

STANDING COMMITTEE ON ECONOMIC  
DEVELOPMENT AND INFRASTRUCTURE

RESEARCH SUMMARY:  
*HYDRAULIC  
FRACTURING FILING  
REGULATIONS*

---

4 JUNE 2015

<b>ABBREVIATIONS</b> .....	<b>4</b>
<b>INTRODUCTION</b> .....	<b>5</b>
REVIEWING THE DRAFT REGULATIONS.....	5
THEMES IN RESPONSES FROM THE COMMITTEE.....	5
<b>WHAT IS HYDRAULIC FRACTURING?</b> .....	<b>6</b>
PAST ACTIVITY IN THE NORTHWEST TERRITORIES .....	7
<i>Horizontal fracturing</i> .....	7
<i>Hydraulic (Vertical) fracturing</i> .....	8
<i>Acid fracturing</i> .....	8
<b>EXPLORING COMMON STATEMENTS</b> .....	<b>9</b>
“HYDRAULIC FRACTURING HAS BEEN USED IN CANADA FOR DECADES” .....	9
“HYDRAULIC FRACTURING HAS NEVER BEEN LINKED TO CONTAMINATED WATER” .....	9
<i>Shallow Aquifer Contamination</i> .....	10
<i>Fracture Communications</i> .....	10
“Evaluating a groundwater supply contamination incident attributed to Marcellus Shale gas development” (Pennsylvania State University).....	11
<i>Litigation and Non-Disclosure</i> .....	11
<b>FRACTURING IN THE NORTHWEST TERRITORIES</b> .....	<b>12</b>
PAST ACTIVITY.....	12
WATER USE.....	12
<i>Required Volumes</i> .....	12
<i>Understanding Water Use</i> .....	12
PRESENT ACTIVITY.....	13
<i>Oil and Gas Activity</i> .....	13
<i>Horizontal fracturing</i> .....	13
<i>Silica Sand</i> .....	14
<i>GNWT Initiatives</i> .....	14
HOW DID HYDRAULIC FRACTURING TAKE PLACE UNDER THE NEB? .....	15
RESOURCE ESTIMATES .....	16
<i>Past Estimates</i> .....	17
“An Assessment of the Unconventional Petroleum Resources of the Bluefish Shale and the Canol Shale in the Northwest Territories” .....	18
<b>THE DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</b> .....	<b>19</b>
REGULATORY FRAMEWORK.....	19
WHAT ARE THE HYDRAULIC FRACTURING FILING REGULATIONS?.....	20
COMPARING THE NEBFR AND THE DRAFT REGULATIONS .....	20
SURETY AND INDEMNITY BONDS .....	22
“FOUR AREAS OF INTEREST TO NORTHERNERS” .....	22
(1) <i>Baseline surface and groundwater information</i> .....	22
(2) <i>Public Disclosure</i> .....	23
(3) <i>Air Quality</i> .....	25
(4) <i>Enhanced Reporting and Disclosure (Pre- and Post-Fracture)</i> .....	26
ALTERATIONS AND ADDITIONS TO THE DRAFT REGULATIONS .....	28
<i>Alteration to the Draft Regulations</i> .....	28
<i>Additions to the Draft Regulations</i> .....	28
EXCLUSIONS FROM THE DRAFT REGULATIONS (HFFR).....	31
<i>Environmental and Socio-economic Assessment, Produced Fluids, Chemical Substances, and Human Resources</i> .....	31
<i>Water</i> .....	32
<i>Environmental Protection Plan</i> .....	33

<i>Waste Management</i> .....	33
<i>Well Suspension and Abandonment</i> .....	33
TERMINOLOGY .....	33
<i>Terms imply a standard without defining, or assigning the responsibility to define, parameters for that standard</i> .....	33
<i>Duplicative words can cause confusion</i> .....	34
<i>Terms are used inconsistently</i> .....	35
<i>Variations on defined terms leave intent unclear</i> .....	35
ITEMS IDENTIFIED BY THE COMMITTEE .....	36
PUBLIC ENGAGEMENT .....	38
<i>Draft Hydraulic Fracturing Filing Regulations: Public Package</i> .....	38
<i>Community Sessions</i> .....	39
<i>Official First Nations Positions on Hydraulic Fracturing</i> .....	40
<b>OTHER</b> .....	<b>42</b>
ABANDONED AND SUSPENDED WELLS .....	42
LAND AND WATER “SUPERBOARD” .....	42
<b>GLOSSARY</b> .....	<b>43</b>
<b>BIBLIOGRAPHY</b> .....	<b>47</b>

**The Standing Committee on Economic Development and Infrastructure consists of MLAs Robert Hawkins (Yellowknife Centre), Frederick Blake Jr. (Mackenzie Delta), Robert Bouchard (Hay River North), Bob Bromley (Weledeh), Kevin Menicoche (Nahendeh), and Michael Nadli (Deh Cho).**

---

## ABBREVIATIONS

---

- AANDC — Aboriginal Affairs and Northern Development Canada
- AER — Alberta Energy Regulator
- CIMP — NWT Cumulative Impact Monitoring Program
- COCA — The Council of Canadian Academies
- COGOA — *Canada Oil and Gas Operations Act*, mirrored in the NWT OGOA
- COGDPR — *Canada Oil and Gas Drilling and Production Regulations*, mirrored in the NWT OGDPR
- CPRA — *Canada Petroleum Resources Act*, mirrored in the NWT PRA
- DFN — Dehcho First Nations
- ENR — NWT Department of Environmental and Natural Resources
- EPP — Environmental Protection Plan (HFFR 6)
- ESRF — Environmental Studies Research Fund
- GHG — Greenhouse gas
- GNWT — Government of the Northwest Territories
- HFFR — *Hydraulic Fracturing Filing Regulations* (draft)
- ISR — Inuvialuit Settlement Region
- ITI — NWT Department of Industry, Tourism, and Investment
- NEB — National Energy Board
- NEBFR — *National Energy Board Filing Requirements for Onshore Drilling Operations Involving Hydraulic Fracturing*
- NAFTA — North American Free Trade Agreement
- NWT — Northwest Territories
- NTGS — Northwest Territories Geological Survey (formerly the Northwest Territories Geosciences Office)
- OGOA — *Oil and Gas Operations Act*
- OGDPR — *Oil and Gas Drilling and Production Regulations*
- OROGO — NWT Office of the Regulator of Oil and Gas Operations
- PRA — *Petroleum Resources Act*
- SDD — Significant Discovery Declaration
- SDL — Significant Discovery Licence
- TcF — Trillion cubic feet (measurement for natural gas)
- TK — Traditional knowledge

---

## INTRODUCTION

---

### REVIEWING THE DRAFT REGULATIONS

The draft regulations are described as “serv[ing] to enhance the existing regulatory framework that is already designed to protect human health and safety and the environment” (Questions and Answers 1). ITI identifies these areas as “northern priorities,” describing the draft regulations as based on “the views and priorities of NWT [Northwest Territories] residents” and attributing identification of these priorities both to broad consultation (e.g., the *Land Use Sustainability Framework*, the *Water Strategy*, etc.) and to Committee reports (CBC News). The Committee responded in a 27 April 2015 news release.

However, what may be considered an “enhancement” by one stakeholder group may not be viewed as such by another. Subsequently, using the *National Energy Board Filing Requirements for Onshore Drilling Operations Involving Hydraulic Fracturing* (NEBFR) as a foundational document, this report will examine differences between the NEBFR and the draft regulations in **three categories**:

- 1) Alterations and additions;
- 2) Exclusions—Sections and provisions from the NEBFR not mirrored in the draft regulations, but **addressed elsewhere** in the regulatory framework; and
- 3) Exclusions—Sections and provisions from the NEBFR not mirrored in the draft regulations and **not addressed elsewhere** in the regulatory framework.

It is important to note that where NEBFR items excluded from the draft regulations are addressed elsewhere in the regulatory framework (e.g., in different regulations), the regulatory effect is not necessarily the same. For further detail, see “[Comparing the NEBFR and the Draft Regulations](#).”

### THEMES IN RESPONSES FROM THE COMMITTEE

To date, the Committee has not taken an official position on hydraulic fracturing. However, the Committee has responded to work put forward by the Government of the Northwest Territories (GNWT), including a study tour and the draft regulations. From these responses, the following themes emerge:

#### **Baseline data and research:**

- Baseline environmental and geological information (establishment and continued collection); and
- Regional seismicity and pre-fracture seismic work.

#### **Monitoring and oversight:**

- Standards for all phases of the drilling process, quality management system, and overall mitigation strategy;
- Implementation of environmental monitoring and area management plans;
- Greenhouse gas (GHG) monitoring and mitigation measures;
- Fracture design and analysis monitoring and reporting;
- [Flowback](#) monitoring;
- Monitor, manage, and mitigate emissions, [flaring](#), and material effects on air quality;
- Link industry commitments to actions; and
- Lessons learned and ongoing review.

**Operations:**

- Wellbore construction, casing, and cementing;
- Well spacing and inter-well communication;
- Require industry to demonstrate they are making every effort to use the most efficient, leading technology in reducing toxic chemicals;
- Standards for tracer chemicals;
- Spills; and
- Well abandonment and remediation.

**Public consultation and disclosure:**

- Meaningful and timely public consultation and disclosure;
- Fair and transparent communication and opportunities for public engagement through all phases of development;
- GNWT should develop active and accessible public information system; and
- Annual and pre-fracture reporting.

**Water and waste management:**

- Freshwater withdrawal and use: minimized use, specified sources and allowable limits, monitoring and reporting;
- Learn from British Columbia experience of borrow pits; and
- Wastewater storage, treatment, and disposal (on-surface storage is unacceptable to the Committee) and transportation expectations (risk and emergency management).

---

**WHAT IS HYDRAULIC FRACTURING?**

---

In 2014 and at the request of the federal government, The Council of Canadian Academies (COCA) produced a report assessing the state of scientific knowledge respecting fracturing. The report addresses shale gas extraction, with a primary focus on available scientific

knowledge. Oil is also discussed, though in less detail. COCA describes hydraulic fracturing as

“[i]njecting fracturing fluids into the target formation at a force exceeding the parting pressure of the rock thus inducing a network of fractures through which oil or natural gas can flow to the wellbore” (The Council of Canadian Academies 224).

Both vertical hydraulic fracturing (vertical wells) and horizontal hydraulic fracturing (vertical wells plus horizontal drilling) are used, but the latter—horizontal multi-stage hydraulic fracturing—is the process most commonly denoted by the term “fracking.” It originated 15 to 20 years ago in the southern United States, was designed to access [unconventional oil and gas resources](#) in particular (The Council of Canadian Academies 37), and continues to develop technologically.

The Alberta Energy Regulator’s (AER’s) description of horizontal fracturing is provided below:

“Because unconventional oil and natural gas is trapped in low-permeability rock, pathways need to be created to allow oil and natural gas to move through the rock to the well and to enable it to be pumped to the surface. A common method of doing this is to use hydraulic fracturing to “fracture” or crack the rock and create the paths required.

Hydraulic well fracturing (“fracking”) is the process of pumping fluid into a wellbore to create enough pressure to crack, or fracture, the rock layer. The fluid usually contains a ‘proppant,’ like sand, that helps keep the fractures open to allow oil and gas to be produced to the well.

To produce unconventional oil and natural gas, horizontal wells and multistage fracturing are used. These wells start by drilling vertically (straight down) and then turning the drill bit so that it drills horizontally through the formation” (Alberta Energy Regulator).

## PAST ACTIVITY IN THE NORTHWEST TERRITORIES

### HORIZONTAL FRACTURING

#### *Conoco-Phillips*

At this time, only two wells in the NWT have been horizontally fractured: Mirror Lake P-20 and Dodo Canyon E-76. Both are ConocoPhillips exploratory wells in the Sahtu Region and while authorized by the National Energy Board (NEB) prior to devolution, both now fall under the jurisdiction of the Office of the Regulator of Oil and Gas Operations (OROGO) (Ramsay 1). Associated [hydraulic fracturing fluid information](#) reports are available through [FracFocus.ca](#) ([P-20](#) and [E-76](#)).

## HYDRAULIC (VERTICAL) FRACTURING

### *Paramount Resources Ltd.*

In November 2011, Paramount Resources Ltd. confirmed that it had “used hydraulic fracturing at approximately five of its well sites in the Cameron Hills” (Thompson).

To the best available knowledge, no peer-reviewed and/or GNWT-initiated studies have been done respecting fracturing in this area, though Kakisa reported the undertaking of baseline water monitoring to CBC in 2011 (Thompson).

### *Lone Pine Resources Ltd.*

One well near the NWT-Yukon border (Pointed Well L-68) was first drilled in 1981, then re-entered in 2011 to test the shale formation; no horizontal drilling took place and approximately 3800 m<sup>3</sup> water was used.

### *Imperial Norman Wells*

The NEB reports two instances of hydraulic fracturing at Imperial Norman Wells in 2011.

The examples above provide a sample of recent activity.

## ACID FRACTURING

### *Paramount Resources Ltd.*

According to the NEB, as of 2012, Paramount Resources had used [acid fracturing](#) (hydrochloric fracturing) three times in the preceding five years in the Cameron Hills. Fracturing took place at wells J-04, 2F-73, and 2H-03 and was performed 1800 m below the surface with a 15 per cent hydrochloric acid solution. It used less than 150 m<sup>3</sup> water.

In 2011, CBC reported that “Paramount Resources confirmed it had indeed used fracking [type not specified] at four different wells in the territory.”

Acid fracturing is used in both conventional and unconventional oil and gas development; the process is quite different from that for vertical or horizontal fracturing. The examples above provide a sample of recent activity.



---

## EXPLORING COMMON STATEMENTS

---

### “HYDRAULIC FRACTURING HAS BEEN USED IN CANADA FOR DECADES”

The document “Questions and Answers” (from the public information package for the draft regulations) states that “hydraulic fracturing... has been used safely in thousands of wells in southern Canada for decades” (1).

While neither horizontal drilling nor hydraulic fracturing (which has been taking place since the 1950s) are new, these processes in combination—horizontal multi-stage hydraulic fracturing—entered the industry mainstream only within the last two decades and mark a significant departure from past practices (The Council of Canadian Academies 37).

COCA further emphasises this distinction:

What is new is the combination of these two technologies; the use of greater amounts of water, sand, and chemicals; and the higher injection rates and pressures to fracture a much larger volume of rock. What is also new is that these technologies are now being applied much more widely to a broad spectrum of unconventional oil and gas resources” (39).

### “HYDRAULIC FRACTURING HAS NEVER BEEN LINKED TO CONTAMINATED WATER”

The Council of Canadian Academies highlights uncertainty with this question. This uncertainty is not because of a proven absence of contamination, but rather because of insufficient data to evaluate claims, insufficient data to understand communication pathways, and an inadequate timeframe to assess “potential long-term cumulative effects” (67):

“The paucity of data and evidence of causal links in this area results from the lack of baseline studies, inadequate monitoring, and in some cases non-disclosure agreements may make it challenging to document incidents of contamination (Bamberger & Oswald, 2012). The very nature of non-disclosure agreements makes it impossible to know how many there are and what matters they cover. According to an article in Bloomberg, a financial news service, “the [nondisclosure agreements] keeps data from regulators, policymakers, the news media and health researchers, and makes it difficult to challenge the industry’s claim that fracking has never tainted anyone’s water” (Efsthathiou & Drajem, 2013) (The Council of Canadian Academies 137).

Additionally, discussion that does not account for the broad scope of the slang term “fracking” (of which “hydraulic fracturing” itself is one component) similarly does not necessarily account for associated activities.

“Jackson et al. (2013b) provide a much more nuanced statement of this generalization: “There is no evidence that fracture propagation out-of-zone to

shallow groundwater has occurred from deep (>1,000 metre) shale gas reservoirs, although no scientifically robust groundwater monitoring to detect gas migration has been attempted to our knowledge.’

- “That is, they do not rule out the potential for contamination in cases of shallow hydraulic fracturing, such as suggested by Tilley and Muehlenbachs (2011) for coal-bed methane extraction in Alberta.
- “As well, they clearly point out the limitation of relying on absence of evidence to support the more general statements of no proven effect that are reflected in the AWWA statement.<sup>1</sup>
- “Note also the distinction between contamination ‘directly attributable to hydraulic fracturing,’ as the AWWA stated, and the larger array of processes associated with shale gas extraction, which may also include wastewater reinjection and cross-contamination between Intermediate Zone layers and shallow groundwater due to poor or absent cement seals surrounding oil and gas industry wells” (The Council of Canadian Academies 66-67).

#### SHALLOW AQUIFER CONTAMINATION

Up to 2014, there was one documented case of Canadian shallow aquifer contamination related specifically to [fracturing fluids](#): Human error caused the contamination at a hydraulic fracturing site in Alberta in 2012 when hydraulic fracturing fluids were injected at 136 m, instead of 1.5 km (The Council of Canadian Academies 82).

In the United States, a 2015 investigation by the *San Francisco Chronicle* revealed that “improperly issued... wastewater injection permits” allowed the injection of [produced fluids](#) into “452 disposal wells... into [California] aquifers whose water, if treated, could have been used for drinking or irrigation” (Baker), an incident referenced here for its similar highlighting of human error.

#### FRACTURE COMMUNICATIONS

In addition to the above, fracture “communications” occur where fracture fluids move from a “fracked” well into an adjacent well (e.g., a suspended or abandoned well), with the potential to travel into aquifers or onto the surface. Twenty such “communications” were reported in Alberta prior to the “Innisfail blowout”<sup>2</sup> and 18 in British Columbia prior to 2010 (The Council of Canadian Academies 82).

---

<sup>1</sup> The American Water Works Association stated in 2013 that it was “aware of no proven case of groundwater contamination directly attributable to hydraulic fracturing” (The Council of Canadian Academies 66).

<sup>2</sup> The “Innisfail blowout” refers to an incident in which “an operator drill[ed] a horizontal well too close (about 130 meter[s]) to a producing well... caus[ing] fluids to discharge at the surface around the pump jack of the producing well (AER, 2012d)” (The Council of Canadian Academies 82).

*(footnote continued)*

“EVALUATING A GROUNDWATER SUPPLY CONTAMINATION INCIDENT ATTRIBUTED TO MARCELLUS SHALE GAS DEVELOPMENT” (PENNSYLVANIA STATE UNIVERSITY)

This study—published in the *Proceedings of the National Academy of Sciences* in 2015—identified natural gas and contaminants, “likely derived from drilling or [high volume hydraulic fracturing] fluids” used in the Marcellus Shale Play in the drinking water of three Pennsylvania homes (Llewellyn, Dorman and Westland).

- While this sample size is small, the study is notable for asserting that it is “the first case published with a complete story showing organic compounds attributed to shale gas development found in a homeowner’s well” (St. Fleur).<sup>3</sup>
- The study further notes that “the most likely explanation... is that stray natural gas and drilling or HF components were driven ~1-3 km along shallow to intermediate depth fractures to the aquifer” and that “wastewaters from a pit leak” may also have contributed” (Llewellyn, Dorman and Westland).

The report’s authors have also discussed their work in detail with *Natural Gas Now*, establishing its qualifiers: They attribute the observed effects (e.g., foaming) to “shale gas development” generally and note that well casing and construction regulations have been enhanced since 2010, when the implicated gas wells had a smaller protective casing, while also noting that observed “UCMs” (unresolved complex mixture of hydrocarbons) were similar to samples from Marcellus Shale production and flowback fluids (Shepstone). The affected properties were purchased by the Chesapeake Energy Corporation in 2012 (St. Fleur).

Additionally, this case highlights the significance of strict well casing and construction regulation, while the newness of this report also shows the ongoing work being done in this field. Its authors further emphasise that “[m]ore such incidents must be analysed and data released publicly so that similar problems can be avoided through use of better management practices” (Llewellyn, Dorman and Westland).

#### LITIGATION AND NON-DISCLOSURE

However, the public release of data is complicated by legislation authorizing the protection of proprietary information. Further, in the United States—where, unlike Canada, much oil and gas development takes place on private land—litigation procedures, including non-disclosure agreements, often seal the records of any cases alleging contamination (The

---

<sup>3</sup> Allegations respecting water contamination have been made before. A civil suit against Alberta Energy and Encana Corporation is discussed under “[Litigation and Non-Disclosure](#).”

Council of Canadian Academies 37). (For further detail, see above, “[Hydraulic fracturing has been used in Canada for decades](#)”)

In April 2015, the Supreme Court of Canada agreed to determine whether a civil suit against Alberta Energy and the Encana Corporation alleging contamination of Alberta well-water may proceed (The Canadian Press). The Supreme Court’s decision as well as the outcome of subsequent cases, if any, may have bearing on the regulation of hydraulic fracturing in Canada. The Supreme Court will determine whether a governmental regulator (e.g., Alberta Energy) may be pursued in civil court.

---

## FRACTURING IN THE NORTHWEST TERRITORIES

---

### PAST ACTIVITY

See above, “[Past Activity in the Northwest Territories.](#)”

### WATER USE

#### REQUIRED VOLUMES

As noted above, Paramount’s acid fracturing used substantially less than wells subject to horizontal fracturing. In comparison, P-20 used 7676.1 m<sup>3</sup> (ConocoPhillips Canada Resources Corp.) and E-76, 6317.35 m<sup>3</sup> (ConocoPhillips Canada Resources Corp.). Both volumes are consistent with ConocoPhillips’s report, “The Canol Shale Play: Possible Outcomes of Early Stage Unconventional Resource Exploration,”<sup>4</sup> which estimated water usage of up to 8000 m<sup>3</sup> per well (3-25).

However, ConocoPhillips also notes that its work in the Canol Shale Play is in “Early Appraisal,” while wells in “Production Testing” or “Production” require greater volumes—e.g., 8000 to 30,000 m<sup>3</sup> per well in the Montney Play for gas/oil and 30,000 to 100,000 m<sup>3</sup> per well in the Horn River Basin Play for gas, respectively (3-25). The *Committee’s Report on August 2012 Hydraulic Fracturing Study Tour* notes that “[a] typical well in the Central Mackenzie Valley may require 10,000 to 25,000 cubic meters of water; that is 10-25 times the amount in the large water tanks in many of our communities or 10 times the volume of an Olympic swimming pool” (5). The Committee has previously advised regulation of water withdrawal limits.

#### UNDERSTANDING WATER USE

These variations highlight the challenges in understanding water usage. Acid fracturing, for instance, uses significantly less water but is also less common than horizontal fracturing, while as discussed above, hydraulically fractured wells in different developmental stages in different locations require different volumes of water that can be drawn from different sources. While it is common to compare water volumes to other uses (e.g., a comparable

---

<sup>4</sup> This report was prepared as part of a submission to the Sahtu Land and Water Board.

number of Olympic-size swimming pools) or other end-results (e.g., hydro-electric, municipal, and other industrial and agricultural draws), these are often not “apples to apples” comparisons. It remains difficult to make productive comparisons without taking a range of other factors into consideration, including:

- **Frequency:** What volumes are required? When and how often?
- **Product:** What is the end-product of the use of what volumes of water (e.g., wells fractured, kilowatt-hours produced, etc.)? Are these comparable?
- **Source:** Where does the water come from (e.g., surface, potable groundwater, non-potable groundwater, fresh, recycled)?
- **Re-usability:** How much water can be re-used and/or recycled and for what purposes? How does this volume compare to the total volume used?

#### PRESENT ACTIVITY

While hydraulic fracturing is not currently taking place in the Northwest Territories and oil and gas activity has slowed generally, associated activities continue.

#### OIL AND GAS ACTIVITY

In May 2015, the NEB and the NTG released “[An Assessment of the Unconventional Petroleum Resources of the Bluefish Shale and the Canol Shale in the Northwest Territories](#)”

In February 2015, the GNWT initiated its first call cycle for oil and gas exploration in the onshore NWT. The results are forthcoming.

Since 2012, seven exploration wells have been drilled in the NWT, two of which were hydraulically fractured (see above, “[See above](#), “Past Activity in the Northwest Territories.””), while since 2010-11, 17 exploration licences have been granted for a total work-bid commitment of \$627.5-million (National Energy Board and Northwest Territories Geological Survey).

#### HORIZONTAL FRACTURING

##### *ConocoPhillips*

ConocoPhillips recently reported that “it doesn’t plan to do any more exploration work in its parcel in the NWT’s Canol shale oil play for the foreseeable future” (Quenneville, Despite discovery, ConocoPhillips not planning more exploration).

Nevertheless, ConocoPhillips applied for a Significant Discovery Declaration (SDD) for both E-76 and P20 on 17 February 2015 (NWT Office of the Regulator of Oil and Gas Operations 1). While the company further states that an SDD and/or subsequent Significant Discovery Licence (SDL) “does not indicate commercial viability” (Quenneville, Despite discovery, ConocoPhillips not planning more exploration) and did not disclose whether their discovery indicated oil, gas, or both, it is important to note that an SDL entrenches a

company's hold on a parcel of land. For comparison, under Alberta's [deeper rights reversion](#), rights revert to the Crown following set periods (Ho).

*Lone Pine Resources Ltd.*

The company reported on 6 May 2013 that the NEB had granted it a Commercial Discovery Declaration (Lone Pine Resources Ltd.). The NEB stated that “it is reasonable that all of Lone Pine’s 66 sections are developable by the use of hydraulic fracturing” (Wohlberg, 'Significant' shale gas find declared in Liard Basin).

In 2012, the company filed a lawsuit against the Government of Canada, suing for \$250 million. The company argues that Québec’s moratorium on hydraulic fracturing violated the North American Free Trade Agreement (NAFTA) in the provincial government’s revocation of its permits (Beltrame). Arguments against the lawsuit contend that governments regulating in the public interest must be permitted time to evaluate and make decisions, while arguments for contend the company experienced a loss that should be recovered (Beltrame).

In September 2013, Lone Pine Resources was delisted from the New York Stock Exchange (Healing), but the lawsuit is ongoing (Wirzba).

SILICA SAND

*Chedabukto Mineral Exploration Project*

In *NewsNorth* on 11 May 2015, the Mackenzie Valley Review Board published a Notice of Public Hearing, indicating that community hearings would be held in Yellowknife and Behchokõ respecting “its environmental assessment of the Chedabukto Mineral Exploration Project... [which] involves small-scale exploration activities, including drilling, to evaluate a silica sand deposit.” The project site is approximately 50 km west of Yellowknife and the Yellowknives Dene First Nation, the North Slave Metis Alliance, and the Tẖchõ Government have identified as stakeholders in the proposed project (Quenneville, Frac sand drilling plans in North Arm, including popular beach, raise concerns).

Silica sand is used for a wide variety of purposes—it can be purchased at Home Depot—but in recent years, it has also been noted for its usefulness as a proppant (holding fractures open) in hydraulic fracturing: 70 per cent of fracking proppants are “naturally-occurring silica sand” (Mitchell). The proposed project has been discussed in the context of hydraulic fracturing since 2013 (Herman).

GNWT INITIATIVES

The NWT Geological Survey (NTGS) is currently engaged in three petroleum-related projects, only one of which is situated outside the Canol Shale Formation:

1. **Liard Basin Hydrocarbon Project:** 2012-2015, investigation of natural gas potential in the Basa Formation, collaboration with the Yukon Geological

Survey and British Columbia Ministry of Energy, Mines, and Natural Gas (Liard Basin Hydrocarbon Project)

Work in the Liard Basin is notable in light both of work across the border (BC and Yukon) and of the Lone Pine Resources Commercial Discovery Declaration.

2. **Seismic Monitoring – Central Mackenzie Valley:** Four earthquake monitoring station surrounding Norman Wells, installed 2013, collecting baseline data one to two times annually “to highlight any changes in the earthquake regime in the area and allow regulators to locate re-injection wells in areas where earthquakes are infrequent” in the event of further development, data will be collected for the next several years as budget permits (Seismic Monitoring - Central Mackenzie Valley)
3. **Shale Basin Evolution in the Central NWT:** 2014-2018, field and subsurface, study Devonian Canol Formation and Cretaceous Slater River Formation to “characterize shale reservoir units” and “expand the knowledge of hydrocarbon resource potential” (Shale Basin Evolution in the Central NWT)

#### HOW DID HYDRAULIC FRACTURING TAKE PLACE UNDER THE NEB?

Prior to devolution, the NEB regulated hydraulic fracturing in the NWT. They will continue to do so for any activity in the Inuvialuit Settlement Region (ISR). A review of their processes is provided below. Horizontal fracturing can generally be divided into four stages: Exploration, development, production, and decommissioning and the NEB works with various partners, including Aboriginal Affairs and Northern Development Canada (AANDC) and the Land and Water Boards. The GNWT describes its processes, which would work many of the same partners, including the Land and Water Boards, on its website. The GNWT public information package was tabled in the Legislative Assembly and is available online at <http://www.assembly.gov.nt.ca/sites/default/files/td255-175.pdf>.

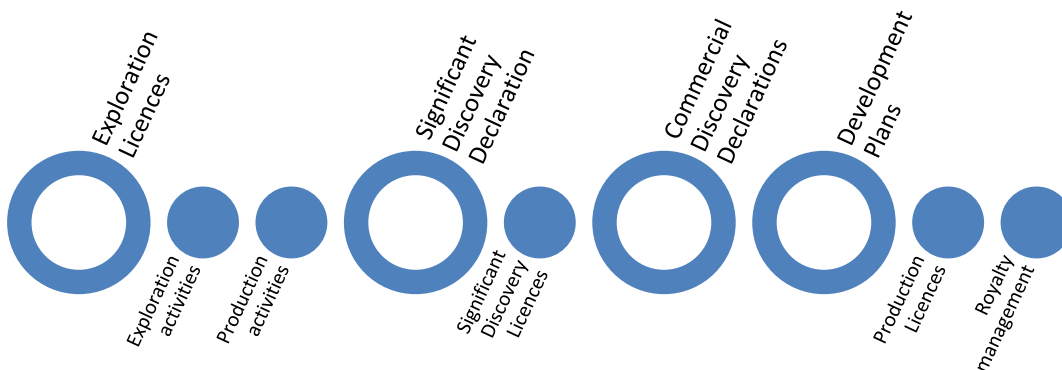


Figure 1

After an Exploration Licence is issued (see Figure 1 above), three items must be obtained before any drilling activities begin:

- 1) Operating Licence;
- 2) Operations Authorization; and
- 3) Well Approval.

An application for an Operations Authorization, made in accordance with the NEBFR, is subject to technical review by the NEB.

At the same time, a Project Description is reviewed by the appropriate Land and Water Board as part of the Environmental Screening process.

- From this review, the proposed project may proceed to the regulatory phase or to Environmental Assessment;
- If an Environmental Assessment is undertaken, it may then proceed to the regulatory phase or to Environmental Impact Review;
- If an Environmental Impact Review is undertaken, it may then proceed to the regulatory phase or be recommended for rejection by the Minister; and
- The Minister may accept or reject the Board's recommendation and may also consult with the Board to request that they further consider and/or modify their recommendation.
- To see this process in a flowchart, see Appendix 1 (originally prepared by the Mackenzie Valley Land and Water Board).

If the NEB issues an Operations Authorization, the operator may then apply for Well Approval. Well Approval is subject to a technical review and if issued, applicable terms and conditions.

Among other things, the NEB is responsible for overseeing:

- Monitoring and compliance verification;
- Geophysical surveys;
- [Exploration, delineation, and development wells](#);
- Building and operation production and transportation facilities for oil and gas; and
- Abandoning wells and facilities.

The NEB requires the disclosure of hydraulic fracturing fluid information within up to 30 days after the hydraulic fracturing operation has finished (Procedures for the Public Disclosure of Hydraulic Fracturing Fluid Composition Information). This information is published on [FracFocus.ca](#), an information site launched in Canada by the British Columbia Oil and Gas Commission.

#### RESOURCE ESTIMATES

There are many estimates of the quantity of oil and gas resources in the NWT. Factors include resource category (onshore/offshore), location (NWT, Canol Shale Formation,



parcel, etc.), and estimate type ([in-place, technically-recoverable, or economically-recoverable](#)), among others.

- In-place estimates refer to oil in the ground, while technically recoverable estimates are made with consideration of current technology but without regard for current market conditions.
- Economically-recoverable estimates are made with consideration of current technology and current market conditions.
- Reserves are also often described with comparisons—e.g., to the Bakken Formation or to the Gulf of Mexico.

An industry executive speaking with *Up Here* magazine emphasises the significance of economically-recoverable estimates: “You could have two billion barrels of oil, but are you going to get a five, 10, 20 per cent recovery factor? That will be key to the economics of the play” (Quenneville, Canol concerns). Accessibility is an additional factor.

#### PAST ESTIMATES

Prior to 22 May 2015, a resource estimate respecting the Northwest Territories had not been made publicly available (National Energy Board and Northwest Territories Geological Survey).

Up to this point, estimates varied widely (from Canada-wide to parcel-specific), though they often focused on the Sahtu region, home to the NWT’s only currently producing conventional oil field. Even so, they ranged from millions to billions of barrels of oil, notwithstanding estimates for natural gas.

- MGM Energy Corp. has, at various points, identified 10 billion barrels of oil-in-place, accompanying GNWT estimates of two to three billion barrels recoverable (Lewis) and 6.1 billion barrels of oil-in-place or 305 million barrels at five per cent recoverability (Chudley).
- Others have identified 162 billion barrels of oil-in-place in Canada overall (US Energy Information Administration), one billion barrels available in the Canol Shale Formation through fracking (Tectonic Energy Consulting Inc.), seven billion of barrels of oil in the Arctic overall (NWT Department of Industry, Tourism, and Investment), and 270 billion barrels of oil-in-place and 8.1 billion barrels recoverable in the Canol Shale Formation (Simoes).

These do not account for estimates respecting shale gas, nor intersections between the two:

- “Shale gas development is just beginning in deeper strata such as the Montney Shale in western Alberta, but rapid shale oil development is already

taking place in the Cardium and Duvernay Formations using hydraulic fracturing technology.” (The Council of Canadian Academies 25).

- **Shale oil:** “oil obtained by artificial maturation of oil shale. The process of artificial maturation uses controlled heating, or pyrolysis, of kerogen to release the shale oil” (Schlumberger).
- **Shale gas:** “natural gas produced from gas shale formations” (Schlumberger)
- **Tight oil:** “oil found in relatively impermeable reservoir rock. Production of tight oil comes from very low permeability rock that must be stimulated using hydraulic fracturing to create sufficient permeability to allow the mature oil and/or natural gas liquids to flow at economic rates” (Schlumberger)
- **Tight gas:** “Gas produced from a relatively impermeable reservoir rock. Hydrocarbon production from tight reservoirs can be difficult without stimulation operations. Stimulation of tight formations can result in increased production from formations that previously might have been abandoned or been produced uneconomically. The term is generally used for reservoirs other than shales” (Schlumberger).

“AN ASSESSMENT OF THE UNCONVENTIONAL PETROLEUM RESOURCES OF THE BLUEFISH SHALE AND THE CANOL SHALE IN THE NORTHWEST TERRITORIES”

On 22 May 2015, the NEB and the NTGS released a joint study—significantly, the first of its kind publicly available—assessing unconventional resource potential in Canol and Bluefish Shale Formations.

- The study estimates 145-billion barrels in oil-in-place for the Canol Shale and 46-billion for the Bluefish. (National Energy Board and Northwest Territories Geological Survey 2), a significant number.
- However, the NEB’s associated briefing note indicates that “only a small fraction of this might be able to be produced” (National Energy Board and Northwest Territories Geological Survey 2):
  - “The analysis does not estimate the amount of marketable (i.e., recoverable) oil because well-test results are not yet publicly available and there is still uncertainty about whether these shales are capable of production” (National Energy Board and Northwest Territories Geological Survey 2).
  - “Recovery factors being achieved from the Eagle Ford Shale of Texas and the Niobrara Shale of Colorado would not be applicable to

the Canol Shale, as these are condensate-rich shale-gas plays that behave differently than shale-oil plays. Recovery factors from the Bakken Formation of North Dakota would also not be applicable to the Canol Shale, as the Bakken is a siltstone, with production characteristics that are considerably different from a shale. The closest analog might be the Permian Basin of Texas, where operators report expected recovery factors of about three per cent. However, a key difference is that large areas of the Canol Shale are located at significantly shallower depths than these other shale-oil prospects and the lower pressures may make the recovery of oil more difficult. If a three per cent recovery factor was applied to the in-place value for the Canol Shale, the recoverable resource would become 4.35 billion barrels.” (National Energy Board and Northwest Territories Geological Survey 8).

---

## THE DRAFT *HYDRAULIC FRACTURING FILING REGULATIONS*

---

### REGULATORY FRAMEWORK

In any future hydraulic fracturing activity, OROGO would work with a number of departments and agencies both within and outside the GNWT, including:

- The Departments of Environment and Natural Resources; Lands; and Industry, Tourism, and Investment;<sup>5</sup>
- The Gwich’in, Mackenzie, Sahtu, and Wek’èezhii Land and Water Boards;
- The Mackenzie Valley Environmental Impact Review Board; and
- The NEB.

Section 3 of the draft regulations requires [applicants](#) and [operators](#) to comply with the *Oil and Gas Operations Act* and its regulations in addition to the draft regulations. The draft regulations also reference quasi-judicial instruments, including:

- The *Environmental Protection Plan Guidelines*;
- The *Safety Plan Guidelines*; and
- The *Alberta Ambient Air Quality Objectives and Guidelines*.

Other territorial statutes and regulations, mirrored from federal counterparts at devolution, will also affect hydraulic fracturing activity in the NWT, including:

- The *Petroleum Resources Act* and its regulations, which govern other elements of oil and gas activity, including disclosure and resource royalties;
- The *Lands Act* and its regulations, which govern land use;

---

<sup>5</sup> Federal statutes and regulations mirrored at devolution were divided among these three departments.

- The *Waters Act* and its regulations, which govern water use, licensing, and waste disposal/discharge; and
- The *Surface Rights Board Act*.

OROGO has also indicated that it will continue to draw on more experienced regulators, including the AER and the NEB. A pricing schedule for such consultation has been established with the NEB. It is unclear whether budget limitations (e.g., an allotted maximum) may apply to such consultation.

For more information on partners' roles and responsibilities, see Appendix 2 for a document prepared by ITI ("[NWT Regulatory System at a Glance](#)").

#### **WHAT ARE THE *HYDRAULIC FRACTURING FILING REGULATIONS*?**

The draft regulations establish filing requirements, requiring specified information to be provided to OROGO with an application for an operating authorization or a well approval respecting hydraulic fracturing.

- ITI briefed the Committee on the draft regulations on 23 February 2015, while the regulations were released to the public on 31 March 2015, opening 90 days of public engagement that is scheduled to conclude at the end of June.
- Prior to devolution, the NEBFR was the primary regulatory document for hydraulic fracturing activity in the NWT. It was supported by a broad statutory framework.
- OROGO assumed regulatory responsibility with devolution, but the NEBFR will remain in place until such time as the GNWT implements a replacement (Questions and Answers 3).
- While much of the draft regulations mirror the NEBFR, there are significant variances. These will be discussed below.
- Generally, it may be asked how applications made under these requirements will be evaluated (e.g., an assessment framework, evaluation tools, baseline requirements, etc.) as well as how compliance will be monitored and enforced (including steps taken if non-compliance is identified).

#### **COMPARING THE NEBFR AND THE DRAFT REGULATIONS**

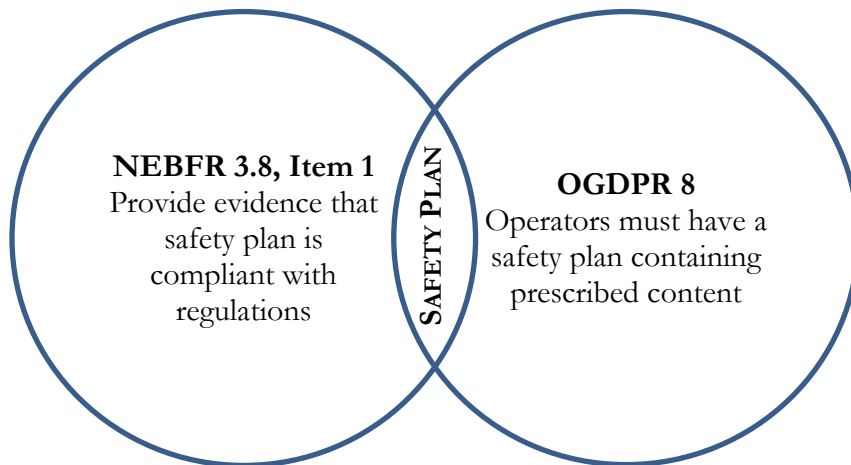
As discussed above, this report examines differences between the NEBFR and the draft regulations in **three categories**:

- 1) Alterations and additions;
- 2) Exclusions—Sections and provisions from the NEBFR not mirrored in the draft regulations, but **addressed elsewhere** in the regulatory framework; and
- 3) Exclusions—Sections and provisions from the NEBFR not mirrored in the draft regulations and **not addressed elsewhere** in the regulatory framework.

Again, as discussed above, it is important to note that **even if the subject of an NEBFR provision excluded from the draft regulations is addressed elsewhere in the regulatory framework** (e.g., the *Oil and Gas Operations Act*, OGOA, or the *Oil and Gas Drilling and Production Regulations*, OGDPR, etc.), **the regulatory effect is not necessarily the same**. Two examples are provided below.

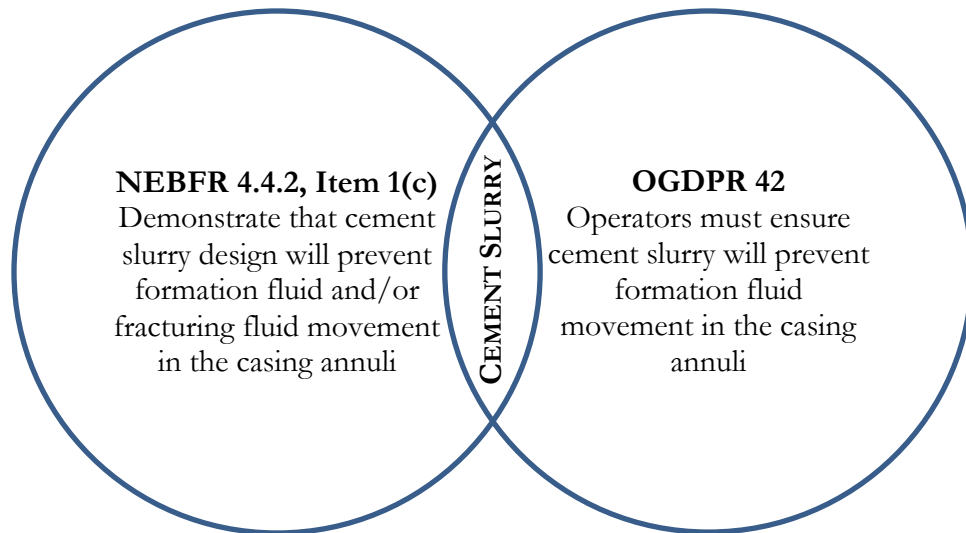
- NEBFR 3.8, Item 1 requires applicants to provide evidence that their safety plan was developed in accordance with the appropriate regulations.

This section is not mirrored in the draft regulations and while section 8 of the *Oil and Gas Drilling and Production Regulations* establishes safety plan requirements, this is **not equivalent to requiring applicants to file evidence that their safety plan is compliant prior to being granted an Operations Authorization**.



- NEBFR 4.4.2, Item 1(c) requires applicants to demonstrate that their cement slurry design and cementing program are designed to prevent formation fluid and/or fracturing fluid movement in the [casing annuli](#).

This item is not mirrored in the draft regulations and while OGDPR 41 requires operators to ensure that their cement slurry is designed and installed to prevent formation fluids movement in the casing annuli, this is **not equivalent to requiring applicants to file evidence that this is the case prior to being granted an Operations Authorization and it does not include fracturing fluids**.



### SURETY AND INDEMNITY BONDS

Under both the NEBFR and OGOA, applicants must present proof of financial responsibility. The NEBFR specifically note that a surety bond will not be accepted. OGOA authorizes a letter of credit, a guarantee, or an indemnity bond, or any other form approved by the Registrar. It is unclear if OROGO will also refuse a surety bond as proof of financial responsibility.

### “FOUR AREAS OF INTEREST TO NORTHERNERS”

As discussed above, the GNWT has emphasised four areas as receiving particular attention in the draft regulations:

- 1) Baseline surface and groundwater information;
- 2) Public disclosure of chemical additives;
- 3) Air quality; and
- 4) Enhanced reporting and disclosure (pre- and post-fracture).

However, in some cases, **related NEBFR content has been excluded from the draft regulations.**

#### (1) BASELINE SURFACE AND GROUNDWATER INFORMATION

**paragraph 6(b):** the Environmental Protection Plan (EPP) must include studies assessing the state of surface and ground water resources **\*new\***.

**paragraph 6(d):** EPP must contain a water quality assurance plan for how surface water and groundwater will be assessed, protected, and monitored for impacts from planned and unauthorized discharges from drilling, hydraulic fracturing, flaring, formation flow testing,

**incinerating**, well suspension, and abandonment and production activities (“**incinerating**” is **\*new\***).

**paragraph 6(l)**: EPP must list the chemicals used in the hydraulic fracture fluids and the predicted concentration ranges of those chemicals **While the inclusion of this information in the EPP is \*new\*, the NEB still included this information in its public disclosure procedures** (Procedures for the Public Disclosure of Hydraulic Fracturing Fluid Composition Information).

**paragraph 6(o)**: EPP must describe how the **water** monitoring and sampling program will detect any contamination from oil and gas operations, including hydraulic fracturing (**NEBFR 3.10, Item 23 refers to “groundwater monitoring”**).

#### *Comments*

1. Parameters for these studies<sup>6</sup>—e.g., methodology, extent, assessment area, assessment time period, authors, number of studies, etc.—as well as parameters for OROGO’s evaluation of any studies filed under this provision are unclear.
2. While the above sections outline new filing requirements respecting baseline surface and groundwater information, several NEBFR filing requirements associated with water have not been mirrored in the draft regulations. Some are partially addressed in the OGDPR.

This includes three items under section 4.4.1 (Groundwater Protection), four sub-items under 4.4.2 (Well Casing and Cementing), four items under 4.4.3 (Drilling Fluids), and five under 4.4.4 (Wellbore Integrity). For further detail, see Appendix 3 for an annotated version of the NEBFR.

#### (2) PUBLIC DISCLOSURE

**section 26 \*new\***: An applicant shall indicate to the Registrar whether they are willing to prepare and publicly disclose a “pre-fracture report,” including:

- Applicant’s risk assessment (s.5);
- Applicant’s Environmental Protection Plan (s.6); and
- Waste management measures (s.7)
- An operator shall indicate to the Regulator whether they are willing to prepare and publicly disclose their annual environmental report (OGDPR 86) or their annual safety report (OGDPR 87).

If the applicant/operator is willing, they shall indicate the manner, including timing, in which the disclosure will be made.

---

<sup>6</sup> Studies are expressly required by paragraph 5(2)(b) (mirrored) and paragraph 6(b) (**\*new\***).

If not willing, they will indicate their reasons.

*Comments*

1. Under both the NEBFR and the draft regulations:
  - Public disclosure is voluntary.
2. Under both the NEBFR and the draft regulations, applicants must file:
  - Description of procedures for the selection, evaluation, and use of chemical substances, including process chemicals and drilling fluid ingredients;
  - List of the chemicals used in the hydraulic fracture fluids;
  - Predicted concentration ranges of those chemicals; and
  - Indication whether applicants are willing to publicly disclose the chemical composition of hydraulic fracturing fluids, including concentration ranges.

A GNWT representative indicated to *Northern Journal* that the draft regulations expanded upon the NEBFR by directly asking operators to publicly disclose information (Wohlberg, NWT government releases proposed fracking regulations for territory). However, this is not the case: Both the NEBFR and the draft regulations require the applicant to indicate their willingness to disclose.

3. However, the draft regulations also expand upon the NEBFR as follows:
  - Including significantly expanded information, including the EPP and operators' annual environmental and safety reports, under the umbrella of public disclosure, though such disclosure remains voluntary;
  - Requiring applicant/operator to state reasons for refusing disclosure; and
  - Categorizing content disclosure as a "pre-fracture report," where disclosure under the NEBFR comes within up to 30 days after the hydraulic fracturing of a well.<sup>7</sup>

It is also unclear whether, because disclosure is voluntary, applicants and/or operators may choose to release only a portion of the listed information (or to release it post-fracture, if that was their elected manner and timing of disclosure).

It is unclear if minimum parameters will guide disclosure.

---

<sup>7</sup> The Sahtu Land and Water Board previously required ConocoPhillips to disclose information in advance of fracturing.



Further, additional EPP content related to ambient air quality and entrained gases (s.8)—which includes address of GHG and flaring—is not included. It is unclear whether this excludes s.8 from public disclosure.

4. The NEB indicates that it “expects” applicants and operators to disclose (Frequently Asked Questions: Filing Requirements for Onshore Drilling Operations Involving Hydraulic Fracturing).

Additionally, the NEB requests operators to waive their privileges under paragraphs 101(7)(a) to (c) of the *Canada Petroleum Resources Act*, which establish waiting periods for the release of information respecting exploratory, delineation, and development (producing) wells and are mirrored in the NWT *Petroleum Resources Act*, paragraphs 91(8)(a) to (c).

During public engagement, it was indicated that “the GNWT is currently cuffed by the terms of the federal legislation [it] mirrored during devolution” (Wohlberg, Fort Smith voices distrust around fracking in the NWT) and that the *Petroleum Resources Act* (PRA) prevents it from requiring operators to disclose. **However, examining the [current NEB procedures](#) and as discussed above, this is not necessarily the case: It is unclear whether OROGO will match the NEB in expressly requesting that operators waive their privileges.**

5. OROGO will be participating in FracFocus.ca.

It is unclear what parameters will guide NWT-based companies’ engagement with FracFocus.ca (e.g., what information, when, in what format) or if this website will also feature the additional information requested by the draft regulations.

### (3) AIR QUALITY

**Paragraph 6(d):** the required water quality assurance report must demonstrate how surface water and groundwater quality will be assessed, protected, and monitored for impacts from planned and unplanned discharges from drilling, hydraulic fracturing, flaring, and formation flow testing, **incinerating**, well suspension and abandonment and production activities (“**incinerating**” is *\*new\**).

**paragraph 6(e):** the required air quality assurance plan must demonstrate how the impacts to the environment from air emissions during site access, handling and storage of produced fluids including formation and [flowback](#) fluids, flaring, **incinerating**, and formation flow testing operations will be minimized (“**incinerating**” is *\*new\**).

**paragraph 6(f)(i):** the required air quality assurance plan must include a description of the [criteria air contaminants](#), [black carbon](#), and hydrogen sulfide that will be released during the proposed work or activity *\*new\**.

**paragraph 6(f)(ii):** the required air quality assurance plan must demonstrate that [green completion techniques](#) will be used to ensure at least 90 per cent of flowback gas or oil vapour is recovered and at least 95 per cent of gas or oil vapour that cannot be recovered is incinerated, or if use of these techniques is impracticable, that incinerators with at least 99 per cent efficiency will be used to dispose of the flowback gas or oil vapour **\*new\***.

**paragraph 6(f)(iii):** the required air quality assurance plan must demonstrate how air quality will be assessed, protected, and monitored from impacts from planned discharges and fugitive or other unauthorized discharges from drilling, hydraulic fracturing, flaring, formation flow testing, **incinerating**, storage of produced fluids including formation and flowback fluids, well suspension and abandonment and production activities (**“incinerating” is \*new\***).

**paragraph 6(g):** EPP must describe how greenhouse gas emissions will be monitored and measured and the steps that will be taken to mitigate these emissions **\*new\***.

**section 8: Ambient Air Quality and Entrained Gases \*new\***.

*Comments*

1. NEBFR 3.10 (Environmental Protection Plan), Items 8 and 9 address air quality. These are mirrored in sections 6(e) and 6(f)(iii), but have also been significantly expanded in section 8 of the draft regulations.
2. It is unclear what criteria would be used in determining what is “impracticable,” nor what role OROGO would play in such a determination. Paragraph 8(e)(ii) also refers to green completion techniques, specifically in reference to the reduction of [volatile organic compound](#) (VOC) emissions, but paragraph 8(f) further states that the use of incineration instead of green completion techniques may be justified “based on an economic evaluation.”

(4) ENHANCED REPORTING AND DISCLOSURE (PRE- AND POST-FRACTURE)

**paragraph 6(b):** include studies assessing the state of surface and ground water resources **\*new\***

**paragraph 6(f)(i):** describe the criteria air contaminants, black carbon and hydrogen sulphide that will be released during the proposed work or activity **\*new\***

**paragraph 6(f)(ii):** the required air quality assurance plan must demonstrate that green completion techniques will be used to ensure at least 90 per cent of flowback gas or oil vapour is recovered and at least 95 per cent of gas or oil vapour that cannot be recovered is incinerated, or if use of these techniques is impracticable, that incinerators with at least 99 per cent efficiency will be used to dispose of the flowback gas or oil vapour **\*new\***

**paragraph 6(g):** EPP must describe how greenhouse gas emissions will be monitored and measured and the steps that will be taken to mitigate these emissions **\*new\***

**paragraph 6(l):** EPP must list the chemicals used in the hydraulic fracture fluids and the predicted concentration ranges of those chemicals **\*new\* to the EPP, but not to the filing requirements overall**

**paragraph 8(d)(iii) \*new\*:** monthly air quality reports must be submitted to the Regulator, listing any flaring or incineration that occurred and demonstrating compliance with ambient air quality limits, **but only where ambient emission monitoring is required under para.8(c)**—that is:

- where exceedances of ambient air quality limits are identified through the initial emissions assessment referred to in para.8(b);
- where incineration or flaring of sour or acid gas occurs;
- where more than 72 hours of flaring or incinerating is anticipated by the operator;
- where incineration or flaring occurs within 500 metres of a residential area; or
- where the Regulator determines that complex or extensive emission sources require further assessment.

#### *Comments*

1. As discussed above, s.8 (Ambient Air Quality and Entrained Gases) is part of the EPP, but is not included under the umbrella of public disclosure (s.26).

Thus, while any reporting made under s.8 is new to the draft regulations and would reach OROGO, it would not reach the public.

It is unclear what parameters will guide OROGO’s determination whether “further assessment” is required, nor how such reports would be evaluated or otherwise used.

2. As discussed above, the draft regulations encompass a wider range of information and significantly, identify a “pre-fracture report,” but do not specify a manner or timeframe for disclosure (e.g., baseline requirements for applicants), nor do they appear to address post-fracture disclosure, excepting the voluntary disclosure of annual environmental and safety reports.
3. Arguably, the exclusion of NEBFR items that are not addressed elsewhere in the regulatory framework constitute a reduction in reporting to OROGO.

## ALTERATIONS AND ADDITIONS TO THE DRAFT REGULATIONS

Specific examples are discussed below, but for a detailed comparison of the NEBFR, the draft regulations, and the rest of the regulatory framework, see Appendix 6.

### ALTERATION TO THE DRAFT REGULATIONS

**NEBFR 3.10.22** requires applicants to describe procedures for detecting, investigating, reporting, and correcting “the causes and causal factors of pollution (exceedances of discharge limits),” while the mirrored provision in the draft regulations refers to “the causes and causal factors of exceedances of ambient air quality”; arguably the NEBFR covers a broader scope.

**NEBFR 3.10.23** refers to “groundwater monitoring,” while the mirrored provisions in the draft regulations refer to “water monitoring”; arguably the draft regulations cover a broader scope.

### ADDITIONS TO THE DRAFT REGULATIONS

The sections discussed below are **\*new\*** to the draft regulations (not mirrored from the NEBFR). Several items will be familiar from above sections, but are repeated here to provide a complete list.

For further detail, see Appendix 4 for an annotated version of the draft regulations.

**Section 2:** Where there is any legislative or regulatory inconsistency between these regulations and another instrument, these regulations will take priority.

**Section 3:** Establishes the regulatory framework for hydraulic fracturing activities, requiring applicants under these regulations to comply with them in addition to the *Oil and Gas Operations Act* (OGOA) and its other regulations.

**Section 4:** Authorize OROGO to waive any requirement under these regulations “if the Regulator is satisfied that the requirement is not relevant.”

The NEB indicates that applicants must always comply with applicable acts and regulations: If an applicant feels that a filing requirement is not relevant to their application, they must prove to the NEB that all applicable acts and regulations have been satisfied.

**Subsection 6(b):** EPP must “include studies assessing the state of surface and groundwater resources.”

**Paragraphs 6(f)(i) and 6(f)(ii):** EPP must contain an air quality assurance plan that describes the criteria air contaminants, black carbon, and hydrogen sulphide that will be released and demonstrate how green completion techniques will be used to recover at least 95 per cent of flowback gas or oil vapour and that at least 95 per cent of the unrecovered

will be incinerated. Additionally, if these techniques are impracticable, incinerators with at least 99 per cent efficiency must be used.

**Subsection 6(g):** EPP must describe how greenhouse gas emissions (GHG) will be monitored and measured, plus that steps that will be taken to mitigate these emissions.

**Subsection 6(l):** EPP must list the chemicals used in the hydraulic fracture fluids, plus their predicted concentration ranges. (As discussed above, this is **\*new\*** to the EPP, but not to the filing requirements.)

**Section 8:** Establishes additional EPP requirements, specifically addressing of ambient air quality and entrained gases in the filed air quality assurance plan. As discussed above, s.8 represents a significant expansion on the NEBFR.

**Section 12:** Establishes the definition of “application” in terms of Well Approval

**Section 26:** Establishes requirements respecting “[Public Disclosure of Chemical Additives.](#)”

*Comments*

1. As discussed above, parameters for these studies<sup>8</sup>—completed by applicants— as well as parameters for OROGO’s evaluation of any studies filed under this provision are unclear.

- The 2013-2014 project status report for the five-year Sahtu-based study, “Establishing a watershed framework for assessing cumulative impacts of development,” notes that

“[d]ata collected by proponents are not always on spatially or temporally relevant scales (e.g., proponents often use the spatial scale of their leased block rather than taking a watershed approach), therefore a relevant understanding of how the aquatic system works (variability within the system), what the baseline conditions are and how the system responds to disturbance is difficult to achieve” (Chin).

Thus, while this new provision expands on the NEBFR, further clarification of its scope and parameters may be needed in order to collect meaningful data.

2. It may be asked how data collected under a variety of disparate “umbrellas”—for example, by industry; the ENR, ITI, Lands, the NTGS, and community partners (e.g., community-based water monitoring)—will be marshalled to establish an effective baseline framework.

---

<sup>8</sup> Studies are expressly required by paragraph 5(2)(b) (mirrored) and paragraph 6(b) (**\*new\***).

The GNWT has emphasised monitoring and research in the Sahtu region in its public engagement (NWT Department of Industry, Tourism, and Investment).

- Cumulative Impact Monitoring Program (CIMP)
  - \$700,000 in 2014/15
  - Seven projects in the Sahtu in 2014-15: Water (1), caribou (4), fish (1), and traditional knowledge (TK) (1); and
  - Four NWT-wide projects with Sahtu relevance in 2014-15: Water (2) and fish (2)
  
- Environmental Studies Research Fund (ESRF)
  - [f]unded by industry, providing financial support for environmental and social studies to assist in decision-making processes related to oil and gas exploration and development” (NWT Department of Environment and Natural Resources).
  - Central Mackenzie Surface Water and Groundwater Baseline Assessment;
  - Caribou Genetic Diversity Population Study;
  - Forest Succession and Regeneration Initiative;
  - State of Spatial Knowledge Project; and
  - TK initiatives
  
- GNWT and ENR
  - Three years community-based water monitoring at 13 Sahtu sites
  - Participant in the Sahtu Environmental Research and Monitoring Forum

The importance of these projects is not disputed. However, while it is significant that the Sahtu hosts the only two horizontally fractured NWT wells, a baseline framework at an expanded regional and/or territorial level would also arguably be useful.

For example, horizontal fracturing has taken place in the British Columbia portion of the Liard Basin and is likely to take place in the future in the Yukon portion, while preliminary (NTGS) studies are underway in the NWT portion. Additionally, as discussed above, **Error! Reference source not found.** was granted a Commercial Discovery Declaration for its parcel in the Liard Basin, respecting natural gas at Pointed Mountain L-68 (Lone Pine Resources Ltd.).

Arguably, collection of baseline data in this region would also be an effective and valuable tool.

3. **Paragraphs 6(f)(i) and (ii):** Both expand on the associated NEBFR provision, mirrored in paragraph 6(f)(iii). However, as discussed above, it is not specified how techniques will be determined practicable or impracticable, nor who will do so.
4. **Subsection 6(g):** This expands on the NEBFR, which did not expressly refer to GHG. However, parameters for this information, including baseline requirements and how data will be collected and evaluated, are not specified.

#### EXCLUSIONS FROM THE DRAFT REGULATIONS (HFFR)

As discussed above, while the HFFR has expanded on parts of the NEBFR, other NEBFR items have been excluded.

Specific examples are discussed below, but for a detailed comparison of the NEBFR, the draft regulations, and the rest of the regulatory framework, see Appendix 5.

For further detail, see Appendix 3 for an annotated version of the NEBFR.

#### ENVIRONMENTAL AND SOCIO-ECONOMIC ASSESSMENT, PRODUCED FLUIDS, CHEMICAL SUBSTANCES, AND HUMAN RESOURCES

In September 2013, the NEB introduced the NEBFR “to clarify the Board’s expectations regarding information to be included in all future applications under the *Canada Oil and Gas Operations Act* (COGOA) involving onshore hydraulic fracturing operations” (1).

At the time, the *Northern Journal* reported that stakeholders particularly noted the following:<sup>9</sup>

1. **NEBFR 2.0 (Environmental assessment):** While NWT Land and Water Boards are responsible for environmental assessment (EA), an EA is not always required. A project may proceed to the regulatory stage without one.<sup>10</sup> (For more information, see [“How did hydraulic fracturing take place under the NEB?”](#))
  - If an EA is required, the NEB works with the relevant Board to minimize duplication.

---

<sup>9</sup> Also noted were NEBFR 4.5, Item 4 (Measuring, recording, sampling, and analysing all produced fluids including flowback and formation fluids) and NEBFR 3.10, Item 19 (Selection, evaluation, and use of chemical substances, including process chemicals and drilling fluid ingredients), **both mirrored** in the draft regulations.

<sup>10</sup> Shell withdrew from a joint application with MGM. to “complete exploratory horizontal fracking in the Sahtu” when required to complete an EA MGM closed in 2014, citing financial and operational difficulties, as well as “stranded” northern resources (Wohlberg, MGM shut-down opens up NWT oil leases). Paramount Resources Ltd. completed their acquisition of the company in June 2014 (Marketwired).

- Regardless, the NEB completes its own process through the NEBFR.
  - The draft regulations have not mirrored the NEBFR provisions— Any form of environmental assessment is deferred to the discretion of the appropriate Land and Water Board. Board structures are currently contested in court.
  - While it has been indicated that the draft regulations would not duplicate requirements under existing territorial legislation and regulations or items under the jurisdiction of the Land and Water Boards, NEBFR requirements for environmental and socio-economic assessment were specific to the NEB and separate from the Land and Water Boards.
2. **NEBFR 2.0** (Socio-economic assessment):
- NEBFR 2.0 also includes items on consultation and socio-economic assessment. As discussed above, these items have not been mirrored in the draft regulations.
3. **NEBFR 3.5, 3.6, 3.7, and 3.8** (Consideration and address of human resource elements, including human error):
- NEBFR 3.3 (Management System) and 3.8 (Safety Plan) are not mirrored in the draft regulations, though some items are addressed elsewhere in the regulatory framework.
  - NEBFR 3 (Safety Culture), 3.6 (Human Factors), and 3.7 (Lessons Learned) are not mirrored in the draft regulations and are not found elsewhere in the regulatory framework. For further discussion of human resource elements, see “[Shallow Aquifer Contamination](#).”
  - Items respecting human resource elements had been noted as particularly challenging for companies to complete during their applications (Wohlberg, Fracking critics praise new NEB rules for the North).

#### WATER

As discussed above in “[\(1\) Baseline surface and groundwater information](#)” several NEBFR items related to water and water quality were not mirrored, though some are partially addressed under the OGDPR, including three items under section 4.4.1 (Groundwater Protection), four sub-items under 4.4.2 (Well Casing and Cementing), four under 4.4.3 (Drilling Fluids), and five under 4.4.4 (Wellbore Integrity).



## ENVIRONMENTAL PROTECTION PLAN

NEBFR 3.10, Item 5, requires applicants to describe how they will address heritage resources, protected areas, and species at risk, specifically noting boreal caribou.

The *NWT Wildlife Research and Management Plan 2011-2016* identifies “landscape change due to increased oil and gas development, seismic lines, and timber harvest” as the “primary management concern” for boreal caribou (NWT Department of Environment and Natural Resources).<sup>11</sup>

NEBFR 3.10, Items 11 and 12 establish requirements to identify and address knowledge gaps and to include ongoing research and information gathering into the activity. These are not mirrored in the draft regulations and do not appear elsewhere in the regulatory framework.

## WASTE MANAGEMENT

NEBFR 3.11, Header and Items 3 and 6 establish requirements to minimize volumes of waste materials, describe methods and protocols used to establish discharge limits, and to arrange compliance monitoring and performance measurement. These are not mirrored in the draft regulations, though they are partially addressed in OGDPR 9(j) and(k).

## WELL SUSPENSION AND ABANDONMENT

NEBFR 4.5.5 (Well Suspension and Abandonment), Items 1, 4, 6, and 7 are not mirrored in the draft regulations and do not appear elsewhere in the regulatory framework.

## TERMINOLOGY

Other notable items in the draft regulations are quite small—sometimes a single word—but may be worth further examination for potential regulatory impact.

TERMS IMPLY A STANDARD WITHOUT DEFINING, OR ASSIGNING THE RESPONSIBILITY TO DEFINE, PARAMETERS FOR THAT STANDARD

It is unclear which individual, agency, or other party determines:

“adequate” well control systems	HFFR 20(2)(b)
---------------------------------	---------------

---

<sup>11</sup> CIMP “has initiated a project to examine forest succession and regeneration response on seismic lines with respect to ecology, disturbance factors, and time... address[ing] the primary management concern identified by ENR for boreal caribou in the NWT Wildlife Research and Management Plan 2011-2016 of landscape change due to increased oil and gas development, seismic lines, and timber harvest” (NWT Department of Environment and Natural Resources).

“ <i>applicable</i> ” standards	HFFR 7(a)
“ <i>appropriate</i> ” coordination in emergency response procedures	HFFR 9(2)(m)
“if use of [green completion] techniques is <i>impracticable</i> ”	HFFR 5(2)(d)
“ <i>reasonable</i> precautions”	HFFR 5(2)(d)
“ <i>significant</i> ” emissions sources”	HFFR 8(d)(i)

Similarly, some terms imply an assumed meaning, but remain ambiguous:

“area”	HFFR 6(c)
“best industry practices”	HFFR 25(c)(x), 25(c)(xi)
“drilling season”	HFFR 21
“industry best practices”	HFFR 7(a), 14, 15, 16(1), 20(2)(b), 23, 25(b)
“long-term”	HFFR 9(2)(vi)
“pollutants of concern”	HFFR 8(d)(ii)(A)
“short-term”	HFFR 9(2)(v)
“suspected seismic event”	HFFR 17(a)(i)

#### DUPLICATIVE WORDS CAN CAUSE CONFUSION

For example, differences between the following paired terms are unclear:

“ <i>acceptable</i> and <i>tolerable</i> levels of risk”	HFFR 5(2)(c)
“various <i>levels</i> or <i>tiers</i> of emergency”	HFFR 9(2)(c)

“ <i>processes and procedures</i> ,” “ <i>processes</i> ,” “ <i>criteria and processes</i> ,” “ <i>plan</i> ,” “ <i>procedures</i> ,” and “ <i>criteria and procedures</i> ”	HFFR 2
“ <i>proposed work or activity</i> ”	HFFR 6(f)(i)
“ <i>all stages or phases of the proposed work</i> ”	HFFR 5(2)(h)

#### TERMS ARE USED INCONSISTENTLY

For example, five sections require applicants to “consider” specified information, but only one of these requires that such information be “considered and incorporated.”

#### VARIATIONS ON DEFINED TERMS LEAVE INTENT UNCLEAR

- “[Natural environment](#)” is expressly defined (s.1), but the draft regulations use both “natural environment” and “environment.”
- “[Potable water](#)” is expressly defined (s.1), but the draft regulations refer both to “potable water zones” and “groundwater zones.” It is unclear if these terms hold different meaning, nor how either “zone” is defined (e.g., depth, area, coordinates, etc.).
  - “Potable water,” “groundwater,” “surface water,” and “water” all have small, but potentially significant variances of meaning.
  - The NEBFR define “groundwater” as “potable-quality water in permeable, sub-surface formations are zones that are typically above the depth of the surface casing shoe as set for oil and gas well drilling.”
  - ConocoPhillips’s discussion paper distinguishes between “shallow groundwater” and “deep groundwater (non-potable)” (3-25).
  - The NWT *Waters Act* defines “groundwater” as “all water in a zone of saturation beneath the land surface, regardless of its origin.” However, because the *Waters Act* is a separate statute, its definition would not apply to the draft regulations (filing requirements), but to activity (water use).
  - COCA identifies three zones in discussions of groundwater: “The **Fresh Groundwater Zone** (FGWZ) has potable water and somewhat deeper water that can be made potable by minimal water

treatment. No comprehensive study in Canada has defined the depth of the bottom of the FGWZ, which varies from region to region. A general estimate is between 100 and 300 metres below land surface, although it may be as deep as 500 to 600 metres. In Alberta, the depth of the FGWZ is defined as where the maximum concentration of total dissolved solids is 4,000 mg/L.... Shallow groundwaters in the FGWZ typically have low salinity of less than 1,000 mg of total dissolved solids per litre (1,000 ppm). However, the FGWZ may include brackish waters up to 4,000 ppm. This is suitable for livestock or may be recovered for human consumption by advanced water treatment processes.... The term **Deep Zone** has no formal scientific meaning. It refers to zones with shale beds that are targets for gas extraction by hydraulic fracturing. Between the Deep Zone and the FGWZ lies the **Intermediate Zone**, where the groundwater is brackish to saline and may contain formations with entrapped gases that have no commercial value and thus were bypassed during drilling and well completion” (63).

- [“Well operation”](#) is expressly defined, but does not appear in the draft regulations, which use well operations” as well as other terms, including “oil and gas operations,” “hydraulic fracturing operations,” and simply “operations,” raising potential questions about how a well’s full lifespan will be addressed. For further discussion, see below.

#### ITEMS IDENTIFIED BY THE COMMITTEE

In its past responsive work and research, the Committee has noted the following as points of interest respecting the regulation of hydraulic fracturing.

#### 1. **The regulatory framework should be clear.**

- [“NWT Regulatory System at a Glance”](#) was released with the draft regulations; however, some documents referenced within the regulations—including the *Environmental Protection Plan Guidelines*, the *Safety Plan Guidelines*, and the *Alberta Ambient Air Quality Objectives and Guidelines*—were not included.
- The [“Plain Language Summary”](#) was also provided; it references the NEBFR and provides the draft regulations’ section headings.

#### 2. **Water withdrawal and wastewater management**

- Water withdrawal is not expressly addressed in the draft regulations.
- It is unclear if the regulations permit, or otherwise specifically address, on-surface storage.

- The NWT is not currently equipped for in-jurisdiction disposal (via deep-well injection or otherwise). It can be assumed that all waste materials would be transported out of the NWT for disposal elsewhere for the foreseeable future; however, this appears to be more an operational requirement than a regulatory condition.
- It is unclear whether the regulations leave open the option of on-surface storage—whether in tanks or pits—in future.

### 3. Full well lifespan, including abandonment and decommissioning

- The draft regulations account for well lifespan, abandonment, and decommissioning in greater detail than the draft Guidance, but less detail than the NEBFR.
- NEBFR 4.5.5 (Well Suspension and Abandonment), Items 1, 4, 6, and 7 are not mirrored in the draft regulations and do not appear elsewhere in the regulatory framework.
- OGDPR 56 to 59 address well suspension and abandonment, but do not duplicate the excluded NEBFR items.
- The subjects of NEBFR 4.5.5, Item 2 is addressed through OGDPR 56 and Item 3, through OGDPR 36(2). However, the regulatory effect (offence provision vs. filing requirement) is not the same.
- Requirements referencing lists of activities, including “suspension and abandonment” are found in paragraph 6(d), 6(f)(iii), and 6(i).
- The term “well operation” includes “suspension or abandonment of a well”—Thus, all requirements addressing “well operation” would also apply to well suspension and abandonment.
- However, “well operation” appears only in the draft regulations’ definitions section (s.1), while “well operations” appears only twice, in subsection 13(1) and paragraph 20(2)(b).
- “Termination” means the abandonment, completion, or suspension of a well’s operation, but does not appear in the draft regulations outside the definitions section (s.1). A “safety termination plan” is discussed in paragraph 17(b), specifically in reference to suspected seismic event response.
- Requirements addressing affected suspended and abandoned offset wells are found in paragraphs 23(g) and 24(f).

- Decommissioning is referenced once in the draft regulations in subsection 10(e), which requires all-season well pad plans to include plans for decommissioning and reclamation for the all-season well pad. Decommissioning is also addressed in OGDPR 6(k).

**Northern operating conditions, including winter roads, permafrost, and limited community infrastructure”**

- NEBFR 4.1, Item 2 requires a description of how environmental factors during winter operations could potentially affect the work or activity. It is not mirrored in the draft regulations and does not appear elsewhere in the regulatory framework.
- Five NEBFR items addressing permafrost are mirrored in the draft regulations, while two are not.<sup>12</sup>
- NEBFR 4.4.2, Item 1(c) does not address permafrost, but a nearly identical provision in the OGDPR (s.41) requires operators to ensure that the cement slurry is designed and installed to protect permafrost zone integrity.
- OGDPR 41 was not introduced by the GNWT, but originated with these regulations’ federal counterpart, mirrored at devolution. While it establishes more stringent requirements than Item 1(c), it does not serve an equivalent regulatory function (offence provision vs. regulatory requirement).
- CIMP notes an NWT-wide permafrost disturbance mapping project in 2014-15.

*Comments*

1. It is unclear how waste material would be addressed once transported out of the NWT—e.g., would it be shipped elsewhere for on-surface storage or disposal by some other means?

**PUBLIC ENGAGEMENT**

DRAFT *HYDRAULIC FRACTURING FILING REGULATIONS*: PUBLIC PACKAGE

The public package available on the ITI website includes:

---

<sup>12</sup> NEBFR 4.4.2 (Well Casing and Cementing), Items 1(a) and (b), which require demonstration that the surface casing designed to isolate groundwater zones and permafrost from potential oil, gas, and/or saline water zones and that it is set below all known or reasonably estimate groundwater and permafrost. OGDPR 39(c) address integrity of gas haydrate and potable water zones, but not saline water zones.

- [Proposed Regulations](#) and [Plain Language Summary](#);
- [Press Release](#) and [Backgrounder](#);
- [FAQ: Hydraulic Fracturing Filing Regulations](#);
- [Monitoring and Research](#);
- [Environmental Assessment Coordination](#);
- [NWT Regulatory System at a Glance](#); and
- [Monitoring and Research Related to Hydraulic Fracturing in the NWT](#).

Additional information was also tabled in the Legislative Assembly on 2 June 2015 (Tabled Document 255-17(5)).

#### COMMUNITY SESSIONS

The Department of Industry, Tourism, and Investment is currently engaged in public engagement respecting the draft regulations.

- NWT communities visited or scheduled to be visited are: Inuvik, Fort Good Hope, Norman Wells, Tulita, Fort Simpson, Fort Liard and Nahanni Butte (both rescheduled due to weather), Hay River, Fort Smith, and Yellowknife. On 17 April 2015, the Committee was advised that both Deline and Colville Lake would also be visited. Colville Lake’s session will take place 2 June 2015 at 2:00 pm and Deline’s session on 2 June 2015 at 7:00 pm.

The GNWT has committed to providing the Committee with the results of these meetings at their conclusion. All community engagement sessions are open to the public (in the public domain).

- The Committee had previously requested that the results of each session be made available to members and to the public not at the end of engagement, but on a rolling basis throughout the review period.

On 6 April 2015, *Northern Journal* reported that the Department had committed to making “input from the engagement sessions... available online on a regular basis” (Wohlberg, NWT government releases proposed fracking regulations for territory) while representatives further committed to sharing input with communities during sessions (Sheldon); however, this has not been completed to date.

- ITI further noted during its sessions that these sessions were undertaken separately from any section 35 (treaty) consultation; it is unclear when section 35 consultation will take place, or if it is currently underway.

In the interim, this report draws on existing media coverage to identify the themes listed below. Note that coverage has focused primarily on the Sahtu, with less attention to the Deh

Cho and the South Slave regions. While some residents have spoken in favour of development,<sup>13</sup> the primary themes of much of the public response appear to be ones of concern and questioning, including reservations toward fracking overall as well as a desire for additional time and further consideration (research, study, and public engagement).

- Wide-ranging conversation: hydraulic fracturing in general, the Premier's trip to China, oil sands, cultural appropriation;
- Questioning whether hydraulic fracturing should take place;
- Desire to extend review period;
- Need for more research and additional time;
- Fair benefits for Aboriginal communities;
- Desire for water quality and environmental security (e.g., low water levels, downstream effects, cumulative effects of multiple wells);
- Desire for education and understanding;
- Control of contracts for local workers;
- Support for local economies, including but not limited to development;
- Desire for community participation and consultation, including section 35 consultation;
- Concern respecting the protection of proprietary information to the detriment of public interest;
- Regulations to be used to protect Aboriginal people and northerners;
- Desire for work coupled with desire for health and security; and
- Proposed visit to Tulita by North Dakotans.

#### OFFICIAL FIRST NATIONS POSITIONS ON HYDRAULIC FRACTURING<sup>14</sup>

- In May 2015, the Dehcho First Nations (DFN) voted to ban hydraulic fracturing on their traditional lands (Dehcho First Nations). Representatives addressed the GNWT during an engagement session in Fort Smith, saying, "DFN will not allow or consent to hydraulic fracturing of oil and gas reserves in Dehcho traditional territory" (Wohlberg, Fort Smith voices distrust around fracking in the NWT).
- In April 2015, the Dene Nation issued a news release respecting hydraulic fracturing. National Chief Bill Erasmus said, "We agree that more time is needed in the Northwest Territories for reviewing and discussing hydraulic

---

<sup>13</sup> For example, CBC reports that in Norman Wells, the Norman Wells Land Corporation that the current engagement sessions are insufficient, while the Tulita District Land Corporation spoke in favour of development (Quenneville, Scott and Sheldon, Norman Wells has its say on draft fracking regulations). CBC also reports that the Yamoga Land Corporation noted a need for more time for its own review (CBC News).

<sup>14</sup> "In British Columbia, ownership of subsurface resources is typically included in settlement lands, except where such rights have already been allocated. In other parts of Canada, ownership of subsurface resources may vary from negotiation to negotiation" (Aboriginal Affairs and Northern Development Canada).



fracturing for natural gas and oil” and recognized the Committee’s news release of 27 April 2015. This follows a 2011 unanimous resolution “calling for a moratorium to be in place until further research is concluded” (Dene National Office and the Assembly of First Nations (NWT)).

- In August 2014, *Northern Journal* reported that the Sahtu Dene and Métis called on both the Sahtu Secretariat and the GNWT to “establish a joint commission to review the ‘technical, environmental, economic, and regulatory aspects’ of fracking” (Wohlberg, Sahtu Dene, Métis call for regional fracking review).
- In August 2014, the Gwich’in Tribal Council unanimously passed a motion calling on both the GNWT and the Yukon Government to “prohibit any fracking in the Yukon and Northwest Territories” (Gwich’in Tribal Council 6). The Gwich’in position was also cited in the [final report produced by the Yukon Select Committee Regarding the Risks and Benefits of Hydraulic Fracturing](#).
- In July 2014, the Akaitcho Treaty 8 Tribal Corporation (Deninu Kue, Lutsel K’e, Dettah, and Ndilo) passed resolutions to ban fracking and uranium exploration in Akaitcho territory as well as working with the Tłı̨chǫ Government and the Dehcho First Nations to protect a cultural site at Whitebeach Point (Punter).
- In April 2014, the Fort Norman Métis Land Corporation issued a letter of support specific to Conoco-Phillips exploratory activities (P-20 and E-76), stating their support for “development in [their] area” and the need for “economic stimulus” (Fort Norman Metis Land Corporation). In April 2013, the Corporation passed a resolution in support of the two exploratory wells, citing benefits to the Tulita District Dene and Métis and the desire to gather information.
- In 2014, the Sahtu Secretariat called on the GNWT to establish a joint commission with the Sahtu to review fracturing risks and benefits, seek advice, facilitate public dialogue, and produce a public report, including recommendations (The Sahtu Secretariat Incorporated).
- In 2013, the Łı̨ı̨dlı̨ Kúę́ First Nation passed a resolution calling for a moratorium until additional research on land, water, and health was completed and “regulatory requirements and safeguards” were in place (Łı̨ı̨dlı̨ Kúę́ First Nation).
- Additionally, in June 2015, a petition calling for a “fracking moratorium pending comprehensive public review” was tabled in the Legislation Assembly, while in March 2014, a petition calling to “refer fracking

applications to environmental review” was also tabled. The GNWT responded in March 2014 (Tabled Document 86-17(5)) Also in 2014, a petition signed by residents of Tulita, calling for “a chance to vote on the fracking decision (Tabled Document 71-17(5)).” Tabled documents are available online at <http://www.assembly.gov.nt.ca/documents-proceedings>.

- In May 2014, that year’s NWT Elders Parliament (held biannually, alternating with the NWT Youth Parliament) “voted unanimously in favour of a moratorium” on horizontal fracturing (CBC News).

---

## OTHER

---

### ABANDONED AND SUSPENDED WELLS

Abandoned and suspended wells related to oil and gas development and located in the Northwest Territories are identified in a [one-page document](#) released by OROGO in April 2015.

For further discussion of the role of suspended and abandoned well monitoring, see [“Fracture Communications.”](#))

### LAND AND WATER “SUPERBOARD”

On 27 February 2015, the NWT Supreme Court granted the Tłı̨chǫ Government an injunction against the formation of a land and water “superboard.” As a result, the Wek’èezhìi Land and Water Board, as well as the Gwich’in and Sahtu boards, are preserved in their current form until the Tłı̨chǫ Government’s case against the Government of Canada is decided. The Sahtu Secretariat has similarly filed against the federal government.

- Currently, the Gwich’in Tribal Council, the Sahtu Secretariat, and the Tłı̨chǫ Government each appoint two of four members to their respective Boards and hold a 25 per cent vote toward the selection of that Board’s Chair (Shaner).
- Under the contested “superboard” structure, the Gwich’in Tribal Council, the Sahtu Secretariat, and the Tłı̨chǫ Government would each appoint one of ten members and would have no guarantee of appointment on proposed three-person panels respecting applications in their region (Shaner).

---

**GLOSSARY**

---

<b>Applicant</b>	“applicant for an operating authorization under section 10 of OGOA” (HFFR 1)
<b>Acid fracturing</b>	<p>“A hydraulic fracturing treatment performed in carbonate formations to etch the open faces of induced fractures using a hydrochloric acid treatment. When the treatment is complete and the fracture closes, the etched surface provides a high-conductivity path from the reservoir to the wellbore” (Schlumberger).</p> <p>Acid fracturing uses a different method of fracture propagation than hydraulic fracturing.</p>
<b>Black carbon</b>	“Black carbon (BC) is the most strongly light-absorbing component of particulate matter (PM), and is formed by the incomplete combustion of fossil fuels, biofuels, and biomass. BC is emitted directly into the atmosphere in the form of fine particles (PM <sub>2.5</sub> )” (United States Environmental Protection Agency).
<b>Casing annuli</b>	“The space between two concentric objects, such as between the wellbore and casing or between casing and tubing, where fluid can flow. Pipe may consist of drill collars, drillpipe, casing or tubing” (Schlumberger).
<b>Criteria air contaminants (CAC)</b>	a substance identified as a criteria air contaminant in the <a href="#"><i>National Pollutant Release Inventory Notice</i></a> , published in the Canada Gazette under subsection 46(1) of the <a href="#"><i>Canadian Environmental Protection Act</i></a> , 1999;
<b>Deeper rights reversion</b>	“Deeper rights reversion was introduced into the Department of Energy’s tenure system in 1976. It allows for petroleum and natural gas rights below the base of the deepest productive zone to be deleted from a lease and returned to the land bank. This releases the rights that had been sterilized by shallow production and allows for further development” (Alberta Energy). See also “shallow rights reversion.”
<b>Delineation well</b>	“a well that is so located in relation to another well penetrating an accumulation of petroleum that there is a reasonable expectation that another portion of that accumulation will be penetrated by the first-mentioned well

and that the drilling is necessary in order to determine the commercial value of the accumulation” (PRA 91(1))

<b>Development well</b>	“a well that is so located in relation to another well penetrating an accumulation of petroleum that it is considered to be a well or part of a well drilled for the purpose of production or observation or for the injection or disposal of fluid into or from the accumulation” (PRA 91(1))
<b>Economically recoverable</b>	“Economically recoverable resources are resources that can be profitably produced under current market conditions” (US Energy Information Administration).
<b>Entrained gas</b>	“The gas present in the fluids of a wellbore circulatory system. Many well-intervention operations are conducted with the well live or held on balance. Fluids circulated within the wellbore under these conditions are likely to pick up reservoir fluid and gas. The entrained gas and fluid require special handling and processing before the base fluid can be safely recirculated in the wellbore or prepared for disposal” (Schlumberger).
<b>Exploration Licence</b>	Grants oil and gas exploration privileges to successful bidders; OROGO held its first auction in February 2015
<b>Exploratory well</b>	“a well drilled on a geological feature on which a significant discovery has not been made” (PRA 91(1))
<b>Flaring</b>	“Flaring is the burning of natural gas that cannot be processed or sold. Flaring disposes of the gas while releasing emissions into the atmosphere... Flaring is also used to dispose of sour gas containing H <sub>2</sub> S and waste gas containing contaminants such as H <sub>2</sub> S and Carbon Dioxide (CO <sub>2</sub> )” (Caliber Planning).
<b>Flowback</b>	“The process of allowing fluids to flow from the well following a treatment, either in preparation for a subsequent phase of treatment or in preparation for cleanup and returning the well to production” (The Council of Canadian Academies 223).
<b>Formation fluid</b>	“any fluid that occurs in the pores of a rock” (The Council of Canadian Academies 224)
<b>Fracturing fluid</b>	“fluid used to hydraulically induce cracks in the target

formation and includes the applicable base fluid and all additives” (The Council of Canadian Academies 224).

**Green completion techniques**

“methods that minimize the amount of natural gas or oil vapours that are released to the environment when a well is being flowed during the completion phase of a well” (HFFR 1)

“Reduced emissions completions (RECs)—also known as reduced flaring completions or green completions—is a term used to describe an alternate practice that captures gas produced during well completions and well workovers following hydraulic fracturing. Portable equipment is brought on site to separate the gas from the solids and liquids produced during the high-rate flowback, and produce gas that can be delivered into the sales pipeline. RECs help to reduce methane, VOC, and HAP emissions during well cleanup and can eliminate or significantly reduce the need for flaring” (United States Environmental Protection Agency Air and Radiation).

**Hydraulic fracturing fluid information**

Information included in disclosure—e.g., to the NEB and/or to FracFocus.ca

**In-place resources**

Estimate of oil and gas in the ground, broader than both technically and economically recoverable estimates.

**Natural environment**

“the physical and biological environment” (HFFR 1)

**Operator**

“the holder of an operating authorization under section 10 of OGOA” (HFFR 1)

**Potable water**

“water that is safe for human consumption” (HFFR 1)

**Produced fluids**

“produced water: water naturally present in a reservoir or injected into a reservoir to enhance production, produced as a co-product when gas or oil is produced” (The Council of Canadian Academies 225)

**Shallow rights reversion**

“The government will implement shallow rights reversion to maximize extraction of the resource. Under this policy, mineral rights to shallow gas geological formations that are not being developed would revert back to the government and be made available for resale” (Alberta Energy).

**Technically recoverable**

“Technically recoverable resources represent the volumes of

oil and natural gas that could be produced with current technology, regardless of oil and natural gas prices and production costs” (US Energy Information Administration).

**Unconventional oil and gas resources**

“The AER refers to unconventional oil as tight oil: oil found in low-permeability rock, including sandstone, siltstone, shale, and carbonates.

“The AER refers to unconventional natural gas as tight gas: natural gas found in low-permeability rock, including sandstone, siltstones, and carbonates; and shale gas: natural gas locked in fine-grained, organic-rich” (Alberta Energy Regulation).

**Volatile organic compound (VOC)**

“Volatile organic compounds (VOCs) are carbon-containing gases and vapors such as gasoline fumes and solvents (but excluding carbon dioxide, carbon monoxide, methane, and chlorofluorocarbons). Although there are many thousands of organic compounds in the natural and polluted troposphere that meet the definition of a VOCs, most measurement programs have concentrated on the 50 to 150 most abundant hydrocarbons” (Environment Canada).

**Well operation**

“the operation of drilling, completion, recompletion, intervention, re-entry, workover, suspension or abandonment of a well” (HFFR 1)

---

## BIBLIOGRAPHY

---

- Aboriginal Affairs and Northern Development Canada. "Resolving Aboriginal Claims: A Practical Guide to Canadian Experiences." 15 September 2010. Aboriginal Affairs and Northern Development Canada. 20 May 2015 <<http://www.aadnc-aandc.gc.ca/eng/1100100014174/1100100014179>>.
- Alberta Energy. Deeper Rights Reversion Zone Designation Lookup. n.d. 22 May 2015 <<http://www.energy.alberta.ca/LandAccess/DRRZD/1520.asp>>.
- Alberta Energy Regulation. What is Unconventional Oil and Gas? n.d. 22 May 2015 <<https://www.aer.ca/about-aer/spotlight-on/unconventional-regulatory-framework/what-is-unconventional-oil-and-gas>>.
- Alberta Energy Regulator. "What is Hydraulic Fracturing?" 2015. Alberta Energy Regulator. 11 May 2015 <<https://www.aer.ca/about-aer/spotlight-on/unconventional-regulatory-framework/what-is-hydraulic-fracturing>>.
- Alberta Energy. Shallow Rights Reversion. n.d. 22 May 2015 <<http://www.energy.alberta.ca/tenure/603.asp>>.
- Baker, David R. "California oil regulators could lose power over aquifer mess." 19 May 2015. SFGATE. 20 May 2015 <<http://www.sfgate.com/business/article/California-oil-regulators-could-lose-power-over-6274252.php>>.
- Beltrame, Julian. "Quebec Fracking Ban Lawsuit Shows Perils of Free Trade Deals: Critics." 23 January 2014. HuffPost Business Canada. 20 May 2015 <[http://www.huffingtonpost.ca/2013/10/03/quebec-fracking-ban-lawsuit\\_n\\_4038173.html](http://www.huffingtonpost.ca/2013/10/03/quebec-fracking-ban-lawsuit_n_4038173.html)>.
- Caliber Planning. What is Flaring? 22 May 2015. 22 May 2015 <<https://rfn.caliberplanning.com/index.php?content=faq&section=flaring>>.
- CBC News. "Dehcho leaders vote to ban fracking in traditional territory." 8 May 2015. CBC North. 20 May 2015 <<http://www.cbc.ca/news/canada/north/dehcho-leaders-vote-to-ban-fracking-in-traditional-territory-1.3063011>>.
- . "Fort Good Hope questions value of fracking regulations meeting." 14 April 2015. CBC North. 25 May 2015 <<http://www.cbc.ca/news/canada/north/fort-good-hope-questions-value-of-fracking-regulations-meeting-1.3031889>>.
- . "Fracking never got environmental review, consultant says." 29 November 2011. CBC. 7 April 2015 <<http://www.cbc.ca/news/canada/north/fracking-never-got-environmental-review-consultant-says-1.1036374>>.
- . "N.W.T. elders parliament votes for a freeze on fracking." 9 May 2013. CBC News. 4 June 2015 <<http://www.cbc.ca/news/canada/north/n-w-t-elders-parliament-votes-for-a-freeze-on-fracking-1.2637232>>.
- . "N.W.T. minister Ramsay apologizes for confusion on fracking rules." 30 April 2015. CBC North. 12 May 2015 <<http://www.cbc.ca/news/canada/north/n-w-t-minister-ramsay-apologizes-for-confusion-on-fracking-rules-1.3055755>>.
- Chin, Krista. Establishing a watershed framework for assessing cumulative impacts of development. Annual Project Status Report. Yellowknife, NT: Northwest Territorie Cumulative Impact Monitoring Program, 2014.

- Chong, Jed and Milana Simikian. Shale Gas in Canada: Resource Potential, Current Production and Economic Implications.  
<http://www.parl.gc.ca/Content/LOP/ResearchPublications/2014-08-e.pdf>. Ottawa: Parliamentary Information and Research Service: Economics, Resources, and International Affairs Division, 2014.
- Chudley, Jody. "MGM Energy could be poised for greatness - eventually." 2013 March 2013. Alberta Venture. 2013 April 2015 <<http://albertaventure.com/2013/03/mgm-energy-canol-shale/>>.
- ConocoPhillips Canada Resources Corp. "Hydraulic Fracturing Fluid Product Component Information Disclosure." 17 February 2014. National Energy Board with FracFocus. 19 May 2015 <<http://www.neb-one.gc.ca/fracfocus/2014-02-17-2082.pdf>>.
- . "Hydraulic Fracturing Fluid Product Component Information Disclosure." 10 March 2014. National Energy Board with FracFocus. 19 May 2015 <<http://www.neb-one.gc.ca/fracfocus/2014-03-10-2081.pdf>>.
- Dehcho First Nations. "Tabled Document 257-17(5)." 2 June 2015. 4 June 2015 <<http://www.assembly.gov.nt.ca/sites/default/files/td257-175.pdf>>.
- Dene National Office and the Assembly of First Nations (NWT). "Press Release from Dene National Office and the Assembly of First Nations (NWT)." 9 May 2015. Iksokapi Magazine. 20 May 2015 <<http://www.iksokapimagazine.com/2015/05/09/in-the-news-dene-nation-agrees-more-consultation-needed-on-hydraulic-fracturing/>>.
- Dixit, Bharat. "National Energy Board's Regulation of Shale Oil and Gas Activities." Calgary: National Energy Board, 21 August 2012.
- Emory Paquin Consulting. Hydraulic Fracturing of Unconventional Oil and Gas Reservoirs: An Overview of Environmental Impacts. Yellowknife: NWT Department of Environment and Natural Resources, 2012.
- Environment Canada. Volatile Organic Compounds (VOCs). 17 July 2013. 22 May 2015 <<https://www.ec.gc.ca/air/default.asp?lang=En&n=15B9B65A-1>>.
- Fort Norman Metis Land Corporation. "Re: Land Use and Water Licence Application - S14A-003/S14L1-002." 24 April 2014. Mackenzie Valley Land and Water Board. 26 May 2015 <[http://www.mvlwb.ca/Boards/slwb/Registry/2014/S14A-003%20-%20Husky%20Oil%20Operations%20Ltd/S14A-003%20-%20Review%20Comment%20FNMLC%20-%20Apr%2028\\_14.pdf.pdf](http://www.mvlwb.ca/Boards/slwb/Registry/2014/S14A-003%20-%20Husky%20Oil%20Operations%20Ltd/S14A-003%20-%20Review%20Comment%20FNMLC%20-%20Apr%2028_14.pdf.pdf)>.
- Gwich'in Tribal Council. "31st Annual General Assembly." 19-21 August 2014. Gwich'in Tribal Council. 20 May 2015 <<http://gwichin.nt.ca/wp-content/uploads/2014/10/GTC-2014-AGA-Resolutions.pdf>>.
- Healing, Dan. "Update: Lone Pine shares worthless under deal." 23 September 2013. Calgary Herald. 20 May 2015 <<http://www.calgaryherald.com/business/Update+Lone+Pine+shares+worthless+under+deal/8958980/story.html>>.
- Herman, Lyndsay. "NWT a potential fracking sand producer." 23 September 2013. Northern News Services Online. 20 May 2015 <[http://www.nnsl.com/frames/newspapers/2013-09/sep23\\_13fra.html](http://www.nnsl.com/frames/newspapers/2013-09/sep23_13fra.html)>.
- Ho, Karen K. "Discovery raises concern." 27 March 2015. Northern News Services Online. 15 May 2015 <[http://www.nnsl.com/frames/newspapers/2015-03/mar30\\_15con.html](http://www.nnsl.com/frames/newspapers/2015-03/mar30_15con.html)>.



- K'aalo-Stantec Limited in collaboration with ConocoPhillips Canada. The Canol Shale Play: Possible Outcomes of Early Stage Unconventional Resource Exploration. Discussion Paper. Calgary, 2013.
- Lewis, Jeff. "Promise of NWT shale oil boom draws global interest but prospects far from certain." 4 January 2013. Financial Post. 2 April 2015  
<[http://business.financialpost.com/news/energy/promise-of-nwt-shale-oil-boom-draws-global-interest-but-prospects-far-from-certain?\\_\\_lsa=992e-9156](http://business.financialpost.com/news/energy/promise-of-nwt-shale-oil-boom-draws-global-interest-but-prospects-far-from-certain?__lsa=992e-9156)>.
- Łııdlı Kuę First Nation. "Tabled Document 256-17(5)." 2 June 2015. Northern Journal. 4 June 2015 <<http://www.assembly.gov.nt.ca/sites/default/files/td256-175.pdf>>.
- Llewellyn, Grant T., et al. Evaluating a groundwater supply contamination incident attributed to Marcellus Shale gas development. Washington, DC: Proceedings of the National Academy of Sciences , 2015.
- Lone Pine Resources Ltd. "Lone Pine Resources Announces Shale Gas Land Continuation at Pointed Mountain in the Liard Basin." 6 May 2013. MarketWired. 19 May 2015  
<<http://www.marketwired.com/press-release/lone-pine-resources-announces-shale-gas-land-continuation-pointed-mountain-liard-basin-tsx-lpr-1786774.htm>>.
- . "Significant Properties." 2011. Lone Pine. 19 May 2015  
<<http://www.lonepineresources.com/operations/significant-properties/>>.
- Marketwired. "Paramount Resources Ltd. Completes Acquisition of MGM Energy Corp." 11 June 2014. Boe Report. 20 May 2015  
<<http://boereport.com/2014/06/11/paramount-resources-ltd-completes-acquisition-of-mgm-energy-corp/>>.
- Mitchell, Clive. "Strict specifications: UK frac sand potential." 15 May 2015. Industrial Minerals. 19 May 2015 <<http://www.indmin.com/Article/3453980/Strict-specifications-UK-frac-sand-potential.html>>.
- National Energy Board and Northwest Territories Geological Survey. "Energy Briefing Note: An Assessment of the Unconventional Petroleum Resources of the Bluefish Shale and the Canol Shale in the Northwest Territories." May 2015. National Energy Board. 22 May 2015 <<http://www.neb-one.gc.ca/nrg/sttstc/crdlndprtrlmpdct/rprt/2015shlnt/2015shlnt-eng.pdf>>.
- National Energy Board. "Filing Requirements for Onshore Drilling Operations Involving Hydraulic Fracturing." 12 September 2013. National Energy Board. 14 May 2015  
<<https://www.neb-one.gc.ca/bts/ctrq/gnthr/flrqnsdrllprtn/2013-09-12nbl-eng.pdf>>.
- . Frequently Asked Questions: Filing Requirements for Onshore Drilling Operations Involving Hydraulic Fracturing. 26 September 2014. 7 April 2015  
<<https://www.neb-one.gc.ca/bts/ctrq/gnthr/flrqnsdrllprtn/flrqnsdrllprtnfq-eng.html#s6>>.
- . "Procedures for the Public Disclosure of Hydraulic Fracturing Fluid Composition Information." 1 October 2014. National Energy Board. 7 April 2015  
<<https://www.neb-one.gc.ca/bts/ctrq/gnthr/cndlgsprtnct/hdrlcfctrng/dsclsrhdrlcfctrng-eng.html>>.
- Northwest Territories Geological Survey. "Liard Basin Hydrocarbon Project." n.d. Northwest Territoreis Geological Survey. 14 May 2015  
<<http://www.nwtgeoscience.ca/project/summary/liard-basin-hydrocarbon-project>>.

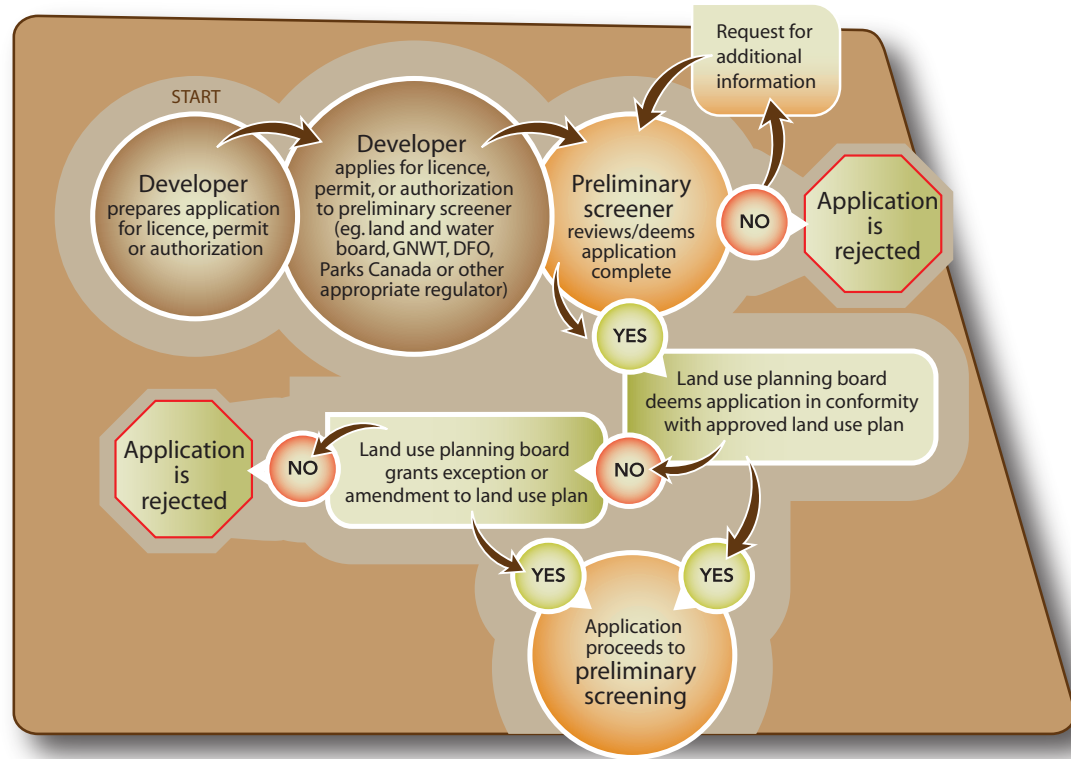
- “Seismic Monitoring - Central Mackenzie Valley.” n.d. Northwest Territories Geological Survey. 14 May 2015 <<http://www.nwtgeoscience.ca/project/summary/seismic-monitoring-central-mackenzie-valley>>.
  - “Shale Basin Evolution in the Central NWT.” n.d. Northwest Territories Geological Survey. 14 May 2015 <<http://www.nwtgeoscience.ca/project/summary/shale-basin-evolution-central-nwt>>.
- NWT Department of Environment and Natural Resources. “Monitoring and Research Related to Hydraulic Fracturing in the NWT Fact Sheet.” n.d. NWT Department of Industry, Tourism, and Investment. 22 May 2015 <[http://www.iti.gov.nt.ca/sites/default/files/monitoring\\_and\\_research\\_related\\_to\\_hydraulic\\_fracturing\\_in\\_the\\_nwt.pdf](http://www.iti.gov.nt.ca/sites/default/files/monitoring_and_research_related_to_hydraulic_fracturing_in_the_nwt.pdf)>.
- NWT Department of Industry, Tourism, and Investment. “David Ramsay: NWT Oil and Gas Strategy - Update.” n.d. NWT Department of Industry, Tourism, and Investment. 19 May 2015 <<http://www.iti.gov.nt.ca/news/david-ramsay-nwt-oil-and-gas-strategy-%E2%80%93-updatea>>.
- “Monitoring and Research Related to Hydraulic Fracturing in the NWT.” 1 April 2015. NWT Department of Industry, Tourism, and Investment. 20 May 2015 <[http://www.iti.gov.nt.ca/sites/default/files/final\\_backgrounder\\_-\\_monitoring\\_and\\_research.pdf](http://www.iti.gov.nt.ca/sites/default/files/final_backgrounder_-_monitoring_and_research.pdf)>.
  - “Northwest Territories Hydraulic Fracturing Filing Regulations LTR.” Yellowknife, 19 February 2015.
  - “Questions and Answers.” 1 April 2015. NWT Department of Industry, Tourism, and Investment. 14 May 2015 <[http://www.iti.gov.nt.ca/sites/default/files/faq\\_apr17.pdf](http://www.iti.gov.nt.ca/sites/default/files/faq_apr17.pdf)>.
- NWT Office of the Regulator of Oil and Gas Operations. “Notice to Potential Directly Affected Person(s).” 17 February 2015. NWT Office of the Regulator of Oil and Gas Operations. 15 May 2015 <[http://www.oilandgasregulator.iti.gov.nt.ca/sites/default/files/notice\\_to\\_potential\\_daps\\_e\\_-\\_nwt-sdd-2015-001\\_-\\_with\\_map.pdf](http://www.oilandgasregulator.iti.gov.nt.ca/sites/default/files/notice_to_potential_daps_e_-_nwt-sdd-2015-001_-_with_map.pdf)>.
- NWT Standing Committee on Economic Development and Infrastructure. “EDI Meeting Notes: In-Camera Briefing Respecting the Draft Northwest Territories Hydraulic Fracturing Filing Regulations.” Yellowknife, NT, 23 February 2015.
- “Guidance Document - Hydraulic Fracturing in the Northwest Territories LTR.” Yellowknife, NT, 26 November 2013.
  - Report on August 2012 Hydraulic Fracturing Study Tour: Toward a Policy Framework for Hydraulic Fracturing in the Northwest Territories. [http://www.assembly.gov.nt.ca/sites/default/files/12-11-05\\_report\\_on\\_august\\_2012\\_hydraulic\\_fracturing\\_study\\_tour\\_-\\_toward\\_a\\_policy\\_framework\\_for\\_hydraulic\\_fracturing\\_in\\_the\\_northwest\\_territories.pdf](http://www.assembly.gov.nt.ca/sites/default/files/12-11-05_report_on_august_2012_hydraulic_fracturing_study_tour_-_toward_a_policy_framework_for_hydraulic_fracturing_in_the_northwest_territories.pdf). Yellowknife: 17th Legislative Assembly of the Northwest Territories, 2012.
- Punter, Cody. “Akaitcho seek GNWT court challenge.” 14 July 2014. Northern News Services Online. 2 June 2015 <[http://www.nnsl.com/frames/newspapers/2014-07/jul14\\_14aka.html](http://www.nnsl.com/frames/newspapers/2014-07/jul14_14aka.html)>.
- Quenneville, Guy. “Canol concerns.” n.d. up here business. 13 April 2015 <<http://upherebusiness.ca/post/89972897832>>.

- “Despite discovery, ConocoPhillips not planning more exploration.” 18 March 2015. CBC North. 14 May 2015 <<http://www.cbc.ca/news/canada/north/despite-discovery-conocophillips-not-planning-more-exploration-1.3000367>>.
- “Frac sand drilling plans in North Arm, including popular beach, raise concerns.” 27 January 2015. CBC North. 20 May 2015 <<http://www.cbc.ca/news/canada/north/frac-sand-drilling-plans-in-north-arm-including-popular-beach-raise-concerns-1.2932706>>.
- Quenneville, Guy, Shannon Scott and Peter Sheldon. “Norman Wells has its say on draft fracking regulations.” 15 April 2015. CBC North. 25 May 2015 <<http://www.cbc.ca/news/canada/north/norman-wells-has-its-say-on-draft-fracking-regulations-1.3033607>>.
- Ramsay, Minister David. “Return to Written Question 27-17(5): Horizontally Fractured Wells in the Northwest Territories.” Yellowknife, 25 March 2015.
- Schlumberger. Oilfield Glossary. n.d. 22 May 2015 <<http://www.glossary.oilfield.slb.com/en/Terms.aspx?LookIn=term%20name&filter=entrained+gas>>.
- Oilfield Glossary. n.d. 22 May 2015 <<http://www.glossary.oilfield.slb.com/en/Terms.aspx?LookIn=term%20name&filter=annulus>>.
- Oilfield Glossary. n.d. 22 May 2015 <[http://www.glossary.oilfield.slb.com/en/Terms/a/acid\\_frac.aspx](http://www.glossary.oilfield.slb.com/en/Terms/a/acid_frac.aspx)>.
- Oilfield Glossary. n.d. 22 May 2015 <<http://www.glossary.oilfield.slb.com/en/Terms.aspx?LookIn=term%20name&filter=shale+oil>>.
- Oilfield Glossary. n.d. 22 May 2015 <[http://www.glossary.oilfield.slb.com/en/Terms/t/tight\\_oil.aspx](http://www.glossary.oilfield.slb.com/en/Terms/t/tight_oil.aspx)>.
- Oilfield Glossary. n.d. 22 May 2015 <[http://www.glossary.oilfield.slb.com/en/Terms/s/shale\\_gas.aspx](http://www.glossary.oilfield.slb.com/en/Terms/s/shale_gas.aspx)>.
- Oilfield Glossary. n.d. 22 May 2015 <[http://www.glossary.oilfield.slb.com/en/Terms/t/tight\\_gas.aspx](http://www.glossary.oilfield.slb.com/en/Terms/t/tight_gas.aspx)>.
- Shaner, Honourable Justice K. “Tlicho Government vs Canada (Attorney General), 2015 NWTSC 09.” 27 February 2015. 3 March 2015 <<http://www.documentcloud.org/documents/1678355-tlicho-govt-v-canada-rea-judg.html#document/p1>>.
- Shepstone, Tom. Penn State Explains Their Groundwater Study. 18 May 2015. 22 May 2015 <<http://naturalgasnow.org/penn-state-explains-their-groundwater-study/>>.
- Simoes, Bill. “A New North American Shale Oil Champion.” 9 January 2013. Nasdaq. 19 April 2015 <<http://www.nasdaq.com/article/a-new-north-american-shale-oil-champion-cm206027>>.
- St. Fleur, Nicholas. “Fracking Chemicals Detected in Pennsylvania Drinking Water.” 4 May 2015. The New York Times. 14 May 2015 <<http://www.nytimes.com/2015/05/05/science/earth/fracking-chemicals-detected-in-pennsylvania-drinking-water.html?smid=tw-share&r=0>>.
- “Tabled Document 255-17(5).” 2 June 2015. 4 June 2015 <<http://www.assembly.gov.nt.ca/sites/default/files/td255-175.pdf>>.

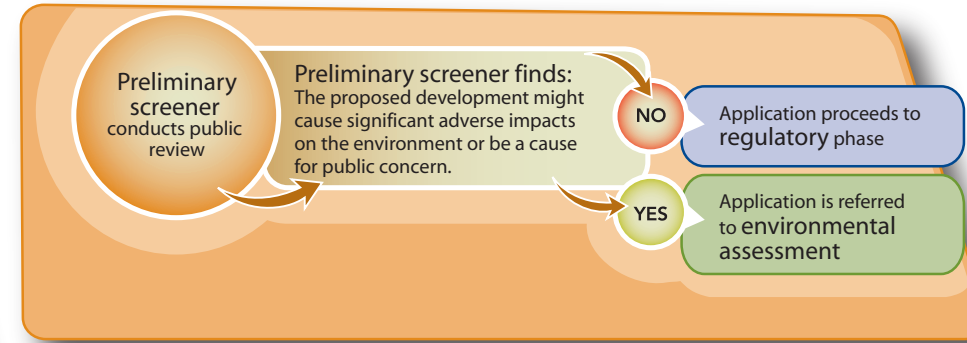
- “Tabled Document 71-17(5).” n.d. 4 June 2015  
 <<http://www.assembly.gov.nt.ca/sites/default/files/td71-175.pdf>>.
- Tectonic Energy Consulting Inc. “‘Significant’ shale gas find declared in Liard Basin.” 29 July 2013. Tectonic Energy Consulting Inc. 13 April 2015  
 <<http://www.tectonicenergy.com/significant-shale-gas-find-declared-in-liard-basin>>.
- The Canadian Press. “Jessica Ernst's fracking case to be heard by Supreme Court of Canad.” 30 April 2015. CBC. 19 May 2015  
 <<http://www.cbc.ca/news/canada/calgary/jessica-ernst-s-fracking-case-to-be-heard-by-supreme-court-of-canada-1.3055627>>.
- The Council of Canadian Academies. Environmental Impacts of Shale Gas Extraction: The Expert Panel on Harnessing Science and Technology to Understand the Impacts of Shale Gas Extraction. Ottawa, CA: The Council of Canadian Academies, 2014.
- The Department of Industry, Tourism, and Investment. “Proposed new Hydraulic Fracturing Filing Regulations support GNWT committment to balanced and responsible development.” 1 April 2015. Northwest Territories Industry, Tourism, and Investment: Oil and Gas. 12 May 2015  
 <[http://www.iti.gov.nt.ca/sites/default/files/final\\_news\\_release\\_-\\_proposed\\_hf\\_regulations.docx.pdf](http://www.iti.gov.nt.ca/sites/default/files/final_news_release_-_proposed_hf_regulations.docx.pdf)>.
- The Government of the Northwest Territories. “Tabled Document 86-17(5).” 28 May 2014. 4 June 2015 <<http://www.assembly.gov.nt.ca/sites/default/files/td86-175.pdf>>.
- The Northwest Territories Geological Survey. “NWT Geological Survey: Presentation.” Yellowknife: NWT Geological Survey, 24 April 2015.
- The Sahtu Secretariat Incorporated. “2014 Annual General Meeting [Tabled Document 141-17(5)].” 22 October 2014. Northwest Territories Legislative Assembly. 2 June 2015  
 <[http://www.assembly.gov.nt.ca/sites/default/files/td\\_141-175.pdf](http://www.assembly.gov.nt.ca/sites/default/files/td_141-175.pdf)>.
- Thompson, Roxanna. “Kakisa concerned about use of hydraulic fracturing.” 24 November 2011. Northern News Services Online. 7 April 2015  
 <[http://www.nnsl.com/frames/newspapers/2011-11/nov24\\_11PAR.html](http://www.nnsl.com/frames/newspapers/2011-11/nov24_11PAR.html)>.
- United States Environmental Protection Agency Air and Radiation. “Lessons Learned from Natural Gas STAR Partners: Reduced Emissions Completions for Hydraulically Fractured Natural Gas Wells.” 2011. United States Environmental Protection Agency. 7 April 2015  
 <[http://www.epa.gov/gasstar/documents/reduced\\_emissions\\_completions.pdf](http://www.epa.gov/gasstar/documents/reduced_emissions_completions.pdf)>.
- United States Environmental Protection Agency. Basic Information. 30 March 2012. 22 May 2015 <<http://www.epa.gov/blackcarbon/basic.html>>.
- US Energy Information Administration. “EIA/ARI World Shale Gas and Shale Oil Resource Assesssment.” 17 May 2013. 13 April 2015  
 <[http://www.eia.gov/analysis/studies/worldshalegas/pdf/chaptersi\\_iii.pdf](http://www.eia.gov/analysis/studies/worldshalegas/pdf/chaptersi_iii.pdf)>.
- . Technically Recoverable Shale Oil and Shale Gas Resources: An Assessment of 137 Shale Formations in 41 Countries Outside the United States. 13 June 2013. 22 May 2015 <<http://www.eia.gov/analysis/studies/worldshalegas/>>.
- Wirzba, Emily. “Congress: Investor-state harms U.S. sovereignty.” 18 May 2015. The Hill. 20 May 2015 <<http://thehill.com/blogs/congress-blog/foreign-policy/242273-congress-investor-state-harms-us-sovereignty>>.

- Wohlberg, Meagan. "Fort Smith voices distrust around fracking in the NWT." 18 May 2015. Northern Journal. 19 May 2015 <<http://norj.ca/2015/05/fort-smith-voices-distrust-around-fracking-in-nwt/>>.
- . "Fracking critics praise new NEB rules for the North." 23 September 2013. Northern Journal. 13 May 2015 <<http://norj.ca/2013/09/fracking-critics-praise-new-neb-rules-for-the-north/>>.
- . "MGM shut-down opens up NWT oil leases." 21 April 2014. Northern Journal. 20 May 2015 <<http://norj.ca/2014/04/mgm-shut-down-opens-up-nwt-oil-leases/>>.
- . "NWT government releases proposed fracking regulations for territory." 6 April 2015. Northern Journal. 16 April 2015 <<http://norj.ca/2015/04/nwt-government-releases-proposed-fracking-regulations-for-territory/>>.
- . "Sahtu Dene, Métis call for regional fracking review." 18 August 2014. Northern Journal. 25 May 2015 <<http://norj.ca/2014/08/sahtu-dene-metis-call-for-regional-fracking-review/>>.
- . "'Significant' shale gas find declared in Liard Basin." 13 May 2013. Northern Journal. 19 May 2015 <<http://norj.ca/2013/05/significant-shale-gas-find-declared-in-liard-basin/>>.
- Wohlberg, Meagan. "Dehcho First Nations reject new NWT fracking rules." 27 April 2015. Northern Journal. 2 June 2015 <<http://norj.ca/2015/04/dehcho-first-nations-reject-new-nwt-fracking-rules/>>.

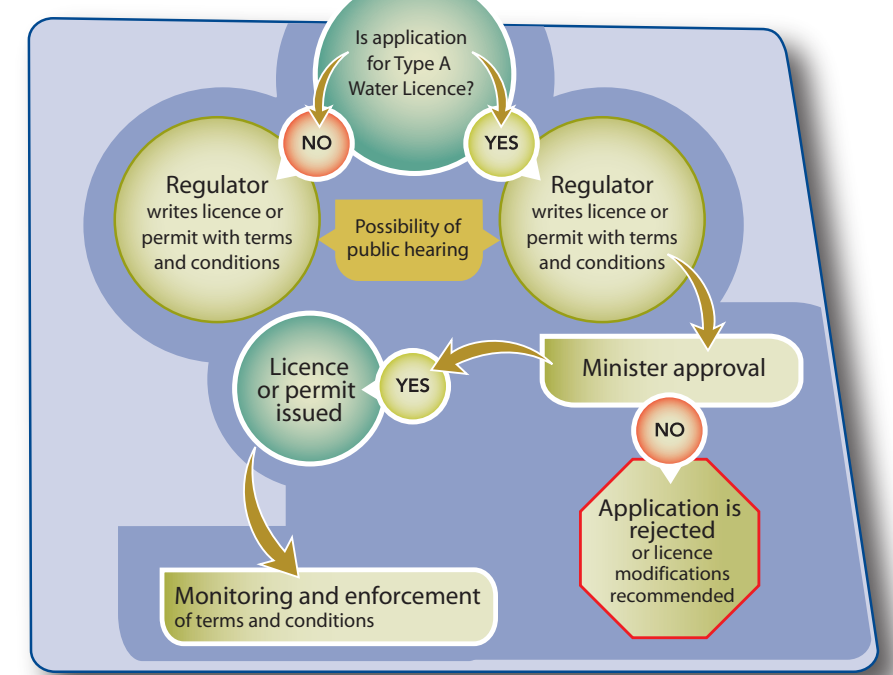
### Application for Licence/Permit/Authorization



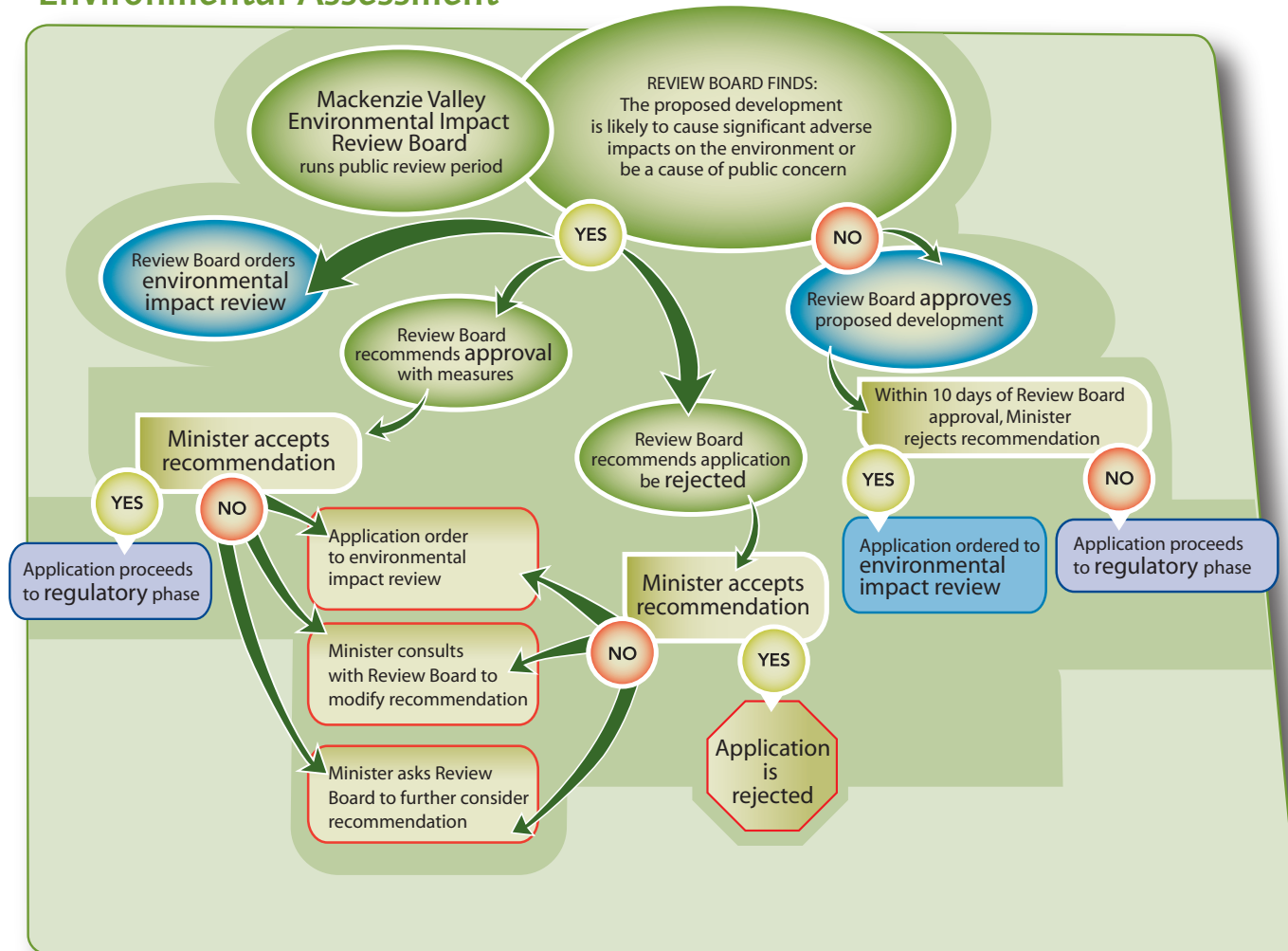
### Preliminary Screening



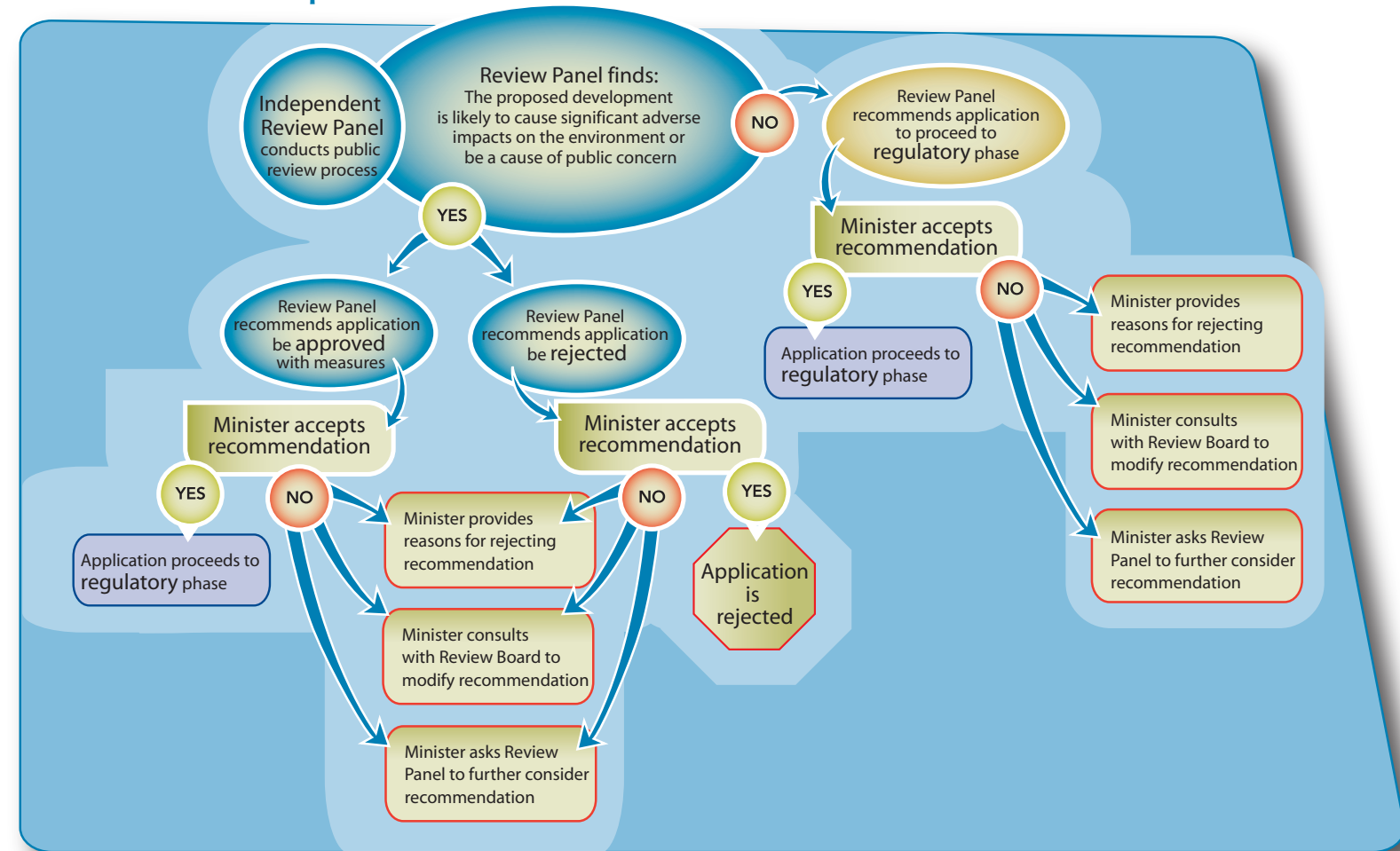
### Regulatory Phase



### Environmental Assessment



### Environmental Impact Review





## NWT Regulatory System at a glance

**Environmental Impact Assessment (EIA)** is a planning tool to ensure that the biological, physical, social, cultural and economic effects of human activities are fully considered before any irreversible decisions are made. They are conducted pursuant to federal and territorial legislation and settled claims.

### Preliminary Screening

High level initial scan to determine if more in-depth review is required.

Triggered by land use permit, water licence or other applications.

Almost always conducted by Land and Water Boards – 42 day time limit

Screener must answer two questions:

1. Might the development cause significant environmental impacts?
2. Might the development cause public concern?

If either answer is yes, screener must refer development to Review Board for environmental assessment

95% of applications require only a preliminary screening

Other Regulators may also be required to conduct a preliminary screening of authorizations they issue (ie: Office of the Regulator of Oil and Gas Operations)

### Environmental Assessment

Mackenzie Valley Environmental Impact Review Board conducts environmental assessments

GNWT acts as a technical advisor to provide Review Board with advice and evidence on impacts and mitigations:

- Scoping and Terms of Reference
- Technical Review
- Public Hearings

Public process – other parties also provide input, advice and evidence

Most EA's have a 16 month time limit

Rare – two or three per year

Any department or agency of the GNWT has the authority to refer a project to EA. Please note that the federal government, settled claims organizations, the regional land and water board and Mackenzie Valley Environmental Impact Review Board (MVEIRB) can also refer a project to environmental assessment

### Environmental Impact Review

The environmental impact review is carried out by an independent panel

Takes a very focused look at the potential environmental impacts and public concern of a proposed development.

The review will determine if a development should proceed to the regulatory phase, and if so, under what conditions.

GNWT acts as a technical advisor to provide Review Board with advice and evidence on impacts and mitigations:

Very rare – 2 since MVRMA came into force

**No permits or licences can be issued until the EIA requirements of the MVRMA are met**

## Who is responsible for what?

### Land and Water Boards

- Regulate use of land and water through the issuance of land use permits and water licences in the Mackenzie Valley
- Conduct preliminary screening of developments that require permits, licences or other authorizations

### Mackenzie Valley Environmental Impact Review Board

- Conducts environmental assessments
- Establishes independent panel in the event an environmental impact review is required
- Makes recommendations to the Minister of Lands regarding individual Reports of Environmental Assessment

### Lands

- Coordinates the GNWT's technical review and input into environmental assessment, environmental impact review, and some screening phase regulatory applications (i.e.: mineral and oil and gas development projects) in the Mackenzie Valley under the *Mackenzie Valley Resource Management Act*.
- Oversees and coordinates the GNWT's approach to management of environmental securities on public lands in the NWT.
- Compliance and enforcement responsibilities including inspections, for the terms and conditions for land use permits in the NWT.

### Environment and Natural Resources

- Minister of Environment and Natural Resources (ENR) has legislative authority over water, excluding the offshore, in the NWT.
- The ENR Minister approves Type A water licences and Type B water licences, where a hearing has been held, associated with undertakings on lands not excluded from the Devolution Agreement.
- ENR is responsible for inspections and enforcement of these licences.

### Industry, Tourism and Investment

Management of mineral and petroleum resources through:

- Administration of third party rights (e.g., PRD)
- Administration of royalties on production
- Administration of legislation, regulations and policy (NWTMR, CPRA, OGOA)
- Economic analysis and scientific research

### Office of the Regulator of Oil and Gas Operations

- Issuance of authorizations (e.g., Operations Authorization)
- Incident response and management
- Inspection and compliance

### National Energy Board (Inuvialuit Settlement Region only)

- Issuance of authorizations (e.g., Operations Authorization)
- Incident response and management
- Inspection and compliance

**NB:** Responsibility for specific approvals may shift as the GNWT continues to strengthen and adapt the regulatory system to NWT priorities and values.



## Appendix 3: NEBFR - Annotated

This document has been annotated.

No provisions have been altered; however, to confirm any provision, please refer to an unedited copy.



National Energy  
Board

Office national  
de l'énergie

# FILING REQUIREMENTS FOR ONSHORE DRILLING OPERATIONS INVOLVING HYDRAULIC FRACTURING

September 2013

## Legend

Red: Provisions that do not appear in the draft regulations or elsewhere in the regulatory framework.

Purple: Provisions that do not appear in the draft regulations, but that do appear elsewhere in the regulatory framework



National Energy  
Board

Office national  
de l'énergie

# **FILING REQUIREMENTS FOR ONSHORE DRILLING OPERATIONS INVOLVING HYDRAULIC FRACTURING**

September 2013

## Permission to Reproduce

Materials may be reproduced for personal, educational and/or non-profit activities, in part or in whole and by any means, without charge or further permission from the National Energy Board, provided that due diligence is exercised in ensuring the accuracy of the information reproduced; that the National Energy Board is identified as the source institution; and that the reproduction is not represented as an official version of the information reproduced, nor as having been made in affiliation with, or with the endorsement of the National Energy Board.

For permission to reproduce the information in this publication for commercial redistribution, please e-mail: [info@neb-one.gc.ca](mailto:info@neb-one.gc.ca)

## Autorisation de reproduction

Le contenu de cette publication peut être reproduit à des fins personnelles, éducatives et/ou sans but lucratif, en tout ou en partie et par quelque moyen que ce soit, sans frais et sans autre permission de l'Office national de l'énergie, pourvu qu'une diligence raisonnable soit exercée afin d'assurer l'exactitude de l'information reproduite, que l'Office national de l'énergie soit mentionné comme organisme source et que la reproduction ne soit présentée ni comme une version officielle ni comme une copie ayant été faite en collaboration avec l'Office national de l'énergie ou avec son consentement.

Pour obtenir l'autorisation de reproduire l'information contenue dans cette publication à des fins commerciales, faire parvenir un courriel à : [info@neb-one.gc.ca](mailto:info@neb-one.gc.ca)

© Her Majesty the Queen in Right of Canada 2013  
as represented by the National Energy Board

Paper: NE23-175/2013E  
978-1-100-22558-6

PDF: NE23-175/2013E-PDF  
978-1-100-22559-3

This report is published separately in both official languages. This publication is available upon request in multiple formats.

Copies are available on request from:

The Publications Office  
National Energy Board  
444 Seventh Avenue S.W.  
Calgary, Alberta T2P 0X8

E-Mail: [publications@neb-one.gc.ca](mailto:publications@neb-one.gc.ca)  
Fax: 403-292-5576  
Phone: 403-299-3562  
1-800-899-1265

For pick-up at the NEB office:

Library  
Ground Floor

Printed in Canada

© Sa Majesté la Reine du Chef du Canada 2013  
représentée par l'Office national de l'énergie

Paper: NE23-175/2013F  
978-0-660-21048-3

PDF: NE23-175/2013F-PDF  
978-0-660-21131-2

Ce rapport est publié séparément dans les deux langues officielles. On peut obtenir cette publication sur supports multiples, sur demande

Demandes d'exemplaires :

Office national de l'énergie  
Bureau des publications  
444, Septième Avenue S.-O.  
Calgary (Alberta) T2P 0X8

Courrier électronique : [publications@neb-one.gc.ca](mailto:publications@neb-one.gc.ca)  
Fax: 403-292-5576  
Phone: 403-299-3562  
1-800-899-1265

Des exemplaires sont également disponibles

à la bibliothèque de l'Office  
(rez-de-chaussée).

Imprimé au Canada

# Table of Contents

<b>1.0</b>	Introduction	1			
	1.1 The Purpose of the Filing Requirements	2			
<b>2.0</b>	Environmental Assessment	3			
	2.1 Proposed Project Location	4			
	2.2 Project Description Content for the Purpose of EA	6			
	2.2.1 Consultation	7			
	2.2.2 Socio-Economic Impacts	7			
<b>3.0</b>	Operations Authorization	8			
	3.1 Proof of Financial Responsibility	9			
	3.2 Declaration by Applicant or by Owner	9			
	3.3 Management System	9			
	3.4 Management System Implementation	10			
	3.5 Safety Culture	11			
	3.6 Human Factors	11			
	3.7 Lessons Learned	11			
	3.8 Safety Plan	12			
	3.9 Risk Assessment	12			
	3.10 Environmental Protection Plan	13			
	3.11 Waste Management	14			
	3.12 Spill Contingency Plan	14			
<b>4.0</b>	Well Approval	16			
	4.1 Well Description	17			
	4.2 Detailed Drilling Schedule	17			
	4.3 Geophysical Assessment	17			
	4.3.1 Geophysical Hazards Identification	17			
	4.3.2 Identification of Target Formations, Faults and Seismic Attributes	17			
	4.3.3 Geophysical Data for Hydraulic Fracturing	17			
	4.3.4 Monitoring and Reporting of Suspected Seismic Events	18			
	4.4 Drilling Program	18			
	4.4.1 Groundwater Protection	18			
	4.4.2 Well Casing and Cementing	18			
	4.4.3 Drilling Fluids	19			
	4.4.4 Wellbore Integrity (wellbore, annulus, inter-wellbore)	19			
	4.4.5 Well Control System	20			
	4.4.6 Relief Well Capability	20			
	4.5 Well Completion and Hydraulic Fracturing Operations	20			
	4.5.1 Well Completion Operation	20			
	4.5.2 Hydraulic Fracturing Design	21			
	4.5.3 Hydraulic Fracture Operations	21			
	4.5.4 Formation Flow Tests	21			
	4.5.5 Well Suspension and Abandonment	22			
<b>5.0</b>	All-Season Well Pads	23			
<b>6.0</b>	Inter-Well Distances on Multi-Well Pads	25			

# 1.0 Introduction

The National Energy Board (NEB or Board) is an independent federal agency established in 1959 by the Parliament of Canada. The NEB has regulatory responsibilities for oil and gas exploration and production activities, including the drilling, completion, hydraulic fracturing and formation flow testing of, and production from onshore unconventional reservoirs under the *Canada Oil and Gas Operations Act* (COGOA)<sup>1</sup> and its regulations. The purpose of COGOA, among other things, is to promote safety, protection of the environment and the conservation of oil and gas resources.

While the NEB may issue authorizations pursuant to paragraph 5(1)(b) of the COGOA, the NEB does not administer the following processes: land tenure and rights issuance (exploration licences, significant discovery licences and production licences), royalty management and benefits plans. Applicants should contact Aboriginal Affairs and Northern Development Canada or Natural Resources Canada for further information on these matters.

## 1.1 The Purpose of the Filing Requirements

The Filing Requirements for Onshore Drilling Operations Involving Hydraulic Fracturing (Filing Requirements) should be used in all cases where a proposed work or activity requiring an Operations Authorization (OA) involves hydraulic fracturing.

These Filing Requirements outline the information the Board will need to assess future applications for drilling that involve hydraulic fracturing.<sup>2</sup> The Filing Requirements apply to hydraulic fracturing operations in the Northwest Territories and Nunavut.

These Filing Requirements focus on the unique elements of hydraulic fracturing. The Board expects each applicant to submit the information described in the Filing Requirements with its application for an OA. Additional information may need to be submitted with each subsequent application for an approval, such as a Well Approval or Formation Flow Test Approval.

The information set out in the Filing Requirements does not prevent the Board from requesting any additional information it may find relevant, or from waiving certain Filing Requirements if they are not relevant to the applied-for work or activities. The applicant is responsible for complying with all applicable statutory and regulatory requirements. Accordingly, the Filing Requirements should be read in association with the COGOA and its regulations<sup>3</sup>, particularly the *Canada Oil and Gas Drilling and Production Regulations* (COGDPR) and any guidelines issued by the NEB regarding these regulations.

The Filing Requirements are not static and will be updated periodically. The Board is committed to continually improving its regulatory process so that its decisions on applications for all authorized works or activities regulated under COGOA promote safety, protection of the environment and conservation of oil and gas resources.

---

1 R.S.C., 1985, c.O-7

2 Hydraulic fracturing typically includes a well-stimulation process in which fluids, proppant and additives are pumped under high pressure into a hydrocarbon-bearing formation. The fluid pressure creates fractures in the formation and the fluid transports the proppant into the fractures. The proppant keeps the fractures open and allows the hydrocarbons to flow from the formation to the wellbore. The additives may: reduce friction, prevent the growth of microorganisms, and inhibit corrosion within the wellbore.

3 These Regulations include:

- *Canada Oil and Gas Drilling and Production Regulations*, SOR/2009-315;
- *Canada Oil and Gas Operations Regulations*, SOR/83-149; and
- *Oil and Gas Spills and Debris Liability Regulations*, SOR/87-331.

# 2.0

## Environmental Assessment

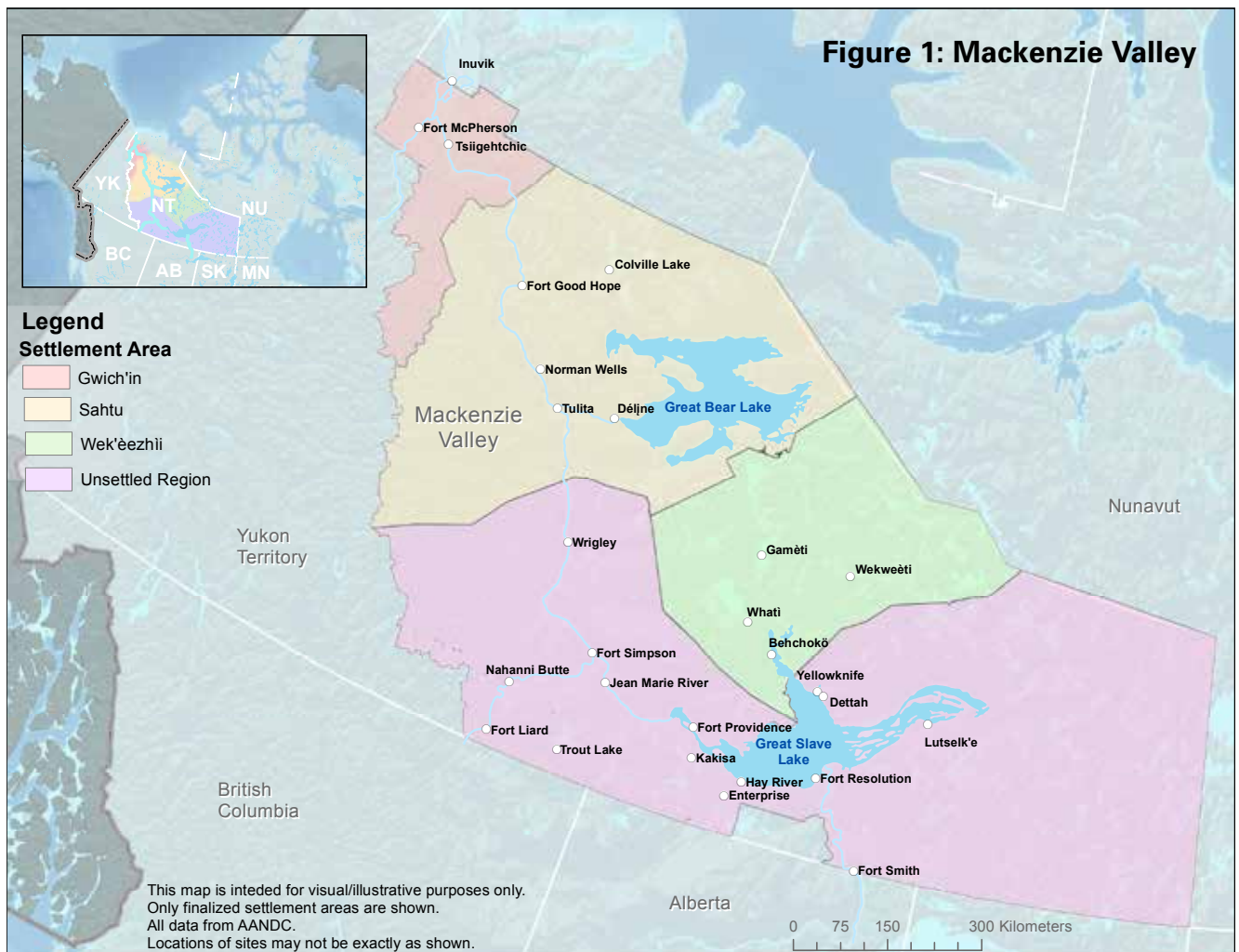
As part of its environmental protection responsibilities, the NEB makes sure that an environmental assessment (EA) is conducted for proposed activities in the Northwest Territories and Nunavut. The NEB conducts its own EA prior to issuing an OA as well as coordinating EAs with the northern boards or committees established by the *Mackenzie Valley Resource Management Act* (MVRMA)<sup>4</sup>, the *Inuvialuit Final Agreement* (IFA) and the *Nunavut Land Claims Agreement* (NLCA)<sup>5</sup>. An EA must be completed before a COGOA authorization can be issued.

The NEB relies on a proponent’s project description to coordinate EAs with northern boards and agencies. Accordingly, proponents are encouraged to provide a project description to the NEB as early as possible. See Section 2.2 for further details.

## 2.1 Proposed Project Location

Proposed development projects that occur in the Mackenzie Valley require a preliminary environmental screening, EA or review under Part 5 of the MVRMA. A preliminary screening is conducted by a Land and Water Board (LWB). Projects may also be referred to the Mackenzie Valley Environmental Impact Review Board (MVEIRB) which carries out EAs and public reviews.

Pursuant to the MVRMA, the NEB does not issue an OA until the LWB or MVEIRB has issued its decision. The NEB considers the recommendations made by the LWB or MVEIRB before it decides, on the basis of environmental impact considerations, whether or not the proposed work or activities should proceed and, if so, on what terms and conditions, including mitigative measures.



4 S.C. 1998, c.25

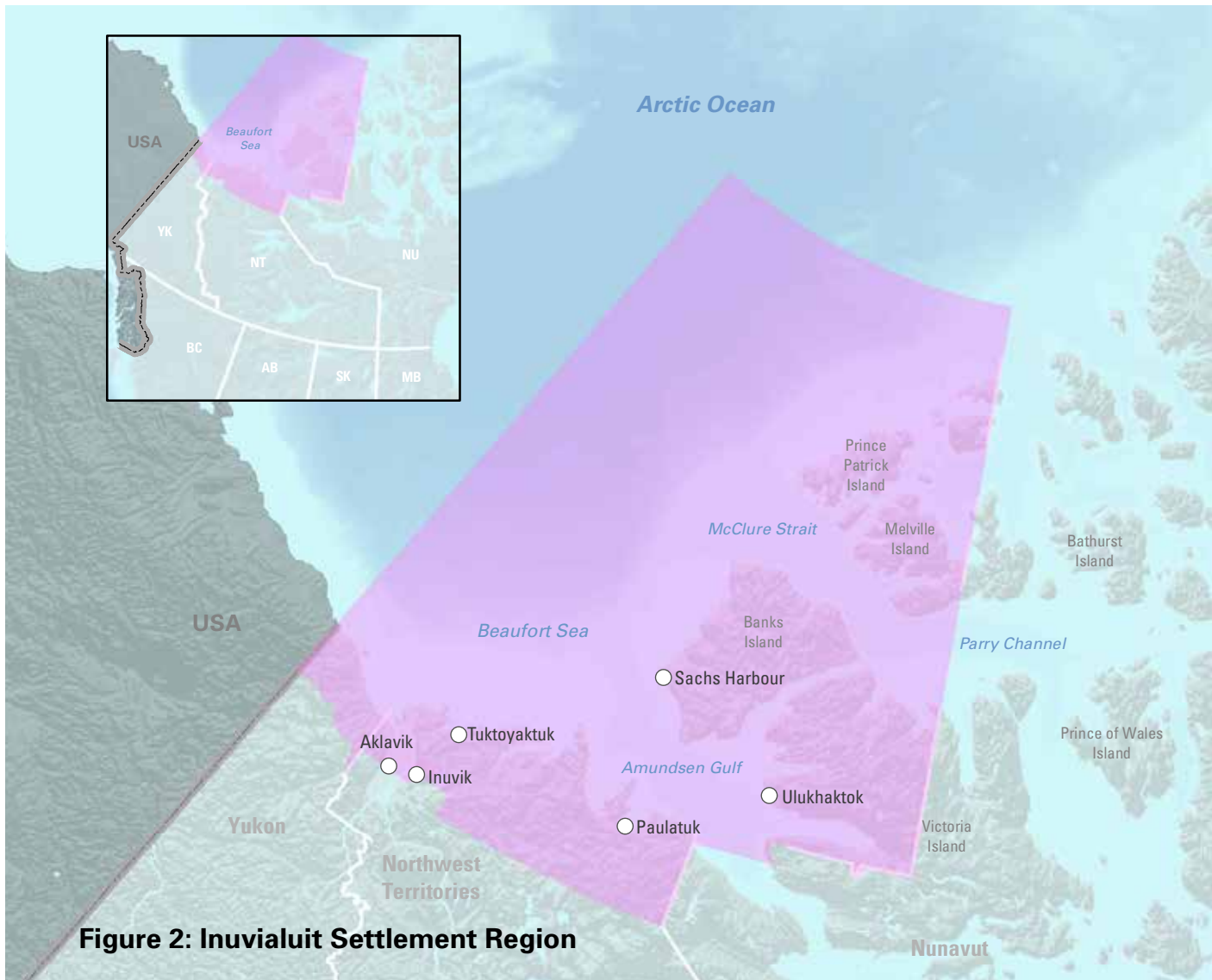
5 For additional information, refer to the various land claim agreements such as the *Inuvialuit Final Agreement*, the *Nunavut Land Claims Agreement*, the *Sahtu Dene and Metis Comprehensive Land Claim Agreement*, the *Gwich'in Comprehensive Land Claim Agreement*, or the *Tàtchò Land Claim and Self-Government Agreement*.



Proposed work and activities that occur in the Inuvialuit Settlement Region require an environmental screening or review under the *Inuvialuit Final Agreement*. An environmental screening is conducted by the Environmental Impact Screening Committee (EISC). Projects may be referred to the Environmental Impact Review Board (EIRB) which carries out environmental impact assessments and public reviews. Proponents should provide the same information to the NEB and EISC or EIRB so that conclusions are based on the review of consistent information.

Typically, during the EISC or EIRB processes there is extensive consultation that ensures local perspectives and issues are identified. The IFA addresses the prevention of loss or damage to wildlife and habitat and subsequent compensation if there is loss in terms of harvesting opportunities.

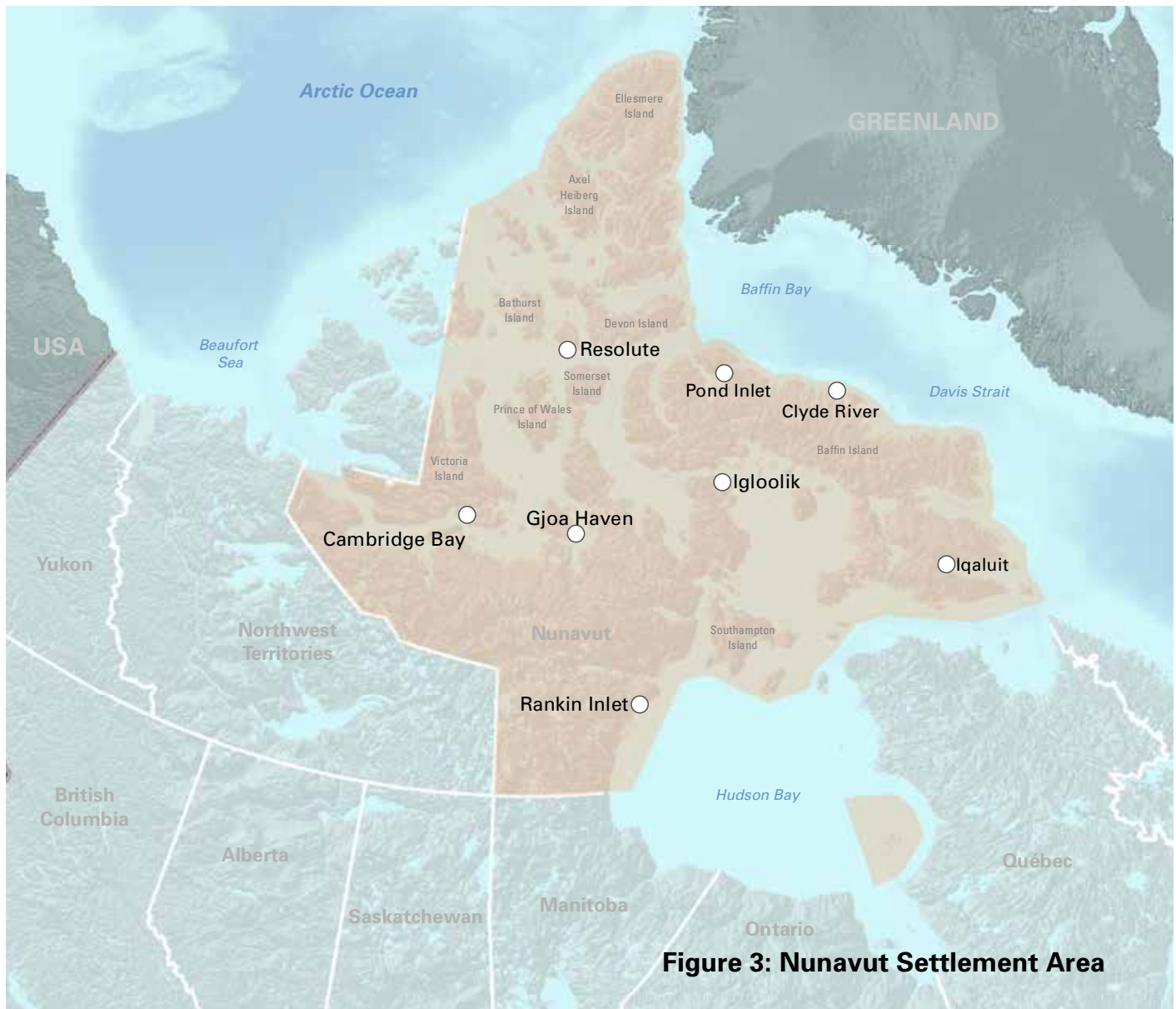
The IFA requires the NEB to wait for an EISC or EIRB decision before issuing any regulatory authorization. The NEB considers the recommendations before it decides, on the basis of environmental impact considerations, whether or not the work and activities should proceed and, if so, on what terms and conditions, including mitigative measures.



**Figure 2: Inuvialuit Settlement Region**

The Nunavut Impact Review Board (NIRB) screens proposed projects in the Nunavut Settlement Area (NSA) under the *Nunavut Land Claims Agreement* to determine whether or not an environmental impact review is required. The NEB will keep the NIRB updated on the NEB EA process and, although the NIRB may not be a party to the EA, the NIRB is able to provide comments during the EA process.

Typically, for projects located completely outside of the NSA, the proponent will provide project information to the NIRB to determine if potential trans-boundary impacts would trigger an assessment under the NIRB.



## 2.2 Project Description Content for the Purpose of EA

The project description is to include detailed information on: the project development; potential impacts to the environment, including potential impacts from accidents and malfunctions; consultation with Aboriginal groups and the public; socio-economic impacts arising from environmental impacts; and mitigation measures to protect the environment.

The following filing requirements describe the information to be included in a project description. Information about details to be provided in a project description may also be found under a number of sources, depending on where the project is located, including:

- Mackenzie Valley Review Board, Environmental Impact Assessment Guidelines;
- EISC, Environmental Impact Screening Guidelines;
- EISC, Environmental Impact Screening Guidelines, “provide guidance and direction to parties participating in the environmental screening of proposed developments” in the ISR;
- EISC, Environmental Impact Screening Guidelines, Appendix F: Example Project Description Submission Content Guide;
- EIRB, Environmental Impact Review Guidelines; and

- NIRB, Guide 3 - Filing Project Proposals and the Screening Process, Guide 5 - The NIRB Review Process, and Guide 7 - Preparation of Environmental Impact Statements.

Proponents should provide the same information to the NEB and northern boards and agencies so that conclusions are based on evaluation of consistent information.

### 2.2.1 Consultation

#### Context

The applicant is required to consult with persons or groups who may be affected by the proposed project. The extent of consultation required for any given application will depend on the nature of the project and its scope. The project description should provide the results of consultation conducted and offer sufficient details to justify the extent of that consultation. It should also offer a description of what other consultation activities were carried out.

#### Goal

The project description provides evidence to outline the policies and principles by which an applicant will ensure that it adequately consults with, and respects the rights of, those potentially affected. The project description also describes the project's consultation program and explains why its design and implementation are appropriate for the nature of the project and its scope.

#### Filing Requirements

1. Provide an overview of the consultation approach, including:
  - a. the policy or vision with respect to consultation;
  - b. the principles and goals established for the project's consultation program;
  - c. a copy of the consultation protocol, if established, along with any documented policies and principles for collecting traditional knowledge or traditional land use information, if applicable;
  - d. identifying any government authorities (Aboriginal, local, territorial, and federal) which were included in the consultation process;

- e. demonstrating that all groups or persons potentially affected by the project have been made aware of the project and are aware of approximately when the project application to the Board will be filed; and
- f. identifying the groups or persons potentially affected by the project who have been consulted, along with a summary of their concerns and comments.

2. Provide a summary of the response made regarding each of the concerns or comments identified above, including:
  - a. the measures taken, or that will be taken, to address those concerns or an explanation of why no further action is required to address the concerns or comments;
  - b. how outstanding concerns will be addressed; and
  - c. how information from persons or groups, including local and traditional knowledge, has influenced the design or operation of the project.

### 2.2.2 Socio-Economic Impacts

#### Goal

The project description provides sufficient detail to demonstrate an understanding of how the project will affect the social, cultural and economic status of residents and communities in the region or area where the project is located and what measures will be implemented to protect their well-being.

#### Filing Requirements

1. Provide information in the project description regarding the social, cultural and economic status of regional area residents and communities.
2. Describe what measures will be implemented for the protection of the social, cultural and economic status of regional area residents and communities.

# 3.0

## Operations Authorization

The NEB may issue an authorization for each work or activity proposed to be carried out. An authorization may be subject to terms and conditions that the NEB determines. The Operations Authorization and the Well Approvals are the primary regulatory permissions necessary to conduct a drilling program. Other non-NEB permits, licences or authorizations may also be required.

An Operating Licence is a prerequisite to carry out any oil and gas work or activity. Any individual or corporation may apply to the NEB for an Operating Licence. For additional information regarding an Operating Licence, refer to the *Canada Oil and Gas Operations Regulations*.

### 3.1 Proof of Financial Responsibility

Applicants should refer to the *Draft Financial Viability and Financial Responsibility Guidelines*<sup>6</sup> for information.

### 3.2 Declaration by Applicant or by Owner

#### Goal

The application provides a declaration by the applicant or by the owner in accordance with section 5.11 of COGOA confirming that equipment and installations are fit for their intended purposes throughout the proposed activities.

#### Filing Requirements

1. Provide a declaration executed by the most senior accountable officer of the applicant or owner that, at commencement and throughout execution of the activities, the equipment and installations that are to be used in the work or activities are fit for the locations and purposes for which they are to be used, the operating procedures relating to them are appropriate for those uses, and the personnel who are to be employed in connection with them are qualified and competent for their employment.
2. Describe the processes used to monitor compliance with the declaration by applicant or by owner. Describe the actions taken should the applicant find a violation of any condition upon which its declaration was made, which should include taking immediate corrective action or ceasing the activity until such time as the validity of the declaration can be re-established.

### 3.3 Management System

#### Goal

The application describes the management system with enough detail to demonstrate:

- the integration of operations and technical systems with financial and human resource management for the purposes of achieving safety, security, environmental protection, and

conservation of resources;

- how the system ensures compliance with the COGOA and its regulations, and any authorizations and approvals issued by the Board;
- that it applies to plans, programs, manuals, and systems required under the COGOA and its regulations;
- that it corresponds to the size, nature, and complexity of activities authorized under the COGOA and its regulations, and the associated hazards and risks; and
- that it provides a strong foundation for a pervasive culture of safety, forcefully affirmed by the organization's leadership, rigorously documented in writing, known to all employees and contractors involved in safety and environmental protection, and consistently implemented in the field.

#### Filing Requirements

1. Identify the name and position of the person accountable for the establishment, implementation and maintenance of the management system. Provide evidence of their acceptance of these responsibilities.
2. Identify and describe the policies upon which the system is based, including goals and objectives respecting management and improvement of process and occupational safety, security, environmental protection and conservation of resources.
3. Describe and provide supporting evidence of the applicant's organizational structure to meet the requirements of the management system, which clearly identifies and communicates roles, responsibilities and authorities at all levels of the applicant. Demonstrate and substantiate that resourcing is adequate based on the size, nature and complexity of organizational activities.
4. Identify positions critical to safety within the organization and provide a job description for each.
5. Demonstrate that the management system has systematic, explicit, comprehensive, proactive, and documented processes for:
  - a. the development of annual objectives and targets related to safety, security, environmental protection, and conservation of resources, and a means to measure these objectives and targets;

---

<sup>6</sup> Or any guideline issued by the Board that supersedes the *Draft Financial Viability and Financial Responsibility Guidelines*.

- b. the identification and analysis of potential hazards, including the maintenance of an inventory of hazards;
- c. the evaluation and management of risks associated with all hazards, including the risks related to normal and abnormal operating conditions, and the development, implementation, and communication of preventative, protective, and mitigative measures for identified hazards and risks;
- d. incorporating contractors, subcontractors, and any service providers;
- e. ensuring and maintaining the integrity of all facilities and equipment necessary to ensure safety, security, environmental protection, and conservation of resources;
- f. the identification and monitoring of applicable acts, regulations, approvals, and orders as they relate to the applicant's obligations with respect to safety, security, protection of the environment, and conservation of resources, and the maintenance of a table of concordance to monitor compliance and identify and resolve any non-compliance;
- g. the identification and management of any changes in the applicant's activities that could affect safety, security, environmental protection, or conservation of resources, including changes related to new hazards, risks, designs, specifications, standards, procedures, organizational changes, and legal requirements;
- h. the establishment of competency requirements and effective training programs so that employees, contractors, subcontractors, service providers and any other persons working with or on behalf of the applicant are trained, competent, and appropriately supervised to perform their duties;
- i. internal and external communications that support safety, security, environmental protection, conservation of resources, and the effective implementation and operation of the applicant's management system;
- j. ensuring that the records supporting and demonstrating the implementation of the management system and related requirements are developed, retained, accessible, and maintained;
- k. the identification of documentation requirements for the development, review, revision, and control of documents, with approval by the authority for effective implementation of the management system;
- l. the coordination and management of activities undertaken by employees, contractors, subcontractors, service providers and any other persons who could be working with or on behalf of the applicant or operator;
- m. the internal reporting of hazards, near misses, and incidents and the maintenance of measures for taking corrective actions to prevent their recurrence, including a data system to monitor and analyze trends;
- n. preparation and response for safety, security, environmental incidents, and emergency situations;
- o. monitoring, measuring, and recording safety, security, environmental management, and resource conservation performance to evaluate the implementation and effectiveness of the management system;
- p. a quality assurance program to improve the activities authorized under the COGOA and the COGDPR; and
- q. a process for conducting audits and reviews of the management system and taking corrective and preventative actions if a non-compliance is identified.

### 3.4 Management System Implementation

#### Goal

The application describes the management system oversight program with enough detail to demonstrate that:

- it has been fully implemented across the organization and is functional for the purposes of achieving safety, security, environmental protection, and conservation of resources;
- all hazards that pose a threat to the safety and integrity of drilling and fracturing operations, including those related to human factors, have been identified and mitigated; and
- it is subject to an internal quality assurance process for continual improvement.

#### Filing Requirements

1. Describe and provide supporting evidence of the most recent internal and external management system audits, including the corrective and preventative

action plans generated as a result of any related findings.

2. Describe all hazards identified in association with this project, including the methods used to eliminate or mitigate the related risks.

### 3.5 Safety Culture

#### Goal

The application describes the management system with enough detail to demonstrate organizational commitment and support for the development and maintenance of a positive safety culture.

#### Filing Requirements

1. Describe and provide supporting evidence of the commitments, policies, practices, and programs that support continual improvement of the organization's safety culture, including that of contractors, subcontractors, service providers and any other persons who could be working with or on behalf of the applicant.
2. Describe and provide evidence of leadership commitment and acceptance of accountability for safety performance by the most senior executive of the organization.
3. Describe how the organization measures safety culture and provide the results from the most recent assessments, including employee perception survey results.
4. Provide a copy of the action plan designed to respond to the safety culture assessment and to support the development and maintenance of a positive safety culture.
5. Describe how workers will be actively engaged in the process of safety management throughout the life cycle of the project.
6. Describe and provide evidence of the organization's policy and procedures for safety "stand downs", including the conditions and activities during which this practice is deemed mandatory.
7. Describe how the organization encourages workers to actively report safety threats, hazards, near-misses, and incidents without fear of recrimination.
8. Provide evidence of the applicant's stop work authority policy and its implementation. Describe

how this authority is exercised by workers.

Describe how the policy, procedure, and related responsibilities are communicated to all contractors, subcontractors, service providers and any other persons who could be working with or on behalf of the applicant.

9. Describe how the organization would implement, maintain, assess, and improve safety culture for a project when activities are of short duration or are discontinuous.
10. Describe how a safety culture is maintained during periods when there is no activity or when there is a change to the crew.

### 3.6 Human Factors

#### Goal

The application describes the management system with enough detail to demonstrate that:

- human performance has been taken into consideration during project planning and risk assessments; and
- the human performance challenges associated with drilling and hydraulic fracturing activities have been addressed.

#### Filing Requirements

1. Describe how human factors are identified and addressed during the project planning phase in order to effectively manage the potential for human error during drilling and hydraulic fracturing operations.
2. Provide a list of all human factors assessed and the proposed controls, including those which are unique to the operational environment.

### 3.7 Lessons Learned

#### Goal

The application describes the management system with enough detail to demonstrate that lessons learned from internal and external incidents and near-misses are incorporated into policies, processes, and procedures, and to ensure continual improvement.

#### Filing Requirements

1. Describe the process by which lessons from incidents and near-misses in the organization and

across the industry are and will be incorporated into the organization's management system and related programs.

2. Describe how these lessons will be communicated to all workers to ensure they are aware of potential threats, hazards, and remedies.

### 3.8 Safety Plan

#### Goal

The applicant must include a Safety Plan in all applications for an authorization. See section 8 of the COGDPR as well as the *Safety Plan Guidelines*,<sup>7</sup> for further information on the contents of a Safety Plan. The Safety Plan should provide enough detail to demonstrate the procedures, practices, resources, sequence of key safety-related activities, and monitoring measures necessary to ensure the safety of the proposed work or activity.

#### Filing Requirements

1. Provide evidence that the Safety Plan was developed in accordance with section 8 of the COGDPR and Safety Plan Guidelines.
2. Provide a summary of and references to the management system that demonstrate how it will be applied to the proposed work or activity and how the duties set out in COGDPR with regard to safety will be fulfilled.
3. Describe the organizational and command structure of the operator and contractors, subcontractors, service providers and any other persons who could be working with or on behalf of the applicant for each phase of the proposed work or activity.
4. Provide up to date contact information and the position of the person accountable for the Safety Plan and of the person responsible for implementing it.
5. Describe the compliance monitoring arrangement of the plan and performance measurement in relation to its objectives.
6. Describe how the role of contractors, subcontractors, service providers and any other persons who could be working with or on behalf of the applicant will be incorporated into the Safety Plan.
7. Describe how any changes to the Safety Plan will be incorporated.

### 3.9 Risk Assessment

#### Goal

The application describes the applicant's risk assessment and risk management processes with enough detail to demonstrate that the applicant has:

- effective processes in place to identify threats and hazards to safety and the environment, to identify and select effective mitigative measures, and to evaluate and manage the associated risks; and,
- taken, or will take, all reasonable precautions to ensure that safety and environmental protection risks have been addressed for the proposed work or activity, including taking into account the interaction of all components, including structures, facilities, equipment, operating procedures, and personnel.

#### Filing Requirements

1. Provide a summary of the studies undertaken to identify threats and hazards and to evaluate risks to safety and the environment related to the proposed work or activity.
2. Describe the processes and procedures used to identify and select all reasonable precautions pursuant to the requirements of section 19 of the COGDPR.
3. Describe the risk assessment framework used to determine acceptable and tolerable levels of risk for the proposed work or activities.
4. Identify the criteria used for deciding what is and what is not a reasonable precaution.
5. Provide a description of the hazards that were identified and the results of the risk evaluation.
6. Provide a summary of the measures to avoid, prevent, reduce and manage safety risks.
7. Provide a list of all structures, facilities, equipment and systems critical to safety and environmental protection and a summary of the system in place for their inspection, testing and maintenance.
8. Describe threats and hazards critical to safety identified for all stages or phases of the activities from design through to completion of operations including those related to:
  - a. facility and drilling unit integrity;

---

7 Safety Plan Guidelines can be found at: <http://www.neb-one.gc.ca/clf-nsi/rpblctn/ctsndrgltn/rgltnsdgdlnsprnttthrc/drllngprdcnrgltn/sftplngdln-eng.html>



- b. well integrity;
- c. well control; and
- d. hydraulic fracturing operations.

### 3.10 Environmental Protection Plan

#### Goal

Applications for authorizations include an Environmental Protection Plan (EPP). See section 9 of the COGDPR and the *Environmental Protection Plan Guidelines*<sup>8</sup> for further information on the contents of an EPP. The EPP should provide enough detail to demonstrate:

- an understanding of how the work or activity will interact with the environment;
- that the EPP has the procedures, practices, resources, and monitoring necessary to manage hazards and to protect the environment from the impacts of the proposed work or activity, including potential impacts to groundwater;<sup>9</sup> and
- that the predicted environmental hazards and risks, including the preventive and mitigative measures in the EA are incorporated.

#### Filing Requirements

1. Provide evidence that the EPP is developed in accordance with the applicable sections of the *Environmental Protection Plan Guidelines*.
2. Demonstrate how the management system for the proposed work or activities will ensure that the duties set out in the COGDPR with regard to environmental protection will be fulfilled.
3. Provide a summary of the studies undertaken to identify environmental hazards and to evaluate environmental risks relating to the proposed work or activity.
4. Describe the species that would be particularly sensitive to emissions or spills of oil, hydraulic fracturing fluids, other fluids or emissions from well drilling, hydraulic fracturing or formation flow testing operations.
5. Describe how any heritage resources, protected areas, species at risk and species at risk recovery strategies, such as for boreal caribou, will be addressed in the proposed work or activity.
6. Identify the sources of fresh and saline water and their volumes required for drilling, hydraulic fracturing, completions, formation flow testing and/or production activities and provide an assessment of impacts to the environment and to area residents and communities.
7. Provide a water quality assurance plan for how surface water and groundwater quality will be assessed, protected and monitored for impacts from planned and unauthorized discharges from drilling, hydraulic fracturing, flaring, and formation flow testing, well suspension and abandonment and production activities.
8. Demonstrate how the impacts to the environment from air emissions during site access, handling and storage of produced fluids including formation and flowback fluids, flaring and formation flow testing operations would be minimized.
9. Provide an air quality assurance plan that describes how air quality will be assessed, protected and monitored for impacts from planned discharges and fugitive or other unauthorized discharges from drilling, hydraulic fracturing, flaring, formation flow testing, storage of produced fluids including formation and flowback fluids, well suspension and abandonment and production activities.
10. Identify the volumes of water that would be recycled, reused as fracture fluids, transported out of the region for approved disposal elsewhere, and/or disposed by deep well injection.
11. Describe any knowledge gaps regarding the environmental setting of the work or activity (biological, physical, and geological) and how these gaps will be addressed.
12. Describe how results of ongoing research or information gathering initiatives will be incorporated into the proposed work or activity.
13. Describe the hazards to the environment that were identified and the results of the risk evaluation of those hazards.
14. Describe the measures to anticipate, avoid, prevent, reduce, and manage environmental risks.
15. Verify that the environmental protection measures, commitments and implementation plan will be

8 Environmental Protection Plan Guidelines can be found at: <http://www.neb-one.gc.ca/clf-nsi/rpblctn/ctsndrgltn/rgltnsndgdlnsprnttthrc/drlngprcdctnrgltn/nvrnmntplngdln-eng.html>

9 For the purpose of these Filing Requirements, “groundwater” is considered to be potable-quality water in permeable, sub-surface formations or zones that are typically above the depth of the surface casing shoe as set for oil and gas well drilling.

provided to the appropriate employee, contractors, subcontractors, service providers and any other persons who could be working with or on behalf of the applicant, and that the measures will be reviewed with them prior to drilling, completion, hydraulic fracturing, flaring and formation flow testing operations, well suspension or abandonment operations and prior to production operations and annually thereafter.

16. Describe all structures, facilities, equipment, and systems critical to environmental protection, and provide a summary of the system in place for their inspection, testing, and maintenance.
17. Describe the organizational and command structure of the applicant and contractors, subcontractors, service providers and any other persons working with or on behalf of the applicant for each phase of the proposed work or activity.
18. Provide the contact information and position of the person accountable for the EPP and the person responsible for implementing it.
19. Describe the procedures for the selection, evaluation, and use of chemical substances, including process chemicals and drilling fluid ingredients.
20. Indicate if the applicant is willing to publically disclose the chemicals used in the hydraulic fracture fluids.
21. Describe the arrangements for monitoring compliance with the EPP and for measuring performance in relation to its objectives.
22. Describe the processes and procedures to detect, report, investigate and correct the causes and causal factors of pollution (exceedances of discharge limits), and to prevent re-occurrences.
23. Describe how the groundwater monitoring and sampling program will detect any contamination from oil and gas operations including hydraulic fracturing operations.

### 3.11 Waste Management

#### Context

“Waste material” is any garbage, refuse, sewage, waste well fluids, or any other useless material that is generated during drilling, completions, hydraulic fracturing, formation flow testing, well or production operations, including drill cuttings, used or surplus drilling and

completion fluids, hydraulic fracture fluids, produced fluids including formation fluids and flowback fluids. Applicants are expected to take all reasonable measures to minimize the volumes of waste materials generated by their operations, and to minimize the quantity of substances of potential environmental concern contained within these waste materials. No substance should be discharged to the environment unless the Board has determined that the discharge is acceptable.

#### Goal

Applications must include a complete and adequate plan to manage discharged waste material.

#### Filing Requirements

1. Provide evidence that the waste management plan was developed with reference to the applicable existing discharge standards, guidelines, objectives or best practices set out by government departments and agencies or industry.
2. Describe the planned waste discharges, the limits of these discharges, and the equipment and procedures for treatment, handling, and disposal of waste material.
3. Identify and reference any methods or protocols that were used to establish the discharge limits.
4. Describe the equipment and procedures for the treatment, handling, and disposal of waste material.
5. Describe any agreements or arrangements for disposal of waste material associated with drilling, completion, hydraulic fracturing and formation flow testing or production activities.
6. Describe the arrangement for monitoring compliance with the waste management plan and for measuring performance in relation to its objectives.
7. Provide details of incident reporting procedures in the event of exceedances of the discharge limits.

### 3.12 Spill Contingency Plan

#### Context

A spill contingency plan should provide emergency response procedures to mitigate environmental and safety impacts from unplanned or accidental discharges to the environment. Pollution, which includes spills, also refers to situations where discharges from authorized operations or activities exceed the authorized discharge limits.

## Goal

Applications Contingency Plans for spill response will provide enough detail to demonstrate that effective systems, processes, procedures, and capabilities will be in place to:

- minimize the impacts to the natural environment from unauthorized or accidental discharges; and
- protect workers and the public.

## Filing Requirements

1. Describe the worst-case scenario for a loss of surface or subsurface containment of hydraulic fracturing fluids, formation fluids and flowback fluids.
2. Describe the consequences of the worst-case scenario, including:
  - a. the estimated flow rate;
  - b. properties of the fluid released;
  - c. the volume of fluid that could be released;
  - d. the volume of fluid that would be recovered;
  - e. the likely short-term impacts on the environment and communities;
  - f. the residual long-term impacts on the environment and communities; and
  - g. how long it would take to regain well control in worst-case operating conditions.
3. Provide organization charts describing the emergency response command structure and responder positions, including the duties, responsibilities, and accountabilities for the various levels or tiers of emergency.
4. Describe the process and procedures for containing and recovering, or eliminating and cleaning-up, spilled substances.
5. Describe the process for collection, handling, storage, and disposal of spill wastes anticipated for various spill scenarios, including a loss of containment scenario.
6. Describe the process and procedures to report and monitor all spills and spill response progress.
7. Provide the decision criteria and flow chart to be used for determining the appropriate spill countermeasures.
8. Describe the criteria and procedures to monitor the effectiveness of each response strategy and method.
9. Provide an inventory of dedicated and readily-deployable spill-response equipment, materials, and communications equipment and facilities, and identify expected mobilization and field deployment response times.
10. Describe the training qualification requirements and competency measures for personnel.
11. Describe the scope and frequency of any pre-drilling and operational spill-response exercises intended to test response and further verify effectiveness of response strategies, methods, and emerging technologies.
12. Describe how emergency response procedures will provide for appropriate coordination with relevant municipal, territorial, and federal emergency response plans and mutual aid agreements. Include the sharing or augmenting of response resources.
13. Identify any responder roles and response equipment and training that may be provided to community-based responders.
14. Describe the plan to monitor adverse impacts to the natural environment from significant or persistent spills.
15. Describe the procedures for identifying clean-up priorities for potentially impacted valued environmental, physical, and socio-economic components.
16. Describe the criteria and procedures for both short-term and long-term monitoring and reporting of the impact of spill countermeasures on the natural environment.

# 4.0 Well Approval

An operator who has obtained an Operations Authorization and who intends to drill, re-enter, workover, complete, recomplete, suspend, or abandon a well or part of a well shall obtain a Well Approval in accordance with section 10 of the COGDPR.

## 4.1 Well Description

### Goal

The application includes essential information about the drilling program and geological conditions to ensure safety and integrity of the drilling operation.

### Filing Requirements

1. Provide a description of the well, including:
  - a. the purpose of the proposed well and an overview of the drilling program;
  - b. schematics of the proposed well illustrating the hole sizes, casing and cementing program, and other information necessary to illustrate the proposed well design;
  - c. identification and description of the target formations, emphasizing structural and depositional interpretations, and rationale for selecting the well location and target formations;
  - d. the directional plan;
  - e. the formation temperature, formation pressure and fracture gradients;
  - f. the plans for conducting leak-off tests or formation integrity tests; and
  - g. the well data acquisition plan.
2. Describe how environmental factors during winter operations, including extreme temperatures, limited daylight, and remoteness of the operations could potentially affect the work or activity.

## 4.2 Detailed Drilling Schedule

### Goal

The application describes the operations plan in enough detail to demonstrate how well operations, including critical operations, will be completed within a safe operating season.

### Filing Requirements

1. Provide a detailed schedule showing each drilling and completions operations.
2. Provide approximate durations of critical operations that include hydraulic fracturing and formation flow testing.
3. Indicate how a relief well described in the Contingency Plan is incorporated in the drilling program.

## 4.3 Geophysical Assessment

### 4.3.1 Geophysical Hazards Identification

#### Goal

The application describes the geophysical potential hazards in enough detail to demonstrate that the applicant has taken all reasonable precautions and used industry best practices to identify and manage hazards.

#### Filing Requirements

1. Identify geophysical drilling hazards including, but not limited to, permafrost, active faulting, natural seismicity, shallow gas, and karst.
2. Describe the mitigative and preventive measures that would be used to manage the risks during drilling and hydraulic fracturing.

### 4.3.2 Identification of Target Formations, Faults and Seismic Attributes

#### Goal

The application describes the oil and gas target formations in sufficient detail to demonstrate that the best available technology and industry best practices have been considered.

#### Filing Requirements

1. Provide an interpretation of all faults, especially delineating major faults that may connect the target formations to the groundwater zones.
2. Provide isopach and structure maps of the target formations.
3. Explain how seismic attributes have been used for structure and reservoir quality identification (e.g. coherence).

### 4.3.3 Geophysical Data for Hydraulic Fracturing

#### Goal

The application describes how geophysical data has been considered and incorporated into the hydraulic fracturing program design in accordance with industry best practices.

#### Filing Requirements

1. Identify the data needed to model the fracturing geometry and complexity and describe how it was or will be acquired.

2. Identify the tools and methods that will be used to monitor the fracture propagation, including but not limited to, microseismic, tiltmeter or fluid tracer.
3. Outline the means by which the petrophysical, geochemical and geomechanical properties of the target, overlying and underlying formations have been or would be acquired.
4. Demonstrate how the petrophysical, geochemical and geomechanical properties of the target, and the overlying and underlying formations would be used to determine whether fracture propagation is enhanced, prevented or inhibited.
5. Using the empirical data obtained from the subject wells and/or adjacent wells, submit the geomechanical properties of the overlying and underlying formations to demonstrate there are effective fracture barriers.
6. Indicate how updates to the analysis and interpretation of fracture geometry and propagation would be incorporated during the hydraulic fracturing operations.
7. Describe the process of evaluation of the predicted and actual fracture geometry, especially as it relates to fractures that extend beyond the target formations.
8. Describe how the geophysical data was used and/or will be used to assist in hydraulic fracturing operations, such as:
  - a. seismic volume with interpretation of faults, groundwater zones, target formation and wellbore trajectory; and
  - b. time depth curves and velocity profile.

#### **4.3.4 Monitoring and Reporting of Suspected Seismic Events**

##### **Goal**

The application describes with sufficient detail:

- how a suspected seismic event may be monitored during drilling, completions, hydraulic fracturing and formation flow testing operations; and
- a safety termination plan, should a suspected seismic event result in a safety shutdown or disruption to drilling, completions, hydraulic fracturing or formation flow testing operations.

##### **Filing Requirements**

1. Provide a reporting plan if a suspected seismic event occurs.
2. Describe how oil and gas drilling, completions, hydraulic fracturing and formation flow testing operations will be safely terminated if a suspected seismic event occurs during operations.

#### **4.4 Drilling Program**

##### **4.4.1 Groundwater Protection**

##### **Goal**

The applicant's drilling program demonstrates that effective measures are in place to protect groundwater zones from the impacts of drilling and hydraulic fracturing operations.

##### **Filing Requirements**

1. Describe the policies and procedures of the drilling and hydraulic fracturing program that address groundwater protection.
2. Describe the process to identify groundwater zones that includes use of technology such as sample analysis, drilling log, cased hole log and open hole logs.
3. Identify possible groundwater contamination pathways from drilling and hydraulic fracturing operations, and measures to prevent this contamination.

For additional filing requirements regarding surface and groundwater protection, see Section 3.8 Safety Plan, and Section 3.10 Environmental Protection Plan.

##### **4.4.2 Well Casing and Cementing**

##### **Goal**

The application must demonstrate that the proposed well casing and cementing will isolate and protect groundwater and permafrost from drilling and hydraulic fracturing operations.

##### **Filing Requirements**

1. The applicant demonstrates that:
  - a. the surface casing is designed to isolate groundwater zones and permafrost from potential oil, gas and/or saline water zones, and

the casing program provides wellbore integrity particularly in the casing annuli;

- b. the surface casing is designed to be set below all known or reasonably estimated utilizable groundwater zones and permafrost;
  - c. the cement slurry design and cementing program are designed to prevent any movement of formation fluids and/or fracturing fluids in the casing annuli;
  - d. conductor pipe and surface casing cementing programs are designed to ensure casings are cemented to surface; and
  - e. the intermediate casing or the next set of casing after the surface casing would be cemented to surface.
2. Describe how cement bond logs will be used to evaluate well control barriers to address the anticipated formation pressure and hydraulic fracturing pressure.
  3. Identify potential loss circulation zones, loose formations and any other factors that may affect the casing and cementing program. Demonstrate how all these factors are considered in the casing and cementing design and execution plan.
  4. Describe the casing pressure testing process and the criteria for a successful pressure test. Describe how the casing will be pressure tested to maximum anticipated formation pressure and to pressure, so that wellbore integrity is ensured.
  5. Describe the quality control and testing procedures for the casing and casing accessories, including the shoe track and casing float system that will withstand maximum hydraulic fracturing pressure.

#### 4.4.3 Drilling Fluids

##### Goal

The application describes the drilling fluids system and program with sufficient detail, such that the following are demonstrated:

- well control is maintained at all times;
- the system and associated monitoring equipment is designed, installed, operated, and maintained to provide an effective barrier against formation pressure; and
- the system and associated monitoring equipment is designed, installed, operated, and maintained to allow proper well evaluation while drilling safely without polluting the environment.

##### Filing Requirements

1. Demonstrate that the drilling fluids program addresses industry best practices for drilling fluids safety, quality control, handling and storage.
2. Describe the drilling fluids testing and monitoring program to accurately measure flow rate, volumes, density, and other properties.
3. Identify the minimum inventory of drilling fluids and material to maintain well control according to industry best practices.
4. Describe the indicators and alarms associated with the drilling fluids system, which should be capable of accurately measuring, displaying, and recording all parameters that may indicate a hazard to personnel, affect the integrity of the well and loss of well control, or indicate a possible loss of drilling fluids in the formation.

#### 4.4.4 Wellbore Integrity (wellbore, annulus, inter-wellbore)

##### Goal

The applicant provides enough detail to demonstrate that:

- at least two independent and tested physical well barriers are in place during each phase of well operations;
- well barriers ensure well integrity at all times during the well life cycle, and under all load conditions including completion and hydraulic fracturing operations; and
- if the well control is lost or if safety, environmental protection or the conservation of resources is threatened, the applicant will take any action necessary to rectify the situation without delay, despite any condition to the contrary in the well approval.

##### Filing Requirements

1. Identify and describe the well barriers for each phase of drilling and completions operations that includes perforation, hydraulic fracturing and formation flow testing.
2. Demonstrate sufficient well barriers would be in place inside the tubing and casing annuli to prevent contamination of groundwater and the environment from the reservoir and/or wellbore fluids.
3. Describe the testing method and procedure for well barriers and demonstrate that each of the physical

well barriers qualify as an independently tested barrier and is monitored and maintained during and after the hydraulic fracturing operations.

4. Identify and describe the well barrier policies, procedures and work instructions that ensure that personnel are aware of the well barrier envelopes at any given point in time.
5. Identify and describe the monitoring program in place to ensure that well integrity is maintained throughout the life of the well.

#### **4.4.5 Well Control System**

##### **Goal**

The application describes the well control system with enough detail to demonstrate that during all well operations, reliable well control equipment is installed to control flows and/or loss, prevent blow-outs, and safely carry out all well activities.

##### **Filing Requirements**

1. Identify the minimum blow-out preventor (BOP) requirement for the proposed activities, and demonstrate how the proposed BOP is appropriate, adequate, and effective for the proposed well.
2. Describe the well control system to be used and how the equipment meets the best industry standards and practices.
3. Describe the processes to be used for equipment selection, testing, and maintenance that are critical to safety which will ensure well control in all foreseeable conditions and circumstances
4. Describe how the proposed well control systems are adequate for well operations including drilling, open-hole and cased logging, perforation, hydraulic fracturing and formation flow testing.
5. Provide evidence that the BOP stack is designed for the specific drilling operation and appropriate for the proposed well, and that the BOP stack:
  - a. has not been compromised or damaged;
  - b. will operate in the conditions in which it will be used; and
  - c. has been maintained according to the original manufacturer's specifications.
6. Describe the process to ensure that no unauthorized modifications are made to any of the equipment that is critical to safety.

#### **4.4.6 Relief Well Capability**

##### **Goal**

The application demonstrates the capability to drill a relief well within the same drilling season to kill an out of control well.

A relief well is one contingency measure employed to respond to loss of well control. If there is a loss of well control, an operator is expected to use all available means to bring into control a well blow-out while designing, mobilizing, and undertaking a relief well operation.

##### **Filing Requirements**

1. Describe the plans and procedures to kill an out-of-control well.
2. Identify the drilling unit that will be used and provide a mobilization plan.
3. Provide an estimate of the time that it would take to drill the relief well and kill the out of control well.

#### **4.5 Well Completion and Hydraulic Fracturing Operations**

##### **4.5.1 Well Completion Operation**

##### **Goal**

The application describes the well completion program including the unconventional resources hydraulic fracturing operations with enough detail to demonstrate that the testing of any completion interval is conducted safely and does not cause waste or pollution and that all barriers are tested to the maximum pressure to which they are likely to be subjected.

##### **Filing Requirements**

1. Demonstrate that the well control system and operations will be designed, utilized, maintained, and tested as necessary to control the well in each phase of completion operations.
2. Demonstrate how the well will be continuously monitored during well completion operations, particularly monitoring pressure in the casing annuli during the hydraulic fracturing operations.
3. Demonstrate that the operating system meets or will exceed the requirements to which they may be subjected and will follow industry best practices.



4. Describe how wellhead equipment is designed to operate safely and efficiently under the maximum load conditions.

### 4.5.2 Hydraulic Fracturing Design

#### Goal

The application demonstrates:

- how the applicant has considered all the possible hydraulic fracturing design variables for the targeted formations, and at minimum follows the industry best practices; and
- how the hydraulic fracturing will be conducted safely while protecting the environment.

#### Filing Requirements

1. Describe the policies, procedures, and methods for modeling the hydraulic fracturing program.
2. Identify the design variables that are critical to fracture propagation including:
  - a. in-situ stresses and the choice of the creation of transversal and longitudinal fracture;
  - b. selection of fracture treatment;
  - c. perforations and orientation of the well;
  - d. spacing of the fracture and fracture length, height, and width;
  - e. optimization proppant laden fluid volume;
  - f. control of proppant flowback; and
  - g. method to evaluate each fracture.
3. Describe the policies and procedures to maintain threshold pressure limit during hydraulic fracturing operations and how personnel will be informed of the pressures, rates and densities at any given point in time during the hydraulic fracturing operation.
4. Describe the design basis for the selection of the fracturing fluids and chemical additives for the proposed hydraulic fracturing program.
5. Demonstrate that the wellbore integrity is considered in the hydraulic fracturing design.
6. Describe how the proposed hydraulic fracturing program addresses any risks for inter-wellbore communication of the nearby wells.
7. Describe how owners of affected suspended and abandoned offset wells would be notified of a proposed hydraulic fracturing operation.

### 4.5.3 Hydraulic Fracture Operations

#### Goal

The applicant describes the well hydraulic fracturing equipment and operation with enough detail to demonstrate that the safety of the workers is maintained and that hydraulic fracturing will not cause waste or pollution. The applicant must also demonstrate that all equipment is tested to the maximum pressure to which it is likely to be subjected.

#### Filing Requirements

1. Describe the policies and procedures to monitor wellbore annuli during hydraulic fracturing operations.
2. Describe in detail how the equipment, procedures and resources are adequate to support and complete proposed hydraulic fracturing and formation flow testing operations.
3. Describe the policies and procedures for testing surface and downhole equipment before commencing hydraulic fracturing operations.
4. Describe in detail the on-site storage capability for produced fluids including flowback fluids and formation fluids.
5. Describe in detail the handling, treatment, disposal and waste management capabilities for the fracture fluids, flowback fluids and other used or un-used chemicals.
6. Describe the applicant's policies and processes to monitor suspended and abandoned offset wells during hydraulic fracturing of the well.

### 4.5.4 Formation Flow Tests

#### Goal

The application describes the formation flow testing program based on industry best practices with enough detail to demonstrate that:

- formation flow testing will be conducted when well conditions and weather permit, without endangering personnel and equipment and harming the environment;
- formation flow testing will evaluate the productive capacity or injectivity potential of the formation;
- formation flow testing will establish reservoir and rock characteristics and properties;

- all produced fluids including flowback fluids and formation fluids will be adequately measured and recorded, sampled and analyzed;
- flaring is minimized; and
- formation flow testing will not adversely affect the ultimate recovery of oil and gas from the target formation.

### Filing Requirements

1. Provide the objectives of the formation flow test program including the type of information that is expected to be derived from the test.
2. Provide the formation flow test procedures including the precautions that will be taken prior to, during and at termination so that the tests would be conducted and terminated in a safe, controlled, and environmentally responsible manner in accordance with Section 34 of the COGDPR and industry best practices.
3. Provide the following for the formation flow test program:
  - a. a description of any load and/or injection fluids that are to be used during the tests and estimates of the volumes;
  - b. a description of the formations to be tested including depths, estimated pressures, estimated temperatures, and anticipated reservoir fluids;
  - c. a list of all planned flow/injection and build-up/fall-off periods with durations and the rationale for selecting those durations;
  - d. estimates of the flow rates or injection rates;
  - e. a description of anticipated formation fluids;
  - f. a description of how all produced fluids, including flowback fluids and formation fluids, would be measured and recorded;
  - g. a description of the produced fluid sampling and analysis program, including frequency;
  - h. a description of disposal options considered;
  - i. a description of how and where the produced fluids including flowback fluids and formation fluids would be separated, temporarily stored, transported and disposed;
  - j. a description of how the formation flow test will be conducted and terminated in a safe, controlled and environmentally responsible manner in accordance with best industry practices; and,
  - k. a description of how the formation flow test is designed to acquire data necessary to assess

productive capacity or injectivity potential of the target formation in accordance with best industry practices.

### 4.5.5 Well Suspension and Abandonment

#### Goal

The application describes the well suspension and abandonment program with enough detail to demonstrate that the suspended or abandoned well satisfies the requirements of the COGDPR and meets or exceeds industry best practices.

#### Filing Requirements

1. Describe plans, policies and procedures, materials, and equipment needed to facilitate the orderly suspension of operations and securing of the well.
2. Demonstrate how the suspended or abandoned well can be readily located.
3. Describe how the well will be suspended or abandoned with downhole and wellhead schematics. Demonstrate that at least two tested well control barriers are in place.
4. Describe how the well would be tested for surface casing vent flows and if surface casing vent flows exist, describe the surface casing vent flow would be addressed in the well suspension and abandonment program.
5. Identify and describe in detail the effective well barriers that are in place for the suspended or abandoned wells to prevent groundwater contamination from the reservoir fluids and/or wellbore fluids. Demonstrate that the well barriers remain effective after the hydraulic fracturing operations.
6. Provide the estimated duration of suspended status of any well proposed to be suspended, and describe future plans for the well.
7. Describe in detail the policies, procedures and monitoring program for planned temporary well suspension during completion and well testing operations.
8. Describe how the suspended well will be monitored and inspected, to ensure its continued integrity and to prevent pollution as applicable.

# 5.0 All-Season Well Pads

## **Goal**

The application describes plans for proposed all season well pads with enough detail to demonstrate that, when an all-season well pad is proposed, it will be constructed, maintained and decommissioned in a manner that will be safe and will protect the environment.

## **Filing Requirements**

1. Provide a description of the proposed design of any all-season well pad(s) including:
  - a. the dimensions of the all-season well pads;
  - b. the maximum number of wells that the all-season well pads may accommodate;
  - c. how the design of the all-season well pads would safely accommodate oil and gas operations including concurrent operations and emergency egress;
  - d. how the design of the all-season well pads would minimize impacts to the environment including wetlands and permafrost; and,
  - e. the rationale for the set-back distances of the all-season well pad from any surface features and/or infrastructure.
2. Provide a description of the safety precautions and any mitigative measures for environmental impacts that would be undertaken during the construction of the all-season well pad.
3. Provide a timeline for the construction of the all-season well pad.
4. Provide a description of the all-season well pad maintenance program including, if applicable, a permafrost integrity monitoring and management plan.
5. Provide a general description of decommissioning and reclamation plans for the all-season well pad.

# 6.0 Inter-Well Distances on Multi-Well Pads

## Goal

The application sufficiently demonstrates that the proposed inter-well distances will allow for safe operations, protect the environment and optimize the recovery of hydrocarbons.

## Filing Requirements

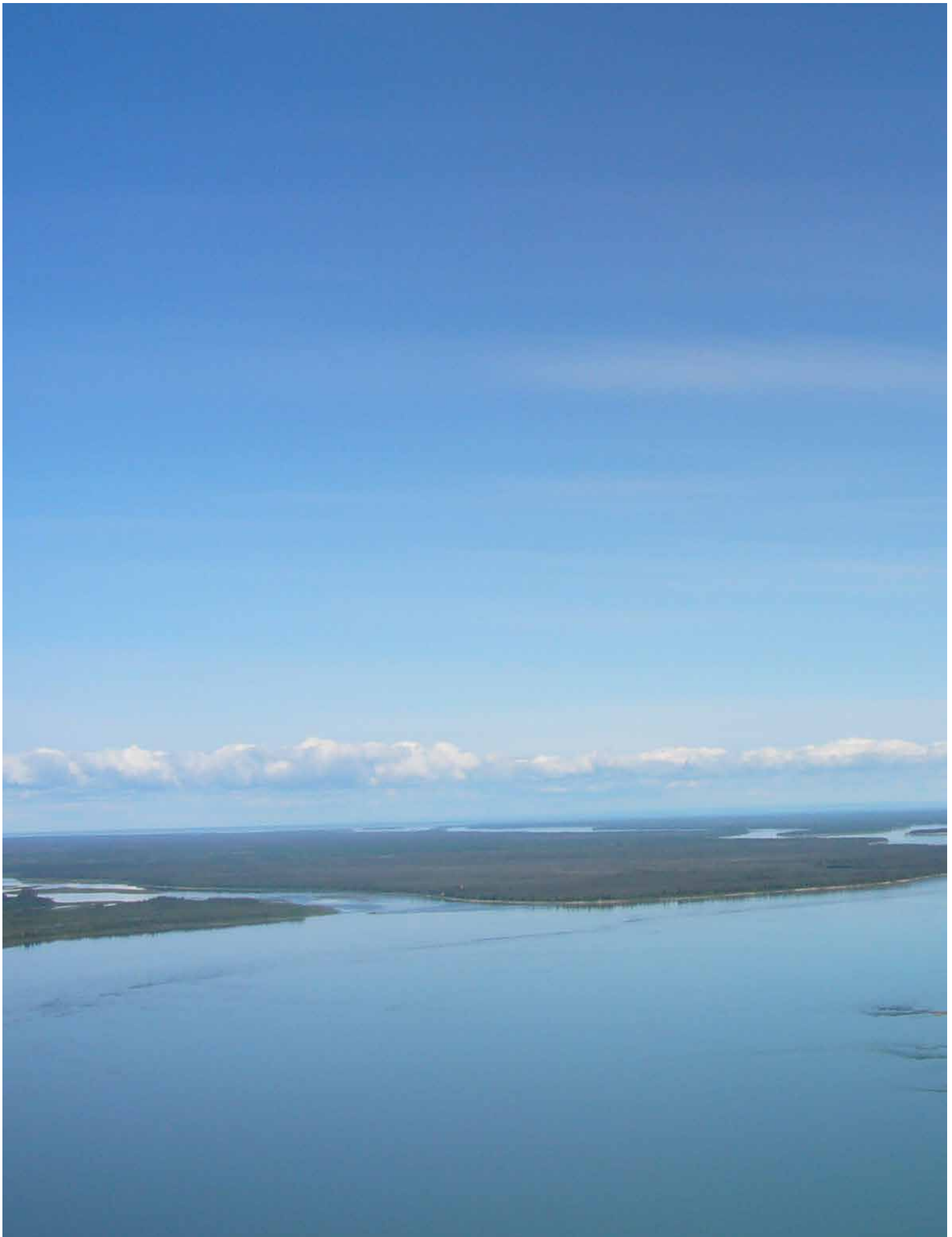
### *Subsurface Inter-Well Distances on Multi-Well Pads*

1. Provide the rationale for the proposed subsurface inter-well distances of wells located on multi-well pads as it relates to the optimizing the fracture network and the optimal recovery of hydrocarbons.

### *Surface Inter-Well Distances on Multi-Well Pads*

1. Provide the rationale for the proposed surface inter-well distances of wells located on multi-well pads.
2. If concurrent operations are proposed, provide a concurrent operations plan that describes how the risk of collisions, fire and worker safety would be managed during concurrent operations including information on the following:
  - a. the chain of command, communication and coordination;
  - b. the preventive and mitigative measures that would be utilized for collision avoidance, fire safety, worker safety and the protection of existing wellheads and facilities; and
  - c. emergency coordination and fire control.
3. Provide a permafrost integrity monitoring and management plans, for locations where permafrost exists, including information on the following:
  - a. a description of how the proposed inter-well distance would affect the integrity of the permafrost during operations including production operations;
  - b. the mitigative measures that would be utilized to protect the permafrost; and
  - c. a description of how the integrity of the permafrost would be monitored.

Please refer to the Board's Draft Spacing Order for the requirements relating to the protection of the correlative rights of adjacent licences and joint production arrangements.



**Appendix 4: The Draft *Hydraulic Fracturing Filing Regulations* - Annotated**

This document has been annotated.

No provisions have been altered; however, to confirm any provision, please refer to an unedited copy.

---

---

MISCELLANEOUS NOTICES/AVIS DIVERS

---

---

NOTICE

OIL AND GAS OPERATIONS ACT

Notice is given, in accordance with subsection 53(1) of the *Oil and Gas Operations Act*, that the Commissioner in Executive Council proposes to make the *Hydraulic Fracturing Filing Regulations* which appear below. Interested persons are invited to make representations with respect to the proposed regulations in writing before June 29, 2015 to the following address:

Petroleum Resources  
Department of Industry, Tourism and Investment  
Government of the Northwest Territories  
P.O. Box 3019  
Inuvik, NT X0E 0T0  
HFRegulations@gov.nt.ca

**Legend**

**Red:** New provisions not mirrored from the National Energy Board Filing Requirements (NEBFR)

**Purple:** Provisions mirrored from NEBFR, but with alterations

**Black:** Provisions mirrored from the NEBFR without substantive alteration



## PROPOSED HYDRAULIC FRACTURING FILING REGULATIONS

The Commissioner in Executive Council, under section 52 of the *Oil and Gas Operations Act* and every enabling power, makes the *Hydraulic Fracturing Filing Regulations*.

1. In these regulations,

"air pollutant emission factor" means an air pollutant emission factor within the meaning of AP-42, *Compilation of Air Pollutant Emission Factors*, Volume 1, Fifth Edition, January 1995, published by the United States Environmental Protection Agency; (*facteur d'émission de polluants atmosphériques*)

"air quality assurance plan" means a plan prepared in accordance with paragraph 6(f); (*plan d'assurance de la qualité de l'air*)

"ambient air quality limits" means the ambient air quality objectives set out in Table 1 of the *Alberta Ambient Air Quality Objectives and Guidelines*, August 2013, published by Alberta Environment; (*normes de qualité de l'air ambiant*)

"applicant" means an applicant for an operating authorization under section 10 of the Act; (*demandeur*)

"authorization" means an authorization issued by the Regulator under section 10 of the Act; (*autorisation*)

"barrier" means any fluid, plug or seal that prevents gas or oil or any other fluid from flowing unintentionally from a well or from a formation into another formation; (*barrière*)

"completion interval" means a section within a well that is prepared to permit the

- (a) production of fluids from the well,
- (b) observation of the performance of a reservoir,  
or
- (c) injection of fluids into the well; (*intervalle de complétion*)

"criteria air contaminant" means a substance identified as a criteria air contaminant in the *National Pollutant Release Inventory Notice*, published in the *Canada Gazette* under subsection 46(1) of the *Canadian Environmental Protection Act, 1999*; (*principal contaminant atmosphérique*)

"drilling program" means a program for the drilling of one or more wells within a specified area and time using one or more drilling installations and includes any work or activity related to the program; (*programme de forage*)

"Environmental Protection Plan Guidelines" means the Environmental Protection Plan Guidelines issued by the Regulator under subsection 18(1) of the Act; (*directives relatives au plan de protection de l'environnement*)

"fluid" means gas, liquid or a combination of the two; (*fluide*)

"formation flow test" means an operation

- (a) to induce the flow of formation fluids to the surface of a well to procure reservoir fluid samples and determine reservoir flow characteristics, or
- (b) to inject fluids into a formation to evaluate injectivity; (*essai d'écoulement de formation*)

"green completion techniques" means methods that minimize the amount of natural gas or oil vapours that are released to the environment when a well is being flowed during the completion phase of a well; (*techniques de complétion écologiques*)

"hydraulic fracturing" means the transmission of a carrier fluid to apply pressure and transport proppants to an underground geologic formation to create or enhance subsurface fractures and facilitate the release of any petroleum or natural gas, but does not include fracturing for the production of wells for potable water; (*fracturation hydraulique*)

"incident" means

- (a) an event that causes
  - (i) a lost or restricted workday injury,
  - (ii) death,
  - (iii) fire or explosion,
  - (iv) a loss of containment of any fluid from a well,
  - (v) an imminent threat to the safety of a person, installation or support craft, or
  - (vi) pollution,
- (b) an event that results in a missing person, or
- (c) an event that causes
  - (i) the impairment of any structure, facility, equipment or system critical to the safety of persons, an installation or support craft, or
  - (ii) the impairment of any structure, facility, equipment or system critical to environmental protection; (*incident*)

"natural environment" means the physical and biological environment; (*milieu naturel*)

"near-miss" means an event that would likely cause an event set out in paragraph (a) of the definition "incident" but does not, due to particular circumstances; (*quasi-incident*)

"operator" means the holder of an operating authorization under section 10 of the Act; (*exploitant*)

"permafrost" means the thermal condition of the ground when its temperature remains at or below 0°C for more than one year; (*pergélisol*)

"pollution" means the introduction into the natural environment of a substance or form of energy outside the limits applicable to an activity that is subject to an authorization, including spills; (*pollution*)

"potable water" means water that is safe for human consumption; (*eau potable*)

"recovery" means the recovery of oil and gas under reasonably foreseeable economic and operational conditions; (*récupération*)

"relief well" means a well drilled to assist in controlling a blow-out in an existing well; (*puits de secours*)

"Safety Plan Guidelines" means the Safety Plan Guidelines issued by the Regulator under subsection 18(1) of the Act; (*directives relatives au plan de sécurité*)

"surface casing" means the casing that is installed in a well to a sufficient depth, in a competent formation, to establish well control for the continuation of the drilling operations; (*tubage de surface*)

"suspended", in relation to a well or part of a well, means a well or part of a well in which drilling or production operations have temporarily ceased; (*suspension de l'exploitation*)

"termination" means the abandonment, completion or suspension of a well's operations; (*cessation*)

"waste material" means any garbage, refuse, sewage or waste well fluids or any other useless material that is generated during drilling, completions, hydraulic fracturing, formation flow testing, well or production operations, including used or surplus drilling or completion fluids, hydraulic fracture fluids, produced fluids including formation fluids and flowback fluids and drill cuttings and produced water; (*déchets*)

"well approval" means an approval granted by the Regulator under section 13 of the *Oil and Gas Drilling and Production Regulations*; (*approbation relative à un puits*)

"well-bore" means the hole drilled by a bit in order to make a well; (*trou de sonde*)

"well control" means the control of the movement of fluids into or from a well; (*contrôle d'un puits*)

"well operation" means the operation of drilling, completion, recompletion, intervention, re-entry, workover, suspension or abandonment of a well; (*travaux relatifs à un puits*)

"workover" means an operation on a completed well that requires removal of the Christmas tree or the tubing.  
(*reconditionnement*)

NEW 2. In the event of a conflict or inconsistency between these regulations and any other regulations under the Act, these regulations shall prevail to the extent of the conflict or inconsistency.

NEW 3. In respect of a project involving hydraulic fracturing, an applicant or operator shall, in addition to any other requirement established by the Act or the regulations, comply with these regulations.

NEW 4. The Regulator may waive a requirement set out in these regulations if the Regulator is satisfied that the requirement is not relevant to the applied-for work or activities.

## PART 1 OPERATING AUTHORIZATION

### Risk Assessment

5. (1) An applicant shall submit to the Regulator a risk assessment demonstrating that the applicant has
- (a) effective processes in place to identify threats and hazards to safety and the environment, to identify and select effective mitigative measures, and to evaluate and manage the associated risks; and
  - (b) taken, or will take, all reasonable precautions to ensure that safety and environmental protection risks have been addressed for the proposed work or activities.
- (2) The risk assessment must contain
- (a) a summary of the studies undertaken to identify threats and hazards and to evaluate risks to safety and the environment related to the proposed work or activity;

NEBFR 3.9 also includes "activities, including taking into account interaction of all components (facilities, equipment, operating procedures, personnel, etc.)"

- (b) a description of the processes and procedures used to identify and select all reasonable precautions under section 19 of the *Oil and Gas Drilling and Production Regulations*;
- (c) a description of the risk assessment framework used to determine acceptable and tolerable levels of risk for the proposed work or activities;
- (d) a description of the criteria used for deciding what is and what is not a reasonable precaution;
- (e) a description of the hazards that were identified and the results of the risk evaluation;
- (f) a summary of the **measures being adopted** to avoid, prevent, reduce and manage safety risks;
- (g) a list of all structures, facilities, equipment and systems critical to safety and environmental protection and a summary of the system in place for their inspection, testing and maintenance; and
- (h) a description of the threats and hazards critical to safety identified for all stages or phases of the **proposed work or activity** from design through to completion of operations, including those related to
  - (i) facility and drilling unit integrity,
  - (ii) well integrity,
  - (iii) well control, and
  - (iv) hydraulic fracturing operations.

NEBFR 3.9, Item 6 uses "measures," not "measures being adopted"

NEBFR 3.9, Item 8 uses "activities," not "proposed work or activity."

#### Environmental Protection Plan

**6.** In addition to the requirements set out in section 9 of the *Oil and Gas Drilling and Production Regulations*, an environmental protection plan must be developed in accordance with the Environmental Protection Plan Guidelines, and must

- (a) describe the species that would be particularly sensitive to emissions or spills of oil, hydraulic fracturing fluids, other fluids or emissions from well drilling, hydraulic fracturing or formation flow testing operations;
- NEW (b) include studies assessing the state of surface and ground water resources;**
- (c) identify the sources of fresh and saline water and their volumes required for drilling, hydraulic fracturing, completions, formation flow testing or production activities and provide an assessment of impacts on the environment and on area residents and communities;
- (d) contain a water quality assurance plan for how surface water and groundwater quality will be assessed, protected and monitored for impacts from planned and unauthorized discharges from drilling, hydraulic fracturing, flaring,

- formation flow testing, **incinerating**, well suspension and abandonment and production activities;
- (e) demonstrate how the impacts to the environment from air emissions during site access, handling and storage of produced fluids including formation and flowback fluids, flaring, **incinerating**, and formation flow testing operations will be minimized;
- (f) contain an air quality assurance plan that
- NEW** (i) **describes the criteria air contaminants, black carbon and hydrogen sulfide that will be released during the proposed work or activity,**
- NEW** (ii) **demonstrates that green completion techniques will be used to ensure at least 90% of flowback gas or oil vapour is recovered and at least 95% of gas or oil vapour that cannot be recovered is incinerated, or if use of those techniques is impracticable, that incinerators with at least 99% efficiency will be used to dispose of the flowback gas or oil vapour, and**
- (iii) demonstrates how air quality will be assessed, protected and monitored for impacts from planned discharges and fugitive or other unauthorized discharges from drilling, hydraulic fracturing, flaring, formation flow testing, **incinerating**, storage of produced fluids including formation and flowback fluids, well suspension and abandonment and production activities;
- NEW** (g) **describe how greenhouse gas emissions will be monitored and measured and the steps that will be taken to mitigate these emissions;**
- (h) identify the volumes of water that will be
- (i) recycled, reused as fracture fluids, transported out of the region for approved disposal elsewhere, or
- (ii) disposed by deep well injection;
- (i) **demonstrate** how the environmental protection measures, commitments and implementation plan will be provided to the appropriate employee, contractors, subcontractors, service providers and any other persons who could be working with or on behalf of the applicant, and ensure that those measures will be reviewed with those persons
- (i) prior to drilling, completion, hydraulic fracturing, flaring, formation flow testing operations, **incinerating**, well suspension or abandonment operations,
- (ii) prior to production operations, and
- (iii) annually thereafter;
- (j) describe all structures, facilities, equipment, and systems critical to environmental protection, and provide a summary of the

NEBFR 3.10, Item 7 does not include "incinerating."

NEBFR 3.10, Item 8 does not include "incinerating."

NEBFR 3.10, Item 9 uses "describes," not "demonstrates," and does not include "incinerating."

NEBFR 3.10, Item 15 uses "verify," not "demonstrate."

system in place for their inspection, testing, and maintenance;

- (k) describe the procedures for the selection, evaluation, and use of chemical substances, including process chemicals and drilling fluid ingredients;

**NEW (l) list the chemicals used in the hydraulic fracture fluids and the predicted concentration ranges of those chemicals;**

- (m) describe the arrangements for monitoring compliance with the Environmental Protection Plan and for measuring performance in relation to its objectives;
- (n) describe the processes and procedures to detect, report, investigate and correct the causes and causal factors of **exceedances of ambient air quality and discharge limits**, and to prevent re-occurrences; and
- (o) describe how the water monitoring and sampling program will detect any contamination from oil and gas operations, including hydraulic fracturing operations.

NEBFR 3.10, Item 22 uses "factors of pollution (exceedances of discharge limits," not "exceedances of ambient air quality and discharge limits."

#### Waste Management

7. In addition to the requirements set out in paragraphs 9(h) to (j) of the *Oil and Gas Drilling and Production Regulations*, those portions of the environmental protection plan addressing waste materials must

- (a) **demonstrate that the measures respecting waste management were developed with reference** to the applicable existing discharge standards, guidelines, objectives or best practices set out by government departments and agencies or industry;

NEBFR 3.11, Item 1 uses "provide evidence that the waste management plan was developed with reference," not "demonstrate that the measures respecting waste management were developed."

- (b) describe any agreements or arrangements for disposal of waste material associated with drilling, completion, hydraulic fracturing and formation flow testing or production activities; and
- (c) provide details of incident reporting procedures in the event of exceedances of the discharge limits.

#### Ambient Air Quality and Entrained Gases

NEW

**8.** In addition to the requirements set out in subparagraphs 6(f)(i) to (iii), those portions of the environmental protection plan consisting of the air quality assurance plan must

- (a) include an emissions inventory
  - (i) using appropriate air pollutant emission factors, and
  - (ii) describing predicted releases for all emission sources including boilers and process heaters, flares and incinerators, storage tanks, compressors, pumps, pneumatic controllers, gathering lines, pressurized vessels, flash tanks, dehydrators, and all modes of transportation;
- (b) include an initial emissions assessment created by using information derived from the emissions inventory to conduct screening level emission dispersion modeling, including background emission levels and potential cumulative impacts;
- (c) demonstrate that refined emission dispersion modelling and ambient emission monitoring will be conducted in the following circumstances:
  - (i) where exceedances of ambient air quality limits are identified through the initial emissions assessment referred to in paragraph (b),
  - (ii) where incineration or flaring of sour or acid gas occurs,
  - (iii) where more than 72 hours of flaring or incinerating is anticipated by the operator,
  - (iv) where incineration or flaring occurs within 500 m of a residential area,
  - (v) where the Regulator determines that complex or extensive emission sources require further assessment;
- (d) where ambient emission monitoring is required under paragraph (c), demonstrate
  - (i) how emission monitors will be sited appropriately downwind of significant emission sources,
  - (ii) that an air quality specialist will be employed to maintain



- (A) real-time, continuous gas and particulate analyzers capable of accurately monitoring pollutants of concern identified in the initial emissions assessment referred to in paragraph (b), and
  - (B) real-time, continuous meteorological equipment capable of accurately recording wind speed, wind direction and temperature, and
- (iii) that monthly air quality reports and comprehensive annual air quality reports will be prepared, listing any flaring or incineration that occurred and demonstrating compliance with ambient air quality limits, and that those reports will be submitted to the Regulator;
- (e) demonstrate
  - (i) how entrained gases will be separated and removed from flowback and produced water prior to storage of the liquid, and
  - (ii) that volatile organic compound emissions will be reduced by
    - (A) capturing the gases using green completion techniques, or
    - (B) subject to paragraph
  - (f), incinerating the gases using incinerators with at least 99% efficiency; and
- (f) where it will be proposed to reduce volatile organic compound emissions by incineration under clause (e)(ii)(B), contain procedures to ensure that the decision to incinerate is based on an economic evaluation justifying the non-use of green completion techniques.

#### Spill Contingency Plan

9. (1) An applicant shall submit to the Regulator a spill contingency plan demonstrating that effective systems, processes, procedures and capabilities will be in place to minimize the impacts to the natural environment from unauthorized, unplanned or accidental discharges, and to protect workers and the public.

NEBFR 3.12, Header does not include "unplanned."

- (2) The spill contingency plan must
- (a) describe the worst-case scenario for a loss of surface or subsurface containment of hydraulic fracturing fluids, formation fluids and flow back fluids;
  - (b) describe the consequences of the worst-case scenario, including
    - (i) the estimated flow rate,
    - (ii) properties of the fluid released,
    - (iii) the volume of fluid that could be released,
    - (iv) the volume of fluid that would be recovered,
    - (v) the likely short-term impacts on the environment and communities,
    - (vi) the residual long-term impacts on the environment and communities, and
    - (vii) how long it would take to regain well control in worst-case operating conditions;
  - (c) contain organizational charts describing the emergency response command structure and responder positions, including the duties, responsibilities, and accountabilities for the various levels or tiers of emergency;
  - (d) describe the processes and procedures for containing and recovering, or eliminating and cleaning-up, spilled substances;
  - (e) describe the processes for collection, handling, storage, and disposal of spill wastes anticipated for various spill scenarios, including a loss of containment scenario;
  - (f) describe the processes and procedures to report and monitor all spills and spill response progress;
  - (g) identify every person who may be affected by a spill and describe the processes and procedures for notifying those persons of a spill;
  - (h) contain the decision criteria and flow chart to be used for determining the appropriate spill countermeasures;
  - (i) describe the criteria and procedures to monitor the effectiveness of each response strategy and method;
  - (j) contain an inventory of dedicated and readily deployable spill-response equipment, materials, communications equipment and facilities, and identify expected mobilization and field deployment response times;
  - (k) describe the training qualification requirements and competency measures for personnel;
  - (l) describe the scope and frequency of any pre-drilling and operational spill-response exercises intended to test responses and further

- verify the effectiveness of response strategies, methods and emerging technologies;
- (m) describe how emergency response procedures will provide for appropriate coordination with relevant municipal, territorial, and federal emergency response plans and mutual aid agreements, including the sharing or augmenting of response resources;
  - (n) identify any responder roles and response equipment and training that may be provided to community based responders;
  - (o) describe the plan to monitor adverse impacts to the natural environment from significant or persistent spills;
  - (p) describe the procedures for identifying clean up priorities for potentially impacted valued environmental, physical, and socio-economic components; and
  - (q) describe the criteria and procedures for both short-term and long-term monitoring and reporting of the impact of spill countermeasures on the natural environment.

#### All-season Well Pads

**10.** Where all-season well pads are planned to be used, an operator shall submit to the Regulator an all-season well pad plan that

- (a) describes the proposed design of any all-season well pad, including
  - (i) the dimensions of the all-season well pads,
  - (ii) the maximum number of wells that the all-season well pads may accommodate,
  - (iii) how the design of the all-season well pads will safely accommodate oil and gas operations including concurrent operations and emergency egress,
  - (iv) how the design of the all-season well pads will minimize impacts to the environment including wetlands and permafrost, and
  - (v) the rationale for the set-back distances of the all-season well pad from any surface features or infrastructure;
- (b) describes the safety precautions and any mitigative measures for environmental impacts

- that will be undertaken during the construction of the all-season well pad;
- (c) provides a timeline for the construction of the all-season well pad;
  - (d) describes the all-season well pad maintenance program including, if applicable, a permafrost integrity monitoring and management plan; and
  - (e) contains a general description of decommissioning and reclamation plans for the all-season well pad.

#### Inter-Well Distances on Multi-Well Pads

**11.** (1) An operator shall submit to the Regulator an inter-well distance plan that demonstrates that the proposed inter-well distances will allow for safe operations, protect the environment and optimize the recovery of hydrocarbons.

(2) The inter-well distance plan must provide the rationale for the proposed subsurface inter-well distances of wells located on multi-well pads as it relates to optimizing the fracture network and the optimal recovery of hydrocarbons.

- (3) The inter-well distance plan must
  - (a) provide the rationale for the proposed surface inter-well distances of wells located on multi-well pads;
  - (b) in the case where concurrent operations are proposed, contain a concurrent operations plan that describes how the risk of collisions, fire and worker safety would be managed during concurrent operations including information on the following:
    - (i) the chain of command, communication and coordination,
    - (ii) the preventive and mitigative measures that would be utilized for collision avoidance, fire safety, worker safety and the protection of existing wellheads and facilities,
    - (iii) emergency coordination and fire control; and
  - (c) in the case of those locations where permafrost exists, contain a permafrost integrity monitoring and management plan describing
    - (i) how the proposed inter-well distance would affect the integrity of the permafrost during operations, including production operations,

- (ii) the measures utilized to monitor the integrity of the permafrost, and
- (iii) the mitigative measures that would be utilized to protect the permafrost.

## PART 2 WELL APPROVAL

**NEW** 12. In this Part, "application" means an application for a well approval made in accordance with sections 10 to 12 of the *Oil and Gas Drilling and Production Regulations*.

### Operations Plan

13. (1) An application must contain an operations plan describing how well operations, including critical operations, will be completed within a safe operating season.

- (2) The operations plan must
  - (a) contain a detailed schedule showing each drilling and completions operations;
  - (b) list approximate durations of critical operations that include hydraulic fracturing and formation flow testing; and
  - (c) indicate how a relief well is incorporated in the drilling program.

NEBFR 4.2, Item 3 reads "Indicate how a relief well described in the Contingency Plan is incorporated in the drilling program."

### Geophysical Hazards Identification

14. An application must describe potential geophysical hazards in enough detail to demonstrate that the operator has taken all reasonable precautions and used industry best practices to identify and manage hazards, and must

- (a) identify geophysical drilling hazards including, but not limited to, permafrost, active faulting, natural seismicity, shallow gas, and karst; and
- (b) describe the mitigative and preventive measures that will be used to manage the risks during drilling and hydraulic fracturing.

### Identification of Target Formations, Faults and Seismic Attributes

15. An application must describe the oil and gas target formations in sufficient detail to demonstrate that the best available technology and industry best practices have been considered, and must contain

- (a) an interpretation of all faults, especially delineating major faults that may connect the target formations to the groundwater zones;

- (b) isopach and structure maps of the target formations; and
- (c) an explanation of how seismic attributes have been used for structure and **reservoir quality identification and coherence**.

NEBFR 4.3.2, Item 3 reads "reservoir quality identification (e.g., coherence)."

#### Geophysical Data for Hydraulic Fracturing

**16.** (1) An application must contain a hydraulic fracturing program design demonstrating that geophysical data has been considered and incorporated into the hydraulic fracturing program design in accordance with industry best practices.

- (2) The hydraulic fracturing program design must
  - (a) identify the data needed to model the fracturing geometry and complexity and describe how it was or will be acquired;
  - (b) identify the tools and methods that will be used to monitor the fracture propagation, including but not limited to, microseismic, tiltmeter or fluid tracer;
  - (c) outline the means by which the petrophysical, geochemical and geomechanical properties of the target, overlying and underlying formations have been or will be acquired;
  - (d) demonstrate how the petrophysical, geochemical and geomechanical properties of the target, and the overlying and underlying formations will be used to determine whether fracture propagation is enhanced, prevented or inhibited;
  - (e) identify, based on the empirical data obtained from the subject wells or adjacent wells, the geomechanical properties of the overlying and underlying formations, and demonstrate there are effective fracture barriers;
  - (f) indicate how updates to the analysis and interpretation of fracture geometry and propagation will be incorporated during the hydraulic fracturing operations;
  - (g) describe the process of evaluation of the predicted and actual fracture geometry, especially as it relates to fractures that extend beyond the target formations; and
  - (h) describe how the geophysical data was used or will be used to assist in hydraulic fracturing operations, including
    - (i) seismic volume with interpretation of faults, groundwater zones, target formation and wellbore trajectory, and
    - (ii) time depth curves and velocity profile.

### Monitoring and Reporting of Suspected Seismic Events

- 17.** An application must contain
- (a) a description of how
    - (i) a suspected seismic event will be monitored throughout the entirety of the operations, including drilling, completions, hydraulic fracturing and formation flow testing,
    - (ii) the applicant will respond to a suspected seismic event, up to and including terminating operations, and
    - (iii) the applicant will notify the Regulator of any suspected seismic event; and
  - (b) a safety termination plan, describing how oil and gas drilling, completions, hydraulic fracturing and formation flow testing will be safely terminated if a suspected seismic event occurs during operations.

NEBFR 4.3.4, Item 1 includes explicit direction to provide a reporting plan. Section 17 appears to describe a reporting plan, but does not name it as such.

NEBFR 4.3.4, Header reads "may be monitored during drilling, completions, hydraulic fracturing, and formation flow testing operations."

### Water Protection

- 18.** An application must contain a drilling program demonstrating that effective measures are in place to protect potable water zones from the impacts of drilling and hydraulic fracturing operations.

NEBFR 4.4.1, Header uses "groundwater zones," not "potable water zones."

### Well Casing and Cementing

- 19.** (1) In addition to the requirements set out in sections 39 to 41 of the *Oil and Gas Drilling and Production Regulations*, an operator shall submit to the Regulator a description of the well casing and cementing.

(2) The description must demonstrate that the proposed well casing and cementing will isolate and protect groundwater and permafrost from drilling and hydraulic fracturing operations, and must

- (a) describe how cement bond logs will be used to evaluate well control barriers to address the anticipated formation pressure and hydraulic fracturing pressure;
- (b) describe how the casing will be pressure tested to maximum anticipated formation pressure, so that wellbore integrity is ensured; and
- (c) describe the quality control and testing procedures for the casing and casing accessories, including the shoe track and casing float system that will withstand maximum hydraulic fracturing pressure.

NEBFR 4.4.2, Item 4 further includes, "Describe the casing pressure testing process and the criteria for a successful pressure test."

### Well Control System

**20.** (1) In addition to the requirements set out in sections 35 to 38 of the *Oil and Gas Drilling and Production Regulations*, an operator shall submit to the Regulator a description of the well control system.

(2) The description must describe the well control system with enough detail to demonstrate that procedures, materials and equipment are in place to minimize the risk of loss of well control, and must

- (a) describe the well control system to be used and how the equipment meets the best industry standards and practices; and
- (b) describe how the proposed well control systems are adequate for well operations, including drilling, open-hole and cased logging, perforation, hydraulic fracturing and formation flow testing.

NEBFR 4.4.5, Header reads "demonstrate that during all well operations, reliable well control equipment is installed to control flows and/or loss, prevent blow-outs, and safely carry out all well activities."

### Relief Well Capability

**21.** An application must demonstrate the operator's capability to drill a relief well within the same drilling season to kill an out-of-control well, and must

- (a) describe the plans and procedures to kill an out-of-control well;
- (b) identify the drilling unit that will be used and provide a mobilization plan; and
- (c) provide an estimate of the time that it would take to drill the relief well and kill the out-of-control well.

NEBFR 4.4.6, Header does not specify "operator." The NEBFR definition of "relief well" can be found under HFFR 1. Section 38 of the *Oil and Gas Drilling and Production Regulations* also addresses loss of well control.

### Well Completion Operation

**22.** (1) In addition to the requirements set out in section 46 of the *Oil and Gas Drilling and Production Regulations*, an operator shall submit to the Regulator a description of the proposed well completion.

(2) The description must describe the well completion program, including the unconventional resources hydraulic fracturing operations, and must

- (a) demonstrate how the well will be continuously monitored during well completion operations, particularly monitoring pressure in the casing annuli during the hydraulic fracturing operations; and
- (b) demonstrate that the operating system meets or exceeds the requirements to which it may be subjected and will follow industry best practices.

NEBFR 4.5.1, Header further includes "describe... with enough detail to demonstrate that the testing of any completion interval is conducted safely and does not cause waste or pollution and that all barriers are test to the maximum pressure to which they are likely to be subjected."

OGDPR 46(1)(c) requires that "[a]n operator must ensure completion interval testing and production is conducted safely and without waste or pollution."



### Hydraulic Fracturing Design

**23.** An application **must demonstrate** that all possible hydraulic fracturing design variables for the targeted formations have been considered and that **the design follows the industry best practices**, and must

- (a) describe the policies, procedures, and methods for modelling the hydraulic fracturing program;
- (b) identify the design variables that are critical to fracture propagation including
  - (i) in-situ stresses and the choice of the creation of transversal and longitudinal fracture,
  - (ii) selection of fracture treatment,
  - (iii) perforations and orientation of the well,
  - (iv) spacing of the fracture and fracture length, height, and width,
  - (v) optimization proppant laden fluid volume,
  - (vi) control of proppant flowback, and
  - (vii) the method to evaluate each fracture;
- (c) describe the policies and procedures to maintain threshold pressure limit during hydraulic fracturing operations and how personnel will be informed of the pressures, rates and densities at any given point in time during the hydraulic fracturing operation;
- (d) describe the design basis for the selection of the fracturing fluids and chemical additives for the proposed hydraulic fracturing program;
- (e) demonstrate that the wellbore integrity is considered in the hydraulic fracturing design;
- (f) describe how the proposed hydraulic fracturing program addresses any risks for inter-wellbore communication of the nearby wells; and
- (g) describe how owners of affected suspended and abandoned offset wells will be notified of a proposed hydraulic fracturing operation.

NEBFR 4.5.2, Header includes "at minimum follows the industry best practices" and "must demonstrate... how the hydraulic fracturing will be conducted safely while protecting the environment."

### Hydraulic Fracture Operations

**24.** An application must describe the well hydraulic fracturing equipment and operation with enough detail to demonstrate that the safety of the workers is maintained and that hydraulic fracturing will not cause waste or pollution, and must

- (a) describe the policies and procedures to monitor wellbore annuli during hydraulic fracturing operations;

- (b) describe in detail how the equipment, procedures and resources are adequate to support and complete proposed hydraulic fracturing and formation flow testing operations;
- (c) describe the policies and procedures for testing surface and down hole equipment before commencing hydraulic fracturing operations, including showing that all equipment is tested to the maximum pressure to which it is likely to be subjected;
- (d) describe in detail the on-site storage capability for produced fluids including flowback fluids and formation fluids;
- (e) describe in detail the handling, treatment, disposal and waste management capabilities for the fracture fluids, flow back fluids and other used or un-used chemicals; and
- (f) describe the operator's policies and processes to monitor suspended and abandoned offset wells during hydraulic fracturing of the well.

#### Formation Flow Tests

**25.** An application must describe the formation flow testing program, and must

- (a) contain the objectives of the formation flow test program including the type of information that is expected to be derived from the test;
- (b) describe the formation flow test procedures, including the precautions that will be taken prior to, during and at termination, so that the tests will be conducted and terminated in a safe, controlled, and environmentally responsible manner in accordance with section 34 of the *Oil and Gas Drilling and Production Regulations* and industry best practices; and
- (c) contain the following respecting the formation flow test program:
  - (i) a description of any load and injection fluids that are to be used during the tests and estimates of the volumes,
  - (ii) a description of the formations to be tested including depths, estimated pressures, estimated temperatures, and anticipated reservoir fluids,
  - (iii) a list of all planned flow, injection build-up and fall-off periods with durations and the rationale for selecting those durations,
  - (iv) estimates of the flow rates or injection rates,
  - (v) a description of anticipated formation fluids,

- (vi) a description of how all produced fluids, including flowback fluids and formation fluids, will be measured and recorded,
- (vii) a description of the produced fluid sampling and analysis program, including frequency,
- (viii) a description of disposal options considered,
- (ix) a description of how and where the produced fluids, including flowback fluids and formation fluids, will be separated, temporarily stored, transported and disposed,
- (x) a description of how the formation flow test will be conducted and terminated in a safe, controlled and environmentally responsible manner in accordance with best industry practices,
- (xi) a description of how the formation flow test is designed to acquire data necessary to assess productive capacity or injectivity potential of the target formation in accordance with best industry practices.

### PART 3 PUBLIC DISCLOSURE

#### Reports

- NEW** 26. (1) An applicant shall indicate to the Regulator whether the applicant is willing to prepare and publically disclose a pre-fracture report containing the following information:
- (a) the risk assessment described in section 5;(b) the environmental protection plan described in section 6, including the water quality assurance plan described in paragraph 6(d), the list of the chemicals used in the hydraulic fracture fluids described in paragraph 6(l) and the waste management measures described in section 7.
- (2) An operator shall indicate to the Regulator whether the operator is willing to prepare and publically disclose the following reports:
- (a) the annual environmental report described in section 86 of the *Oil and Gas Drilling and Production Regulations*;
  - (b) the annual safety report described in section 87 of the *Oil and Gas Drilling and Production Regulations*.

(3) If an applicant or operator is willing to publically disclose the information described in subsection (1) or the reports described in subsection (2), as the case may be, the applicant or operator shall indicate the manner, including timing, in which the disclosure will be made.

(4) If an applicant or operator is not willing to publically disclose the information described in subsection (1) or the reports described in subsection (2), as the case may be, the applicant or operator shall explain the reasons for that decision.

Appendix 5: Comparing the NEBFR to the NWT Regulatory Framework

NATIONAL ENERGY BOARD FILING REQUIREMENTS	DRAFT HYDRAULIC FRACTURING FILING REGULATIONS	NT OIL AND GAS OPERATIONS ACT	NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS	OTHER
<b>2.0 Environmental Assessment</b>				
2.1 – Proposed Project Location 2.2 – Project Description Content for the Purpose of EA 2.3 – Consultation 2.4 – Socio-Economic Impacts				
<b>3.0 OPERATIONS AUTHORIZATION</b>				
<b>3.1 – Proof of Financial Responsibility</b>  Refers applicants to the <i>Draft Financial Viability and Financial Responsibility Guidelines</i> .  The multi-page <i>Guidelines</i> specifically note that surety bonds will not be accepted.		<b>13 and 64</b> Applicants for an operating authorization must present proof of financial responsibility.  This proof may be a letter of credit, a guarantee, or an indemnity bond, or take any other form approved by the Regulator.  Added: N/A  Excluded: Prohibition on surety bonds		
<b>3.2 Declaration by Applicant or Owner</b>				
<b>3.2.1</b> Applicant’s most senior accountable executive must declare: <ul style="list-style-type: none"> <li>• Equipment and installations fit for their locations and purposes;</li> <li>• Related operating procedures appropriate; and</li> <li>• Associated personnel trained and competent.</li> </ul>		<b>15(1)</b> Applicant must declare: <ul style="list-style-type: none"> <li>• Equipment and installations fit for their locations and purposes;</li> <li>• Related operating procedures appropriate; and</li> <li>• Associated personnel trained and competent.</li> </ul> Under 15(2), where specific equipment is		

NATIONAL ENERGY BOARD FILING REQUIREMENTS	DRAFT HYDRAULIC FRACTURING FILING REGULATIONS	NT OIL AND GAS OPERATIONS ACT	NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS	OTHER
		<p>concerned, the owner of that equipment may provide the declaration.</p> <p><b>Added:</b> owner</p> <p><b>Excluded:</b> most senior accountable executive</p>		
<p><b>3.2.2</b> Declaration must describe:</p> <ul style="list-style-type: none"> <li>• Compliance monitoring processes; and</li> <li>• Actions to be taken upon identifying non-compliance, including immediate corrective action or ceasing the activity.</li> </ul>		<p><b>15(3)</b> If any changes result in non-compliance with the declaration, a new declaration must be provided to the Regulator as soon as possible.</p> <p>However, this is <b>not directly correlative</b> with the NEBFR, which stipulates what the declaration must contain.</p>		
<p><b>3.3 Management System</b></p>				
<p><b>Header</b> Management system must demonstrate:</p> <ul style="list-style-type: none"> <li>• Operation and technical systems integrated with financial and human resource management to achieve safety, security, and environmental protection, and conservation of resource;</li> <li>• Compliance with COGOA and its regulations;</li> <li>• Correspondence to size, nature, and complexity of activities authorized under COGOA and its regulations, and to associated hazards and risks; and</li> <li>• Strong foundation for a pervasive safety culture.</li> </ul>			<p><b>5(1) and 5(4)</b> A management plan must:</p> <ul style="list-style-type: none"> <li>• Integrate operations and technical systems with the management of financial and human resources</li> <li>• Ensure compliance with OGOA and its regulations; and</li> <li>• Correspond to size, nature, and complexity of operations and activities, and associated hazards and risks.</li> </ul> <p><b>Added:</b> operations</p> <p><b>Excluded:</b> safety culture</p>	

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	OTHER
<p><b>3.3.1</b> Management system must:</p> <ul style="list-style-type: none"> <li>Identify name and position of person responsible for establishment, implementation, and maintenance; and</li> <li>Provide evidence of their acceptance of these responsibilities.</li> </ul>			<p><b>5(2)(k)</b> The management system must:</p> <ul style="list-style-type: none"> <li>Identify name and position of person responsible for management system establishment, implementation, and maintenance.</li> </ul> <p><b>Added:</b> N/A</p> <p><b>Excluded:</b> acceptance of responsibilities</p>	
<p><b>3.3.2</b> Management system must:</p> <ul style="list-style-type: none"> <li>Identify and describe its base policies, including goals and objectives for management, process, occupational safety, security, environment protection, and resource conservation.</li> </ul>			<p><b>5(2)(a)</b> The management system must include:</p> <ul style="list-style-type: none"> <li>The system's base policies</li> </ul> <p><b>5(2)(b)</b> The management system must include</p> <ul style="list-style-type: none"> <li>Processes for setting goals for safety, environmental protection, and waste prevention improvement</li> </ul> <p><b>Added:</b> N/A</p> <p><b>Excluded:</b> objectives, management, process, occupational safety, and security</p>	
<p><b>3.3.3</b> Management system must:</p> <ul style="list-style-type: none"> <li>Describe and provide evidence of applicant's organizational structure;</li> <li>Clearly identify and communicate roles, responsibilities, and authorities at all levels; and</li> <li>Substantiate adequate resourcing based on activities' size, nature, and complexity.</li> </ul>			<p><b>5(2)(g)</b> The management system must:</p> <ul style="list-style-type: none"> <li>Describe all processes for making personnel aware of their roles and responsibilities</li> </ul> <p><b>Added:</b> N/A</p> <p><b>Excluded:</b> organizational structure; identified roles, responsibilities, and authorities; and substantiated adequate resourcing</p>	

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
<p><b>3.3.4</b> Management system must:</p> <ul style="list-style-type: none"> <li>Identify positions critical to safety, with job descriptions.</li> </ul>				
<p><b>3.3.5(a)</b> Management system must demonstrate systematic, explicit, comprehensive, proactive, and documented processes for:</p> <ul style="list-style-type: none"> <li>Annual objective and target development respecting safety, security, environmental protection, resource conservation; and</li> <li>Means to measure the above.</li> </ul>			<p><b>5(2)(b)</b> The management system must include:</p> <ul style="list-style-type: none"> <li>Processes for setting goals to improve safety, environmental protection, and waste prevention.</li> </ul> <p><b>Added:</b> N/A</p> <p><b>Excluded:</b> Process criteria, annual requirements, security, and measurement means</p>	
<p><b>3.3.5(b)</b> Management system must demonstrate systematic, explicit, comprehensive, proactive, and documented processes for:</p> <ul style="list-style-type: none"> <li>Identification and analysis of potential hazards; and</li> <li>Hazard inventory maintenance.</li> </ul>			<p><b>5(2)(c)</b> The management system must include:</p> <ul style="list-style-type: none"> <li>Process for identifying hazards; and</li> <li>For evaluating and managing associated risks.</li> </ul> <p><b>Added:</b> evaluating and managing associated risks</p> <p><b>Excluded:</b> process criteria, hazard analysis, hazard inventory maintenance</p>	
<p><b>3.3.5(c)</b> Management system must demonstrate systematic, explicit, comprehensive, proactive, and documented processes for:</p> <ul style="list-style-type: none"> <li>Evaluation and management of risks associated with all hazards, including those related to normal and abnormal conditions; and</li> <li>Development, implementation, and</li> </ul>				



<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
communication of preventative, protective, and mitigative measures.				
<p><b>3.3.5(d)</b> Management system must demonstrate systematic, explicit, comprehensive, proactive, and documented processes for:</p> <ul style="list-style-type: none"> <li>Incorporating contractors, subcontractors, and any service providers.</li> </ul>			<p><b>5(2)(j)</b> Management system must include:</p> <ul style="list-style-type: none"> <li>Arrangements for coordinating management and operations among owner, contractor, operator, and others as applicable.</li> </ul> <p><b>Added:</b> others as applicable</p> <p><b>Excluded:</b> process criteria, subcontractors, service providers</p>	
<p><b>3.3.5(e)</b> Management system must demonstrate systematic, explicit, comprehensive, proactive, and documented processes for:</p> <ul style="list-style-type: none"> <li>Ensuring and maintaining facility and equipment integrity to ensure safety, security, environmental protection, and resource conservation.</li> </ul>			<p><b>5(2)(e)</b> Management plan must include:</p> <ul style="list-style-type: none"> <li>Processes for ensuring and maintaining facility, structures, installations, support craft, and equipment integrity to ensure safety, environmental protection, and waste prevention.</li> </ul> <p><b>Added:</b> structures, installations, support craft</p> <p><b>Excluded:</b> process criteria, security</p>	
<p><b>3.3.5(f)</b> Management system must demonstrate systematic, explicit, comprehensive, proactive, and documented processes for:</p> <ul style="list-style-type: none"> <li>Identification and monitoring of acts, regulations, approvals, and orders related to safety, security, environmental protection, and resource conservation obligations; and</li> </ul>				

NATIONAL ENERGY BOARD FILING REQUIREMENTS	DRAFT HYDRAULIC FRACTURING FILING REGULATIONS	NT OIL AND GAS OPERATIONS ACT	NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS	OTHER
<ul style="list-style-type: none"> <li>Maintaining table of concordance to monitor compliance as well as to identify and resolve non-compliance.</li> </ul>				
<p><b>3.3.5(g)</b> Management system must demonstrate systematic, explicit, comprehensive, proactive, and documented processes for:</p> <ul style="list-style-type: none"> <li>Identifying and managing changes that could affect safety, security, environmental protection, or resource conservation, including new hazards, risks, designs, specifications, standards, procedures, organizational changes, and legal requirements.</li> </ul>				
<p><b>3.3.5(h)</b> Management system must demonstrate systematic, explicit, comprehensive, proactive, and documented processes for:</p> <ul style="list-style-type: none"> <li>Establishing competency requirements and effective training programs for employees, contractors, subcontractors, service providers, and any other persons working with or on behalf of the applicant</li> </ul>			<p><b>5(2)(d)</b> The management system must include:</p> <ul style="list-style-type: none"> <li>Processes for ensuring personnel are trained and competent</li> </ul> <p><b>72</b> An operator must ensure all personnel have the necessary experience, training, and qualifications and are able to conduct their duties in compliance prior to their start of work.</p> <p>However, these are <b>not directly correlative</b> to the NEBFR, which stipulates that processes for competency requirements and training programs must be included in the management system.</p> <p>“Personnel” is not expressly defined in</p>	

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
			either the OGOA or the OGDPR.	
<p><b>3.3.5(i)</b> The management plan must demonstrate systematic, explicit, comprehensive, proactive, and documented processes for:</p> <ul style="list-style-type: none"> <li>• Internal and external communications systems to support safety, security, environmental protection, resource conservation; and</li> <li>• Effective management system implementation and operation</li> </ul>			<p><b>5(3)</b> Management system must be controlled and set out logically and systematically for ease of understanding and efficient implementation.</p> <p>Section 19 requires operators to take all reasonable precautions to ensure safety and environmental protection, and lists a number of examples, including paragraph (d), which addresses language and other communications barriers.</p> <p>However, these are <b>not directly correlative to the NEBFR.</b></p>	
<p><b>3.3.5(j)</b> Records supporting and demonstrating management plan development must be developed, retained, accessible and managed.</p>			<p><b>5(2)(h)</b> Management system must include processes for ensuring all system documents are current, valid, and have been approved.</p> <p>However, this is <b>not directly correlative to the NEBFR, which addresses retention and accessibility.</b></p>	
<p><b>3.3.5(k)</b> Management system must demonstrate systematic, explicit, comprehensive, proactive, and documented processes for:</p> <ul style="list-style-type: none"> <li>• Identifying requirements for development, review, revision, and control, with approval.</li> </ul>			<p><b>5(2)(h)</b> Management system must include processes for:</p> <ul style="list-style-type: none"> <li>• Ensuring all system documents are current, valid, and have been approved.</li> </ul> <p>However, this is <b>not directly correlative to the NEBFR, which establishes requirements for review of the management system.</b></p>	
<p><b>3.3.5(l)</b> Management system must demonstrate systematic, explicit, comprehensive, proactive, and documented processes for:</p>			<p><b>5(2)(j)</b> Management system must include:</p> <ul style="list-style-type: none"> <li>• Arrangements for coordinating management and operations among</li> </ul>	

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	OTHER
<ul style="list-style-type: none"> <li>Coordination and management of activities undertaken by employees, contractors, subcontractors, service providers, and any other person working with or on behalf of the operator</li> </ul>			<p>the owner, contractors, operators, and others as applicable</p> <p><b>Added:</b> process criteria, owners, operators, others as applicable</p> <p><b>Excluded:</b> employees, service providers, any other person(s)</p>	
<p><b>3.3.5(m)</b> Management system must demonstrate systematic, explicit, comprehensive, proactive, and documented processes for:</p> <ul style="list-style-type: none"> <li>Internal reporting of hazards, near-misses, and incidents; and</li> <li>Maintenance of monitoring measures, including data system to monitor and analyze trends</li> </ul>			<p><b>5(2)(f)</b> Management system must include:</p> <ul style="list-style-type: none"> <li>Processes for internal reporting and analysis of hazards, minor injuries, incidents, and near-misses; and</li> <li>Processes for corrective actions</li> </ul> <p><b>Added:</b> process criteria, minor injuries, processes for corrective actions</p> <p><b>Excluded:</b> monitoring measures</p>	
<p><b>3.3.5(n)</b> Management system must demonstrate systematic, explicit, comprehensive, proactive, and documented processes for:</p> <ul style="list-style-type: none"> <li>Preparation and response for safety, security, environmental incidents, and emergency situations.</li> </ul>				
<p><b>3.3.5(o)</b> Management system must demonstrate systematic, explicit, comprehensive, proactive, and documented processes for:</p> <ul style="list-style-type: none"> <li>Performance monitoring, measuring, and recording respecting safety, security, environmental management, and resource conservation to evaluate system</li> </ul>				

NATIONAL ENERGY BOARD FILING REQUIREMENTS	DRAFT HYDRAULIC FRACTURING FILING REGULATIONS	NT OIL AND GAS OPERATIONS ACT	NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS	OTHER
implementation and effectiveness.				
<p><b>3.3.5(p)</b> The management plan must demonstrate systematic, explicit, comprehensive, proactive, and documented processes for:</p> <ul style="list-style-type: none"> <li>Quality assurance plan to improve activities authorized under COGOA and the COGDPR</li> </ul>				
<p><b>3.3.5(q)</b> Management system must demonstrate systematic, explicit, comprehensive, proactive, and documented processes for:</p> <ul style="list-style-type: none"> <li>Conducting system audits and reviews; and</li> <li>Taking corrective and preventative actions to non-compliance.</li> </ul>			<p><b>5(2)(i)</b> Management system must include:</p> <ul style="list-style-type: none"> <li>Processes for conducting periodic reviews or audits; and</li> <li>Processes for taking corrective action to non-conformance and improvement opportunities.</li> </ul> <p><b>Added:</b> process criteria, or (“reviews <i>or</i> audits”), improvement opportunities</p> <p><b>Excluded:</b> “reviews <i>or</i> audits” instead of “reviews <i>and</i> audits”</p>	
<p><b>3.4 Management System Implementation</b></p>				
<p><b>Header</b> Management system oversight program must demonstrate:</p> <ul style="list-style-type: none"> <li>Fully implemented system across the organization to achieve safety, security, environmental protection, and resource conservation;</li> <li>Identification and mitigation of threats to safety and drilling and fracturing operations integrity,</li> </ul>				

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
<ul style="list-style-type: none"> <li>including human factors; and</li> <li>Internal quality assurance process for continual improvement.</li> </ul>				
3.4.1 Describe and provide supporting evidence of most recent internal and external management system audits, including resulting corrective and preventative action plans				
3.4.2 Describe all hazards identified in association with this project, including elimination or mitigation methods for related risks			<p>8(c) Safety plan must describe identified hazards and the results of the risk evaluation.</p> <p>However, this is not directly correlative to the NEBFR provisions on management systems or management system oversight programs.</p>	
<b>3.5 Safety Culture</b>				
<b>Header</b> Management system must demonstrate commitment to positive safety culture development and maintenance				
3.5.1 Describe and provide evidence of: <ul style="list-style-type: none"> <li>Commitments, policies, practices, and programs that support continual improvement of safety culture, including that of contractors, subcontractors, service providers, and any other persons who could be working with or on behalf of the applicant.</li> </ul>				

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
<p><b>3.5.2</b> Describe and provide evidence of:</p> <ul style="list-style-type: none"> <li>• Leadership commitment</li> <li>• Most senior executive’s acceptance of safety performance accountability</li> </ul>				
<p><b>3.5.3</b> Describe safety culture measurement methods.</p> <p>Provide most recent assessment results, including employee perception survey results.</p>				
<p><b>3.5.4</b> Provide action plan designed to respond to safety culture assessment and to support positive safety culture development and maintenance.</p>				
<p><b>3.5.5</b> Describe how workers will be actively engaged in safety management through project life cycle.</p>				
<p><b>3.5.6</b> Describe and provide evidence of safety “stand down” policies and procedures, including when this would be mandatory.</p>				
<p><b>3.5.7</b> Describe how organization encourages workers to actively report safety threats, hazards, near-misses, and incidents without fear of recrimination</p>				
<p><b>3.5.8</b> Provide evidence of stop work authority policy and its implementation.</p>				

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
Describe how workers exercise this authority.  Describe communication of policy, procedures, and related responsibilities to all contractors, subcontractors, service providers, and any other persons who could be working with or on behalf of the applicant.				
<b>3.5.9</b> Describe safety culture implementation, maintenance, access, and improvement for short duration or discontinuous project activities.				
<b>3.5.10</b> Describe safety culture maintenance during no-activity periods or when crews change			<p><b>19(b)</b> Operators must take all reasonable precautions to ensure safety and environmental protection, including ensuring safe work methods during all drilling, well, or production operations.</p> <p><b>19(c)</b> The above must also include a shift handover system to effectively communication conditions, deficiencies, or other problems that might impact safety or environmental protection</p> <p>However, these are <b>not directly correlative</b> to the NEBFR, which requires applicants to file details of safety culture maintenance procedures.</p>	
<b>3.6 Human Factors</b>				
<b>Header</b> Management system must demonstrate:				



NATIONAL ENERGY BOARD FILING REQUIREMENTS	DRAFT HYDRAULIC FRACTURING FILING REGULATIONS	NT OIL AND GAS OPERATIONS ACT	NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS	OTHER
<ul style="list-style-type: none"> <li>• Consideration of human performance during project planning and risk assessment; and</li> <li>• Address of human performance challenges associated with drilling and hydraulic fracturing</li> </ul>				
<b>3.6.1</b> Describe identification and address of human factors during project planning to effectively manage potential for human error during drilling and hydraulic fracturing operations				
<b>3.6.2</b> List all human factors assessed, with proposed controls and including those unique to the operational environment				
<b>3.7 Lessons Learned</b>				
<b>Header</b> Management system must demonstrate: <ul style="list-style-type: none"> <li>• Lessons learned from internal and external incidents and near-misses incorporated into policies, processes, and procedures.</li> </ul>			<b>5(2)(f)</b> Management system must include: <ul style="list-style-type: none"> <li>• Processes for internal reporting and analysis of hazards, minor injuries, incidents, and near-misses; and</li> <li>• Processes for corrective actions</li> </ul> <p>However, this is <b>not directly correlative</b> to the NEBFR, which directly addresses “lessons learned.”</p>	
<b>3.7.1</b> Describe how lessons from incidents and near-misses in the organization and across the industry are and will be incorporated into the management system				

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
and related programs.				
<b>3.7.2</b> Describe how lessons will be communicated to all workers to ensure awareness of potential threats, hazards, and remedies				
<b>3.8 Safety Plan</b>				
<b>Header</b> Application must include a safety plan, demonstrating procedures, practices, resources, sequence of key safety-related activities, and monitoring measures.			<b>Section 8</b> stipulates safety plan content requirements.	
<b>3.8.1</b> Provide evidence that the Safety Plan was developed in accordance with COGDPR 8 and Safety Plan Guidelines.			<b>Section 8</b> stipulates safety plan content requirements.  However, this is <b>not directly correlative</b> with NEBFR provisions, which require evidence that a safety plan meets these requirements.	
<b>3.8.2</b> Provide a summary of and references to the management system, demonstrating: <ul style="list-style-type: none"> <li>• How it will be applied to the proposed work or activities; and</li> <li>• How COGDPR safety duties will be incorporated into the Safety Plan</li> </ul>			<b>8(a)</b> Safety plan must include a summary of and references to the management system, demonstrating: <ul style="list-style-type: none"> <li>• How it will be applied to the proposed work or activities; and</li> <li>• How COGDPR safety duties will be incorporated into the Safety Plan</li> </ul> <b>Added:</b> N/A  <b>Excluded:</b> N/A	
<b>3.8.3</b> Describe organizational and command structure of operator, contractors,			<b>8(f)</b> Safety plan must describe the organizational structure for the proposed	

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	OTHER
subcontractors, service providers, and any other person who could be working with or on behalf of the applicant.			<p>work or activity, clearly explaining:</p> <ul style="list-style-type: none"> <li>• their relationship to each other; and</li> <li>• contact information and position of the person accountable for the safety plan and of the person responsible for implementing it</li> </ul> <p><b>Added:</b> description criteria</p> <p><b>Excluded:</b> operator, contractors, subcontractors, service providers, any other person(s)</p>	
<p><b>3.8.4</b> Safety plan must include:</p> <ul style="list-style-type: none"> <li>• Up-to-date contact and position information for person(s) accountable for plan and implementation</li> </ul>			<p><b>8(f)(ii)</b> Safety plan must include contact and position information for person(s) accountable for plan and implementation.</p> <p><b>Added:</b> N/A</p> <p><b>Excluded:</b> up-to-date</p>	
<p><b>3.8.5</b> The safety plan must describe:</p> <ul style="list-style-type: none"> <li>• Compliance monitoring;</li> <li>• Performance measurement of objectives</li> </ul>			<p><b>8(h)</b> Safety plan must:</p> <ul style="list-style-type: none"> <li>• Describe safety plan compliance monitoring;</li> <li>• Describe safety plan objectives performance measurement</li> </ul> <p><b>Added:</b> N/A</p> <p><b>Excluded:</b> N/A</p>	
<p><b>3.8.6</b> Describe how roles of contractor, subcontractor, service provider, and any other person who could work with or on behalf of the applicant will be incorporated into the Safety Plan.</p>			<p><b>5(2)(j)</b> describes this in the context of the management system.</p> <p><b>This is not correlative to the NEBFR, because it is not addressed in the context of</b></p>	

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
			the safety plan.	
<b>3.8.7</b> Describe how any changes to the Safety Plan will be incorporated.				
<b>3.9 Risk Assessment</b>				
<b>Header</b> Risk assessment and management processes must: <ul style="list-style-type: none"> <li>Describe effective processes to identify threats and hazards to safety and environment, identify and select effective mitigative measures, and evaluate and manage associated risks; and</li> <li>Demonstrate applicant has taken, or will take, all reasonable precautions to address safety and environmental risks, including taking into account interaction of all components (facilities, equipment, operating procedures, personnel, etc.)</li> </ul>	Mirrored in HFFR 5, except “including taking into account interaction of all components (facilities, equipment, operating procedures, personnel, etc.)”			
<b>3.9.1</b> Provide summary of studies undertaken to identify threats and hazards and to evaluate risks to safety and the environment	Mirrored in HFFR 5(2)(a)			
<b>3.9.2</b> Describe processes and procedures used to identify and select all reasonable precautions pursuant to OGDPR 19	Mirrored in HFFR 5(2)(b)			
<b>3.9.3</b> Describe risk assessment framework used to determine acceptable and tolerable levels of risk	Mirrored in HFFR 5(2)(c)			
<b>3.9.4</b> Identify criteria for deciding what is and is not a reasonable precaution	Mirrored in HFFR 5(2)(d)			

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
<b>3.9.5</b> Describe hazards identified and risk evaluation results	Mirrored in HFFR 5(2)(e)			
<b>3.9.6</b> Provide summary of measures to avoid, prevent, reduce, and manage safety risks	Mirrored in HFFR 5(2)(f), except “measures being adopted” not “measures”			
<b>3.9.7</b> Provide list of all structures, facilities, equipment, and systems critical to safety and environmental protection and summary of system in place for inspection, testing, and maintenance	Mirrored in HFFR 5(2)(g)			
<b>3.9.8(a)-(d)</b> Describe threats and hazards critical to safety identified for all stages or phases of activities from design to completion of operations, including those related to: <ul style="list-style-type: none"> <li>• Facility and drilling unit integrity;</li> <li>• Well integrity;</li> <li>• Well control; and</li> <li>• Hydraulic fracturing operations</li> </ul>	Mirrored in HFFR 5(2)(h), except “proposed work or activity” not “activities”			
<b><u>3.10 Environmental Protection Plan (EPP)</u></b>				
<b>Header</b> Applications must include an EPP providing enough detail to demonstrate: <ul style="list-style-type: none"> <li>• Understanding of how work/activity will interact with environment;</li> <li>• That EPP has procedures, practices, resources, and monitoring necessary to manage hazards and to protect the environment from the impacts of the proposed work or activity, including potential impacts to groundwater; and</li> <li>• Predicted environmental hazards and risks, including preventive and mitigative measures, are</li> </ul>				

NATIONAL ENERGY BOARD FILING REQUIREMENTS	DRAFT HYDRAULIC FRACTURING FILING REGULATIONS	NT OIL AND GAS OPERATIONS ACT	NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS	OTHER
incorporated into the EPP				
3.10.1 Provide evidence that EPP developed in accordance with applicable sections of the <i>Environmental Protection Plan Guidelines</i>	Mirrored in HFFR 6			
3.10.2 Demonstrate how management system will ensure COGDPR environmental protection duties will be fulfilled			<p><b>Section 9</b> identifies content requirements for the environmental protection plan.</p> <p>However, this is <b>not directly correlative</b> to the NEBFR, which requires a filed demonstration of how the management system will meet protection duties.</p>	
3.10.3 Provide a summary of the studies undertaken to identify environmental hazards and to evaluate environmental risks relating to the proposed work or activity			<p><b>9(b)</b> Environmental protection plan must include a summary of the studies undertaken to identify environmental hazards and to evaluate environmental risks relating to the proposed work or activity</p> <p><b>Added:</b> N/A</p> <p><b>Excluded:</b> N/A</p>	
3.10.4 Describe species particularly sensitive to emissions or spills of oil, hydraulic fracturing fluids, other fluids or emissions from well drilling, hydraulic fracturing or formation flow testing operations.	Mirrored in HFFR 6(a)			
3.10.5 Describe how any heritage resources, protected areas, species at risk and species at risk recovery strategies, such as for boreal caribou, will be addressed in the proposed work or activity				

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
<b>3.10.6</b> Identify sources of fresh and saline water, and volumes required for drilling, hydraulic fracturing, completions, formation flow testing, and/or production activities. Provide assessment of impact to environment and area residents and communities.	Mirrored in HFFR 6(c)			
<b>3.10.7</b> Provide water quality assurance plan for how surface water and groundwater quality will be assessed, protected, and monitored for impacts from planned and unplanned discharges from drilling, hydraulic fracturing, flaring, and formation flow testing, well suspension and abandonment, and production activities	Mirrored in HFFR 6(d), except added “incinerating”			
<b>3.10.8</b> Demonstrate how impacts to environment from air emissions during site access, handling, and storage of produced fluids, including formation and flowback fluids, flaring, and formation flow testing operations would be minimized.	Mirrored in HFFR 6(e), except “demonstrates” not “describes” and added “incinerating”			
<b>3.10.9</b> Provide air quality assurance plan that describes how air quality will be assessed, protected, and monitored for impacts from planned discharges and fugitive or other unauthorized discharges from drilling, hydraulic fracturing, flaring, formation flow testing, storage of produced fluids, well suspension and abandonment, and production activities	Mirrored in HFFR 6(f), except added “incinerating”			
<b>3.10.10</b> Identify volumes of water that would be recycled, reused as fracture fluids, transported out of the region for approved disposal elsewhere, and/or disposed by deep well injection.	Mirrored in HFFR 6(g)			

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
<p><b>3.10.11</b> Describe:</p> <ul style="list-style-type: none"> <li>• Knowledge gaps regarding environmental setting (biological, physical, and geological); and</li> <li>• How these will be addressed</li> </ul>				
<p><b>3.10.12</b> Describe how results of ongoing research or information-gathering initiatives will be incorporated into proposed work or activity</p>				
<p><b>3.10.13</b> Describe:</p> <ul style="list-style-type: none"> <li>• Identified hazards to the environment; and</li> <li>• Results of subsequent risk evaluation.</li> </ul>			<p><b>9(c)</b> Environmental protection plan must include:</p> <ul style="list-style-type: none"> <li>• Identified hazards to the environment; and</li> <li>• Results of subsequent risk evaluation.</li> </ul> <p><b>Added:</b> N/A</p> <p><b>Excluded:</b> N/A</p>	
<p><b>3.10.14</b> Describe measures to anticipate, avoid, prevent, reduce, and manage environmental risks.</p>			<p><b>9(d)</b> Environmental protection plan must include:</p> <ul style="list-style-type: none"> <li>• A summary of the measures to avoid, prevent, reduce, and manage environmental risk.</li> </ul> <p><b>Added:</b> N/A</p> <p><b>Excluded:</b> anticipate</p>	
<p><b>3.10.15</b> Verify environmental protection measures, commitments, and implementation plan will be provided to</p>	<p>Mirrored in HFFR 6(i), except “demonstrate” not “verify”</p>			



<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
appropriate persons and that they will be reviewed prior to drilling, completion, hydraulic fracturing, flaring, and formation flow testing operations, well suspension and abandonment operations, and prior to production operations and annually thereafter.				
<b>3.10.16</b> Describe all structures, facilities, equipment, and systems critical to environmental protection, and provide summary of system in place for inspection, testing, and maintenance	Mirrored in HFFR 6(j)			
<b>3.10.17</b> Describe organizational and command structure of applicant and of contractors, subcontractors, service providers, and any other persons working with or on behalf of the applicant for each phase of the proposed activity.			<p><b>9(f)</b> Environmental protection plan must describe the organizational structure for the proposed work or activity and the command structure on the installation.</p> <p><b>Added:</b> N/A</p> <p><b>Excluded:</b> command structure, applicant and others, each phase</p>	
<b>3.10.18</b> Provide contact information for person(s) accountable for the EPP and responsible for implementing it			<p><b>9(f)(ii)</b> Environmental protection plan must include contact information and position for person(s) accountable for plan and implementation.</p> <p>Added: N/A</p> <p>Excluded: N/A</p>	
<b>3.10.19</b> Describe procedures for selection, evaluation, and use of chemical substances, including process chemicals and drilling fluid ingredients	Mirrored in HFFR 6(k)			

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
<b>3.10.20</b> Indicate if the applicant is willing to publically disclose the chemicals used in the hydraulic fracture fluids.	Public disclosure is addressed in HFFR 26			
<b>3.10.21</b> Describe arrangements for monitoring compliance with the EPP and for measuring performance in relation to its objectives	Mirrored in HFFR 6(m)			
<b>3.10.22</b> Describe processes and procedures to detect, report, investigate, and correct the causes and causal factors of pollution (exceedances of discharge limits), and to prevent re-occurrences.	Mirrored in HFFR 6(n), except “factors of exceedances of ambient air quality” not “factors of pollution (exceedances of discharge limits)”			
<b>3.10.23</b> Describe how groundwater monitoring and sampling program will detect any contamination from oil and gas operations including hydraulic fracturing operations	Mirrored in HFFR 6(o), except “water” not “groundwater”			
<b>3.11 Waste Management</b>				
<b>Header</b> Applicants expected to take all reasonable measures to minimize waste materials generated by their operations, and to minimize the quantity of substances of potential environmental concern contained within these waste materials.  No substance should be discharged to the environment unless the Board has determined that the discharge is acceptable.	Definition of “waste material” mirrored in the HFFR, except added “produced water.”  The requirements at left are not mirrored in the draft regulations and are not present elsewhere in the regulatory framework.			It is assumed that that OROGO will determine what discharges are acceptable, but it is unclear what parameters will guide this determination.
<b>3.11.1</b> Provide evidence that waste management plan was developed	Mirrored in HFFR 7(a), except “evidence that the measures respecting the waste management plan,” not “evidence that waste management plan”			

NATIONAL ENERGY BOARD FILING REQUIREMENTS	DRAFT HYDRAULIC FRACTURING FILING REGULATIONS	NT OIL AND GAS OPERATIONS ACT	NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS	OTHER
<p><b>3.11.2</b> Describe:</p> <ul style="list-style-type: none"> <li>Planned waste discharges and limits; and</li> <li>Procedures for treatment, handling, and disposal.</li> </ul>			<p><b>9(h)</b> Environmental protection plan must describe equipment and procedures for waste material treatment, handling, and disposal</p> <p><b>9(i)</b> Environmental protection plan must describe all discharge streams and limits for any discharge into the natural environment, including any waste material.</p> <p><b>Added:</b> All discharge streams including waste material</p> <p><b>Excluded:</b> N/A</p>	
<p><b>3.11.3</b> Identify and reference methods or protocols used to establish discharge limits</p>			<p><b>Paragraph 5(2)(b)</b> management system must include processes for setting goals for the safety, environmental protection, and waste prevention improvement.</p> <p>However, this is <b>not directly correlative</b> with the NEBFR, which stipulate the identification of methods and protocols within the EPP.</p>	
<p><b>3.11.4</b> Describe equipment and procedures for waste material treatment, handling, and disposal</p>			<p><b>9(h)</b> Environmental protection plan must describe equipment and procedures for waste material treatment, handling, and disposal</p> <p><b>Added:</b> N/A</p> <p><b>Excluded:</b> N/A</p>	

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
<b>3.11.5</b> Describe any agreements or arrangements for disposal of waste material associated with drilling, completion, hydraulic fracturing and formation flow testing, or production activities	Mirrored in HFFR 7(b)			
<b>3.11.6</b> Describe arrangement for: <ul style="list-style-type: none"> <li>waste management plan compliance monitoring; and</li> <li>Measuring performance</li> </ul>			<p><b>9(j)</b> Environmental protection plan must describe discharge limit compliance monitoring system; and</p> <p><b>9(k)</b> Environmental protection plan must arrange plan compliance monitoring and performance measurement.</p> <p>However, this is not directly correlative to the NEBFR, which describes compliance monitoring for the waste management plan.</p>	
<b>3.11.7</b> Provide incident reporting procedure details in event of exceedances of discharges limits	Mirrored in HFFR 7(c)			
<b>3.12 Spill Contingency Plan</b>				
<b>Header</b> Demonstrate that effective systems, processes, procedures, and capabilities will be in place to: <ul style="list-style-type: none"> <li>minimize the impacts to the natural environment from unauthorized or accidental discharges; and</li> <li>protect workers and the public.</li> </ul>	Mirrored in HFFR 9(1), except added “unplanned”			
<b>3.12.1</b> Describe worst-case scenario for loss of surface/subsurface containment of hydraulic fracturing fluids, formation fluids, and flowback fluids	Mirrored in HFFR 9(2)(a)			
<b>3.12.2(a)-(g)</b> Describe consequences of worst-case scenario	Mirrored in HFFR 9(2)(b)			
<b>3.12.3</b> Provide organization charts describing emergency response command	Mirrored in HFFR 9(2)(c)			

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
structure and responder positions, including duties, responsibilities, and accountabilities.				
<b>3.12.4</b> Describe process and procedures for containing and recovering, or eliminating and cleaning up, spilled substances	Mirrored in HFFR 9(2)(d)			
<b>3.12.5</b> Describe process for collection, handling, storage, and disposal of spill wastes anticipated for various spill scenarios, including loss of containment scenario.	Mirrored in HFFR 9(2)(e)			
<b>3.12.6</b> Describe process and procedures to report and monitor all spills and spill response progress.	Mirrored in HFFR 9(2)(f)			
<b>3.12.7</b> Provide decision criteria and flow chart to determine appropriate spill countermeasures.	Mirrored in HFFR 9(2)(h)			
<b>3.12.8</b> Describe criteria and procedures to monitor effectiveness of each response strategy and method.	Mirrored in HFFR 9(2)(g)			
<b>3.12.9</b> Provide inventory of dedicated and readily deployable spill-response equipment, materials, and communications equipment and facilities, and identify expected mobilization and field deployment response times.	Mirrored in HFFR 9(2)(j)			
<b>3.12.10</b> Describe personnel training qualifications requirements and competency measures	Mirrored in HFFR 9(2)(k)			
<b>3.12.11</b> Describe scope and frequency of any pre-drilling and operational spill-response exercises intended to test response and further verify effectiveness of response strategies, methods, and emerging technologies.	Mirrored in HFFR 9(2)(l)			
<b>3.12.12</b> Describe how emergency response procedures will provide for appropriate	Mirrored in HFFR 9(2)(m)			

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
coordination with relevant municipal, territorial, and federal emergency response plans and mutual aid agreements. Include the sharing or augmenting of response resources.				
<b>3.12.13</b> Identify any responder roles and response equipment and training that may be provided to community-based responders.	Mirrored in HFFR 9(2)(n)			
<b>3.12.14</b> Describe plan to monitor adverse impacts to natural environment from significant or persistent spills	Mirrored in HFFR 9(2)(o)			
<b>3.12.15</b> Describe procedures for identifying clean-up priorities for potentially impacted valued environmental, physical, and socio-economic components.	Mirrored in HFFR 9(2)(p)			
<b>3.12.16</b> Describe criteria and procedures for short-term and long-term monitoring and reporting of spill countermeasures' impact on natural environment.	Mirrored in HFFR 9(2)(q)			
<b>4.1 Well Description</b>				
<b>Header</b> Application must include essential information about the drilling program and geological conditions to ensure drilling operation safety and integrity				
<b>4.1.1.(a)-(g)</b> Well description must include: <ul style="list-style-type: none"> <li>• Purpose of proposed well and drilling program overview;</li> <li>• Schematics indicating hole sizes, casing and cementing program, other information necessary to illustrate proposed design;</li> <li>• Identification and description of target formations, emphasizing structural and depositional</li> </ul>			<b>11</b> Requires drilling program and well data acquisition program to be included in application.  <b>33</b> Address leak-off tests.  <i>Otherwise, well description is not expressly addressed in the HFFR or elsewhere in the regulatory framework.</i>	

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
<p>interpretations, and rationale for selecting well locations and target formations;</p> <ul style="list-style-type: none"> <li>• Directional plan;</li> <li>• Formation temperature, pressure, fracture gradients;</li> <li>• Plans for conducting leak-off tests; and</li> <li>• Well data acquisition plan.</li> </ul>				
4.1.2 Describe how environmental factors during winter operations, including extreme temperatures, limited daylight, and remoteness could potentially affect work/activity				
<b>4.2 Detailed Drilling Schedule</b>				
<b>Header</b> Demonstrate how well operations, including critical operations, will be completed within a safe operation season	Mirrored in HFFR 13(1)			
4.2.1 Provide detailed schedule showing each drilling and completions operation	Mirrored in HFFR 13(2)(a)			
4.2.2 Provide approximate duration of critical operations that include hydraulic fracturing and formation flow testing	Mirrored in HFFR 13(2)(b)			
4.2.3 Indicate how relief well described in Contingency Plan incorporated into drilling program	Mirrored in HFFR 13(2)(c), except reference to “Contingency Plan”			
<b>4.3 GEOPHYSICAL ASSESSMENT</b>				
<b>4.3.1 Geophysical Hazards Identification</b>				
<b>Header</b> Demonstrate applicant has taken all reasonable precautions and used industry best practices to identify and manage	Mirrored in HFFR 14, except “operator” not “applicant”			

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
hazards				
4.3.1.1 Identify geophysical drilling hazards including, but not limited to, permafrost, active faulting, natural seismicity, shallow gas, and karst	Mirrored in HFFR 14(a)			
4.3.1.2 Describe mitigative and preventive measures to manage risks during drilling and hydraulic fracturing	Mirrored in HFFR 14(b)			
<b>4.3.2 Identification of Target Formations, Faults, and Seismic Attributes</b>				
<b>Header</b> Demonstrate that best available technology and industry best practices have been considered	Mirrored in HFFR 15			
4.3.2.1 Provide interpretation of all faults, especially major faults that may connect target formations to groundwater zones	Mirrored in HFFR 15(a)			
4.3.2.2 Provide isopach and structure maps of target formations	Mirrored in HFFR 15(b)			
4.3.2.3 Explain how seismic attributes used for structure and reservoir quality identification (e.g., coherence)	Mirrored in HFFR 15(c), except “e.g., coherence” not “and coherence”			
<b>4.3.3 Geophysical Data for Hydraulic Fracturing</b>				
<b>Header</b> Describe how geophysical data considered and incorporated into hydraulic fracturing program in accordance with best industry practices	Mirrored in HFFR 16			
4.3.3.1 Identify data need to model fracturing geometry and complexity. Describe how it was/will be acquired.	Mirrored in HFFR 16(2)(a)			



<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
<b>4.3.3.2</b> Identify tools and methods that will be used to monitor fracture propagation, including but not limited to microseismic, tiltmeter, or fluid tracer	Mirrored in HFFR 16(2)(b)			
<b>4.3.3.3</b> Outline means by which petrophysical, geochemical and geomechanical properties of target, overlying and underlying formations acquired.	Mirrored in HFFR 16(2)(c)			
<b>4.3.3.4</b> Demonstrate how petrophysical, geochemical and geomechanical properties of the target, and overlying and underlying formations would be used to determine whether fracture propagation is enhanced, prevented or inhibited.	Mirrored in HFFR 16(2)(d)			
<b>4.3.3.5</b> Using empirical data obtained from the subject wells and/or adjacent wells, submit geomechanical properties of overlying and underlying formations to demonstrate effective fracture barriers.	Mirrored in HFFR 16(2)(e)			
<b>4.3.3.6</b> Indicate how updates to fracture geometry and propagation would be incorporated during hydraulic fracturing operations.	Mirrored in HFFR 16(2)(f)			
<b>4.3.3.7</b> Describe process of evaluation of predicted and actual fracture geometry, especially as it relates to fractures that extend beyond target formations.	Mirrored in HFFR 16(2)(g)			
<b>4.3.3.8(a)-(b)</b> Describe how geophysical data was used and/or will be used to assist in hydraulic fracturing operations, such as: <ul style="list-style-type: none"> <li>• seismic volume with interpretation of faults, groundwater zones, target formation and wellbore trajectory; and</li> <li>• time depth curves and velocity</li> </ul>	Mirrored in HFFR 16(2)(h)			

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
profile.				
<b>4.3.4 Monitoring and Reporting of Suspected Seismic Events</b>				
<b>Header</b> Describe how suspected seismic events may be monitored during drilling, completions, hydraulic fracturing, and formation flow testing operations; and a safety termination plan.	Mirrored in HFFR 17, except “throughout the entirety of the operation, including drilling... operations” not “during drilling... operations”			
<b>4.3.4.1</b> Provide reporting plan if suspected seismic event occurs	Mirrored in HFFR 17(a), except “reporting plan” is not used			
<b>4.3.4.2</b> Describe how oil and gas drilling, completions, hydraulic fracturing, and formation flow testing operations will be safely terminated if a suspected seismic event occurs during operations.	Mirrored in HFFR 17(b)			
<b>4.4 DRILLING PROGRAM</b>				
<b>4.4.1 Groundwater Protection</b>				
<b>Header</b> Demonstrate effective measures in place to protect groundwater zones from impacts of drilling and hydraulic fracturing operations	Mirrored in HFFR 18, except “potable water” not “groundwater”			
<b>4.4.1.1</b> Describe drilling and hydraulic fracturing program policies and procedures addressing groundwater protection.				
<b>4.4.1.2</b> Describe process to identify groundwater zones, including use of technology such as: <ul style="list-style-type: none"> <li>• Sample analysis;</li> <li>• Drilling log;</li> <li>• Cased hole log;</li> </ul>			Cased hole logs are referred to only in subsection 6(i), which requires that an application for authorization include a field data acquisition program.	

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
<ul style="list-style-type: none"> <li>Open hold logs.</li> </ul>				
4.4.1.3 Identify groundwater contamination pathways from drilling and hydraulic fracturing operations and measures to prevent this contamination				
<b>Additional filing requirements regarding surface and groundwater protection: 3.8 and 3.10</b>	See above.			
<b>4.4.2. Well Casing and Cementing</b>			<b><i>Oil and Gas Drilling and Production Regulations</i></b>	<b>4.4.2. Well Casing and Cementing</b>
<b>Header</b> Demonstrate proposed well casing and cementing will isolate and protect groundwater and permafrost from drilling and hydraulic fracturing operations	Mirrored in HFFR 19(2)			
4.4.2.1(a) Demonstrate that: <ul style="list-style-type: none"> <li>Surface casing designed to isolate groundwater zones and permafrost from potential oil, gas, and/or saline water zones; and</li> <li>Casing program provides wellbore integrity, particularly in the casing annuli</li> </ul>				
4.4.2.1(b) Demonstrate that: <ul style="list-style-type: none"> <li>Surface casing set below all known or reasonably estimated utilizable groundwater zones and permafrost.</li> </ul>				
4.4.2.1(c) Demonstrate that cement slurry design and cementing program designed to			<b>41</b> An operator must ensure that cement slurry is designed and installed to	

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	OTHER
prevent formation fluid and/or fracturing fluid movement in the casing annuli.			<ul style="list-style-type: none"> <li>• Prevent formation fluid movement in the casing annuli;</li> <li>• If required for safety, resource evaluation, or waste prevention: isolate oil, gas, and water zones;</li> <li>• Retard cemented interval casing corrosion; and</li> <li>• Protect gas hydrate and permafrost zone integrity, plus potable water zones (for onshore wells)</li> </ul> <p><b>Added:</b> isolate oil, gas, and water zones (where required); retard corrosion; and protect gas hydrate, permafrost, and potable water zones (onshore wells)</p> <p><b>Excluded:</b> fracturing fluid</p>	
4.4.2.1(d) Demonstrate that conductor pipe and surface casing cementing programs designed to ensure casings cemented to surface				
4.4.2.1(e) Demonstrate that intermediate casing or next set of casing after surface casing would be cemented to surface				
4.4.2.2 Describe how cement bond logs will be used to evaluate well control barriers to address anticipated formation pressure and hydraulic fracturing pressure	Mirrored in HFFR 19(2)(a)			
4.4.2.3 Identify potential loss circulation zones, loose formations, and any other factors that may affect the casing and cementing program.			35 An operator must ensure that adequate procedures, materials, and equipment are in place and utilized to minimize the risk of loss of well control in the event of lost circulation.	

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
Demonstrate how these factors are considered in the casing and cementing design and execution plan.			This is the only provision in the OGDPR to address lost circulation.	
<b>4.4.2.4</b> Describe: <ul style="list-style-type: none"> <li>• Casing pressure testing process;</li> <li>• Criteria for successful pressure test; and</li> <li>• Describe how casing will be pressure-tested to maximum anticipated formation pressure to ensure wellbore integrity</li> </ul>	Partially mirrored in HFFR 19(2)(b), excepting descriptions of “casing pressure testing process” and “criteria for successful pressure test.”			
<b>4.4.2.5</b> Describe quality control and testing procedures for casing and casing procedures, including shoe track and casing float system that will withstand maximum hydraulic fracturing pressures	Mirrored in HFFR 19(2)(c)			
<b>4.4.3 Drilling Fluids</b>				
<b>Header</b> Application must describe drilling fluids system with sufficient detail to demonstrate the following (below):				
<b>4.4.3.1</b> Demonstrate drilling fluids program addresses industry best practices for safety, quality, control, handling, and storage.			<b>22</b> Fuel, potable water, spill containment products, safety-related chemicals, drilling fluids, cement, and other consumables must be readily available in sufficient quantities, and stored and handled in a manner that minimizes their deterioration, ensures safety, and prevents pollution.  “Pollution” means the introduction into the natural environment of a substance or form of energy outside	

NATIONAL ENERGY BOARD FILING REQUIREMENTS	DRAFT HYDRAULIC FRACTURING FILING REGULATIONS	NT OIL AND GAS OPERATIONS ACT	NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS	OTHER
			<p>the limits applicable to an activity that is subject to an authorization, including spills (HFFR 1).</p> <p><b>23</b> An operator must ensure that the handling of all chemical substances, including drilling fluid and drill cuttings, does not create a hazard to safety or the environment.</p> <p>However, these are <b>not directly correlative</b> to the NEBFR, which stipulates filing requirements respecting a dedicated drilling fluids program addressing industry best practices.</p>	
<p><b>4.4.3.2</b> Describe the drilling fluids testing and monitoring program to accurately measure flow rate, volumes, density, and other properties</p>			<p><b>60(1)</b> The operator shall ensure the rate of flow and the volume of fluids are recorded. However, this is not directly correlative to the NEBFR, which requires a description.</p>	
<p><b>4.4.3.3</b> Identify minimum inventory of drilling fluids and material to maintain well control, according to industry best practices</p>			<p><b>22(a)</b> An operator must ensure that drilling fluids are available and sufficient. However, this is not directly correlative to the NEBFR, which requires an inventory.</p>	
<p><b>4.4.3.4</b> Describe drilling fluids system indicators and alarms, which should be capable of accurately measuring, displaying, and recording all parameters that may:</p> <ul style="list-style-type: none"> <li>• Indicate a hazard to personnel;</li> <li>• Affect well integrity and loss of well control; or</li> <li>• Indicate possible loss of drilling fluids in formation</li> </ul>			<p><b>28(b)</b> An operator must ensure that monitoring equipment indicators and alarms are strategically located on the drilling rig to alert onsite personnel.</p> <p><b>Added:</b> location</p> <p><b>Excluded:</b> detail</p>	

NATIONAL ENERGY BOARD FILING REQUIREMENTS	DRAFT HYDRAULIC FRACTURING FILING REGULATIONS	NT OIL AND GAS OPERATIONS ACT	NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS	OTHER
<b>4.4.4 Wellbore integrity (wellbore, annulus, inter-wellbore)</b>				
<p><b>Header</b> Applicant must demonstrate:</p> <ul style="list-style-type: none"> <li>• At least two independent, tested well barriers in place during each phase of well operations;</li> <li>• Well barriers ensure well integrity at all times during the well life cycle and under all load conditions, including completion and hydraulic fracturing indications; and</li> <li>• If well control is lost, or if safety, environmental protection, or resource conservation is threatened, applicant will take any action necessary to rectify without delay</li> </ul>			<p><b>36(2)</b> After setting the surface casing, at least two independent and tested well barriers must be are in place during all well operations.</p> <p><b>38</b> If well control is lost, an operator must take any action necessary to rectify the situation without delay.</p> <p><b>Added:</b> N/A</p> <p><b>Excluded:</b> well barriers</p>	
<b>4.4.4.1</b> Identify and describe well barriers for each phase of drilling and completions operations, including perforation, hydraulic fracturing, and formation flow testing				
<b>4.4.4.2</b> Demonstrate sufficient well barriers in place inside tubing and casing annuli to prevent groundwater and environmental contamination from reservoir and/or wellbore fluids.			<p><b>39(c)</b>An operator must ensure that well and casing design protect gas hydrate, permafrost, and potable water.  <i>However, these are not directly correlative to the NEBFR, which requires a demonstration.</i></p>	
<p><b>4.4.4.3</b> Demonstrate well barrier testing method and procedure.</p> <p>Demonstrate each physical well barrier qualifies as independently tested and is monitored and maintained during and after</p>			<p><b>36(2)</b> An operator must ensure at least two independent, testing well barriers.  <i>However, these are not directly correlative to the NEBFR, which requires testing procedures and a demonstration.</i></p>	

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
hydraulic fracturing operations.				
4.4.4.4 Identify and describe well barrier policies, procedures, and work instructions to ensure personnel aware of barrier envelopes at all times				
4.4.4.5 Identify and describe monitoring program in place to ensure well integrity maintained through the life of the well.			<p><b>24(1)</b> An operator must ensure work or activity ceases without delay if persons' safety or well integrity endangered or likely to be, or if pollution is caused or likely to be.</p> <p><b>24(2)</b> Operations will not resume until it can be done safely and without pollution.</p> <p>However, this is <b>not directly correlative</b> to NEBFR provisions, which stipulate monitoring requirements.</p>	
<b>4.4.5 Well Control System</b>				
<p><b>Header</b> Application must describe well control system, demonstrating that during all well operations, reliable well control equipment is installed to:</p> <ul style="list-style-type: none"> <li>• Control flows and/or loss,</li> <li>• Prevent blow-outs; and</li> <li>• Safely carry out all well activities</li> </ul>	Mirrored in the HFFR, excepting detail (“during all well operations... activities”).		<p><b>36(1)</b> An operator must ensure that during all well operations, reliably operating well control equipment is installed to control kicks, prevent blow-outs, and safely carry out all well activities and operations, including drilling, completion, and workover operations.</p> <p><b>Added:</b> control kicks</p> <p><b>Excluded:</b> control flows and/or loss</p>	
4.4.5.1 Identify minimum blow-out preventer (BOP) requirement.				



<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
Demonstrate how proposed BOP is appropriate, adequate, and effective for the proposed well.				
4.4.5.2 Describe well control system to be used and how equipment meets best industry standards and practices	Mirrored in HFFR 20(2)(a)			
4.4.5.3 Describe processes for equipment selection, testing, and maintenance that are critical to safety and which will ensure well control in all foreseeable conditions and circumstances	Mirrored in HFFR 20(2)(a)		<p><b>8(e)</b> Safety plan must include a list of all structures, facilities, equipment, and systems critical to safety, and a summary of the system in place for inspection, testing, and maintenance.</p> <p><b>Added:</b> structures, facilities, systems, inspection</p> <p><b>Excluded:</b> ensure well control, foreseeable conditions and circumstances</p> <p>However, this is <b>not directly correlative</b> to NEBFR provisions, which require applicants to file their processes.</p>	
4.4.5.4 Describe how proposed well control systems adequate for well operations, including drilling, open-hole and cased logging, perforation, hydraulic fracturing, and formation flow testing	Mirrored in HFFR 20(2)(b)			
4.4.5.5 Provide evidence BOP stack designed for specific drilling operation and appropriate for proposed well				
4.4.5.5(a) Provide evidence BOP stack not compromised or damaged				

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
4.4.5.5(b) Provide evidence BOP stack will operate in conditions in which it will be used				
4.4.5.5(c) Provide evidence BOP stack maintained according to original manufacturer's specifications				
4.4.5.6 Describe process to ensure no unauthorized modifications made to any equipment critical to safety				
<b>4.4.6 Relief Well Capability</b>				
<b>Header</b> Application demonstrates capability to drill relief well within same drilling season to kill out-of-control well	Mirrored in HFFR 21, with specification of "operator" responsibility.  "Relief well" is defined under section 1.  OGDPR 38 addresses loss of well control.		<b>38</b> If well control is lost, the operator shall take any action to rectify without delay.  <i>However, this is not directly correlative to the NEBFR, which requires demonstration of relief well capability.</i>	
4.4.6.1 Describe plans and procedures to kill out-of-control well	Mirrored in HFFR 21(a)			
4.4.6.2 Identify drilling unit that will be used and provide mobilization plan	Mirrored in HFFR 21(b)			
4.4.6.3 Provide estimate of time needed to drill relief well and kill out-of-control well	Mirrored in HFFR 21(c)			
<b><u>4.5 WELL COMPLETION AND HYDRAULIC FRACTURING OPERATIONS</u></b>				
<b><u>4.5.1 Well Completion Operation</u></b>			<i>Oil and Gas Drilling and Production</i>	

NATIONAL ENERGY BOARD FILING REQUIREMENTS	DRAFT HYDRAULIC FRACTURING FILING REGULATIONS	NT OIL AND GAS OPERATIONS ACT	NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS	OTHER
			<u>Regulations</u>	
<p><b>Header</b> Application must describe well completion, including unconventional resources hydraulic fracturing operations, demonstrating:</p> <ul style="list-style-type: none"> <li>• Completion interval testing conducted safely without waste or pollution; and</li> <li>• All barriers test to maximum pressure to which they are likely to be subjected.</li> </ul>	Mirrored in HFFR 22(2), except detail (“completion interval testing... subjected”).		<p><b>46(1)(c)</b> An operator must ensure completion interval testing and production conducted safely and without waste or pollution.</p> <p><b>Added:</b> production</p> <p><b>Excluded:</b> barrier testing</p>	
<p><b>4.5.1.1</b> Demonstrate well control system and operations designed, utilized, maintained, and tested as necessary to control well in each phase of completion operations</p>				
<p><b>4.5.1.2</b> Demonstrate how well will be continuously monitored during completion operations, particularly monitoring pressure in the casing annuli during the hydraulic fracturing operations</p>	Mirrored in HFFR 20(2)(a)			
<p><b>4.5.1.3</b> Demonstrate that the operating system meets or will exceed the requirements to which they may be subjected and will follow industry best practices</p>	Mirrored in HFFR 20(2)(b)			
<p><b>4.5.1.4</b> Describe how wellhead equipment designed to operate safely and efficiently under maximum load conditions</p>			<p><b>48</b> An operator must ensure wellhead and Christmas tree equipment, including valves, designed to operate safely and efficiently under maximum anticipated load conditions</p> <p><b>Added:</b> Christmas tree equipment, valves</p>	

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
			Excluded: N/A	
<b>4.5.2 Hydraulic Fracturing Design</b>				
<b>Header</b> Application must demonstrate: <ul style="list-style-type: none"> <li>• Consideration of all possible hydraulic fracturing design variables for targeted formations and at minimum, follow industry best practices; and</li> <li>• How hydraulic fracturing will be conducted safely while protecting the environment</li> </ul>	Mirrored in HFFR 23, except “at minimum” and requirement to demonstrate “how the hydraulic fracturing will be conducted safely while protecting the environment.”			
<b>4.5.2.1</b> Describe policies, procedures, and methods for modeling hydraulic fracturing program	Mirrored in HFFR 23(a)			
<b>4.5.2.2(a)-(g)</b> Identify design variables critical to fracture propagation, including: <ul style="list-style-type: none"> <li>• in-situ stresses and the choice of the creation of</li> <li>• transversal and longitudinal fracture;</li> <li>• selection of fracture treatment;</li> <li>• perforations and orientation of the well;</li> <li>• spacing of the fracture and fracture length,</li> <li>• height, and width;</li> <li>• optimization proppant laden fluid volume;</li> <li>• control of proppant flowback; and</li> <li>• method to evaluate each fracture.</li> </ul>	Mirrored in HFFR 23(b)			
<b>4.5.2.3</b> Describe policies and procedures to maintain threshold pressure limit during hydraulic fracturing operations and how personnel will be informed of pressures,	Mirrored in HFFR 23(c)			

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
rates and densities at any given point in time during the hydraulic fracturing operation.				
<b>4.5.2.4</b> Describe design basis for selection of fracturing fluids and chemical additives for proposed hydraulic fracturing program	Mirrored in HFFR 23(d)			
<b>4.5.2.5</b> Demonstrate wellbore integrity considered in hydraulic fracturing design	Mirrored in HFFR 23(e)			
<b>4.5.2.6</b> Describe how proposed hydraulic fracturing program addresses any risk for inter-wellbore communication of the nearby wells	Mirrored in HFFR 23(f)			
<b>4.5.2.7</b> Describe how owners of affected suspended and abandoned wells would be notified of a proposed hydraulic fracturing operation	Mirrored in HFFR 23(g)			
<b>4.5.3 Hydraulic Fracture Operations</b>				
<b>Header</b> Describe well hydraulic fracturing equipment and operation with enough detail to demonstrate workers' safety maintained and that hydraulic fracturing will not cause waste or pollution. Demonstrate all equipment tested to maximum pressure to which it is likely to be subjected.	Mirrored in the HFFR. The requirement for testing to maximum pressure is under HFFR 24(c).			
<b>4.5.3.1</b> Describe policies and procedure to monitor wellbore annual during hydraulic fracturing operations	Mirrored in HFFR 24(a)			
<b>4.5.3.2</b> Describe in detail how all equipment, procedures, and resources adequate to support and complete proposed hydraulic fracturing and formation flow testing operations	Mirrored in HFFR 24(b)			
<b>4.5.3.3</b> Describe policies and procedures for testing surface and downhole equipment before commencing hydraulic fracturing	Mirrored in HFFR 24(c)			

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
operations				
4.5.3.4 Describe in detail on-site storage capability for produced fluids including flowback and formation fluids	Mirrored in HFFR 24(d)			
4.5.3.5 Describe in detail handling, treatment, disposal, and waste management capabilities for fracture fluids, flowback fluids, and other used or un-used chemicals	Mirrored in HFFR 24(e)			
4.5.3.6 Describe applicant’s policies and procedures to monitor suspended and abandoned offset wells during hydraulic fracturing of the well	Mirrored in HFFR 24(f), except “operator” not “applicant”			
<b>4.5.4 Formation Flow Tests</b>				
<p><b>Header</b> Application describes formation flow testing program, demonstrating:</p> <ul style="list-style-type: none"> <li>• formation flow testing conducted when well conditions and weather permit, without endangering personnel and equipment and harming the environment;</li> <li>• formation flow testing will evaluate the productive capacity or injectivity potential of the formation;</li> <li>• formation flow testing will establish reservoir and rock characteristics and properties;</li> <li>• all produced fluids including flowback fluids and formation fluids will be adequately measured and recorded, sampled and analyzed;</li> <li>• flaring is minimized; and</li> <li>• formation flow testing will not adversely affect the ultimate recovery of oil and gas from the target formation.</li> </ul>			<p><b>52</b> An operator must ensure:</p> <ul style="list-style-type: none"> <li>• no development well put into production unless Regulator has approved a formation flow test; and</li> <li>• if development well subjected to well operation that might change deliverability, productivity or injectivity, formation flow test conducted within reasonable time frame after well operation is ended</li> </ul> <p><b>52</b> An operator may conduct formation flow test if, before conducting that test, they</p> <ul style="list-style-type: none"> <li>• Submit to Regulator a detailed testing program; and</li> <li>• Obtain Regulator’s approval</li> </ul> <p><b>52</b> The Regulator</p> <ul style="list-style-type: none"> <li>• May require operators to conduct formation flow test on well drilled on a geological feature, other than first well, if test would contribute substantially to the geological and</li> </ul>	

NATIONAL ENERGY BOARD FILING REQUIREMENTS	DRAFT HYDRAULIC FRACTURING FILING REGULATIONS	NT OIL AND GAS OPERATIONS ACT	NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS	OTHER
			<p>reservoir evaluation. (4)</p> <ul style="list-style-type: none"> <li>• Shall approve a formation flow test if operators demonstrate test will be conducted safely, without pollution and in accordance with good oilfield practices, will enable operators to obtain data on well deliverability or productivity, establish reservoir characteristics, and obtain representative samples of the formation fluids.</li> </ul> <p><b>Added:</b> operational requirements</p> <p>Excluded: when conditions and weather permit, analysis of produced fluids (nb: this is addressed below), minimized flaring,</p> <p>However, this is <b>not directly correlative</b> to NEBFR provisions, which stipulate that applicants must file the specified content of the formation flow testing program. However, for further detail, see below (mirrored provisions).</p>	
4.5.4.1 Provide formation flow test objectives	Mirrored in HFFR 25(a)			
4.5.4.2 Provide formation flow test procedures, including precautions (prior to, during, at termination) so that tests are conducted and terminated in safe, controlled, and environmentally responsible manner	Mirrored in HFFR 25(b)		See also s.34.	
4.5.3.3(a)-(k) Provide a formation flow test program	Mirrored in HFFR 25(c)			

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
<b>4.5.5 Well Suspension and Abandonment</b>				
<b>Header</b> Application must describe well suspension and abandonment program, demonstrating suspended or abandoned well meets COGDPR requirements and meets or exceeds industry best practices			<p><b>56 to 59</b> Addresses suspension and abandonment.</p> <p>However, this is <b>not directly correlative to NEBFR provisions, which requires applicants to describe their well suspension and abandonment program.</b></p>	
<b>4.5.5.1</b> Describe plans, policies and procedures, materials, and equipment to facilitate orderly suspension of operations and well securement			<p>See above.</p> <p>The requirements at left are not directly addressed by the draft regulations.</p>	
<b>4.5.5.2</b> Demonstrate how suspended or abandoned well can be readily located			<p><b>56</b> An operator must ensure that every suspended or abandoned well can be readily located.</p> <p><b>Added:</b> N/A</p> <p><b>Excluded:</b> N/A</p>	
<b>4.5.5.3</b> Describe how well will be suspended or abandoned with downhole or wellhead schematics  Demonstrate at least two well control barriers in place			<p><b>36(2)</b> An operator must ensure that after setting the surface casing at least two independent and tested well barriers are in place during all well operations, which includes suspension and abandonment.</p> <p>However, this is <b>not directly correlative to NEBFR provisions, which requires a demonstration.</b></p>	
<b>4.5.5.4</b> Describe how well would be tested for surface casing vent flows; and If surface casing vent flows exist, describe				



NATIONAL ENERGY BOARD FILING REQUIREMENTS	DRAFT HYDRAULIC FRACTURING FILING REGULATIONS	NT OIL AND GAS OPERATIONS ACT	NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS	OTHER
surface how it would be addressed in suspension and abandonment program.				
<p>4.5.5.5 Identify and describe in detail effective well barriers in place for suspended and abandoned well to prevent groundwater contamination from reservoir and/or wellbore fluids.</p> <p>Demonstrate well barriers remain effective after hydraulic fracturing operations.</p>			<p>56 Suspended and abandoned well must be left in a condition that:</p> <ul style="list-style-type: none"> <li>Provides for isolation of all oil or gas bearing zones and discrete pressure zones, and in the case of an onshore well, potable water zones; and</li> <li>Prevents any formation fluid from flowing through or escaping from the well-bore.</li> </ul> <p><b>Added:</b> oil, gas, and discrete pressure zones; formation fluids</p> <p><b>Excluded:</b> after hydraulic fracturing operations</p>	
<p>4.5.5.6 Provide estimated duration of suspended status of any well proposed to be suspended.</p> <p>Describe future plans for the well.</p>				
<p>4.5.5.7 Describe in detail policies, procedures, and monitoring program for planned temporary well suspension during completion and well testing operations</p>				
<p>4.5.5.8 Describe how suspended well will be monitored and inspected to ensure continued integrity and to prevent pollution as applicable.</p>			<p>57 Operators of suspended wells must ensure wells are monitored and inspected to maintain continued integrity and to prevent pollution.</p>	

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
			<p><b>Added:</b> N/A</p> <p><b>Excluded:</b> as applicable</p> <p>However, this is not directly correlative to the NEBFR, which requires a filed description of how this will be accomplished.</p>	
<b><u>5.0 ALL-SEASON WELL PADS</u></b>				
<b>Header</b> Demonstrate that, when an all-season well pad is proposed, it will be constructed, maintained and decommissioned in a manner that will be safe and will protect the environment.	Mirrored in the HFFR, except added “operator”			
<b>5.1(a)-(e)</b> Provide description of the proposed design of any all-season wellpad.	Mirrored in HFFR 10(a)			
<b>5.2</b> Describe safety precautions and any mitigative measures for environmental impacts (during construction).	Mirrored in HFFR 10(b)			
<b>5.3</b> Provide construction timeline.	Mirrored in HFFR 10(c)			
<b>5.4</b> Describe all-season well pad maintenance program including, if applicable, permafrost integrity monitoring and management plan	Mirrored in HFFR 10(d)			
<b>5.5</b> Provide general description of decommissioning and reclamation plans for all-season well pad	Mirrored in HFFR 10(e)			
<b><u>6.0 INTERWELL DISTANCES ON MULTI-WELL PADS</u></b>				
<b>Header</b> Application demonstrates that	Mirrored HFFR 11(1), except added			

<i>NATIONAL ENERGY BOARD FILING REQUIREMENTS</i>	<i>DRAFT HYDRAULIC FRACTURING FILING REGULATIONS</i>	<i>NT OIL AND GAS OPERATIONS ACT</i>	<i>NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS</i>	<i>OTHER</i>
proposed inter-well distances will allow for safe operations, protect the environment, and optimize hydrocarbon recovery	“operator”			
<b><u>Subsurface Inter-Well Distances on Multi-Well Pads</u></b>				
6.1 Provide rationale for proposed subsurface inter-well distances as related to optimizing fracture network and optimal hydrocarbon recovery	Mirrored in HFFR 11(2)			
<b><u>Surface Inter-Well Distances on Multi-Well Pads</u></b>				
6.1 Provide rationale for proposed surface inter-well distances	Mirrored in HFFR 11(3)(a)			
6.2(a)-(c) If applicable, provide concurrent operations plan describing how risk of collisions, fire, and worker safety would be managed during concurrent operations, including: <ul style="list-style-type: none"> <li>• Chain of command, communication, coordination;</li> <li>• Preventative and mitigative measures; and</li> <li>• Emergency coordination and fire control.</li> </ul>	Mirrored in HFFR 11(3)(b)			
6.3(a)-(c) Provide permafrost integrity monitoring and management plans for locations where permafrost exists, including information on the following: <ul style="list-style-type: none"> <li>• Description of how proposed inter-well distances would affect permafrost integrity during operations, including production operations</li> </ul>	Mirrored in HFFR 11(3)(c)			

NATIONAL ENERGY BOARD FILING REQUIREMENTS	DRAFT HYDRAULIC FRACTURING FILING REGULATIONS	NT OIL AND GAS OPERATIONS ACT	NT OIL AND GAS DRILLING AND PRODUCTION REGULATIONS	OTHER
<ul style="list-style-type: none"> <li>Mitigative measures to be utilized; and</li> <li>Description of permafrost integrity monitoring.</li> </ul>				
<p><b>Footer</b> Refer to NEB <i>Draft Spacing Order</i></p>			<p>2 The Regulator is authorized to</p> <ul style="list-style-type: none"> <li>Make orders respecting area allocation, including determination of spacing unit size and well production rates for drilling or producing oil and gas; and</li> <li>Exercise any powers and perform any duties that may be necessary for the management and control of oil or gas production.</li> </ul> <p>However, it is unclear whether OROGO has issued such an order, nor how closely it mirrors the NEB <i>Draft Spacing Order</i>.</p>	