Out of Control:
Nova Scotia’s Experience with Fracking for Shale Gas
Report Summary

Nova Scotia has had one small experience with hydraulic fracturing (fracking) for shale gas. Between 2007 and 2009, Triangle Petroleum drilled five vertical exploratory wells in Hants County. Three of the wells were fracked.

Although work on the Triangle project stopped four years ago, new information and problems relating to the project continue to come to light. The most glaring issue has been the difficulty of disposing of millions of litres of fracking wastewater contaminated with chemicals and radioactive elements.

A look at the records shows this is not the only problem. Out of Control: Nova Scotia’s Experience with Fracking for Shale Gas documents what actually happened in Hants County, what the company did, what government regulators did, how decisions were made, and the lessons which can be learned.

For this report, the Nova Scotia Fracking Resource and Action Coalition (NOFRAC) examined documents obtained through Freedom of Information requests, as well as public documents and media reports.

The most glaring issue has been the difficulty of disposing of millions of litres of fracking wastewater.

Read the full report.
What emerged was a series of problems including:

- Wastewater ponds built and filled without appropriate permits.
- A leaking wastewater pond but no soil testing done.
- A company determined to dispose of millions of litres of fracking wastewater underground, despite provincial refusals.
- Nova Scotia Environment (NSE) allowed discharge of 7 million litres of untreated fracking wastewater into the Windsor sewage treatment system, although an internal NSE document states that fracking wastewater (formation water) is typically too contaminated to be released into the environment without treatment.
- NSE gave approvals for disposal of fracking wastewater before they had information about the full range of contaminants in the wastewater, including radioactive elements.

**Triangle’s Plan**

Triangle Petroleum, with its subsidiary Elmworth Energy, holds petroleum rights, granted by the Province of Nova Scotia, for an area of 1,920 square kilometers, known as the Windsor Block. The area stretches from Maitland to Wolfville, much of it along the Minas Basin. Triangle’s plan was to explore for and extract shale gas, initially in the Kennetcook-Noel area. The company planned to use new techniques of high-volume slickwater hydraulic fracking with horizontal drilling to release the gas.

The first phase of Triangle’s development plan called for drilling and fracking 210 wells grouped on 35 well pads (6 wells per pad), with 5 compressor stations – all in a 70 square kilometer area. A pipeline drilled under the Shubenacadie River would bring the gas to the Maritimes Northeast Pipeline. The longer-term plan called for 680 wells to be developed in four areas, Kennetcook, Stanley, Avon and Wolfville, with 80 wells developed per year over the first nine-year period.
What happened and what didn’t

Although five exploration wells were drilled, and three were fracked, no horizontal drilling and fracking was carried out. No shale gas production took place. No compressor stations or pipelines were built.

Fourteen million litres of fresh water was used to frack two of the exploratory wells, KC #1 and KC #2. Nova Scotia Environment gave permits for large amounts of fresh water to be taken from the Kennetcook and Noel Rivers for these operations. The fresh water was mixed with chemicals, some of them known carcinogens, to conduct the fracks. The company requested and obtained permission to withdraw an additional 6 million litres from the Noel River to frack the Noel Lake well, although it is difficult to determine exactly how much fresh water was used for this well.

Wastewater disposal unresolved

More than 14 million litres of wastewater were generated. Four years later, millions of litres of wastewater still remain in ponds at the two Kennetcook sites, open to the elements and susceptible to leaching and spillovers. Analysis shows that the wastewater contains radioactive elements and toxins released from the shale. It also contains residues of fracking chemicals. The wastewater is highly saline, three to four times saltier than seawater. Questions about how to dispose of the wastewater remain unresolved after years of wrangling between the company and government departments.

In October 2012, evidence emerged that seven million litres of fracking wastewater had been released, untreated, through the Windsor sewage treatment plant several years earlier. An additional 3.5 million litres of fracking wastewater remains unaccounted for. Government departments did not initially require that the company report where the wastewater was disposed of. Now no one, including the government, appears to know where some of it went.

Site contamination?

Government records show that at least one wastewater pond leaked. Records also show that Triangle was given permission to remove frozen wastewater from the waste ponds and allow it to melt on the ground at the drill sites, rather than disposing of it at an authorized facility. Until November 2012, no soil or water testing had been done on or around the sites, and Nova Scotia Environment, the department responsible for environmental oversight of the operations, had no plans to do so.

Tip of the iceberg

The problems that remain unresolved in Hants County are the after-effects of a tiny exploratory operation.
Unlike the three Hants County wells, which were only drilled and fracked vertically, a shale gas production well is drilled vertically and then horizontally for a distance of up to 3 kilometers. Wells are clustered, usually 6 to a well pad, as in Triangle’s development plan. Each production well is fracked horizontally over its entire length to release gas from the shale. A production well requires substantially more water (on average 3-6 times more) and chemicals than an exploratory well, in order to drill long distances through dense shale.

Tons of contaminated drilling mud and sand are generated, as well as millions of litres of wastewater. Thousands of heavy truck trips, averaging at least 1000 per frack, are required. With production wells come flaring (burning off) of gas and compressor stations emitting large quantities of volatile organic compounds. High levels of air pollution can have significant health impacts.

Each stage of shale gas production has an impact on eco-systems and on health.

Triangle’s Hants County operations represent the barest tip of the fracking iceberg. The Hants County experience suggests that neither industry nor the Province is ready to address the range of problems inherent in shale gas development and fracking, even at the lowest conceivable levels of exploratory operations.

Lessons to be learned

Although the Hants County experience with drilling and fracking for shale gas was minimal, valuable lessons can still be learned. The problems that Nova Scotia experienced with this small project are very similar to the problems being experienced on a much larger scale where shale gas extraction is taking place.

▶ In the relatively new unconventional gas industry, industry is far ahead of regulators. Governments lag behind and have difficulty responding effectively as unexpected issues and problems emerge.

▶ When regulators base decisions on information provided by industry, the results can be unexpected problems that are difficult or impossible to resolve satisfactorily.

▶ If industry does not want to comply with local rules or regulations, it is difficult to make them do so, especially in a timely way.

▶ Even the exploratory stages of unconventional gas development can have significant impacts.

▶ It is essential to understand the specific conditions of Nova Scotia, including geology, land use, water resources, infrastructure and other factors, in evaluating the potential impacts of shale gas development.

▶ Many of the effects of hydraulic fracturing and shale gas production may appear only over time. This was true in Hants County, where the presence of radioactive materials in wastewater was identified only several years after drilling and disposal of some of the waste, and it is true with well leakage. The magnitude of the industry
increases both risks and cumulative impacts. Some harm may not become apparent until long after operations have finished and the company responsible has moved on.

▶ It is crucial to look at the big picture of shale gas extraction and evaluate the combined impacts of all aspects of this new type of natural gas production, including but not limited to hydraulic fracturing. A permit-by-permit, well-by-well approach is not sufficient to avoid problems. The Nova Scotia government’s current review of hydraulic fracturing needs to evaluate the risks and impacts of shale gas development as a whole, including issues which are currently excluded, such as health, local economies, communities, and global climate.

▶ At this time, there is no scientific evidence indicating that any method of disposal of fracking wastewater is environmentally safe, considering cumulative and long-term impacts. Until a proven solution to the wastewater problem can be found, it would be wise not to allow fracking in Nova Scotia, nor to allow Nova Scotia to become the fracking wastewater disposal centre for other provinces.

▶ Emerging science is exposing unexpected and serious risks. The first independent peer-reviewed scientific studies into the impacts of shale gas development were published only two years ago. Many aspects are only now being researched and documented. When risks are high and damage can be long lasting, as with fresh water contamination, massive land use change and multiple health impacts, it is common sense to wait until there is sufficient valid evidence on which to base decisions.

The risks of shale gas were not as evident in 2007, when Triangle began work, as they are today. In 2013, no government can move ahead with shale gas development and later say, “we didn’t know there would be problems.”
Conclusion: Two possible roads ahead

*Industry proposes:* “Let’s push ahead. How can we learn to do better if you don’t let us try? Those problems in other places are exaggerated, and it will be different here. Trust us and let’s develop shale gas together, with new regulations.” Cash-strapped governments are desperate to believe this is possible.

*Other voices say:* “Slow down. Risks are significant and when things go wrong, there may be no way to fix them. Let’s take an honest look at all the risks and benefits, and see whether this industry will be good for Nova Scotia – economically, environmentally and socially – now and in the long-term. Decisions need to be based on independent scientific evidence, not industry hype, and the science is not yet in.”

The road ahead is still a choice. A small province like Nova Scotia does not have a lot of room to make costly mistakes.

Nova Scotia does not need to jump onto the shale gas bandwagon. The gas is not going away, and current prices are very low. Unconventional gas, including shale gas, is an industry with only a ten-year history. There is a lot still to learn, a lot of truths yet to uncover. Nova Scotia would be wise to take a long time out, and wait to learn from independent science, including studies based on the experiences of other areas.

The Nova Scotia Fracking Resource and Action Coalition recommends either:

A 10-year legislated moratorium on shale gas and fracking exploration and development. After 10 years, the province will be in a better position to evaluate, based on scientific evidence, whether shale gas can be extracted safely. Or,

Ban shale gas and fracking now. Some jurisdictions have decided that there is enough evidence already to ban shale gas development. Nova Scotia could do the same.

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