



**Alberta
Energy
Regulator**

Hydraulic Fracturing; Alberta's Regulatory Perspective

Presentation to Yukon Select Committee, January 6 , 2014

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Alberta's Regulatory History

- » Government of Alberta created first energy regulator 75 years ago
- » Mandate has expanded over the decades
- » Alberta Energy Regulator: new organization, new mandate

AER Mandate

- » *The Alberta Energy Regulator ensures the safe, efficient, orderly, and environmentally responsible development of hydrocarbon resources over their entire life cycle. This includes allocating and conserving water resources, managing public lands, and protecting the environment while providing economic benefits for all Albertans.*

What We Regulate

- 》 Over 185 000 wells and 405 000 km of pipelines
- 》 775 gas processing plants
- 》 Nine oil sands mines, more than 50 thermal in situ and 200 primary/enhanced schemes
- 》 Five bitumen upgraders
- 》 Ten coal mines and four processing plants

The AER Across Alberta

› 9 Field Centres (expanding)

› Field inspectors, community and aboriginal relations staff, local ADR support

› Head Office (Calgary)

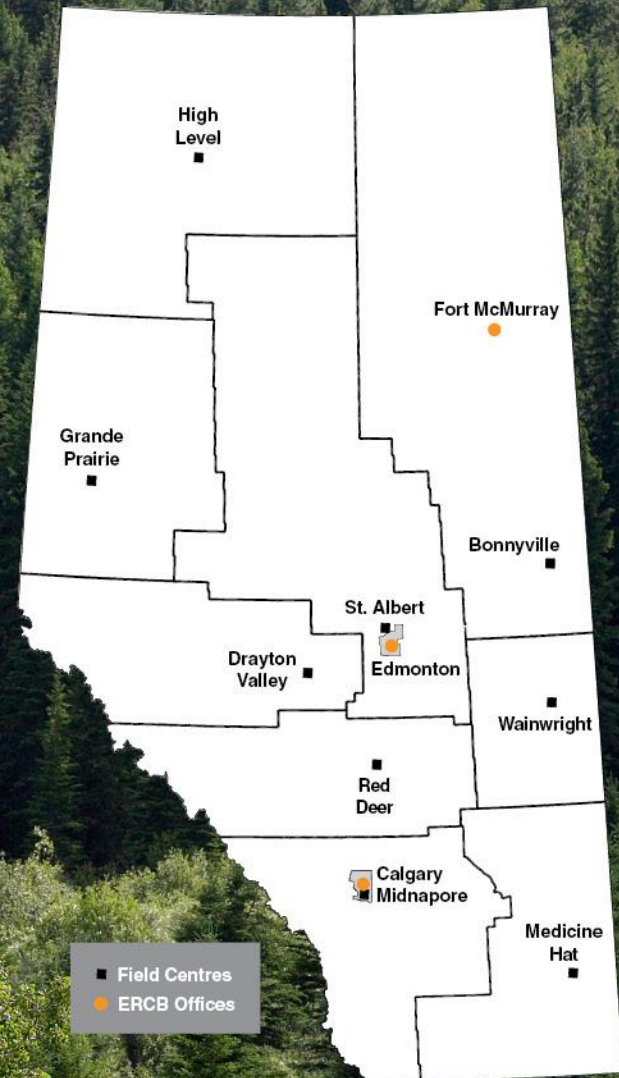
› Engineering, geology, economic, legal, environmental, data management, stakeholder relations and applications staff

› Core Research Centre (Calgary)

› Alberta Geological Survey (Edmonton)

› Geo-hazards, earth science and groundwater and resource mapping

› Fort McMurray Oil Sands Regional Office



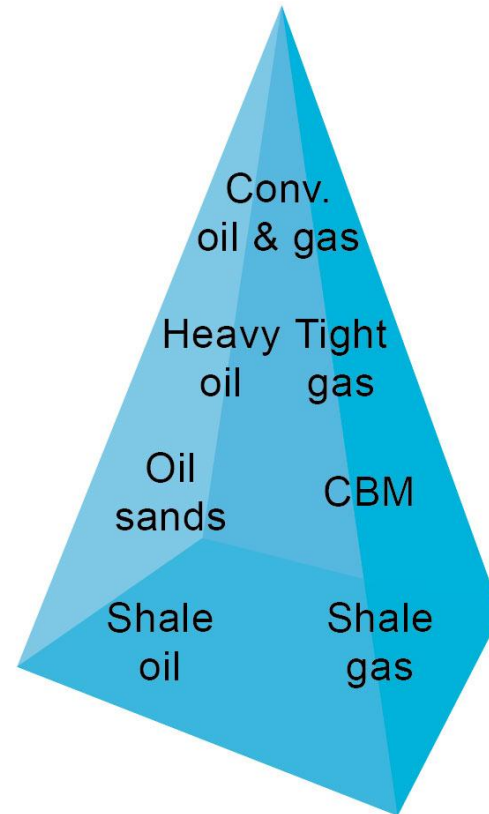
Drivers for Change

- » Depleting conventional oil and gas
- » New technology; economics
- » Abundant unconventional resources
- » New risks and opportunities
- » Changing Stakeholder expectations and evolving needs
- » Opportunity for Process effectiveness and efficiency enhancement

CONVENTIONAL



UNCONVENTIONAL



The New “Prize”: 8+ Alberta Shale-Gas Formations

- 》 Shale Gas In Place: *3406 Tcf*
 - 》 2005 Ultimate Conventional Gas Potential 223 Tcf
- 》 Shale NGL In Place: *58.5 Bbbls*
- 》 Shale Oil in Place: *423.5 Bbbls*
 - 》 Bitumen in Place 1844 Bbbls
- 》 Majority of resource owned by all Albertans.

What is Hydraulic Fracturing?

- › Hydraulic fracturing is injection of fluids under high pressure to crack the rock to allow oil and gas to flow
- › Three Components:
 - › Proppant (e.g. sand)
 - › Carrier Fluid (e.g. water but also oil or gas based)
 - › Additives: Engineering uses
- › Why is it used?

Alberta's experience

》 Historical context

- 》 174,000 wells fractured in Alberta since 1950s
- 》 Drilling horizontal wells since mid 1980s
- 》 Since 2008, over 7500 horizontal wells with multistage fracturing

》 Wide Spread Use of New Technology

- 》 Three quarters of new crude oil and 2/3 of gas wells are horizontal
- 》 Targeting a wide range of geological targets (Cardium, Viking, Duvernay, Montney, Exshaw, Glauconitic, Mannville, Ellerslie, Beaverhill Lake)

》 Wide Range of Completion-Stimulation Techniques

- 》 Fracturing technique and water use dependent of rock properties and other factors

Non-Confidential Horizontal Multistage Fractured Well Activity by Fluid Type

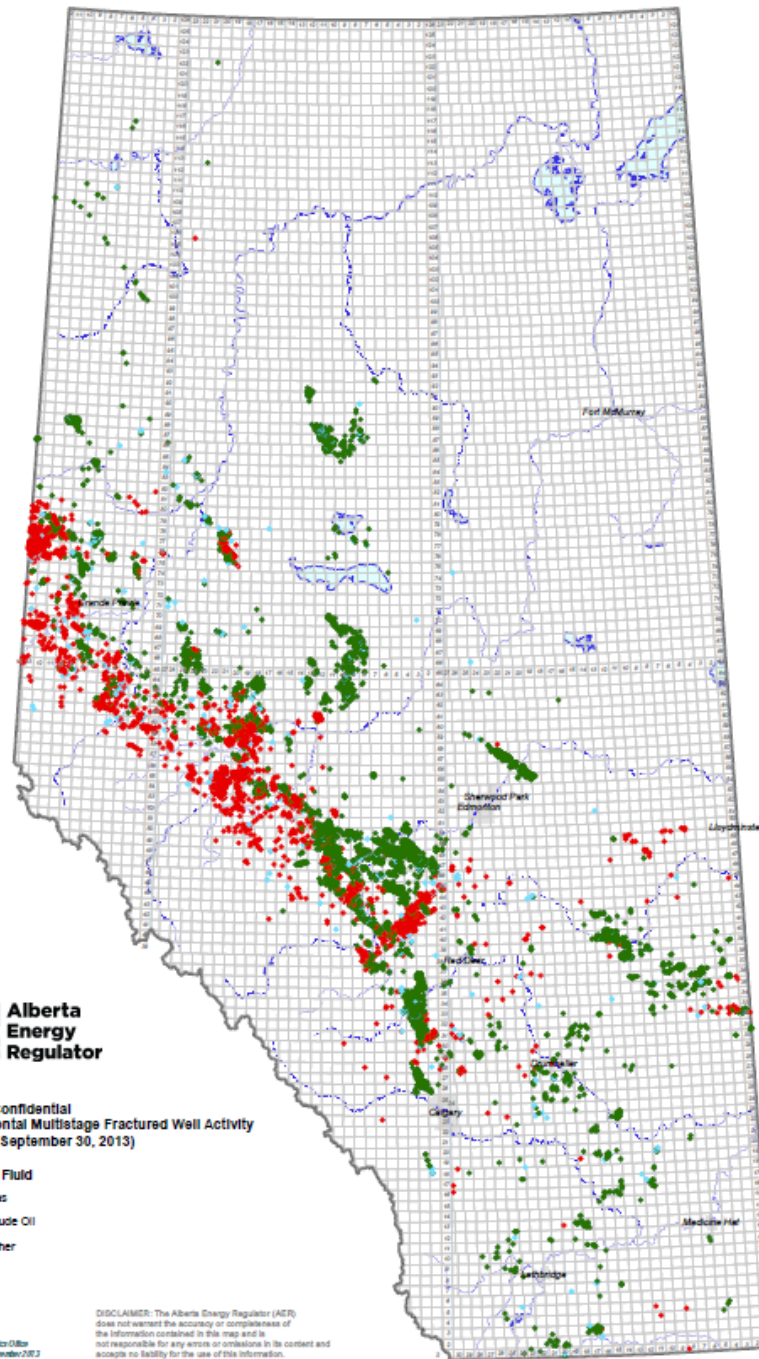


Non-Confidential
Horizontal Multistage Fractured Well Activity
(as of September 30, 2013)

Status Fluid
• Gas
• Crude Oil
• Other

Energy Statistics Office
May/June/November 2013

DISCLAIMER: The Alberta Energy Regulator (AER) does not warrant the accuracy or completeness of the information contained in this map and is not responsible for any errors or omissions in its content and accepts no liability for the use of this information.



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Duvernay Formation

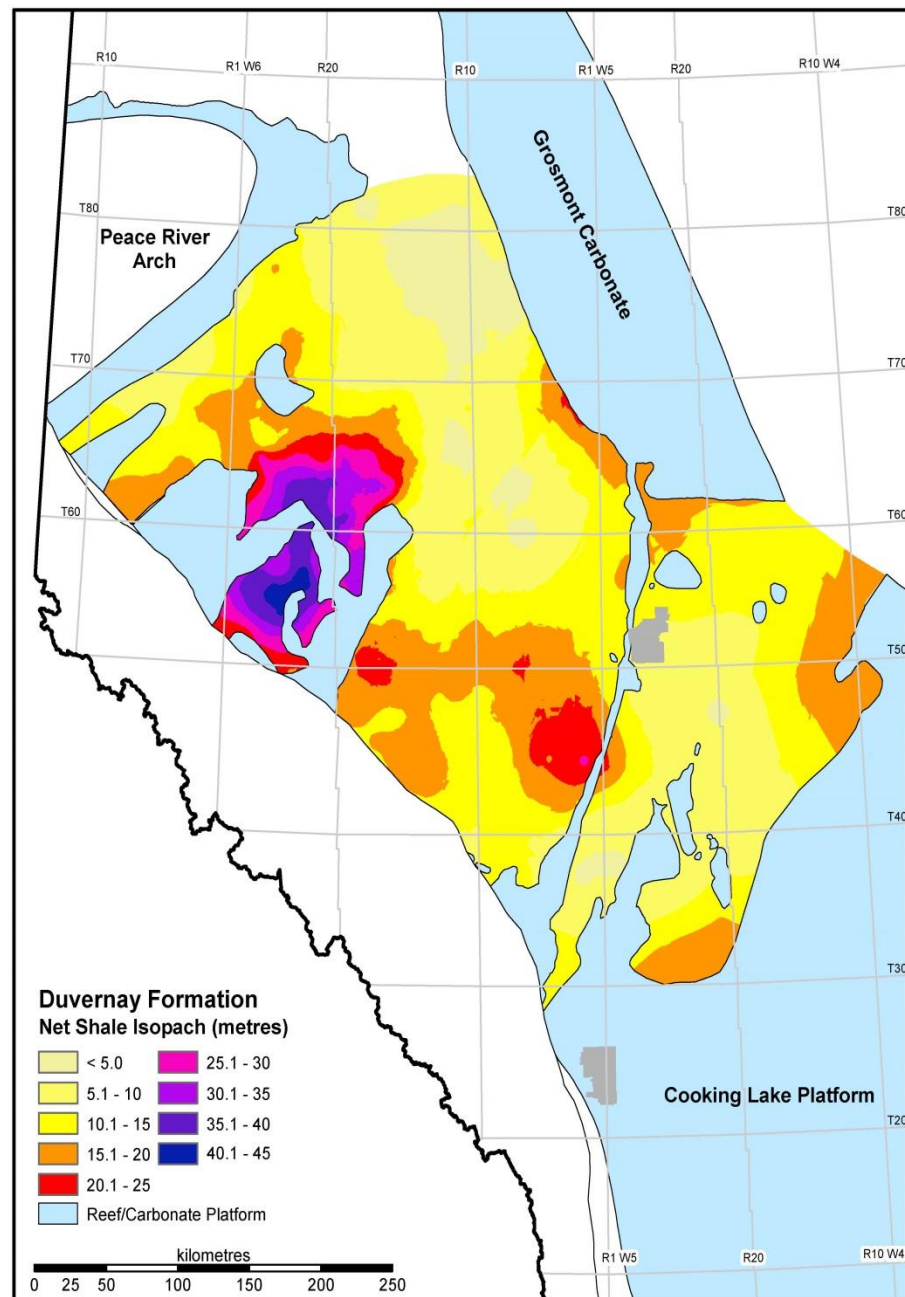


Figure 2.1.5. Net shale isopach of the Duvernay Formation

Regulatory Framework

» Full life cycle single regulator:

- » Extensive and accessible information base to support decisions and stakeholder understanding
- » Comprehensive set of documented science based and risk based technical rules
- » Application process with legally defined pre-application notification rights, engagement and a balanced review of competing issues
- » Dispute resolution including ADR and public hearings

Regulatory Framework cont.

- 》 Compliance assurance, field inspections and audit, enforcement
- 》 Abandonment, reclamation and liability management
- 》 Performance measures and reporting
- 》 Documented regulatory change review process with appropriate stakeholder engagement

Engagement Tools

- » Traditional tools of one on one discussions expanding to include more community based engagement
- » Some engagement lead by AER, others lead by companies or by community leaders and synergy groups
- » Synergy Alberta supports building community based multi-stakeholder groups www.synergyalberta.ca

Alberta Government Policy Example

》 **Water Act; Water for Life**

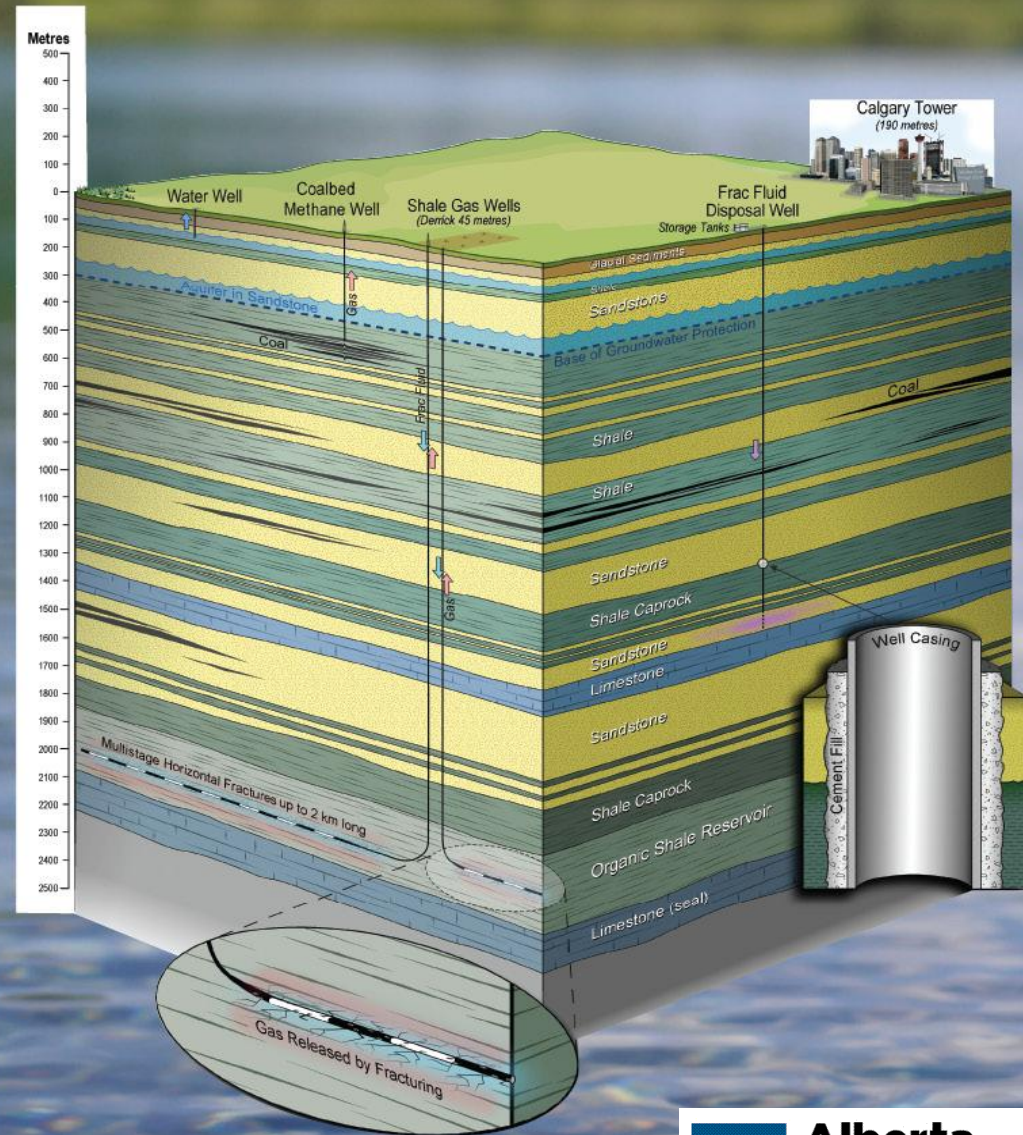
- 》 Sets out water management policy for all water use sectors and conservation targets
- 》 Established Multi-stakeholder Water Council to lead review of potential changes
- 》 State of the Environment reports
- 》 Local Watershed Planning and Advisory Committees
- 》 Water Conversation sessions in local communities to understand concerns and discuss future actions

AER Response to Emerging Unconventional Resource

- » Expand available information base
- » Understand potential for new risks and review/update technical rules related to water, land and air impacts
- » Public communication
- » Adopt new unconventional regulatory framework - Discussion paper on Regulating Unconventional Resources in Alberta, www.aer.ca

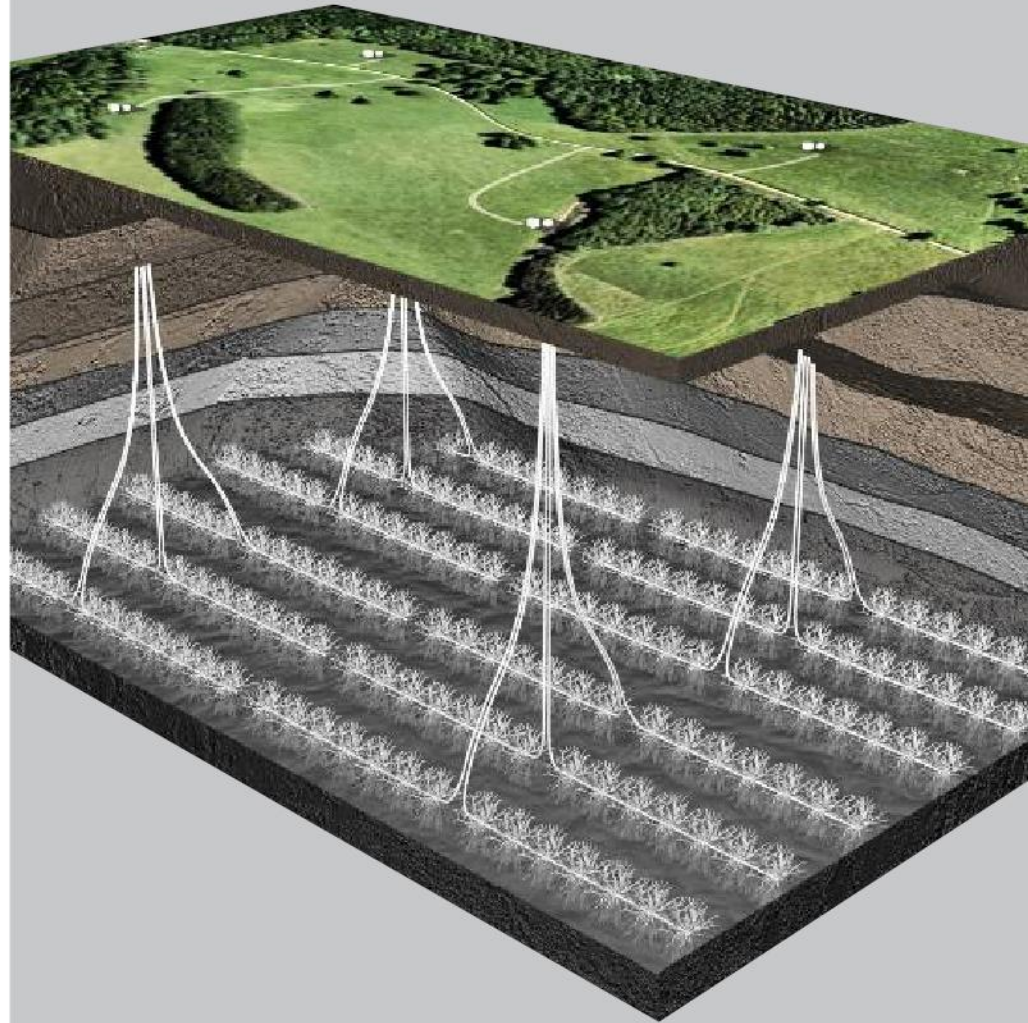
Unconventional Oil & Gas Development Challenges

- › **Water management and protection**
 - › Water sourcing
 - › Treatment and recycle
 - › Chemical toxicity
- › **Containment; Hydraulic Fracturing Operations**
- › **Surface infrastructure planning and cumulative impacts**
- › **Resource recovery**
- › **Communication**



Surface Impacts

- » Horizontal wells of 1000m to 3000m located on multi well pads offer significant options to reduce surface impacts compared to vertical wells including reduced roads and pipelines
- » Concentrated industrial impacts require greater care in selecting pad site locations, assessing truck routes and engagement of additional landowners
- » Some existing single well sites not suitable for pads; reengage landowner



Information

» Directive 59:

- » NEW water use measurement and sourcing details for all wells fractured in Alberta
- » Mandatory fracture fluid chemical disclosure
- » Limited trade secret protection
- » Public access thru fracfocus.ca; January 2013

» Mapping of Unconventional Resources (see Shale and Siltstone Resources, open file 2012-06)

Information Cont.

- » **Mapping** of non-saline /saline groundwater
- » **Groundwater Observation Well Network**
- » **Baseline private water well testing**
- » **Seismic monitoring stations**
- » **Public ST reports** on flaring, land use, water use, spills, inspections, enforcement, drilling activity, reserves, detailed incident investigations
- » **Web based** application registry
- » **New** incident reporting system

AER Baseline Requirements

- › Dir 008: Surface Casing Depth Requirements
- › Dir 009: Casing Cementing Requirements
- › Dir 020: Well Abandonment
- › Dir 029: Applications and Hearing Process
- › Dir 031: Guidelines for... Cost Claims
- › Dir 035: Baseline Water Well Testing
- › Dir 038: Noise Control
- › Dir 044: Surveillance - Water Production in Wells
- › Dir 044: Surveillance - Water Production in Wells
- › Dir 050: Drilling Waste Management
- › Dir 051: Injection and Disposal Wells
- › Dir 055: Storage Requirements
- › Dir 056: Energy Development Applications
- › Dir 058: Oilfield Waste Management
- › Dir 059: Drilling & Completion Data Filing
- › Dir 083: Hydraulic Fracturing Subsurface Integrity

Example of NEW Requirements

》 Directive 083: Hydraulic Fracturing – Subsurface Integrity

》 Increase wellbore integrity assurance

- 》 Dual barrier protection or equal
- 》 Mandatory notification to AER of fracturing commencement
- 》 Increased field presence

》 Inter-well Communication

- 》 Operators need risk management plan
- 》 Manage well control at offset wellbores
- 》 Dedicated incident review teams

》 Shallow Fracturing near water wells

- 》 Protection by prescribed setbacks and volume limitations

Industry Best Practices

› Industry associations are part of the solution and are supporting:

- › Stewardship programs, performance reports and corporate actions to meet social license to operate
- › Industry sponsored studies and recommended practices to meet and exceed baseline regulatory requirements
- › National public communication by associations with web based information and community information sessions
- › Local Best Practices



Unconventional Regulatory Framework Building a New Approach

Draft Unconventional Regulatory Framework

- **Responding to the intensity, duration and scale of developing unconventional resources:**
 - Starts with existing regulations and processes
 - Organize risks by play, integrate surface and subsurface
 - Regulatory response proportional to risk
 - Recognize differences from exploration to piloting to full development
 - Expand regulatory focus from proximity impacts to more cumulative, play-based impacts
 - Support innovation and science
 - Increase early planning and collaboration amongst companies, expand information base, and enhance community engagement

How it Works

NEW: Pad Approvals

- » Local planning with additional landowners to address location, water use, noise, lights, traffic, emissions.
- » Consolidates approvals and pad based data needs

NEW: Project Plan Submission

- » Operator specific; address multi pad development with expanded community engagement

NEW: Play Development Plan

- » All operators collectively address integrated air, land and water challenges seeking large scale management solutions
- » show alignment with LUF and water conservation policy

What Should Plans Include:

› Water Management

- › Play or project level plan showing water availability, assessment of alternative sources and recycle options, plans address **NET** environmental impacts

› Surface infrastructure development

- › **Minimizing** footprint, linear disturbances, trucking, noise, emissions and waste management, **balance** new development with pace of reclamation

› Sub-surface reservoir management

- › Resource recovery, minimize flaring, ER potential, reserves assessment

› Stakeholder engagement

- › Local community, business leaders, local authorities

› Lifecycle wellbore Integrity

› Fit with overarching land use and watershed plans

Outcomes for Play Based Stakeholder Engagement

- › Stakeholders understand the potential scope of development as a result of early disclosure of development plans
- › Stakeholders have timely, clear and fair opportunities for engagement
- › Engagement efforts demonstrate an understanding of local community and stakeholder concerns and how best to address those concerns
- › Communication with stakeholders goes beyond traditional notification procedures to building productive relationships
- › Stakeholders have opportunities to provide input and express concerns early about how development may affect their community



Thank you

www.aer.ca