

Kirsten Oravec
Concerned Citizens of Bonne Bay South



September 27, 2013

Scott Tessier, Chairman and CEO
Canada-Newfoundland and Labrador Offshore Petroleum Board
5th Floor, TD Place
140 Water Street
St. John's, NL
A1C 6H6

Dear Mr. Tessier and those responsible for the SEA for Western Newfoundland,

In response to the amended Strategic Environmental Assessment of the western Newfoundland Project we wish to bring to your attention several important issues that we believe your assessment did not properly address, though there were letters written to note these issues.

The geology of western Newfoundland is not that of the Bakken in Saskatchewan. The company, Shoal Point Energy compared the Green Point to the the Marcellus of eastern North America, which is presently being hydraulically fractured in Pennsylvania and Ohio with some serious health and environment issues resulting.

A quick examination of the geology of western Newfoundland reveals that they are paleozoic sediments dominated by limestones and shales that were affected by the Taconic orogeny. In some places these sediments were transported during the Taconic. Because of this event the sediments are broken by vertical and subvertical faulting with surface expression, some faults are major, others less so. As well the body of sediments of interest are cut by sub-horizontal thrust faults of the Taconic orogeny. The GSC and the NL Dept. of Geology has mapped faults cutting through these sediments being exposed either on land or off shore under a shallow marine cover (less than = 60 m)¹.

The paleozoic sediments seen on shore as well as inland range from vertical to steeply inclined to folded to gently tilted beds, often bounded and offset by faults, most of them tending NW-SE in direction. Near Sally's Cove, at the Green Point International Geological Stratotype site the

¹ Bell, J.S. and Howie, R.D. (1990) *in* Geology of the Continental Margin of Eastern Canada, GSC Geology of Canada, no. 2 edited by Keen and Williams.

beds are overturned. In the northern part of the area, north of the Bay of Islands, the body of paleozoic sediments were transported during the Taconic and sometimes are only found floating within a chaotic melange of sediments above it and below it. Faults bound these bodies and cut through them.

Mapping is weak offshore, but one can only assume that these faults, vertical and folded sediments, melanges and other breaks in the sediments continue offshore, under the waters of the Gulf of St. Lawrence. In the Gulf itself strong NE-SW trending faults are found running parallel. Some geologists believe these are failed rifting event faults and that their expression descends into the crystalline basement.

The GSC1 has mapped vertical and subvertical faults on a transect ending at the Port au Port (figure 4.2, Bell and Howie). They mapped a subvertical fault cutting the Green Point Shales extending from ~ 3 km to a surface expression. Off shore they have mapped vertical faults from the basement to the top of the sediments. These major vertical faults have only a thin sand/gravel/mud veneer of cover over them. Further north GSC Map MR 54 have faults mapped in the sediments near Sally's Cove.

GSC MR-54 indicates a slump of 1 billion cubic meters of unsupported rock at the mouth of Bonne Bay, located about equidistant between the Sally's Cove and Trout River proposed drill targets. Earthquakes have been known to be triggered by hydraulic fracturing.

Of major concern is the negligible to thin veneer of sands and gravel that cover the bedrock in the Gulf of St. Lawrence. Glaciation removed cover material near shore and left behind either bare rock or thin sands and gravels near shore. This is not a material that would protect the waters of the Gulf of St. Lawrence from the possibility of fluids leaking up structures due to high pressure fracturing of the paleozoic sediments.

Glaciation formed the landscape of western Newfoundland, and in doing that removed the sedimentary cover. There is only the thinnest veneer of cover seen on land in western Newfoundland, a mix of glacial sands, tills, gravels and clays. Offshore, within the first 20 km at the Port au Port Bell and Howie map negligible cover, and the next 40 km there is less than 40 m of cover. The Geology of Canada, no. 2, maps the near shore sediment as sands and gravels. In the case of a leak due to hydraulic fracturing there is either no or very little cover to hold in leaking fluids that have risen vertically, and the ones that are there are very porous.

We worry that the local strongly overturned, subvertical bedding, folded bedding, and sedimentary beds that have faulting can cause leakage of hydraulically fractured oils, gases and fracking fluids into the Gulf of St. Lawrence, when the fracking is being done under the Gulf, and into local aquifers when it is being done on land. Because of this we have extremely concerns about the long term health of the pristine Gulf of St. Lawrence.

The whole Gulf, not just the area of immediate to the SEA area, represents a 1.2 billion dollar annual Gulf fishery covering the waters of five provinces. For all intensive purposes the waters of the Gulf are more like an inland sea, with currents flowing north from the Port au Basque area towards St. Barbs, turning southwest and following the coast of Quebec down towards the

mouth of the St Lawrence River, were for all intensive purposes a good amount of the current swings north again towards Newfoundland. A spill or leak in the Gulf would recirculate and recirculate over the years, affecting all of the Gulf and impacting all of its cold water fishery. The experiment of a cold water oil spill on a pristine northern fishery has been run, and is still running in Alaska's Gulf of Valdez. The fishery has not returned from it's famous spill decades ago.

Faulting and porous beds of sediments coupled with well failure represent a danger not only to the off-shore Gulf waters but to the on shore ground and surface waters of Newfoundland.

Besides the inherent weaknesses in the geology of western Newfoundland due to folding and faulting there is the issue of well leakage.

The gas industry itself show that about 6 percent of cement jobs in wells fail immediately upon installation, and recent experience in the Pennsylvania Marcellus shale has borne this out over and over again. Pennsylvania's Department of Environmental Protection has found 6.2 percent of new gas wells were leaking in 2010, 6.2 percent in 2011 and 7.2 percent so far in 2012. In a report entitled "Well Integrity Failure Presentation," drilling service company Archer reports that nearly 20 percent of all oil and gas wells are leaking worldwide. A 2003 joint industry publication from Schlumberger, the world's No. 1 fracking company, and oil and gas giant ConocoPhillips, cites astronomical failure rates of 60 percent over a 30-year span.

When the cement fails, it opens a pathway for gas and other toxins involved in the drilling and fracking process to migrate into groundwater and to the surface, here, being the Gulf of St. Lawrence, a rich ecosystem that is source of many marine species that drive a 1.2 billion dollar annually fishery.

In our research we have looked for communities in the Marcellus with a hydraulic fracturing programs underway where there have been no contamination of ground water due to drilling and fracking and, among the hundreds of them, could not find one that didn't have (in many cases a significant) groundwater contamination problem resulting from drilling and fracking. Contamination due to well failure and leakage render homes and communities unfit for residential and agricultural use. What about failures in the Gulf? Unlike land, a current will keep moving the leaking fluids through the gulf, not only contaminating the immediate area, but that of the whole gulf, affecting the fisheries of five provinces.

A question to be addressed too, is who is responsible for the well after the firm shuts shop? Failure rates rise for old well. Is there a well 80 years old that has not failed. Who pays for the clean up and addressing the wide ranging environmental and health issues that rise from the abandonment of the wells?

Insurers will not insure houses in places where fracking contamination has occurred. Add that to the health issues who would want to live in western NL then? Who would want to visit?

The Colorado School of Public Health found a likelihood of moderate to severe health affects from drilling and fracking to residents living in the immediate area due to both water and air

contamination. More than 75 % of the chemicals used for fracking have long term health affects and many of them are not immediately expressed (2). VOCs are another area of concern that can adversely affect human and animal populations as a result of drilling and fracking operations (2).

The impacts of leaking wells, leaking fracking fluids in fractured rock and up faults and strata would effect the fishery, agriculture, tourism and other industries in the region of western Newfoundland adversely.

The Gulf in Newfoundland waters is an important spawning ground for marine life, as well as being excellent fishing grounds. It is important too in regards to marine life and the fishery that all of the Newfoundland part of the Gulf could be labeled as important or sensitive.

- Huge sectors of importance for marine mammals (sect. 5.3.3.2)
- Sectors unique and essential for cod, redfish, plaice (spawning, juveniles, migration) (sect. 4.2.1.7)
- Unique winter refuges for herring and capelin (sect. 4.2.1.7)
- Important sites for lobster, krill, etc. (sect. 4.2.1.8)
- West Coast Atlas of sensitive zones show that the vast majority of the Newfoundland West Coast could be qualified as sensitive (sect. 4.2.1.1).

Unfortunately, no synthesis map of all the sensitive or biologically important zones is presented in the report. Such a map would have helped us realize that nearly all of the Western Newfoundland coast could be qualified as important or sensitive.

Tourism is a major industry to western Newfoundland, bringing \$129 million dollars annually to the communities from Port au Basque to St. Anthony. Hydraulic fracturing could adversely impact that.

In the SEA to be commented on Woody Point was listed as receiving only 1 cruise ship in 2012 when it in actuality it received 5 cruise ships over the season starting in June and running until October, with one visiting twice. All of these cruise ships offloaded visitors into the communities. In 2013 there were 6 cruise ships that off loaded, according the the Town of Woody Point more than 1700 visitors. The ships came in between July and September, and unlike the SEA of AMEC did not only arrive in September. In 2012 and 2013 Woody POint also had cruise ship visitors who came to Bonne Bay south from the Cruise ships that tied up in Corner Brook. The community is already expecting 5 ships to land in Woody Point for 2014, over the course of the full summer.

Another element of the SEA by AMEC is the question of how well it expresses the concerns of the populations that were consulted. There is much worry and concern in the region. People understand that their livelihoods depend upon the pristine waters, air and land of the Gulf weather their work is in the fishery, tourism or forestry. Oil development can severely impact all of the above industries.

Oil exploration and hydraulic fracturing in the western Newfoundland waters and on shore can adversely affect all the rich marine waters of the Gulf, adversely impact a pristine ecosystem, and impact the a source of life and work for thousands of people in hundreds of communities along the shores of the Gulf of St. Lawrence in five provinces.

With this we wish to thank you and be aware there are serious concerns with both conventional oil exploration and hydraulic fracking for oil.

Thank You,

The Concerned Citizens of Bonne Bay South

Kirsten Oravec



¹ Bell, J.S. and Howie, R.D. (1990) *in* Geology of the Continental Margin of Eastern Canada, GSC Geology of Canada, no. 2 edited by Keen and Williams.

(2) Colburn, T, Kwiatkowski, C., Shultz, K, and M. Bachran. 2011. Natural Gas Operations from a Public Health Perspective. Human and Ecological rishks Assesment, 17:10309-1056.