

Groundwater and Surface Water Regulation and Management in Western Canada's Emerging Shale Gas Regions



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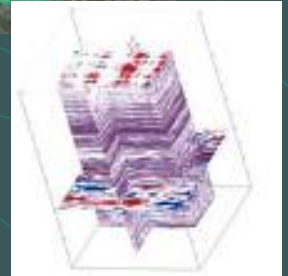
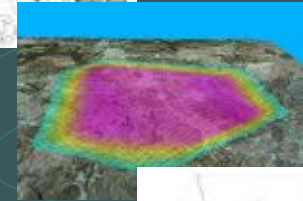
Presentation Overview

- Shale gas locations
- Current water regulations
 - Alberta
 - BC
- Drivers for new regulations
- Questions



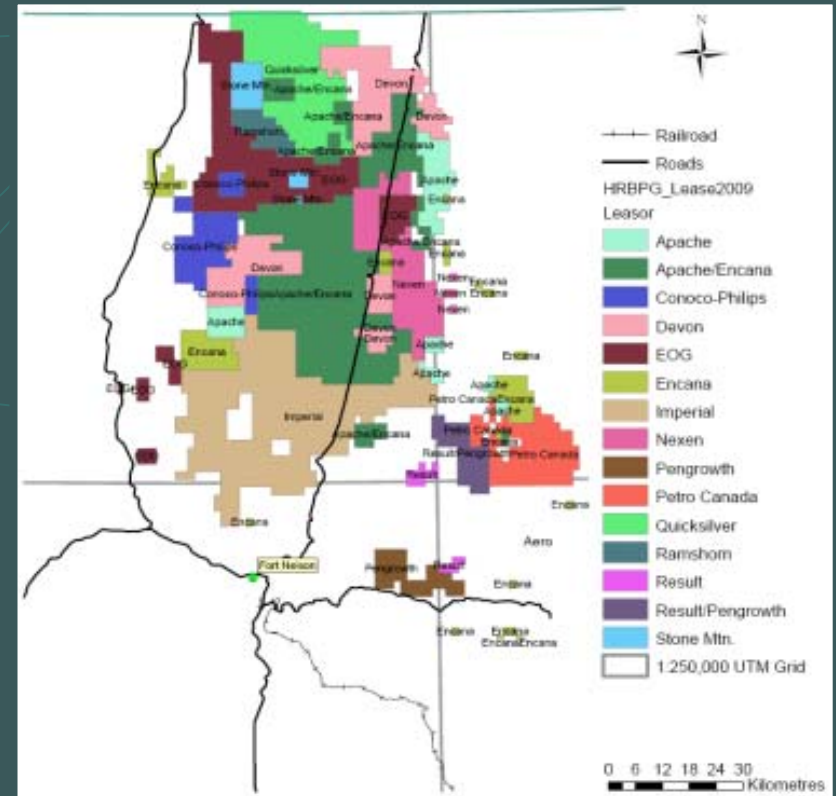
Shale Gas Market

- Key areas
 - Horn River Basin
 - Montney area
 - Alta too
- Market type
 - New
 - Rapidly developing
 - Water use significant
 - No water = no gas



Example – Horn River Basin (14 mbrs)

- 60 wells drilled this 2010 (200 wells by 2012)
- Press Release: Nexen alone 500 to 700 wells
- Large water volumes (25,000 to 40,000 m³/well)
- Monitoring for impacts, sustainability, etc



Current Water Regulations - AB



Current Water Regulations - AB



- Historically (source, produced, disposal)...
- ERCB for saline water
- AENV for non-saline water
- AENV-ERCB MOU (Dec/07)
- Work closer together



Current Water Regulations - AB



- Current ERCB (water related)
 - Directive 8 (surface casing, BGWP)
 - Directive 35 (CBM, not shale gas)
 - Directive 27 (fracing)
 - Directive 44 (non-saline produced water)
- System works well (+/-)



Current Water Regulations - AB



- Current AENV (non-saline water)
 - GW and SW use needs a license (Water Act, TDLs)
 - Some exemptions (dugouts)
 - Groundwater Evaluation Guideline
 - Water for on-going drilling and fracing
 - AENV trend = TDLs → licenses
- System works well



Current Water Regulations - AB

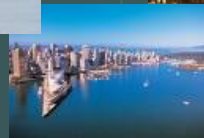


- Summary (Alberta for shale gas)
 - Not a “big” industry here yet
 - Saline and non-saline water well-defined
 - GW and SW licensing regs in-place
 - Move to maximize water recycle
 - Moving forward...
 - Tweak +/- for shale gas

Before we continue...



Current Water Regulations - BC



Current Water Regulations - BC



- Regulatory Bodies
 - BC MOE (Water Stewardship Division)
 - BC has no saline or non-saline distinction
 - Land & Water BC – Water Mgmt Branch
 - Issues approvals and SW licenses
 - BC has no GW licenses
 - BC Ministry of Health
 - OGC
 - Issues Well Authorizations
 - Oil and Gas Activities Act (OGAA, summer/10)

Current Water Regulations - BC



- BC MOE (Water Stewardship Division)
 - Protection of safe/reliable water supplies
 - Sustainable/water smart activities
 - Raising awareness of the value of water
- Involvement with shale gas = minimal

Current Water Regulations - BC



- LWBC - Water Mgmt Branch
 - Issue approvals (for short-term use) and SW water licenses under the BC Water Act.
 - Regulate water utilities
 - Work with other government /stakeholders
 - Work to ensure best use of BC water resources

Current Water Regulations - BC

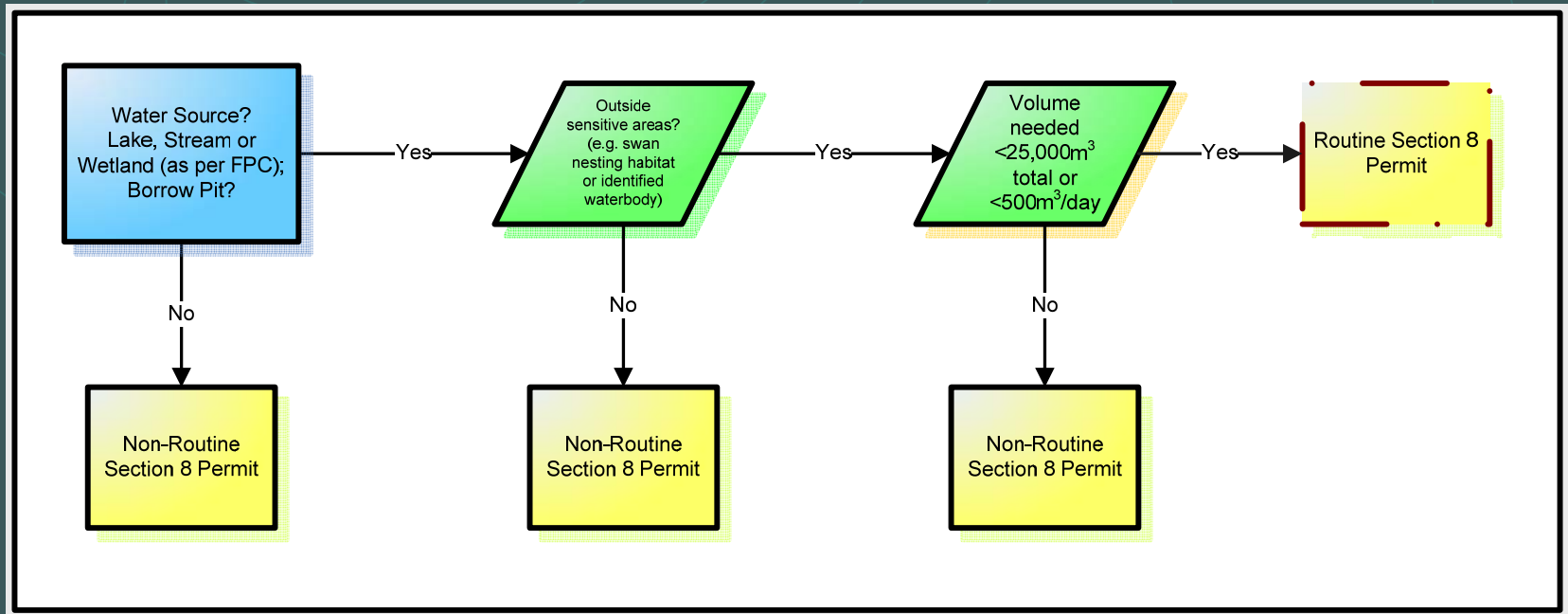


- BC Ministry of Health Services
 - n/a except for drinking water at plants/camps

Current Water Regulations - BC



- Oil & Gas Commission (OGC)
- Draft water permitting process



- Water recycle not required, but...



OCC – Draft Water Permitting Process

- Section 8, 9 and 26 permits
 - Routine Applications
 - Blanket water permit issued for “approved sources”
 - Hydrological information on sources prior to withdrawal
 - Volumes $< 25,000 \text{ m}^3$, or $< 500 \text{ m}^3/\text{d}$, $\sim < 1$ year long
 - Non-routine Applications
 - Larger volume for a full 12 months, or for water bodies with environmental sensitivities, First Nations or public concerns
 - Identify diversion points and required water volumes
 - Mitigation plan for maintaining water body integrity
 - First Nations consultation (Section 8 permits)

Presentation Overview

- Remember BC has no GW license process, but...
- GW extraction may require EA under the *Environmental Assessment Act* where:
 - Part of a larger project that triggers an assessment
 - GW extraction >75 litres per second
(approx 1000 l/gpm, 6,500 m³/d)

Current Water Regulations - BC



- Summary (BC for shale gas)
 - Saline and non-saline water not defined
 - SW license regs in-place, but...
 - No GW license regs
 - No requirement to recycle water
 - Moving forward...
 - OGAA ? 
 - GW license process ?
 - Finalize draft OGC water permit process ?
 - Monitoring for local → cumulative impacts
 - Other ?



Closure

- Thank You
- Questions



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