

CAPE views on Hydraulic Fracturing

This submission is being made on behalf of Citizen Action to Protect the Environment (CAPE), a Hants County-based registered non-profit society. We appreciate the opportunity to provide comments on the provincewide review of unconventional hydraulic fracturing (UHF) or fracking.

Our members live within the Windsor Block, for which Triangle Petroleum had a production lease until the current moratorium on fracking. We first became aware in October 2010 that fracking had been used in some wells in Hants County. Although several CAPE members had attended the Open House in Summerville in 2009, there was no public mention and/or explanation of fracking during the time members were present. Landowners who gave permission for seismic testing didn't seem to realize that the next step could involve fracking. If fracking is even being considered for an area, the first condition should be open public and meaningful consultation with members of the communities.

CAPE members are aware of the amount of wastewater that resulted from two vertically fracked wells and the challenges to finding a safe method for its disposal. Many have attended the public meetings with government officials in or near Kennetcook during the last 2-3 years. We have made a point of learning about fracking taking place in other areas, and several travelled to hear presentations by Dr. Tony Ingraffea and Jessica Ernst. We have become very concerned about numerous aspects of hydraulic fracturing and the serious consequences that could result if the present moratorium in NS were lifted.

A. Limiting Aspect of Super-Arching Questions

First of all, we want to question the selection of the super-arching questions announced in the minutes of the panel meeting on Feb. 12/14:

1. Does this technology work and is it being done safely to the satisfaction of communities anywhere?
2. Could this technology work and could it be done safely to the satisfaction of communities in Nova Scotia?

We are very concerned that these questions narrow the scope of the review, and may influence the conclusions and recommendations. We had understood that the question about UHF before Nova Scotians at this time would involve considering the broad, cradle to grave evaluation of it, determining if enough evidence exists to assess the short and long –term health, environmental, socio-economic implications, and comparing any benefits with the risks, while specifying ownership of those risks.

After the Wheeler review was announced, a letter from Dan O'Connor on behalf of the NDP government clarified that, "The new panel will indeed take a whole of industry approach, and evaluate the full impact of all material aspects of unconventional gas extraction". The present government made a commitment that the moratorium on hydraulic fracturing will remain "until we can definitively determine that fracking will not harm our resources, our environment, or the general public in any way". We believe that any guiding question to determine health, socio-economic, and environmental risks from UHF must be broad enough to include impact on climate change and the inherent ramifications for future generations. We suggest as a question that better conveys the intended task: *Can we definitively determine that fracking will not harm our resources, our environment or the general public in any way?*

B. Water shortages and implications for other industries

The importance of clean and available water cannot be overstated. A recent poll by the Canadian Union of Public Employees found that 87% of those surveyed believe that "water is our most precious resource" and government needs "to ensure that we retain public control over water" (The Chronicle Herald, June 4/11).

We are concerned about the huge volumes of water required for UHF, and that permission had been granted for the withdrawal of up to 1,334,000 litres of fresh water per day during 2007-9 from the Kennetcook River, and without public consultation. While most rural residents in NS depend on ground and surface water for drinking, bathing, cleaning, etc., many also appreciate that rural living provides opportunities for healthy and recreational activities such as gardening, fishing, hunting, sailing, hiking in the woods, that are only possible with an adequate water supply. Most CAPE members know of neighbours and/or relatives who already have to depend on having water hauled during the summer when their wells go dry.

Many Hants County residents depend on produce and meat from our local farmers. During the past ten years there has been an increase in the number of organic farms in our area that are prospering, expanding, and employing local workers. Specialty crops such as grapes and hops are now being grown to support wine and beer enterprises. During the summer, each year along the 215 Highway, thousands of tourists have stayed at Peterson's Campground to attend the Acoustic and Bluegrass Festivals and then been enticed to participate in recreational opportunities and other attractions in the county. These are but a few of examples of viable, sustainable industries that could be lost if groundwater were compromised from UHF. Who would be interested in going camping or hiking if the woods were so dry that forest fires are a concern? Who would be interested in swimming in our lakes or rivers if fracking were taking place?

In seven states, including Colorado, Oklahoma, Texas and Wyoming, the vast majority of the counties where fracking is occurring are also suffering from drought, according to an analysis of industry-compiled fracking data and the U.S. Department of Agriculture.

A fourth- generation farmer, Kent Pepler, reported that he couldn't afford to irrigate the land because deep-pocketed energy companies had driven up the price of water. Diverting large quantities of water for fracking had proven to be a hardship for municipalities with limited capacity to augment their local water supplies—supplies that must also provide drinking and irrigation water for residents. (1)

C. Chemicals in Wells and Groundwater

We are concerned about chemicals that are used in fracking, present in wastewater produced, and also in the slickwater that is not recovered but remains underground to make its presence felt at some time in the future.

NS currently has some of the highest rates of cancer in the country. People in this area had been encouraged to participate in the 'Atlantic Path- Partnership for Tomorrow's Health' study. Water testing was part of this on-coming study to determine if exposure to arsenic and other chemicals may be factors in the development of cancer and other diseases. We believe it is extremely counterproductive to allow tens of thousands of litres of chemicals to be injected into our ground when each well is drilled, fracked, and refracked. Some of this will in turn result in wastewater that may contain arsenic and/or radioactive particles, along with numerous other chemicals. It has been reported that 25-75% of the slickwater is not recovered.

A study by Theo Colborn et al (2011) confirms the presence of hundreds of chemicals in the list of those used and produced in drilling and fracking in "Natural Gas Operations From a Public Health Perspective". The potential health effects of the 353 chemicals identified by Chemical Abstract Service (CAS) numbers were assessed. They found that more than 75% of the chemicals could affect the skin, eyes, and other sensory organs, and the respiratory and gastrointestinal systems. Approximately 40-50% could affect the brain/nervous system, immune and cardiovascular systems, and the kidneys; 37% could affect the endocrine system; and 25% could cause cancer and mutations. They also discussed unpredictable, delayed, life-long health effects on individuals and /or their offspring, and I quote:

Numerous systems, most notably the endocrine system, are extremely sensitive to very low levels of chemicals, in parts-per billion or less. The damage may not be evident at the time of exposure but can have unpredictable delayed, life-long effects on the individual and/or their offspring. Effects of this nature would be much harder to identify than obvious impacts such as skin and eye irritation that occur immediately upon contact. Health impairments could remain hidden for decades and span generations. Specific outcomes could include reduced sperm production, infertility, hormone imbalances, and other sex related disorders. Further compounding this concern is the potential for the shared toxic action of these contaminants, especially those affecting the same and/or multiple organ systems". (2)

Evidence is also growing that toxic fluids used for hydraulic fracturing can also migrate into adjacent water bodies. A 2012 study in the journal UK Ground Water Forum warned that hydraulic fracturing opens more pathways for the movement of both fluids and methane(3). And a recent study by the US Environmental Protection Agency in Pavilion, Wyoming, found that toxic fluids had contaminated local water supplies.(4)

Research conducted by four scientists at Duke University found that levels of flammable methane gas in drinking water wells increased to dangerous levels when those water supplies were close to natural gas wells. The water samples taken closest to the gas wells had on average 17 times the levels detected in wells further from active drilling. They also determined that the type of gas detected at high levels in the water was the same type of gas that energy companies were extracting thousands of feet underground. (5) This indicated that the gas could be seeping underground through natural or manmade faults and fractures, or coming from cracks in the well structure itself.

We believe this research adds validity to Dr. Anthony Ingraffea's view that joints will open in unpredictable ways when fracked. Dr. Ingraffea, who has a PhD in Rock Fracture Mechanics, purports that fracking is really re-fracturing existing fractures. His theory easily explains why water samples taken from wells closest to gas wells would have higher levels of methane. It also gives a reasonable explanation for 'communication incidents', where fracking materials injected in one well show up in another. Several of these incidents have been reported from British Columbia.

D. Toxins in Air

The potential for toxins in the air exists throughout most of the processes involved in the shale gas industry from the drilling, to venting or flaring of the gases. The effects of fracking on air quality and health are becoming almost as much of a concern as pollution of our water.

In the small town of Dish in Texas that has a high concentration of shale gas wells, the air quality was tested after a large number of residents started getting sick. The air was found to contain high levels of cancer-causing chemicals. Follow-up blood testing revealed those same chemicals present in levels above the currently acceptable levels in half of the people assessed. It was determined that these carcinogenic chemicals were in the 'slickwater' used when fracking (6).

It appears that there may be a correlation between the development of breast cancer and exposure to toxins from shale gas development. According to a report in 2011 by the Centers for Disease Control and Prevention, six counties in the western Dallas- Fort Worth area have the highest rates of invasive breast cancer in Texas. While the rate of invasive breast cancer is falling across the nation it had risen in these six counties, the same six counties with the most intensive gas drilling development, causing residents to be concerned about exposure to toxins. (7)

E. Legal Challenges

Just recently, in April 2014, a Texas family was awarded \$3 million in what is believed to be the first ever verdict on the negative health impacts of fracking. Bob and Lisa Parr of Wise County sued Aruba Petroleum for shale gas drilling for sickening both of them, and their daughter, as well as pets and livestock.

This was not the first suit filed against an energy company, but according to managing attorney Deborah Goldberg, most of the others ended in settlements imposing gag orders. She also explained that companies have had "an effective campaign of secrecy that protected them," historically dodging blame by claiming proprietary rights on the details of their operations. (8)

Perhaps one of the most disturbing yet predictable aspects of this news is that Aruba plans to appeal the verdict. It certainly appears that the gas industry has generally been effective at silencing the public outcry of individuals who have become sickened and weak from poor health attributed to gas development on or near their properties. Numerous anecdotal reports demonstrate that with the deep pockets of the gas and oil companies, lengthy legal battles are next to impossible for most individuals whose businesses and health are floundering after enduring ongoing exposure to toxins.

It has been seven years since oil patch consultant, Jessica Ernst, began litigation to sue Alberta Environment, the Energy Resources Conservation Board and Encana, one of Canada's largest shale gas drillers, over the contamination of her well water and the failure of government authorities to properly investigate the contamination. Her lawyer, Klippenstein, argued that Alberta Environment's application to strike the entire lawsuit constituted "an abuse of process" designed to cause unnecessary delays and to exhaust the resources of Ernst.(9)

Industry studies show that 6-7% of new wells leak, and up to 60% after 30 years. (10) As landowners in Nova Scotia, we need to be cognizant not only of the risks from UHF, but also the chances of ever receiving fair compensation for pollution of well and/or ground water, loss of health, and property damages.

F. Fracking linked to Earthquakes

Our group commended the previous Minister of Environment for his strong stance on not allowing wastewater to be injected into wells. The association of disposal wells with earthquakes has been recognized and has recently been expanded to include concern about the process of fracking actually triggering earthquakes. A state investigation of five earthquakes in the Youngstown area of Ohio in March 2014 found that it was probable that the earthquakes, ranging in magnitude from 2.1 to 3.0 were tied directly to fracking. Rick Simmers of the State Department of Natural Resources, was aware that earlier studies had linked earthquakes to deep-injection wells used for the disposal of fracking wastewater. Since no disposal wells were in the affected area, Simmers said this was the first time they were tied directly to fracking. (11)

Other reports indicate that this has happened before. Fracking tests near Blackpool, UK, were also determined to be the 'likely cause' of tremors in November 2011. The report, commissioned by energy firm Cuadrilla, found that it was "highly probable" that shale gas test drilling triggered earth tremors in Lancashire. (12)

Nova Scotia is such a small, beautiful province. We certainly don't want to risk triggering earthquakes by allowing UHF!

G. Disposal of Wastewater and Radionuclides

We continue to have concerns about an industry that cannot document ways to safely dispose of wastewater. Considering that after more than 5 years of having wastewater remain in ponds designed for fresh water in Kennetcook, we understand that the water will be used in an experimental process after excess radiation has been filtered out and reverse osmosis has removed the salts and most of the other impurities. The discovery in March 2014 of hundreds of bags of radioactive filters discarded in an abandoned building in North Dakota does not give us confidence that materials and equipment would be properly accounted for if UHF were allowed (13). A recent article in The Chronicle Herald (Apr. 17/14) noted the problem Nova Scotia already has with illegal dumping in wooded areas, with the landowner usually required to clean up the mess. The possibility of accidental exposure to this amount of radiation is even more concerning.

CAPE members question allowing dumping of treated wastewater into the Minas Basin, which flows into the Bay of Fundy. We are concerned that heavy metals, radionuclides, and other chemicals still present in the wastewater will accumulate in the soil/mud along the banks and bottom of the water. After Cuadrilla Resources fracked at Preese Hall in England, they found levels of radium 90 times higher than naturally occurs in drinking water. Regulations at that time had classed the wastewater as industrial effluent and Cuadrilla had been legally authorized to discharge two million gallons into the Manchester Ship Canal after being processed at the Davyhulme treatment works in Trafford. Flowback water is now classed as radioactive waste following European regulations, which came in to force in October 2011 (14). Without a valid permit, the company can drill, but not frack and the operator and treatment works need a permit to safely dispose of it. We would like the opportunity to compare these European regulations with those in place in NS.

In Pennsylvania, researchers from Duke University, led by geochemist Avner Vengosh, checked on the effluent from a commercial treatment plant, Josephine Brine Treatment Facility. They compared radioactivity and dissolved solids in sediment both up- and downstream of the facility and found a 90% reduction in radioactivity in the effluent. The authors noted that radioactive constituents would have accumulated to high levels in the sludge that would go to a landfill. Stream sediments at the discharge site also had high levels of radioactivity, keeping it out of the surface water downstream but posing the risk of bioaccumulation in the local food web. The outflow sediment radiation levels at the

discharge site were 200 times those in upstream sediments. Vengosh states that this highlights “the potential of radium accumulation in stream and pond sediments in many other sites where fracking fluids are released to the environment.”(15)

Radioactive drilling waste is a form of TENORM (short for “technologically enhanced naturally occurring radioactive material”)—that is, naturally occurring radioactive material (NORM) that has become more concentrated or otherwise made more available for human exposure through technology, or in this case -fracking. The salts in shale waters reached extreme concentrations over millions of years, and their chemical interactions with the surrounding rock can mobilize radionuclides. We are aware that dissolved compounds often precipitate out of the water, building up as radionuclide-rich “scale” inside pipes. To remove the pipe-clogging scale, operators might inject chemicals to dissolve it, or it also may be removed mechanically using drills, explosives, or jets of fluid. We need to have more information on the efficacy of safety protocols around these procedures. We agree with the author’s suggestion that “the current patchy understanding of radioactive fracking waste’s fate in the environment precludes making good decisions about its management”. (16)

H. Property and Real Estate Values

We also have concerns over future real estate values. Many Nova Scotians will face dire situations where the only real equity that they have - their homes - will be diminished or reduced to zero. Potentially large parts of this scenic province could be abandoned. The legacy of fracking in Nova Scotia will be one of rural decay in a developed country. Although this sounds dramatic, it is a fact that if you don't have water you can't have life. Correspondingly, municipalities will see a reduced tax base with the resulting reduced property values. The key is uncompromised water and its availability on a property. "For rural residents without access to municipal water, the quality of well water is essential for daily living and is a key driver of property value. Any actual risk or perceived risk related to water can affect property value."

"Other factors in property value diminution may occur if the habitability decreases (also related to use and enjoyment of that property); the ability to finance, refinance, or mortgage the property decreases; the ability to rent a property decreases; the risk perceptions of property owners change; or the risk of physical endangerment increases (also related to use and enjoyment). With the environmental uncertainties associated with unconventional shale gas activities, each of these outcomes is possible."(17)

Recent actions by Rex Tillerson, chairman and chief executive of Exxon Mobil, confirm that fracking can be a real threat to property values. Tillerson joined with his neighbours in a lawsuit to block construction of a water tower required for fracking. Neighbours cited concerns of noise nuisance and traffic hazards from heavy trucks used to haul and pump massive amounts of water. Tillerson’s primary concern was that his multi-million

dollar property would be devalued. Ironically, fracking is a core part of Exxon's business. (18)

I. Mortgageability and Insurance Issues

There will be negative effects on mortgageability issues related to fracking in rural Hants County or any county in the province if we say yes to fracking.

“These side effects are triggering mortgage companies in the U.S. to take a second look at properties near or on wells. It's becoming increasingly common for buyers to be denied mortgages for homes in areas where fracking is taking place.” (19)

Mortgageability concerns stem from the potential environmental hazards and risks that may occur from shale gas development activities. If environmental contamination or risk is present (e.g. if drilling activities are present on a property), some banks will not originate mortgage loans on those residential properties. In a New York Bar Association article, Radow (2011) indicated that Wells Fargo is one of the banks that will not originate a loan on a residential property with drilling activities. For homeowners hoping to sell their home in the future, there is cause for concern that shale gas development activity may affect their ability to sell due to a potential buyer's inability to originate a mortgage on the property.”(20)

"Another concern related to real estate valuation is the lack of insurance coverage for any potential claims that might result from improper shale gas development activities on or near one's property. On July 13, 2012, Nationwide Mutual Insurance Company (2012) issued a press release that said the company did not have a comfort level with the unique risks associated with shale gas development and that they could not insure against problems from fracking activities for a reasonable price. This decision by Nationwide suggests that property owners should consult with their insurance company and possibly an attorney to determine the possible outcomes in case of an adverse event related to shale gas development activities." (21)

We need a thorough and complete evaluation on how the activities of unconventional shale gas fracking are likely to affect future property values, future land ownership and future land use in Nova Scotia. The Wheeler panel needs to investigate these potential effects on real estate and insurance so that both the proponents and those who are against fracking understand what the future could be. We trust that the Wheeler panel will do so in the coming chapters of its Review.

What government would be willing to live with the damaging negative legacy that will be evidenced in a post-fracked rural landscape?

Conclusion

On April 22, 2014, a group of more than 800 local elected officials from all 62 New York State counties, held a press conference in Albany. They spoke of resolutions in municipalities across the state that have been passed urging renewed caution on fracking and touting municipal support for the growing opportunities presented by renewable energy. The resolutions point to increasing evidence of water contamination, air pollution and a range of other health and environmental harms from fracking. They also note that the oil and gas industry's economic and jobs projections from fracking have been significantly exaggerated, and that fracking poses some potentially significant economic costs including road damage, property value declines, and increased crime rates and social impacts.

These views were expressed:

“Issues such as air pollution from fracking are very serious, and the best data only lead us to conclude that fracking would put our health at risk”

“The municipal resolutions were spurred by the significant increase in the body of scientific evidence showing harm from fracking over the last year and the increasing need for growth in renewable energy”

“Fracking job numbers don't hold up in reality and they largely go to out-of-state workers, and drilling and fracking jobs have proven themselves to be deadly. In contrast, with renewable energy, we can utilize our strong research universities to create opportunities for our youth here in New York and bring innovative companies into our state—particularly as solar, wind and efficiency technologies make such tremendous strides.”

“Given critical and alarming data emerging each week, it's clear from the existing science that fracking poses a very real danger to our health and water,” said Syracuse City Councillor-at-Large Jean Kessner. “That's why we feel so strongly that the state must maintain the moratorium until and unless comprehensive, cumulative studies are completed and it's proven that fracking can be done safely. **To date, there's only significant evidence to the contrary.**”(22)

Members of CAPE believe that it is impossible to have healthy communities without a healthy environment. In “Trading Water for Fuel is Fracking Crazy”, David Suzuki maintains that hydraulic fracturing comes with serious environmental problems, problems from groundwater contamination to massive ecosystem and habitat disruption — even small earth tremors — all done in the name of short-term gain.

In order to protect the health and environment of future generations, we believe it is imperative that we heed his sage advice:

“In the short term, we must realize that we have better ways to create jobs and build the economy than holding an "everything must go" sale on our precious resources. In the longer term, we must rethink our outdated economic systems, which were devised for times when resources were plentiful and infrastructure was scarce. **Our highest priorities must be the air we breathe, the water we drink, the soil that provides food and the biodiversity that keeps us alive and healthy.**”(23)

Considering the emerging evidence of water contamination, air pollution, harm to health and the environment, we urge the Wheeler Panel to recommend a legislated ban on hydraulic fracturing in NS.

Thank you for your consideration.

Sincerely,

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Chair, CAPE

Cc:

Premier Stephen McNeil
Hon. Randy Delorey
Hon. Andrew Younger
MLA Chuck Porter
MLA Margaret Miller
Warden Richard Dauphinee

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