

October 19, 2015

Dr. Ray Gosine  
Chair, Hydraulic Fracturing Review Panel  
Bruneau Centre for Research and Innovation  
Memorial University of Newfoundland  
St. John's, NL, A1C 5S7

Dear Dr. Gosine:

I am writing in response to your June 4, 2015, letter in which you requested me to provide input into the Newfoundland and Labrador Hydraulic Fracturing Review Panel's review of hydraulic fracturing in Newfoundland and Labrador.

I have prepared input on hydraulic fracturing in the enclosed document, Reflections on Hydraulic Fracturing, for consideration by the Panel.

If you require clarification on the contents of the document, please do not hesitate to contact me.

Sincerely yours,



**David J. Allison MD, FRCPC**  
Chief Medical Officer of Health



## **Reflections on Hydraulic Fracturing**

**Dr. David Allison, Chief Medical Officer of Health**

**Submission to the**

**Newfoundland and Labrador Hydraulic Fracturing Review Panel**

**October 14, 2015**

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## Hydraulic Fracturing Review Panel

In October 2014, the Newfoundland and Labrador Government established the Hydraulic Fracturing Review Panel to review and provide recommendations on whether or not to allow hydraulic fracturing to occur in Western Newfoundland. On June 4, 2015, Dr. Ray Gosine, chairperson of the Panel, invited the Chief Medical Officer of Health with the Department of Health and Community Services to provide input to the Panel on public health issues related to hydraulic fracturing. A copy of the letter from Dr. Gosine is attached.

## Health Input to Panel

The Office of the Chief Medical Officer of Health would like the Panel to consider several observations as they complete their public review and prepare recommendations about hydraulic fracturing in Western Newfoundland. The reflections provided in this submission to the Panel are provided in the context of the mandate of my office, the Department and the Regional Health Authorities (RHAs), and a population health approach to health where the scope, geographic location and impacts of a proposed industrial development are uncertain. The comments are not based on any specific expertise or experience with hydraulic fracturing and oil and gas exploration, nor are they the result of a comprehensive assessment or scientific literature review of hydraulic fracturing.

## Health Mandate

As stated in the Department's *Strategic Plan 2014-2017*<sup>1</sup>, the mandate of the Department of Health and Community Services, in part, is to provide leadership, coordination, monitoring and support to the regional health authorities and other entities who deliver programs and services ensuring quality, efficiency and effectiveness in areas such as:

- Preservation and promotion of health;
- Prevention and control of disease;
- Public health and the enforcement of public health standards;
- Administration of health care facilities;
- Programs for seniors, persons with disabilities and persons with mental health and addictions issues;
- Long term care and community support services; and
- Control, possession, handling, keeping and sale of food and drugs.

The mandate of the province's four RHAs - Western Health, Labrador-Grenfell Health, Central Health and Eastern Health - is derived from the *Regional Health Authorities Act*<sup>2</sup>. The responsibilities of the RHAs are stated in the Act and include the following:

<sup>1</sup> Department of Health and Community Services, *Strategic Plan 2014-2017*

<sup>2</sup> *Regional Health Authorities Act*, SNL 2006 Chapter R-7.1, <http://www.assembly.nl.ca/legislation/sr/statutes/r07-1.htm#16>

- Promote and protect the health and well-being and implement measures for the prevention of disease and injury and the advancement of health and well-being;
- Assess health and community services on an ongoing basis; and
- Develop objectives and priorities for the provision of health and community services which meet the needs of its region and which are consistent with provincial objectives and priorities.

Medical Officers of Health with the Department of Health and Community Services and the RHAs do not have a legislative or regulatory mandate for industrial developments, including oil and gas developments that propose to utilize hydraulic fracturing methods.

## Health and Population Health

Generally, when people discuss health their focus is primarily on the presence or absence of illness and the services provided in a community or region to diagnose and treat those illnesses. Health, however, is more than just the physical well-being of a person or people in a community. The World Health Organization (WHO) defines health as *“a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”*.<sup>3</sup> As inferred from the WHO definition of health, health is affected by many factors such as social, economic, physical and environmental conditions.

Population health refers to the ability of people to adapt and respond to various aspects of life not just to the health status of a population. Population health may be defined as *“an approach to health that aims to improve the health of the entire population and to reduce health inequities among population groups. In order to reach these objectives, it looks at and acts upon the broad range of factors and conditions that have a strong influence on our health.”*<sup>4</sup> A population health approach to health encompasses a range of strategies and supports that allows individuals, families and communities to experience positive health outcomes. Initiatives that focus on physical, social and emotional well-being, the prevention of illness and injury, as well as initiatives to support people in managing and maintaining their own health and lifestyle, form a solid foundation for addressing population health.

<sup>3</sup> Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April, 1948.

<sup>4</sup> What is population health? Public Health Agency of Canada, [http://www.phac.aspc.gc.ca/ph\\_sp/approach\\_approche/index\\_eng.php#What](http://www.phac.aspc.gc.ca/ph_sp/approach_approche/index_eng.php#What)

# Western Newfoundland

The Office of the Chief Medical Officer of Health is not aware of any specific risks to health from hydraulic fracturing that would be unique for the population of Western Newfoundland. Risks to population health would likely be related to individual hydraulic fracturing sites and the impact difficult to generalize for the region. Risks would be dependent on a number of demographic and geographic or physical variables and influenced by determinants of health status.

Western Newfoundland is the area subject to the Panel’s review of hydraulic fracturing. This is a large geographical area comprised of many unique communities, relatively low population density and large expanses of wilderness providing local populations and visitors varied opportunities for professional, recreational and other pursuits. The Panel, as it reviews health impacts of hydraulic fracturing, should consider the current (baseline) health status of populations in Western Newfoundland that could be impacted by hydraulic fracturing activities. Baseline health status could include descriptions of pre-existing health issues, inequalities and influences on health.

Population health status data for Western Newfoundland and the Province is available through several sources including:

<ul style="list-style-type: none"> <li>▪ Newfoundland and Labrador Community Accounts <a href="http://www.nl.communityaccounts.ca">www.nl.communityaccounts.ca</a></li> </ul>	<p>Community Accounts provides users with a reliable and comprehensive source of community, regional, and provincial data, including health data available from the Canadian Community Health Surveys<sup>5</sup>.</p>
<ul style="list-style-type: none"> <li>▪ Newfoundland and Labrador Centre for Health Information <a href="http://www.nlchi.nl.ca">www.nlchi.nl.ca</a></li> </ul>	<p>The Centre provides “quality health information to health professionals, the public, researchers and health system decision-makers”<sup>6</sup>.</p>
<ul style="list-style-type: none"> <li>▪ Western Regional Health Authority Environmental Scan 2013-2014 <a href="http://www.westernhealth.nl.ca/uploads/PDFs/environmental-scan-2013-2014.pdf">www.westernhealth.nl.ca/uploads/PDFs/environmental-scan-2013-2014.pdf</a></li> </ul>	<p>The Scan provides a summary of population health data available for Western Newfoundland for 2013-2014.</p>
<ul style="list-style-type: none"> <li>▪ Statistics Canada, Health Profile of Western Regional Health Authority, 2013 <a href="http://www12.statcan.gc.ca/health-sante/82-228/index.cfm?Lang=E">http://www12.statcan.gc.ca/health-sante/82-228/index.cfm?Lang=E</a></li> </ul>	<p>Access to the latest health-related data for selected health regions and census metropolitan areas.</p>

<sup>5</sup> Newfoundland and Labrador Community Accounts, [www.nl.communityaccounts.ca](http://www.nl.communityaccounts.ca)

<sup>6</sup> Newfoundland and Labrador Centre for Health Information [www.nlchi.nl.ca](http://www.nlchi.nl.ca)

Health status reports typically refer to a combination of self-reported information obtained through census data, questions posed during the Canadian Community Health Survey or the Canadian Health Measures Survey, and data obtained from health system interactions such as hospitalizations, and mortality. There may be gaps in the human health baseline information that is available which would require specific studies to obtain additional information that would contribute to the decision-making process.

A list of resources in Appendix 2 related to health status and hydraulic fracturing can be used to guide the development of a research agenda and a decision making algorithm around health issues.

## Potential Health Impacts

Policy decisions leading to industrial development in a particular area of the province may have both positive and negative health impacts. Health impacts are *“the overall effects, direct or indirect, of a policy, strategy, programme or project on the health of a population”*.<sup>7</sup> For example, there may be an increase in employment prospects in areas with high unemployment allowing people the opportunity to improve their health and well-being. Conversely, industrial development may introduce contaminants into the environment that can cause illness in people who are exposed. Safe food, water and air, along with employment, income and housing, are critical to a population’s good health.

The following environmental and public health issues are relevant to people in areas where hydraulic fracturing activities occur.

- Safety and injury prevention related to motor vehicle traffic (e.g., transportation of dangerous goods and operation of heavy equipment, traffic volume) necessary for hydraulic fracturing site operation and maintenance;
- Human exposure to noise, and possibly dust, from commercial motor vehicles and fracturing site activities occurring near where people live;
- Human exposure to air pollutants from commercial vehicle emissions and hydraulic fracturing operations (e.g., emissions from generators, gas flaring and venting);
- Human exposure, for example through the contamination of drinking water sources (e.g., groundwater wells or surface water supplies), to chemicals of unknown toxicological characteristics used in hydraulic fracturing methods and found in the waste generated by hydraulic fracturing processes;
- Emissions and exploration activity impacts on soil used for agriculture;
- Release of chemicals, including pesticides, and radioactive pollutants, into the environment from hydraulic fracturing site maintenance and operation, including the potential contamination of country foods (fish, game, berries, etc.);
- Public access to affordable housing with worker migration to rural areas;

<sup>7</sup> Health impact assessment, main concepts and suggested approach. Gothenburg Consensus Paper, World Health Organization European Centre for Health Policy, December 1999.

- Worker access to temporary accommodation, recreation facilities, community and social services; and
- Emergency preparedness in the event of a significant system failure.

The magnitude of the potential environmental health impacts would be dictated by a number of variables, such as scale of development, geography, population density, pre-existing population health status, potential exposure pathways, etc., in relation to the location of hydraulic fracturing sites.

In addition to the environmental health issues listed above, other determinants of health, such as employment and income, need to be considered. Increasing individual, community and corporate wealth have impacts, many of which will be positive. For individuals, wealth provides opportunities related to lifestyle choices, a persons' physical and social environment, housing, diet, etc. Generally, populations with higher incomes are healthier than populations with lower incomes. Employment with higher incomes allows people to secure better housing and sufficient sources of healthy food. For communities, industrial development provides sources of revenue through taxation that they can use to enhance the built environment and improve the health of the population. For corporations, expanding industrial development provides them with the opportunity to increase profits and improve their economic situation which benefits employees of the corporation and shareholders, and allows them to provide economic benefit to governments through taxation.

If people in a community are benefiting economically from a hydraulic fracturing development by gaining employment, selling goods and services, and so forth, then overall health and well-being may be improved. However, social and community health risks can arise during rapid economic development. A rapid change in population, industrialization and economic prosperity can lead to increased rates of crime, drug and alcohol abuse, sexually-transmitted infections, domestic violence; inadequate supply and quality of housing; increased cost of living; and increased demand for public services, including policing, social services, healthcare and local government services. These social and community health risks can be compounded by inequities amongst the local population. The social and community health risks associated with the "Boomtown Effect" are thought to be more intense for small communities with a traditional way of life that did not previously involve the industrial sector responsible for the boom. There are reports of the Boomtown Effect for communities in North Dakota and Saskatchewan.

For a discussion on the economic status impacts on individual and community health, and other determinants of health, information is available from the Joseph Roundtree Foundation, Public Health Agency of Canada and the World Health Organization (see attached list of Resources in Appendix 2 for more information).



## Health Impact Assessment

For significant policy decisions, where the potential policy impacts on human health and well-being are unknown or uncertain, health impact assessments are being utilized more frequently world-wide as part of decision-making processes. A health impact assessment is defined as *“A combination of procedures, methods and tools by which a policy, program or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population”*.<sup>8</sup>

If a health impact assessment were undertaken information on both the negative and positive impacts of hydraulic fracturing in Western Newfoundland may be identified. The assessment could examine health impacts from the perspective of the determinants of health, some of which are outside the responsibility of the health sector, and the environmental health impacts listed previously.

The National Collaborating Centre for Healthy Public Policy) has a resource on health impact assessment ([www.ncchpp.ca/54/Health\\_Impact\\_Assessment.ccnpps](http://www.ncchpp.ca/54/Health_Impact_Assessment.ccnpps)).

## Health Risk Assessment

A more focused level of health impact inquiry, the health risk assessment, can be conducted at the local project-specific level. This type of assessment is used to determine the types, and likelihood, of impacts of a development on defined human populations. The United States Environmental Protection Agency defines human health risk assessment as *“the process to estimate the nature and probability of adverse health effects in humans who may be exposed to chemicals in contaminated environmental media, now or in the future.”*<sup>9</sup>

As part of any health risk assessment, health status, including socio-economic status and behavioural risk factor analysis would be undertaken. Also, given the lack of specific information about the health impacts of hydraulic fracturing operations, consideration should be given to undertaking additional work on potentially affected populations that includes physical and biomedical measures. This work could be conducted in conjunction with any additional baseline analyses undertaken.

## Industry Regulation

<sup>8</sup> Health impact assessment, main concepts and suggested approach. Gothenburg Consensus Paper, World Health Organization European Centre for Health Policy, December 1999.

<sup>9</sup> United States Environmental Protection Agency [http://www2.epa.gov/risk/human\\_health\\_risk\\_assessment](http://www2.epa.gov/risk/human_health_risk_assessment).

For industrial developments that may have broad undefined health impacts on a population, the following may be considered part of a regulatory framework for the industry.

- The protection of human health as specific priority in regulations and the process governing the approval of future developments; and
- Proposals undergoing environmental assessment include a specific requirement for local-level health impact and/or risk assessment.

## **Health-Related Resources**

Other reports, studies, presentations and policy statements may be useful to the Panel during the review of health impacts of hydraulic fracturing. A selection is listed in Appendix 2. While documents have not been specifically reviewed, it can be seen even with a cursory review of titles that potential concerns that have been studied elsewhere range from hospitalization rates, risks to groundwater and air quality, and general health status.

## **Conclusions**

The Panel has not requested the Chief Medical Officer of Health to take a position either for or against hydraulic fracturing in Western Newfoundland and it is beyond the mandate and expertise of that position to do so.

Given the mandate of the Office of the Chief Medical Officer of Health to preserve and promote health and prevent illness, this submission emphasizes the need to consider health impacts of hydraulic fracturing using a determinants of health approach and exercise caution where the health impacts of hydraulic fracturing development are unknown or uncertain.

## Appendix 1

### Letter from Review Panel to Chief Medical Officer of Health

Newfoundland and Labrador  
Hydraulic Fracturing Review Panel

June 4, 2015

Dr Faith Stratton  
Chief Medical Officer of Health  
Department of Health and Community Services  
West Block – Confederation Building  
P.O. Box 8700  
St. John's, Newfoundland, A1B 4J6  
Email [fstratton@gov.nl.ca](mailto:fstratton@gov.nl.ca)

Dear Dr. Stratton,

I am writing to you in my capacity as Chair of the Panel that has been appointed by the Government of Newfoundland and Labrador to undertake a public review on hydraulic fracturing in Western Newfoundland. Further details, including the Terms of Reference for the Panel, can be found at [www.nlhfrp.ca](http://www.nlhfrp.ca).

The Panel views matters related to public health to be central to our work and the submissions received to date also indicate that matter of public health are of great concern to individuals and groups in the Province. I understand that Dr. Kevin Keough, a member of the Panel, spoke with you about our work and that you would be prepared to share some of your perspectives with the Panel. The Panel is committed to an open and transparent process so we would want to make any information that you share with the Panel available through our web site.

The Panel is interested in your professional perspective on any of the issues that you believe are important for the Panel and government to consider in any risk-benefit analysis of hydraulic fracturing.

In addition to this broad invitation for input, the Panel would be particularly interested in your thoughts about the following questions:

- Are there specific potential environmental health impacts that pertain to and might have special relevance to the people in the region of the Island where hydraulic fracturing might be employed?
- Are you aware of materials from other jurisdictions related to health impacts that would add information or perspectives that might have particular relevance to the west coast of Newfoundland?

PHONE

EMAIL

ADDRESS

WEB

- Can you comment on the use of environmental health risk assessments and health impact assessments in consideration of the matter of hydraulic fracturing?
- Can you provide a perspective on the role that individual and community income and wealth play in individual and community health and how these factors might be considered by the Panel?
- Can you share with the Panel any information on health status or any known special or unique risks to health in Western Newfoundland where hydraulic fracturing might occur?

Thank you for being willing to consider the matters noted above and we believe that your submission will represent important information for our work. We look forward to receiving your submission at your earliest convenience. Also, as we undertake our work, the Panel would appreciate the opportunity to follow up with you on matters arising as appropriate.

Yours truly,

Dr. Ray Gosine  
Chair, Hydraulic Fracturing Review Panel

c.c. Dr. Kevin Keough

## Appendix 2

## Resources

### **Population Health Status Data:**

Newfoundland and Labrador Centre for Health Information. <http://nlchi.nl.ca/>

Newfoundland and Labrador Statistics Agency. "Community Accounts: Sharing Data, Providing Information, Developing Knowledge." *Newfoundland and Labrador Community Accounts*. <http://nl.communityaccounts.ca/>

Statistics Canada. *Health Profile, December 2013*. <http://www12.statcan.gc.ca/health-sante/82-228/index.cfm?Lang=E>

Western Health. (2014). *Western Regional Health Authority Environmental Scan 2013-2014*. <http://westernhealth.nl.ca/uploads/PDFs/environmental-scan-2013-2014.pdf>

### **Health Status and Hydraulic Fracturing:**

Jemielita T. et al. (2015) "Unconventional Gas and Oil Drilling Is Associated with Increased Hospital Utilization Rates." *PLoS ONE* 10(7): e0131093. doi: 10.1371/journal.pone.0131093.

Kahrilas G.A. et al. (2015) "Biocides in Hydraulic Fracturing Fluids: A Critical Review of Their Usage, Mobility, Degradation and Toxicity." *Environmental Sciences and Technology*, 49, 16-32. Doi:10.1021/es503724k.

Kormacher K.S. et al. (2014) "Unconventional Natural Gas Development and Public Health: Toward a Community-Informed Research Agenda." *Reviews on Environmental Health*, 29(4):293-306. doi:10.1515/reveh-2014-0049

Meng Q. (2015) "Spatial Analysis of Environment and Population at Risk of Natural Gas Fracking in the State of Pennsylvania, USA." *Science of the Total Environment*, 515-516: 198-206. Doi: 10.1016/j.scitotenv.2015.02.030.

Pulik L.B. et al. (2015) "Impact of Natural Gas Extraction on PAH Levels in Ambient Air." *Environmental Science and Technology*, 49, 5203-5210. Doi: 10.1021/es506095e

Rabinowitz P.M. et al. (2015) "Proximity to Natural Gas Wells and Reported Health Status: Results of a Household Survey in Washington County, Pennsylvania." *Environmental Health Perspectives*, 123:21-26; doi:10.1289/ehp.130732.

Saberi P. et al. (2014) "Field Survey of Health Perception and Complaints of Pennsylvania Residents in the Marcellus Shale Region." *International Journal of Environmental Research and Public Health*, 11, 6517-6527: doi:10.3390/ijerph110606517.

Williams P.R.D. (2015) "Applying Risk Analysis to Two Divisive Topics: Hydraulic Fracking and Marijuana Use." *Risk Analysis*, 35(5), 762-765. Doi:10.1111/risa.12420.

## **Economic Impact on Individual and Community Health**

Joseph Roundtree Foundation: <http://www.jrf.org.uk/sites/files/jrf/income-health-poverty-full.pdf>

Public Health Agency of Canada: <http://www.phac-aspc.gc.ca/ph-sp/determinants/index-eng.php>

World Health Organization: <http://www.who.int/hia/evidence/doh/en/>.

## **Additional Health-Related Resources:**

American Public Health Association. (2012) *The Environmental and Occupational Health Impacts of High-Volume Hydraulic Fracturing of Unconventional Gas Reserves*. Policy Statement.

<http://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2014/10/02/15/37/hydraulic-fracturing>

Benusic, Michael A. (2013) "Fracking in BC: A Public Health Concern." *BCMJ*, Vol. 55, No. 5, June 2013, 238-239.

<http://www.bcmj.org/council-health-promotion/fracking-bc-public-health-concern>

Concerned Health Professionals of New York. (2014) *Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking (Unconventional Gas and Oil Extraction)*.

<http://concernedhealthny.org/wp-content/uploads/2014/07/CHPNY-Fracking-Compendium.pdf>

European Parliament. (2011) *A Study on the Impacts of Shale Gas and Shale Oil Extraction on the Environment and Human Health*.

<http://www.europarl.europa.eu/document/activities/cont/201107/20110715ATT24183/20110715ATT24183EN.pdf>

New York State Department of Health. (2014) *A Public Health Review of High Volume Hydraulic Fracturing for Shale Gas Development*.

[http://www.health.ny.gov/press/reports/docs/high\\_volume\\_hydraulic\\_fracturing.pdf](http://www.health.ny.gov/press/reports/docs/high_volume_hydraulic_fracturing.pdf)

Colorado School of Public Health. (2011) *The Battlement Mesa Health Impact Assessment on Natural Gas Development*.

<http://www.garfield-county.com/environmental-health/battlement-mesa-health-impact-assessment-draft2.aspx>

Lampe, D.J. and J. F. Stolz. (2015). "Current perspectives on Unconventional Shale Gas Extraction in the Appalachian Basin." *Journal of Environmental Science and Health Part A Toxic/Hazardous Substances & Environmental Engineering* (Impact Factor: 1.16). 04/2015; 50(5):434-46. DOI: 10.1080/10934529.2015.992653.

Nicol, Anne-Marie and Helen Ward. (2015) *Public Health Impacts of Hydraulic Fracturing: Seismic Activity and Potential Risks*. PowerPoint Presentation. National Collaborating Centre for Environmental Health.

[http://www.nccch.ca/sites/default/files/CPHA\\_2015\\_Hydraulic\\_Fracturing-Nicol.pdf](http://www.nccch.ca/sites/default/files/CPHA_2015_Hydraulic_Fracturing-Nicol.pdf)

Office of the Chief Medical Officer of Health New Brunswick Department of Health. (2012) *Chief Medical Officer of Health's Recommendations Concerning Shale Gas Development in New Brunswick*.

[http://www2.gnb.ca/content/dam/gnb/Departments/hs/pdf/en/HealthyEnvironments/Recommendations\\_ShaleGasDevelopment.pdf](http://www2.gnb.ca/content/dam/gnb/Departments/hs/pdf/en/HealthyEnvironments/Recommendations_ShaleGasDevelopment.pdf)

Pakpoor, Julia. (2015) "Health Professionals Call for Urgent Halt to Fracking because of Public Health Concerns." *BMJ* 2015;350:h1791.

Tuller, David. (2015) "As Fracking Booms, Dearth Of Health Risk Data Remains." *Health Affairs*. June vol. 34 no. 6, 903-906.

United States Environmental Protection Agency. (2015) *Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources (External Review Draft)*. US Environmental Protection Agency, Washington, DC, EPA/600/R-15/047.

<http://cfpub.epa.gov/ncea/hfstudy/recordisplay.cfm?deid=244651>

Witter, Roxana et al. (2008) *Potential Exposure-Related Human Health Effects of Oil and Gas Development: A White Paper*. Natural Resources Defense Council. Working Materials.

[http://docs.nrdc.org/health/files/hea\\_08091702A.pdf](http://docs.nrdc.org/health/files/hea_08091702A.pdf)