Hydraulic Fracturing is not new

First commercial hydraulic fracturing job was at Velma, Oklahoma in 1949
(Courtesy of Halliburton, 2010)
Natural gas and emissions

- **Natural gas burns about 50% cleaner than coal when used in power generation and has far fewer emissions**
  - CO2 emissions from energy use lowest in 20 years, partially because of increased natural gas use in power generation (U.S. EIA 2012)

- **Scientific research indicates little difference between shale gas and conventional gas in terms of GHG emissions:**
  - “life-cycle GHG emissions of natural gas produced from shale resources are only slightly higher (3.8%) than those of natural gas produced from more conventional sources” (NRCan 2012)
  - “relatively little difference between conventional and shale gas in life-cycle GHG emissions” (ICF Consulting Canada 2012)
  - “it is also clear is that the production of shale gas and specifically, the associated hydraulic fracturing operations have not materially altered the total GHG emissions from the natural gas sector” (MIT, Nov 2012)
Water Use: The Facts

- In BC, of all surface water authorized (excluding waterpower), the oil and gas industry accounted for less than 1% (0.6) of the total
  - Source: BC Oil & Gas Commission, 2010

- Commonly 50 to 90% of fracturing fluid is recovered

- Fracturing fluid is 98.5% water and sand

- Disclosure of fracturing fluid additives is mandatory in AB & BC on Fracfocus.ca
Reducing Surface Footprint

Multi-well pads have significantly reduced the amount of disturbed area versus a comparable vertical well development.

6 Horizontal wells (8 fracs/well) = 48 total fracs per section

Same development would require 48 vertical wells each on a separate wellsite

Adapted from www.encana.com
Opportunities for the Yukon

• Territorial Government revenues
  • Royalties
  • Taxes

• Social Benefits: individual & societal
  • Jobs & increased standard of living & income
  • Strengthened social programs via bolstered government revenues

• Local & Reliable Energy Supply
  • Natural gas is cleaner
  • Reduce local energy costs via reduced imports
Social License:
Earning Confidence & Trust

- Effective & efficient government oversight of industry operations
  - world class regulatory frameworks

- Industry commitment to continued social and environmental performance
  - Transparency in operations, outcomes

- Leadership in technology & innovation investments

- International recognition & reputation for leadership
CAPP Guiding Principles for Hydraulic Fracturing

1. We will safeguard the quality and quantity of regional surface and groundwater resources, through sound wellbore construction practices, sourcing fresh water alternatives where appropriate, and recycling water for reuse as much as practical.

2. We will measure and disclose our water use with the goal of continuing to reduce our effect on the environment.

3. We will support the development of fracturing fluid additives with the least environmental risks.

4. We will support the disclosure of fracturing fluid additives.

5. We will continue to advance, collaborate on and communicate technologies and best practices that reduce the potential environmental risks of hydraulic fracturing.
CAPP Hydraulic Fracturing Operating Practices

CAPP Hydraulic Fracturing Operating Practice: Baseline Groundwater Testing

Overview

The Practice is designed to help companies ensure that they are implementing best practices to minimize the potential environmental impacts of hydraulic fracturing.

What Does This Practice Mean?

The Practice is designed to help companies ensure that they are implementing best practices to minimize the potential environmental impacts of hydraulic fracturing.

How Will This Work?

The Practice is designed to help companies ensure that they are implementing best practices to minimize the potential environmental impacts of hydraulic fracturing.

CAPP Hydraulic Fracturing Operating Practice: Fracturing Fluid Additive Risk Assessment and Management

Overview

The Practice is designed to help companies ensure that they are implementing best practices to minimize the potential environmental impacts of hydraulic fracturing.

What Does This Practice Mean?

The Practice is designed to help companies ensure that they are implementing best practices to minimize the potential environmental impacts of hydraulic fracturing.

How Will This Work?

The Practice is designed to help companies ensure that they are implementing best practices to minimize the potential environmental impacts of hydraulic fracturing.

CAPP Hydraulic Fracturing Operating Practice: Anomalous Induced Seismicity: Assessment, Monitoring, Mitigation and Response

Overview

The Practice is designed to help companies ensure that they are implementing best practices to minimize the potential environmental impacts of hydraulic fracturing.

What Does This Practice Mean?

The Practice is designed to help companies ensure that they are implementing best practices to minimize the potential environmental impacts of hydraulic fracturing.

How Will This Work?

The Practice is designed to help companies ensure that they are implementing best practices to minimize the potential environmental impacts of hydraulic fracturing.
Hydraulic Fracturing Regulations

- **Well Casing & Cementing**
  - Casing design and cementing requirements isolate and protect usable groundwater
  - Surface casing must be cemented to surface

- **Protecting Water Wells & Groundwater**
  - Fracturing at shallow depths (<600 m) requires risk assessment
  - Fracturing restrictions in proximity to water wells
  - Only non-toxic fracturing fluids can be used above usable groundwater
  - Baseline water well testing prior to hydraulic fracturing:
    - Not currently required in AB, but requirements are expected in 2014
    - In BC, water well testing may be a condition of well approval if concerns arise
    - Most companies voluntarily test nearby water wells prior to drilling

- **Chemical Disclosure**
  - Mandatory to publicly disclose fracturing fluid composition; mandatory in BC & AB
Hydraulic Fracturing Regulations

- **Water Use**
  - Water licences/permits required for fresh water withdrawals
  - Licences/permits have withdrawal limits and reporting requirements

- **Fluid Handling & Management**
  - Requirements for proper containment of fluids used or generated
  - Fluids that cannot be recycled or reused must be injected into deep disposal wells
    - Disposal wells must meet design and construction requirements

- **Seismicity**
  - Seismic monitoring, reporting and mitigation (BC)

- **Inter-wellbore Communication**
  - Risk assessment and well control plan required (AB)
  - Recommended notification of and coordination with other operators prior to hydraulic fracturing within 1000 m of a well (BC)
Appendices
Fracturing Fluid Additive Disclosure

- Publicly disclose, on a well-by-well basis, the chemical ingredients in additives used
- Supports action by provincial governments to make disclosure mandatory

Disclosure on FracFocus.ca is mandatory in BC and Alberta
- Advocating for FracFocus.ca as disclosure vehicle across Canada
Fracturing Fluid Additive Risk Assessment and Management

- Identify and manage potential health and environmental risks associated with these additives
- Develop risk management plans for each well fractured

CAPP sponsored the development of a screening tool for its members to classify fracturing fluid additives according to potential health and environmental risks.
The Modern Practices of Hydraulic Fracturing: A Focus on Canadian Resources

Prepared for:

PTAC
SCEK

ALL Consulting

Revised November 2012

Available on SCEK and PTAC websites
Baseline Groundwater Testing

- Enable assessment of potential changes in groundwater over time
- Test existing domestic water wells within 250 m of wellhead prior to drilling
- Participate in regional groundwater monitoring programs

The BC Government has committed to establishing a collaborative groundwater monitoring system for northeastern BC
Wellbore Construction and Quality Assurance

- Critical to protecting groundwater resources
- Compliance with regulations and good engineering practice
- Confirm wellbore integrity prior to fracturing
Water Sourcing, Measurement & Reuse

- Evaluate available water sources
- Measure and report water withdrawals
- Reuse water as much as practical

**Industry-funded supporting studies:**

- Fracturing Fluid Flowback Reuse Feasibility Study & Design Tool
- Determination of Water Monitoring Standards for Oil & Gas Operators
- Integrated Assessment of Water Resources for Unconventional Oil & Gas Plays in West-Central AB
Fluid Transport, Handling, Storage & Disposal

- Identify, evaluate and mitigate potential risks of fluid transport, handling, storage and disposal
- Enable quick and effective response to spills
Anomalous Induced Seismicity

- New practice introduced in late 2012
- Assess the potential for anomalous induced seismicity
- Where assessment indicates potential for anomalous induced seismicity exists, implement practices for:
  - Wellbore placement and drilling design
  - Personnel preparedness
  - Monitoring
  - Mitigation and response

Six new seismic monitors will be added in NEBC for a total of eight - paid for by industry and government