

Dear Sirs ,

I began my own investigation into "fracking" after I read, "A Colossal Fracking Mess" in Vanity Fair <http://www.vanityfair.com/business/features/2010/06/fracking-in-pennsylvania-201006> . I found no shortage of horror stories with a google search for "fracking" . However searches for "gas drilling", "drilling muds" went to industry sites , not articles on concern for the human and environmental health impacts .The more I read, the more I discovered that in the popular press, "fracking" meant every aspect of shale gas development. Problems from seismic testing, case stage drilling, gas processing and shipping , were all being reported under the "fracking" headline. At the same time, it was clear that when the gas industry said "fracking", they were specifically referring to the actual fracturing itself not even the environmental consequences of airborne emissions to create the fracture, or the produced waters from the fracture counted as problems associated with fracking .Industry wanted the public ,and regulators to focus exclusively on the below ground events , and away from all other aspects of developing a shale gas industry . What was also obvious, was that most of the environmental, human and animal health problems were not caused by the below ground fracing, but the above ground air emissions, the processing of produced waters, and quality of life issues related to noise and traffic . Beyond ignoring the context of the fracturing event, the industry took an extreme position, that no one could prove that the fracking caused any damage .On the surface the claim sounds reasonable, but of course the industry standard is perverse. It impossible to prove anything that occurs with no witnesses, and from a science perspective it is an absurd statement . The late Stephen Schnieder made the point , " There is no such thing as proof in systems science . Exact science is an oxymoron. It is always a probability function where you are changing the relative confidence based on what you can say about detection and attribution statistics and how many consistent lines of evidence match up that leads to a subjective confidence" .

If I was being charitable, I would say that the horror show created by shale gas development on rural communities was based on ignorance, false assumptions, and wishful

thinking , as opposed to evil intent. I suspect that the shale gas industry actually didn't understand the breakthroughs in fracking technology that released shale gas would fundamentally change the very nature of what was called fracking . I suspect that the industry thought, as it claimed, that fracking shale formations could provide a clean, safe source of energy to last generations . I suspect they really believed that the bonanza would benefit landowners, farmers, governments , and not least , themselves . If I was being charitable, I would accept that the industry believed every word of their hype. However, the industry's reaction to the unfolding tragedy was distinguished by an attitude of denial and contempt . There was no pause , no change in operating procedures, no sober second thought . Each new problem was greeted as the last one , with disinterest and increasing hostility toward industry's victims.

Historically , the oil and gas industry , has incorporated a culture of risk . Acceptance of risk has allowed the industry to make incredible technological breakthroughs , made it possible to access hydrocarbons in places long thought inaccessible . Acceptance of high levels of risk has also been at the root of all the great oil gas disasters of the age .

One obvious problem is that the shale industry pretends that the Earth's surface and crust are composed of inert matter, as if we don't know that it is a complex interrelated system . We know that there is no layer of impermeable rock preventing the release of gas from fracking, yet industry assures us that this fantasy layer is real , and presents cartoons as evidence .

When the first reports of well water contamination close to where industry was fracking shale formations were reported the industry should have taken the reports seriously. The record suggests that they didn't. While the companies denied responsibility, they provided water via buffalos. As the damage piled up and law suits came in from the people who had means to hire lawyers, companies settled out of court . The settlements included no admission of guilt, and a non-disclosure clause , preventing the plaintiff from discussing their experience . In one famous case, gag order was applied to the children of

the plaintiff <http://www.businessinsider.com/gag-order-bars-two-us-children-from-talking-about-fracking-2013-8>.

There are several peer reviewed studies from researchers at Duke University showing the presence of thermogenic hydrocarbons in water wells near gas fracking activities <http://sites.nicholas.duke.edu/avnervengosh/duke-study-on-shale-gas-and-fracking/> . The industry criticised the studies, rather than change practices.

In December of 2011 , the US Environmental Protection Agency admitted that fracking fluids had been detected in a Wyoming aquifer .<http://www.bloomberg.com/news/2011-12-08/gas-fracking-chemicals-detected-in-wyoming-aquifer-epa-says.html>,

Yet despite the well known contamination of drinking water supplies from fracking , the gas industry can still claim that there is no proof that fracking contaminated any wells.

The question at hand is not whether fracking can be "proved" to have contaminated anything, but rather, is the shale gas industry being conducted without doing significant damage to human, animal, and environmental health. Unfortunately that was not a question considered by regulators in Pennsylvania, Colorado, Texas ,Louisiana or Wyoming .These are states with long histories hosting the oil and gas industry, all the necessary regulations to ensure best practices were in place. And they were all states were no one considered the consequences of dispersed industrialization on the human, animal and environmental health of rural communities , even to the extent that shale gas operations were established on producing dairy farms. The reality is that shale gas industry converts rural landscapes into open air factories, converting rural environments into industrial zones .Jon Fenton from Wyoming describes it this way , "I went from living on a farm to living in a refinery", or as Pennsylvanian Victoria Switzer calls "an occupation". As Dr. Theo Colborn describes it , "From the first day the drill bit is inserted into the ground until the well is completed, toxic materials are introduced into the borehole and returned to the surface along with produced water and other extraction liquids."<http://cce.cornell.edu/EnergyClimateChange/NaturalGasDev/Documents/PDFs/frackin%20chemicals%20from%20a%20public%20health%20perspective.pdf>

The situation is made more complex by the combination of types of pollutants emitted . In addition to the BTEX chemicals shale gas production also generates ozone, unsafe levels of silica dust , heavy metals, and "naturally occurring" heavy metals and radio active materials are released into the environment . To be clear , the term "naturally occurring" is ,misleading . The naturally occurring radioactive materials, (NORMs) and heavy metals are naturally present in the shales , but in the absence of fracking would do not naturally occur at the surface. Indeed the range of toxic agents flooding environments around shale operations, produce a range of illnesses just as varied, organ damage, respiratory problems, painful joints , headaches, nosebleeds, dizziness , inability to concentrate .

One concern about the development of shale gas in Nova Scotia, are the areas leased for oil and gas by the provincial Department of Energy .Because of my local knowledge the , Lake Ainslie Bloc lease appears particularly inappropriate , the others may be just as bad, but I don't know the areas. The LAB lease surrounds Lake Ainslie, the largest freshwater lake in Nova Scotia . Lake Ainslie is the main source of the Southwest Margaree River , much of which is in the lease. The Sou'west Margaree joins the Northeast Margaree River at Margaree Forks to form the Margaree River , which then feeds the Gulf of St Lawrence . The Lake Ainslie-Margaree River system is a member of the Canadian Heritage River System . The CHRS , is a conservation program established by federal and provincial governments in 1984 to recognize rivers with outstanding natural and cultural features.
<http://www.chrs.ca/en/main.php> .

Lake Ainslie is home to provincial significant recreational trout fishery , and a locally significant commercial Gaspereaux (Alewives) fishery . The Gaspereaux migrate up the Margaree River every spring to spawn in Lake Ainslie. Since pioneer days , residents built weirs on the river bank to catch the fish, which are then salted, and since early colonial days form a part of the Nova Scotia -Caribbean trade . This trade explains why there is sugar in Nova Scotia scones and oatcakes, unlike their Highland Scots counterparts, and why rum is considered superior to malt whiskey among the Gaels of Nova Scotia, unlike our Highland Scots

counterparts . The fishery is a central feature of the economy and culture of the communities of "Am Braighe" , the Gaelic name of the region . Forestry and cattle raising are also significant for the residents of the area who still make their living from the land as their pioneer ancestors did .

The internationally significant Salmon sport fishery on the Northeast Margaree and Margaree Rivers fall outside the LAB lease, yet the fishery is dependent on the water quality of Lake Ainslie and Southwest Margaree . Guiding anglers is an important contribution to the economy of those who live along the Northeast Margaree , where tourism, forestry and cattle round off the economy of those who live off the land there .

The LAB lease also includes the Trout Brook Provincial Wilderness Area, above Lake Ainslie's south east border , and the MacFarlane Woods a Provincial Nature Reserve .

The presence of a Heritage River, designated Wilderness Area and Nature Reserve , were not considered in the Province's decision to offer a lease for the area . There is no heavy industry within the LAB lease . The people residing in the remaining areas of the lease sustain themselves through tourism, agriculture, and forestry .

The LAB lease is also home to Glenora Distillery , North America's only pure malt Scotch . The entire water supply of the distillery falls within the LAB lease. One of the major reasons for the location of the distillery was local water quality. The Glenora Distillery represents a long term investment in the area , entirely dependent on water quality.

Despite the obvious incompatibility of the local economy with development of an oil and gas industry, without any discussion or any consultation with the communities effected , Nova Scotia Department of Energy offered the LAB lease for auction. The Provincial Department of Environment granted an exploratory drilling license to Petroworth , a wildcat firm , for MacIsaac point , within half a kilometer of 8 homes , in swampy ground that drains into Lake Ainslie , adjacent to a drainage ditch which drains into the lake . I personally attended two public meetings where Petroworth president Neil Mednick said that Petroworth would fracture the

well , if results of exploratory drilling indicated a "fracable" resource . At the meeting in West Lake Ainslie, the standing room only crowd filled the hall to such an extent that late arrivals were unable to get inside , and representatives from the Nova Scotia Department of Energy took part in the presentation. Bill McCarthy , retired mechanic and garage owner, former director of North Inverness Forest Management said to Petroworth , " No one wants you here." Not a soul spoke up in disagreement with Bill's statement . I also attended a meeting on the Waycobah First Nation, where a capacity crowd made their opposition to drilling at Lake Ainslie very clear, even jeering the offer of local employment (an offer not made at the WLA meeting). The Inverness County Council passed a resolution opposing fracing, drilling, and the issuance of the LAB lease , and later a by-law prohibiting fracing from the county . While the resolution and by-law are not binding , they indicate the broad opposition to any development of oil and gas in the county . The depth of resistance was demonstrated by the Margaree Environmental Association's court challenge , which failed on the question of whether a drainage ditch was a watercourse , on which no evidence was presented. The stated opposition of the Mikmaq Warriors to any drilling, has included several information pickets at the Canso causeway, and many local Mikmaq Warriors played an active role in the direct action taken against shale development in New Brrunswick .

For all of the opposition, it seems that Petroworth's inability to secure financing was the only legal impediment to drilling the test well ,and Petroworth's bankruptcy the only reason the province finally revoked the lease, after years of granting Petroworth extensions . The distinction of "legal Impediment" should not be overlooked . In addition to broad opposition to gas and oil development in the area , there is also deep opposition. Speaking with the provincial Nova Scotia Environment employee, he shared with me , and his superiors, his fear in going anywhere near the proposed test site . How far "direct action" would go to prevent drilling is an open question. We have seen direct action against development of shale gas in Australia ,the UK , and New Brunswick.

This is the age of the internet , and the presentations on the horror show of living near

shale operations are only a mouse click away ;
Tim Ruggiero , Dish Texas <https://www.youtube.com/watch?v=y4SgPKHikPM>
Calvin Tillman , former Mayor Dish Texas
<https://www.youtube.com/watch?v=t3cQMFFNXOg>
John Fenton, Wyoming <https://www.youtube.com/watch?v=M5F9oYJ8kSo>
Suzzan Spiegle, Rifle Colorado
<https://www.youtube.com/watch?v=fg5B7L9hDhs>
Carol Jean Moten, Avella (western)
Pennsylvania https://www.youtube.com/watch?v=5MPsw_rfDew
Jodi Borello , Masontown (western) Pennsylvania
<https://www.youtube.com/watch?v=uXqVtzCT5jw>
Linda and David Headley Fayettevill Co. (western)
Pennsylvania <https://www.youtube.com/watch?v=6S-hUyZEH-M>
Victoria Switzer Dimock (north eastern) Pennsylvania
<https://www.youtube.com/watch?v=2Dv27iPypXs>

These are presentations from experts in the field of fracing.
These people live with shale
gas development everyday. These are people living in the shale gas
factory, 24 hours a day,
seven days a week , year in year out . Most of these presentations are
form professional
people . They were not activists prior to being fraced , prior to the
industrial occupation by an
invading army.It is worth mentioning that recently Tim Ruggerio's
neighbours won a \$3 million
dollar suit against the same company that went out of it's way to make
Tim's family life as
Hellish as possible <http://bizbeatblog.dallasnews.com/2014/04/wise-county-gets-3-million-in-fracking-suit.html/> . Indeed, aside from illness , abuse is the common
thread in all their
stories. Contempt for the local population appears to be standard
operating procedure for
shale gas industry.

Air quality in the San Antonio region of Texas has been declining
since fracing began in the
Eagle Ford Shale in 2008 . The recent release of the damning evidence led
to the Texas
Commission of Environmental quality to take immediate action and cut
funding for air quality
research <http://www.post-gazette.com/powersource/latest-oil-and-gas/2014/04/25/Texas-pulls-funding-from-air-quality-program-over-released-data/stories/201404250178>

Al Appleton is the former Commissioner of the York City
Department of Environmental
Protection, and Director of the New York City Water and Sewage system .
Al has long
experience as a regulator and his conclusions should not be ignored . Al
makes the point that

shale gas is not an industry that can be regulated. Al points out that no government in the world would tell a shale gas company to shut down a \$15 million dollar well, because it was causing environmental damage. "This is an industry that can't afford to do it right", (even if they wanted to)<https://www.youtube.com/watch?v=tGTrRQAEps4> .David Hughes report , Drill Baby Drill <http://www.postcarbon.org/drill-baby-drill/report> , points out , among other things, that in 2012 US shale gas producers spent \$40 billion dollars to produce \$32.5 billion worth of gas . This is not an industry that can afford environmental responsibility . Economist Deborah Rogers report Shale and Wall Street <http://shalebubble.org/wp-content/uploads/2013/02/SWS-report-FINAL.pdf> , shows how the support for shale gas is coming from investment banking looking for a new scam to replace the sub-prime mortgage scam . In a presentation from October 2013 Ms.Rogers using actual reported data from industry , show that shale gas is not a long lived enterprise https://www.youtube.com/watch?v=6Rs_X6uJD88. In addition to reporting on the costs of raid damages compared to revenues from shale , Ms. Rogers reports on the production numbers from Fort Worth Texas , which is 2008 received \$50 million in royalties from 44 shale wells , but 2012 the royalties had dropped to \$23 million, from 379 shale wells, and that the city manager has informed council that they should not expect any royalties in 2014 , an excellent example of the flawed economics of shale development . The New York Times published leaked gas industry emails in 2011 where shale gas is called a "Ponzi Scheme"<http://www.nytimes.com/interactive/us/natural-gas-drilling-down-documents-4.html> The SEC filings reviewed by Ms. Rogers show that shale gas isn't an energy strategy , but an investment banking scam . Maria van der Hoeven chief executive for the International Energy Agency in an interview with the Christian Science Monitor mentioned that a recent IEA report found that the US shale boom in both oil and gas will be over by 2024 <http://www.csmonitor.com/Environment/Energy-Voices/2014/0228/IEA-chief-Only-a-decade-left-in-US-shale-oil-boom>.

Al Appleton mentions "industry culture", and it's worth mentioning a few aspects of industry culture, even if we don't expect to see similar models here. Chesapeake Energy has

been front and center in the fracking of Pennsylvania , and was teetering on bankruptcy, even after selling off inflated leases . Chesapeake's solution to their financial difficulties, was to charge their leasee's to deliver their gas to market , whatever amount their contracts with landowners allowed

<http://stateimpact.npr.org/pennsylvania/2014/03/14/chesapeake-energys-5-billion-shuffle/> . Obviously in the Canadian context this sort of skulduggery would be more difficult to pull off, but it goes to the character of the industry . Shale gas industry loses money , and the ways these companies stay in business is an issue for consideration .Another example of industry culture is the dumping of radioactive socks from the Bakken shale oil boom . Shale oil has not created a glut of oil ,shale oil is very profitable (exploding trains notwithstanding) yet we keep encountering stories of illegal dumping of radioactive waste , which industry could well afford not to do

<http://abcnews.go.com/International/wireStory/north-dakota-finds-radioactive-oil-waste-23459886> and dumping on "Indian Reservations"<http://www.forbes.com/sites/jeffmcmahon/2013/07/24/strange-byproduct-of-fracking-boom-radioactive-socks/> . This is the culture of the fracking industry , even when economics don't preclude responsibility .The shale gas culture show an industry disinterested in it's consequences for the people who live there , disinterested in environmental toll they create , a culture of Evil narrowly focussed on a demonic agenda

Part of the sales job for shale gas development was that since burning natural gas produced less CO2 emissions than burning coal, that switching from coal to gas would be a responsible step .Indeed , over the past four years there has been a steady emergence of science demonstrating that shale development does not meet industry and regulator expectations . The industry has attacked the studies from Cornell University claiming that fugitive methane emissions more than cancel out any benefit from reduced CO2 emissions from burning gas instead of coal

http://www.eeb.cornell.edu/howarth/publications/Howarthetal2012_Final.pdf .

A more recent examination, taking direct measurements instead of theoretical values, show high levels of methane emissions in some cases 1000 times above EPA estimates

, would indicate that the previous Cornell studies have underestimated the problem <http://www.pnas.org/content/early/2014/04/10/1316546111> . Shale proponents have cheered shale gas impact on US CO2 emissions, as gas displaced coal. Unfortunately , the displaced coal didn't remain under mountain tops , it was mined and exported to foreign markets, so while US emissions fell , emissions of CO2 from US coal remained unchanged . <http://co2scorecard.org/home/researchitem/29>.

Do we know all of the costs and all of the risks from shale gas development ? Absolutely not . With every week new studies are published on the public health costs and risks of shale development . This recent paper from <http://ehp.niehs.nih.gov/1307866/> shows the need to for further study. A recent paper <http://ehp.niehs.nih.gov/wp-content/uploads/122/1/ehp.1306722.pdf> shows a correlation between birth defects and proximity to shale operations .

Dr. Mariann Lloyd-Smith <https://www.youtube.com/watch?v=WsDukbcnue4> , mentions the presence of CFCs in the air near shale operations . This was the first I had heard of this ozone depleter involved with fracing .

In 2010 , there was no reference to fracing and earthquakes . These reports came from Ohio, and were originally linked to deepwell injection of waste water from fracing, <http://pubs.usgs.gov/bul/1951/report.pdf> then we got reports from Ohio and Texas , linking fracing directly to earthquakes <http://america.aljazeera.com/articles/2014/4/12/fracking-linked-toearthquakesohiouticashale.html>, http://www.nap.edu/catalog.php?record_id=13355. Dr. Theo Colborn describes the pollution from petrochemicals as a "war on the womb" <https://www.youtube.com/watch?v=2r2Rx8VRq48> , where amounts of endocrine disruptors too small to be measured have a measurable impact on human health .

Of all the media reports on fracing surely the most bizarre is that of Exxon Mobile Chairman, President and CEO Rex Tillerson , bringing a suit to stop fracing infrastructure from being built near his home . In the suit Tillerson raises the same concerns other landowners in gasland have , citing ugliness, increased traffic and noise, and damage

to quality of life and property values
<http://online.wsj.com/news/articles/SB10001424052702304899704579391181466603804>. When I first read the story, I assumed I was reading "The Onion", or some other satirical publication, but the story is true. I hope Mr. Tillerson wins his case, and creates a precedent for other Texas landowners to protect their property rights and their quality of life.

In the Maritimes we are frequently assured that in Alberta fracking has caused no problems at all. Seven years ago Jessica Ernst launched her suit against Encana and government regulators over the fracking of her water <http://www.ernstversusencana.ca/>. Recently government lawyer Neil Boyle argued that the case should be thrown out because "There could be millions or billions in damages" <http://theyee.ca/News/2014/04/18/Anti-Fracking-Suit/>. Seven years into the case, there has not yet been any evidence entered, as the defendants have kept the case tied up in procedural wrangling, another aspect of the culture of evil that is shale gas development.

People make choices about where they want to live. Living in rural Nova Scotia isn't easy. The failed promise of industrialization, coal, steel, pulp and paper, are clear. People who relied on those jobs are largely gone. Those who remain mostly extract their livelihood from the land and the sea. It is said that you can't eat scenery, but those who live here know that that is exactly what puts food on the table. Fishing, forestry, agriculture, and tourism are the mainstays of the local community economy and none of those industries are compatible with developing a shale gas industry over the same landscape. Al Appleton described shale as an "anti development strategy". Shale gas development in Nova Scotia is not going to produce a climate where Nova Scotians no longer are forced to move to make large wages. Between 1900, and 2000, Inverness county lost half its population, and shale has will not change that, although if it was allowed here, it would damage the existing employment opportunities

It simply isn't possible for me to present all the known reasons that shale gas industry should not be allowed in Nova Scotia, or anywhere else. In the past three years of

studying the issue, the evidence against shale gas has increased , and absolutely no information has emerged in support of any of the industry's claims . Reassuring cartoons, and other fantasy evidence presented by industry have been shown time and again to be nothing but misleading propoganda .Shale gas is not a bridge fuel to a low carbon future , but sabotage against clean non emitting energy development . Shale gas, in almost every regard is the polar opposite of what it's proponents claim . Rather than the truth lying somewhere between what proponents and opponents claim , it is worse than it's strongest critics know . Between whatever arbitrary cut off date your panel uses , and the time of your reports release , new information will be published on shale gas, and that new information will add to the existing catalogue of horrors released .

In short, shale gas industry coverts a rural landscape into a factory without walls, as an interim stage to full conversion to a toxic waste site, with accompanying loss of property values, health, quality of life, and overall environmental degradation.

Thank You for your attention

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