



ADVANTAGE emerging trends papers MONTHLY

Fracking

RISKS ASSOCIATED WITH FRACKING IN NORTH AMERICA

February 2016 / By Ingrid Sapona

The great surge in fracking activities in North America intended to increase opportunity for employment, energy independence, and economical improvement. However, it also brought a number of insurance and environmental risks of great concern, including onsite accidents resulting in worker safety; homeowners reporting bodily injury and property damage; and environmental issues related to water resources and earthquakes. This paper seeks to define and identify fracking activities and risks in North America, and specifically in Canada.

What is Fracking?

Hydraulic fracturing – “fracking” for short – is a process involving injecting fluid under high pressure into wells to fracture shale formations or coal beds to release oil, natural gas, or methane gas. The development of shale resources is considered unconventional gas recovery because the gas is contained in difficult-to-produce reservoirs, which require special completion, stimulation and/or production techniques to achieve economic production.

The Surge in Fracking

Fracking has been used by oil and gas companies since the 1950s. But, a combination of factors came into play at the end of the 20th century and start of the 21st century that contributed to the great surge in fracking activities in North America:

- Technological advances in horizontal drilling techniques and fracking technology. The push in the U.S. for energy independence. By many accounts, thanks to fracking, the U.S. is on the verge of achieving energy independence. The high price of crude oil.

- The regulatory environment, particularly the fact that under the [Energy Policy Act of 2005, hydraulic fracking is exempt from requirements of the Safe Drinking Water Act](#). The exemption left regulation of fracking activities up to individual states.
- The argument that fracking activities create jobs – this was an especially attractive argument in the early-to-mid 2000s when there was high unemployment.

But, the oversupply of gas from fracking has driven the price of gas down and, when this fact is combined with the low price of crude, the relatively stable employment rates, and the increasing amount of renewable energy coming on line, the attractiveness of fracking may be waning.

The following figures provide a sense of how prolific the shale gas extraction industry has become:

- [U.S. natural gas production from shale is expected to triple from 2010-2035](#).
- More than 2.5 million wells have been fracked worldwide, with [200,000 of them in Canada, with more than ¾ of that number in Alberta](#). According to Alberta Energy Regulator (AER) information released in 2015, [the number of wells fracked in Alberta in 2014 was 3,395, which is up from the number fracked in 2013, but 2014's number pales by comparison to the over 8,000 that were fracked in 2008](#).
- [The B.C. government's economic strategy relies heavily on exporting natural gas, much of which can be expected to come from fracking activities](#).

Fracking Fluid

[The fluid injected \(referred to as “fracking fluid” or “slickwater”\) is a mixture of water and chemicals that are added to “make the water more slippery” \(which helps to reduce friction\) and for specific engineering purposes](#). Ingredients used in fracking fluids vary, but they can include things like surfactants (soaps), biocides (to prevent growth of algae), corrosion inhibitors, foaming, and gelling agents. Sand and other solids, including ceramic beads, for example, are often pumped in to keep the fissures propped open to allow the methane gas to escape once the fluid pumping is stopped. Such additives are called “proppants”.

Drilling companies consider their fracking mixture proprietary and generally do not disclose the exact composition. [Some of the chemicals used in fracking fluid are carcinogens, such as benzene, lead, methanol, boric acid, and various radioactive isotopes](#). [Though many point out that fracking fluid is primarily water](#), as an EPA science advisor pointed out to reporters, given the volume of fluid used in fracking, “... a small percentage may mean hundreds or thousands of gallons of chemicals... Remember one percent of a million gallons is a large number – 10,000 gallons.”^[1]

[As a result of growing complaints from communities and groups, some jurisdictions require disclosure of the compounds used in fracking fluids](#). [According to FracFocus](#), a hydraulic fracking chemical registry managed in the U.S. by the Ground Water Protection Council and Interstate Oil and Gas Compact Commission, 23 states require chemical disclosure. But, that's a bit misleading, as some states allow companies to withhold

some information on the basis of it being a trade secret.^[2] [In March 2015 the Obama administration announced that companies drilling for oil and natural gas on federal lands must disclose the chemicals used in fracking.](#)^[3]

[Since 2012 the Canadian Association of Petroleum Producers \(CAPP\) has had a Guiding Principle that supports the disclosure of fracking fluid additives.](#) Disclosure is optional, but the CAPP Guiding Principle applies to CAPP members. In terms of disclosing trade secrets, the CAPP specifically states that where the specific identity of a chemical ingredient is considered a trade secret, a more general identification is to be used consistent with the Material Safety Data sheet (MSDS).^[4] [A few well operators have announced that they will not claim the ingredients in their fracking fluid, constituting it as a trade secret.](#)

What are Injection Wells?

[Injection wells are wells used to place fluid underground.](#) Using an injection well to dispose of fracking fluid is quite common. ([Such wells are sometimes referred to as disposal wells](#)). In fact, according to the EPA, disposal wells are the primary way fracking fluid is disposed of in most regions of the U.S.^[5]

Unlike fracking, injection wells are subject to the U.S. Safe Drinking Water Act (SDWA). Injection wells that deal with fracking fluids generally fall into so-called Class II wells. As a result, they must satisfy the requirements of the [Underground Injection Control regulations](#).

Environmental Concerns Raised by Fracking and Injection Wells

There are a number of environmental concerns raised by fracking, but this Trends Paper will focus on the most significant, which relate to water resources and earthquakes.

Impact on Water

Concerns related to water have to do with:

- depletion of water resources because of the amount of water used in fracking operations;
- contamination of drinking water supplies; and
- treatment or disposal of fracking wastewater.

The amount of water used varies depending on the type of well and how many times it's fracked. The U.S. Environmental Protection Agency (EPA) estimates that each fractured well requires thousands of millions of gallons of water.^[6] The EPA estimates that the median volume of water used per well in the U.S. is about 1.4 million gallons (5.7 million litres).^[7] In other words, for 2011 and 2012, on average, 44 billion gallons of water were used for fracking in each of those years.^[8] Fracking proponents often point out that

though the amount of water needed seems high, in the U.S. for example, the water usage in shale fracking is less than 1% of total annual water use.[9]

Contamination of ground water is another concern. The introduction of contaminants to surface or subsurface water from spills of on-site storage and transportation of chemicals and additives used in fracking fluid is one such concern. Spills can flow overland to nearby surface water, they can contaminate soil, and they can infiltrate and contaminate underlying groundwater.[10]

Subsurface migration of fracking fluids into potable water aquifers is another concern. There can be leakage of fracking fluid from defects in the well casing, as well as unintended movement of fluids from the production zone through subsurface geologic formation.[11] According to the EPA, “construction issues, sustained casing pressure, and the presence of natural faults and fractures can work together to create a pathway for fluids to migrate toward drinking water resources.”[12] The experts from the Council of Canadian Academies concluded that (as of 2014, the time of their report), “data are lacking ... particularly in relation to potential groundwater contamination”.

Many believe the primary risk to drinking water comes from handling the wastewater produced by fracking. It's not known exactly how much water is recovered after fracking operations. Indeed, the estimates vary widely: from 3% to 80%. Fracking fluids recovered must either be treated or disposed of.[13] In some cases well operators retain the wastewater on-site (in steel tanks or lined pits) and some fluids are disposed of using injection wells.

Earthquakes

A lot of scientific evidence has come out linking various reports of earthquakes (seismic activity) and fracking-related activities.[14] The fact that in 2014, Oklahoma (where the energy industry is the largest employer) had nearly 700 earthquakes, which is more than California had that year, is pretty convincing evidence. Earthquake activity tied to fracking is now often referred to as “induced seismicity”.

Most of the information available about earthquakes induced by human activity relate to injection well activity. For example, the U.S. Geological Survey has publically stated that, “Deep injection of wastewater is the primary cause of the dramatic rise in detected earthquakes and the corresponding increase in seismic hazard in the central U.S.

In addition to a sizeable increase in the number of induced earthquakes being reported, the magnitude of those reported is increasing. For example, Oklahoma recorded a 4.6 magnitude earthquake in January 2016 – one of the strongest ever reported in the state. B.C. has also noted an increase in the number of earthquakes in the past few years. Part of the reason the province has recorded so many more earthquakes is because it has increased the number of monitoring stations and the sensitivity of the monitoring equipment. But, despite the fact that some characterize the induced quakes as “small” or low magnitude, there are plenty of reports of fairly strong quakes that have been attributed to fracking. In December 2015, for example, B.C.’s energy regulator concluded that a 4.6 magnitude quake in northeast B.C. in

August 2015 was caused by fracking. In the years to come it is clear that people will be studying whether the rate and magnitude of induced quakes correlates to factors such as the injection pressure and volume of fluids injected.

An Oklahoma woman, who had suffered injuries when her chimney toppled over in an earthquake registering 5.0, won the right to sue the oil company for damages (The suit was settled out of court and no further details are available).

The U.S. Geological Survey has studied how injection-induced earthquakes can be incorporated into its seismic hazards maps, which are used for insurance purposes, building codes, and emergency response plans.

Fracking Activities and Insurance

In this section we'll look at some insurance issues related to:

- those engaged in fracking (for example, oil and gas companies and drilling companies); and
- property owners on whose land fracking is taking place, or who live in an area where it's taking place.

Insurance issues for those engaged in fracking

For companies engaged in fracking, there are various insurable risks, including:

- operational risks – such as worker safety-related claims;
- risks related to equipment as a result of activities and accidents; and
- risks related to environmental damage.

Many insurers prefer to avoid underwriting fracking activities because of the risks involved. According to one source, “[T]he biggest issue holding back oil and gas drilling insurance coverage is a shortage of reinsurance capacity”. The authors attribute this shortage to a lack of education, particularly among European reinsurers who don't have much experience with fracking because it is still relatively new there.[15]

At the same time, the U.S. National Association of Insurance Commissioners has urged fracking operators to take out coverage over and above CLO coverage, with particular attention to environmental impact liability (EIL) coverage. As well, as of March 2015, one U.S. source indicated that there were about 45 fracking-related tort lawsuits pending in the U.S. Companies engaged in fracking carry commercial general liability insurance (CGL), which will cover them for third-party bodily injury and property damage claims. Pollution exclusions in CGL policies normally exclude coverage for something like a claim for contamination caused by fracking fluid. Whether the insurer succeeds in relying on a pollution exclusion is not clear. This, of course, begs the question of whether fracking fluids are pollutants. Fracking company executives have gone so far as to drink a glass of their fracking fluid in public to demonstrate how safe it is.[16]

For those companies who don't necessarily want to roll the dice in terms of whether a pollution exclusion might apply, some insurers offer an Energy Pollution Liability Extensions (EPL) endorsement, which typically covers unexpected and unintended discharges of pollutants. An EPL is probably a good idea, though at least one insurer argued that the release of chemicals during the operation was intentional and so the EPL did not apply. Another argument an insurer could make with respect to an EPL is that it should be treated like a claims made policy and so if the insured does not provide timely notification of the claim, it's barred. In the case of a mishap with fracking fluid, there could be an issue in determining when the discharge happened: is it the date the fracking took place, or the date the fluid escaped, polluting the water or well.

Risks Due to Blowouts

Well operators also often carry Operator's Extra Expense liability coverage. This provides protection for liabilities related to well failures. Blowouts present specific risks for oil and gas companies, and [fracking activities have led to an increase in blowouts \(CGL policies, for example, typically exclude well blowouts\)](#). In addition to blowouts caused by casing and cementing failures and surface events, blowouts have been reported at the completion/fracking stage and in situations involving communication between multiple wells.^[17] As well, there has been an increase in reported blowouts involving producing wells and plugged and abandoned fracked wells.^[18]

The potential for blowouts arising at multiple wellheads as a result of communication during fracturing is a growing concern for the insurance industry. [The B.C. Oil & Gas Commission issued a Safety Advisory in May 2010 as a result of a so-called "large kick" that took place on a well that was being horizontally drilled for unconventional gas in B.C.](#) A kick is "an unintended entry of water, gas, oil, or other formation fluid into [a] wellbore that is under control and can be circulated out."^[19] If the fluid is not controlled, however, a blowout may occur.^[20] As of May 2010 the B.C. Oil & Gas Commission knew of 18 fracture communication incidents in B.C. and one in Alberta.^[21] [Since May 2015 B.C. has asked permit holders to report all inter-well communication incidents.](#)

If there is communication between wells, there is the potential of a single well blowout damaging multiple nearby wells. If an insured's well causes a blowout in multiple wells, an insurer might consider it one occurrence and therefore subject to one limit in a Control of Well policy. As a result, depending on the policy limit, the insured could end up underinsured. So, determining the appropriate policy limit is key.

Risks to Equipment On-Site

When the well is drilled, the rig is moved from the well site and the fracking equipment is brought in to complete the well. The equipment required to carry out fracking is quite extensive and more expensive than other drill rig equipment. As a result, it's important for insurers to put more capacity for the care, custody, and control issues under Control of Well policies for fracking activities.

Environmental insurance policies that are written to protect various parties, including developers, subcontractors, and investors, can help manage risks from fracking activities. Because of the unique aspects of each operation, environmental insurance policies should be tailored to the specific transaction and risks. Below are some of the potential exposures that might be included in an environmental policy:

- property damage and bodily injury,
- natural resource damages,
- liability associated with transportation and disposal of hazardous wastes or substances,
- project delays and business interruptions,
- loss of collateral value,
- contract liability, and
- costs for legal defence.

Insurance issues for homeowners living where fracking is happening

The applicability of liability coverage in a homeowner's policy for an environmental harm caused by fracking is evaluated in much the same way that coverage would be evaluated under a CGL policy. The insurer would want to determine whether:

- the claim or suit seeks recovery of damages,
- the damages are because of bodily injury or property damage within the meaning of the policy,
- the injury or damages were caused by an "occurrence", and
- any policy exclusions apply.

Whether an insured will be covered under their homeowners' policy for claims related to fracking will depend on their coverage. For example, some homeowners' policies include a specific pollution exclusion. So, if the well is contaminated from fracking fluid, they may not be covered under their homeowners' policy. If they suffer a loss as a result of an earthquake caused by nearby fracking, chances are their homeowner's policy won't cover the loss, as earthquakes are not usually covered by such policies. In cases where the homeowner's insurance covers their loss, the insurance company would most likely sue the well operator. As one commentator pointed out, [though the severity of property damage claims due to induced seismic activity may be relatively small, the cumulative value could significantly impact drill operators.](#)

If their homeowner's policy does not cover the loss, the property owner would likely look to the oil and gas company and any subcontractors. Homeowners could bring a claim based on negligence, gross negligence, strict liability, or nuisance.^[22] In Oklahoma a homeowner was injured when an earthquake rocked her home in 2011. [In 2015, Oklahoma's highest court ruled that she can sue two oil companies that operated injection wells near her home.](#)

Given the increased seismic activity attributable to fracking activities – both in number of quakes and magnitude – there has been an increase in interest in earthquake insurance among homeowners – at least in the U.S. What homeowners have to look out for, however, is that some policies exclude earthquakes that are induced. Also, [if the policy has an anti-concurrent causation provision, homeowners may find that a loss suffered as a result of a fire, for example, may not be covered if it resulted from an uncovered peril, such as an induced earthquake.](#)

In Oklahoma, where there has been an unprecedented increase in the number of seismic events, the Oklahoma Department of Insurance issued a bulletin in March 2015 requiring that insurance adjusters and agents receive continuing education focused on earthquake loss training. And, to ensure policyholders understand their policy coverage related to induced seismic activity, [in October 2015 they issued a bulletin requiring insurers to provide a “clarifying notice” to policyholders regarding their coverage for such earthquakes. After the 4.8 magnitude quake that hit northwest Oklahoma in early January 2016, there was a surge in the number of calls to insurers about earthquake insurance. Insurance claims in Oklahoma as a result of crumbling bricks and cracked foundations are rising.](#)

Conclusion

The technological changes that made fracking into shale economically feasible, and the vast shale deposits in North America, brought about the surge in fracking. Though the lower price of oil may make fracking less economically attractive, it seems clear that fracking activities will continue in Canada and the U.S. Insurers and reinsurers will have to keep up with technology and carefully assess the risks involved so they can design products and coverage that meets the market’s demand for insurance, while assessing their own appetite for underwriting these risks.

Sidebar: Fracking in Canada

Canada’s shale reserves are located in B.C., Alberta, Quebec, New Brunswick, and Nova Scotia.

Here’s a rundown of where fracking stands in Canada today, including some specific regulatory requirements and studies underway.

In September 2011 the federal Environment Minister asked Environment Canada to conduct a study into the impact of fracking. In April 2014 the Council of Canadian Academies published a report that was commissioned by the Federal Minister of Environment. The 14 international experts concluded that, [“authoritative data about potential environmental impacts are currently neither sufficient, nor conclusive”](#). According to the report, data regarding the environmental impacts of shale gas development is particularly lacking in relation to potential for groundwater contamination and methane emissions.^[23] The report also says that “More, well-targeted science is required to

ensure that, ultimately, long-term public interests are well understood and safeguarded.”[24]

After release of the report the Harper government’s Environment Minister commented that fracking is safe and the federal government would leave regulation of fracking to the provinces. Since being elected in October 2015, Trudeau’s Liberal government has not made public statements about its position or views on fracking (In August 2014 Trudeau, then an MP, publicly endorsed further scientific study before fracking for shale gas expands).

British Columbia

Fracking is being carried out in various parts of B.C., particularly in the northeast corner of the province in the Horn River Basin and the Montney Trend, which are the most active regions in Canada in terms of shale gas production. Interestingly, fracking there began in about 2006.[25] Since 2012 B.C. has required disclosure of the chemicals used in fracking fluids (on a well-by-well basis). The B.C. Oil and Gas Commission also tracks how much water is being used by companies for fracking. In 2014, for example, a total of 643 wells were fracked in B.C. with 8.25 million cubic meters of water used for fracking that year. Quite a lot of seismic activity has been recorded in areas of BC where fracking is going on. B.C. requires fracking be stopped if it triggers an earthquake of 4.0 or more. Fracking cannot resume until the well operator puts a mitigation plan in place.

Alberta

Alberta has extensive experience with fracking. According to Alberta Energy, about 174,000 wells have been fracked in the province since it was introduced more than 50 years ago. Alberta requires that licensees must report to the Energy Resources Conservation Board (ERCB) information about the ingredients of their fracking fluid. However, there are special allowances for trade secrets.

Alberta’s NDP government, which demanded an independent scientific review of fracking and had raised concerns about fracking being out of control when it was the opposition party, has asked the Alberta Energy Regulator to present the government with all the information it can on fracking. After it reviews the information available, it will decide whether additional scientific review is needed. Premier Notley has said that fracking needs to be looked at, but her government will not do anything to take the energy industry by surprise.[26]

Like B.C., Alberta requires fracking be stopped if it triggers an earthquake of 4.0 or more and they must immediately report it to the Alberta Energy Regulator. Fracking may not resume there without the AER’s approval.[1]

Ontario

Ontario does not appear to have significant potential reserves that anyone has shown any interest in exploring or fracking. Regardless, in March 2015, an NDP MPP in Ontario introduced a private member’s bill proposing that Ontario ban fracking. Ontario’s government

promptly voted down the bill. The provincial Natural Resources Minister said his ministry is reviewing what the province might do and he refused to put a timeline on the review.

Quebec

Quebec stopped shale gas exploration in March 2011, pending a full environmental study of fracking. [“We are committed to making sure that it is done properly or it won’t be done at all.”](#) Quebec’s then Environment Minister, Pierre Arcand, told a news conference. “Quebeckers must understand that we will not accept any compromises especially when it involves health and safety as well as respect for the environment. And we will take whatever time is needed to fulfill these conditions.”^[28] [In December 2014 the advisory office of environmental hearings](#) (BAPE, as it’s known in French) issued a report that concluded that [the environmental costs associated with fracking outweigh the economic benefits](#). [After the report was released, Quebec Premier Philippe Couillard told Radio-Canada that he doesn’t see any interest in developing fracking in the province. Some commentators saw this as Quebec closing the door on shale gas development, but others have been quick to note that the provincial government has steadfastly refused to “join New York and other jurisdictions in enacting ... bans on hydraulic fracking”.](#)

New Brunswick

In December 2014 the New Brunswick government put a moratorium on fracking that will remain in place until five conditions are met. [The conditions include consultation with First Nations, plan for wastewater disposal, and credible information about the impact of fracking on health, water, and the environment](#). In March 2015 the province announced a commission to study fracking. [The commission is expected to report to the province within a year](#).

Nova Scotia

[In June 2011 Nova Scotia announced a joint review by the departments of Energy and Environment to examine the potential impacts of fracking](#). Exploration stopped pending further scientific study. [The report was published in August 2014](#). The panel recommended that fracking not proceed until more is learned about it and that the province should design a system that ensures community buy-in.^[29] [In November 2014 Nova Scotia’s government passed a fracking bill that extends the moratorium on high-volume hydraulic fracking in shale formations until the government can develop regulations](#). The bill contains an exemption that allows fracking for the purpose of research and testing. The province’s energy minister, Andrew Younger, noted that the law is not meant to provide a permanent moratorium.^[30]

Prince Edward Island

Fracking is not much of an issue in PEI at this point because the province has not received any applications to drill. As a result, in 2014 the Environment Minister indicated the province does not see a reason to announce a moratorium on fracking. [In the event](#)

anyone expresses an interest in drilling, the province would require a complete environmental assessment.

Newfoundland and Labrador

Newfoundland and Labrador have placed moratoria on fracking.

[1] See Phillips, *supra* note 15.

[2] *Id.*

[3] See Phillips, *supra* note 15.

[4] *Id.* at p. 3.

[5] *Id.*

[6] See EPAs Assessment – Executive Summary, *supra* note 26, at p. ES-6.

[7] *Id.* at p. ES-9.

[8] *Id.* at p. ES-6.

[9] *Id.* at p. ES-7.

[10] See EPAs Assessment – Executive Summary, *supra* note 26, at p. ES-13.

[11] See EPAs Assessment – Executive Summary, *supra* note 26, at p. ES-14.

[12] EPAs Assessment – Executive Summary, *supra* note 26, at p. ES-15.

[13] *Id.*

[14] See, for example, the 2012 Observed Seismicity in the Horn River, <https://www.bcogc.ca/node/8046/download>, and the 2014 Observed Seismicity in the Montney Trend, <https://www.bcogc.ca/node/12291/download>. See also, “Modern Shale Gas Development in the United States: An Update”, by the National Energy Technology Laboratory, September 2013, which talks about induced seismicity caused by injection wells, at p. 62, <https://www.netl.doe.gov/File%20Library/Research/Oil-Gas/shale-gas-primer-update-2013.pdf>.

[15] *Id.*

[16] “Emerging issues in insurance for fracking and application of the EPLE endorsement”, commentary by Michael M. Salem, *Westlaw Journal – Insurance Coverage*, Vol. 24, issue 8, Nov. 27, 2013 at p.

4, <http://www.ambest.com/directories/bestconnect/NelsenFrackingArticle.pdf>. See

also, <http://www.thecanadianencyclopedia.ca/en/article/fracking/>.

[17] *Id.*

[18] *Id.*

[19] *Id.*

[20] *Id.*

[21] *Id.*

[22] *Id.*

[23] *Id.*, at p. 215.

[24] *Id.*, at p. 220.

[25] *Id.*

[26] *Id.*

[27] *Id.*

[28] *Id.*

[\[29\]](#) Id. at p.4-5.

[\[30\]](#) Id.