

Western Canada Resource Plays: The Phoenix Awaits!

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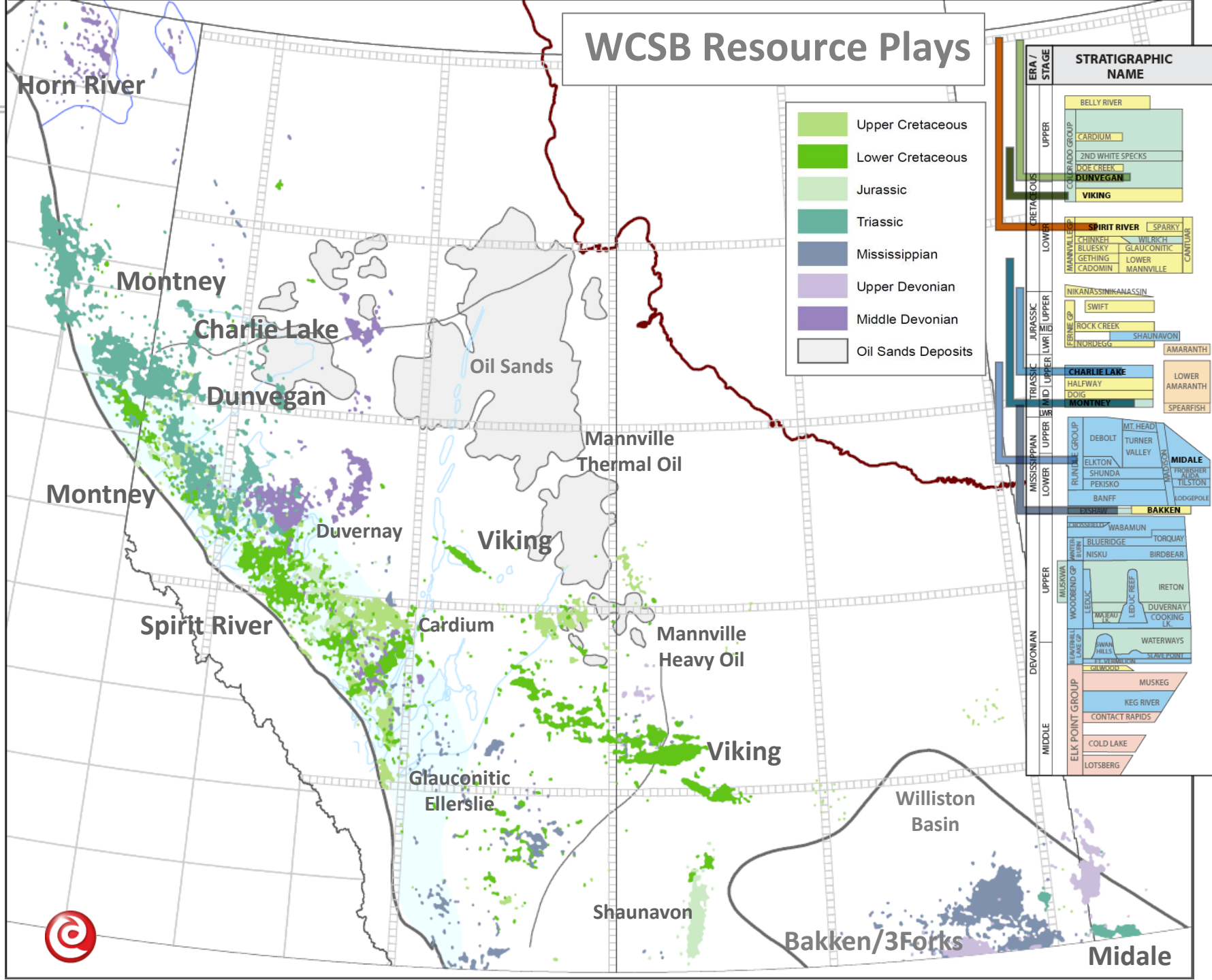
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- 2015 WCSB Production Highlights
- Hot Resource Plays—Activity and Completions
- Developing Resource Plays
- Wrap Up

WCSB Resource Plays

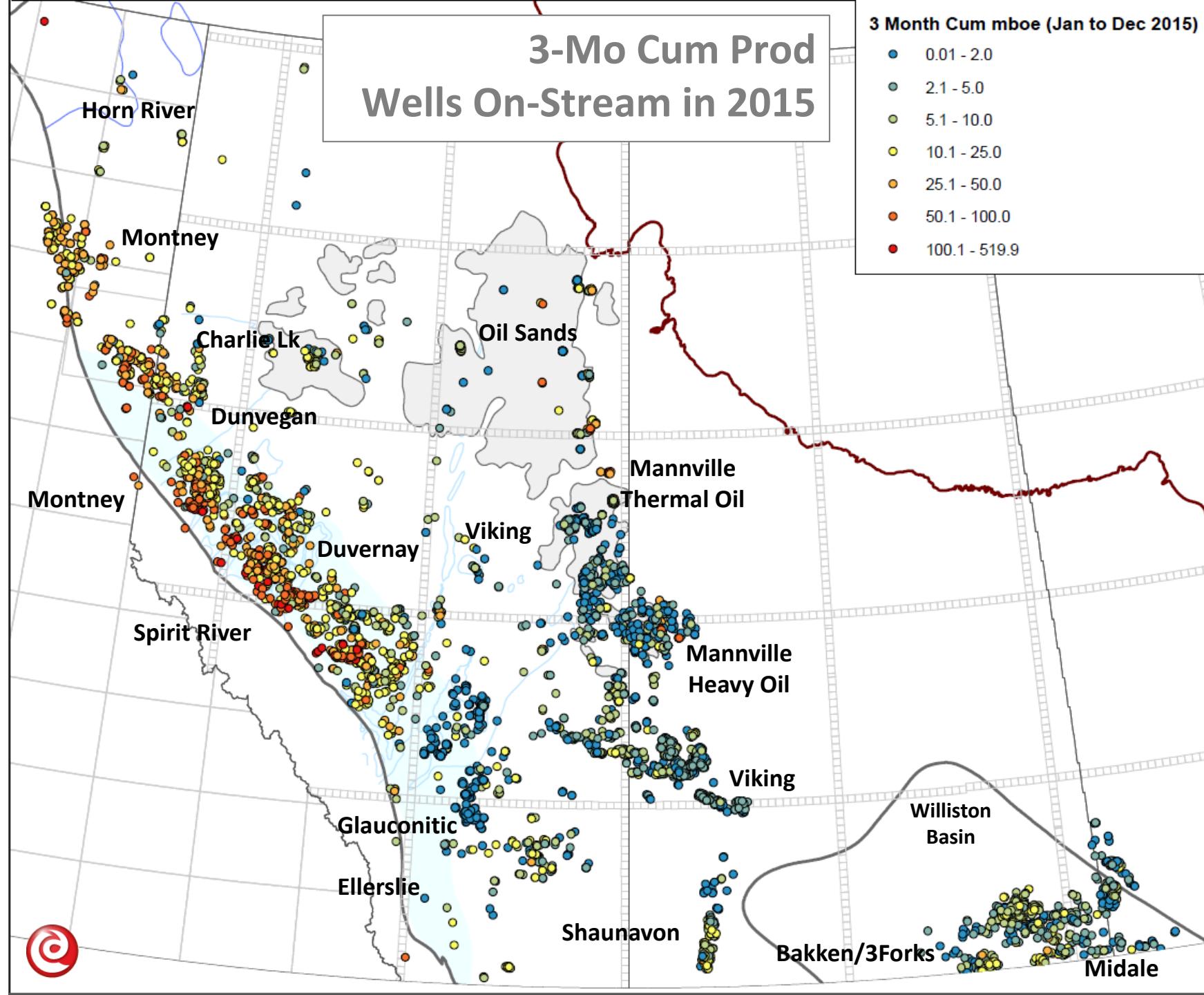


2015 Production Highlights

3-Mo Cum Prod Wells On-Stream in 2015

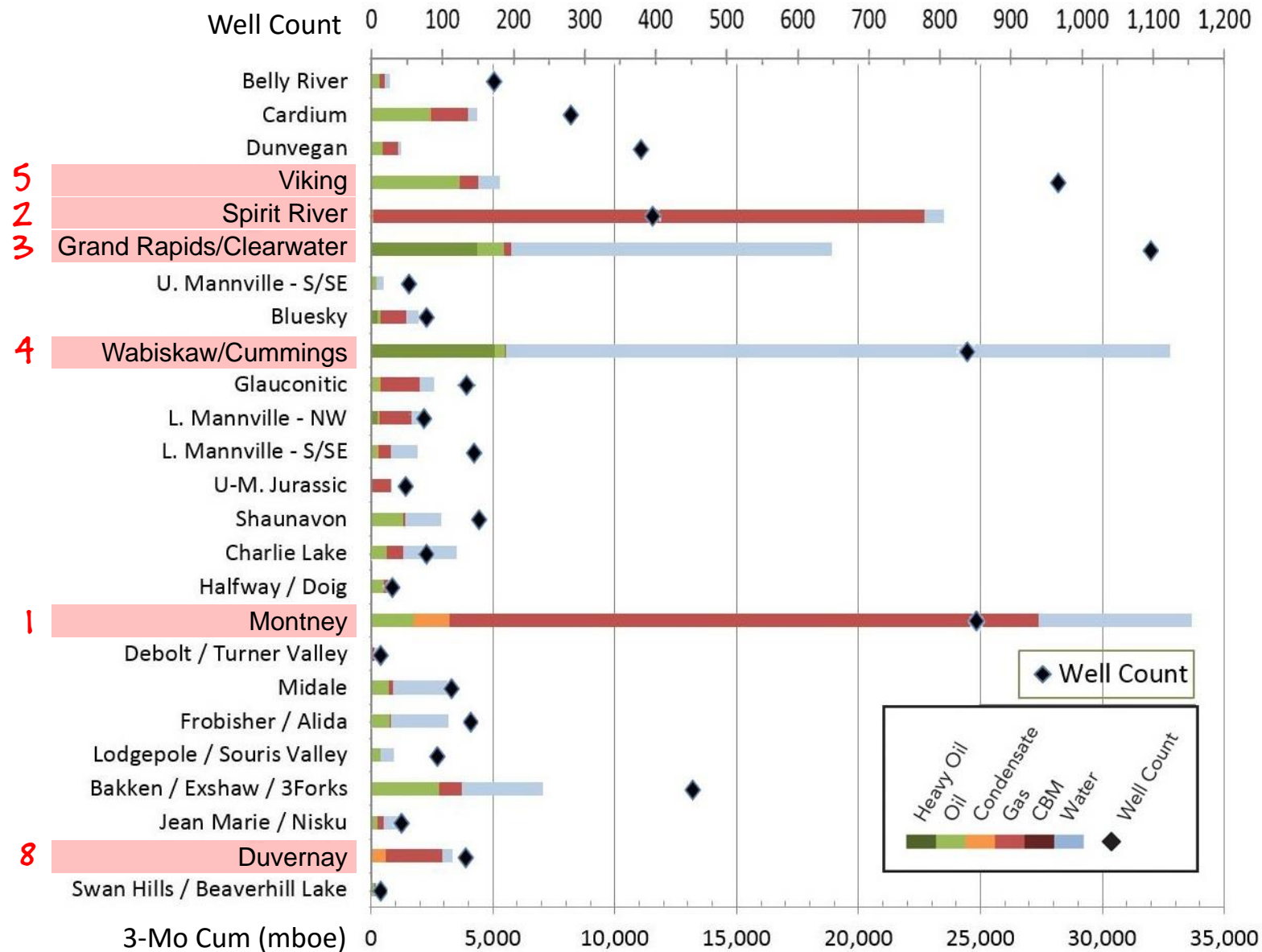
3 Month Cum mboe (Jan to Dec 2015)

- 0.01 - 2.0
- 2.1 - 5.0
- 5.1 - 10.0
- 10.1 - 25.0
- 25.1 - 50.0
- 50.1 - 100.0
- 100.1 - 519.9



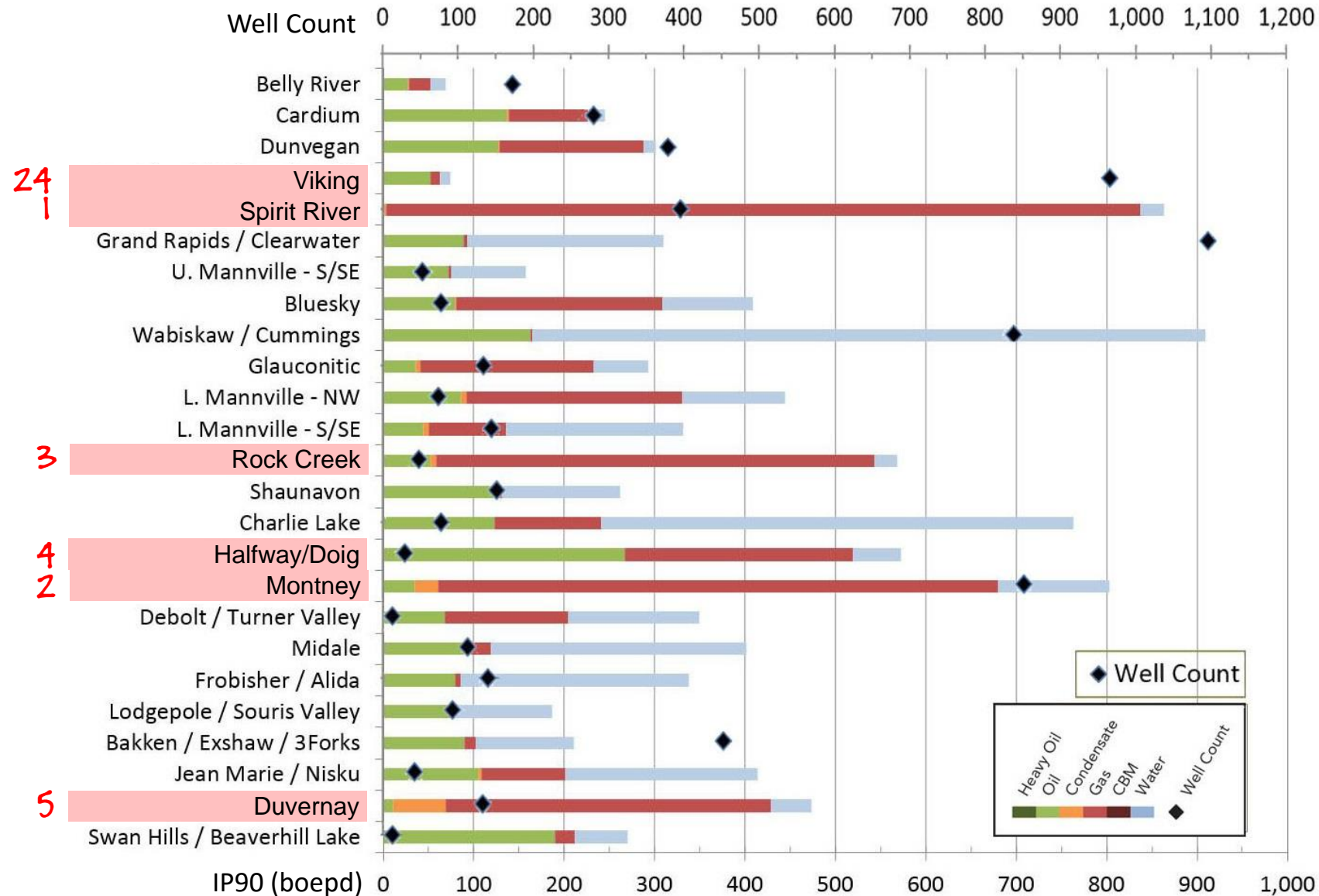
Production and Well Count by Formation

3-Mo Cum Prod—Wells On-Stream in 2015



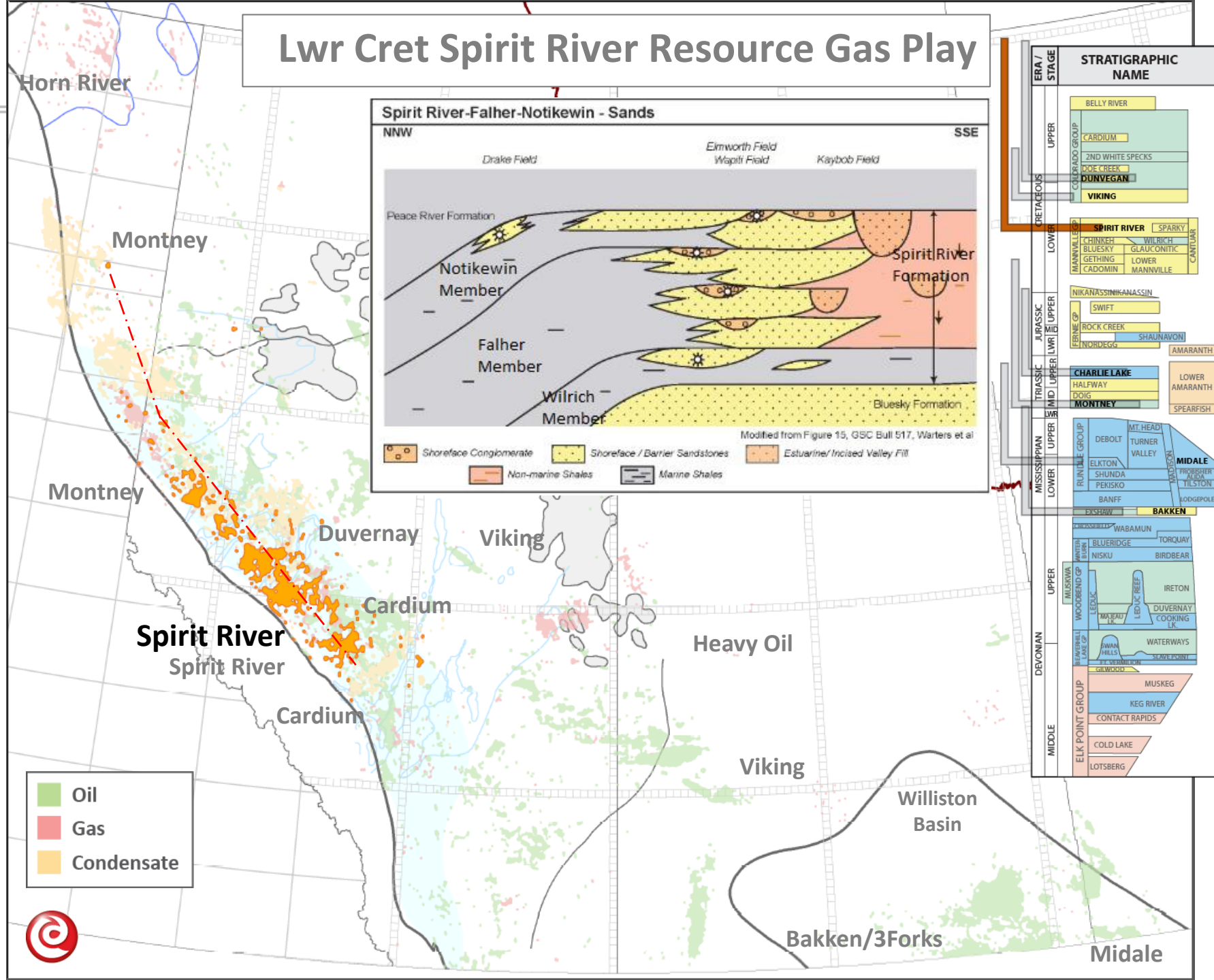
Production and Well Count by Formation

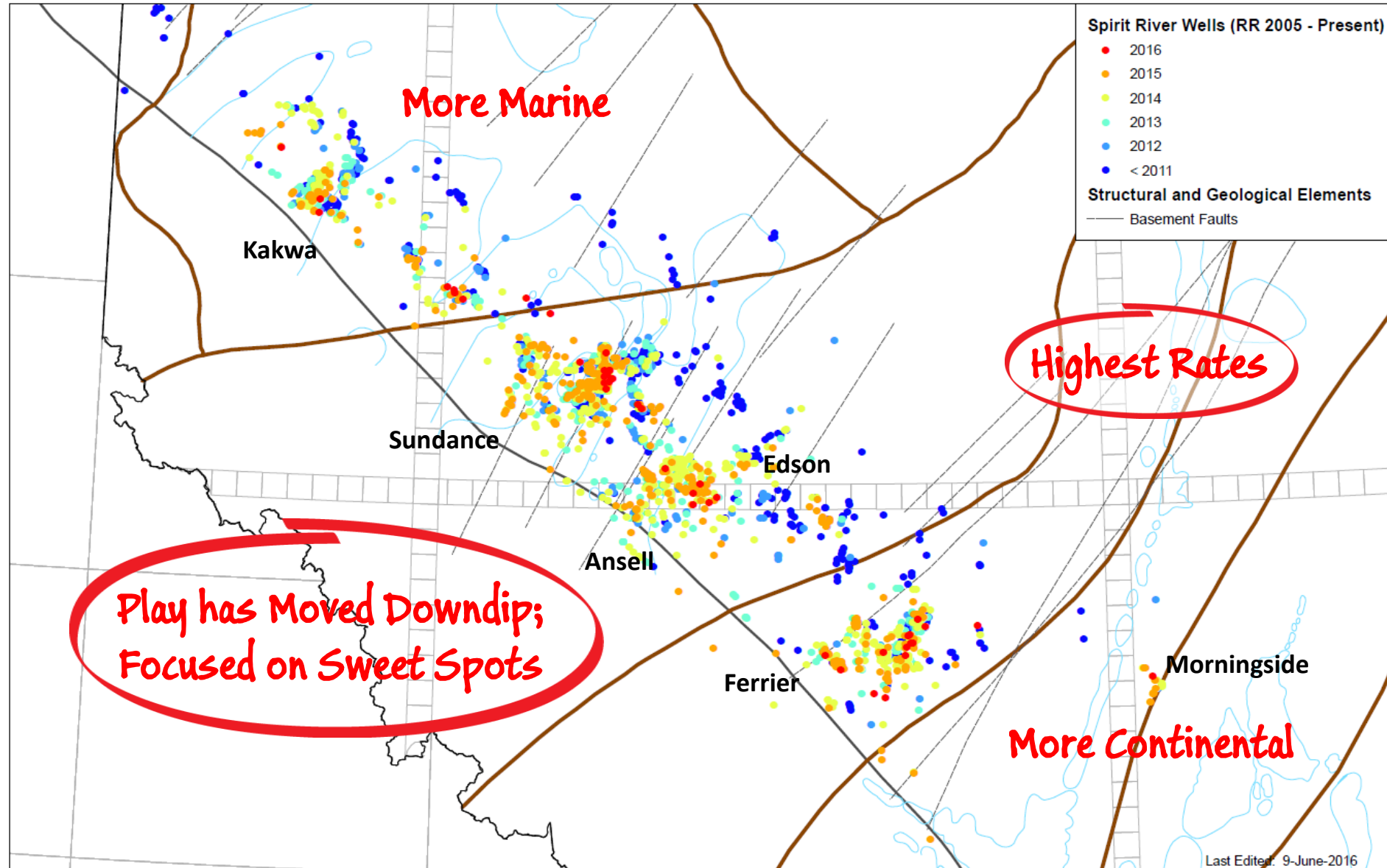
IP90 Average Rate—Wells On-Stream in 2015



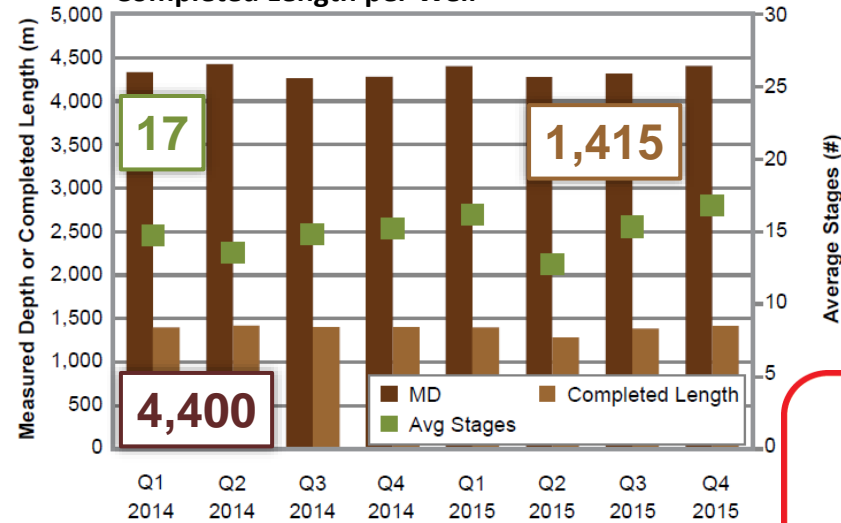
Hot Resource Plays

Lwr Cret Spirit River Resource Gas Play

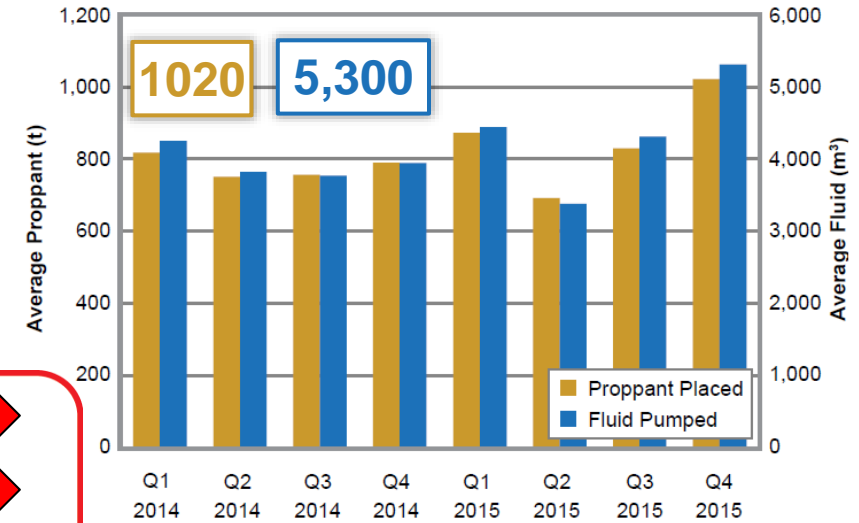




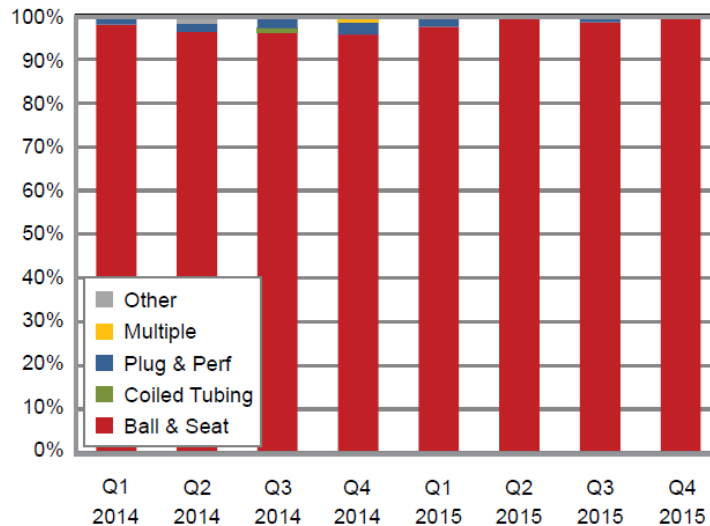
Avg Stages, Measured Depth and Completed Length per Well



Avg Proppant and Fluid per Well

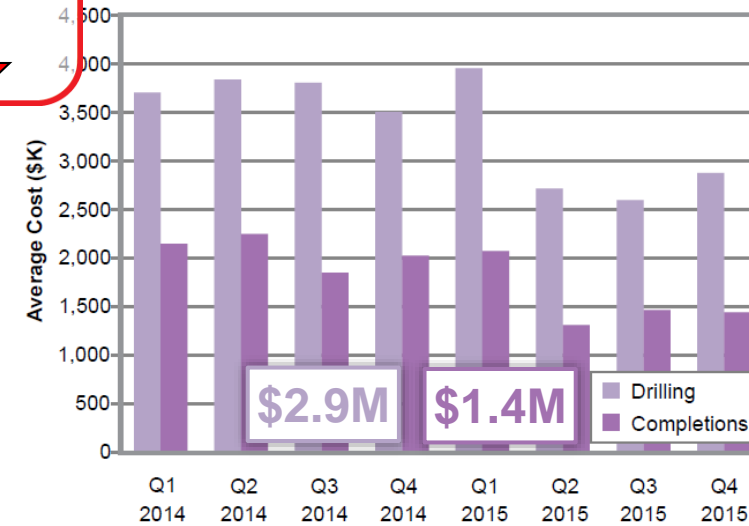


Technology Group Distribution



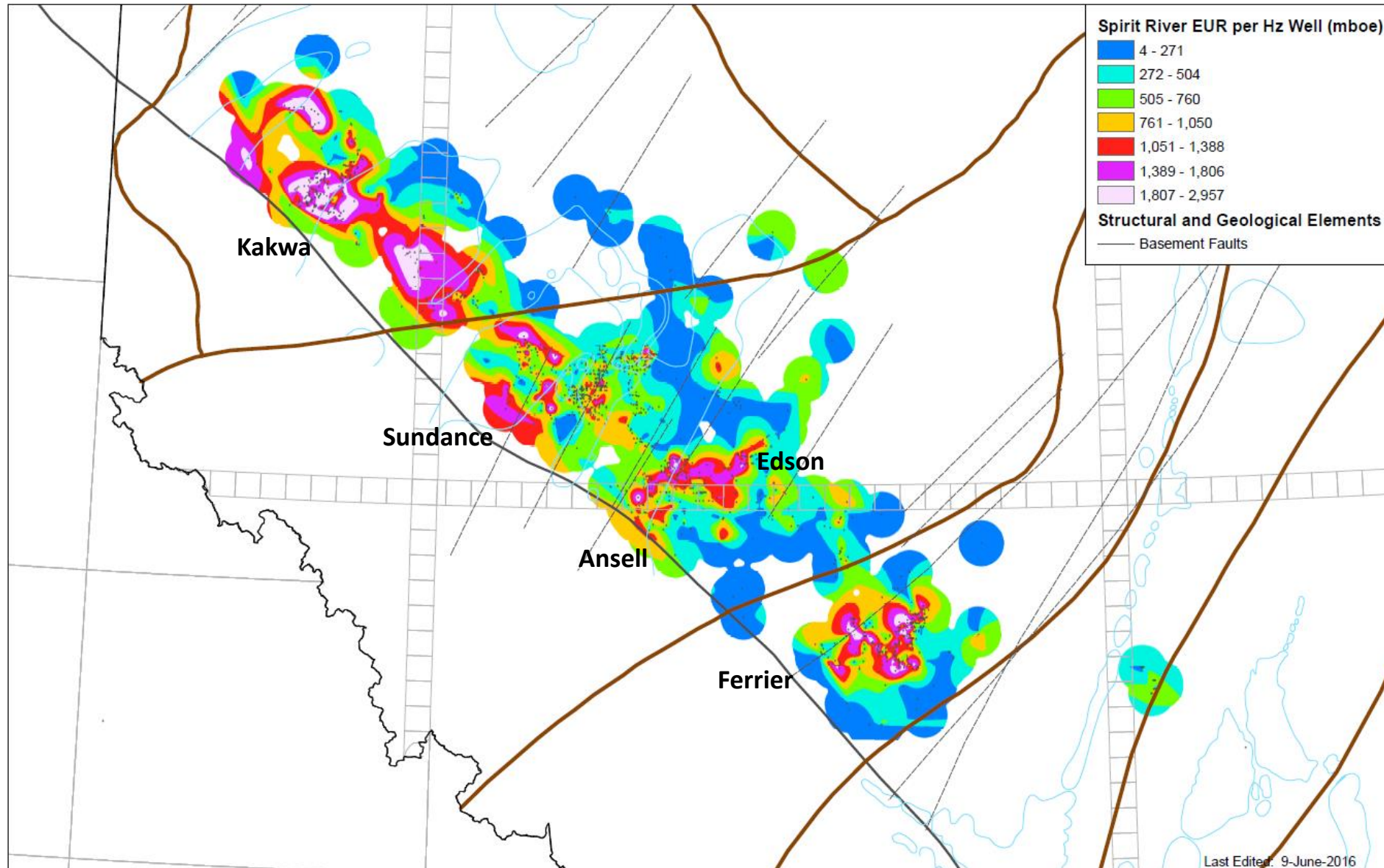
Stages ↔
Length ↔
Proppant ↑
Cost ↓

Avg D&C Costs per Well

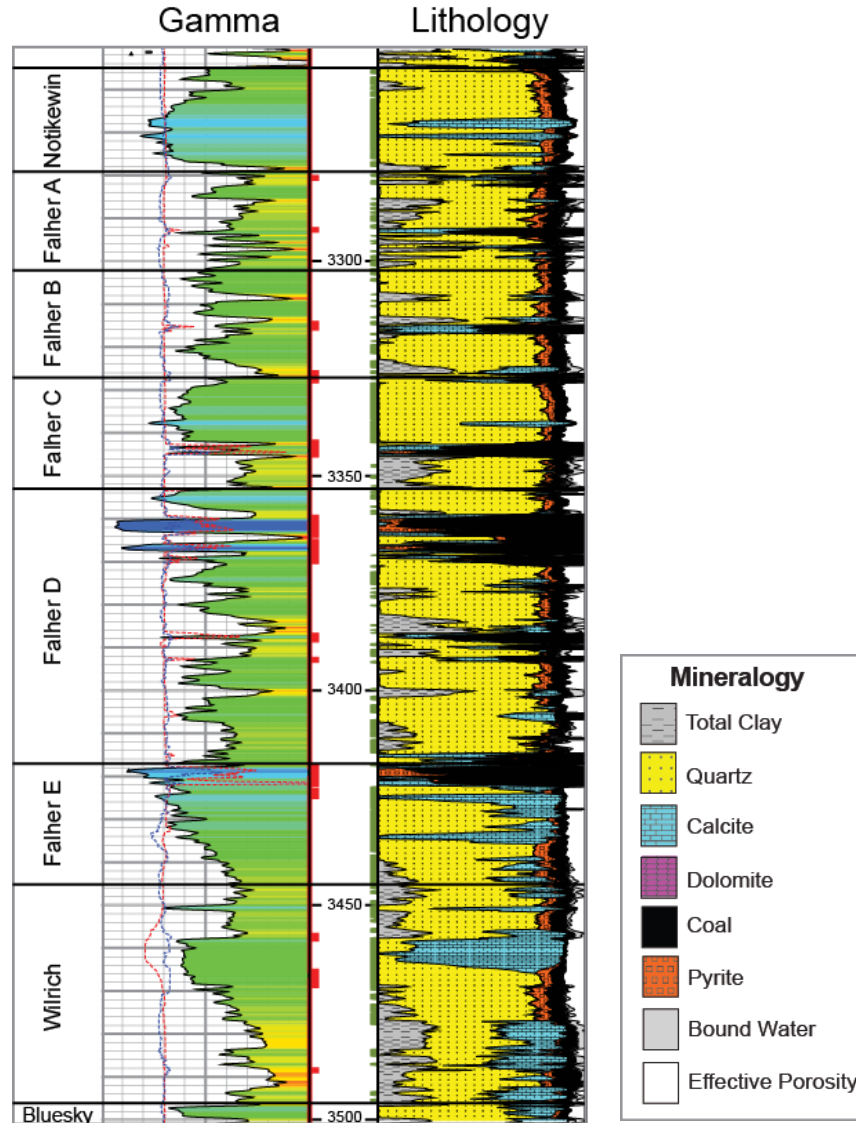


SPIRIT RIVER

Estimated Ultimate Recovery (EUR) per Hz Well



5-23-57-1W6



Pros

- Pay ~ 120m
- Stacked sands
- Highest IP rates in Basin

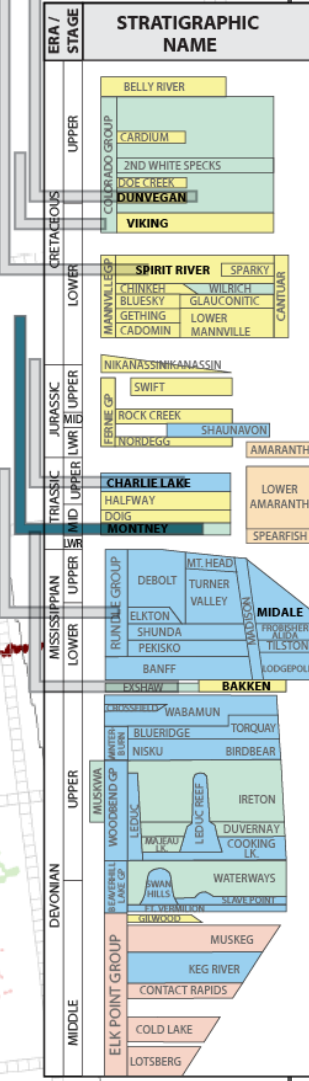
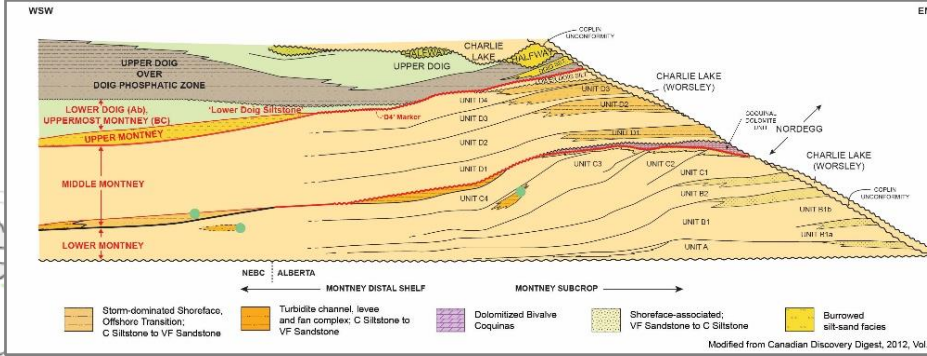
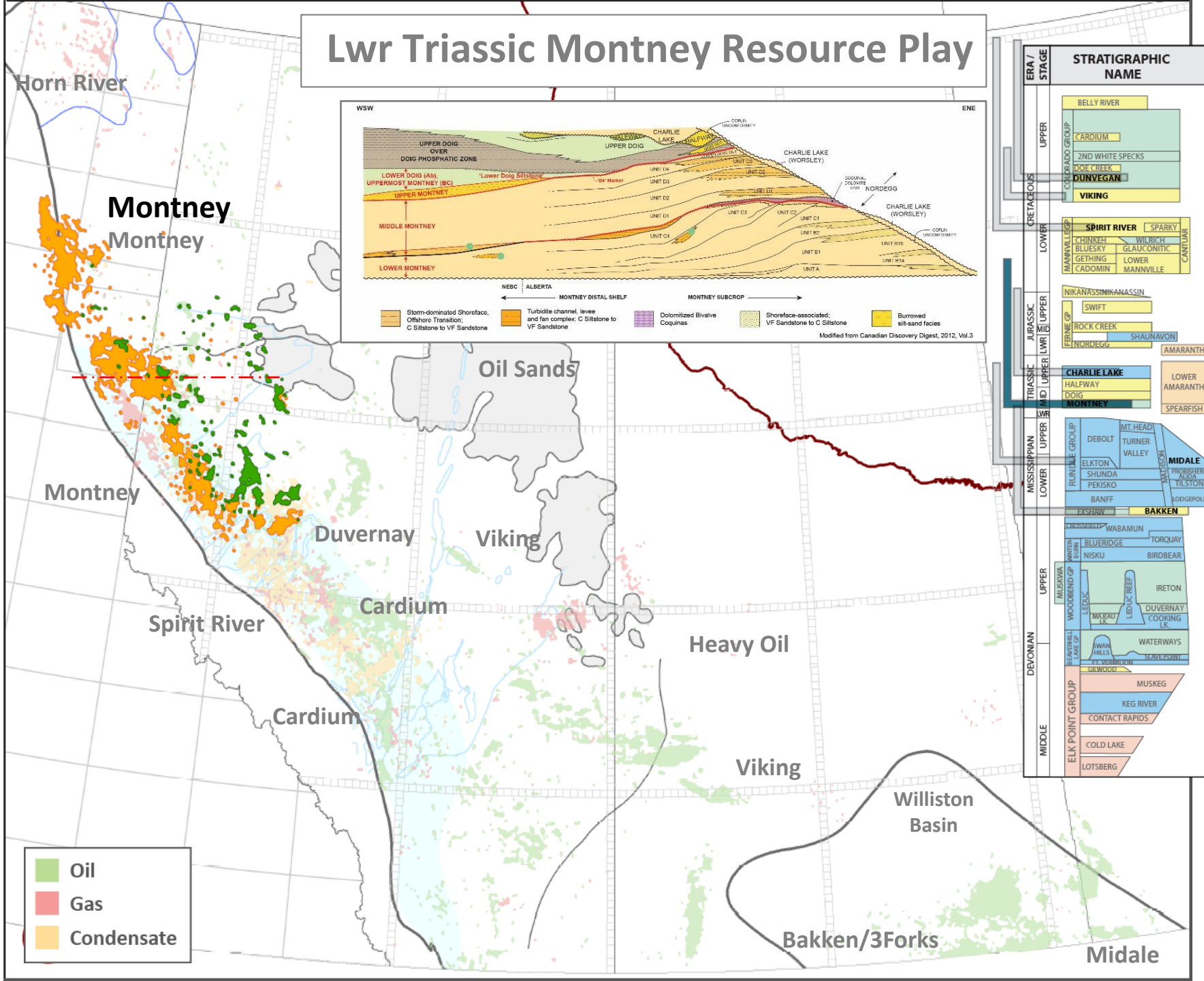
Cons

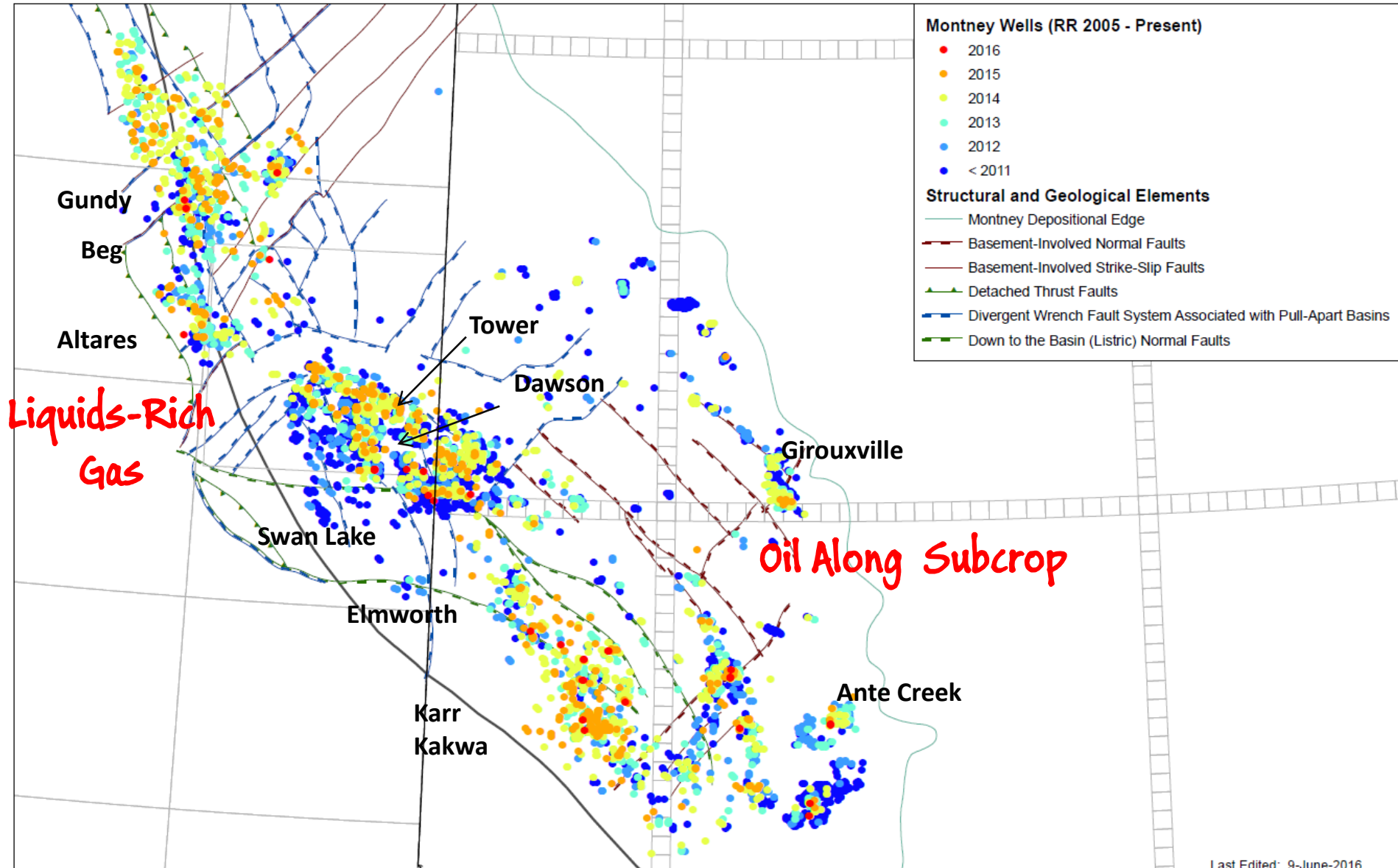
- Variable liquids rates
- Geological complexity

Costs

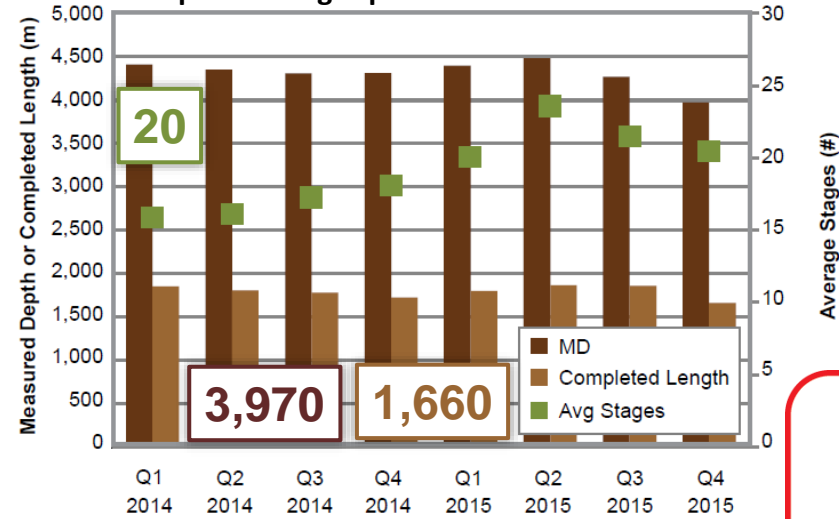
- Avg D&C Cost—\$4.3MM
- Half Cycle Cost—\$5,137/boepd

Lwr Triassic Montney Resource Play

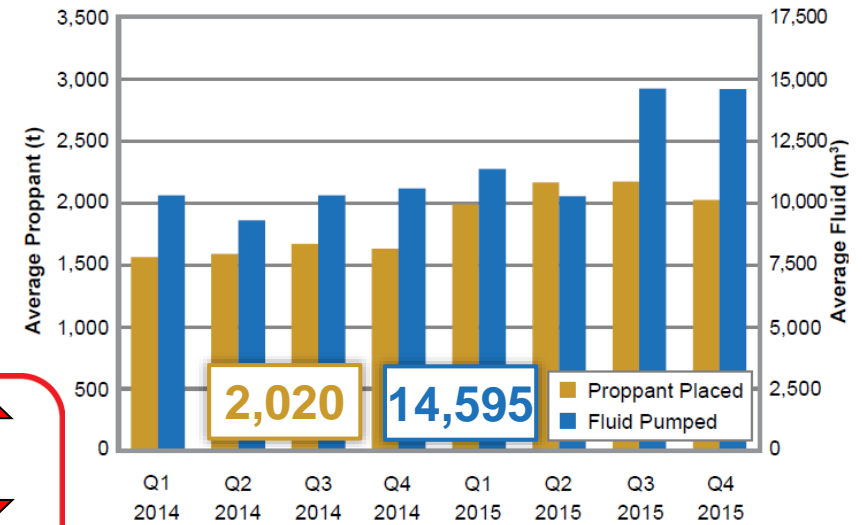




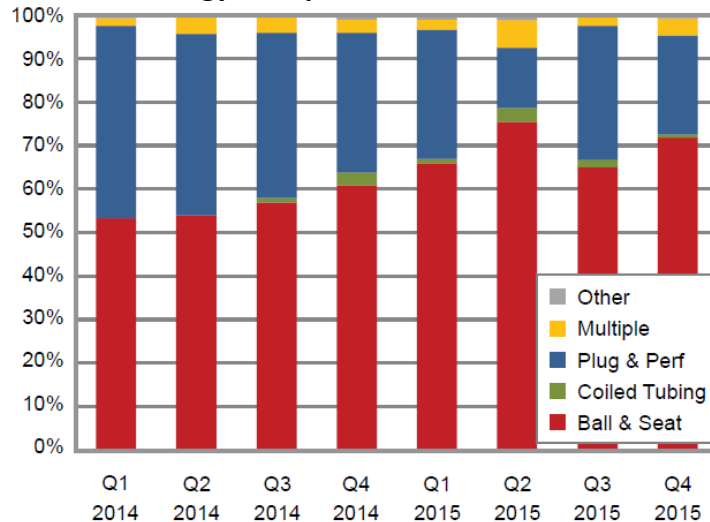
Avg Stages, Measured Depth and Completed Length per Well



Avg Proppant and Fluid per Well

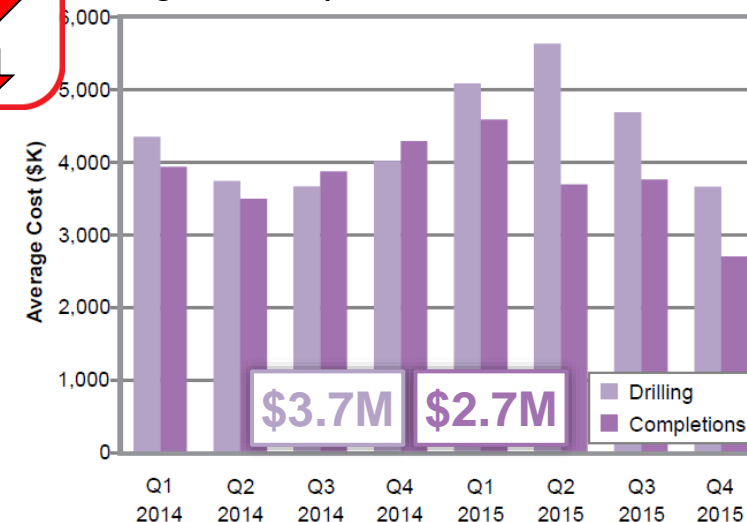


Technology Group Distribution

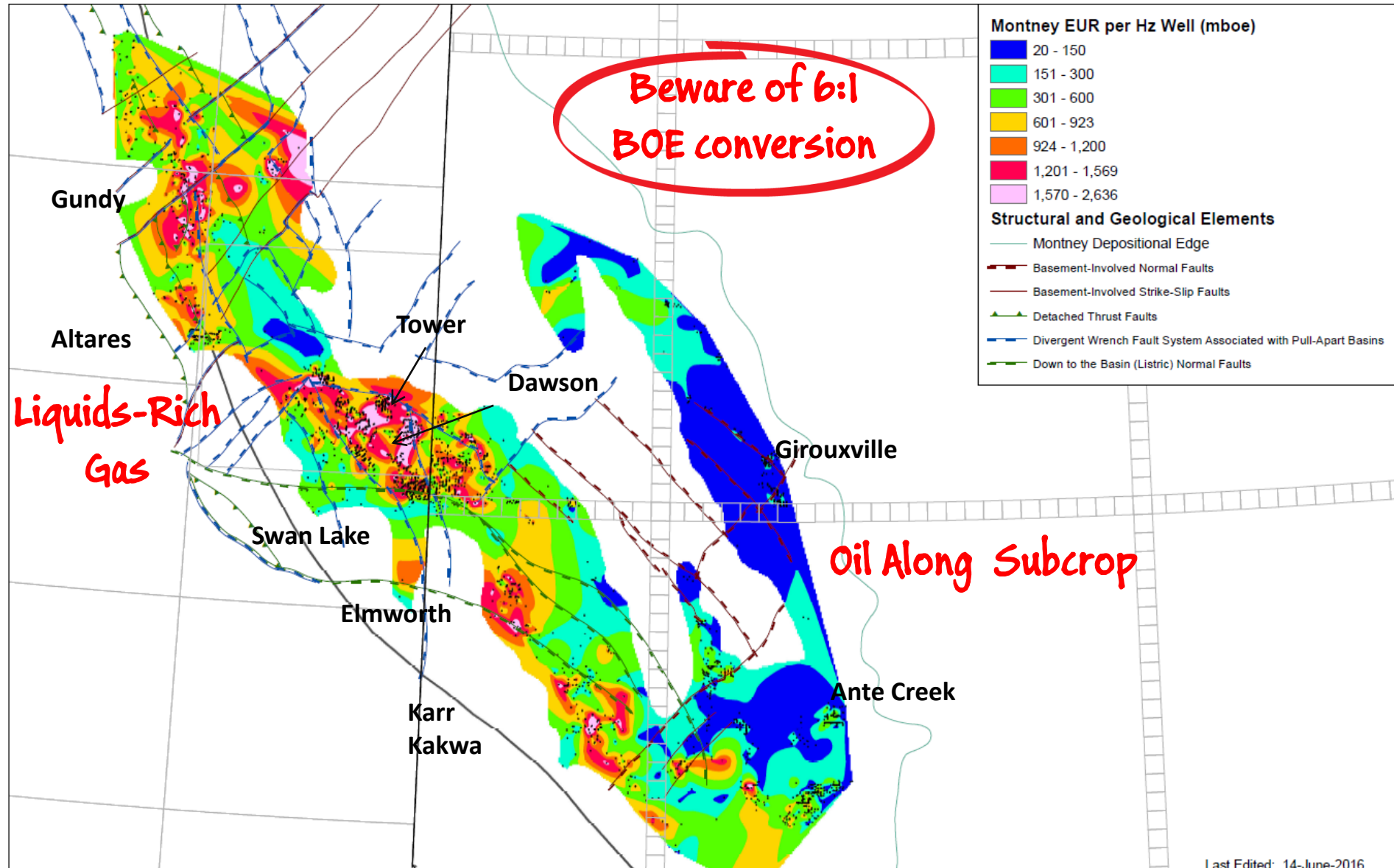


Stages ↑
Length ↓
Proppant ↔
Cost ↓

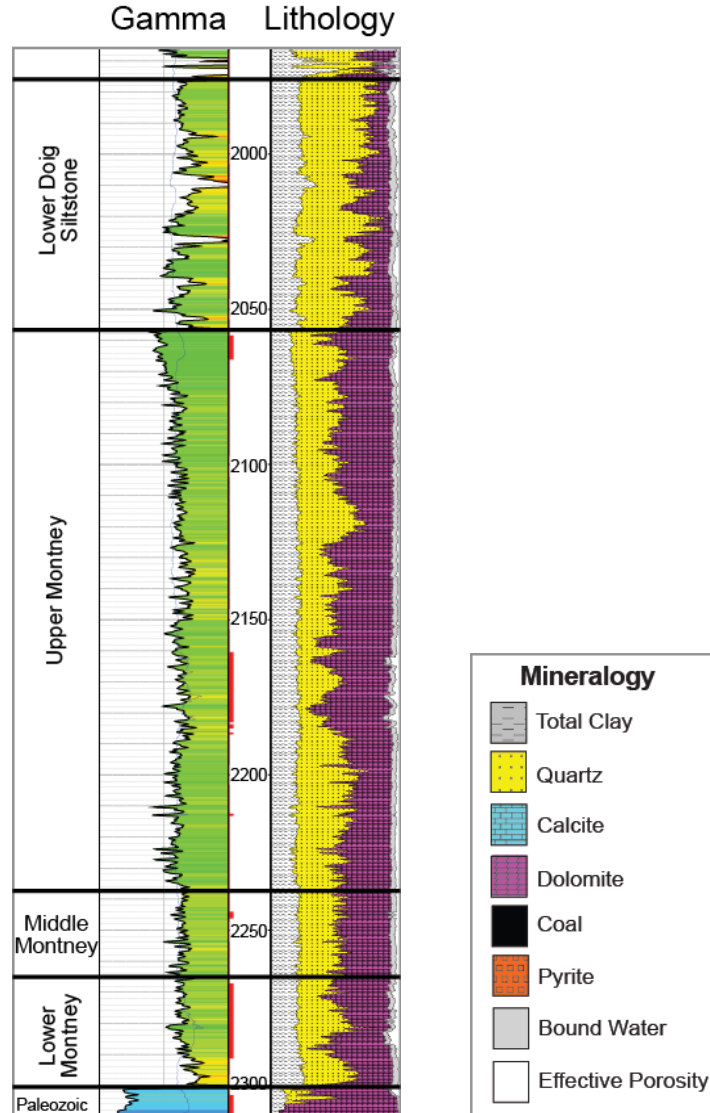
Avg D&C Costs per Well



Estimated Ultimate Recovery (EUR) per Hz Well



15-25-80-16W6



Pros

- Pay ~ 300m
- Potential for vertically stacked laterals
- High rates

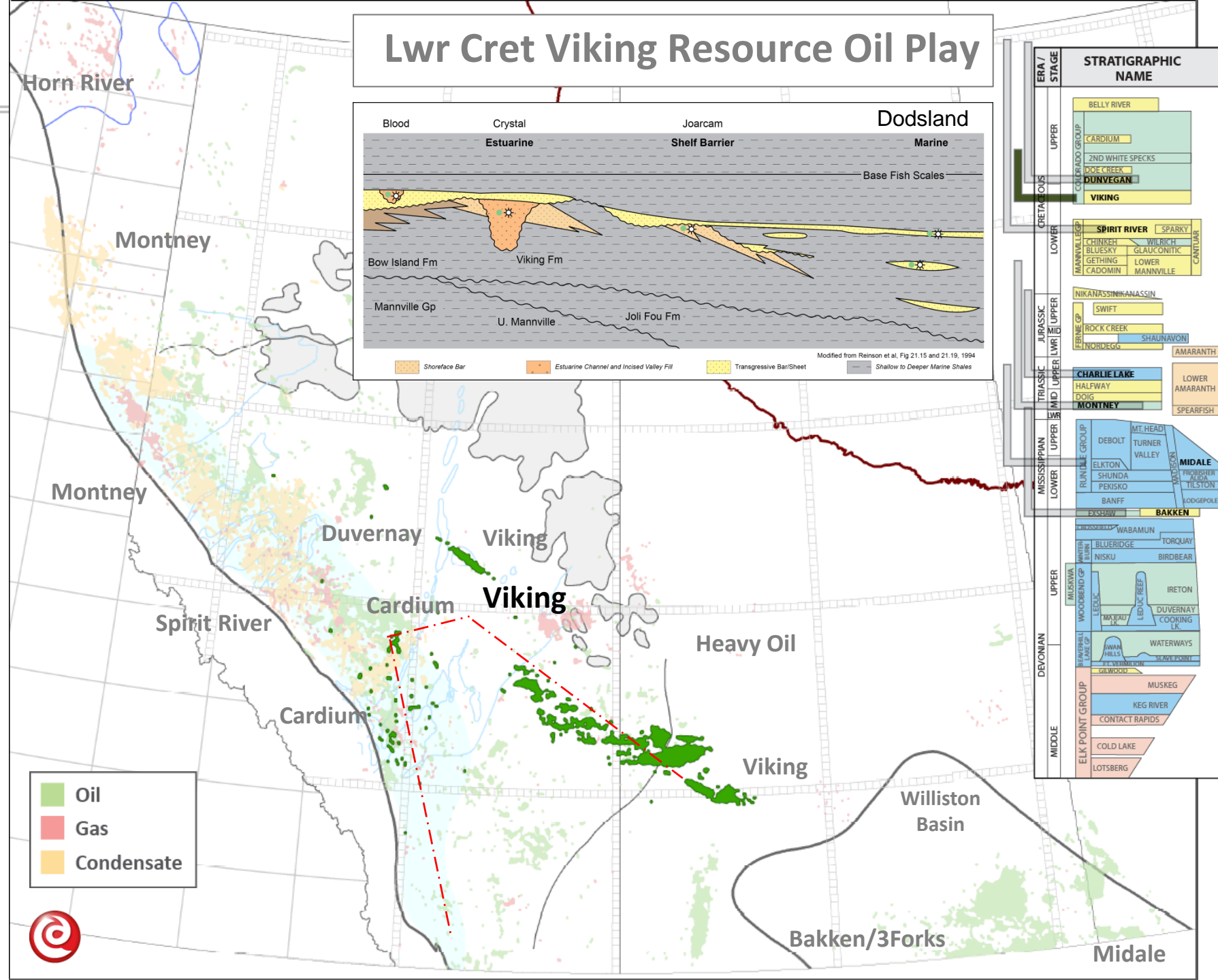
Cons

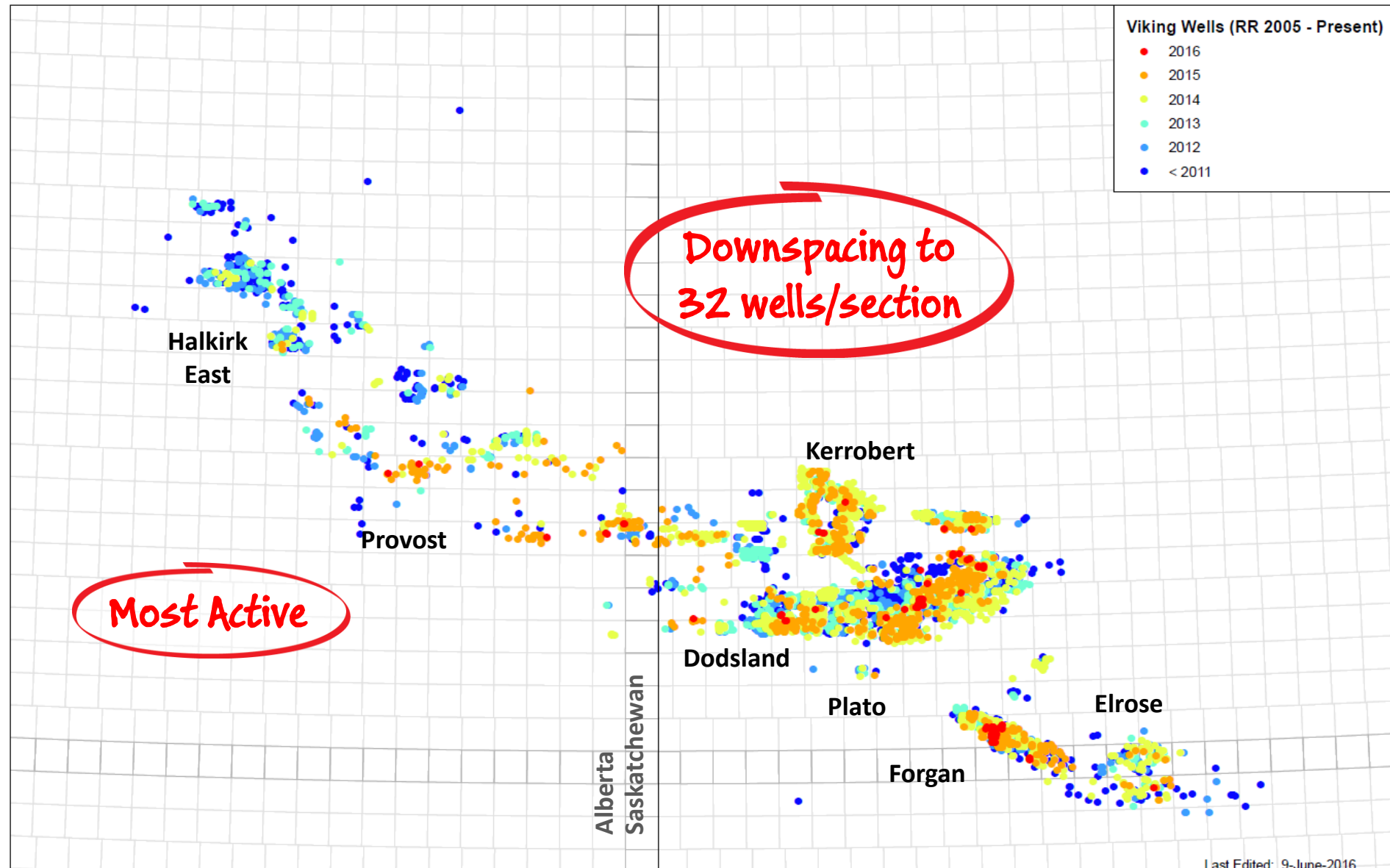
- Reservoir heterogeneity
- Variable liquids content

Costs

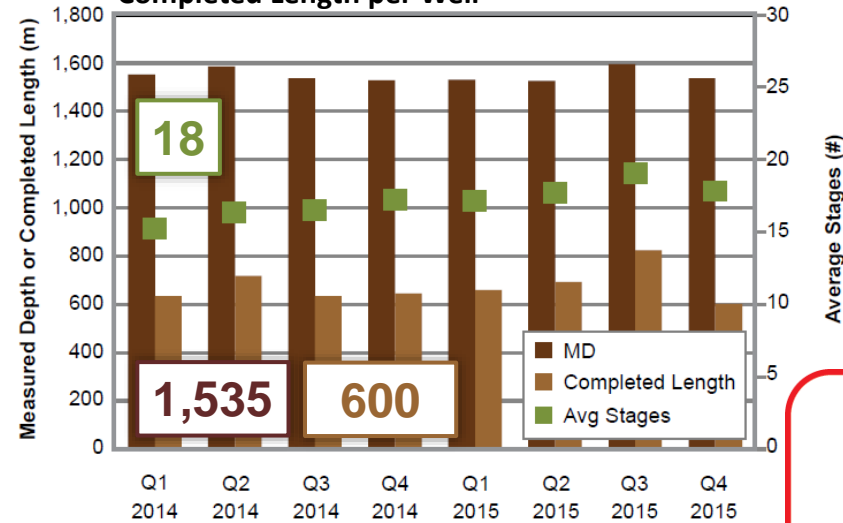
- Avg D&C Cost—\$6.4MM
- Half Cycle Cost—\$9,412/boepd

Lwr Cret Viking Resource Oil Play



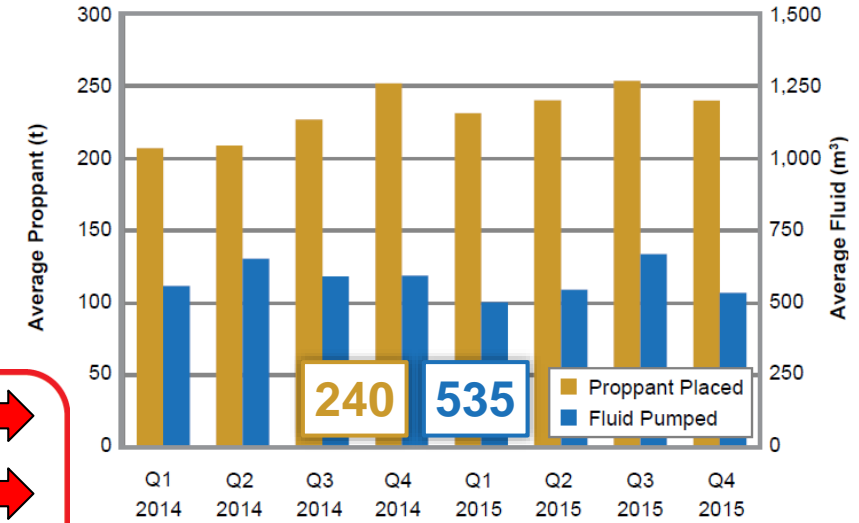


Avg Stages, Measured Depth and Completed Length per Well

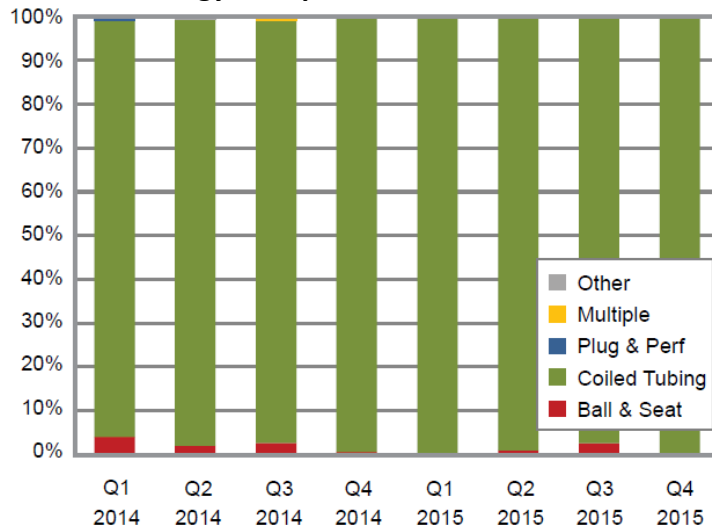


Stages ↔
Length ↔
Proppant ↔
Cost ↓

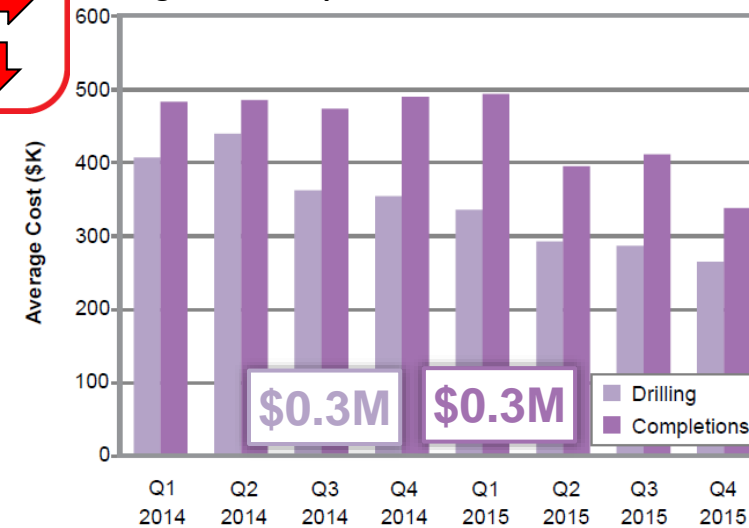
Avg Proppant and Fluid per Well



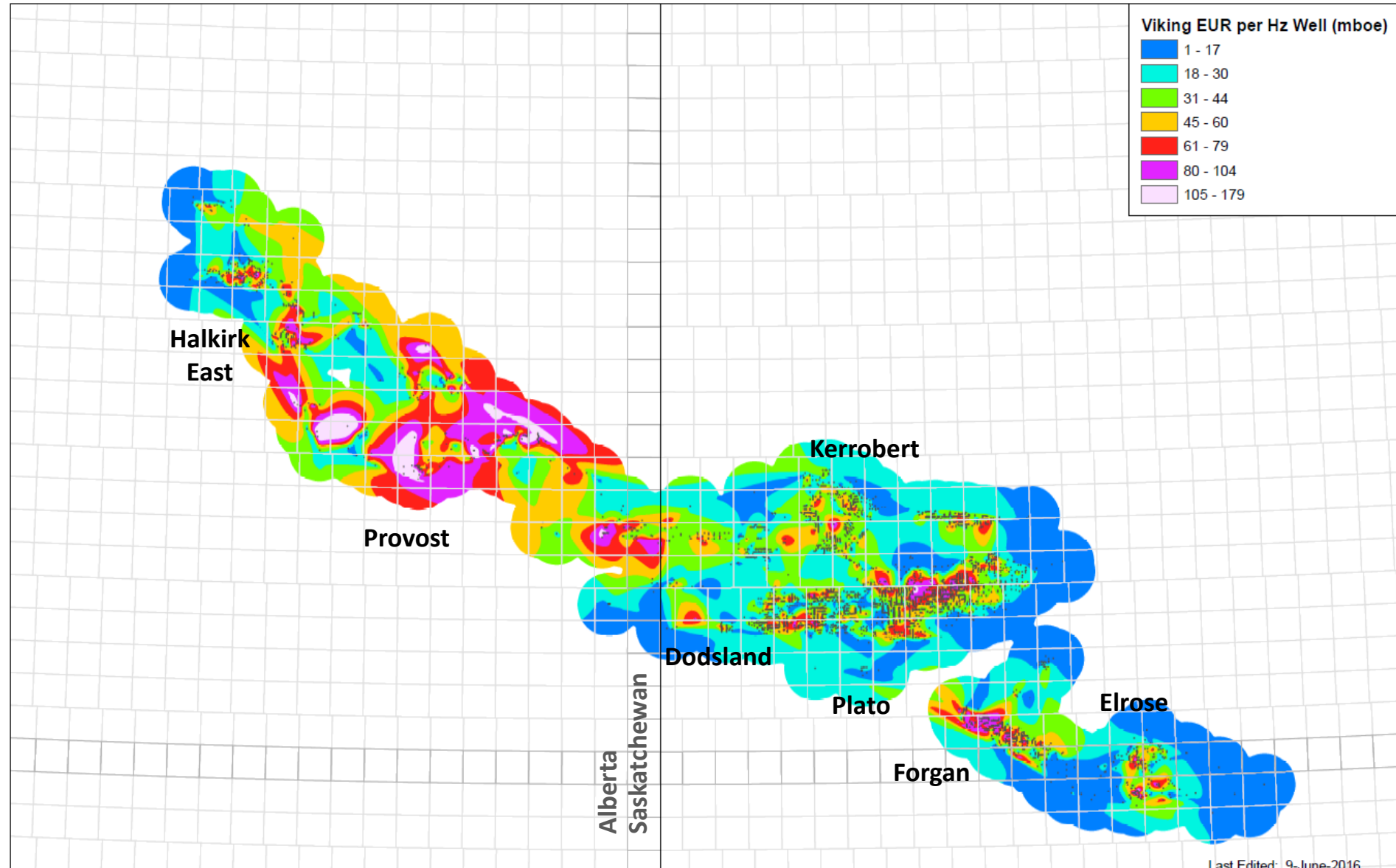
Technology Group Distribution



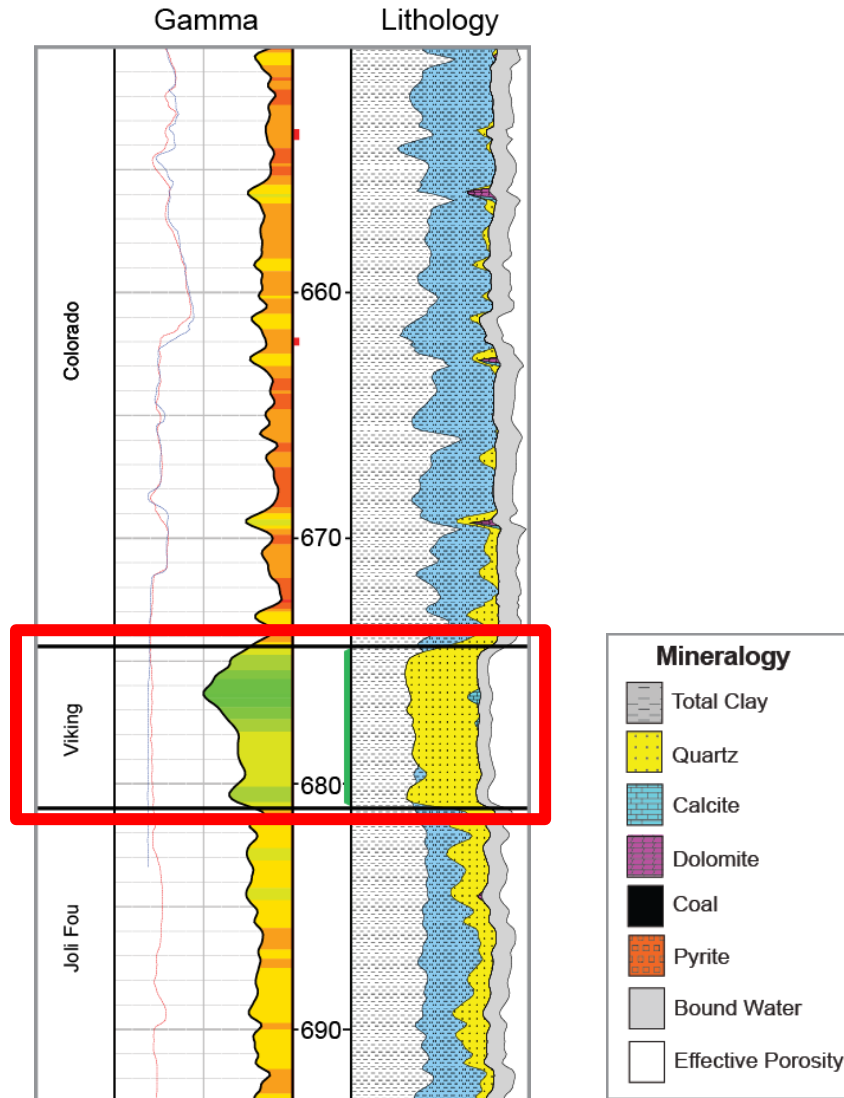
Avg D&C Costs per Well



Estimated Ultimate Recovery (EUR) per Hz Well



3-23-31-21W3



Pros

- Large areal extent
- Lowest cost play WCSB
- Most active play WCSB

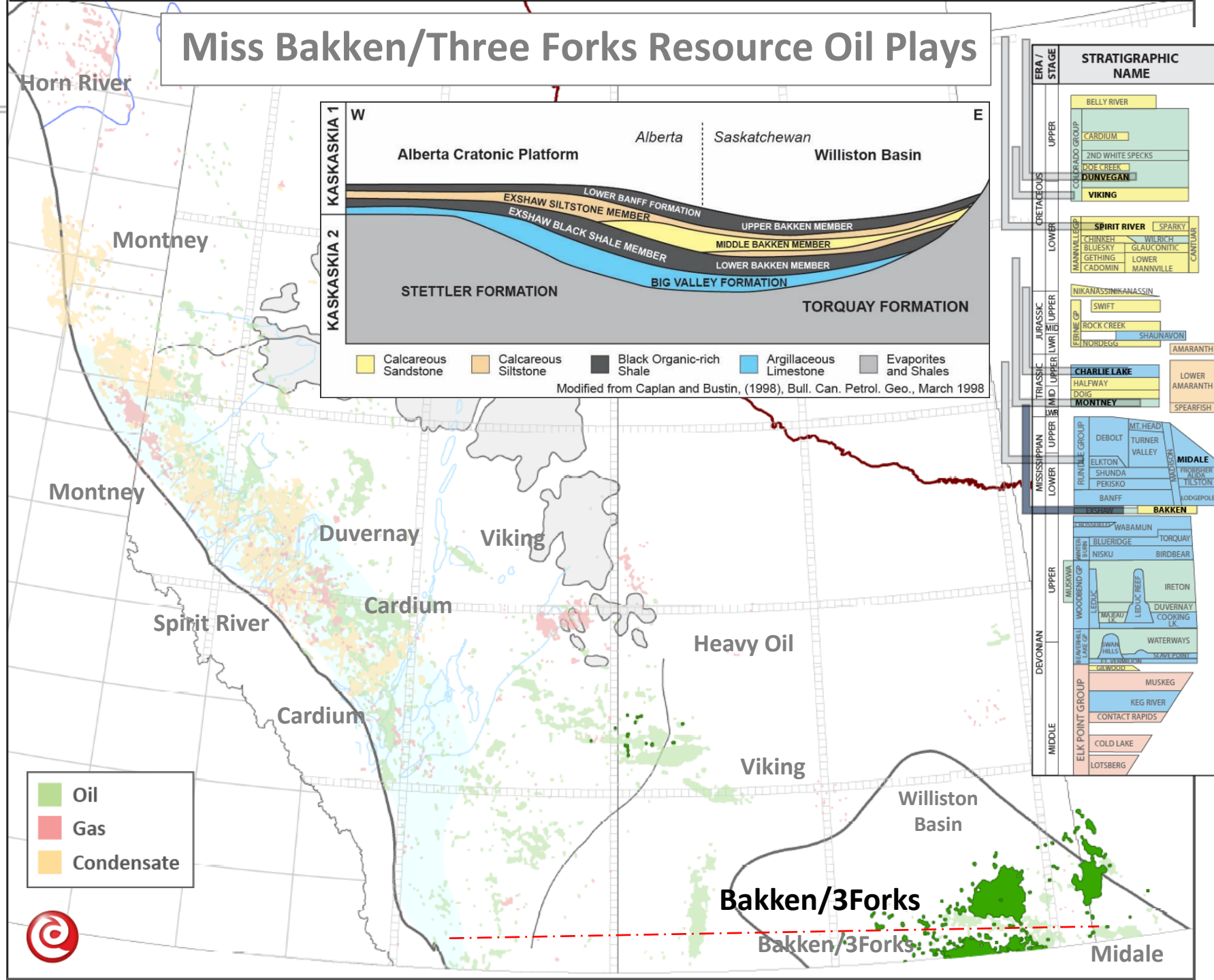
Cons

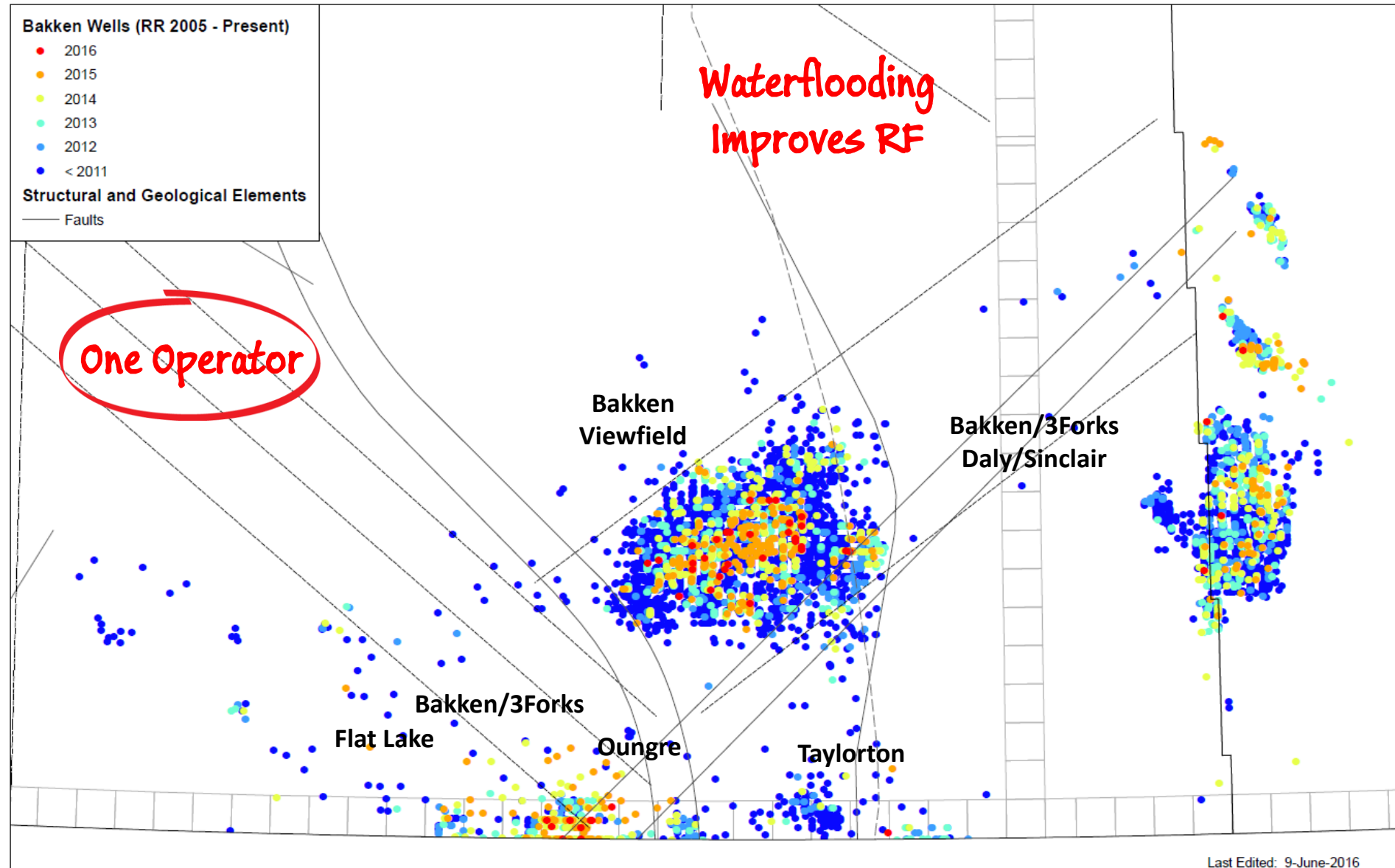
- Pay 5-10m

Costs

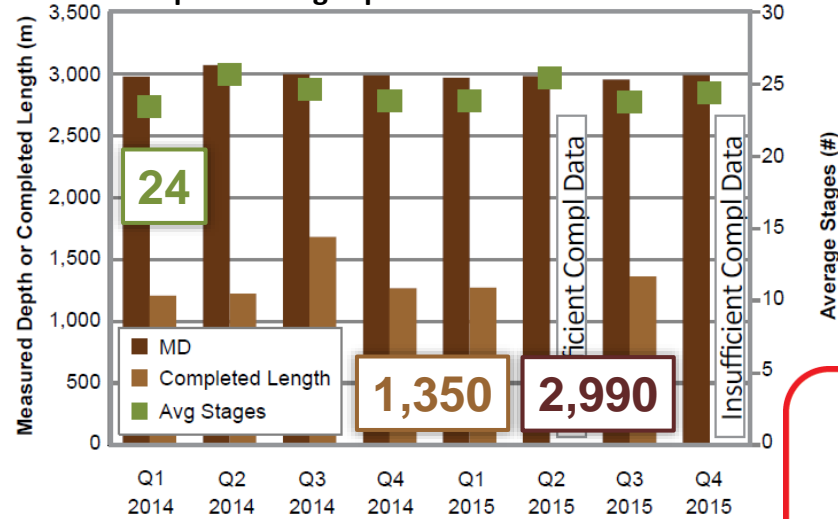
- Avg D&C Cost—\$0.6MM
- Half Cycle Cost—\$9,524/boepd

Miss Bakken/Three Forks Resource Oil Plays

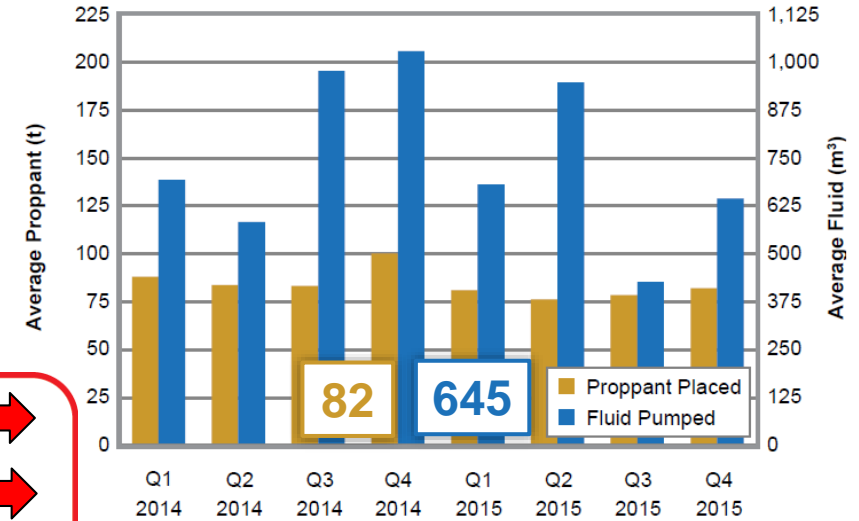




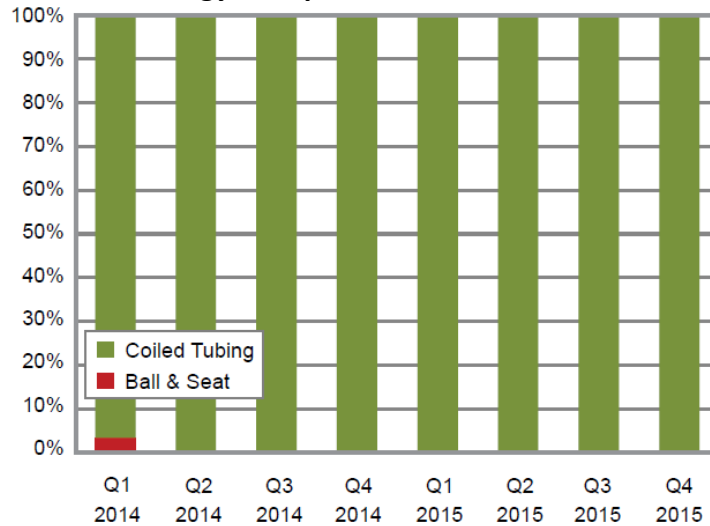
Avg Stages, Measured Depth and Completed Length per Well



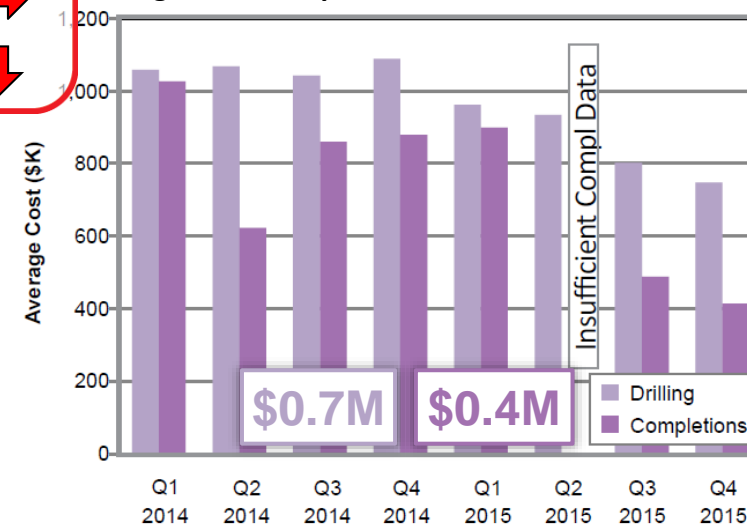
Avg Proppant and Fluid per Well



Technology Group Distribution



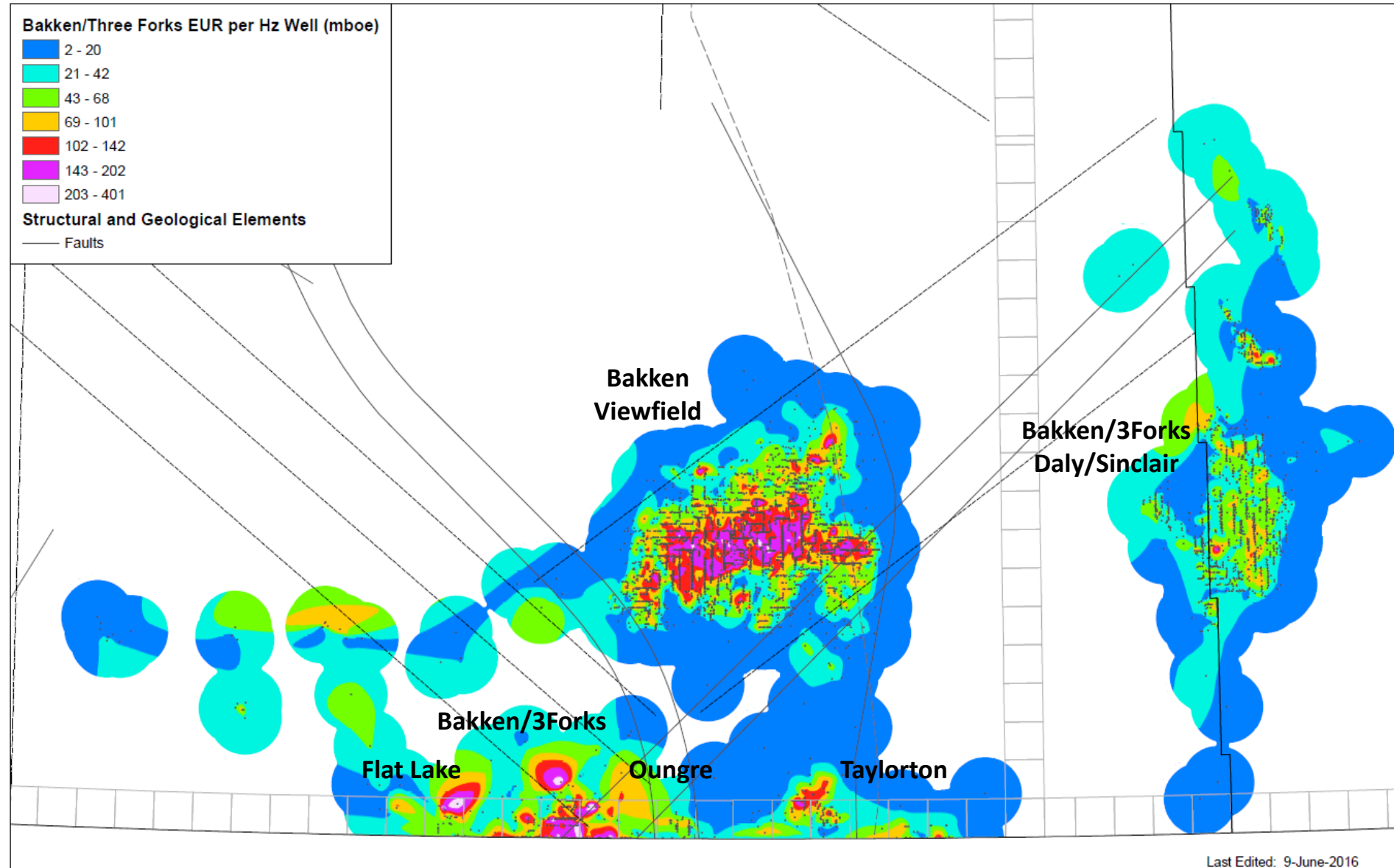
Avg D&C Costs per Well



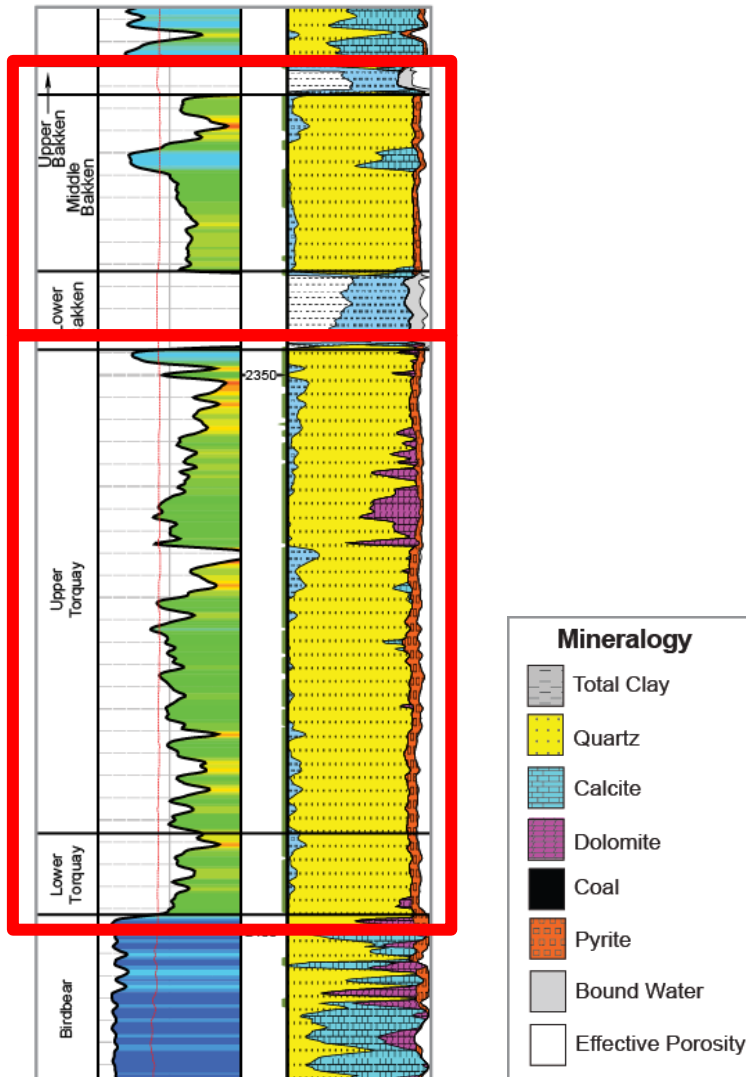
Stages ↔
Length ↔
Proppant ↔
Cost ↓

BAKKEN/THREE FORKS

Estimated Ultimate Recovery (EUR) per Hz Well



21/5-17-1-15W2



Pros

- Stacked Bakken/Three Forks
- Mature play—efficiencies

Cons

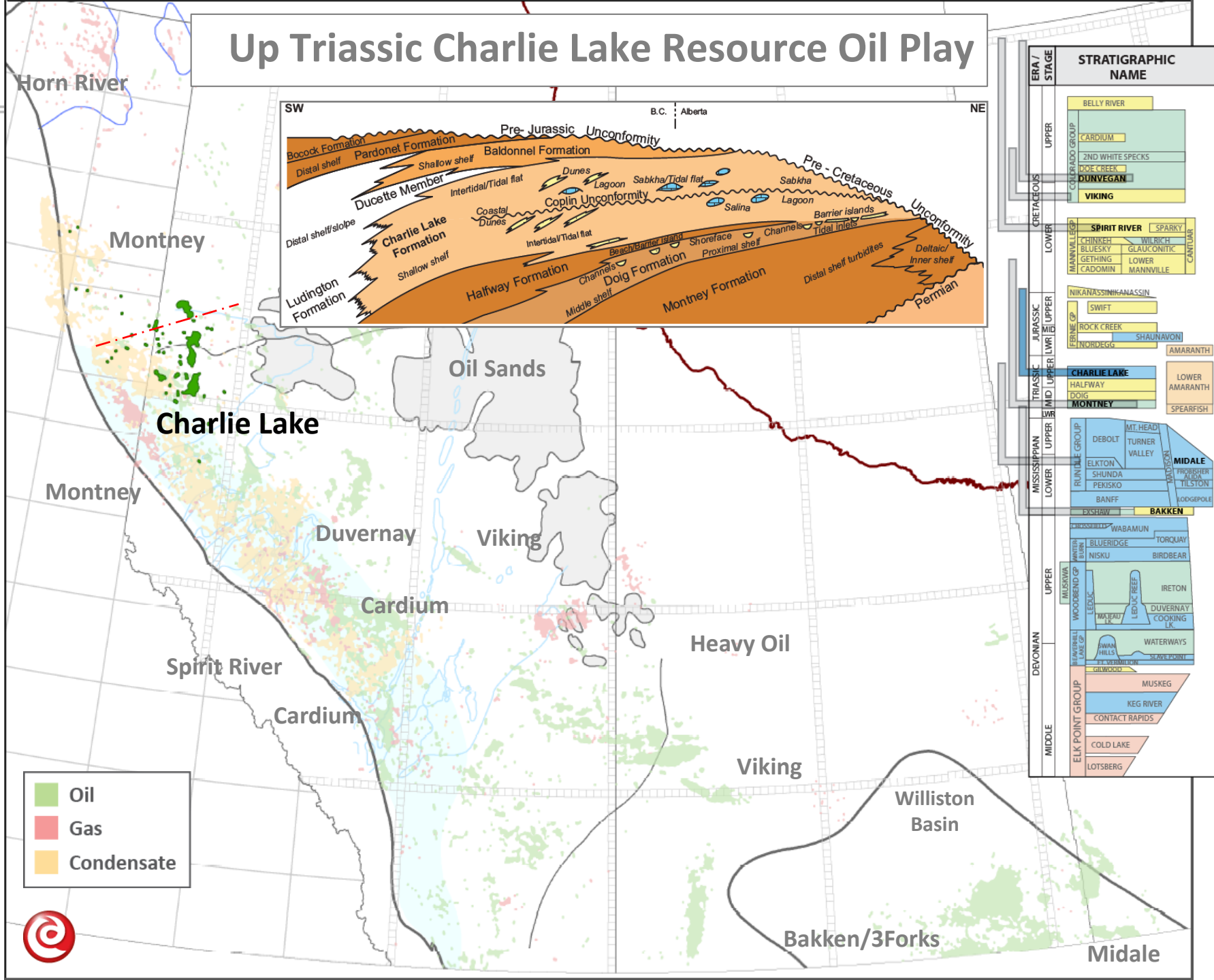
- Pay 5-15m

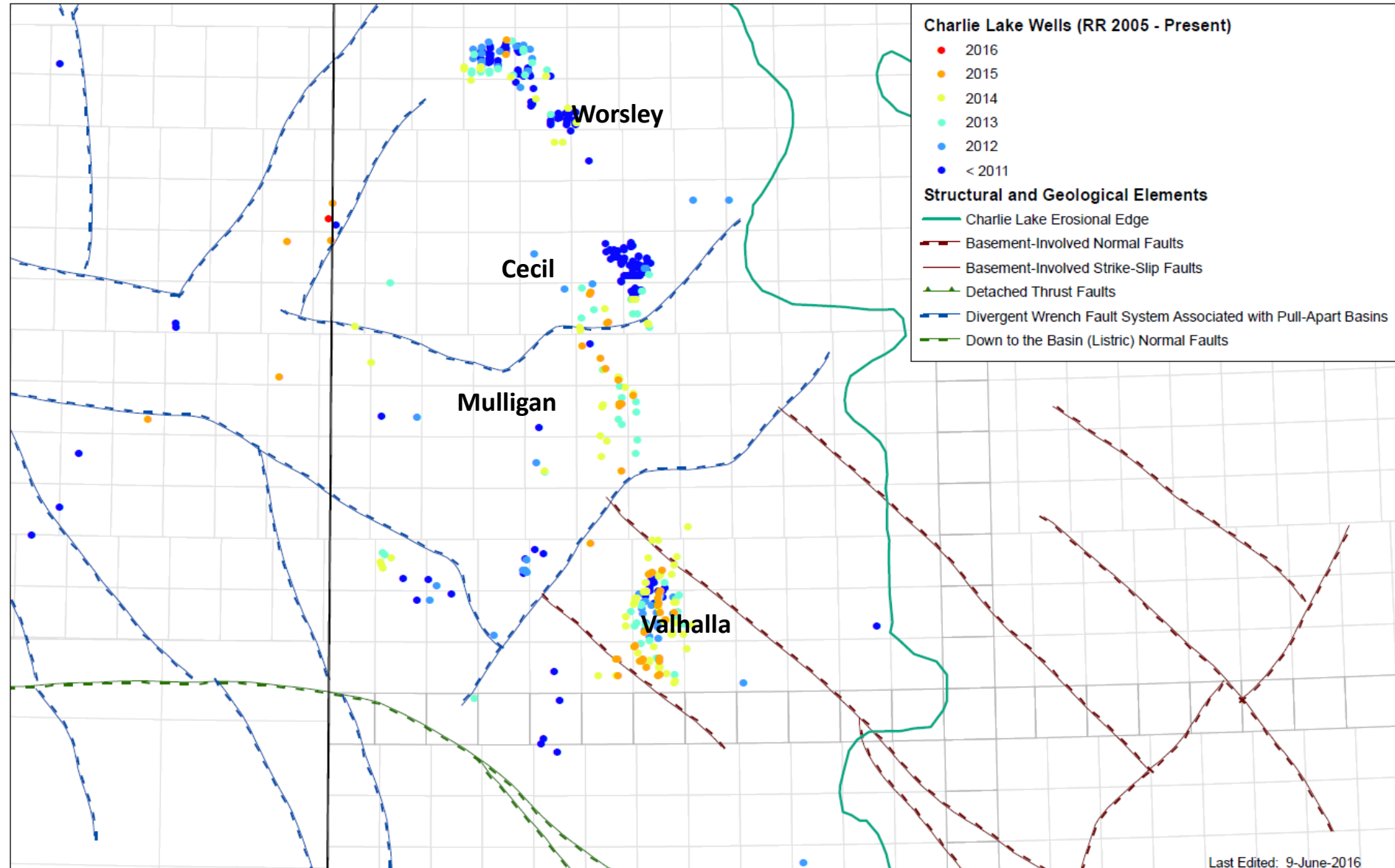
Costs

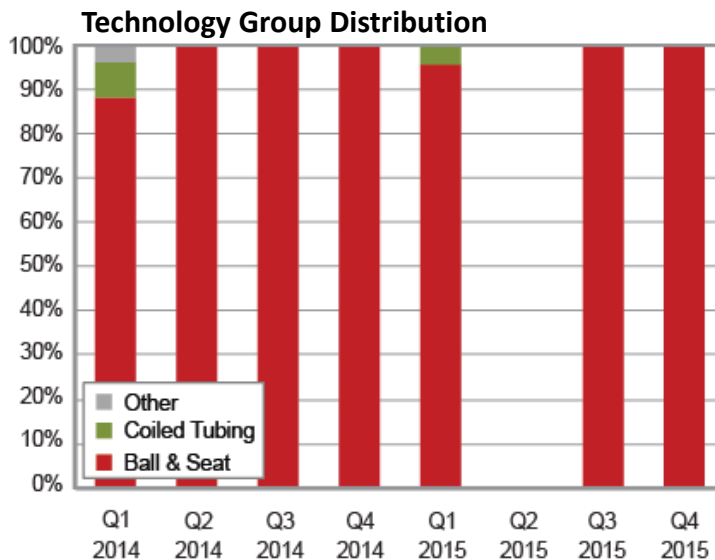
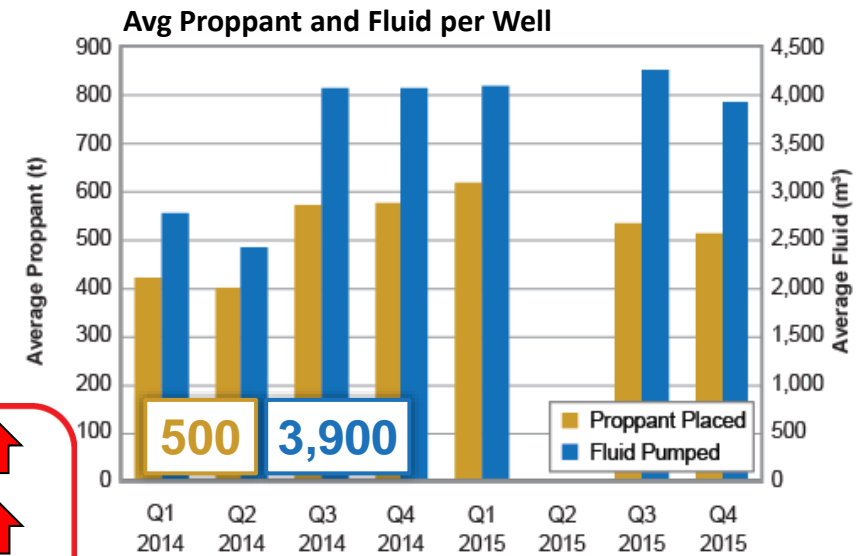
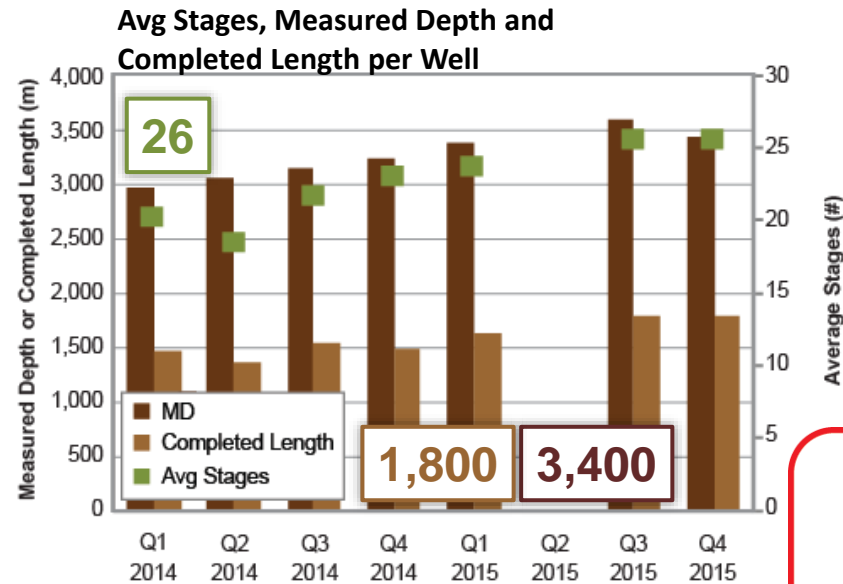
- Avg D&C Cost—\$1.1MM
- Half Cycle Cost—\$12,605/boepd

Developing Resource Plays

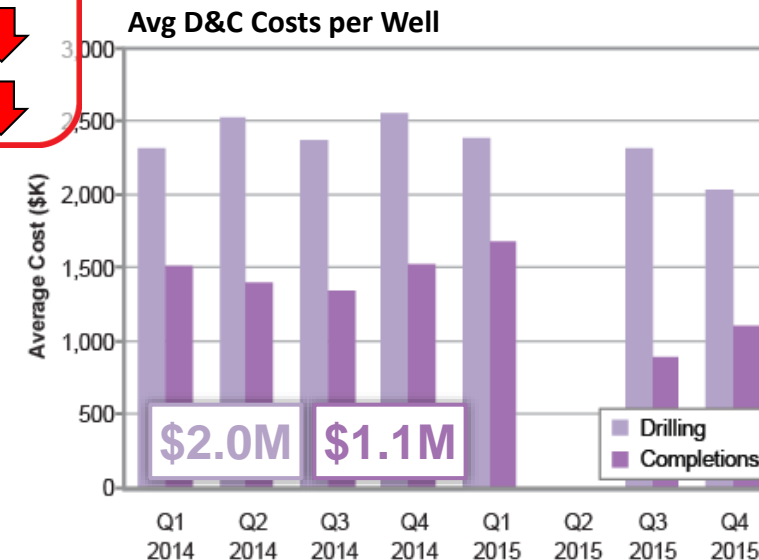
Up Triassic Charlie Lake Resource Oil Play



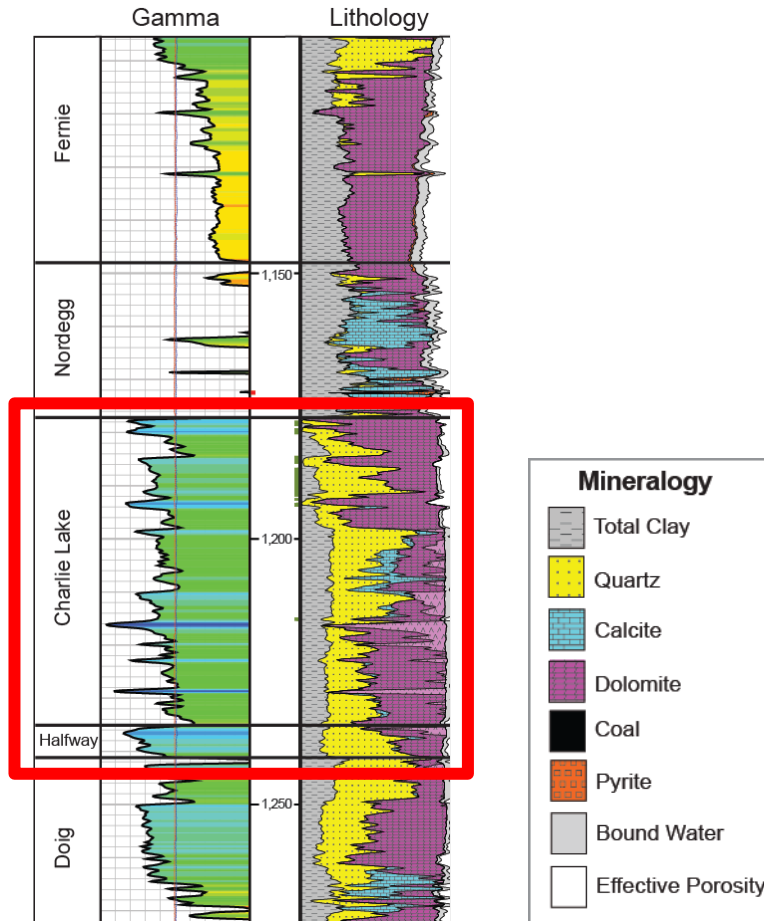




Stages ↑
Length ↑
Proppant ↓
Cost ↓



16-15-81-8W6



Pros

- Oil-prone
- An upper and lower play

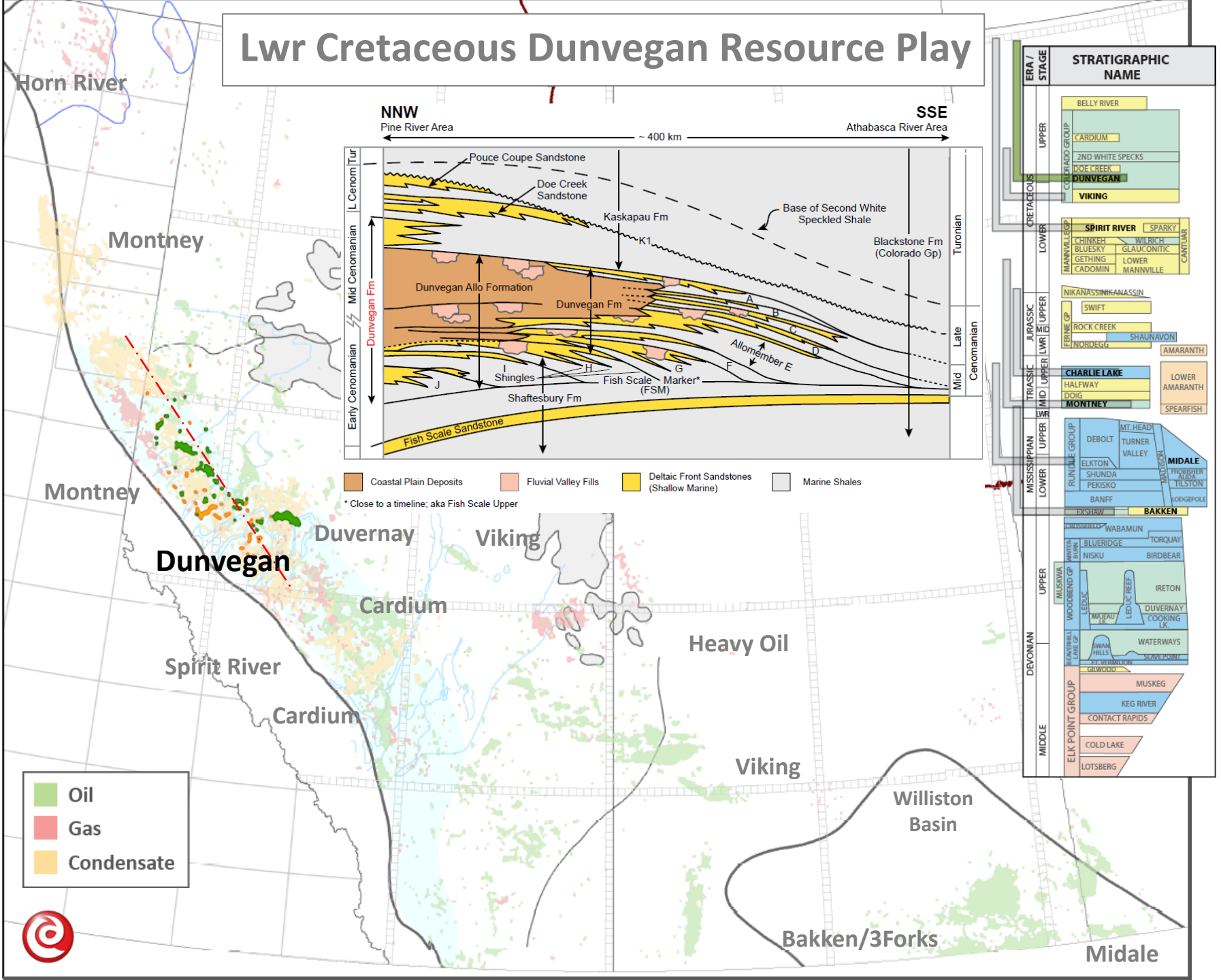
Cons

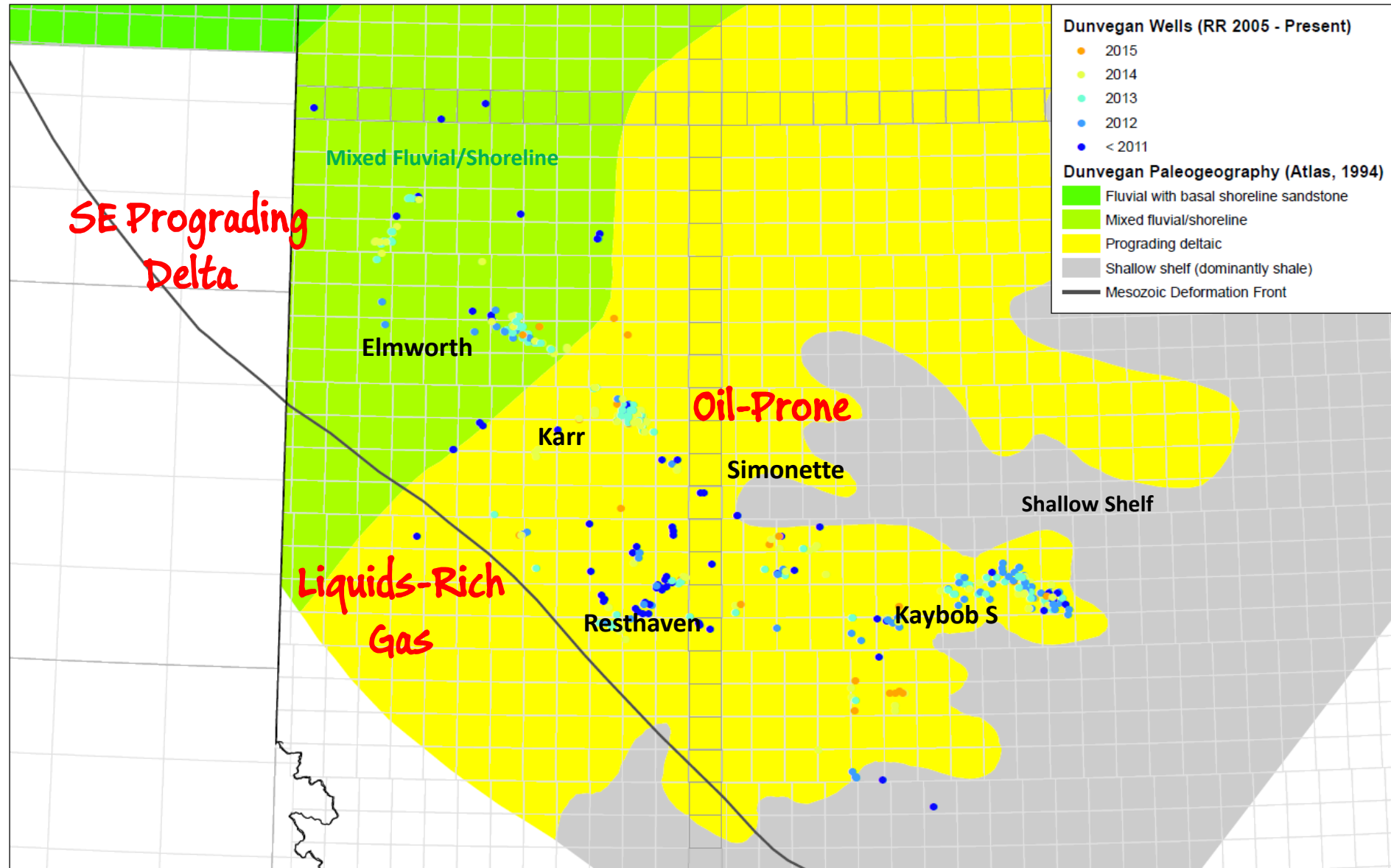
- Pay ~10m
- Rel thin reservoirs
- Reservoir heterogeneity

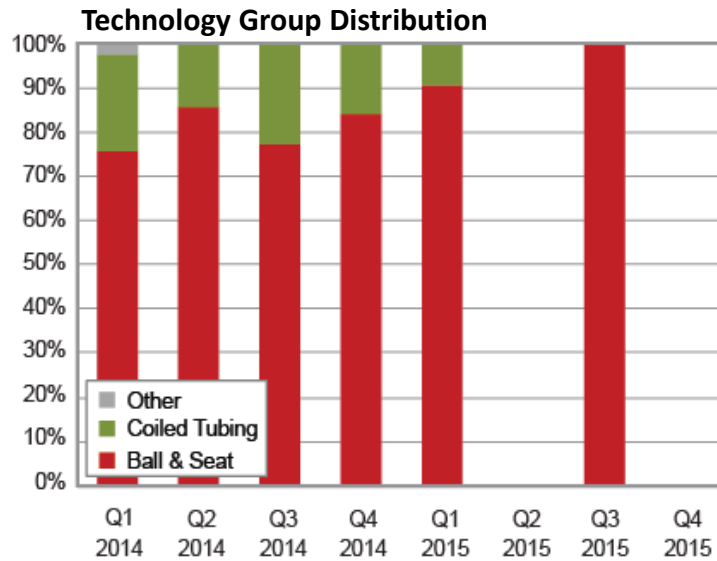
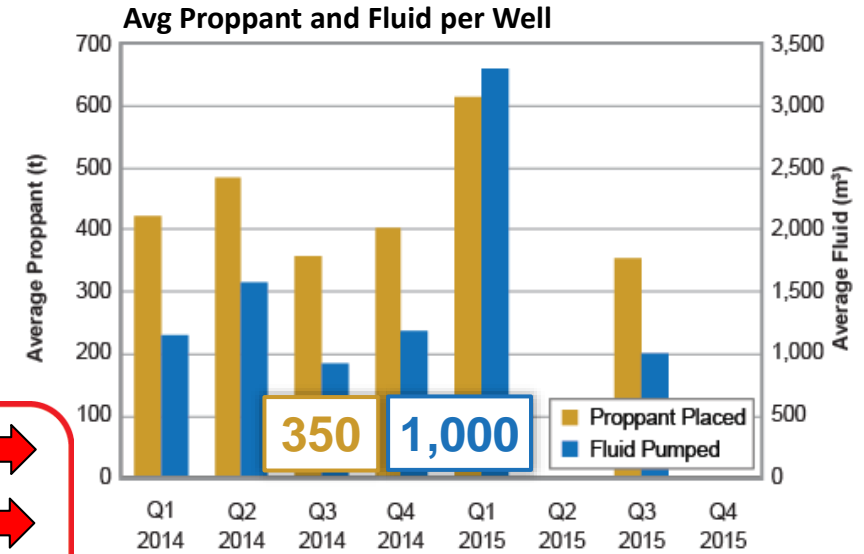
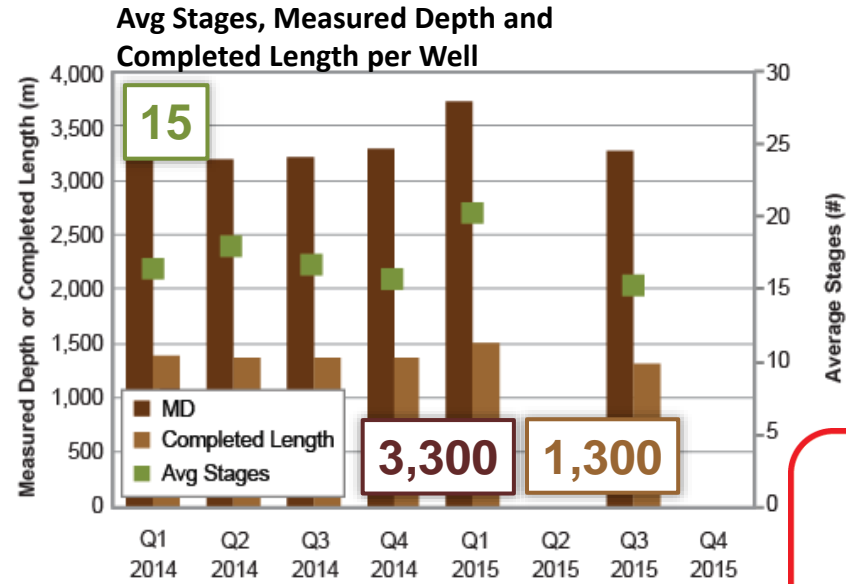
Costs

- Avg D&C Cost—\$3.1MM
- Half Cycle Cost—\$12,863/boepd

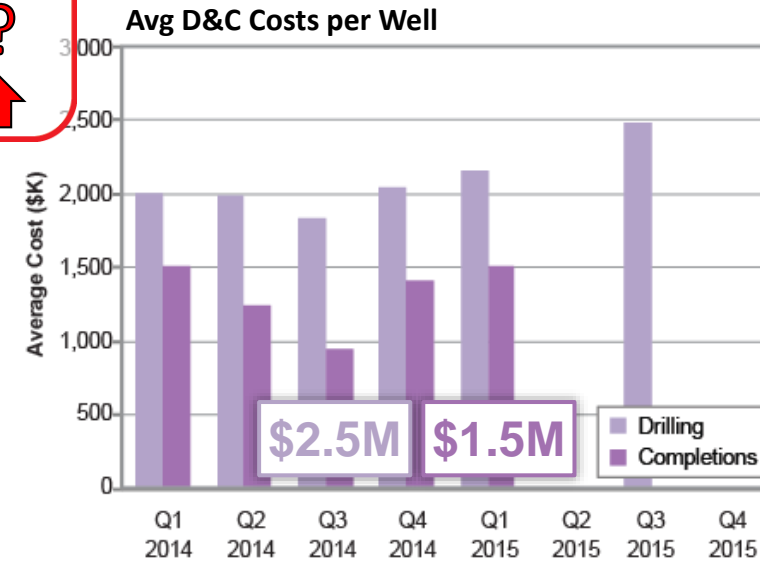
Lwr Cretaceous Dunvegan Resource Play



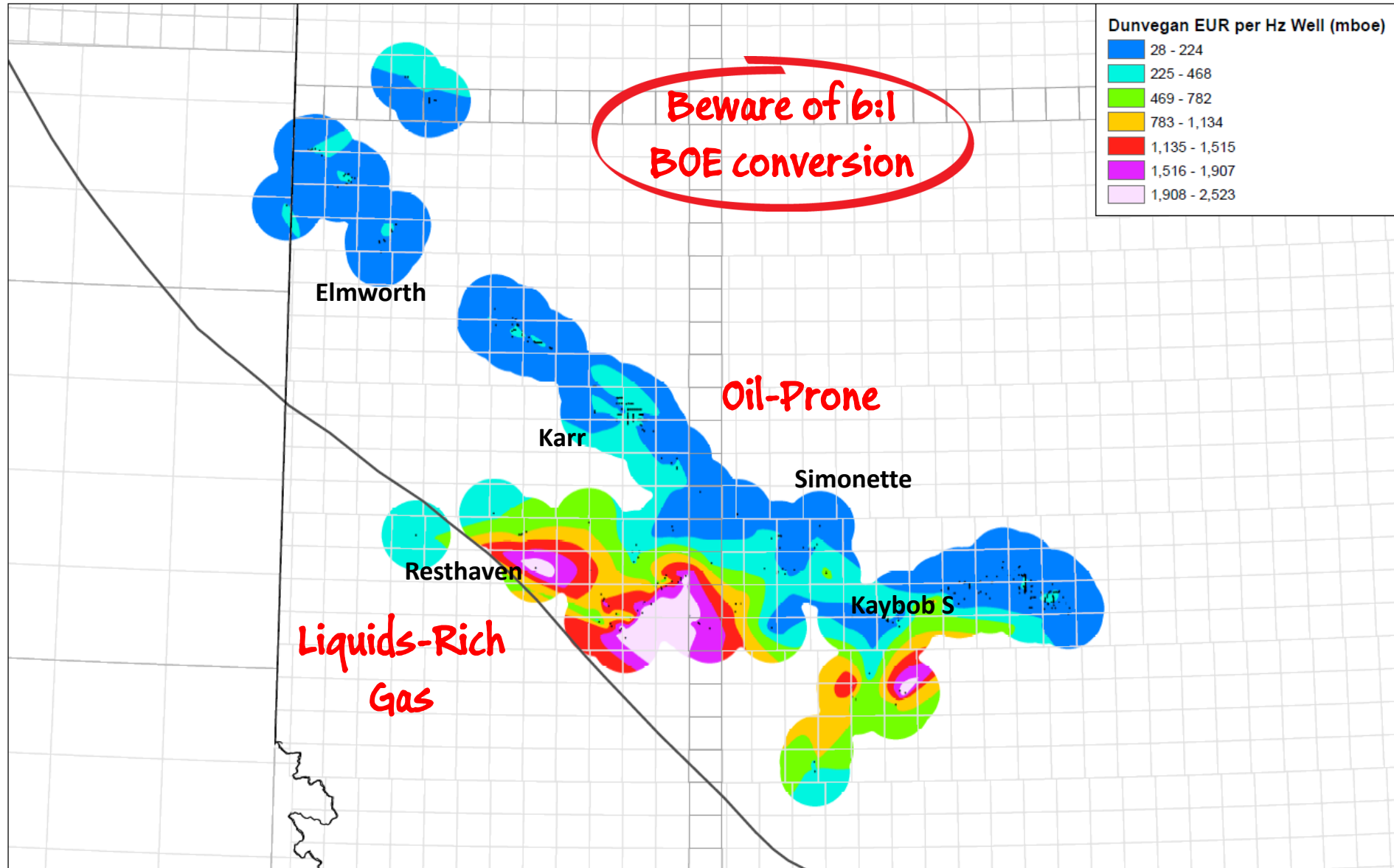


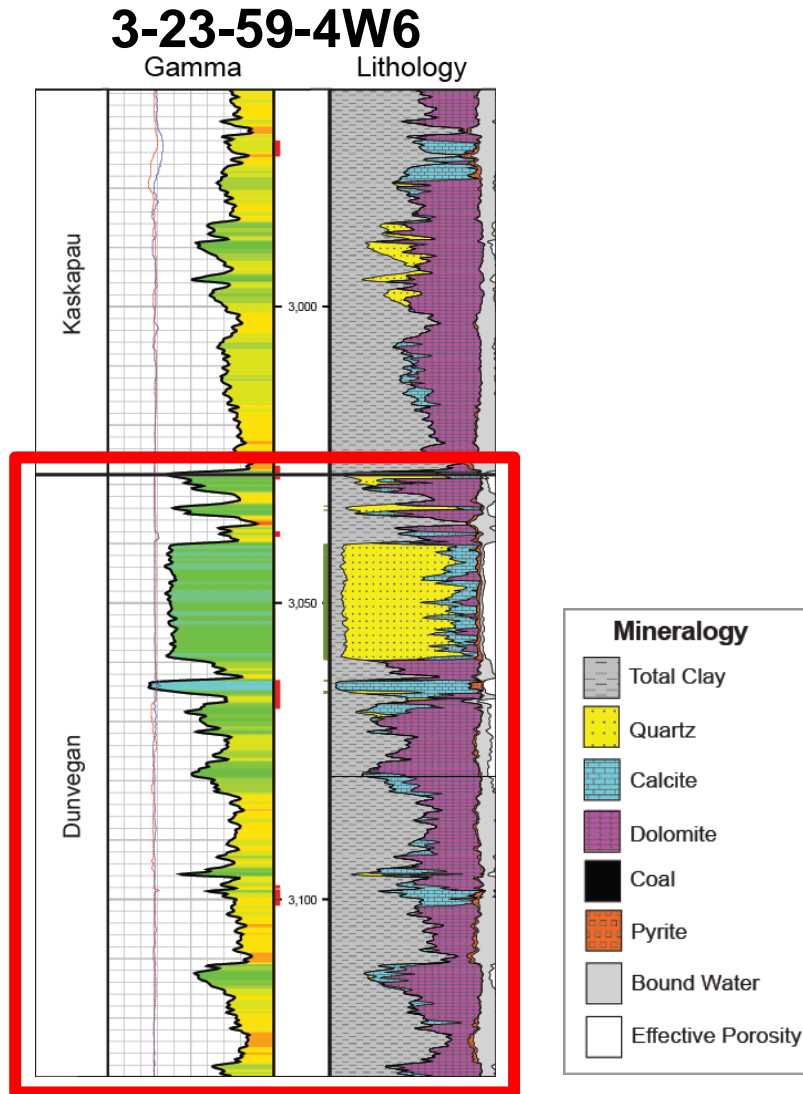


Stages ↔
Length ↔
Proppant ?
Cost ↑



Estimated Ultimate Recovery (EUR) per Hz Well





Pros

- Oil, liquids-rich gas
- Stacked reservoirs
- High rates

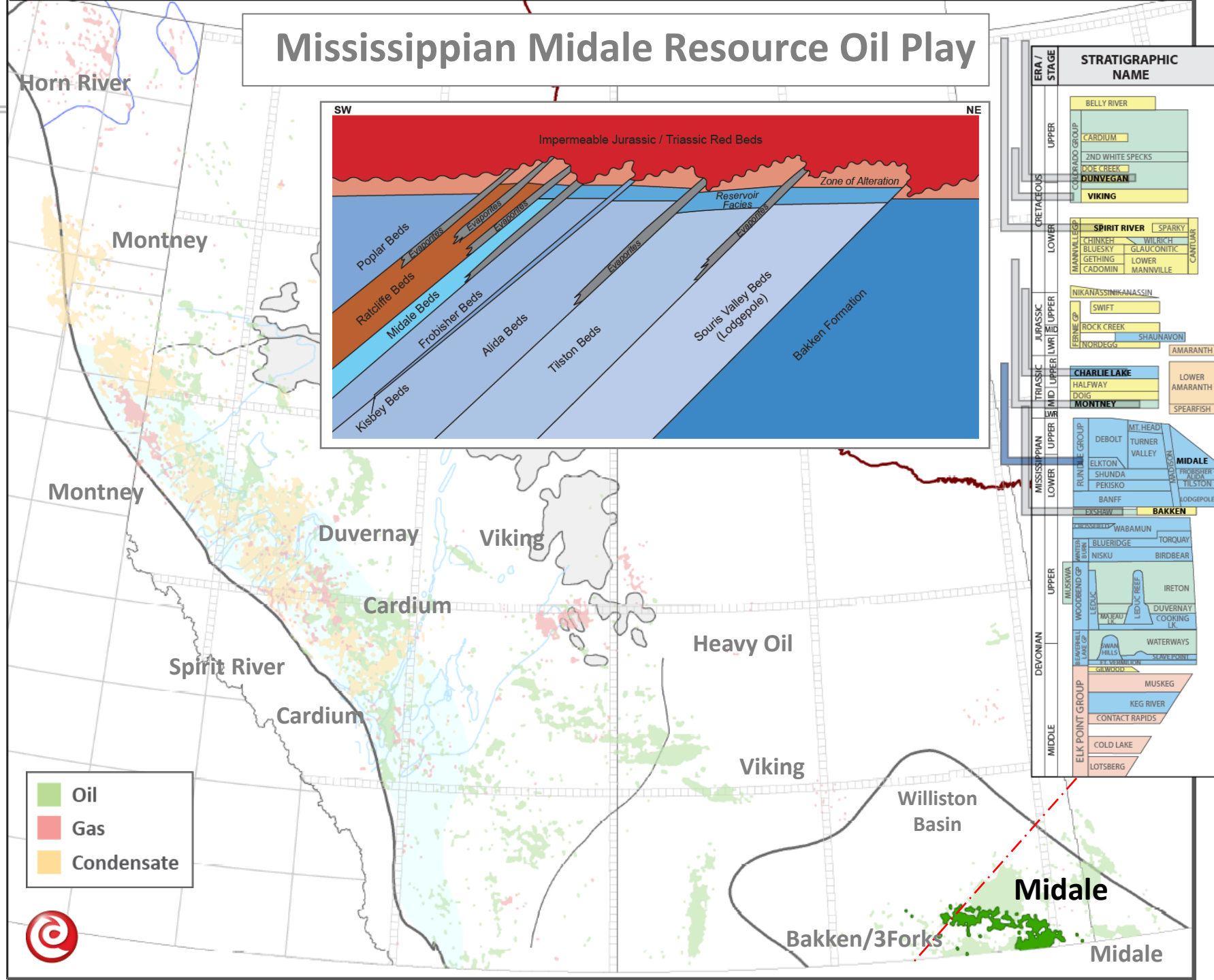
Cons

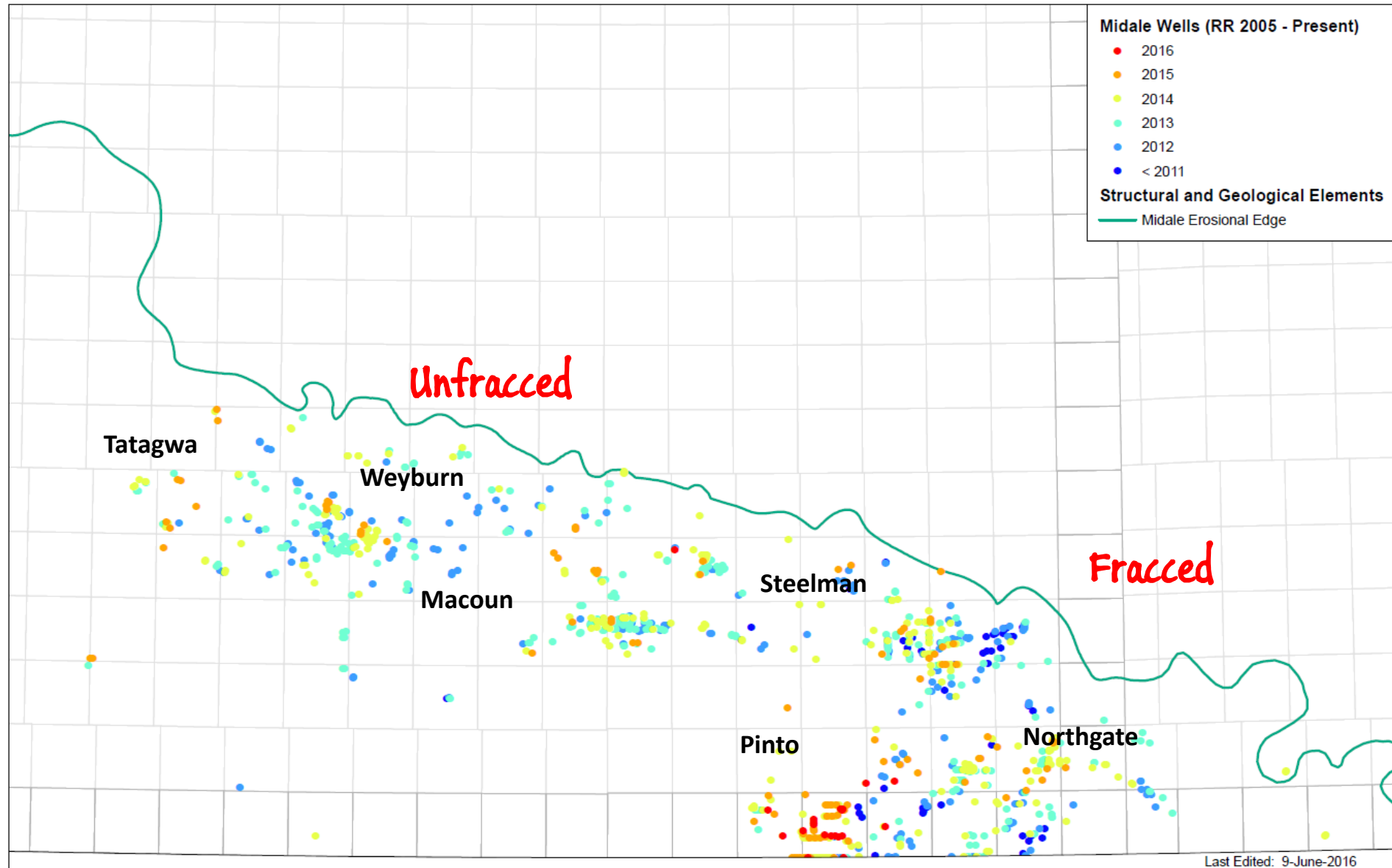
- Pay 5–20m
- Rapid facies change
- Liquids variable

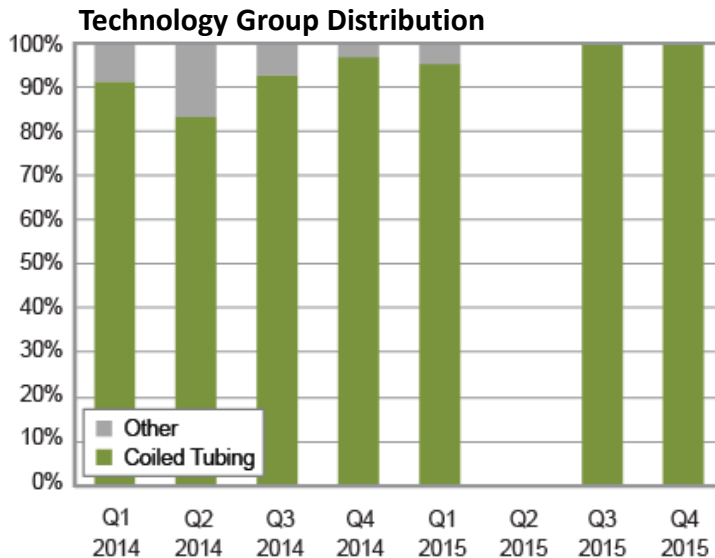
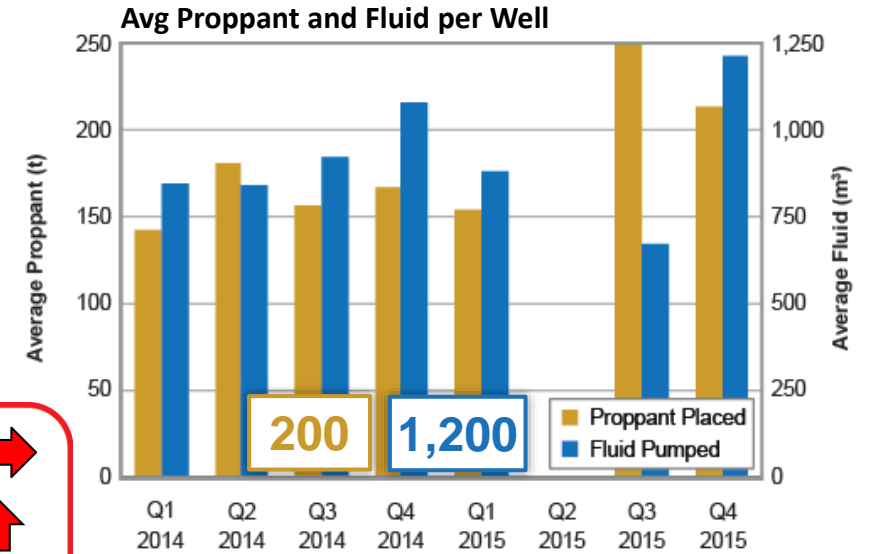
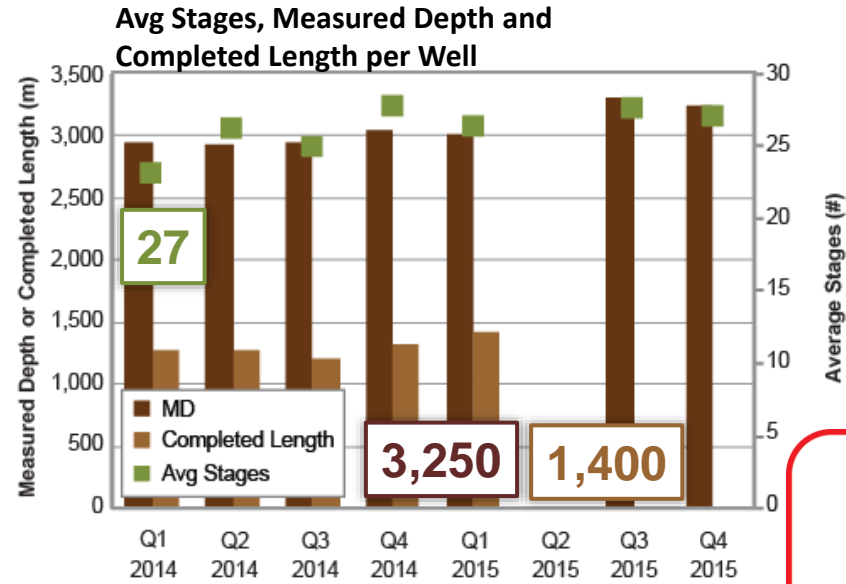
Costs

- Avg D&C Cost—\$4.0MM
- Half Cycle Cost—\$9,153/boepd

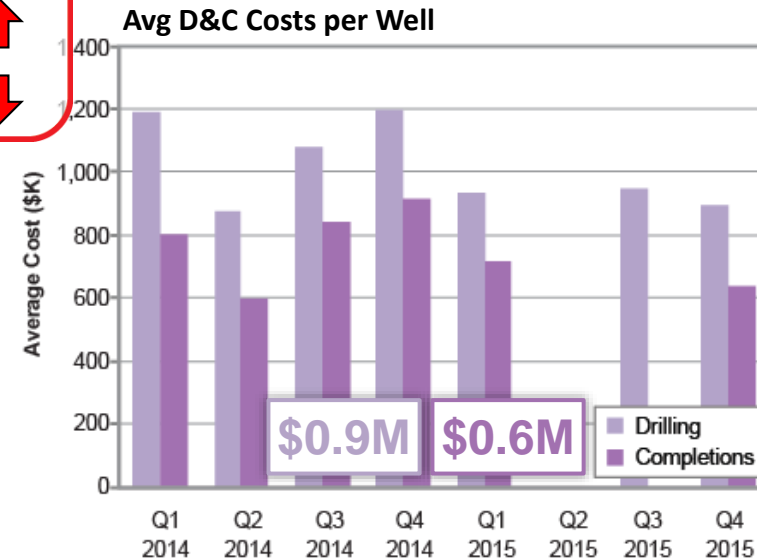
Mississippian Midale Resource Oil Play



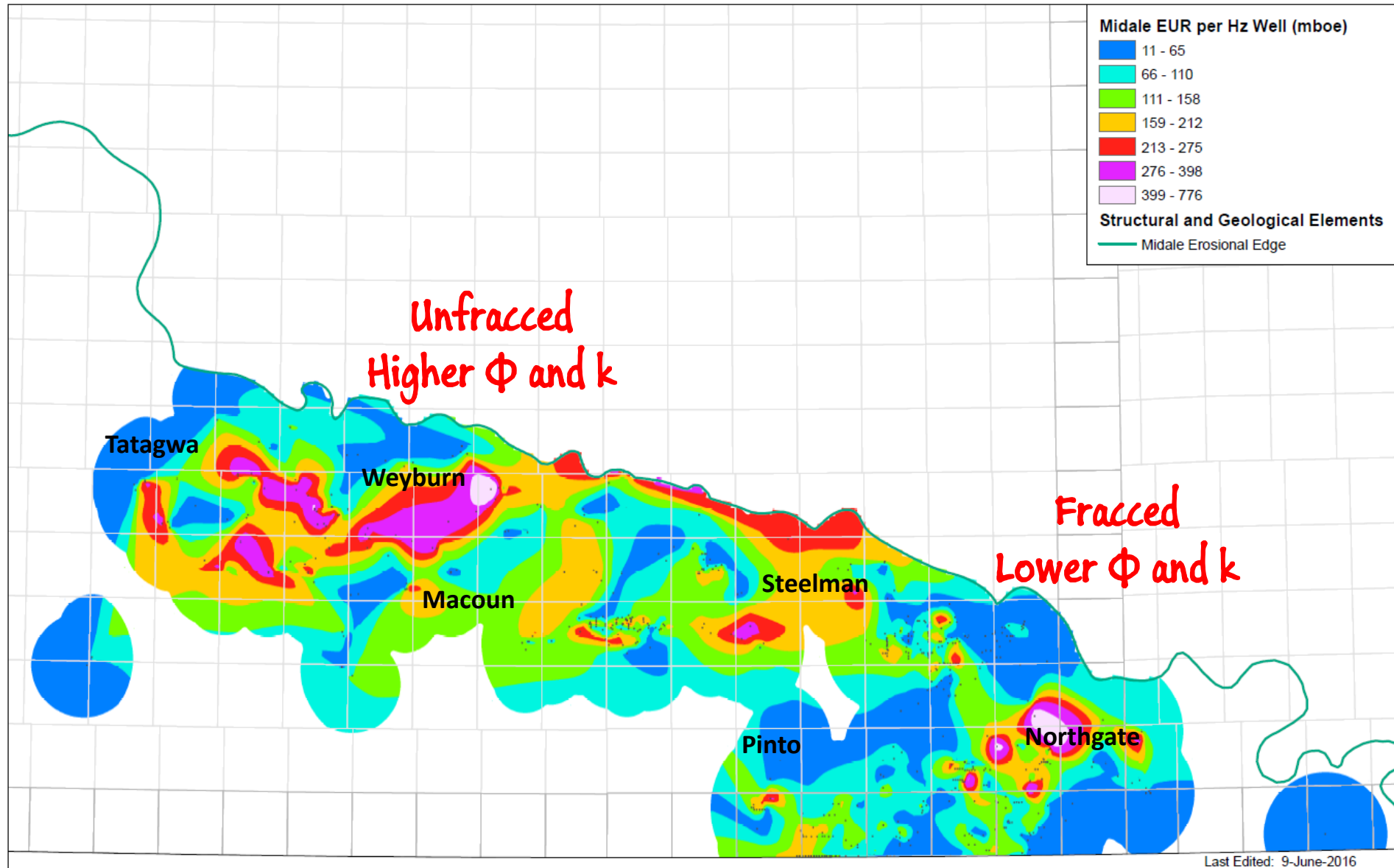




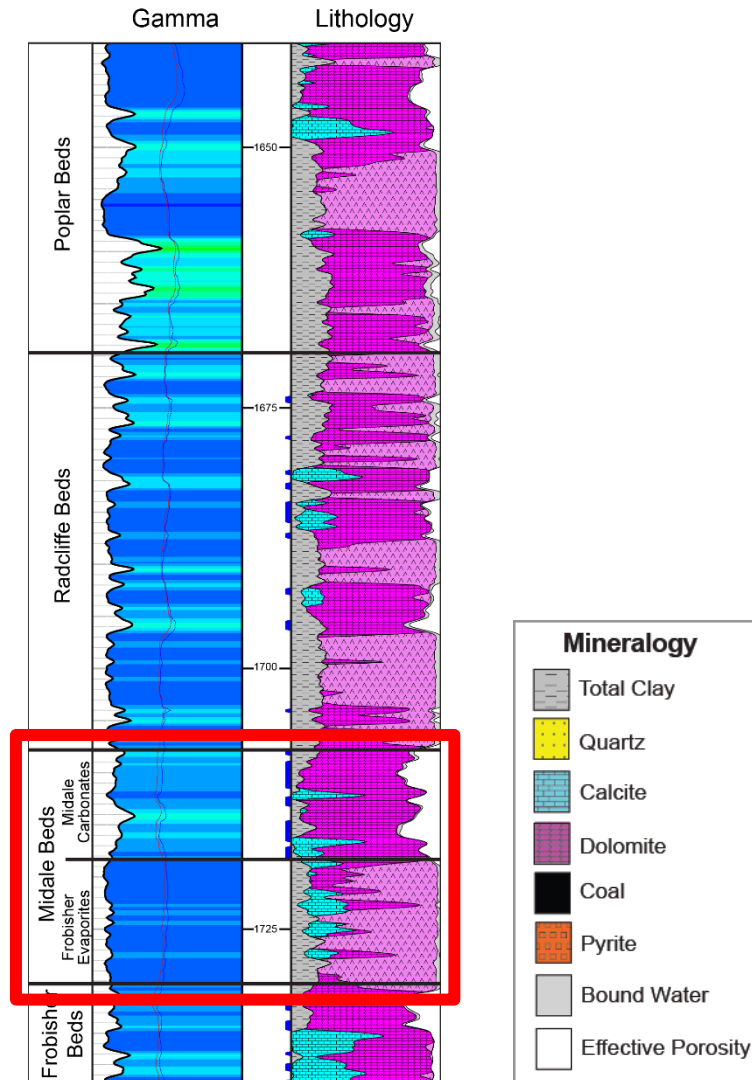
Stages ↔
Length ↑
Proppant ↑
Cost ↓



Estimated Ultimate Recovery (EUR) per Hz Well



5-28-1-6W2



Pros

- Large oil-in-place
- Moderate decline rates
- Short, shallow wells




































Cons

- Thin pay (<10m)
- Complex lithology

Costs

- Avg D&C Cost—\$1.5MM
- Half Cycle Cost—\$12,605/boepd

Wrap Up

Emerging Plays			Maturing Play	Mature Plays		
Dunvegan	Charlie Lake	Midale	Spirit River	Montney	Bakken	Viking
MD 3,300m Lateral 1,300m Pay 20m (Liquids Rich Gas/Oil)	MD 3,500m Lateral 1,800m Pay 10m (Oil)	MD 3,250m Lateral 1,400m Pay 10m (Oil)	MD 4,400m Lateral 1,400m Pay 120m (Liquids Rich Gas)	MD 4,000m Lateral 1,700m Pay 300m (Liquids Rich Gas/Oil)	MD 3,000m Lateral 1,350m Pay 15m (Oil)	MD 1,535m Lateral 600m Pay 10m (Oil)
Wells Drilled (2015)  54	Wells Drilled (2015)  77	Wells Drilled (2015)  113	Wells Drilled (2015)  395	Wells Drilled (2015)  850	Wells Drilled (2015)  451	Wells Drilled (2015)  965
D&C Costs (\$MM)  4.0	D&C Costs (\$MM)  3.1	D&C Costs (\$MM)  1.5	D&C Costs (\$MM)  4.3	D&C Costs (\$MM)  6.4	D&C Costs (\$MM)  1.1	D&C Costs (\$MM)  0.6
IP90 (boepd)  437	IP90 (boepd)  241	IP90 (boepd)  119	IP90 (boepd)  837	IP90 (boepd)  680	IP90 (boepd)  102	IP90 (boepd)  63
Half Cycle Cost (D&C Costs/IP90) (\$/boepd)  9,153 Rank 	Half Cycle Cost (D&C Costs/IP90) (\$/boepd)  12,863 Rank 	Half Cycle Cost (D&C Costs/IP90) (\$/boepd)  12,605 Rank 	Half Cycle Cost (D&C Costs/IP90) (\$/boepd)  5,137 Rank 	Half Cycle Cost (D&C Costs/IP90) (\$/boepd)  9,412 Rank 	Half Cycle Cost (D&C Costs/IP90) (\$/boepd)  10,784 Rank 	Half Cycle Cost (D&C Costs/IP90) (\$/boepd)  9,524 Rank 

WCSB Deepest Penetration by Section

Thank you to other contributors

- Pearl Meyer – ppt maestro
- Candace Keeler – cartographer
- Paul Patton – infographic
- Zenith Phillips – graphic designer
- Joshua Lee – EURs
- Luigi Malinis – completions
- Ricky La – completions

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- Pre-Devonian
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