Hydraulic Fracturing & Public Health:

What we know, what we can infer and how we can move forward

Merry Turtiak, Alberta Health
Canadian Public Health Association 2014
May 29, 2014
Overview

• The Basics: Unconventional Oil & Gas, Shale Gas and Hydraulic Fracturing

• Media & Public Perception

• Public Health Concerns & Challenges

• Alberta’s Activities
The Basics:
Conventional vs. Unconventional

- **Conventional (easier to produce)**
  - Oil or gas “flows” easily into the wellbore
  - Easy and inexpensive to develop
  - Do not need special technology to “stimulate” the flow.

- **Unconventional (more difficult to produce)**
  - Little to no ability for the oil or gas to flow through the rock and into a wellbore as its trapped in low permeability rock
  - More expensive to develop, need special technology (i.e. hydraulic fracturing)
The Basics:
Why Develop Unconventional Resources?

Source: Canadian Association of Petroleum Producers
The Basics:
What is Hydraulic Fracturing?

- **Hydraulic Fracturing** is a process that injects fluids into a wellbore under high pressure to fracture or crack the rock to allow hydrocarbons to flow.

- **Horizontal Multi-Stage Hydraulic Fracturing** is the process by which multiple fractures are created along the horizontal section of the well bore and are injected with fluids to allow hydrocarbons to flow.
Hydraulic Fracturing

Hydraulic fracturing, or "fracing," involves the injection of more than a million gallons of water, sand and chemicals at high pressure down and across into horizontally drilled wells as far as 10,000 feet below the surface. The pressurized mixture causes the rock layer, in this case the Marcellus Shale, to crack. These fissures are held open by the sand particles so that natural gas from the shale can flow up the well.
Why “Frack”?

- Accessibility to more oil and gas products
- Multiple well-bores off of one well pad
- Cost efficient practice for industry
- Employment opportunities & broad economic benefit
Shale Gas Plays of North America

Shale Gas Plays of Alberta

Figure R5.11
Shale gas resource potential—general view of major shale gas prospective horizons

- Colorado Group and equivalent
- Fernie Group
- Banff and Exshaw formations
- Woodbend Group and Muskwa Formation
- Southeastern Alberta shallow gas
- Wildmere play area

Source: ST98-2012
Horizontal Multistage Fractured Well Activity by Fluid Type
March 31, 2014
Environmental Public Health Issues & Challenges

Acceptability
- Incineration
- Venting
- Wildlife Pattern Change
- Urban & Suburban Drilling
- Land Sterilization
- Groundwater Protection
- Well Integrity

Air Quality
- Odour
- Land Disturbance
- Induced Seismicity
- Land Sterilization
- Air Quality

Water Quality
- Soil Contamination
- Decreasing Water Availability

Soil Contamination
- Chemicals Used to Frack
- Produced Waste
- Spills

Waste Disposal
- Deep Well Injection
- Litter
- Produced Waste
- Spills
- Litter

Data/Research
- Disclosure
- Flowback
- Waste Treatment
- Large Vehicle Traffic
- Litter

Wildlife Pattern Change
- Climate Change
- Greenhouse Gases
- Flaring

Sour Gas
- Waste Treatment
- New Technology

Communication
- Pace
- Wildfire
- Light Spills
- Emergency Response
- New Technology

“Boomtown”
Media & Public Concerns

• Documentaries & Mainstream Movie

• United States Experience

• Canadian Research & Recommendations
  – New Brunswick Chief Medical Officer of Health’s Recommendations Concerning Shale Gas (2012)
  – Council of Canadian Academies (2014)

• Alberta Community Concerns & Events
Alberta’s Activities
Unconventional Oil & Gas Development

• Enhanced Collaborative Cross Government Work
• Single Energy Regulator
• Integrated Resource Management System
• Unconventional Regulatory Framework & Play Based Regulation
• Regional Land Use Planning
Alberta’s Activities
Regulatory Policy

• Enhanced requirements introduced in 2013 include:
  – Well integrity
  – Inter-wellbore Communication
  – Protection of Non-Saline Aquifers
  – Fracturing near domestic water wells
  – Notification requirements
  – Electronic submission of Fracture Fluid Composition
  – Trade secret – hazardous/non-hazardous
  – Reported publicly via FracFocus.ca
  – Water Usage Data - source & quantity
### Hydraulic Fracturing Fluid Product Component Information Disclosure

- **Last Fracture Date:** March 04, 2013
- **Last Submission Date:** April 30, 2013
- **Province:** AB
- **ERCB Field Centre:** Drayton Valley
- **Surface location:** 01-01-059-02W6
- **Well Licence Number:** 0450078
- **Licensee Name:** Tourmaline Oil Corp.
- **Unique Well Identifier:** 02/04-01-059-02W6/2
- **Well Name:** TOURMALINE 102 HZ SMOKY 4-1-59-2
- **Number of Stages:** 18
- **Bottom Hole Latitude:** 54.066891
- **Bottom Hole Longitude:** -118.172514
- **Lat/Long Projection:** NAD 83
- **Production Fluid Type:** Not Applicable
- **True Vertical Depth (TVD):** 3,177.90
- **Total Water Volume (m3):** 4,063

### Hydraulic Fracturing Fluid Composition:

<table>
<thead>
<tr>
<th>Fracture Start/End Date:</th>
<th>Component Type</th>
<th>Trade Name</th>
<th>Supplier</th>
<th>Purpose</th>
<th>Ingredient/Family Name</th>
<th>CAS # / HMIRC #</th>
<th>Concentration in Component (% by mass)</th>
<th>Concentration in HFF (% by mass)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar 3 2013 - Mar 4 2013</td>
<td>CARRIER FLUID</td>
<td>Frac Sand - regular</td>
<td>Trican</td>
<td></td>
<td>Water</td>
<td>Not Available</td>
<td>100.0000000%</td>
<td>78.495435%</td>
</tr>
<tr>
<td>PROPPANT</td>
<td>Frac Sand Resin Coated Cured</td>
<td>Trican</td>
<td></td>
<td></td>
<td>silica crystalline</td>
<td>14808-60-7</td>
<td>300.0000000%</td>
<td>17.188625%</td>
</tr>
<tr>
<td>PROPPANT</td>
<td>Frac Sand Resin Coated Cured</td>
<td>Trican</td>
<td></td>
<td></td>
<td>silica crystalline</td>
<td>14808-60-7</td>
<td>100.0000000%</td>
<td>3.961015%</td>
</tr>
<tr>
<td>PROPPANT</td>
<td>Frac Sand Resin Coated Cured</td>
<td>Trican</td>
<td></td>
<td></td>
<td>hexamethylenetetramine</td>
<td>100-97-0</td>
<td>1.0000000%</td>
<td>0.039610%</td>
</tr>
<tr>
<td>ADDITIVE</td>
<td>HCl 15%</td>
<td>Trican</td>
<td></td>
<td>Acid</td>
<td>water</td>
<td>7732-18-5</td>
<td>85.0000000%</td>
<td>0.000944%</td>
</tr>
<tr>
<td>ADDITIVE</td>
<td>HCl 15%</td>
<td>Trican</td>
<td></td>
<td>Acid</td>
<td>hydrochloric acid</td>
<td>7647-01-0</td>
<td>15.0000000%</td>
<td>0.000167%</td>
</tr>
<tr>
<td>ADDITIVE</td>
<td>Busan 94</td>
<td>Trican</td>
<td></td>
<td>Bactericide/Biocide</td>
<td>polyethylene glycol</td>
<td>25322-68-3</td>
<td>60.0000000%</td>
<td>0.008291%</td>
</tr>
<tr>
<td>ADDITIVE</td>
<td>Busan 94</td>
<td>Trican</td>
<td></td>
<td>Bactericide/Biocide</td>
<td>2,2-dibromo-3-nitriolopropionamide</td>
<td>10222-01-2</td>
<td>30.0000000%</td>
<td>0.004145%</td>
</tr>
<tr>
<td>ADDITIVE</td>
<td>Busan 94</td>
<td>Trican</td>
<td></td>
<td>Bactericide/Biocide</td>
<td>sodium bromide</td>
<td>7647-15-6</td>
<td>4.0000000%</td>
<td>0.000552%</td>
</tr>
</tbody>
</table>
Alberta’s Activities
Regulatory Policy

- Casing Requirements
- Injection & Disposal Wells
- On-site Storage & Treatment of Waste
- Emergency Response
- Noise & Light
Alberta’s Activities
In Progress

• Odour Management & Assessment
• Baseline Water Well Testing Requirements
• Water Allocation & Surface Storage
• Use of Human Health Impact Assessments in Play developments
• Urban Drilling Policy Development
Alberta’s Activities
In Progress – Research Towards Policy

- Air Quality
- Induced Seismic Activity
- Chemical Usage
- Support to the Canadian Water Network
  - Wastewater Management
  - Subsurface impacts
  - Landscape impacts
  - Water Safety Frameworks
Questions?

Email contact: Merry.Turtiak@gov.ab.ca