



# Shale-Gas Development, Hydraulic Fracturing, and Water in Alberta: AER's Regulatory Program

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# Alberta's Regulatory History

- » Government of Alberta created first 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



# A Phased Approach

- » Phased implementation ensures operational certainty during transition
  - » Phase 1 – Launch, new governance model, new public information
  - » Phase 2 – Geophysical, Public Lands Act, Landowner Registry, enhanced participation
  - » Phase 3 – Water Act, EPEA functions, full integration into AER

# Alberta is a Petroleum Province

- » Enormous natural endowment of hydrocarbons
- » Over 72 000 producing pools and deposits.
- » Favourable geological history of petroleum generation, migration, and entrapment.

# A Long Legacy of Petroleum Production.

- » Over 100 years exploration, production, transportation.
- » >171 000 wells have been fractured to date in Alberta.
- » 6300 horizontal wells with multi-stage hydraulic fracturing since 2008.

# 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 Bbbbls*
- » Shale Oil in Place: *423.5 Bbbbls*
  - » Bitumen in Place 1844 Bbbbls
- » Majority of resource owned by all Albertans.



# Public Concerns with Shale-Gas Extraction and Water

- » Water quality
  - » Natural gas release, chemicals, storage
- » Water quantity
  - » Source protection, interference
  - » Consumptive use and value
- » Formation and well integrity
  - » Water well, aquifer damage
  - » Seismicity

# Current State

## » Water Quality

- » Concerns focused around groundwater, spills.
- » Thermogenic gas has been identified in water wells. Sometimes hard to identify source.

## » Water Quantity

- » No technical issues noted to date associated with shale gas use, either with saline or non-saline water. Concerns for social reasons.

# Current State

- » Formation and Water Well Integrity
  - » Water well complaints usually non-conclusive on performance issues.
  - » Farmers' Advocate program for well rehabilitation in effect when damages found and repaired.
  - » Associated micro-seismicity has been detected with oilfield injection for over 40 years. No damages.

# Responding to Risks and Concerns

- » Balancing outcomes and risks
  - » Public safety
  - » Landowner rights
  - » Environmental protection
  - » Resource conservation
  - » Provincial competitiveness
  - » Cumulative effects
  - » Public interest and legacy

# AER Regulatory Framework

## » Acts

- » Responsible Energy Development Act

- » Oil and Gas Conservation Act

- » Environmental Protection and Enhancement Act

- » Public Lands Act

- » Water Act

## » Regulations under the Acts

- » Necessary, fair, transparent

- » Proportional to risk

# Regulatory Instruments

- » AER has many regulations and directives already in place that protect water.
- » Policy assurance and regulatory delivery mechanisms:
  - » Authorizations
  - » Inspections
  - » Audits
  - » Reporting requirements
  - » Investigations and enforcement

# AER Hydraulic Fracturing Directive 083 – new in 2013

- » Notification prior to hydraulic fracturing (HF)
  - » Increased AER field presence
  
- » Wellbore integrity
  - » Wells undergoing HF require dual-barrier systems or equal level of protection

# AER Hydraulic Fracturing Directive 083

## » Interwellbore Communication

- » Operators need a risk-management plan to ensure offset wells are not intersected by HF.

## » Non-saline Aquifer Protection

- » Aquifers will be protected by vertical setbacks, risk-management and monitoring plans.



# AER Hydraulic Fracturing Directive 083

- » Hydraulic Fracturing Near Water Wells
  - » Water wells protected with prescribed setbacks
  
- » Hydraulic Fracturing Near Top of Bedrock
  - » Fracturing must honour prescribed setbacks

# Disclosure of HF Completion Fluids – Directive 059 Update

- » Reporting of all chemicals used in fracturing operations mandated in AER Directive 059 since Jan. 2013
  - » Publically available on [FracFocus.ca](http://FracFocus.ca)
    - » >2200 wells reported (Jan. 1-Oct. 20, 2013)
  - » Limited “trade secret” protection
    - » AER can obtain ALL chemicals if required

# HF Water Quantity Reporting – Directive 059 Update

- » HF water-use reporting under D 059
  - » AER requires reported use by 14 “water types”
    - » Non-saline – surface (3), groundwater (2), municipal, central facilities;
    - » “Alternatives” – saline groundwater, recycled flowback (2), wastes (3), produced water.
  - » Source location, date, volume, rate, TDS must be reported.

# Seismicity and HF

- » Earthquakes occur naturally in Alberta. Most are not felt, mag. 3.0>
- » Microquakes sometimes associated with oilfield injection, studied for 40+ years; no damage
- » Regional monitoring since 2005 in A.B. has detected microquakes in only one HF instance. No damage / not felt at surface

# HF Research and Investigations

- » Natural contaminants and background
- » Shale hydrogeology
- » Natural pathways and connectedness
- » Place-based risk analysis
- » Subsurface forensics for complaint investigations
- » Science communication & literacy

# HF Information and Education

- » AGS Seismic Monitoring Program
- » Shale Gas Resource Studies (e.g., AGS OFR 2012-06)
- » ST55- Alberta's Base of Groundwater Protection updates.
- » Risk Mapping (e.g., AGS OFR 2009-16 – Connectivity of natural hydraulic pathways, Scollard-Paskapoo system)

# Going Forward

- » Regulatory development based on development of shale-gas plays, place-based risks, and new technologies.
- » Cumulative effects management.
- » Water-use collaboration.
- » Monitoring, reporting, performance evaluation against outcomes.

# Thank You

» [www.aer.ca](http://www.aer.ca)

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