A Response to the New Brunswick Government's White Paper on Recommendations to Govern the Development of Shale Gas From The Taymouth Community Association

Forward

We wish to make it clear at the start that we do not believe any regulation or current technology can make shale gas and oil extraction safe enough to justify its presence in New Brunswick, or elsewhere. We will explain our position below. We are filing our comments now, because this is the first time in over a year that the government has seen fit to ask our opinions.

Our opinions are not the irrational responses of the uninformed. Although we are a rural community, our proximity to Fredericton's universities, government offices and scientific businesses means that we count among our residents highly qualified researchers in all the areas relevant to the issue of shale gas, including geologists, ecologists, hydrologists and more. Many, of course, have labored for us in anonymity, because of their fear that their jobs or businesses may suffer retribution.

It has thus been particularly galling to have our views characterized by government and industry as mere 'emotional' responses. It is not the word 'emotional' that offends us, since one would be a fool not to have an emotional response to threats to one's health, family, and way of life. It is the 'mere' part that is offensive, as highly educated people have spent countless hours researching this issue. We hope to be recognized for the serious and intelligent citizens we are.

The Main Conclusion from Our Research

As stated above, **there are no regulations that will make this process safe**. The reasons for making this bold statement are these:

- Shale gas extraction requires the combination of several recently developed technologies including horizontal drilling with long laterals, multi-stage fracking, multi-well pads and cluster drilling and the use of chemical additives in 'slickwater'. The first instance of their use together in combination was in 2007. Thus, there are no long-term studies on any aspect of this industry. As noted by Dr. Robert Howarth, of Cornell, in his recent testimony before the US Congress, "**almost all of the peer-reviewed literature on the topic has been published in the last year, he added — the first paper dating to 14 months ago**."

- The importance of this is best stated by Dr. Anthony Ingraffea, who asks, "**How do you write regulations for conditions that you have not studied or understand"?**

Dr. Ingraffea is an internationally honored expert in rock fracture mechanics, and is no foe of the petroleum industry with whom he has worked. Yet he opposes the use of 'high volume, slickwater, fracturing of long laterals on clustered multi-well pads' – as the shale gas technique is properly called. His opposition is based both on what he knows, and, more importantly, on what is not known by anyone.

- **Regulations have no effect on the laws of physics, chemistry and geology or human error**. Using industry's own records and statistics, it has been shown by Dr. Ingraffea, and others, that in the first year, one in every twenty new wells drilled experience a failure resulting in human or environmental consequences. This 5% first-year failure rate holds true no matter where or when wells are drilled or what regulatory regime or fines are in effect.

  Because the shale gas environment is one of high pressure, caustics, acids, corrosive brines, a host of fracking chemicals, enormous amounts of water under pressure, and radiation, the failure rate on wells increases with each passing year until, after just a few years, it passes a 50% failure rate. **To put it in perspective, the risk levels for the failure of airplanes or bridges is one in ten million. For a new shale gas well it is one in twenty in its first year, and gets worse with time.**

- **Because shale gas extraction is new, unanticipated problems keep arising. How do you write regulations for things that you didn't even conceive would happen?**

  Examples of this abound and the following list is not intended to be exhaustive.

  ** Natural gas was promoted as a clean burning alternative to coal that will help slow climate change. While it burns cleaner, fugitive emissions of methane from the production of shale gas actually make it worse than coal for climate change. An original study from Cornell stated this, but was pooh-poohed by industry. **Now a study published in Feb 2012 from the National Oceanic and Atmospheric Administration (NOAA) and the University of Colorado using actual measurements upheld the study and showed twice the leakage as claimed by the industry.**

  ** **On June 8 an independent report in Pennsylvania strongly suggested that, "fracking is causing increased methane leakage from natural fault lines that previously emitted methane in much smaller amount**." "Two methane plumes were detected," said Dr. Bryce Payne, environmental scientist and author of the report. "One larger plume substantially increased in size over a few hours, which suggests large amounts of methane were being emitted into the air. A smaller plume was also detected about 2 miles west of the larger one. The data and observations suggest natural gas has spread through an extensive underground area beyond where the plumes were found."

"The International Energy Agency recently recommended in their *Golden Rules for a Golden Age of Gas* Report that drilling companies need to carefully survey the geology of the region to avoid fault lines," said Payne. "With the already-fractured geology of Pennsylvania and parts of New York, our methane measurements demonstrate that this may prove impossible to do."

"There are some places that you just shouldn't drill. Scientists must continue collecting data to answer whether or not the Marcellus Shale can be responsibly drilled or even meet minimal compliance with the EIA's recommendations."

A report published this week, June 21, 2012, concerns the well integrity of injection wells, which we acknowledge that the government says will not be used to store wastewater. However, the study points out that structurally, a disposal well is the same as an oil or gas well.

Until recently, scientists and environmental officials have assumed that deep layers of rock beneath the earth would safely entomb the waste for millennia. There are growing signs they were mistaken.

Wells drilled to bury waste deep beneath the ground have repeatedly leaked, sending dangerous chemicals and waste gurgling to the surface or, on occasion, seeping into shallow aquifers that store a significant portion of the nation's drinking water.

Several key experts acknowledged that the idea that injection is safe rests on science that has not kept pace with reality, and on oversight that doesn't always work. **"In 10 to 100 years we are going to find out that most of our groundwater is polluted,"** said Mario Salazar, an engineer who worked for 25 years as a technical expert with the EPA's underground injection program in Washington. **"A lot of people are going to get sick, and a lot of people may die."**

"There is no certainty at all in any of this, and whoever tells you the opposite is not telling you the truth," said Stefan Finsterle, a leading hydro geologist at Lawrence Berkeley National Laboratory who specializes in understanding the properties of rock layers and modeling how fluid flows through them. **"You have changed the system with pressure and temperature and fracturing, so you don't know how it will behave."**

Some experts see the well failures and leaks discovered so far as signs of broader problems, raising concerns about how much pollution may be leaking out undetected. By the time the damage is discovered, they say, it could be irreversible."

Once again, these are injection wells, but the parallels with shale gas well technology are inescapable. **All the reasons given for its 'safeness' are the same ones given for injection wells – they are too deep - separated from aquifers – have impermeable barriers, etc. And shale gas adds a new unknown - frequent and repeated fracturing of the wells on purpose. All of this underlines and magnifies our position that we don't know enough about this technology to either regulate it or consider it safe.**

** Geologists once dismissed the potential of earthquakes from shale gas extraction. Then it was noticed that thousands seemed to be occurring in places where shale gas development was taking place, a phenomenon now verified by the US Geologic Survey's recent statement that shale gas processes were the 'probable cause.' The industry admitted that it was the use of deep injection wells for wastewater disposal that was the culprit, but assured us that 'fracking' itself was not to blame.

Then last year, the government of the UK stated that fracking itself was responsible for two earthquakes, and Cuadilla, the industry driller, agreed. But now we are told not to worry, because they are small earthquakes. No mention is made of the fact that scientists only have untested hypotheses about the reasons for the earthquakes.

As time has passed it has been discovered that the pipes, storage tanks and machinery used in shale gas extraction become increasingly radioactive. (Assuming radioactive elements exists in the area being drilled – something we expect in New Brunswick.) So, at the end of a well's life, decommissioning must contend with radioactive materials. The problem is worse when produced water (wastewater) is recycled because the effects are cumulative. **Thus, a solution for one problem, recycling to reduce water usage, becomes the source of another problem, radioactive equipment.

Unheard of levels of toxic ground-level ozone smog now occur in sparsely populated rural areas where shale gas is the only industry. But the astounding fact is that these levels occur in the middle of winter and exceed those of the worst cities of the US in summer. **This new phenomena remains unexplained. **How do you write regulations for things that you didn't even conceive would happen?**

Comments on the Government's Proposed Recommendations

The government's discussion paper implicitly acknowledges our view that it is impossible to write regulations for a moving target. There are few actual hard rules or regulations in this paper, only recommendations that 'enhanced' methods be developed. In fact, that wording is used 21 times. **How is the citizenry supposed to comment on regulations that have yet to be developed?**

We will do what we can.

In the few places where hard numbers are used, they are often based on evidence that is already outdated. Examples:

- The recommendations call for wells to be set back 250 metres from homes and 500 metres from hospitals, schools, retirement homes. (9.11. REQUIRED DISTANCES FROM BUILDINGS)
  This exceeds distances used in early shale gas development. Yet the only long-term health study (3 years) recently released from the University of Colorado School of Public Health, states **that anyone living within ½ mile of a well is at a 66% greater risk of cancer and other diseases** – and the study states this is probably an underestimate.

- Gas well pads must be set back 250 metres from a private drinking source. (9.10. AVOIDING INDIVIDUAL WATER WELLS AND OTHER NON-COMMUNAL WATER SUPPLIES) Yet studies by Duke University and the National Academy of Sciences found **serious methane contamination of water wells extending to 1000 metres from a gas well**.

<u>The toughest regulations</u>?

- The only tough regulation that might make a real difference to people living near gas wells would be to require gas companies to pay for a third party test of every water well near a gas well for all the substances, proprietary or not, to be used in each individual frack, before each frack and after. Retesting, if necessary at a later date, should also be covered.

  This is the only way to have baseline evidence that would stand up in court if a citizen should sue over health damages. You can only test for substances you know. Lawsuits are the only available instrument of compensation for health or physical injury. **These recommendations do not address this directly, and only say that a protocol for disclosure of chemicals will be forthcoming.**

- The Minister of DNR trumpets the $1 million fine as the hammer that will make companies follow the rules. Yet let us examine just one jurisdiction visited by the government, Pennsylvania. Several fines exceeding $1 million have been levied including **Cabot being fined $4.1 million.** These huge fines didn't improve the state's number of violations**. So, not only are the proposed New Brunswick regulations not the toughest, it appears that even tougher regulations don't work**.

- The new recommendations call for gas well setbacks of 100 meters from wetlands and 30 metre setbacks for pipelines, storage tanks, roads, and other equipment. Wetlands are defined as being identified on the Dept of Environment's map.

Unfortunately, the highly accurate wetlands map developed over years by the Dept. of the Environment was scrapped last year by the current government. The accuracy of the one in use is questionable, in that it shows many fewer wetlands. This is hardly a tough standard in which one could have much faith.

- Finally, the recommendations allow a substantial amount of industry self-policing and reporting. An example is the plan to allow the industry to monitor its own air emissions. (7.2. EMISSIONS MONITORING) There is even an allowance to let industry to do this by using calculations rather than measurements. **Yet a recent study in "*Nature*" by the National Oceanic and Atmospheric Administration and the University of Colorado used actual measurements, which showed emissions from gas fields were more than twice the industry's calculated estimates**.

The Missing Discussion of Public Health

The greatest shortcoming of the government's discussion paper is what is not addressed or even mentioned. Where is the section dealing with public health issues? Where is the acknowledgement of the growing body of medical evidence surrounding the connections of gas drilling chemicals, (and those that are brought to the surface by drilling), with increased rates of cancer, asthma and other diseases. New studies marking those substances as endocrine disruptors are particularly frightening.

The World Health Organization has just (June 2012) listed diesel fumes as a 'known carcinogen'. Diesel fuel is heavily used in shale gas production and is a major component of ground-level ozone.

We will be guinea pigs

Almost a year ago to the day, in our first meeting with the Natural Gas Working Group, we expressed concern that the group did not have a representative from the Dept. of Public Health. Now, a year later, we are still only promised that the Department will issue a later statement. **Why was this not at the forefront of the gas group's research? How can we comment on recommendations when we don't know their health implications?**

It is inconceivable that the government does not realize that this is THE most important aspect on the minds of people who will live in shale gas areas.

It is likely not mentioned, because so far the few studies and the accumulated statistics and anecdotal evidence would shut down this industry if people knew them. There is a reason why 700 family physicians in New Brunswick and the medical staffs of several hospitals have joined doctors around the continent in calling for a moratorium on shale gas. They cannot treat patients for what they cannot diagnose or understand. And all the statistical evidence about rising rates of cancer and asthma in shale gas areas is compelling.

There is not a word of this in these recommendations. In fact, the only apparent way for injured or sickened citizens to seek redress is to sue the company and hope that the insurance they carry is sufficient. The recommendations only address loss of property or water.

Other Omissions and the Sharing of Revenue

Social Problems

How will we ameliorate the losses to public life that will inevitably accompany shale gas? There are numerous studies about the negative impacts of boom and bust resource extraction economics. They show that areas housing the shale gas industry are worse off after the industry leaves than they were before the industry arrived. Shale gas is worse than most due to its intense boom and the shortness of its life span, measured in years, not decades.

Current reporting from shale gas areas speaks of increased crime and drug problems, overstretched police, fire and emergency medical responders, overburdened hospitals, homelessness, vast road destruction and related traffic problems. Simple supply and demand reaction to hundreds of immigrant workers raises the costs of everything, particularly housing and food. Poor and elderly citizens struggle to survive or must relocate. There are a thousand details wrapped up in these areas, but beyond a generalized statement on sharing royalties with localities and a nebulous plan about how roads will be maintained, no problems are identified or addressed in these recommendations. Economic studies note that the only communities that survive boom-bust industries intact are those that do extensive planning ahead of time at all levels of government. Planning and solutions need to be funded. The sharing of royalties with communities is insufficient for this as they are based on the price of shale gas and the calculations of profit. These will vary greatly, yet the social costs to the communities will be constant and guaranteed, based on the history of shale gas development.

Worker Safety and Health

The government promises jobs, but don't we need new occupational safety regulations to address an industry that has seven times the fatality rate of the average for all industries, a third of which are traffic fatalities, and has more fatalities than the mining industry, according to the US Center for Disease Control?

And we are still learning of new dangers. Recently, the US labor union AFL-CIO petitioned the government to study the problem of workers inhaling silica dust from the sand used in fracking, and develop health rules around it. This is another example of the continually growing number of problems with this industry.

Regulatory Apparatus

Finally, Dr. Howarth also testified to Congress that he could think of no place where the industry regulators were up to the task of enforcement of regulations. Studies show that the growing numbers of gas wells vastly outpaces the number of regulators and

inspections everywhere shale gas is developed. Where is the planning to train, staff, administer and operate the vast regulatory apparatus necessary for all the proposed recommendations, and those to be 'enhanced' in the future? In New Brunswick we are only told that these plans too are coming in the future. **How do we comment?**

Risks are potential, revenues are speculative, but costs are certain. **Social and economic studies state that the few communities that fare well in a boom-bust economy are those who do extensive planning ahead of time. We see virtually no planning.**

Royalties

Unless there are details that we are missing or we are misinterpreting, it seems that Resource Rent Royalties are not based on our understanding of how the shale gas industry works. The intense costs of a gas well occur at the beginning. But with a shale gas well, this is also the time that the vast majority of production occurs. Most estimates show that 65% – 85% of production takes place in the first year or two.

Thus, there will be very little profit generated during this period, and therefore, few rent royalties. This is especially true as 'returns to the investor' are also subtracted as costs before calculating the rent royalty. Conversely, when a well becomes profitable and pays rent royalties, the volume of production subject to royalties will be minimal.

And obviously, if the price of gas is low enough to preclude profits, as it has been for some time, the rent royalties will not be paid. Since this volatile pool of money is what the government plans to tap for health care and education, it will be impossible to write a meaningful budget. Just as obvious is that local governments and landowners will see even fewer funds in their revenue shares. This is already happening in the US where state and local governments have seen royalty payments plummet with the price dips of gas, leaving gaping holes in local budgets.

We note that the chart used in the recommendations to illustrate the calculations of royalties is described as using conservative figures for the price of gas. Yet the actual price of gas for the last many months has been considerably lower than the lowest range used in the chart.

Conclusions

We hope that the government will recognize that its yearlong effort, which produced so few definitive rules and no regulations, is a sign that the task may not be possible. While some of these recommendations might make some practices less dangerous or destructive, that standard is still way short of 'safe and acceptable'. **At the current time the industry is inherently unsafe and unacceptable, and there are no regulations that can change that.**

By starting with the assumption that shale gas development was inevitable, they have looked only at the promised (and questionable) benefits, and largely ignored all those facets that reflected negatively on it.

That attitude is exhibited in these recommendations, which address few of the concerns of the citizenry, and establish that the government (or any government) is unable to regulate this industry. This is evident in every location where shale gas is produced. **It should never be forgotten that this industry would not even exist had it not gotten itself exempted from federal environmental laws in the US.**

The amount of resources put into this task of recommendations would have been better spent planning and developing the sustainable economy for which citizens long. The people would rather be working with the government than fighting to protect themselves from it.

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Our remaining important questions

The government's position has been that it is okay to continue exploration, because if we find shale gas development to be unsafe for either the people or the environment, we can simply stop it at that point. New Brunswick is unique in this position, which is both illogical and has no real-world precedent for working.

It seems to us that this is disingenuous at best, or outright disinformation at worst. As an example, SWN had a three-year license to explore during which it pledged to spend $47 million dollars. The government recently passed a new regulation to grant them extensions of that license, based on the flimsiest excuses we can imagine.

It is thus hard for us to conceive that after allowing the company to explore for 5 years and spend $47 million dollars that the government would say,' Sorry SWN, we don't think it's safe, you'll have to go.' Even if the government did say that, we suspect the action would be followed by costly lawsuits and extreme damage to the province's reputation.

The only sane approach is for a moratorium or ban to be started immediately - before industry invests millions of dollars. However, if the government wants to persist in this fantasy policy, we want to know several things.

First, what will be the legal instrument used to deny leases to companies who have lawfully fulfilled their license agreements?

Secondly, who will decide on what is safe, what will be the decision-making process and who will provide the criteria to decide the standard of 'safeness'?

Will the entire decision making process by open to public comment?

If virtually the entire medical profession in the province, backed by other medical societies around the world and supported by studies, says it is not safe to continue, can they be overridden by a political decision?

What percentage of leaking gas wells or water well contaminations will our 'safety standards' allow? How will that be decided?

If local communities have different conceptions of what is safe, what can they do?

We demand answers to these basic questions before we can give any serious consideration to the government's professed position.