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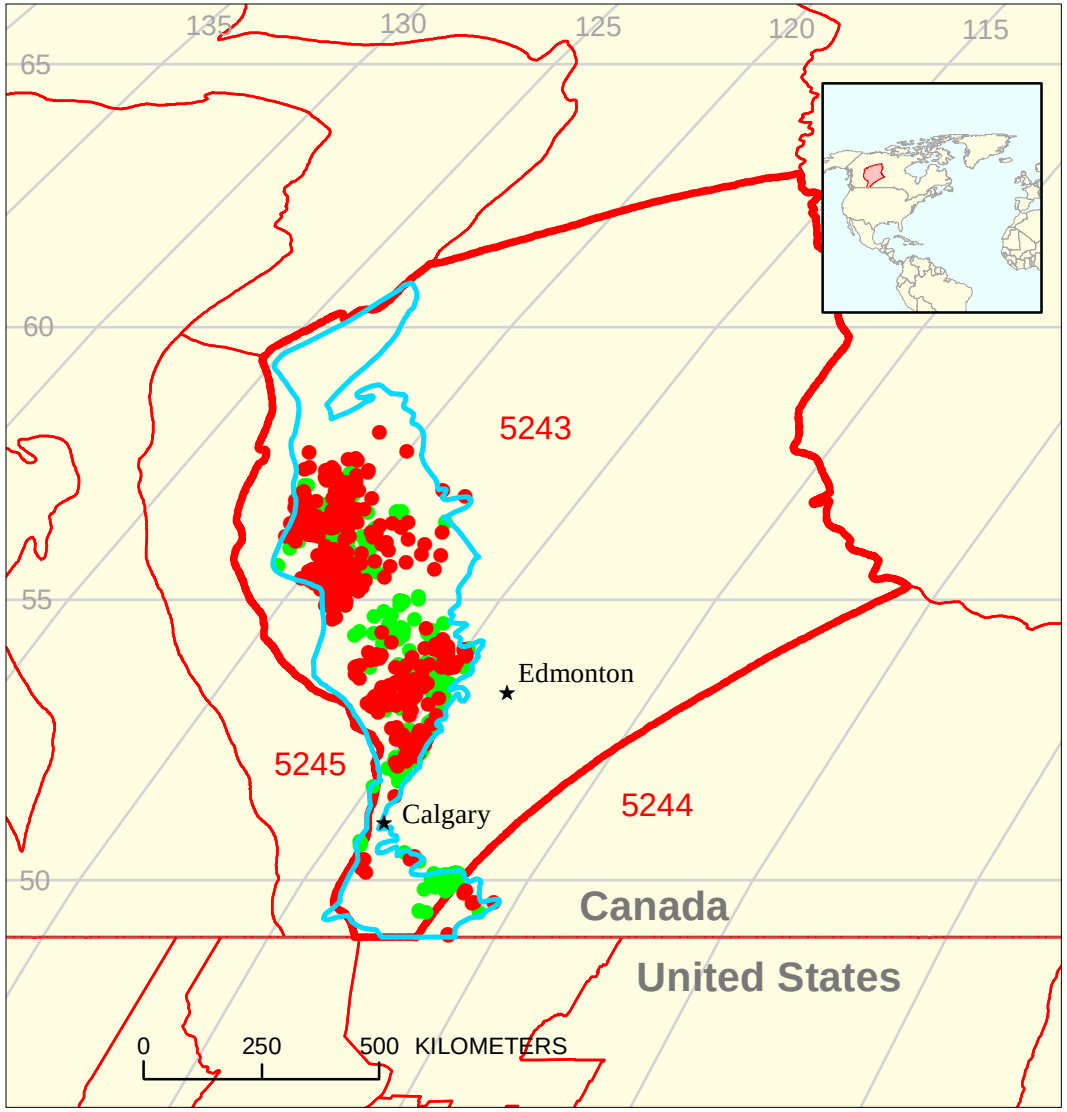
Combined Triassic/Jurassic Oil and Gas Assessment Unit 52430402



Combined Triassic/Jurassic Oil and Gas Assessment Unit 52430402
Alberta Basin Geologic Province 5243
Other geologic province boundary

Geologic Summary

Detailed map of this assessment unit

Exploration/Discovery-History Data
- Plots of Known Field Sizes
- Tables

Assessment Input Data

Assessment Results
- Assessment Unit Summary
- Detailed Assessment Results
- Undiscovered Field-Size Distributions

USGS PROVINCES: Alberta Basin, Rocky Mountain Deformed Belt and Williston Basin (5243, 5245 and 5344)

GEOLOGIST: M.E. Henry

TOTAL PETROLEUM SYSTEM: Combined Triassic/Jurassic (524304)

ASSESSMENT UNIT: Combined Triassic/Jurassic Oil and Gas (52430402)

DESCRIPTION: This oil and gas assessment unit includes small parts of the deformed belt, the western part of the Williston Basin and southern and western parts of the Alberta Basin. The boundary was drawn to enclose an area containing known pools, source rocks and possible reservoir rocks of Triassic and Jurassic age.

SOURCE ROCKS: Principal source rocks for this unit include the Middle Triassic Doig Formation and the Lower Jurassic "Nordegg" and Poker chip shale members of the Fernie Formation. Recent work suggests that several other Triassic rock units may have source potential in this assessment unit.

MATURATION: Source rocks within this unit are thermally mature with respect to liquid or gas petroleum generation throughout virtually the entire assessment unit.

MIGRATION: The distribution of conventionally produced pools assigned to this unit in relation to the distribution of mature source rocks indicates that long distance migration is generally not necessary except in the southeastern part of the unit. Published detailed geochemical analyses suggest, however, that Jurassic oils may have contributed minor volumes to nearby unconventional bitumen deposits.

RESERVOIR ROCKS: The predominant reservoir rock type in this unit is sandstone but carbonate reservoirs are common. In Triassic pools, sandstone reservoirs outnumber carbonate reservoirs by about three to one and Jurassic reservoirs are almost exclusively sandstone.

TRAPS AND SEALS: The most common trap types are combination followed by stratigraphic and structural in the approximate proportion of five to three to one, respectively. Evaporites and shales generally form seals in this unit.

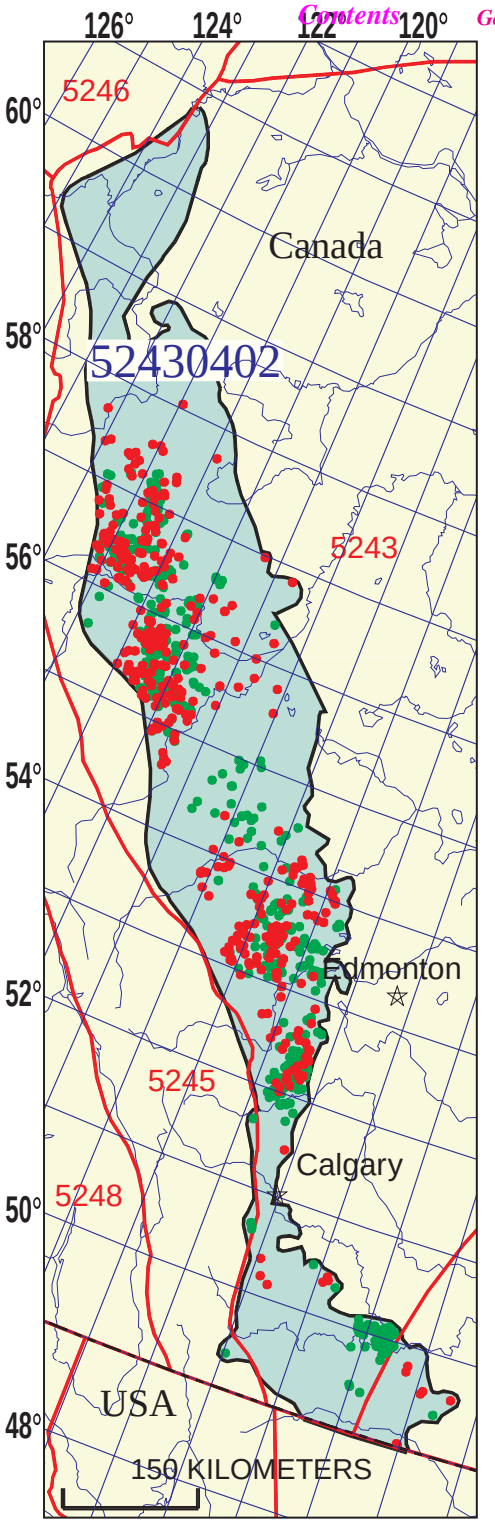
REFERENCES:

Creaney, S., Allen, J., Cole, K.S., Fowler, M.G., Brooks, P.W., Osadetz, K.G., Macqueen, R.W., Snowden, L.R., and Riediger, C.L., 1994, Petroleum generation and migration in the Western Canada sedimentary basin, *in* Mossop, G.D., and Shetsen, I., comps., Geological atlas of the Western Canada sedimentary basin: Calgary, Canadian Society of Petroleum Geologists and Alberta Research Council, p. 455-468.

NRG Associates, Inc., 1994, The significant oil and gas pools of Canada: Colorado Springs, Colo., NRG Associates, Inc. Database available from NRG Associates, Inc., P.O. Box 1655, Colorado Springs, CO 80901.

Riediger, C.L., 1997, Geochemistry of potential hydrocarbon source rocks of Triassic age in the Rocky Mountain Foothills of northeastern British Columbia and west central Alberta: Bulletin of Canadian Petroleum Geology, v. 45, no. 4, p.719-741.

U.S. GEOLOGICAL SURVEY WORLD PETROLEUM ASSESSMENT 2000— DESCRIPTION AND RESULTS
U.S. Geological Survey World Energy Assessment Team



Combined Triassic/Jurassic Oil and Gas Assessment Unit - 52430402

EXPLANATION

- Hydrography
- Shoreline
- 5243 Geologic province code and boundary
- Country boundary
- Gas pool centerpoint
- Oil pool centerpoint
- 52430402 Assessment unit code and boundary

Projection: Lambert. Standard parallels: 49 and 77. Central meridian: -92

SEVENTH APPROXIMATION
NEW MILLENNIUM WORLD PETROLEUM ASSESSMENT
DATA FORM FOR CONVENTIONAL ASSESSMENT UNITS

Date:……..	8/10/99		
Assessment Geologist:……..	M.E. Henry		
Region:……..	North America	Number:	5
Province:……..	Alberta Basin	Number:	5243
Priority or Boutique……	Priority		
Total Petroleum System:……	Combined Triassic/Jurassic	Number:	524304
Assessment Unit:……..	Combined Triassic/Jurassic Oil and Gas	Number:	52430402
* Notes from Assessor	Field sizes were not grown.		
	Assessing pools, not fields to conform to NRG data set.		

CHARACTERISTICS OF ASSESSMENT UNIT

Oil (<20,000 cfg/bo overall) **or** Gas (≥20,000 cfg/bo overall):… Oil

What is the minimum field size?……. 0.5 mmboe grown (≥1mmboe)
(the smallest field that has potential to be added to reserves in the next 30 years)

Number of discovered fields exceeding minimum size:…… Oil: 201 Gas: 390

Established (>13 fields) X Frontier (1-13 fields) _____ Hypothetical (no fields) _____

Median size (grown) of discovered oil fields (mmboe):
1st 3rd 3.4 2nd 3rd 1.4 3rd 3rd 1.1

Median size (grown) of discovered gas fields (bcfg):
1st 3rd 6.7 2nd 3rd 5.9 3rd 3rd 4.9

Assessment-Unit Probabilities:

Attribute	Probability of occurrence (0-1.0)
1. **CHARGE:** Adequate petroleum charge for an undiscovered field ≥ minimum size……	1.0
2. **ROCKS:** Adequate reservoirs, traps, and seals for an undiscovered field ≥ minimum size……	1.0
3. **TIMING OF GEOLOGIC EVENTS:** Favorable timing for an undiscovered field ≥ minimum size	1.0

Assessment-Unit GEOLOGIC Probability (Product of 1, 2, and 3):…….. 1.0

4. **ACCESSIBILITY:** Adequate location to allow exploration for an undiscovered field ≥ minimum size…… 1.0

UNDISCOVERED FIELDS

Number of Undiscovered Fields: How many undiscovered fields exist that are ≥ minimum size?:
(uncertainty of fixed but unknown values)

Oil fields:……min. no. (>0)	20	median no.	60	max no.	150
Gas fields:……min. no. (>0)	40	median no.	120	max no.	300

Size of Undiscovered Fields: What are the anticipated sizes (**grown**) of the above fields?:
(variations in the sizes of undiscovered fields)

Oil in oil fields (mmbo)……min. size	0.5	median size	1	max. size	20
Gas in gas fields (bcfg):……min. size	3	median size	4.5	max. size	90

Assessment Unit (name, no.)
Combined Triassic/Jurassic Oil and Gas, 52430402

AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS

(uncertainty of fixed but unknown values)

Oil Fields:	minimum	median	maximum
Gas/oil ratio (cfg/bo)……	225	450	675
NGL/gas ratio (bngl/mmcfg)……	30	60	90

Gas fields:	minimum	median	maximum
Liquids/gas ratio (bngl/mmcfg)……	15	30	45
Oil/gas ratio (bo/mmcfg)……			

SELECTED ANCILLARY DATA FOR UNDISCOVERED FIELDS

(variations in the properties of undiscovered fields)

Oil Fields:	minimum	median	maximum
API gravity (degrees)……	18	36	55
Sulfur content of oil (%)……	0.5	1	4
Drilling Depth (m) ……	800	1400	3000
Depth (m) of water (if applicable)……			

Gas Fields:	minimum	median	maximum
Inert gas content (%)……	0	0.4	10
CO_2 content (%)……	0	2	23
Hydrogen-sulfide content(%)……	0	0	17
Drilling Depth (m)……	1000	1800	3200
Depth (m) of water (if applicable)……			

Assessment Unit (name, no.)
Combined Triassic/Jurassic Oil and Gas, 52430402

ALLOCATION OF UNDISCOVERED RESOURCES IN THE ASSESSMENT UNIT TO COUNTRIES OR OTHER LAND PARCELS (uncertainty of fixed but unknown values)

1. Canada represents 100 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		100	
Portion of volume % that is offshore (0-100%)……		0	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		100	
Portion of volume % that is offshore (0-100%)……		0	

2. Province 5243 represents 92 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		92	
Portion of volume % that is offshore (0-100%)……		0	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		92	
Portion of volume % that is offshore (0-100%)……		0	

3. Province 5245 represents 3 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		3	
Portion of volume % that is offshore (0-100%)……		0	

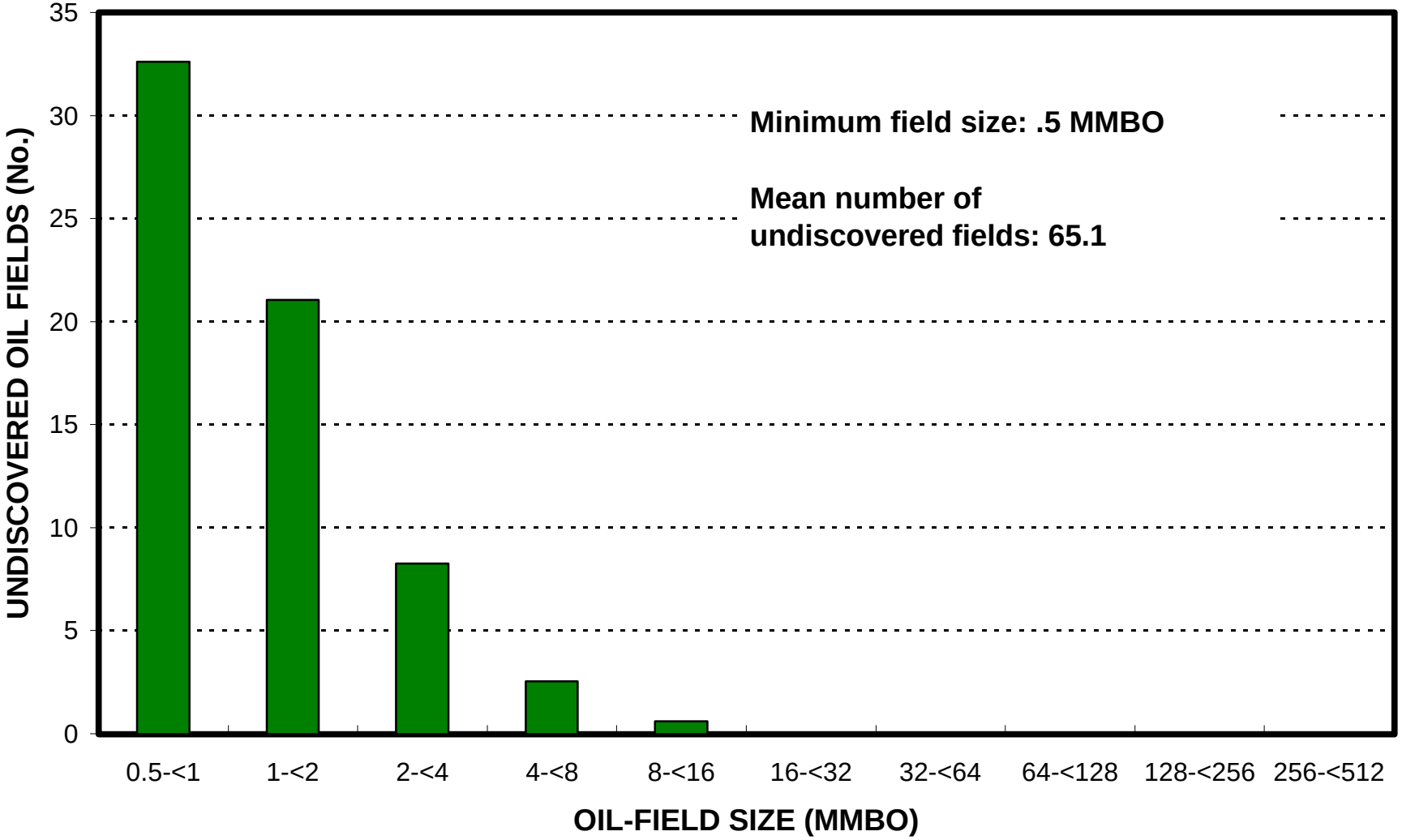
Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		3	
Portion of volume % that is offshore (0-100%)……		0	

4. Province 5244 represents 5 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		5	
Portion of volume % that is offshore (0-100%)……		0	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		5	
Portion of volume % that is offshore (0-100%)……		0	

Combined Triassic/Jurassic Oil and Gas, AU 52430402
Undiscovered Field-Size Distribution



Combined Triassic/Jurassic Oil and Gas, AU 52430402
Undiscovered Field-Size Distribution