

Groundwater and Alberta's Oil and Gas Sector

Michael Bevan, Advisor, Industry Operations
NSWA Groundwater Forum, February 27, 2019



One Province, One Regulator

Our Mandate

The AER's mandate is to ensure 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

thermal/enhanced in situ projects

coal processing

oil sands mines

bitumen upgraders

plants

producing coal mines §210

primary/enhanced recovery projects (in situ)

16

experimental projects



426 000

kilometres of pipelines

gas processing plants



§167 000

operating natural gas and oil wells

§30 000 oil facilities



21000

gas facilities

In addition to inspection and incident response support for 12 000 kilometres of pipelines regulated by the Alberta Utilities Commission.

Water Use in Oil and Gas

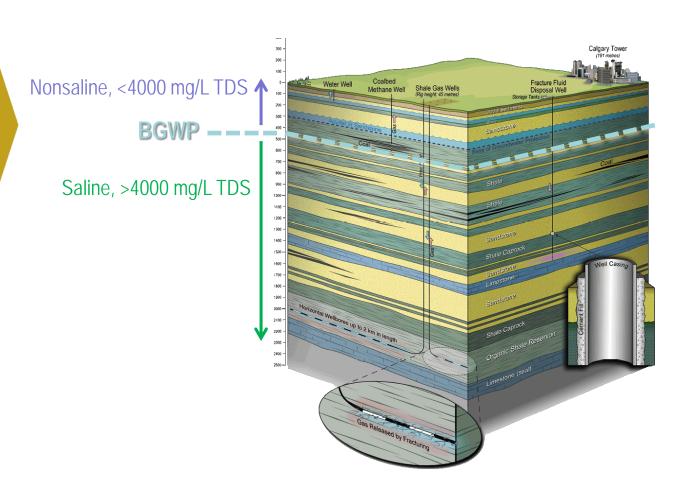
- Well drilling
- Well completion
- Pipelining and testing
- Processing
- Other dust control, ice roads/bridges, office/sanitary use

AER Groundwater Protection Responsibility

- Dil and Gas Conservation Act
 - Protecting fresh water supplies is an AER responsibility
- Environmental Protection and Enhancement Act - EPEA
 - Protect environment, including water
- Water Act
 - Nonsaline groundwater should be preserved

- BGWP: approximate depth where groundwater transitions from nonsaline to saline
 - Enhanced requirements above BGWP

Base of Groundwater Protection



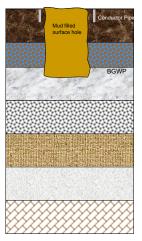
Groundwater Protection: Drilling



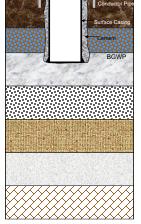
Directive 035

 Baseline water well data collection (for CBM)

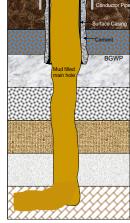
Groundwater Protection: Drilling



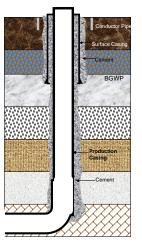
Drill surface hole



Install/cement surface casing



Drill main / production hole

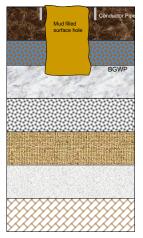


Install/cement production casing

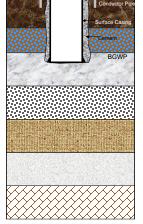
Directive 036

- No toxic fluids above BGWP
- Maintain control of well

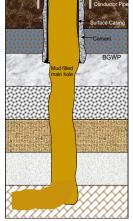
Groundwater Protection: Drilling



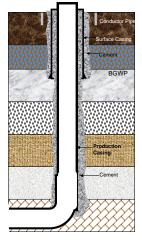
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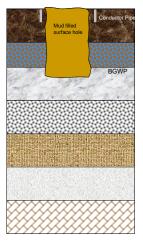


Install/cement production casing

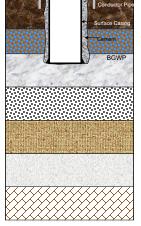
Directive 008

 Minimum depths, shallow vs deep, water flows

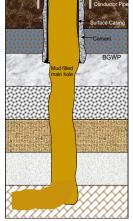
Groundwater Protection: Drilling



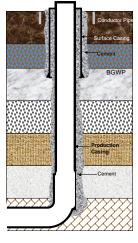
Drill surface hole



Install/cement surface casing



Drill main / production hole



Install/cement production casing

Directive 009

 Surface casing cemented to surface

Groundwater Protection: Completion



Directive 083

- Restrictions near water wells, aquifers, at shallow depths
- Risk assessment, well control plans
- Well integrity testing/ monitoring

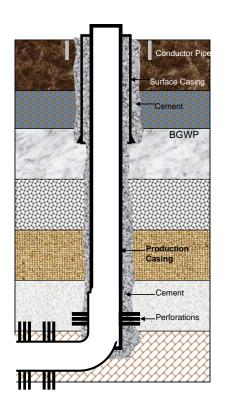
Groundwater Protection: Completion



Directive 059

- Fracture fluid and water source info
 - FracFocus.ca
 - AER Water Report

Groundwater Protection: Completion



Completions – perforating, fracturing

- Subsurface Order #2
 - Seismic monitoring

Groundwater Protection: Operations



Water Production

- Directive 044
 - Water produced from above BGWP: measured, analysed, reported
 - No cross-flow, no nonsaline water production without authorization





Groundwater Protection: Operations

Fluid Handling and Spills

- Directive 036 (again)
 - Properly contained; immediate containment / clean-up of all fluid spills; spill reporting
- Directive 055
 - Requirements to prevent leaks; remediate and investigate

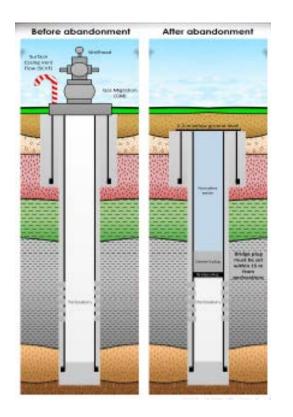
Groundwater Protection: Operations



Waste Disposal

- Directive 050
 - Proper handling of drilling waste
- Directive 051
 - Well construction and monitoring
- Directive 058
 - Site assessment, groundwater monitoring requirements

Regulations: Closure & Abandonment





Directive 020

- Oil and gas zones must be isolated
- Nonsaline groundwater zones above the BGWP must be isolated

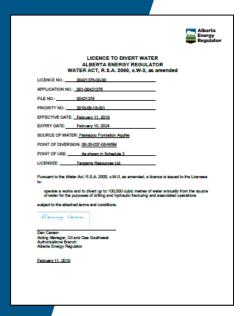
Water Allocation & Use



Water Act

- All nonsaline water use, incl. oil and gas
- Protect environment, prevent impact to other users
- AEP Water Conservation and Allocation Guideline for Oilfield Injection (2006)
 - Conservation, consistency, technical evaluation, adaptability, improvements
 - Alternative source assessment
- AEP Directive for water licensing of hydraulic fracturing projects - area of use approach (2018)
 - Long-term planning
 - Flexibility

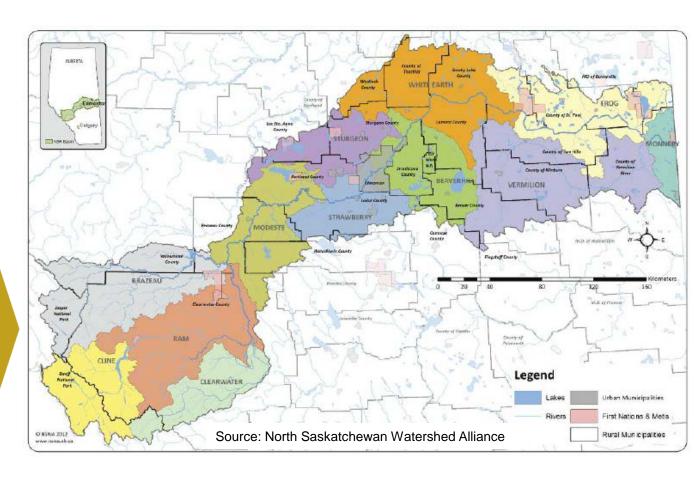
Water Allocation & Use



Water Act License

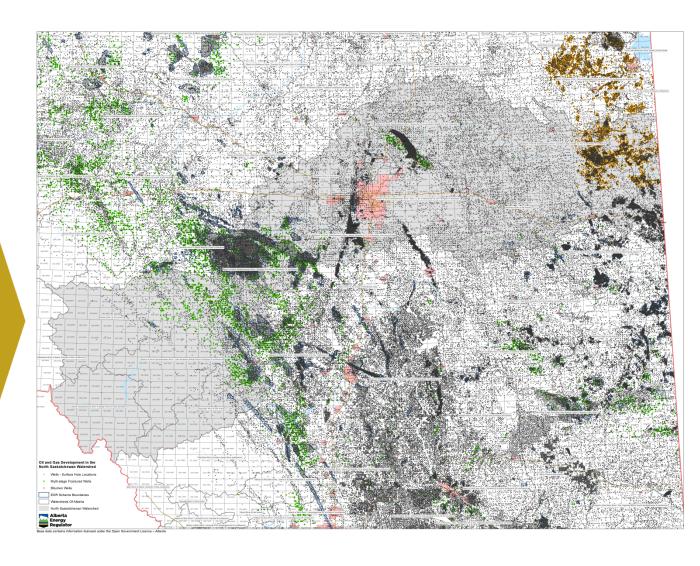
- First in time, first in right
- Conditions, monitoring and reporting
- Term license
 - 5 to 10 years
 - Based on long-term yield assessment
- TDL
 - Up to 1 year
 - Short-term yield assessment
- Notification 30 days on AER's Notice of Application Tool
- Available AEP Authorizations Viewer

North Saskatchewan Watershed

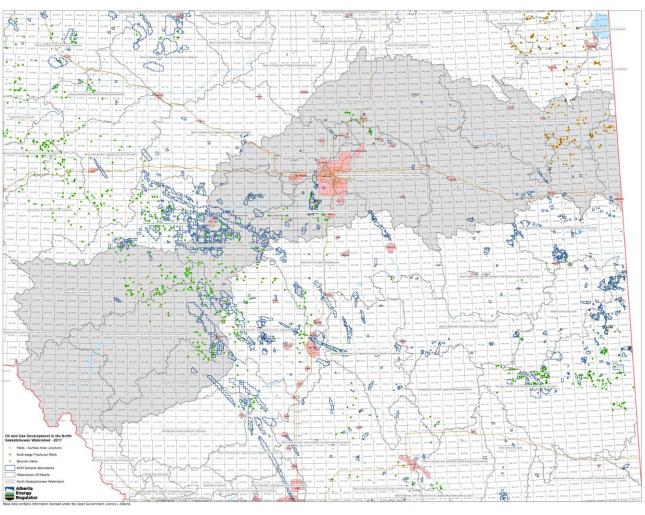


- Water available: ~ 8.5 billion m³ (est.)
- ∑ 2017 nonsaline allocation: ~ 2.1 billion m³
 - Energy sector: ~ 86 million m³ (~4%)

NSW Energy Development



2017 NSW Energy Development



- D Hydrocarbon production
 - 7 million m³ oil
 - 16 million m³ gas

2017 NSW Energy Water Use

EOR

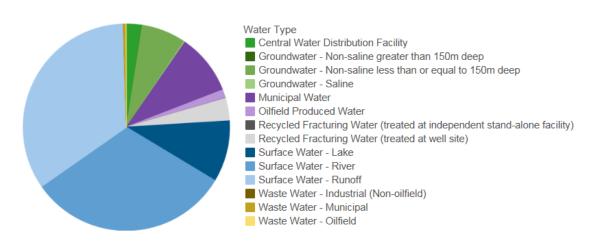
- Nonsaline allocation: ~ 21 million m³
- Water used: ~ 12.5 million m³
 - ~ 12% nonsaline (11% groundwater)
 - < 1% saline groundwater</p>
 - ~ 85% recycled water

- Nonsaline allocation: ~ 8 million m³
- Water used: ~ 2.3 million m³
 - ~ 7% nonsaline (no groundwater)
 - ~ 93% recycled water

2017 NSW Energy Water Use

Hydraulic fracturing

- Nonsaline allocation: ~ 7 million m³
- Water used: ~ 1.4 million m³
 - ~ 95% nonsaline (13% groundwater)
 - ~ 1% saline groundwater
 - ~ 4% recycled water



Provincial overview information

 EOR, hydraulic fracturing, oilsands insitu & mining

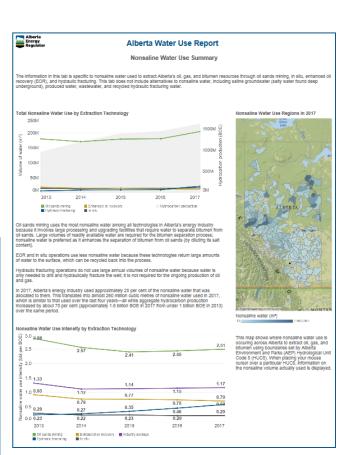
Alberta Energy Industry Water Use Report -2017

Alberta Water Use Report 2017 Water Summary Overall in Alberta, AER experts have estimated that over 140 billion cubic melres of nonsaline water are available. Of this, about 10 billion cubic melres (or 7 per cert) are allocated for size through Water Act incinces for inunbiguit, apricultural, forestly, houstlink, and other local. Of this 10 billion cubic melres of size for a per cert of are allocated for size through Water Act incinces for inunbiguit, apricultural, forestly, houstlink, and other local. Of this 10 billion cubic melres of size for 2 per cert of all an exister available. On the houstly, The remaining 5 billion cubic melres (of per cert) was allocated to other uses such as agricultural, Friently, commercial (e.g., polf courses and grave) prit operations, and municipatities. The maps below displays the proportion of available water that is between for energy development. The boundaries represent hydrological unit Code 8 (HLCS) areas, as est by Alberta Environment and Parias (AEP). While data or groundwater allocation is available across the entire province, information on available water is nown and certain Aberta. Where a raisfully information does not yet exist, the proportion that is allocated in represented as zero. Work is being consocided by the Alberta Geological Survey to develop groundwater availability formation on accordance of the province. Placing your mouse curve over a specific HLCS areas will provide additional information on surface and groundwater availability and allocation, the proportion of the availability and allocation (as a percentage to all sections of Alberta, and the projection of the availability that is specifically allocation, the proportion of the availability and allocation on the province.

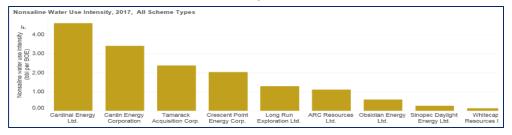
Surface Water Availability and Allocation When companies apply to use water, they must state the maximum annual amount of water they need over the entire life cycle of their project. Companies estimate their naximum water use based on maximum water use based on their project's needs, a general understanding of the geology in the area, as well as a contingency to ensure they have enough water for their energy development project. Due to the need for large volumes of nonsaline water oil sands mining is allocated the most nonsaline water in the most nonsaline water in the industry (66 per cent), followed by enhanced oil recovery (EOR) (10 per cent) in situ (6 per cent), and hydraulic fracturing (9 per cent). "Other" (9 per cent), accounts for other water that is allocated in other energy. is allocated to other energy development activities testing and hydrocarbor the maximum volume of nonsaline water that can be taken. However, across the entire oil and gas industry, companies are using less than their approved allocations. In 2017, the energy industry used 25 per cent of the total volume of nonsaline water

AER Cumulative Surface Water Allocation

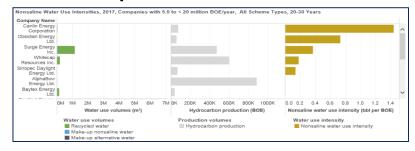




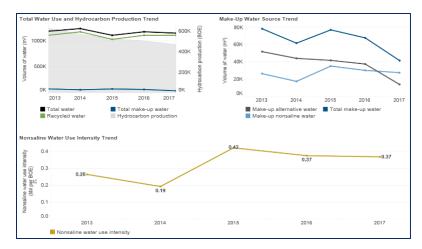
Company specific nonsaline water use performance by sector



Alberta Energy Industry Water Use Report -2017 Compare companies



See trends



Complaint Process

- Emergency & Operational Complaint number:
 - 1-800-222-6514
- Seneral information and inquiries
 - 1-855-297-8311
- AER.ca

Protecting what matters

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