Steve Lyster
Dean Rokosh
Andrew Beaton
Alberta Geological Survey
402, Twin Atria Building
4999–98 Avenue
Edmonton, AB
www.ags.gov.ab.ca

Fran Hein
Alberta Energy Regulator
Suite 1000, 250–5 Street SW
Calgary, AB
www.aer.ca

Alberta Resource Evaluation: Unconventional Shale, Siltstone, Sandstone, and Carbonate

Introduction

The Alberta oil, gas, and liquids resource evaluation project has expanded from organic-rich shale strata to include tight sandstones and carbonates. Our initial focus is to determine the extent of each play area and estimate initial resources in place. Our method of estimating the resource endowment incorporates the concept of uncertainty at every step in order to quantify the wide range of possible values. The method is geared towards early appraisal of unconventional resources.

We are currently focusing on oil-rich tight sandstones and carbonates, especially halo positions around existing oil and gas fields. Formations such as the Cretaceous sandstone-rich Cardium, Viking and Glauconite, and the Devonian Slave Point and Swan Hills carbonates have become the most highly drilled strata in Alberta. Drilling for oil or natural gas liquids in organic-rich strata is continuing in the Devonian Duvernay Formation, Devonian to Mississippian Exshaw and Bakken formations, and the siltstone- and sandstone-dominated Triassic Montney Formation.

The next phase of the project is to determine technically recoverable resources for all strata. The first projects investigate the liquid-rich Duvernay and Montney formations.

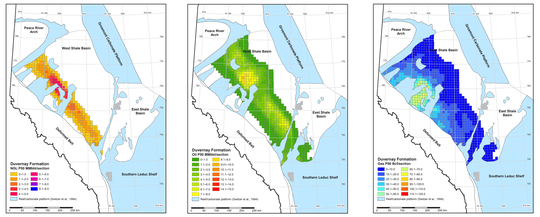
Estimates of Initial Resources In Place for Select Alberta Shale and Siltstone Strata

All formations will be evaluated for technically recoverable resources in the next phase of the project.

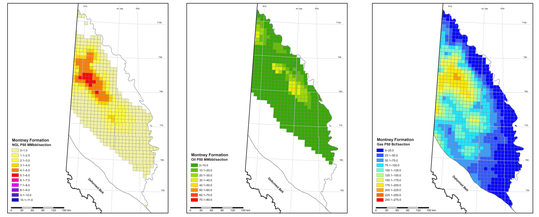
Unit	Adsorbed Gas Content %*	Natural Gas (Tcf)	Natural-Gas Liquids (billion bbl)	Oil (billion bbl)
Duvernay P50	6.8	443	11.3	61.7
Duvernay P90–P10	5.6–8.5	353–540	7.5–16.3	44.1–82.9
Muskwa P50	6.9	419	14.8	115.1
Muskwa P90–P10	4.1–1 0.5	289–527	6.0–26.3	74.8–159.9
Montney P50	17.7	2133	28.9	136.3
Montney P90–P10	10.8–26.0	1630–2828	11.7–54.4	78.6–220.5
Basal Banff/Exshaw P50 (preliminary data; see Section 5.1)	5.7	35	0.092	24.8
Basal Banff/Exshaw P90-P10	3.2–10.0	16–70	0.034–0.217	9.0–44.9
North Nordegg P50 (preliminary data; see Section 5.1)	18.2	148	1.4	37.8
North Nordegg P90–P10	4.6–34.8	70–281	0.487–3.5	19.9–66.4
Wilrich P50 (preliminary data; see Section 5.1)	33.7	246	2.1	47.9
Wilrich P90–P10	6.2–59.2	115–568	0.689–4.449	20.2–172.3
Total P50 (medium estimate) resource endowment	n/a	3424	58.6	423.6

Resource Evaluation of Shale and Siltstone

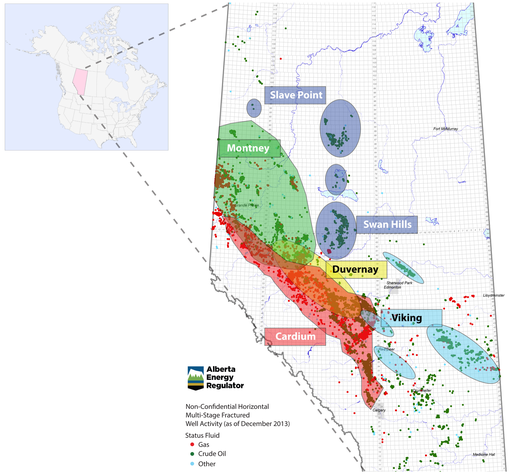
Duvernay Organic-Rich Shale



Montney Siltstone

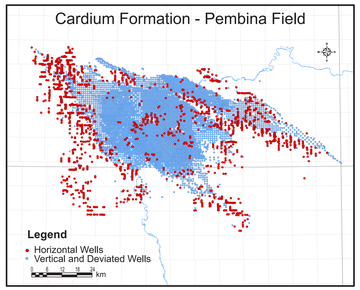


A Sampling of Prospective Unconventional Hydrocarbon-Rich Areas

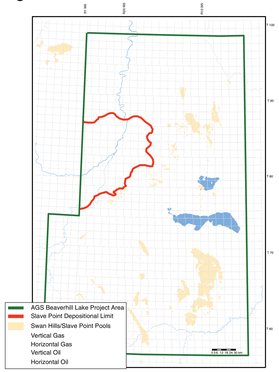


Resource Evaluation of Tight Sandstone and Carbonate

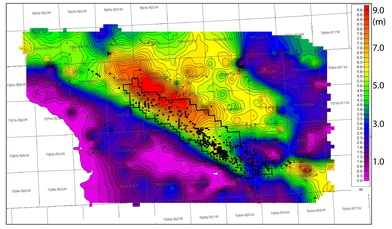
Cardium Formation Sandstone Halo



Slave Point/Swan Hills Formation Tight Carbonate

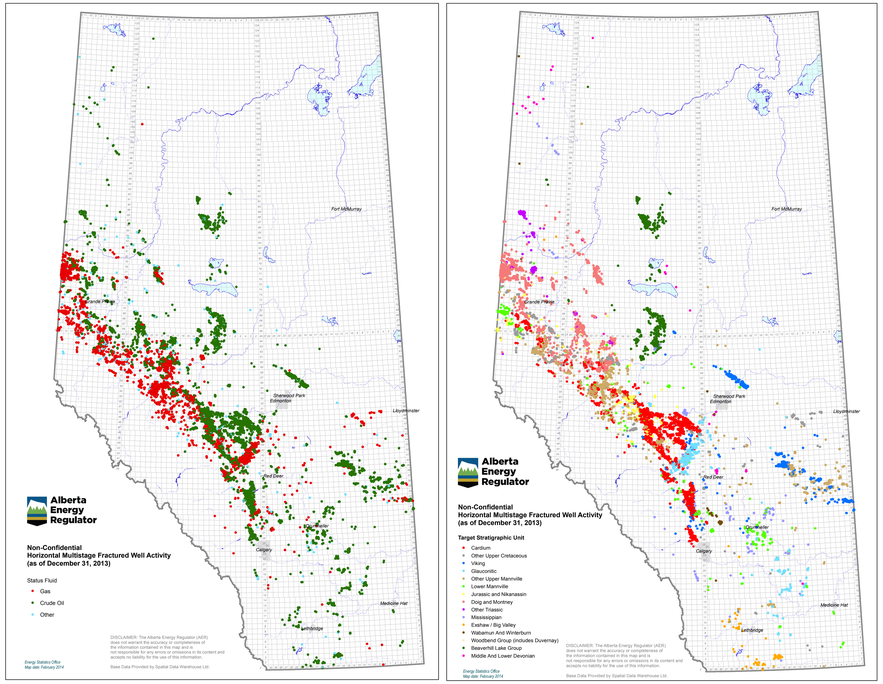


Viking Formation Halo (Sandstone, Silt, Shale)



Viking Formation: Isopach, basal shaley sandstone, Redwater area, east central Alberta. Lower Viking A pool boundary is thick black outline; red dots are locations of horizontal wells, blue dots are those of vertical wells.

Horizontal, Multistage Fractured Wells (HMSF) Completed in Alberta Since 2008



Conclusion

The Alberta Geological Survey is continuing work to quantify resources in unconventional plays. Future work will include determining technically recoverable resources and dividing larger units into more refined plays based on common fluids, reservoir properties, production characteristics, or other geological and engineering criteria. All resource estimates, data, maps, and shapefiles can be found on the website of the Alberta Geological Survey: www.ags.gov.ab.ca.

Acknowledgements

This resource determination work has been a team effort consisting of members of the Petroleum Systems and Earth Resources Team, including Shar Anderson, David Bechtel, Mike Berhane, Chris Crocq, Dongqing Chen, Chris Filewich, Lisa McRitchie, Glen Prior, and John Pawlowicz.