

Discussion Paper: Hydraulic Fracturing - Understanding the General Regulatory Issues

Nova Scotia Hydraulic Fracturing Independent Review and Public Engagement Process

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Abstract

Regulations are a key method by which governments protect and promote the interests of their citizens. Ideally, they serve to prevent harm from occurring, and include measures to mitigate the impact or consequences of harms which may nonetheless take place. Nova Scotians have expressed concerns about whether regulations can provide a satisfactory level of protection from the known and suspected risks associated with hydraulic fracturing. These concerns must be addressed.

This discussion paper does not project a regulatory regime for Nova Scotia. Rather, it explains the limits of regulating, and identifies some of the factors which make it more or less likely that a regulatory regime will serve its purpose.

The paper identifies the roles of different levels of government in the decision-making process around hydraulic fracturing activities, and provides an overview of some of the approaches to regulating hydraulic fracturing in various provinces, including Nova Scotia. It then turns to exploring the relationship between regulations and risk-management, and in particular identifies how the efficacy of regulations for protecting health and the environment turns on (i) the adequacy of the knowledge base,

(ii) political will and responsiveness of the regulations to the knowledge base, and (iii) whether and how regulations are implemented, resourced and enforced. The paper provides examples of these elements in action, drawn from hydraulic fracturing experiences in Canada and the United States. The paper observes that since the adequacy of protection from risks is a matter of degree, resting both on the actions of industry and of the state, and since hydraulic fracturing is publicly contentious, that decisions about the terms under which hydraulic fracturing may or may not take place in Nova Scotia ought to be regionally-specific and community driven.

At the end of the paper is an appendix, which describes some of the lawsuits that have been launched around hydraulic fracturing in Canada and the United States. It includes a brief discussion of legal actions which have been brought against companies as well as provinces.

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How to Read this Paper

This discussion paper will in due course form the basis of a chapter in the final report produced for the *Hydraulic Fracturing Independent Review and Public Engagement Process in Nova Scotia*.¹ The paper should be read in conjunction with the *Primer on Hydraulic Fracturing*² which we released on March 10th 2014. This paper explores the general regulatory issues of Hydraulic Fracturing. To see a full list of other topics being considered in chapters of the final report, and to access previously released discussion papers, please visit the project document page on our website.

How to Provide Feedback on this Paper

We now invite feedback on this discussion paper – for example if there are any aspects that are not clear or which require further explanation. Please email your feedback to hfreview@cbu.ca with 'Regulatory Issues' in the subject line using the feedback form available on the website³. We request that you do not make comments directly in the PDF document and prefer to receive feedback using the form provided, in an email or word attachment, or alternatively please write to HF Review, Verschuren Centre for Sustainability in Energy and the Environment, Cape Breton University, P.O. Box 5300, 1250 Grand Lake Road, Sydney, Nova Scotia, B1P 6L2. Feedback on this paper can be received at any time until July 25, 2014. All feedback received will be taken into account in the final version of the document.

Thank you



Dr David Wheeler
President of Cape Breton University, on Behalf of the Expert Panel, 11th July 2014

¹ See the Verschuren Centre (Cape Breton University) website <http://www.cbu.ca/hfstudy> for full details of the study and all project documentation.

² Available from <http://www.cbu.ca/hfstudy>

³ The discussion paper feedback form is available here: <http://www.cbu.ca/hfstudy/resources/project-documents>

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1. Introduction

This panel has and continues to benefit from a public submission process, which some members of the public have chosen to participate in. Many of those who wrote to the panel expressed concerns about whether regulations can adequately protect public health and safety, and the environment. They described adverse experiences with hydraulic fracturing in Kennetcook, Nova Scotia, where hydraulic fracturing wastewater has sat in open pools for years, and asked who was responsible for letting such problems arise, and why the situation remains outstanding. People also questioned the value of enacting regulations if there is no guarantee that the regulations will be followed or enforced. We saw submissions that focused on knowledge gaps, with members of the public asking about the value of regulations in light of unknown risks. Submissions also expressed concerns that some types of risks cannot be mitigated by regulation.

These concerns are pivotal. Regulations not only set the baseline standard for industry practices, they are also a key way that the state fulfils its responsibility to citizens by protecting and promoting their interests. One role of regulations is to prevent harm from occurring, so that citizens are not forced to pursue remedies through lawsuits, where their legal rights often only materialize *after* harms have already occurred, and those harms may not be reversible.⁴ Thus the issues that are raised above are fundamental, and are reflected in the content of some aspects of this paper.

The paper starts by addressing some informational issues about regulating. In particular, it identifies the roles of different levels of government in decisions about hydraulic fracturing, and then briefly surveys how hydraulic fracturing is currently regulated in a few sample Canadian jurisdictions, including Nova Scotia. The paper then turns to the relationship between regulations and risk-management, and explores these issues pursuant to a framework that was developed by the Council of Canadian Academies in their pivotal 2014 report. This section of the paper, in particular, provides some insights into the public concerns that are described above. It discusses the limits of regulation, as well as some of the factors or conditions that are more likely to make regulation successful. At the end of the paper is an Appendix which provides a brief survey of the public and corporate litigation that has been generated around hydraulic fracturing in the United States and in Canada, including suits against government bodies that have been brought by corporate entities and citizen groups.

While this paper draws on experiences in other jurisdictions, it is not a comprehensive evaluation of the regulations, rules, policies and guidelines that are relied upon in other jurisdictions. Nor

⁴ Jason Gerken, "What the Frack Shale we do? A Proposed Environmental Regulatory Scheme for Hydraulic Fracturing" (2013) *Capital University Law Review* 81 at 99.

does it project a regulatory regime for Nova Scotians. As referenced at various points in this paper, if Nova Scotia continues to explore hydraulic fracturing, a key part of that exploration should be a comprehensive regulatory review and deep consultation process which draws heavily on community participation and also respects the Aboriginal and treaty rights of the Mi'kmaq.

2. What levels of government have a decision-making role about hydraulic fracturing?

Many of the public submissions focused on the provincial government's decision-making role and responsibilities vis-à-vis hydraulic fracturing activities. However, all levels of government – federal, provincial, municipal and Aboriginal – have a degree of authority which may be triggered by activity associated with hydraulic fracturing. It is essential to note that the Federal and Provincial exercises of powers described below are potentially restrained or ousted where Mi'kmaq Aboriginal and Treaty rights are present. Because of the complexity of this issue, it is described in a separate chapter of this report.

a. The Federal Government

The Federal government has jurisdiction over natural resources on federal lands. In Nova Scotia, this means that the Federal government has a role if there was a proposal for hydraulic fracturing activities to take place in national parks such as the Cape Breton Highlands, on Indian reserve land, or on other federal land such as military bases. This explains why UNESCO's efforts to create a hydraulic fracturing buffer zone around Gros Morne Park in Newfoundland have primarily involved the federal government.⁵ The Federal government's mandate is also triggered if there are any interprovincial or international aspects that fall under the purview of the National Energy Board, as might be present if there was a proposal to transport gas from hydraulic fracturing out of Nova Scotia via pipelines.⁶

There are limited circumstances under which a federal environmental assessment would be triggered by proposed hydraulic fracturing activities on provincial lands, such as if the activity was to occur within 'a wildlife area or migratory bird sanctuary'. The impacts which would be studied are also limited to matters which are under federal jurisdiction, such as fish habitat.⁷ The federal government is also responsible for air quality issues, and assessing whether substances are toxic to human health or the environment, and to control the use of such substances.⁸ This last power is quite relevant in the hydraulic fracturing context, because it means that the federal government can restrict or prohibit certain chemicals from being used in the hydraulic fracturing process due to their toxicity.

⁵ Canadian Press, "Fracking buffer around Gros Morne needed: UNESCO" (June 19, 2014) on line at <http://www.cbc.ca/news/canada/newfoundland-labrador/fracking-buffer-around-gros-morne-needed-unesco-1.2680868>

⁶ Eg. *National Energy Board Act Part VI (Oil and Gas) Regulations* SOR/96-244.

⁷ *Canadian Environmental Assessment Act 2012*, sections 5(1), *Regulations Designating Physical Activities*, SOR/2012-147

⁸ *Canadian Environmental Protection Act, 1999* (S.C. 1999, c.33)

b. The Provincial Government

The provincial government has a very significant decision-making role. In Nova Scotia the provincial government owns all underground resources as against private landowners. This includes the shale gas which the hydraulic fracturing process is intended to release. The province also has authority to pass laws regarding the management, control, and exploitation of natural resources within the provincial jurisdiction.⁹ The province further has authority over areas including environmental protection, water protection, emissions, occupational health and safety, emergency measures and roads, as well as industry permitting and licensing. Nova Scotia's current approach to regulating many of these areas is described in several of the other chapters of this report. To fulfil its responsibility to regulate the use of natural resources, and to provide for the health of its residents, Nova Scotia has passed some over-arching legislation.

For example, the province passed a statute called the *Environmental Goals and Sustainable Prosperity Act*. This statute makes a commitment "to fully integrate environmental sustainability and economic prosperity"¹⁰. It identifies three principles for attaining this objective. These principles state:

"the health of the economy, the health of the environment and the health of the people are interconnected",

"environmentally sustainable economic development that recognizes the economic value of the Province's environmental assets is essential to the long-term prosperity of the Province", and

"the environment and economy must be managed for the benefit of present and future generations, which is in keeping with the Mi'kmaq concept of *Netukulimk*, defined by the Mi'kmaq as the use of the natural bounty provided by the Creator for the self-support and well-being of the individual and the community by achieving adequate standards of community nutrition and economic well-being without jeopardizing the integrity, diversity or productivity of our environment"¹¹

Thus, our regulatory framework starts with recognizing the value of long-term prosperity and environmentally sustainable economic development, as well as a recognition of how economic,

⁹ *Constitution Act, 1867* s.109. All Lands, Mines, Minerals, and Royalties belonging to the several Provinces of Canada, Nova Scotia, and New Brunswick at the Union, and all Sums then due or payable for such Lands, Mines, Minerals, or Royalties, shall belong to the several Provinces of Ontario, Quebec, Nova Scotia, and New Brunswick in which the same are situate or arise, subject to any Trusts existing in respect thereof, and to any Interest other than that of the Province in the same

¹⁰ *Environmental Goals and Sustainable Prosperity Act* 2007, c.7, s 4(1). To be achieved by "... having one of the cleanest and most sustainable environments in the world by 2020" (s 4(1)(a)) And "provid[ing] certainty to all sectors of the economy through the Government's economic development strategy... and establish clear environmental goals while improving the provinces economic performance to a level that is equal to or above the Canadian average by the year 2020" (s4(1)(b))

¹¹ *Environmental Goals and Sustainable Prosperity Act* SNS 2007, c.7, s. 3(2)(a), (c) and (d).

human and environmental health are interconnected. This interconnection is also noted in other chapters of this report, which flag associations between economic well-being and population health,¹² and also urge long-term thinking about the relationship between hydraulic fracturing and environmental sustainability.¹³

Nova Scotia's *Environment Act* also places an explicit cap on how much environmental risk can be tolerated. The act states that "the precautionary principle will be used in decision-making so that where there are threats of serious or irreversible damage, the lack of full scientific certainty shall not be used as a reason for postponing measure to prevent environmental degradation."¹⁴ Taken together with the provincial endorsement of the Mi'kmaq concept of *Netuklimk*, Nova Scotia has effectively committed itself to approaching hydraulic fracturing with an eye to the long term and exercising considerable caution.

c. Municipalities

Municipalities also have a decision-making role around many of the activities associated with hydraulic fracturing. For example, they have authority over local transportation issues such as how municipal roads may be used, and some emergency measures. Municipalities also control local environmental matters including wastewater management, solid waste management, noise, local drinking water protection, and have authority to enact by-laws to protect health and safety.¹⁵ Any provincial decision to authorize hydraulic fracturing activity in proximity to a municipality could trigger situations where the municipality would have to decide whether and how to exercise its jurisdiction, given the interests of its constituents. For example, the Municipality of the County of Inverness passed a by-law, based in part on its authority to protect local public health, which is intended to prohibit hydraulic fracturing.¹⁶ Municipalities could also pass by-laws that mitigate certain aspects of hydraulic fracturing activities, such as noise control, or could enter agreements for compensation for the use of municipal roads.

d. Aboriginal Governments

Aboriginal governments have significant roles in decision-making processes about hydraulic fracturing if there is a reasonable chance that their rights could be infringed upon, if shale gas is located under lands over which they do or may hold Aboriginal title, or if there is shale gas under reserve land. The Mi'kmaq of Nova Scotia are likely to have a particularly weighty role, given the robust nature of the Mi'kmaq's treaty rights, and the fact that their traditional territory takes in the whole province. Their guidance may also support understanding how the concept of *Netukulim'k* can be realized in practice. The specific question of how Mi'kmaq rights relate to

¹² Hydraulic Fracturing and Human Health in Nova Scotia discussion paper available at www.cbu.ca/resources/preject-documents

¹³ Environmental Impact discussion paper available at www.cbu.ca/resouces/project-documents

¹⁴ *Environment Act* SNS 1994-95, c.1.

¹⁵ *Municipal Government Act* SNS 1998. C.18, section 172.

¹⁶ Municipality of the County of Inverness, By-Law #45, *Being a by-law to prohibit the use of chemical (slickwater) hydraulic fracturing, otherwise known as high volume hydraulic fracturing (HVHF) or fracking, to extract methane gas or petroleum.* (May 6, 2013)

provincial and federal decision-making processes and authority is discussed in the separate paper, “Hydraulic Fracturing and the Aboriginal, Treaty and Statutory Rights of the Mi’kmaq.”

3. How is hydraulic fracturing currently regulated in Canadian jurisdictions, including Nova Scotia?

There are several jurisdictions in Canada where hydraulic fracturing is occurring or has taken place. There is currently no hydraulic fracturing taking place in Nova Scotia, but Nova Scotia has approved some operations in the past. Unlike off-shore activity, which is regulated by an independent board called the Canada-Nova Scotia Offshore Petroleum Board, onshore oil and gas activity within Nova Scotia is regulated by a number of provincial departments. The central authority is the Department of Energy. It administers the *Petroleum Resources Act*, which determines whether petroleum rights may be granted, and also gives the Minister of Energy the authority to enact regulations.¹⁷ There are several other government departments that regulate activities that are associated with hydraulic fracturing. For example, as discussed in the chapter on water, a project proponent would apply to the Department of the Environment for permits if they sought to withdraw water to use in a hydraulic fracturing operation.¹⁸

There is, however, minimal legislation in Nova Scotia that directly addresses hydraulic fracturing activity. One of the few examples is a statute which bans transporting hydraulic fracturing wastewater into the province.¹⁹ As discussed below, it is clear that Nova Scotia would have to pursue significant regulatory development if it chose to permit hydraulic fracturing.

Owing to their long history of onshore oil and gas development, British Columbia and Alberta have the most experience with onshore oil and gas regulatory frameworks in Canada. In British Columbia, the province created a single regulatory body, the Oil and Gas Commission (BCOGC), to oversee oil and gas activities. The BCOGC is authorized to enforce certain provisions of legislation that would otherwise be spread across multiple government departments and agencies. These include the *Environmental Management Act*, *Forest Act*, *Heritage Conservation Act*, *Land Act* and the *Water Act*. As a result, a hydraulic fracturing operator must apply for well permits and water withdrawal permits through the BCOGC, instead of through another department. This approach mitigates the risk that is otherwise caused by oil and gas operations being regulated in a piece-meal fashion, where problems may remain undetected or unaddressed due to confusion about legal mandate. Most of the BCOGC regulations apply to all oil and gas activities and are not specifically tailored to hydraulic fracturing. However, in the

¹⁷ *Petroleum Resources Act* (R.S.N.S., c.342). See also *Petroleum Resources Regulations* (NS Reg 147/2013), *Onshore Petroleum Geophysical Exploration Regulations* (NS Reg 24/2000) and the *Onshore Petroleum Drilling Regulations* (NS Reg 29/2001)

¹⁸ *Activities Designation Regulations*, N.S. Reg. 47/95, s 5(1)

¹⁹ *Importation of Hydraulic Fracturing Wastewater Prohibition Act 2013* (S.N.S. c. 36)

past few years, the BGOGC has issued several guidelines that refer specifically to the hydraulic fracturing industry.²⁰

Regulation of oil and gas activities in Alberta used to be spread out across several government ministries, and involved the Energy Resources Conservation Board (under Alberta Energy), Alberta Health, and Alberta Environment and Sustainable Resource Development. In 2013, Alberta combined the regulatory duties of these boards and departments into a single regulatory body, the Alberta Energy Regulator (AER), under the aegis of the Alberta Energy Ministry, which is now responsible for all aspects of oil and gas activities. For example, it regulates environmental issues, deep injection wells, and water withdrawals. The AER also has the power to enact new regulations and guidelines with respect to drilling, completing, producing, and abandoning hydraulic fracturing wells.²¹

Like Nova Scotia, New Brunswick regulates on-shore oil and gas activity through a series of Departments and statutes, with its Department of Energy and Mines being a central authority. Key statutes include the *Clean Water Act*, the *Clean Air Act*, the *Pipeline Act* and the *Oil and Natural Gas Act*. New Brunswick recently completed a process for creating a regime to oversee all oil and gas activity in the province, including the extraction of shale gas through hydraulic fracturing. They developed a “Blueprint”²², which focuses on policy issues, and “Rules for Industry”²³ which addresses operational issues. The Rules for Industry build on many aspects of Alberta’s regime, and explicitly adopt all of the Alberta Energy Regulator’s Directives relating to oil and gas drilling and completion.²⁴ New Brunswick describes many of its rules as more stringent than requirements in Alberta and British Columbia,²⁵ and industry representatives have expressed concern that the Rules are “onerous”.²⁶ These Rules are, however, not in the form of a statute or regulation. This means they are not directly enforceable.

²⁰ See for example: B.C. Oil and Gas Commission. (2013c). *Application Guideline for: Deep Well Disposal of Produced Water Deep Well Disposal of Nonhazardous Waste*. Victoria (BC): B.C. Oil and Gas Commission. Online at <https://www.bcogc.ca/node/8206/download>.

²¹ Council of Canadian Academies, “Environmental Impacts of Shale Gas Extraction in Canada” (Ottawa, Council of Canadian Academies, 2014) at 25.

²² Province of New Brunswick, “The New Brunswick Oil and Natural Gas Blueprint” (May 2013). Online at: <http://www2.gnb.ca/content/dam/gnb/Departments/en/pdf/Publications/9281%20ONG%20English%20Final%20web.pdf>

²³ Province of New Brunswick, “Responsible Environmental Management of Oil and Natural Gas Activities in New Brunswick: Rules for Industry” (February 2013) Online at: <http://www2.gnb.ca/content/dam/gnb/Corporate/pdf/ShaleGas/en/RulesforIndustry.pdf>

²⁴ New Brunswick, “Exploring Natural Gas in New Brunswick” (July 2014) at page 18. On line at: <http://www2.gnb.ca/content/dam/gnb/Departments/en/pdf/ExploringNaturalGasinNewBrunswick.pdf>

²⁵ New Brunswick, “Exploring Natural Gas in New Brunswick” (July 2014) at page 16. On line at: <http://www2.gnb.ca/content/dam/gnb/Departments/en/pdf/ExploringNaturalGasinNewBrunswick.pdf>

²⁶ CBC News, “Shale gas rules in New Brunswick among ‘strictest’” (February 15, 2013). Online at: <http://www.cbc.ca/news/canada/new-brunswick/shale-gas-rules-in-new-brunswick-among-strictest-1.1336457>

New Brunswick's officials have indicated that the rules “ ‘for the most part’ will be implemented as conditions to approvals and certificates” that are issued under existing statutes.²⁷ In theory, this creates discretion to not apply the Rules. This issue has apparently been identified by opposition political parties as a source of concern.²⁸

As a part of its regime, New Brunswick created an independent organization, the New Brunswick Energy Institute. The Institute's mandate is “to review and assess the environmental, social, economic and health issues relating to energy extraction, development or production” and thereby serve as an advisory body to the province.²⁹

New Brunswick's new regime is not without public controversy: two separate lawsuits were launched against the province in June 2014. The allegations which are made in these lawsuits include claims that New Brunswick's authorization process violates aboriginal, environmental, and constitutional law.

Nova Scotia has compiled information which describes the similarities and differences in several Canadian and American regimes.³⁰ It has not yet, however, produced a formal public evaluation of that information. If Nova Scotia was to decide to permit hydraulic fracturing, it would benefit from a comprehensive study of the strengths and weaknesses of existing regimes for regulating industry practice and protecting health and the environment, and consider their applicability to the geological, environmental and social conditions in various regions of Nova Scotia.

4. The Role of Regulations and risk-management

Nova Scotia's legislated commitment to the precautionary approach and focus on the long term is consistent with the recommendations that were reached by the Council of Canadian Academies (CCA) in their May, 2014 report on the state of knowledge of potential environmental impacts of hydraulic fracturing, and associated mitigation options.³¹ This peer-reviewed report has been discussed in other papers. It was produced by an independent and arms-length panel of fourteen experts, who engaged in a several year process of working through the evidence on potential environmental impacts of shale gas development, including the use of hydraulic fracturing. They have effectively produced our new baseline for understanding the risks and challenges associated with hydraulic fracturing.

²⁷ CBC News, “Shale gas rules in New Brunswick among ‘strictest’” (February 15, 2013). Online at: <http://www.cbc.ca/news/canada/new-brunswick/shale-gas-rules-in-new-brunswick-among-strictest-1.1336457>

²⁸ CBC News, “Shale gas rules in New Brunswick among ‘strictest’” (February 15, 2013). Online at: <http://www.cbc.ca/news/canada/new-brunswick/shale-gas-rules-in-new-brunswick-among-strictest-1.1336457>

²⁹ New Brunswick Energy Institute. <http://nbenergyinstitute.ca/about>

³⁰ P. Precht and D Dempster, *Jurisdictional Review of Hydraulic Fracturing Regulation (Final Report)* (March 27, 2012) Retrieved from <http://novascotia.ca/nse/pollutionprevention/docs/Consultation.Hydraulic.Fracturing-Jurisdictional.Review.pdf>.

³¹ Council of Canadian Academies, “Environmental Impacts of Shale Gas Extraction in Canada” (Ottawa, Council of Canadian Academies, 2014)

While their report is comprehensive, the CCA chose not to provide an exhaustive list of regulatory requirements. Instead, the panel identified a framework for regulatory goals and risk-management. This framework identifies key issues to consider and benchmarks against which to make decisions about regulating shale gas, including hydraulic fracturing.³² As such, this framework is helpful for deliberations about whether, how, and the extent to which regulating can protect human health and the environment to the satisfaction of Nova Scotians. These five elements are discussed below.

a. Technologies to develop and produce shale gas.

The CCA explains that “Equipment and products must be adequately designed, installed in compliance with specifications, and tested and maintained for reliability.”³³ In practice, technological developments are often achieved outside of the regulatory regime. For example, companies invest in research and development to improve their economic return, to advance industry best practices, and to improve their social license by identifying ways to operate which are more likely to be acceptable to members of the public. The CCA provides several examples of industry-driven technological developments in British Columbia, including reducing chemical additives in fracturing fluids.³⁴ That said, regulators have a role to play with respect to hydraulic fracturing technology. For example, regulators can require industry to use specific technologies, can prohibit or limit the use of certain chemicals, can require the testing of new technologies, and can impose monitoring systems and thresholds for interventions such as requiring a ‘traffic light’ approach to microseismic events.³⁵

b. Management systems to control the risks to the environment and public health.

The CCA identifies the following threshold for risk-management systems: “The safety management of equipment and processes associated with the development and operation of shale gas sites must be comprehensive and rigorous.”³⁶ Risk and safety management systems are essential for environmental protection and worker safety. The National Energy Board, which regulates hydraulic fracturing on federal lands, recently adopted filing requirements for hydraulic fracturing operators to ensure that areas of risk – especially risks caused by accidents and errors – are pre-emptively addressed. The operators must submit a: i) safety plan, ii) risk assessment

³² Council of Canadian Academies, “Environmental Impacts of Shale Gas Extraction in Canada” (Ottawa, Council of Canadian Academies, 2014) at xix.

³³ Council of Canadian Academies, “Environmental Impacts of Shale Gas Extraction in Canada” (Ottawa, Council of Canadian Academies, 2014) at xix.

³⁴ CCA at 64. See Box 3.1. at page 38.

³⁵ M. Zoback, “Managing the seismic risk of wastewater disposal” EARTH, April, 2012, 38-43.

³⁶ Council of Canadian Academies, “Environmental Impacts of Shale Gas Extraction in Canada” (Ottawa, Council of Canadian Academies, 2014) at xix.

and risk management plan, iii) environmental protection plan, iv) waste management plan, and v) spill contingency plan.³⁷

Not unlike technological developments, industry entities also drive elements of safety management, having “developed standards, codes, and guidance to embed risk safety management into the management systems of shale gas operators.”³⁸ For example, the Canadian Association of Petroleum Producers (CAPP) has published a set of operating practices and guiding principles related to hydraulic fracturing activities.³⁹ Government regulators can benefit from these voluntary risk management systems. They can adopt them directly as a regulation, or can use them and the data collected around their efficacy as guidance when creating their own mandatory management system.

c. An effective regulatory system.

The third element of the CCA’s five-part management framework is an effective regulatory system. The CCA report concludes that “Rules to govern the development of shale gas must be based on appropriate science-driven, outcome-based regulations with strong performance monitoring, inspection, and enforcement.”⁴⁰ The CCA highlights several specific regulations that must be included in an effective regulatory system. For example, it identifies well integrity as an important component of hydraulic fracturing regulatory requirements. Ensuring well integrity involves regulating, at a minimum, surface casing depth, casing strings, and logging, and must be sensitive to different geological conditions.⁴¹ Regulations in British Columbia, Alberta, and New Brunswick impose well integrity requirements to varying degrees.⁴² However, for the most part, the CCA’s framework emphasizes identifying the right principles for establishing regulatory requirements.

For example, the CCA’s report highlights the importance of sound science when establishing regulations. They write that standards should refer to “the level of emissions acceptable from a human health or environmental protection point of view.”⁴³ The CCA cautions that establishing these standards can be challenging because of a lack of scientific understanding, changing conditions, and insufficient resources.⁴⁴ These points merit elaboration.

³⁷ National Energy Board, “Filing Requirements for Onshore Drilling Operations Involving Hydraulic Fracturing”. (2013) Ottawa (ON), online: www.neb-one.gc.ca.

³⁸ Council of Canadian Academies, “Environmental Impacts of Shale Gas Extraction in Canada” (Ottawa, Council of Canadian Academies, 2014) at 200.

³⁹ See for example: CAPP (Canadian Association of Petroleum Producers), “Baseline Groundwater Testing”, (2012) Calgary (AB): CAPP.

⁴⁰ Council of Canadian Academies, “Environmental Impacts of Shale Gas Extraction in Canada” (Ottawa, Council of Canadian Academies, 2014) at xix. (CCA)

⁴¹ CCA at 195.

⁴² CCA at 196-197. See Table 9.1.

⁴³ CCA at 223.

⁴⁴ CCA at 203.

As noted above, public submissions repeatedly raised the question of whether regulations can protect human health and the environment from adverse consequences that may arise from or be associated with hydraulic fracturing. It is important to note from the start that some environmental issues are beyond the reach of regulatory protection: and so assessments must weigh the likelihood of an event occurring with the range its potential consequences. As the CCA states: “However sophisticated or well-intentioned, government and industry managers cannot guarantee that all environmental risks will be alleviated or all impacts avoided if development proceeds.”⁴⁵ The answer to this question is thus a matter of degree. Discussed below are three factors for understanding the effectiveness of regulations for addressing risk. They are (i) the adequacy of the knowledge base, (ii) political will and responsiveness of the regulations to the information base, and (iii) implementation, resourcing and enforcement. In some cases, these factors overlap.

i. Adequacy of the knowledge base

The degree to which regulating can protect human health and the environment turns in part on whether there is adequate information to understand how human health and the environment may be adversely impacted by hydraulic fracturing activities, as well as whether there is adequate information to understand how those risks can be mitigated. On the one hand, provinces such as Alberta appear to have gathered evidence so as to enable them to create a detailed and extensive set of standards for well casing and cementing, including prescribing acceptable materials, details for integrity testing, and performance and monitoring requirements,⁴⁶ which have reduced risk to a degree that is acceptable to the Alberta Energy Regulator and the Alberta provincial government. On the other hand, there is an abundant literature that documents knowledge gaps in other areas associated with hydraulic fracturing.

For example, in their review of shale gas development and regulating in Canada, Philips and Goldberg note that a “lack of reliable, scientific data to accurately determine the environmental and health effects of... hydraulic fracturing continues to be a key obstacle to effective regulation of the natural gas industry.”⁴⁷ The CCA report similarly concludes, “it is evident that more science is needed on which to base regulations, and that such regulations will only be effective if they are informed by timely monitoring and enforced rigorously.”⁴⁸ Effective regulation requires reliable information about the *in situ* risks associated with hydraulic fracturing. It also requires an understanding of how rules, standards, and prohibitions can effectively minimize these risks.

One knowledge gap, which impairs effective regulation, or at least assurance that regulations are effective, concerns monitoring. The CCA notes, “it is difficult to judge the efficacy of current

⁴⁵ CCA at 191.

⁴⁶ Keith Luft, Thomas O’Leary and Ian Laing, “Regulatory and Liability Issues in Horizontal Multi-Stage Fracturing” (2012) 50(2) *Alta Law Review* 403 at para 60

⁴⁷ Philips S and M Goldberg, “Natural Gas Development: Extracting Externalities – Towards Precaution-Based Decision-Making”, *McGill International Journal of Sustainable Development Law and Policy* (2013) 8:2 at 178.

⁴⁸ Council of Canadian Academies, “Environmental Impacts of Shale Gas Extraction in Canada” (Ottawa, Council of Canadian Academies, 2014) (CCA) at 219.

regulations because of the lack of scientific monitoring.”⁴⁹ In situ and geologically specific environmental monitoring is necessary to clarify the nature and extent of environmental and health impacts associated with hydraulic fracturing, so as to understand how effectively they can be eliminated or mitigated, or else to determine whether those risks are unacceptable. The Health Chapter of this report outlines a process of Health Impact Assessment (HIA) which may address part of this regulatory gap by ensuring that health consequences, and their distribution, are identified and used as part of the decision-making process. The Health Chapter similarly recommended that if the province was to consider permitting hydraulic fracturing, that the regulatory process require site specific HIAs be conducted. Ensuring effective monitoring of hydraulic fracturing development has been identified as an important component of an effective regulatory regime.⁵⁰

ii. Political will and responsiveness of the regulations to the knowledge base

The question of the efficacy of regulations for protecting human health and the environment also turns on whether the regulatory regime responds adequately to the knowledge base. This is in part about designing a good system, and in part about political will to take on regulatory challenges. For example, it is now known that if the fracturing process impinges on a near-by well, there may be induced pressure pulses or, in an extreme case, oil, gas, and fracturing fluid may be propelled up that well. This is called “interwell communication.” One interwell communication incident occurred in Innisfail, Alberta, in 2012, resulting in approximately 500 barrels of oil and hydraulic fracturing fluid being sprayed over a field.⁵¹ An investigation by EnergyWire found ten such incidents had occurred in Canada and the United States since 2009.⁵² Although extremely uncommon, the consequences of interwell communication can be dire, because if the fluid is not contained it could contaminate shallow aquifers. In the United States, many states see interwell communication as a matter which does not even need to be reported. The Arkansas Oil and Gas Commission, for example, apparently sees the issue as a matter “for companies to resolve between themselves because it affects production.”⁵³

Alberta’s response has been strikingly different. One month after the Innisfail incident, Alberta issued an industry bulletin stating that operators must “maintain well integrity at all times so as not to impact the environment [and] public safety”⁵⁴ and then went on to invest in developing extensive new technological requirements to prevent the likelihood of unintentional

⁴⁹ CCA at xx.

⁵⁰ CCA at xviii.

⁵¹ CBC News, “Fracking to blame for well blowout” December 12, 2012. Online at <http://www.cbc.ca/news/canada/calgary/fracking-to-blame-for-well-blowout-near-innisfail-1.1191497>

⁵² Gayathri Vaidyanathan, “Hydraulic Fracturing: When 2 wells meet, spills can often follow” EnergyWire, Monday August 5, 2013. Online at <http://www.eenews.net/stories/1059985587>.

⁵³ Gayathri Vaidyanathan, “Hydraulic Fracturing: When 2 wells meet, spills can often follow” EnergyWire, Monday August 5, 2013. Online at <http://www.eenews.net/stories/1059985587>.

⁵⁴ ERCB, Bulletin 2012-02, “Hydraulic Fracturing: Interwellbore Communication between Energy Wells” (23 January 2012), online: ERCB <www.ercb.ca/bulletins/Bulletin_2012_02.pdf>.

interwell communication, and to enhance overall well integrity.⁵⁵ Under Directive 83, operators are usually now required to construct their wells differently in a number of ways. For example, requirements are now in place to create multiple barriers to contain any disrupted fluids so they will not enter the environment. As well, operators are required to implement a monitoring system which will detect if the first barrier fails. The political will to respond to this risk, and to impose new and costly changes on industry, was very different between Arkansas and Alberta.

It is unclear what role political will played, as opposed to regulatory gaps, in the Kennetcook situation where two hydraulically fractured wells generated an unexpectedly high volume of hydraulic fracturing wastewater. This wastewater, usually called “flowback”, cannot safely be released directly back into the environment. Instead, it must be processed through a treatment plant or is sometimes disposed of through deep well injection. It is known that with any hydraulic fracturing operation there will be flowback. In the case of the hydraulic fracturing operation in Kennetcook, the high flowback volume resulted in a need to store 14 million litres of fluid. At the time, the Nova Scotia government must have been aware of the nature of the flowback fluid, and its potential for causing risks. The company wanted to inject the fluids in a nearby deep well but the Nova Scotia Department of Environment refused because of the uncertainties involved with reinjection.⁵⁶ Exactly what went on between the parties is not entirely clear. Meanwhile, the wastewater has sat for over 2 years in open, lined storage pits near Kennetcook, a storage practice that would not be permitted in other Canadian jurisdictions such as New Brunswick. In January 2014, heavy rain and snowfall caused the hydraulic fracturing wastewater to leak out of these ponds. Once again, this event was foreseeable. The wastewater remains in these ponds. This situation was discussed, with alarm, in many of the public submissions. Several members of the public forwarded a report on the Kennetcook situation to the Panel: the report describes various moments of what appears to be regulatory inaction, gaps or potential regulatory violations.⁵⁷

The Kennetcook situation appears to have resulted from an absence of regulatory requirements to conclusively address the storage, treatment, and disposal of hydraulic fracturing wastewater, despite the knowledge that if Nova Scotia issued permits for hydraulic fracturing activities to take place, wastewater would be produced and require treatment and disposal. It highlights the importance of political will to ensure that there is a comprehensive regulatory framework and emergency response capabilities in place before hydraulic fracturing activities occur. It also flags the sorts of problems which may be worsened by a piece-meal approach to regulation, where different government agencies have responsibilities at different stages, and regulatory gaps may go unrecognized until there is a live problem.

⁵⁵ Alberta Energy Regulator, “Directive 083: Hydraulic Fracturing – Subsurface Integrity” (May 21, 2013). Online at <http://www.aer.ca/rules-and-regulations/directives/directive-083>

⁵⁶ Council of Canadian Academies, “Environmental Impacts of Shale Gas Extraction in Canada” (Ottawa, Council of Canadian Academies, 2014) at 94.

⁵⁷ Nova Scotia Fracking Resource and Action Coalition (“NOFRAC”), “Out of Control: Nova Scotia’s Experience with Fracking for Shale Gas” (April 2013). Online at <http://www.nofrac.com/wp-content/uploads/2013/04/out-of-control-full-report3.pdf>

A related issue is that sometimes regulatory systems may be drafted in a way that could permit knowledge gaps to occur or persist. For example, although the Minister of the Environment's approval is required for many of the activities to take place which are associated with hydraulic fracturing, the existing provincial regime appears to leave it to the Minister's discretion to determine whether a proposal to engage in hydraulic fracturing should undergo an environmental impact assessment.⁵⁸ If Nova Scotia decides to permit hydraulic fracturing, it is highly unlikely that this status quo would be acceptable to its citizens, especially given how often the public submissions referenced concerns about environmental impact.

Another example of a regulatory response which appears to respond to specific known risks is Alberta's and British Columbia's regulations regarding certain disclosure requirements. Until recently there was limited disclosure of hydraulic fracturing fluid composition to governments, and minimal public access to this information, especially in the United States.⁵⁹ The result is that the ability to monitor for public health risks has been impaired. The situation is changing in many American states, and Canadian provinces are also developing regimes to address this issue. For example, as of 2010, British Columbia began requiring public disclosure.⁶⁰ Its regime has been described as the current high water mark level of disclosure, requiring the reporting of all fluid ingredients, CAS numbers, concentrations, whether the chemical is deemed hazardous, and other use details.⁶¹ Companies are required to post on a public website the chemical additives used in their fracturing fluids along with their maximum concentration within 30 days of completing a fracturing job on a public website (www.fracfocus.ca).⁶² In some American states, such as Wyoming, pre-operation chemical disclosure is required when a company first applies for a permit,⁶³ adding another level of key regulatory oversight. These are important and responsive improvements on previous disclosure requirements. They advance the public interest in allowing regulators and members of the public to be aware of the composition of fracturing fluid.

⁵⁸ Hydraulic fracturing would likely be considered a 'Designated Activity' under the *Activities Designation Regulations* (NS Reg 47/95), either pursuant to Section 17(2)(j), which applies to "a petroleum or natural gas exploration or recovery operation where it is necessary to inject water, brine or chemical agents in order to produce or enhance the recovery of petroleum or natural gas", or (k) "a petroleum or natural gas operation utilizing deep well injection for disposal of liquid production wastes". Pursuant to Part V of the *Environment Act* (and the *Approval Procedure Regulations*, NS Reg 48/95), all 'designated activities' require ministerial approval. This process involves applications, approvals (with or without conditions), or denials. It does not require an environmental assessment.

⁵⁹ Keith Luft, Thomas O'Leary and Ian Laing, "Regulatory and Liability Issues in Horizontal Multi-Stage Fracturing" (2012) 50(2) *Alta Law Review* 403 at para 29.

⁶⁰ British Columbia Ministry of Energy and Mines, Information Bulletin 2012ENER0001-000010, "Canada's First Hydraulic Fracturing Registry Now Online" (9 January 2010), online: <www2nes.gov.bc/news_releases_2009-2013/2012ENER0001-00 0010.pdf>.

⁶¹ Keith Luft, Thomas O'Leary and Ian Laing, "Regulatory and Liability Issues in Horizontal Multi-Stage Fracturing" (2012) 50(2) *Alta Law Review* 403 at para 43-44.

⁶² Council of Canadian Academies, "Environmental Impacts of Shale Gas Extraction in Canada" (Ottawa, Council of Canadian Academies, 2014) ("CCA") at 102.

⁶³ Wyoming Oil and Gas Conservation Commission, *Rules and Regulations*, ch 3, s.45.

On the other hand, the Directives and Regulations currently in force in Alberta and British Columbia do not appear to require the monitoring or disclosure of compounds that are brought to the surface with flowback after fracturing fluid has initially been injected.⁶⁴ This may be a cause of concern as some naturally occurring compounds can be hazardous and little is known about the interactions between chemical additives and natural compounds.⁶⁵ The CCA notes that more “information is also required on potentially hazardous chemicals produced down-hole by chemical interactions under high temperature and pressure.”⁶⁶ Thus regulatory practices in other jurisdictions respond well to some of what is known about mitigating risks associated with the chemicals that are added to water in the hydraulic fracturing process, but do not appear to have addressed the full knowledge base about potential chemical risk.

iii. Implementation, resourcing and enforcement

Finally, the question of whether regulations can protect human health and the environment turns on whether the regime is effective in practice. This third question is partially one of government priorities and capacity. If compliance is not monitored and enforced, industry incentive to comply will likely diminish, and public confidence that they are protected will be lost.⁶⁷ A report published by East Coast Environmental Law (ECELAW) in June 2014 investigated the Department of the Environment’s enforcement activities under the *Environment Act*. They were unable to access information that is submitted to the public registry, and were forced to instead rely on formal requests under the *Freedom of Information and Protection of Privacy Act*. They describe the information which they did receive as incomplete, and so “insufficient to provide a picture of environmental enforcement in Nova Scotia.”⁶⁸ As a result, ECELAW was unable to determine whether “the government is holding polluters accountable for the true cost of environmental harms”.⁶⁹ Such an apparent lack of transparency raises questions about government priorities, and undermines public confidence that harms are indeed being prevented or effectively mitigated by virtue of a regulatory regime.

⁶⁴There is no mention of such a requirement in the regulations or directives where one would expect to find such provisions. E.g. *Oil and Gas Activities Act* [S.B.C. 2008, chapter 36], *Drilling and Production Regulation* B.C. Reg 282/2010 (Updated February 2014); AER (Alberta Energy Regulator) (2012f) Bulletin 2012-25. Amendments to Directive 059: Well Drilling and Completion Data Filing Requirements in Support of Disclosure of Hydraulic Fracturing Fluid Information.

⁶⁵ CCA at 96.

⁶⁶ CCA at 19.

⁶⁷ Katherine Konschnik and Mark Boling, “Shale Gas Development: A Smart Regulatory Framework” *Environmental Science and Technology*, February 24, 2014, pages.c-d.

⁶⁸ East Coast Environmental Law, “Failure to Enforce? Time for transparent and effective environmental enforcement in Nova Scotia” (June 2014) . Online at <http://www.ecelaw.ca/92-failure-to-enforce-final-june-2014.html>

⁶⁹ East Coast Environmental Law, “Failure to Enforce? Time for transparent and effective environmental enforcement in Nova Scotia” (June 2014) at page 6. Online at <http://www.ecelaw.ca/92-failure-to-enforce-final-june-2014.html>

Enforcement requires an adequate budget. The experience in some American states has been that already overburdened agencies are unable to effectively monitor with their existing staff and funding.⁷⁰ Some models levy companies for the cost of regulatory enforcement. Nova Scotia, for example, uses this model for offshore oil and gas. Given the lack of an existing on-shore industry, and uncertainties as to potential profits, this approach may or may not be viable for onshore activities in Nova Scotia. Regardless, mechanisms must be in place to ensure adequate and high quality resourcing. If not, then the best regulations, based on the best science, are unlikely to be effective. As well, the experience in other jurisdictions when governance responsibility is shared across multiple agencies – as it currently is in Nova Scotia – is that the likelihood of risks being identified and acted upon is lessened, unless strong mechanisms are in place to address information sharing and action, as well as a mechanism to ensure responsiveness in the face of apparent mandate gaps.⁷¹

Effectiveness is also a matter of identifying appropriate sanctions for violations. A study of environmental regulatory violations by companies operating in the Marcellus Shale Gas play in Pennsylvania makes several recommendations to enhance compliance and reduce risk. These recommendations include increasing funding to ensure that independent inspections take place prior to drilling, and at key moments such as when wells are being sealed, as well as increasing penalty levels and bonding to further incentivize compliance.⁷² If a company is legislatively responsible for the costs of all negative impacts, they will be more diligent about compliance. Such an outcome is more likely to occur where companies are required to post bonds, which also provide security that costs will be addressed even if a company goes bankrupt.

Given the above factors, the effectiveness of a regulatory system to protect human health and the environment is a matter of degree. Some elements are controlled by government, while others are in the hands of operators. As discussed in the chapters throughout this report, there are different levels of scientific consensus regarding risk levels and certainty, and the effectiveness of mitigation vis-à-vis aspects of hydraulic fracturing. The decision about whether regulations can result in an acceptable level of risk, and whether the risks are offset by potential benefits, is primarily a question that must be answered in conversation between government, scientists, the public, industry, economists and other stakeholders, and the answer may vary in different regions of Nova Scotia. The need for public participation cannot be over-emphasized. This ties in with the fourth and fifth elements of the CCA's framework.

⁷⁰ Wiseman H. Fracturing Regulation Applied. (2012), *Duke Environmental Law and Policy Forum*, 22:361 at 377. Jason Gerken, "What the Frack Shale we do? A Proposed Environmental Regulatory Scheme for Hydraulic Fracturing" (2013) *Cap UL Review* 81 at 116-117

⁷¹ Katherine Konschnik and Mark Boling, "Shale Gas Development: A Smart Regulatory Framework" *Environmental Science and Technology*, February 24, 2014, page b.

⁷² PennEnvironment Research & Policy Center, "Risky Business: An Analysis of Marcellus Shale Gas Drilling Violations in Pennsylvania 2008-2011 (February 2012). On line at http://pennenvironmentcenter.org/sites/environment/files/reports/Risky%20Business%20Violations%20Report_0.pdf.

d. Regional planning.

The CCA Panel's fourth element for regulating risk-management is regional planning. They write that: "To address cumulative impacts, drilling and development plans must reflect local and regional environmental conditions, including existing land uses and environmental risks. Some areas may not be suitable for development with current technology, whereas others may require specific management measures."⁷³ They go on to note that Canadian jurisdictions "are recognizing the need to take a regional approach to managing the cumulative impacts of shale gas development."⁷⁴ Individual companies are not well placed to make such assessments, and regardless this is a matter which requires democratic oversight and accountability. The Alberta Energy Regulator has begun to identify some strategies for addressing cumulative effects. However, the Chief Executive of the Alberta Energy Regulator was explicit that more is needed, having recently commented that "I need a regional plan (from government) [for] the northwest" of the province.⁷⁵ British Columbia has developed oil and gas land use plans for various regions.⁷⁶ They determined that there are some regions where oil and gas activities are permissible, but others where it should not take place in the foreseeable future due to knowledge gaps or unacceptable impacts or risks.⁷⁷ Nova Scotia is fortunate to be considering whether it ought to engage in hydraulic fracturing at a time when it can benefit from these and other experiences, especially in Canadian jurisdictions.

e. Engagement of local citizens and stakeholders.

Regional planning ties in with the role of municipalities and citizens. In describing the fifth element of their framework, the CCA states that "Public engagement is necessary not only to inform local residents of development, but to receive their input on what values need to be protected, to reflect their concerns, and to earn their trust. Environmental data should be transparent and available to all stakeholders."⁷⁸ This panel has supported a level of public engagement, but, as discussed below, public engagement is required on a continuing basis as the province continues its deliberations.

The CCA seems to contemplate situations where hydraulic fracturing is already taking place, urging that "public engagement ideally involves a dialogue between the promoter and residents (including their municipal, First Nations and regional governments) that recognizes that these people have a legitimate stake in the management of the lands the industry wants to use. Successful public engagement starts early in the development process and continues until

⁷³ Council of Canadian Academies, "Environmental Impacts of Shale Gas Extraction in Canada" (Ottawa, Council of Canadian Academies, 2014) ("CCA") at xix.

⁷⁴ CCA at 205.

⁷⁵ Stephen Ewart, "AER looks to courts, government for clarity" Calgary Herald June 28, 2014.

⁷⁶ BCOGC, "Oil and Gas Land Use in Northeast British Columbia" (August 2013). Online at <http://www.bco.gc.ca/node/11039/download>.

⁷⁷ CCA at 207.

⁷⁸ CCA at xix.

decommissioning.”⁷⁹ They contemplate that regulators can impose public engagement requirements especially with regard to information sharing and good neighbor practices.⁸⁰

Given the level of concern in Nova Scotia about hydraulic fracturing that was expressed by those who participated in the public consultation process, public engagement regarding hydraulic fracturing must be substantial, and should not be left to occur only between citizens and individual oil and gas proponents. If Nova Scotia were to permit hydraulic fracturing in the future, various publics must play significant roles in developing the regulatory process, and so determining the rules and terms by which hydraulic fracturing can (and cannot) take place.

There have been a number of studies in the United States about the public’s role when a state is considering whether to permit hydraulic fracturing activities to occur. In particular, they state that a public participation process which “combines scientific analysis and broadly based deliberations is a promising avenue for developing robust and credible information about the risks and supporting governance systems that are responsible to public concerns ...”.⁸¹ The CCA also identifies an on-going role for the public in areas where hydraulic fracturing is occurring, and recommends regulations to ensure that the public is part of the monitoring process, through influencing what is monitored, accessing monitoring results, and commenting on these results.⁸² In the United States, a Guide that was requested by energy companies, and created by the investor groups, goes further, concluding that hydraulic fracturing activities require social license (that is, approval or acceptance by the local community). The Guide states:

Companies must be publicly transparent about managing their environmental footprint and social impacts, and engage with key community stakeholders to earn and maintain their social license to operate. Transparency requires full disclosure of steps being taken to minimize risks, acknowledgement of challenges and failures, and clearly defined steps to continually improve operations.⁸³

From this perspective, the social license to operate is thus a precondition, and a continuing condition, for hydraulic fracturing to occur in any given community.

Finally, the benefits of creating a clear role for the public in any dispute or complaint resolution have been recognized in a variety of fields. Such mechanisms need to be carefully designed, and include not only a structured and accessible dialogue process that gives voice to the public, but also has clear mechanisms to support coming to a settled outcome as well as follow-up mechanisms to monitor and enforce any outcome.⁸⁴ Of course, while some disputes can be

⁷⁹Council of Canadian Academies, “Environmental Impacts of Shale Gas Extraction in Canada” (Ottawa, Council of Canadian Academies, 2014) (“CCA”) at 209.

⁸⁰ CCA at 210.

⁸¹ Warner North, Paul Stern, Thomas Webler and Patrick Field, “Public and Stakeholder Participation for Managing and Reducing the Risks of Shale Gas Development” *Environmental Science and Technology*, March 10, 2014.

⁸² CCA at 13.

⁸³ As cited Jason Gerken, “What the Frack Shale we do? A Proposed Environmental Regulatory Scheme for Hydraulic Fracturing” (2013) *Cap UL Review* 81 at page 124-125.

⁸⁴ John Braithwaite, “The Essence of Responsive Regulation” (2011) 44 *UBC L Rev.* 475.

resolved at this level, not all disputes or complaints ought to be taken through this route, especially those which may require immediate action or sanction.

5. Concluding Comments

The public are asking complex questions about the role and value of regulations. The answers to their questions are not straight-forward. This is in part because the effectiveness of a regulatory system turns on the adequacy of the knowledge base, the practical responsiveness of regulations to the knowledge base, and whether the regulatory system is sufficiently supported by resources and also enforced. It is essential that these questions continue to be asked as this process moves forward.

APPENDIX A: A SURVEY OF LITIGATION

As the pace of hydraulic fracturing activities increases in Canada and the United States, so too do the number of lawsuits. Most the cases have been launched in the United States. It is important to note that Canada and the United States have very different legal systems. For example, in Canada if a person launches a lawsuit and loses, they will be responsible for paying a portion of the legal fees of the party who they sued. However, in the United States, if a person launches a suit and loses, they will not be responsible for any of the costs incurred by the defendant. This feature was identified as one of the reasons why Americans sue more than citizens of any country in the European Union.⁸⁵ There is also a strong tradition of contingency fee relationships in the United States, where the plaintiff's lawyer will be paid a portion of any settlement instead of being paid a fee. The result is that if a suit is unsuccessful, the plaintiff may not be substantially out of pocket. Also, as illustrated at a few points in this paper, American regulatory standards are also not always as strict as those which are present in Canadian jurisdictions, with, for example, the American state governments often left in the dark as to what chemicals are used in hydraulic fracturing fluids, and indeed there is a "current absence of federal regulations of several stages of the fracing process."⁸⁶

Most of the lawsuits involve private landowners seeking compensation for property damage, and in some cases personal injury, allegedly arising from hydraulic fracturing operations.⁸⁷ There are also some actions against regulatory bodies or government. For example, there are currently two outstanding claims against New Brunswick. One draws on alleged violations of the Canadian Charter of Rights and Freedoms, while another cites violations of environmental and aboriginal law. There is also an on-going suit against Alberta that claims Alberta failed in its duty to protect the claimant against harm. As well, there is one significant claim against Canada brought by an American company based on the *North American Free Trade Act*.

Very few claims have actually gone to trial. This results from a combination of many claims being settled out of court, and some claims being dismissed before reaching the trial stage. There are also some cases waiting to be tried.⁸⁸ Some jurisdictions, such as Alberta, also have out-of-court dispute resolution processes to address claims or concerns by private landowners, where the claims are heard by committees that are intended to represent various stakeholder groups.⁸⁹ In so far as such processes are experienced as producing just outcomes, they divert individuals from pursuing a court action.

⁸⁵ Michael Baye, Dan Lovenock and Casper de Vries, "The Litigious Society: Why Americans Spend More on Lawsuits than Brits" July 2005 Economic Journal.

⁸⁶ Hannah Wiseman, Risk and Response in Fracturing Policy, (2013) 84 U. COLO. L. REV.

⁸⁷ Keith Luft, Thomas O'Leary and Ian Laing, "Regulatory and Liability Issues in Horizontal Multi-Stage Fracturing" (2012) 50(2) Alta Law Review 403 at 423.

⁸⁸ Hall, KB. "Hydraulic fracturing contamination claims: problems of proof" (2013) *Ohio State Law Journal Furthermore*, 74 at 25.

⁸⁹ Alberta Energy Regulator, "Statement of Concern". Online at <http://www.aer.ca/applications-and-notice/statement-of-concern>

There has only been one case which went to trial and resulted in a finding in favour of a landowner. The Texas-based *Lisa Parr v Aruba Petroleum* claim, which was determined in April 2014, resulted in the landowner being awarded \$2.9 million in compensation. However, as the verdict was reached by a jury (on a 5-1 split) there are no written reasons explaining how the evidence was weighed, or what factors lead the jury to be convinced that causation had been made out.⁹⁰ The company which was sued has indicated that it will appeal this decision.

Overall, at this point, the cases do little to confirm or deny the existence of the claimed injuries. That said, the cases are informative for helping to reveal issues where the public may have either not felt protected by the existing regulatory regime, or else has perceived a regulatory failure. As such they point to a need to pro-actively regulate.⁹¹ Regulations can prevent harms from occurring, while actions in tort are only successful if a harm has already occurred. The cases also illustrate that the public will seek to hold the state accountable if there is a perception that the state has failed to enforce its own rules, or otherwise abide by the law. Where appropriate, some comments are made about the relevance of the cases for regulating.

I. Contamination Cases

In the United States, most lawsuits related to hydraulic fracturing are brought by private landowners, who seek compensation for alleged contamination arising from hydraulic fracturing operations. The typical claim is that the use of toxic chemicals during the hydraulic fracturing process contaminated groundwater or caused air and surface pollution. These lawsuits rely on several causes of action in tort, including nuisance, trespass, and negligence.⁹² The landowner typically seek compensation for alleged reduction in property value, personal injury, punitive damages or an injunction. However, these cases seldom go to trial.

Mitchell v. EnCana Oil & Gas Inc is a representative American example.⁹³ EnCana Oil and Gas Inc operated hydraulic fracturing activities near Grace Mitchell's property in Johnson County, Texas. After hydraulic fracturing had commenced, Ms. Mitchell alleged that her well water smelled like gasoline, was slick, and was contaminated with various chemicals similar to diesel fuel. She brought claims in nuisance, trespass, negligence, fraud, and strict liability. She sought compensation for loss of use of groundwater, loss of market value of property, remediation, and punitive damages. Like many others, she reached an out-of-court settlement with EnCana, and so the case was dropped.

⁹⁰ *Lisa Parr v. Aruba Petroleum*, Cause No. 11-01650-E, in the County Court at Law No. 5 of Dallas County. See Larry Bodine, "Texas Family Wins Landmark \$3-million Verdict Against Fracking Operator" *The National Trial Lawyers* (April 24, 2014). Online at <http://www.thenationaltriallawyers.org/2014/04/3-million-fracking/>.

⁹¹ Jason Gerken, "What the Frack Shale we do? A Proposed Environmental Regulatory Scheme for Hydraulic Fracturing" (2013) *Cap UL Review* 81 at 99.

⁹² Keith Luft, Thomas O'Leary and Ian Laing, "Regulatory and Liability Issues in Horizontal Multi-Stage Fracturing" (2012) 50(2) *Alta Law Review* 403 at 423.

⁹³ *Mitchell v. Encana Oil & Gas (USA), Inc.; Chesapeake Operating, Inc.; Chesapeake Exploration, LLC*, No. 3:10-cv-02555 (N.D. Tex., Dec. 15, 2010).

In addition to groundwater contamination, air, surface and noise pollution are common concerns being raised in hydraulic fracturing litigation in the United States.⁹⁴ These claims all rely on common law tort causes of action (similar to groundwater contamination) and could also be brought in Nova Scotia.

Of the contamination cases that do go before courts, many are unsuccessful because the landowner plaintiff failed to establish legal causation. To win their case, the landowner must usually prove that the hydraulic fracturing activity directly caused contamination of their property. However, many harmful substances exist naturally in groundwater in low concentrations. As landowners are unlikely to be able to refer to pre-development baseline testing, they are challenged to provide evidence that the presence of a particular harmful substance resulted from hydraulic fracturing, instead of being a natural occurrence.⁹⁵ As well, if there are multiple producers in an area, “it may be difficult, if not impossible, to pinpoint the source of any specific substances, particularly given the natural subsurface movement of groundwater and hydrocarbons.”⁹⁶ There are at least two cases in the United States that were voluntarily withdrawn when the plaintiffs realized they could not meet the evidentiary threshold for proving causation.⁹⁷ In terms of the development of the law, it is frustrating that the Texas case was determined by a jury, as juries do not produce written reasons so no one can see how the jury was persuaded that the evidence in this case proved causation.

As flagged above, many of these cases end in confidential settlements before they reach the court. This makes it impossible to draw conclusions about the merits of the different claims,⁹⁸ because a company may settle for a variety of reasons including avoiding the high costs of a court case which they are unlikely to recover even if the claim is not made out, or avoiding negative publicity. Though these cases provide little guidance in the form of settled case law, they are indicative of the wide range of public concerns relating to the hydraulic fracturing industry.

There appears to have only been one lawsuit brought by a private landowner in Canada over hydraulic fracturing. Ms. Ernst alleges that her water supply was contaminated by hydraulic fracturing operations carried out by EnCana near her home in Rosebud, Alberta.⁹⁹ She initiated this case in 2007; it has yet to be heard on its merits. Ms. Ernst’s claims are similar to those seen in the American lawsuits. These include negligence, nuisance, and trespass. She sought monetary

⁹⁴ Keith Luft et al at 21.

⁹⁵ KB Hall “Hydraulic fracturing contamination claims: problems of proof” (2013) *Ohio State Law Journal* *Furthermore*, at 76.

⁹⁶ Keith Luft, Thomas O’Leary and Ian Laing, “Regulatory and Liability Issues in Horizontal Multi-Stage Fracturing” (2012) 50(2) *Alta Law Review* 403 at 428.

⁹⁷ KB Hall, “Hydraulic fracturing contamination claims: problems of proof” (2013) *Ohio State Law Journal* *Furthermore*, at 74-75.

⁹⁸ F. Gradijan, “State regulations, litigation, and hydraulic fracturing”, (2012) *Environmental & Energy Law & Policy J* 7:1 at 57

⁹⁹ *Ernst v EnCana Corp*, 2013 ABQB 537 at para. 1 [Ernst].

compensation for the loss of use of her property, environmental damage to her property, reduction in property value, and mental and emotional distress.¹⁰⁰

The outcome of the *Ernst v EnCana* contamination case will be of interest to governments, citizens, and hydraulic fracturing companies across Canada. The causes of action that were relied upon by Ms. Ernst are available to all Canadian private landowners, including Nova Scotians. The types of relief sought by Ms. Ernst are also available in Nova Scotia. Contamination cases in Nova Scotia will likely face similar difficulties with respect to proving causation as seen in American contamination lawsuits.

These cases point to a need - in areas where hydraulic fracturing is permitted - for regulations to require baseline testing and monitoring of groundwater, as well as other key environmental indicators before, during and after hydraulic fracturing activities, so that there is at least some clarity on whether changes have taken place. Such testing would in turn help identify whether current regulatory practices do in fact adequately mitigate contamination.

II. Trespass and the Rule of Capture

In the United States, there has been significant litigation between oil and gas producers with respect to subsurface trespass and the ‘rule of capture’.¹⁰¹ The rule of capture is an established common law principle. It states that an oil and gas producer is not liable if gas migrates from an adjacent property to the property where the producer is operating. In other words, a gas rights owner loses rights to the gas below their property if/when it migrates to another property. In the United States, the decision in *Coastal v Garza* established that the rule of capture applied in situations where hydraulic fracturing caused natural gas drainage. In Canada, the rule of capture has been established through oil and gas litigation in Alberta. It has not yet been applied to migration as a result of hydraulic fracturing.¹⁰²

As private property owners in Nova Scotia, unlike the United States, do not own the minerals which rest under their property, the rule of capture is unlikely to provoke much litigation here if the province chooses to permit hydraulic fracturing. However, there could be litigation as between oil and service companies. The question of whether this requires regulatory intervention is a question for industry and government to consider.

III. Corporate litigation

There is one hydraulic fracturing suit in Canada where a corporate party is suing Canada. It is a free trade dispute under the North American Free Trade Agreement (NAFTA). Lone Pine

¹⁰⁰ Ernst at para. 1.

¹⁰¹ Keith Luft, Thomas O’Leary and Ian Laing, “Regulatory and Liability Issues in Horizontal Multi-Stage Fracturing” (2012) 50(2) *Alta Law Review* 403 at 423.

¹⁰² Keith Luft et al at 433.

Resources Inc, an American company, was issued natural gas exploration permits in the Utica shale gas basin underneath the St. Lawrence River in Quebec. In 2011, Quebec’s Bureau d’audiences publiques sur l’environnement issued a report on hydraulic fracturing that prompted Quebec to place a moratorium on all new drilling permits until a strategic environmental evaluation was completed. Then, in April 2012, Quebec announced a moratorium on all hydraulic fracturing in the province.

Lone Pine subsequently filed notice that it intends to sue the Government of Canada under the investor rights chapter of NAFTA.¹⁰³ (They are suing the Government of Canada – not the Quebec government – because the federal government is a party to NAFTA.) The section of NAFTA that they are relying upon “protect[s] investors against arbitrary expropriation and expropriation without compensation by the NAFTA member states.” They claim the moratorium is an “arbitrary, capricious, and illegal revocation of its valuable right to mine for oil and gas.”¹⁰⁴ They seek \$250 million in compensation for their investment in these permits and loss of expected profit from exploiting these resources.

This dispute is on-going, and likely will be for years. Regardless of its outcome, it will identify some of the rights which American hydraulic fracturing companies may possess under NAFTA if they are granted exploration or other rights within Canada. At present, Nova Scotia is not at risk of becoming involved in a NAFTA dispute. However, if Nova Scotia issues licenses or otherwise authorizes American companies to operate here, it should anticipate that liabilities may be incurred if the province subsequently wishes to modify its position on hydraulic fracturing. This is an important consideration for regulators: once a practice is authorized and licenses issued, it may be very costly to change course.

IV. Litigation against governments

In the United States, environmental public interest organizations have brought several cases against both federal and state government departments with respect to hydraulic fracturing issues. For example, the Center for Biological Diversity and the Sierra Club launched a case against the Bureau of Land Management. This action was successful, as they proved the government department had leased land for hydraulic fracturing oil and gas extraction without adequately assessing the risks posed by hydraulic fracturing in the area.¹⁰⁵

In Canada, the Wilderness Committee and Sierra Club BC brought a similar lawsuit against the BC Oil and Gas Commission. Their claim was that it breached the Water Act by granting hundreds of short-term water permits to hydraulic fracturing companies each year. They allege

¹⁰³ Lone Pine’s Notice of Intent to Submit a Claim to Arbitration Under Chapter Eleven of the North American Free Trade Agreement, 8 November 2012, <http://www.international.gc.ca/trade-agreements-accords-commerciaux/assets/pdfs/disp-diff/lone-01.pdf> [07-04-2013].

¹⁰⁴ Lone Pine’s Notice of Intent to Submit a Claim to Arbitration

¹⁰⁵ *Center for Biological Diversity and Sierra Club v. The Bureau of Land Management and Ken Salazar, Secretary of the Department of the Interior*, No. 5:11-cv-06174 (N.D. Cal., December 8, 2011)

that the cumulative impact of these permits will endanger lakes, rivers and streams in northeastern B.C. As a remedy, they are requesting that specific water use authorizations are revoked.¹⁰⁶ This case was filed in November 2013, and has yet to be heard.

A lawsuit has also been launched against the government of New Brunswick by the New Brunswick Anti-Shale Gas Alliance. The statement of claim was filed on June 23, 2014. It argues that the provincial government's decision to authorize hydraulic fracturing activities violates section 7 of the Canadian Charter of Rights and Freedoms. Section 7 protects "life, liberty and security of the person."¹⁰⁷ In particular, they argue that the government's decision to invest "social, political and economic capital and resources owned by the people of New Brunswick in unconventional oil and gas development" impairs the right to life because it is inconsistent with protecting air and water, and because hydraulic fracturing will contribute to climate change. This case raises the familiar issues of water and air contamination, but is novel for framing those issues as violating Charter rights. The remedy they are seeking is for an injunction that would place a moratorium on all shale gas activities until the province can establish "beyond a reasonable doubt and with scientific certainty that unconventional oil and gas development cannot and will not contribute to climate change nor to the contamination of the water, air and land use which causes harm to the health of the Plaintiffs and their future generations in New Brunswick". If this case proceeds to a hearing, it will be of tremendous interest across Canada.

Another lawsuit was launched against New Brunswick on June 26, 2014.¹⁰⁸ This suit was brought by a collection of 18 individuals, including several Aboriginal people. Like the claim brought by the Anti-Shale Gas Alliance, it seeks a court ordered injunction prohibiting shale gas activity unless the government can establish beyond a reasonable doubt and with scientific certainty that hydraulic fracturing will not contribute to climate change or environmental or health contamination. It also seeks various other orders, including compensation for damage caused to Mi'kmaq traditional lands due to exploration activities. The claim alleges violations of environmental, constitutional, and international laws, and also claims violations of the duty to consult which is owed to Aboriginal peoples.

Finally, Ms. Ernst, whose claim against a hydraulic fracturing company was described above, also claimed against the Alberta Energy Regulator (AER). Ms Ernst alleged the AER had acted negligently in its statutory obligations, and in particular was negligent in its response to

¹⁰⁶ *Western Canada Wilderness Committee and Sierra Club of British Columbia Foundation v Oil and Gas Commission and Encana Corporation*, Petition to the Court, 13 November 2013. Available from: http://www.ecojustice.ca/files/s.8-water-approval-fracking-petition/at_download/file

¹⁰⁷ The statement of claim is posted on-line at <http://www.noshalegasnb.ca/wordpress/wp-content/uploads/2014/06/Statement-of-Claim-website-version.pdf>

¹⁰⁸ *Wilhemina Nolan et al v Southwestern Energy Resources Canada Inc. and Her Majesty the Queen in Right of the Province of New Brunswick and Her Majesty the Queen in Right of the Government of Canada*, Statement of Claim (June 26, 2014). Posted online at <https://docs.google.com/file/d/0B5JmzR9UoeLQNDgzNTN0bEs4bIRPNWM0VW5mc1VUTzZRTWM0/edit?pli=1>

Ms. Ernst's concern that the Rosebud aquifer had suffered water contamination.¹⁰⁹ The AER sought to strike the claim on the basis that its enabling statute made it immune from negligence actions. This argument was successful.¹¹⁰ Ms Ernst appealed this decision, and her appeal was heard on May 8, 2014.

Ms. Ernst's claim also named Alberta's Department of Environment and Sustainable Resource Development. She claimed the Department owed her a duty to protect her water well from foreseeable contamination caused by drilling for shallow methane gas. She alleges that the Department breached its duty to her, in part by allegedly failing to conduct a reasonable investigation and to take remedial steps to correct damage.¹¹¹ This claim has not been determined.

Claims against government departments and regulatory boards for failing in their obligations are becoming more common. These cases may allege that government bodies are violating existing environmental laws or negligently performing their duties. Similar sorts of claims could be brought against provincial departments or regulators here in Nova Scotia.

¹⁰⁹ *Ernst v EnCana Corp*, 2013 ABQB 537 ["Earnet"] at para 2.

¹¹⁰ *Ernst* at paras. 56-58.

¹¹¹ *Ernst* at para. 3.