at high pressure to release small pockets of gas trapped in shale formations by cracking the rock. After the fracking process is complete, the wastewater that returns to the surface is so toxic, it cannot be returned to the water cycle without treatment, a process which is currently not used in B.C.

British Columbia stands at a crossroads, with five proposed liquified natural gas (LNG) terminals along its coast. If these terminals are allowed to be built, it would require the province to more than double its fracked gas production. This directly threatens the rivers and lakes that feed the Peace and MacKenzie Rivers, as this thirsty form of energy extraction demands more and more water, with little oversight or monitoring from regulators.

Fracking wastewater is so toxic, it cannot be returned to the water cycle without treatment.

It's hard to project exactly how much water would be needed to feed new demand created by LNG because the amount of water used in a frack can vary widely from well to well. However even if we took the very conservative outlook that doubling production would also at least double water use, that would mean **the province's oil and gas industry would use 10.4 billion litres of water a year, or enough to fill 4,160 Olympic swimming pools.**

Giving away freshwater for free

Prior to 2005, when fracking was introduced to B.C., the oil and gas industry used very small amounts of the water and produced only small amounts of wastewater. This dramatically shifted with the introduction of this new form of gas extraction, and laws and regulations did not change to keep pace. As a result, fracking companies are treated like any other industrial water user in the province even though they are quite different.[2]

A regular industrial water user effectively rents water from the province because they pay a fee for being permitted to use water before treating it to return its natural state and returning it to the water cycle. **Oil and gas is the only industry in B.C. that is permitted to extract fresh water, contaminate it, and then dispose of it untreated by pumping it down what the industry calls a disposal well in order to remove it permanently from the water cycle.**

The water rental cost of the entire oil and gas industry came to less than $8000 in 2021

Despite this, fracking companies pay very little to access water. According to the BC Oil and Gas Commission, in 2021, oil and gas companies withdrew a total of 5.2 billion litres of water.[3]

The majority of that water, 3.5 billion litres to be exact, was withdrawn using water licences under the Water Sustainability Act. To access that water, companies pay an application fee that ranges from $1,000 to $10,000 depending on the volume of water used,[4] and pay a rental fee of just $2.25 for every one million litres - meaning that the rental cost for the entire oil and gas industry came to less than $8,000 in 2020.

Another 1.7 billion litres of water were withdrawn by oil and gas companies using "short term" use approvals.[5] The use of short term is somewhat misleading because these 24-month approvals are often renewed multiple times. **These withdrawals are exempt from paying application and rental fees** – instead, costs are deemed to be covered by the fees oil and gas companies pay when they apply to the Oil and Gas Commision for their operating permit. Finally, oil and gas companies are allowed to access water from wells that are at least 300 metres deep, with no reporting or oversight, and **there are no rent or fees for using this water**.[6]

Where to put all that wastewater

Two essential things to know about fracking wastewater are that a) it can cause serious harm to people and the environment; and b) **the explosion in the number of fracking wells across North America has created huge volumes of wastewater.**

Fracking wastewater comes from two sources: flowback water and what the industry calls "produced" water. Flowback water is fracking fluid that returns to the well head in the two weeks following a frack. Produced water is a mixture of frack fluid and water that has been trapped underground in the rock formation, and is brought to the surface with the gas once the well starts to produce. **Produced water contains high levels of salt, contaminates like arsenic, lead, hexavalent chromium, barium, chloride, sulphates, boron, and benzene (many of which are known carcinogens) and normally occurring radioactive materials.**[7]

Once fracking wastewater comes to the surface, it is first transferred by truck or pipeline from the well to a holding pond. In B.C., the industry uses two kinds of holding ponds: temporary steel tanks called C-rings, which look something like industrial sized above-ground swimming pools, or more long term wastewater ponds, which are simply large plastic-lined pits. Throughout this process, there is the risk of routine spills, pipeline leaks, trucking accidents, and ruptures in pit linings, all of which pose a serious risk to the environment.[8]

The problem with disposal wells

After resurfacing, **most fracking wastewater in B.C. is transported to a disposal well, where it is pumped underground without going through any kind of treatment process**. A disposal well is often just a depleted oil or gas well that has been pushed back into service for this new purpose.[9] Practically speaking, they are little more than boreholes drilled hundreds of metres underground that contain steel piping, the upper sections of which are reinforced with cement. The wastewater travels down the pipe into the rock formation below, and the hope is that wastewater will remain trapped deep underground and not be able to find a path to groundwater aquifers.

The most serious concern about this form of disposal is that wastewater could leak into shallow aquifers and contaminate groundwater due to failures in the cement casings that surround wells. In B.C., companies are required to conduct annual testing intended to help identify problems with well casings. However, in the past B.C. Oil and Gas Commission staff have admitted to issues with their monitoring to ensure that companies are complying with this regulation, especially when it comes to disposal wells.[10]

Injecting wastewater into disposal wells has been identified as one of the causes of earthquakes connected to fracking. There are also concerns that fracking- related earthquakes could open up new pathways in the rock for wastewater to reach groundwater aquifers.[11] In November 2022, a series of earthquakes registering as high as 4.7 on the Richter scale were felt northwest of Fort St. John B.C. The Geological Survey of Canada described the likelihood of these events being linked to fracking as "very high." If confirmed, this would set a new record for the strongest earthquake linked fracking in Canadian history.[12]

Notably in B.C., there are no requirements for operators to conduct baseline testing of water systems surrounding disposal wells, or to conduct on-going monitoring of these water systems, which would alert regulators to waste water finding its way into ground water aquifers. There are also no requirements to monitor or disclose what kind of contaminants are in wastewater being disposed of in the wells.[13]

Alarmingly, a 2017 pilot study conducted by researchers from the Université de Montréal found that **pregnant women living in fracking-impacted communities in northeastern B.C. had elevated levels of many of the same contaminants found in fracking wastewate**r in their urine.[14] While the study concludes that more extensive monitoring is warranted, it raises very serious questions about whether enough precautions are being taken to protect local populations from fracking wastewater.

Case Study: Disposal Well #2240

If there was a poster child for what is wrong with B.C.'s system for managing disposal wells, it would be well #2240, which is located on the traditional territories of the Fort Nelson First Nation.[15]

Well #2240 has been used continuously as a disposal well since 1968, which is concerning because the well casing that keeps waste from making its way into groundwater breaks down over time. Over the 54 years of use, a staggering 43.9 billion litres of wastewater have been pumped into well #2240. To put that in context, the Capilano reservoir in North Vancouver holds 57.9 billion litres of water.

In 2014, a study by the Environmental Law Centre at the University of Victoria first identified this well as problematic – they found that as of that time, t**his single well had been injected with a staggering 39% of all the oil and gas wastewater ever disposed of in B.C.**[16]

Because wastewater is not tracked after disposal, and the government of B.C. does not require testing of the surrounding aquifer, **the fate of this massive quantity of wastewater is unknown** and we have no way of knowing if it is leaking into groundwater or not.[17]

After natural gas wells like these ones near Chetwynd B.C. stop producing, a handful of them are repurposed into wastewater disposal wells. As a result, millions of liters of untreated contaminated wastewater are pumped down wells just like these ones every year.

Policy recommendations

There is no way to frack without poisoning huge amounts of water, and there is no way to clean up or dispose of the wastewater from fracking without putting communities and the environment at risk. Combined that with the very real impacts of climate change that we are already feeling here in B.C., and considering that emissions from oil and gas extraction are still rising in the province, **the long-term solution is clear: we must phase out fracking.**

There are many jurisdictions here in North America that have banned fracking including Quebec, Nova Scotia, New York, Oregon and Washington State. In 2021, California Governor Gavin Newsom announced that the state would stop issuing fracking permits by 2024.[18] **This makes B.C. the only member of the Pacific Coast Collaborative that has not banned or committed to phasing out fracking.**

However, until we begin the work of transitioning away from fracked gas, here are some practical steps the B.C. government can take to protect clean water and communities. Our recommendations are based on technology that already exists and has been successfully deployed elsewhere, and regulatory frameworks from other jurisdictions. They seek to improve and streamline the way the government manages water in B.C. by putting a single ministry in charge of this important resource.

1. Treat fracking waste as hazardous waste

The four characteristics that define hazardous waste are: ignitability, corrosivity, reactivity, and toxicity. To be classified as hazardous waste, a material needs to meet just one of these criteria.[19] Fracking wastewater, which commonly contains arsenic, lead, hexavalent chromium, barium, and benzene, is clearly toxic and may meet requirements for other characteristics as well.

The only solution to the enormous volumes of hazardous waste created by the fracking industry cannot be to pump it completely untreated down disposal wells and ignore the future risks to groundwater. **No other industry in B.C. is allowed to extract fresh water, pollute it and then dispose of it without treating it first.**

We recommend that the B.C. government bring oil and gas operators back under the Environmental Management Act with oversight from the Environmental Protection Division (EPD), and require frackers to treat wastewater through industrial wastewater facilities, (also called centralised waste treatment). **Requiring treatment would not only reduce the risk of hazardous waste being released into the environment, it could also reduce the amount**

of freshwater used by the industry. Currently, a very small amount of fracking wastewater is reused in B.C. in part because untreated wastewater often contains contaminants that could foul wells. Requiring treatment would increase the amount of wastewater that is reused and thereby reduce the industries demand for freshwater.

2. Protect groundwater aquifers

Requiring wastewater treatment can reduce the volume of waste being pumped down disposal wells but not eliminate the need for them entirely. In order to make disposal wells less likely to leak wastewater and contaminate nearby aquifers, we also recommend that the province improve regulations for disposal wells to match the U.S.'s Environmental Protection Agency's regulations for Class I hazardous waste wells.

Testing and monitoring is also key to groundwater management. Because of this, we recommend that the province, through the EPD, also undertake baseline testing of water systems impacted by oil and gas, especially those surrounding the disposal wells, and conduct ongoing monitoring of these water systems. We also recommend that funds from increased water licensing fees be used to offset the cost of testing.

3. Put the Water Stewardship Branch in charge of all access to water

When the B.C. Oil and Gas Commision (BCOGC) was created, it was given special powers under the Water Act to issue short-term approvals for water use for mixing muds and dusting roads. The small volumes of wastewater produced were limited to actual "produced water" that had always been isolated in deep formations. Now, the B.C. Oil and Gas Commision also has authority to provide both water licences and approvals for free water, with no limits on volumes. In addition, if the water is self-reported to be from a source of "deep groundwater" there is currently an exemption from the requirement for a licence or approval.

Oil and gas companies are the only water-users in B.C. able to access water without oversight from the Water Stewardship Branch, some of it completely free of charge. All other water users, including farmers, local governments, and even BC Hydro, have to go through the regular processes and expenses before they can access water licences or approvals. **Because of this, we recommend that the government of B.C. end special treatment for the fracking industry by returning the power to issue water licences and approvals for oil and gas to the Water Stewardship Branch.**

4. Charge a fair price for access to water

The current price regime clearly does not put a high enough price on the permanent destruction of water in a region which is increasingly threatened by drought, and is home to some of the most productive agricultural land in the province.

The current system of oil and gas sector water rental fees and licensing is heavily subsidised. In addition to free water under approvals and exemptions, the water rentals charged under water licences do not reflect the unique destruction of water used for fracking. This one activity has significant impacts on the total volume of water available on the planet and this distinction can no longer be glossed over.

We recommend that the province remove free access to water for fracking under exemptions and approvals, and set a special price for water use for fracking that reflects the reality that this water will be permanently removed from the water cycle. The price must be high enough to encourage conservation, which means ideally a price higher than the cost of treating and reusing wastewater. In addition, there should be a surcharge on the use of the water, with those funds to be used to fund independent oversight of disposal wells and costs of addressing the future impacts of contamination groundwater, through the inevitable leakage due to ageing disposal sites and damage due to earthquakes.

End Notes

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