Technical Review of Outdated Subsidies, Policies and Regulations Governing Water Used by the Oil and Gas Industry

Prepared by Donna Forsyth, BSc, LLB*

This technical review elaborates on the Open Letter to BC provincial government dated November 25, 2021 and entitled "BC Oil and Gas Royalty Review Seriously Flawed without Consideration of Water".

The following analysis outlines the history of water use by the oil and gas industry and the outdated subsidies, policies and regulations that result in the province receiving less than fair value for the water used by that industry. Since almost all of the gas produced in BC is now produced by hydraulic fracturing or "fracking" and since the production of fracked gas relies on the permanent consumption of huge quantities of water, the government's royalty review needs to include water.

A brief history of the evolution of the oil and gas industry and its water use.

The following describes how relatively recent changes in technology used for oil and gas production have resulted in significant changes in the volumes of water used by the industry.

1. **Primary Production (also called Conventional Production)**

Initially, most production was limited to formations where oil and gas resources were under pressure. To produce the oil and gas, a hole was drilled into the formation. After the initial "gusher" from the release of pressure, production of oil and gas from these wells required only minimal technologies, such as pumping jacks (for oil) and pumping stations (for gas). This type of production is now known as "conventional production". There is very little, if any, of this easy and relatively accessible oil and gas left in the province.

Water use for conventional production was limited to the small amounts needed to mix the "muds" that were used to lubricate the drills.

Small amounts of wastewater often accompanied the oil and gas when it came to the surface. This water was classified as "produced water" and the government eventually removed the option for the industry to dispose of this water on the surface in order to prevent contamination of surface water. At that time, the technology to treat this water was limited and, since these small volumes of water originated from deep underground formations, the water had never been potable or available for use by others.

2. **Secondary Production (a later version of Conventional Production)**

In the 1950-60s, it was discovered that injecting water into formations could result in the recovery of more oil and gas. It became common practice to use the injection of water into conventional oil and gas formations in order to improve their production. This injected water was recovered along with the oil and gas and continued to be classified as "produced water" despite the fact that the source of that "produced water" was now lakes, rivers, streams or shallow groundwater wells; in other words, water that could have been used for other

purposes. Despite advances in water treatment technology, this contaminated wastewater continued to be disposed of by injecting it, untreated, underground.

3. Tertiary Production (Unconventional Production)

In general, tertiary or “unconventional production” of oil and gas requires the use of more sophisticated technology to free up the oil and gas. This unconventional production often requires the use of significant volumes of water. An example is the production of gas from shale rock formations in northeast BC, through fracking. Another example of unconventional production is the use of steam to separate bitumen from sand in the Alberta tar sands. These unconventional processes are generally very expensive and provincial and federal governments have historically provided significant subsidies to incentivize investment in them.

While the use of water pressure to crack rock has been around for decades, the current practice of horizontal drilling coupled with multiple applications of hydraulic fracturing in stages in a single well is relatively new. This new fracking technology, which was introduced in BC in 2005, involves mixing huge volumes of water with sand and an unknown recipe of chemicals (many of which are known carcinogens). The resulting slurry is blasted underground, causing cracks to form in the shale rock. The sand holds these cracks open and the gas and chemicals are dissolved in the wastewater recovered from the fracked well. The gas is then separated from the wastewater and transported by pipeline. The remaining wastewater ”chemical soup” is stored and in some cases re-used again, before being transported, largely untreated, to disposal wells for injection underground.

While there has been little application of this technology for oil production in BC, almost all of the gas produced in the province is now “fracked gas”. It is estimated that there are currently 20,000 fracked gas wells in BC. This includes the multiple wells that are now allowed to stem from a single well pad. (Many well pads are now being constructed to accommodate 20 or more horizontal wells radiating out from each well pad.) During the fracking process, each well commonly uses at least 30,000 cubic metres of water. Since the current 639 well pads only have an average of 4.5 wells per pad in the Montney, just maximizing the number of wells for each existing well pad would result in an additional 10,000 wells in the Montney area alone. The estimated water required to frack these wells would be 230 million cubic metres (or 92 Olympic-sized swimming pools), which is more than six times the volume of water used by the fracking industry from 2012 to 2019.

In summary, the current technology used by the oil and gas industry has exponentially changed both the volumes of water used to produce fracked gas and the volumes of toxic wastewater being recovered from these wells. The government’s plan to significantly increase the number of fracked gas wells creates an urgent need to review and address the outdated subsidies, policies and regulations that govern water use by the oil and gas industry.

Key outdated subsidies, policies and regulations related to the fossil fuel industry’s use of water

1. Subsidized costs of water and free water

a) Subsidies through charging water rentals for water permanently removed

The current water rental system was established for industrial users who merely "borrowed" the water. Under a water license, every other industrial water user (except the oil and gas industry) is expected to return the water they use to the water cycle, either directly or indirectly. If the water has become polluted through industrial use, discharge permits issued under the *Environmental Management Act* (EMA) require that the user treat the water before discharging it back into the environment. (Outdated legislation that permits the oil and gas industry to dispose of their wastewater underground is addressed under section 2 below.)

Despite being the only industrial water user that is permitted to permanently remove water from the water cycle, the oil and gas industry continues to pay for their water on the same basis as other industrial water users (i.e., on the basis of "water rentals"). This policy ignores the fact that other industrial users are required to pay significant additional costs to treat their water and then they must return it to the water cycle for the benefit of other users or the environment.

This use of water rentals for the oil and gas industry results in the hugely subsidized rate of $5.62 for every Olympic-sized swimming pool of water the oil and gas industry is permanently removing from the water cycle. The standard amount of water in an Olympic-sized pool is 2.5 million litres.

In addition to this access to heavily subsidized water under water licences, the oil and gas industry has successfully lobbied for additional unlimited volumes of free water under the two exemptions described under b) and c) below.

Despite access to incredibly cheap or free water under the WSA, the fracking industry is making private arrangements to pay landowners substantial amounts of money to access large quantities of water collected in dugouts constructed on private farmland. The amount of water used by the fracking industry from these private sources is unknown. The capture of this water in dugouts removes it from the water cycle and the private sale of that water to the fracking industry prevents any recovery of its value by the government. There is no recognition that had this water not been captured, it would have ultimately helped to saturate the soil, improve the flows in nearby streams and recharge nearby groundwater aquifers.

The royalty review needs to examine the use of water rentals for water that is being permanently removed from the water cycle by the oil and gas industry. The review should also be informed by the fact that the industry is willing to pay significantly more for water acquired through private water sales.

b) Free water under "use approval" exemption

Under the *Water Act* (and now under the *Water Sustainability Act* or WSA), in order to qualify for a water licence, the licence holder must have an "appurtenancy"; in other words, an interest in land. This requirement was meant to prevent abuse of water rights and to ensure the benefit of water use was tied to BC. An alternative type of water right, called a

“use approval”, was created to allow for temporary use of water for activities that were not tied to an interest in land. Use approvals were originally created for road dusting operators who used small amounts of water for dust control. Later, oil and gas well drillers were issued use approvals for small amounts of water to mix drilling muds to lubricate drilling rig bits for conventional oil and gas wells.

Initially, use approvals were not popular since holders paid the same fees and rentals as under water licences and use approvals were only valid for a maximum of 12 months.

That all changed in the 1990s, when legislation was passed to create the unique entity that is the Oil and Gas Commission (OGC). Intended to provide a “one stop shop” to reduce the “bureaucracy” created by separate permitting agencies, the OGC is funded by the industry, has authority to write its own “board” regulations and acts as a single decision maker for the permits required under other legislation (called “specified enactments”). Under these specified enactment authorities, access to water under use approvals for the oil and gas industry became the exclusive jurisdiction of the OGC.

Through the OGC, the industry then successfully lobbied for an exemption from paying fees and rentals for water used under use approvals for oil and gas activities. This was initially done prior to extensive use of fracking technology; in other words, during that period when much smaller volumes of water were being used. The initial rationale for this exemption was that these operators were already paying significant fees for their oil and gas permits, so the fees and rentals for the small volumes of water they were using should be waived.

Despite the substantially changed circumstances surrounding the oil and gas industry’s use of water resulting from fracking, when the *Water Sustainability Act* (WSA) was passed in 2016, the exemption from water fees and rentals for oil and gas activities under use approvals was retained. Under section 3(2) of the Water Sustainability Regulation (WSR), however, a restriction was put in place to prohibit issuing a use approval for fresh water stored behind a dam, unless there was already a water licence for that dam. The WSA also provided authority for the government to limit the volumes of water available under use approvals, but that regulation has yet to be passed. (See section 11(2)(b)) of Water Sustainability Fees, Rentals and Charges Tariff Regulation (WSFRCTR); section 3(2) of Water Sustainability Regulation (WSR); and sections 10 and 127(2) of the WSA.).

This new licensing requirement for water behind dams did result in a noticeable increase in the number of water license applications by the fracking industry. To facilitate this new licensing, the government agreed to appoint staff at the OGC to be “water managers” under the WSA, giving them authority to issue water licenses for oil and gas activities. This was done through a memorandum of understanding between government ministries and the OGC, without consulting the public or First Nations. Amending the legislation to add water licensing to the list of specified enactments would have required consultation.

Over time and through the OGC, the industry also successfully lobbied to increase the duration of time for use approvals. Initially, the maximum term was extended from 12 months to 24 months. Then, under section 10(3) of the WSA, the OGC was given the clear authority to continue their practice of re-issuing use approvals indefinitely for water use at a single facility, such as a well pad.

The royalty review needs to include the subsidy of unlimited free water to the oil and gas industry under use approvals and examine the need for limits on both the types of activities and the volumes of water available under use approvals. The review of this subsidy should also be informed by the fact that the industry is willing to pay significantly more for water acquired through private water sales.

c) Free water under "deep" groundwater exemption

There are two types of "deep wells":

- Deep gas wells that qualify for reduced royalties on the gas they produce, and
- "Deep" groundwater wells (at least 300m deep) that provide free water for oil and gas activities.

(The independent assessment of BC's current royalty system submitted to the government provided analysis of the first kind of "deep well", but not the second.)

Under the policies proposed for the WSA, all non-domestic groundwater use would require a water license or use approval. During consultations on the WSA, an exemption for oil and gas industry use of "saline" groundwater was proposed. At the time, Ministry of Environment staff recommended any such exemption be limited to water with a salinity level of at least 10,000 mg/L TDS, the rationale being that an exemption would encourage the fracking industry to reduce its use of potable water in favour of 'saline' water that was unsuitable for any other purpose.

Despite salinity being the basis for the proposed groundwater exemption during consultation, the industry successfully lobbied to have the salinity requirement removed completely. When the new laws were brought into force in 2016, the only criteria for access to the licensing exemption became the location and depth of the groundwater well. Currently, as long as the well is located in the northeast corner of the province (where most of the fracking is currently occurring), the water is free as long as the well is at least 300m deep and is located below a geological formation called the "fish scale" zone. The exemption removes any requirement for the industry to apply for any permission to use this groundwater. There is no restriction on the size of the well or the volume of water pumped out of the well.

In general, there are no real limits to the depth of groundwater wells other than the limits of the equipment used to drill them. In many parts of the world, such as in California, groundwater wells are routinely drilled to depths below 300 m. That water is often either potable or slightly saline and can be used, with or without treatment, for multiple purposes, including for irrigation of food crops.

It is also likely that these so-called "deep" groundwater wells will draw down water from non-saline, potable aquifers to which they are hydraulically connected. Evidence of this drawdown would include a lowering of the salinity of the groundwater from the well, but there is no requirement to report the salinity of that water. The exemption also by-passes the assessments of potential impacts to stream flows or to other water users under the WSA and effectively prioritizes the use of water for fracking. This reality is chillingly reflected in the

wording of section 52(3) of the WSR, which provides: “Deep groundwater may be diverted and used in accordance with this Part in any quantity and at any time of the year.”.

In 2019, the industry again successfully lobbied, through the OGC, for yet another exemption, this time from the environmental assessment process under the *Environmental Assessment Act* (EAA). The Environmental Assessment Office agreed to the exemption, despite staff from their own ministry expressing concern. The rationale for the new exemption was based on the fact that these wells were exempted from the licensing requirements in the WSA. This ignored the fact that when the original exemption under the WSA was provided, there was both oversight and consultation under the EAA processes for all large groundwater wells.

The exemption of the “deep” groundwater wells from both the water licensing and the EAA processes has removed any consultation requirements for these massive wells, thus removing any opportunity for other groundwater licensees, First Nations or the public to object to these wells pumping unlimited volumes of water at all times of the year. The only recourse is for a water rights holder to convince the government to take action if they can prove that their access to water has been affected by the well. There is no recourse for negative impacts to the environment, including the potential for ground subsidence known to occur in areas where large groundwater withdrawals have taken place.

The review of the current royalty structure needs to include a review of the “deep” groundwater exemption and the fact that it provides unlimited access to free groundwater without a salinity requirement, and without any oversight, assessment of impacts or consultation now that neither the water licensing nor the environmental assessment processes apply. The review of this exemption should also be informed by the fact that the industry is willing to pay significantly more for water acquired through private water sales.

2. Exemption from wastewater treatment - polluter does not pay

As noted above, every other industrial user “borrows” their water and is required to treat it, if necessary, before returning it to the water cycle. Under its unique legislation, wastewater treatment by the oil and gas industry is voluntary.

When the practice of using disposal wells was introduced for water produced from oil and gas wells (“produced water”), three key factors existed: 1) conventional production methods produced much smaller volumes of wastewater, 2) current wastewater treatment technology was not available, and 3) wastewater from conventional wells originated from deep oil and gas formations and had never been available for others to use.

Now, however, the same policy for wastewater disposal is being applied to unconventional fracked gas production in BC, despite: 1) the huge volumes of wastewater recovered from fracking operations, 2) the availability of wastewater treatment technology, and 3) most of the wastewater originated from water sources that were usable by others.

The OGC provides the following public information about disposal wells on their website: (https://www.bcogc.ca/files/publications/Factsheets/disposal-wellfsfinaljuly-2019.pdf)

> *"Water specific to fracture return may be recycled for further use, or disposed by injection into deep subsurface formations, through a disposal well.*
>
> *Surface discharge of produced water is prohibited in B.C. Water used during hydraulic fracturing is not discharged into surface waters, such as lakes and streams, and is not discharged into near surface aquifers used for potable water supply.*"

This ignores the fact that the "prohibition" against surface discharge is based on outdated policies governing "produced water" and the absence of treatment requirements for the wastewater under the *Oil and Gas Activities Act* (OGAA) and the OGC board regulations.

With the successful lobby of the oil and gas industry to keep wastewater treatment voluntary, they enjoy a huge indirect subsidy, through the removal of these costs. A mandatory treatment requirement would also significantly reduce the fracking industry's fresh water consumption. Now, wastewater is only recycled when it can be used, untreated, by injecting it back into the same formation (as noted in the OGC information above). In other words, recycling only happens when it saves the industry money.

Wastewater created from fracking is often radioactive and most of it, if not all, contains dangerous chemicals that are known carcinogens. Prior to injection into disposal wells, this toxic wastewater is stored either in lined, circular, above-ground tanks known as C-rings, or in very large, lined excavated pits. Leaks from these pits have resulted in groundwater contamination and both storage methods create ongoing risks of contamination to surface water, groundwater and the land. The rules governing the restoration of these sites were historically governed by the Contaminated Sites Regulation (CSR) under EMA, with oversight from staff in the Ministry of Environment. However, effective February 1, 2021, the OGC now has exclusive jurisdiction over the restoration of these sites. The OGC's authority to exempt the operating companies from the clean up requirements has also been expanded through a separate amendment to the oil and gas legislation, buried in a recent miscellaneous bill. (See OIC 368 (2020) bringing amendments to the EMA and OGAA into force; and s. 32 of Miscellaneous Bill(2) Bill 21 (2021).)

The rules governing the underground disposal sites are also under the exclusive jurisdiction of the OGC, despite these sites creating additional risks of future contamination and clean-up costs. Migration of toxic wastewater towards the surface can occur through cracks in the rock formations that are being relied upon to isolate it deep underground. Cracks in the casings and concrete plugs of closed oil and gas wells near these disposal sites can also provide pathways for the migration of the wastewater into shallow groundwater aquifers. This migration risk is exponentially increased by the earthquakes known to be occurring as a result of both the fracking of gas wells and the pressure from injecting the wastewater underground. Currently, only the industry-funded and government-enabled OGC is tasked with assessing the impacts of these earthquakes and the safety of these toxic, underground sites.

Independent oversight is needed for both the mandatory wastewater treatment and the cleanup of wastewater storage, spill and underground disposal sites created by the oil and gas industry. This would level the playing field with other industrial water users and reduce the potential for future environmental impacts and costs of cleanup being passed onto future generations. Mandatory wastewater treatment would also

reflect the true value of our water, would allow it to be returned to the water cycle and would incentivize water conservation by the fracking industry. It all begins and ends with a review of the outdated subsidies, policies and regulations governing the disposal of wastewater under the current oil and gas legislation.

**Donna Forsyth has a BSc in Environmental Biology and an LLB from the University of Calgary. From 2006 to 2020, she worked within the BC Ministry of Environment and Climate Change Strategy as a legislative advisor on both water and oil and gas legislation.*