Shale Oil Development on the North Slope

House Resources Committee

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Task Force Update

- Develop SOA multi-agency team, represented by DNR, DEC, AOGCC, ADF&G, DOT, Governor's Office
- SOA is well positioned to manage shale resource play based on current statutes and regulations
- Total well count for shale could be about the same as current total NS well count, only done in a third of the time
  - Pace and magnitude of permitting and development could be significant

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Resource Play Inter-Agency Task Force

- Why the Task Force?
  - Alaska has never had shale resource development
  - Interest in Alaska shale has been very strong since last lease sale
  - Successful exploration could lead to immediate development
    - The true viability of the Great Bear Petroleum acreage is not known until exploration occurs
    - Planned exploration could occur in the next year
  - The State wants to be ready

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Existing Management for Shale Resource Development

State agencies currently regulate the following:

- Well design and construction
- Gas flaring and venting
- Water discharge and storage
- Air quality monitoring
- Ice road and ice pad construction
- Plans of Operation and Plans of Development
- Habitat and wildlife management
- Environmental safeguards including spill prevention and control

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Future work

- Water Management - Source, Recycle, Disposal
- Hydraulic Fracturing Chemical Disclosure - FracFocus.org
- Infrastructure - common facilities such as roads, gathering lines, power, transit line to TAPS, etc.
- Gas Disposition: Use, Vent, Flare

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Source: U.S. Energy Information Administration based on data from various published studies. Canada and Mexico plays from ARI.
Updated: May 9, 2011

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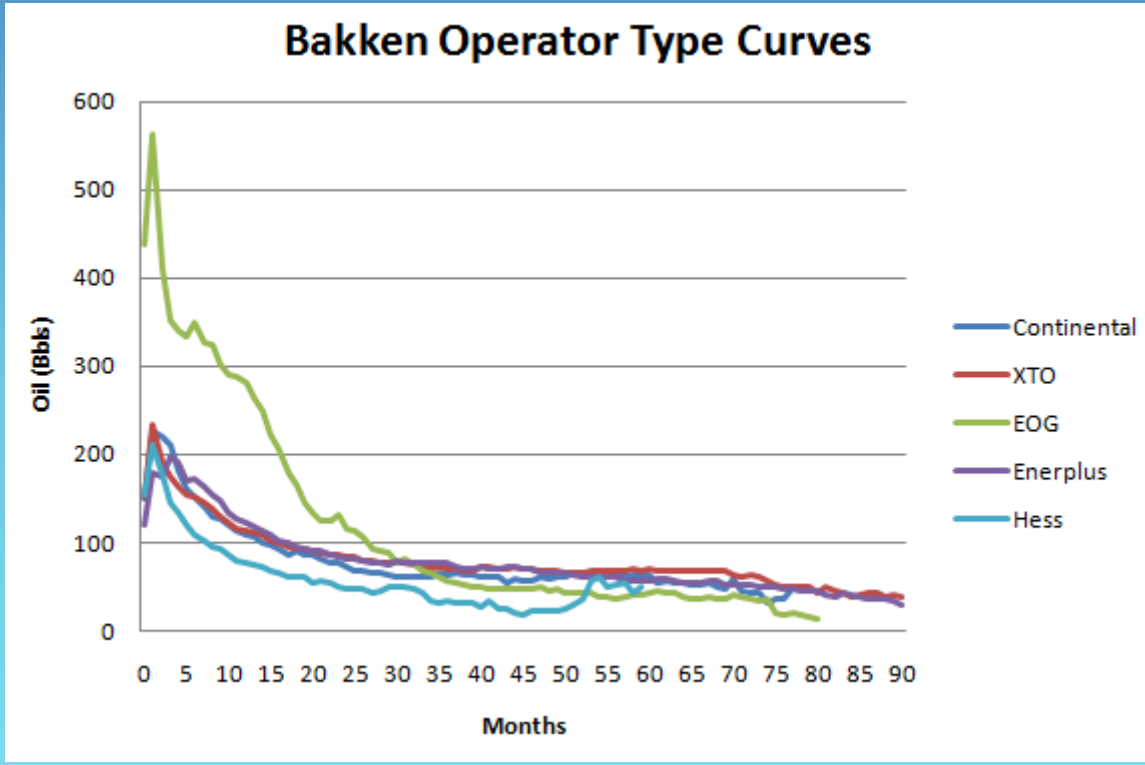
Well Facts

- Alaskan analog is thought to be Eagle Ford Shale, TX

	Bakken	Eagle Ford	Shublik	L. Kingak	Hue/GRZ
Total Organic Carbon	10% avg	2-7%	2-3% avg	5% avg	3% avg
Main Kerogen Types	I/II (oil)	I/II (oil)	I/II-S (oil)	II/III (oil-gas)	II/III (oil-gas)
Oil Gravity, °API	42°	30-50°	24-45°	40°	38°
Thickness	up to 100 ft	50-250 ft	0-600 ft	175-550 ft	100-800 ft
Thermal Maturity	Imm-Oil-Gas	Imm-Oil-Gas	Imm-Oil-Gas	Imm-Oil-Gas	Imm-Oil-Gas
Lithology & Variability	Sh-Slts-Sh	Sh-Slts-Ls	Sh-Slts-Ls	Shale	Sh-Tuff
Brittleness	Yes - Quartz	Yes - Calcite	Yes - Calcite	No ?	No ?
Natural Fractures	Yes	Locally	some zones	?	?
Overpressure	Yes	Locally	?	Probably	Locally

Well Facts

- Exhibit rapid decline with multi-year 'flat tail'



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Whiting Petroleum

Well Facts

- Well drainage is limited and well to well pressure communication doesn't exist
- Requires a high number of horizontal multistage hydraulic fractured wells to maintain production and economic feasibility

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Hydraulic Fracturing

- First 'frac' in ~1903; first commercial application 1940's
- Technology routinely used throughout the industry and in Alaska to increase and restore well productivity
- 25% of wells in Alaska have been hydraulically fractured
- Per AOGCC records, earliest well in Alaska was the Gubik #1 well in 1963
- Well Design and Construction primacy of AOGCC
  - Primary focus on safety, water protection

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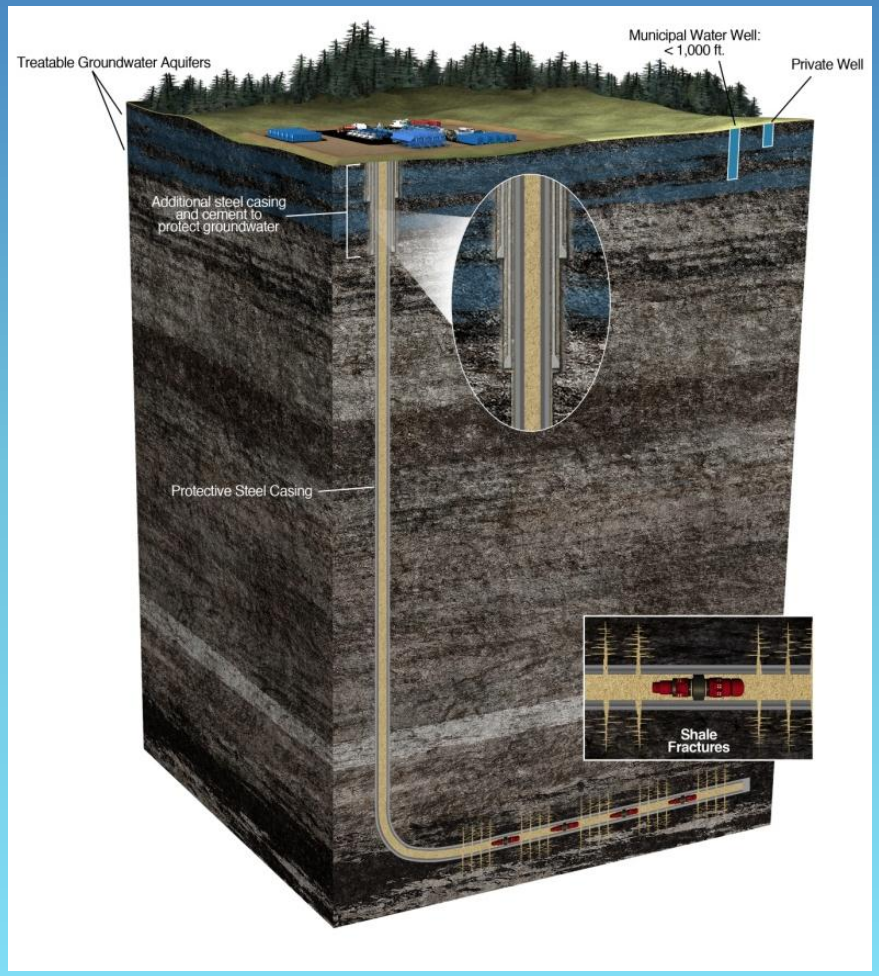
Horizontal Drilling & Hydraulic Fracturing



- Hydraulic fracturing is essential for the production from shale
- Frac fluids are approximately 98% water and sand
- Freshwater aquifers are protected by multiple layers of protective steel casing surrounded by cement; this is administered and enforced under state regulations.
- Deep shale natural gas and oil formations exist many thousands of feet underground.

Graphic courtesy of Chesapeake

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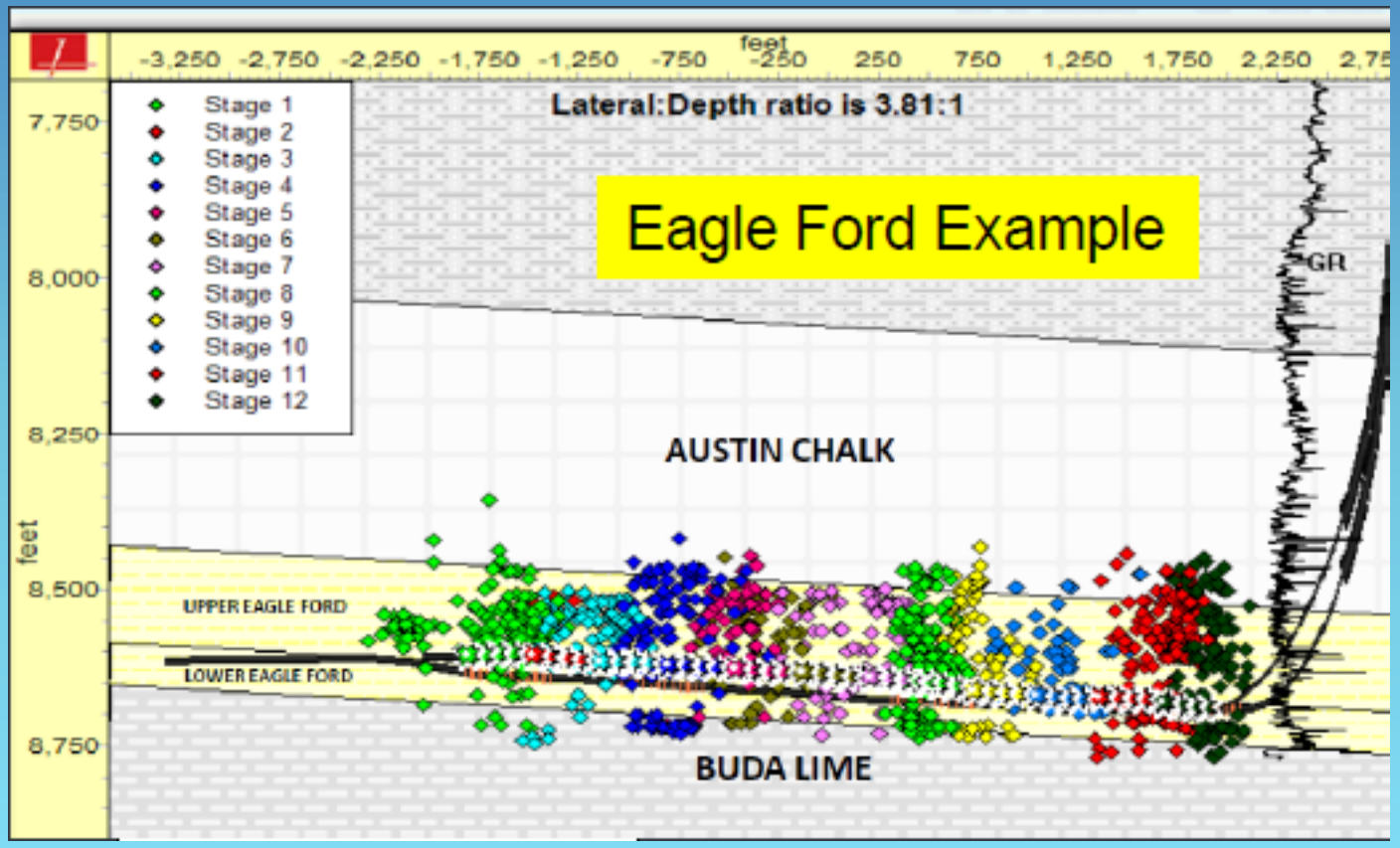
Fracturing height



Graphic courtesy of Halliburton

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Wrap-up

- Alaska's first shale test expected this winter
- Permitting required for conventional wells applicable for shale development
- SOA current permits sufficient, but pace and load on agencies needs to be addressed
- Planning and management of infrastructure important

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