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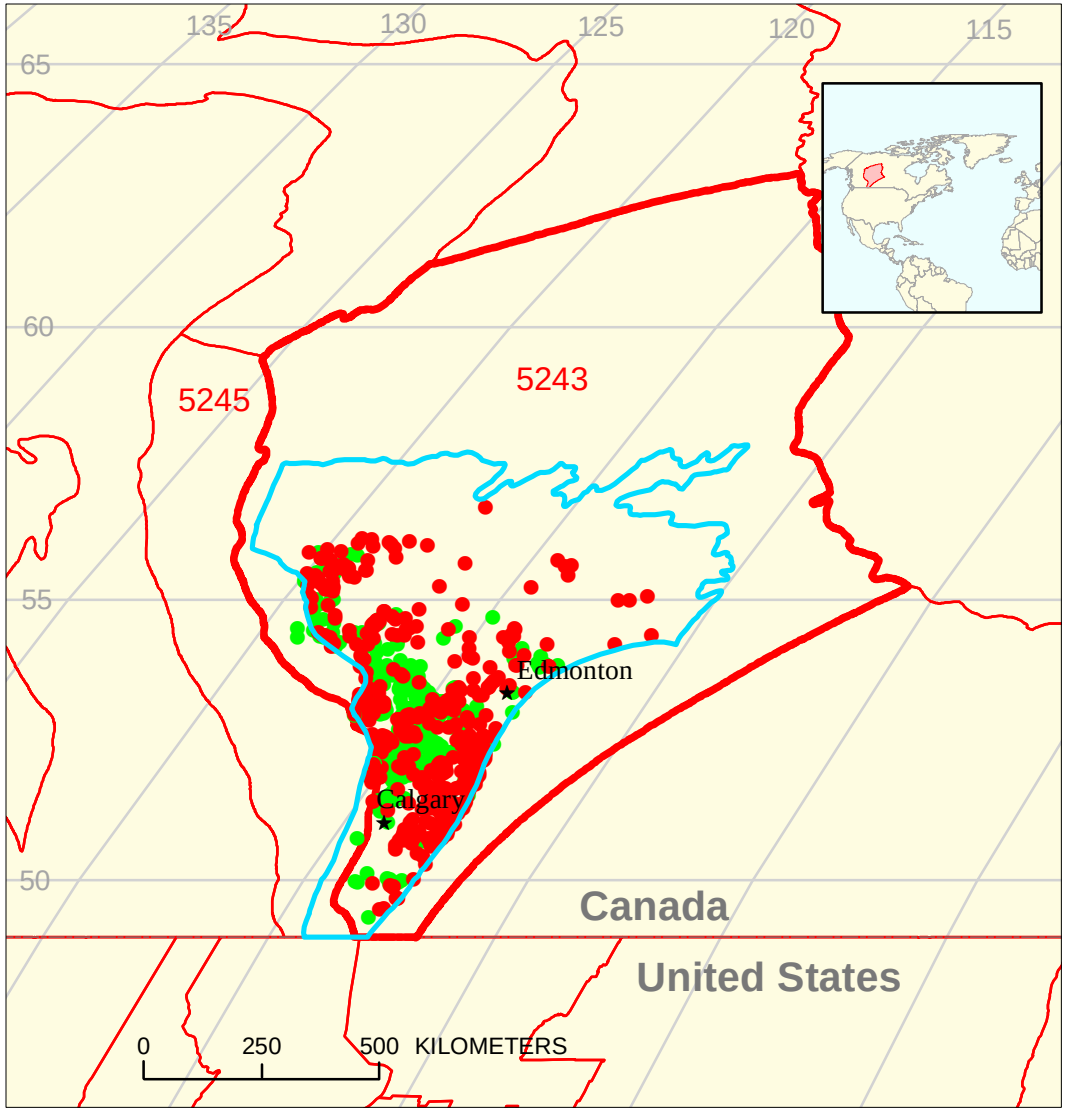
Second White Specks-Cardium Oil and Gas Assessment Unit 52430602



Second White Specks-Cardium Oil and Gas Assessment Unit 52430602
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 and Rocky Mountain Deformed Belt (5243 and 5245)

GEOLOGIST: M.E. Henry

TOTAL PETROLEUM SYSTEM: Second White Specks-Cardium (524306)

ASSESSMENT UNIT: Second White Specks-Cardium Oil and Gas (52430602)

DESCRIPTION: This oil and gas assessment unit includes most of the southwestern part of the Alberta Basin and a small, easternmost, portion of the Rocky Mountain Deformed Belt. The area is generally bounded by the Second White Specks-Cardium Gas assessment unit to the west, the Canadian-United States International Boundary to the south, the Upper Cretaceous Eastern Shallow Gas assessment unit to the east and the Canadian Shield to the northeast.

SOURCE ROCKS: The principal source rock is probably the Upper Cretaceous Second White Speckled Shale although the First White Speckled Shale and the Fish Scales zone are also likely sources.

MATURATION: Thermal maturity levels of source rocks for this unit range from immature in the northeastern part of the unit to overmature in the southwestern part, with respect to liquid petroleum generation.

MIGRATION: Known Upper Cretaceous petroleum production is generally in or near the thermally mature zone; however, relatively long distance lateral gas migration appears to have occurred in central Alberta.

RESERVOIR ROCKS: Shallow marine and fluvial sandstones are the most common reservoir rocks. The Cardium Formation is the most prolific producer, with significant accumulations in the Viking and Belly River Formations and other units.

TRAPS AND SEALS: Traps are predominately stratigraphic with structural influence increasing near the deformed belt. Seals are generally formed by interbedded mudstones.

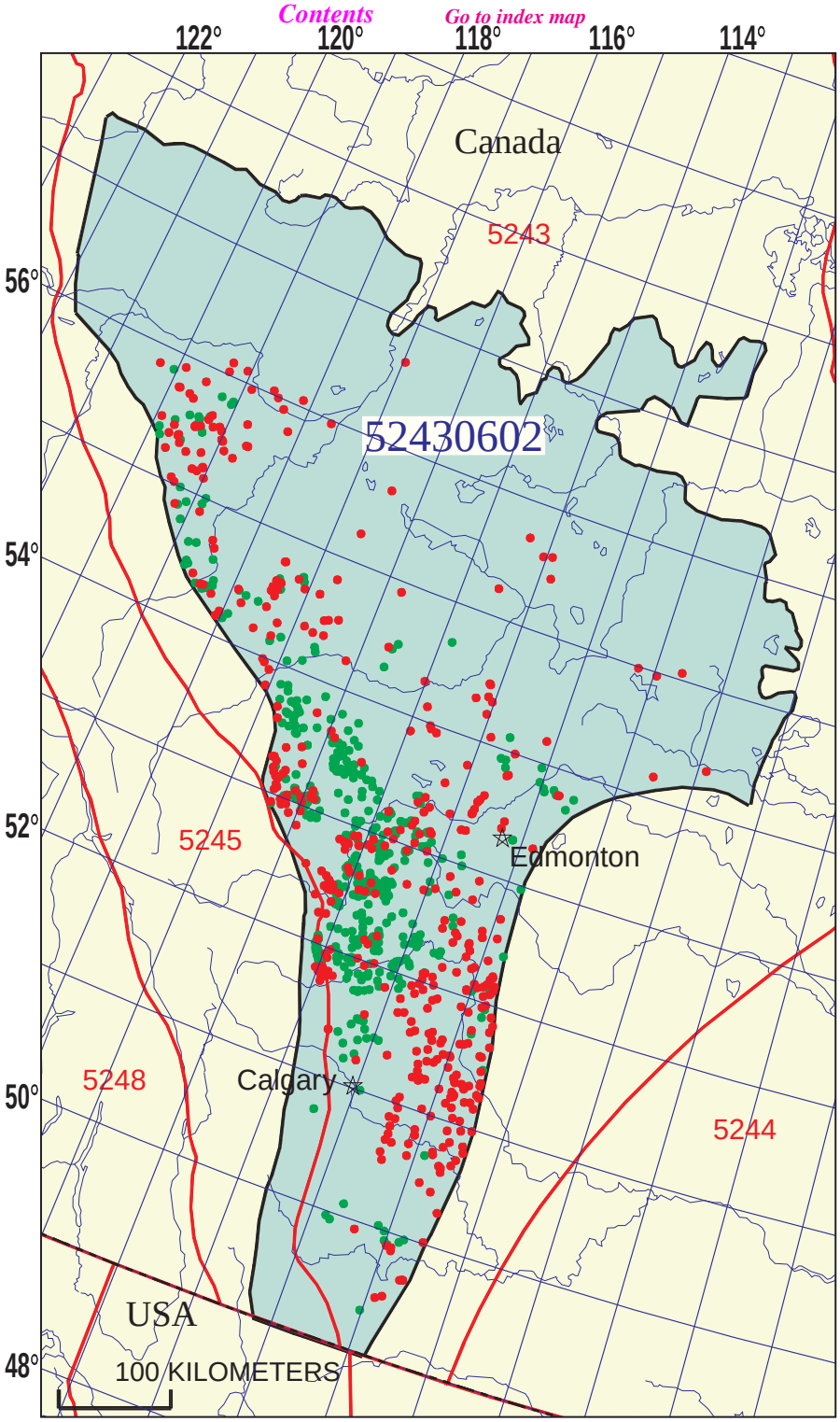
REFERENCES:

Allen, J. and Creaney, S., 1991, Oil families of the Western Canada Basin: Bulletin of Canadian Petroleum Geology, v. 39, no. 2, p. 107-122. .

Creaney, S. and Allen, J., 1990, Hydrocarbon generation and migration in the Western Canada sedimentary basin, *in* Brooks, J., ed., Classic petroleum provinces: Geological Society of London Special Publication No. 50, p. 189-202.

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.



Second White Specks-Cardium Oil and Gas Assessment Unit - 52430602

EXPLANATION

- Hydrography
- Shoreline
- 5243 Geologic province code and boundary
- Country boundary
- Gas pool centerpoint
- Oil pool centerpoint
- 52430602 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:……	Second White Specks-Cardium	Number:	524306
Assessment Unit:……	Second White Specks-Cardium Oil and Gas	Number:	52430602
* 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: 130 Gas: 343
Established (>13 fields) X Frontier (1-13 fields) _____ Hypothetical (no fields) _____

Median size (grown) of discovered oil fields (mmboe):
1st 3rd 2.1 2nd 3rd 2 3rd 3rd 1.2
Median size (grown) of discovered gas fields (bcfg):
1st 3rd 8.9 2nd 3rd 5.8 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)	5	median no.	25	max no.	50
Gas fields:……min. no. (>0)	30	median no.	120	max no.	250

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	15
Gas in gas fields (bcfg):……min. size	3	median size	4.5	max. size	100

Assessment Unit (name, no.)
Second White Specks-Cardium Oil and Gas, 52430602

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)……	30	40	55
Sulfur content of oil (%)……			
Drilling Depth (m) ……	300	1750	2800
Depth (m) of water (if applicable)……			

Gas Fields:	minimum	median	maximum
Inert gas content (%)……	0.2	1.5	8
CO_2 content (%)……	0	0.3	7
Hydrogen-sulfide content(%)……	0	0	0.3
Drilling Depth (m)……	230	1200	3100
Depth (m) of water (if applicable)……			

Assessment Unit (name, no.)
Second White Specks-Cardium Oil and Gas, 52430602

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 96 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		96	
Portion of volume % that is offshore (0-100%).....		0	

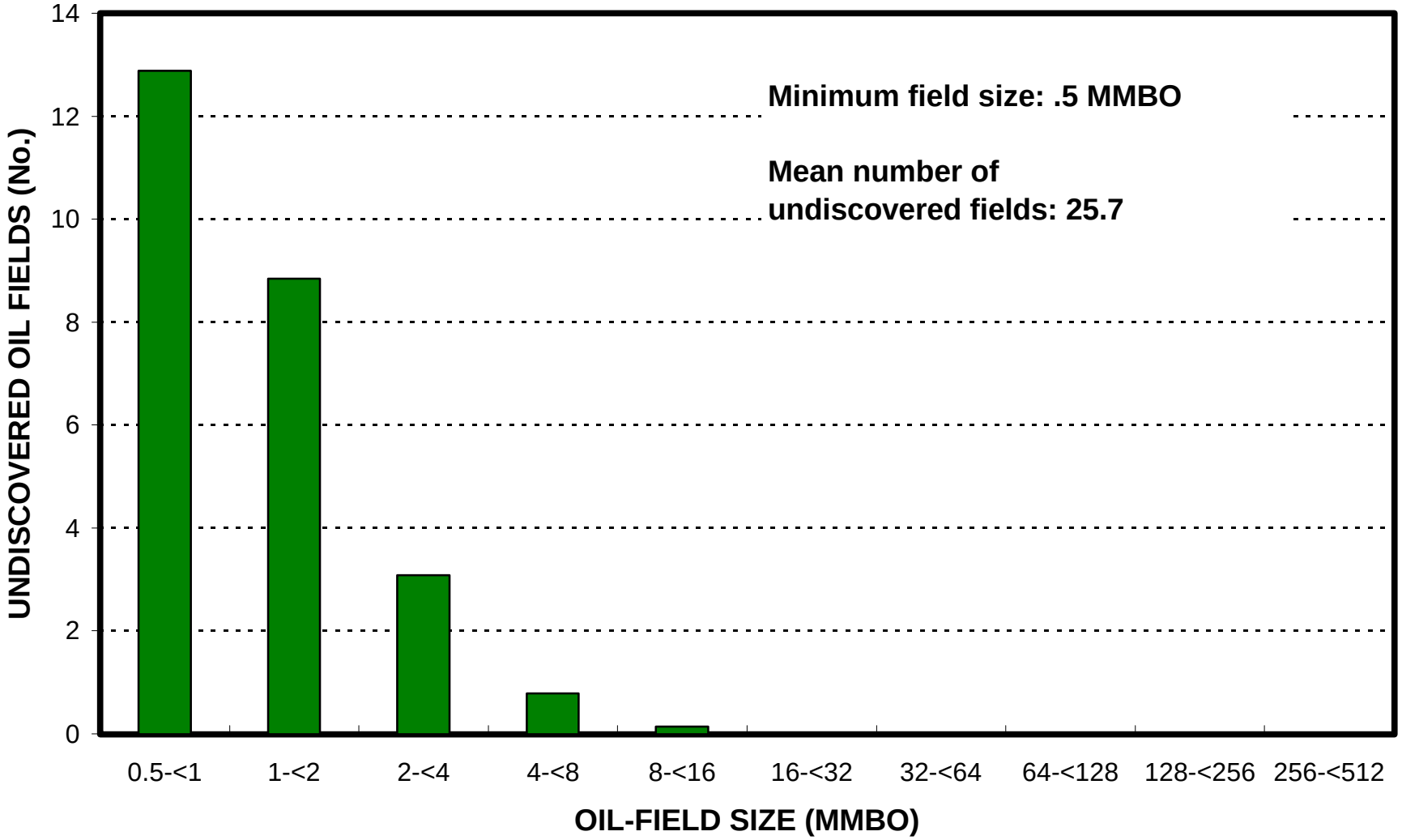
Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		96	
Portion of volume % that is offshore (0-100%).....		0	

3. Province 5245 represents 4 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		4	
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):...		4	
Portion of volume % that is offshore (0-100%).....		0	

Second White Specks-Cardium Oil and Gas, AU 52430602
Undiscovered Field-Size Distribution



Second White Specks-Cardium Oil and Gas, AU 52430602
Undiscovered Field-Size Distribution