

**GEOLOGICAL SURVEY OF CANADA
COMMISSION GÉOLOGIQUE DU CANADA**

Open File 2907

**MANNVILLE GAS RESOURCES OF THE
WESTERN CANADA SEDIMENTARY BASIN
GEOLOGICAL PLAY DEFINITION AND
RESOURCE ASSESSMENT - SUMMARY OF
SLIDES PRESENTED AT CSPG/CSEG
CONVENTION, MAY 9-12, 1994**

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JULY 1994

Although every effort has been made to ensure accuracy, this Open File Report has not been edited for conformity with Geological Survey of Canada standards.

Mannville Gas Resources Of Western Canada Sedimentary Basin - Geological Play Definition and Resource Assessment

Warters, W.J., Cant, D., Tzeng, H.P., Lee, P.J., Geological Survey of Canada, 3303-33rd St. N.W., Calgary, Alberta T2L 2A7

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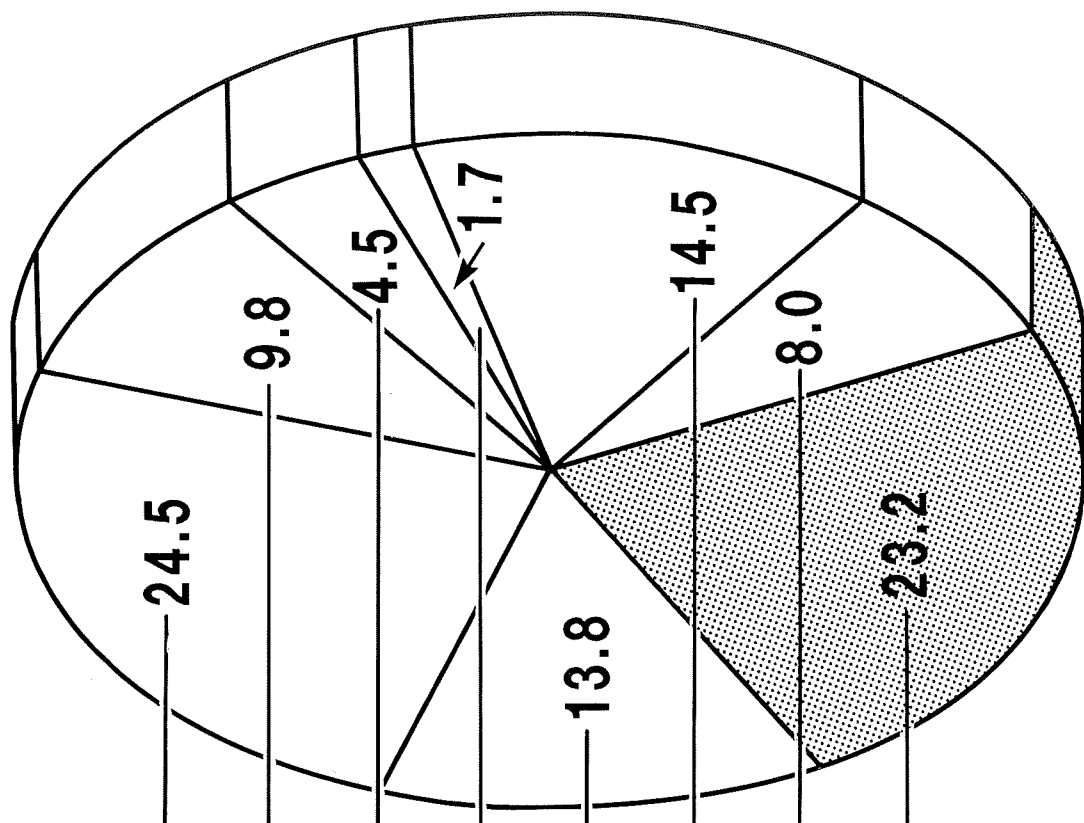
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MANNVILLE GAS PLAYS AND RESERVES

Play Name	No. of Pools	Gas In Place 10 ⁶ m ³	Primary Reserves 10 ⁶ m ³
1) Deep Basin			
Spirit River (E)	276	103,071.9	75,576.6
Bluesky (C)	301	105,478.4	70,968.2
Gething/Dunlevy (B)	666	140,680.6	105,429.7
Cadomin (A)	182	45,824.9	30,136.2
2) Northern Alberta			
Grand Rapids (E)	1097	47,288.9	28,394.0
Clearwater (D)	178	40,246.3	25,607.1
Wabiskaw (C)	220	63,025.8	40,765.0
McMurray (B)	565	45,449.9	27,161.0
3) East-Central Alberta			
Upper Mannville (E)	3186	173,630.5	115,126.8
Lloydminster (D)	604	35,975.7	23,501.0
Cummings (C)	198	5216.0	3,375.0
Dina (B)	230	11,101.9	7,063.0
4) Central Alberta			
Upper Mannville (E)	669	46,594.5	31,663.0
Glauconite (D)	1665	269,170.0	180,097.0
Ostracod (C)	297	38,083.8	26,517.0
Ellerslie/Basal Quartz (B)	2450	256,441.4	167,369.4
5) Southern Alberta			
Upper Mannville (E)	20	1124.0	808.0
Glauconite (D)	268	38,093.4	25,610.0
Sunburst (B)	378	29,932.3	20,356.0
6) Saskatchewan			
Cantaur	4	2433.7	1,815.1
Alberta/Saskatchewan			
Detrital	189	11,298.0	7597.0
TOTAL	13643	1,510,161.9	1,014,936.1

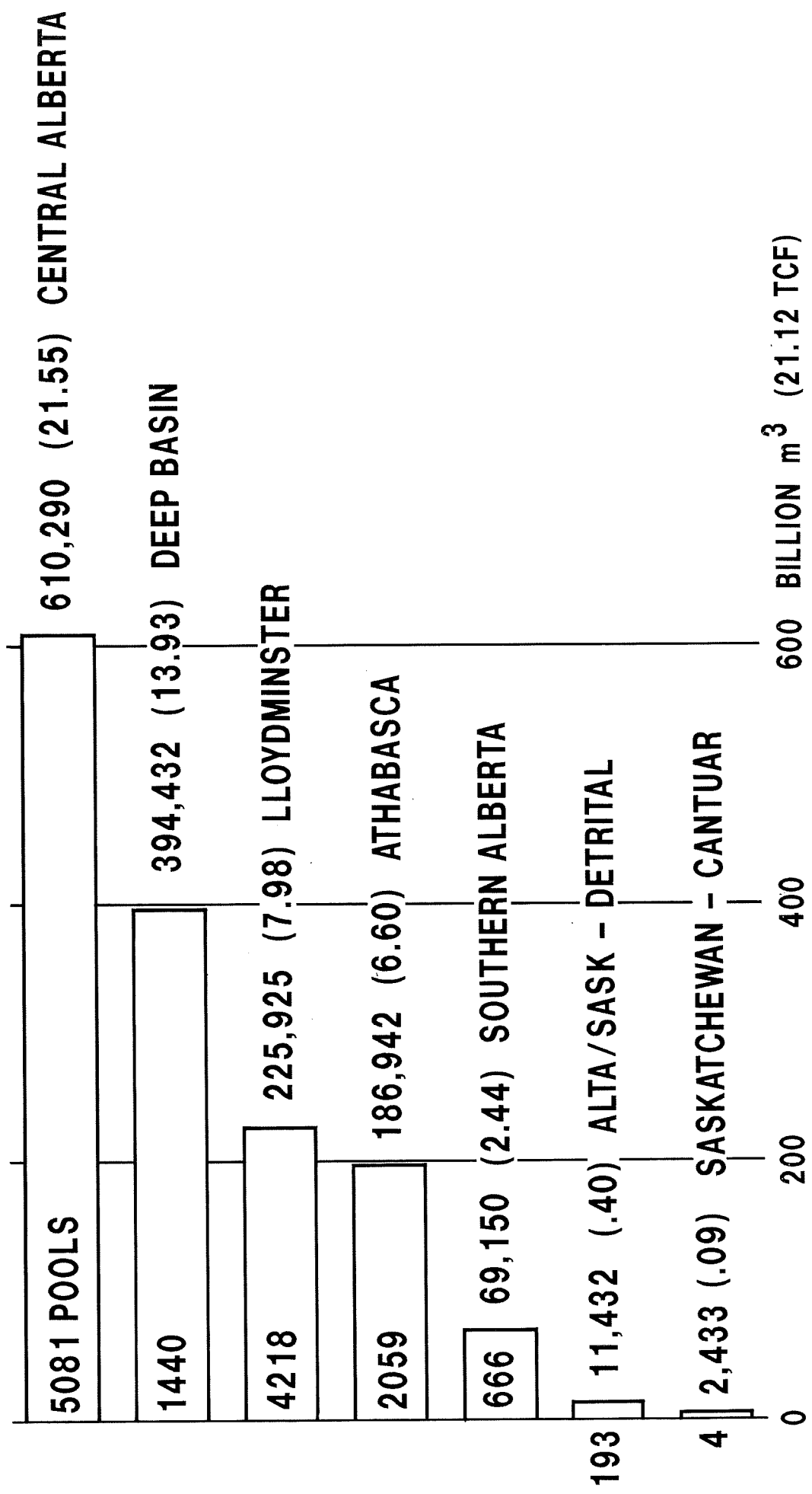
* Compiled from:

- 1) Reservoir Annual 1990, Saskatchewan Energy and Mines.
- 2) Alberta's Reserves of crude oil, oil sands, gas, natural gas liquids and sulphur, 1990, Energy Resources Conservation Board.
- 3) Hydrocarbon and by-product reserves in British Columbia 1990, Province of British Columbia, Ministry of Energy, Mines and Petroleum Resources.

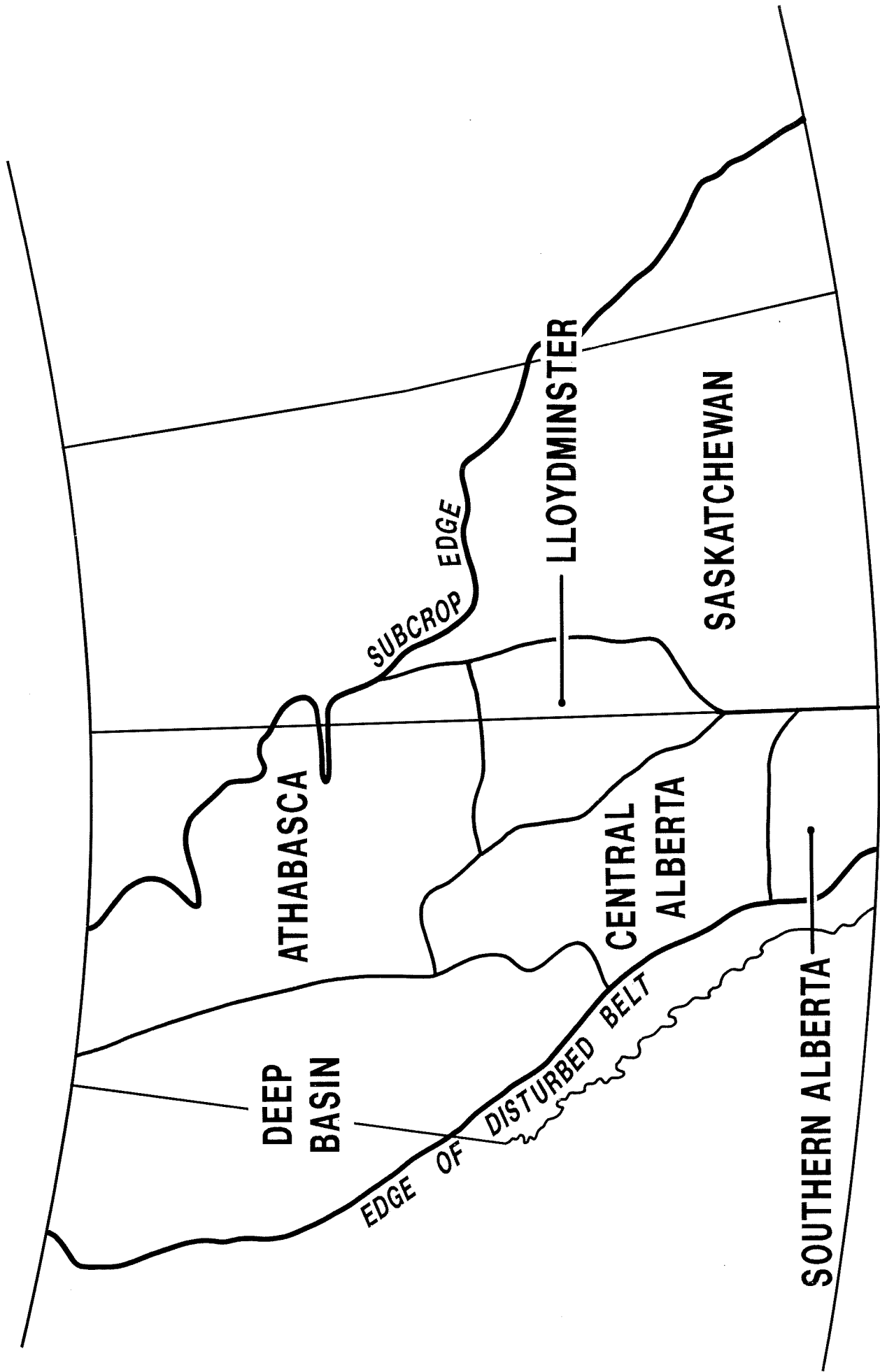


DEVONIAN 56.2 TCF
 PERMIAN - CARBONIFEROUS 22.4 TCF
 TRIASSIC 10.2 TCF
 JURASSIC 3.8 TCF
 FOOTHILLS 31.6 TCF
 UPPER CRETACEOUS - TERTIARY 33.3 TCF
 VIKING - BASAL COLORADO 18.3 TCF
 MANNVILLE 53.0 TCF
 TOTAL 228.8 TCF

**WESTERN CANADA SEDIMENTARY BASIN
 DISCOVERED GAS RESOURCE (%)**

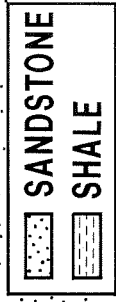


**MANNVILLE GROUP AND EQUIVALENT
DISCOVERED GAS RESOURCE**

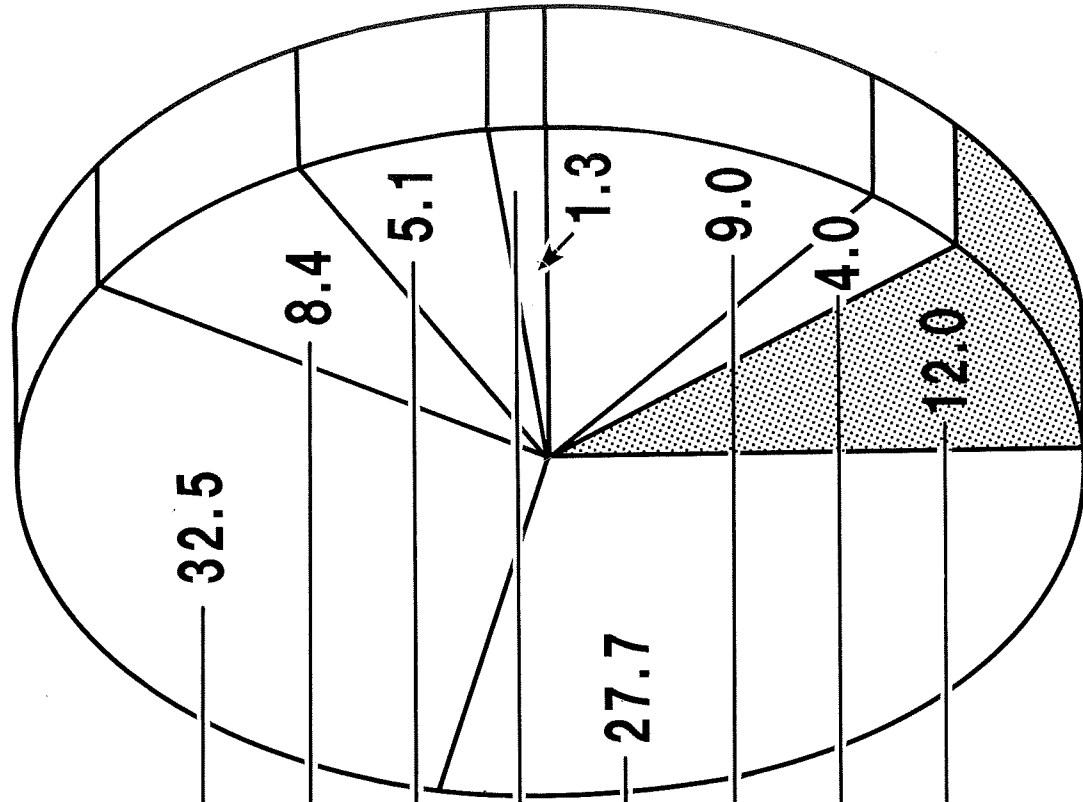


WESTERN CANADA SEDIMENTARY BASIN

1	2	3	4	5	6
DEEP BASIN	ATHABASCA	LLOYDMINSTER	CENTRAL ALBERTA	SOUTHERN ALBERTA	SASKATCHEWAN
NOTIKEWIN SPIRIT RIVER FALHER WILRICH BLUESKY GETHING/ DUNLEVY CADOMIN	GRAND RAPIDS CLEAR - WATER WABISKAW McMURRAY	COLONY McLAREN WASECA SPARKY GP REX LLOYD - MINSTER CUMMINGS DINA	UPPER MANNVILLE GLAUCONITE OSTRACOD ELLERSLIE/ BASAL QUARTZ	UPPER MANNVILLE GLAUCONITE OSTRACOD SUNBURST/ CUTBANK	PENSE CANTUAR
MANNVILLE GROUP		MANNVILLE GROUP		MANNVILLE GROUP	
FORT ST JOHN GROUP		MANNVILLE GROUP		MANNVILLE GROUP	
BULLHEAD GROUP		MANNVILLE GROUP		MANNVILLE GROUP	
DETRITAL					



MANNVILLE STRATIGRAPHY



DEVONIAN 68.5 TCF — 32.5

PERMIAN - CARBONIFEROUS 17.8 TCF — 8.4

TRIASSIC 10.8 TCF — 5.1

JURASSIC 2.8 TCF — 1.3

FOOTHILLS 58.6 TCF — 27.7

UPPER CRETACEOUS - TERTIARY * 19.0 TCF — 9.0

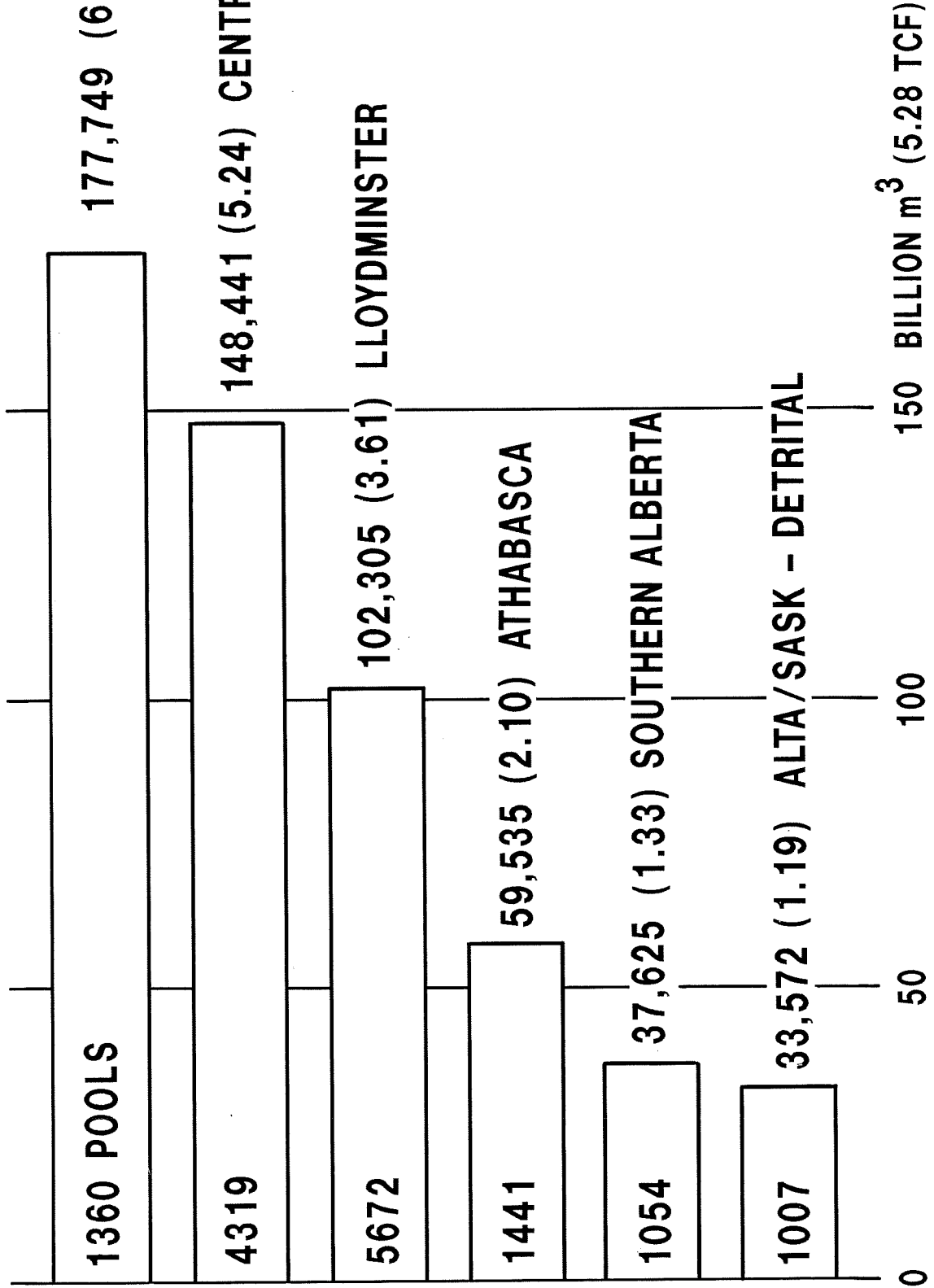
VIKING - BASAL COLORADO * 8.4 TCF — 4.0

MANNVILLE 25.4 TCF — 12.0

TOTAL 211.3 TCF

* ALBERTA ONLY (ERCB 1992)

WESTERN CANADA SEDIMENTARY BASIN
UNDISCOVERED POTENTIAL GAS RESOURCE (%)



177,749 (6.28) DEEP BASIN

148,441 (5.24) CENTRAL ALBERTA

102,305 (3.61) LLOYDMINSTER

59,535 (2.10) ATHABASCA

37,625 (1.33) SOUTHERN ALBERTA

33,572 (1.19) ALTA/SASK - DETRITAL

150 BILLION m³ (5.28 TCF)

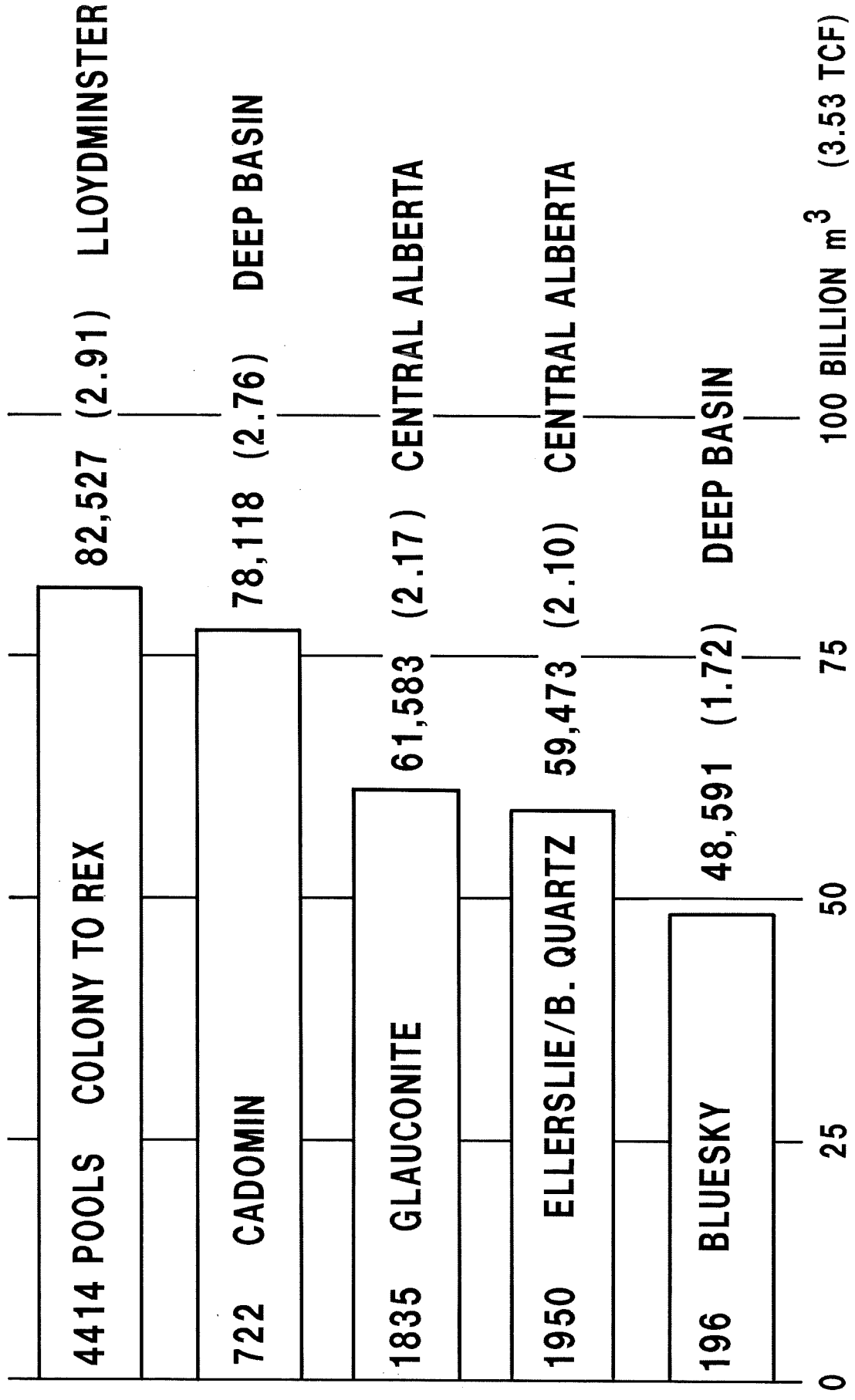
100

50

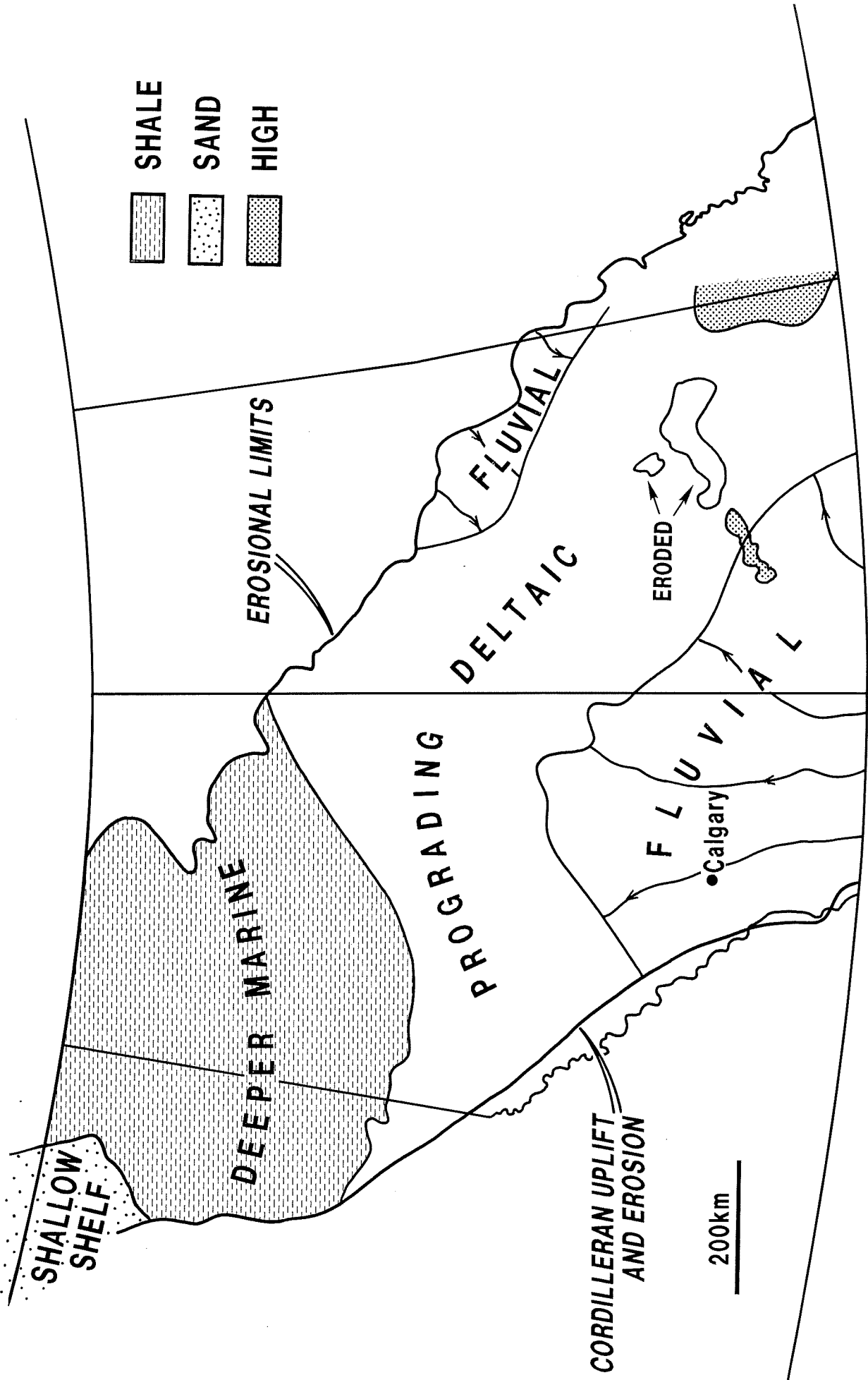
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MANNVILLE GROUP AND EQUIVALENT

POTENTIAL GAS RESOURCE



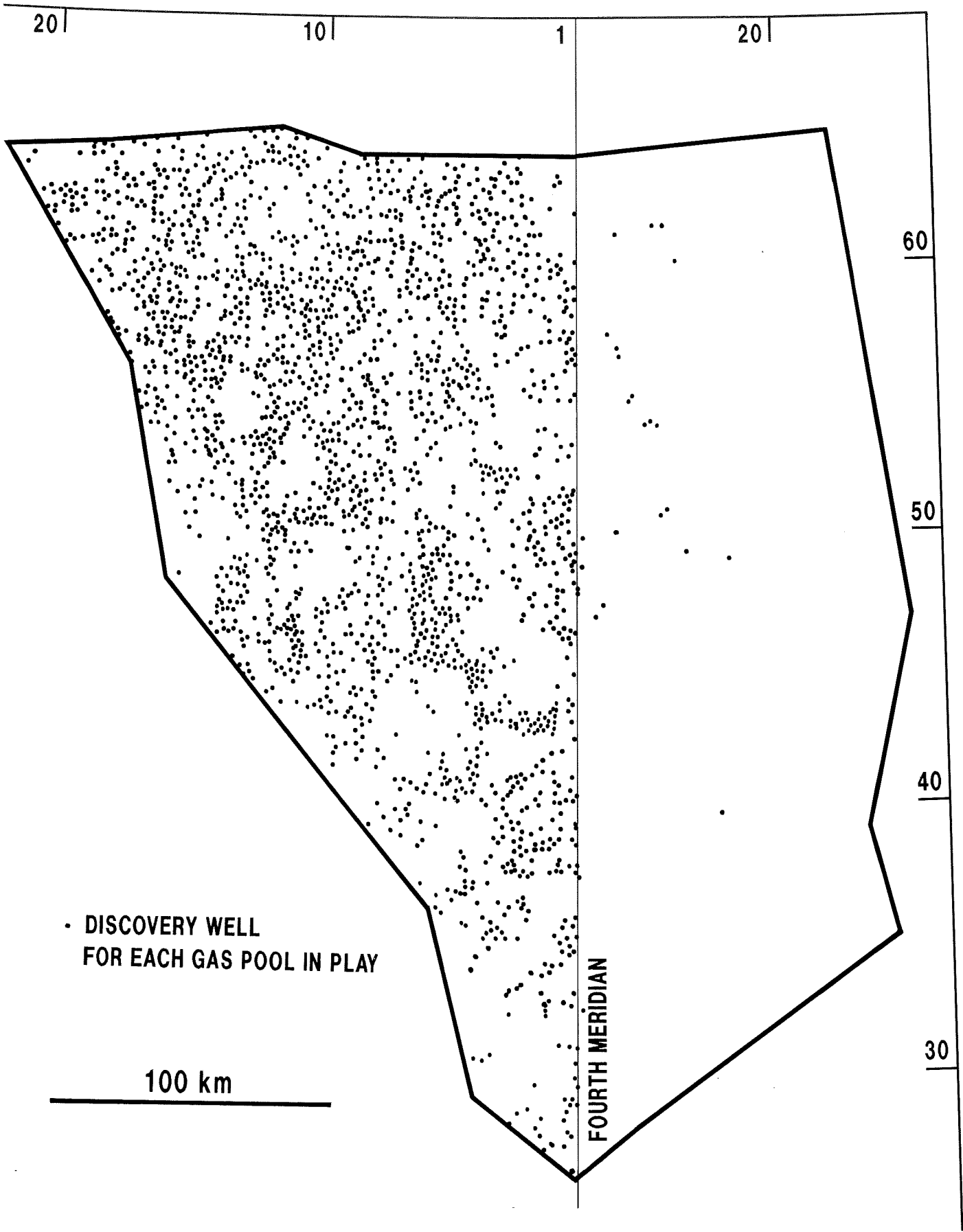
**MANNVILLE GROUP AND EQUIVALENT
TOP 5 PLAYS - POTENTIAL GAS RESOURCE**



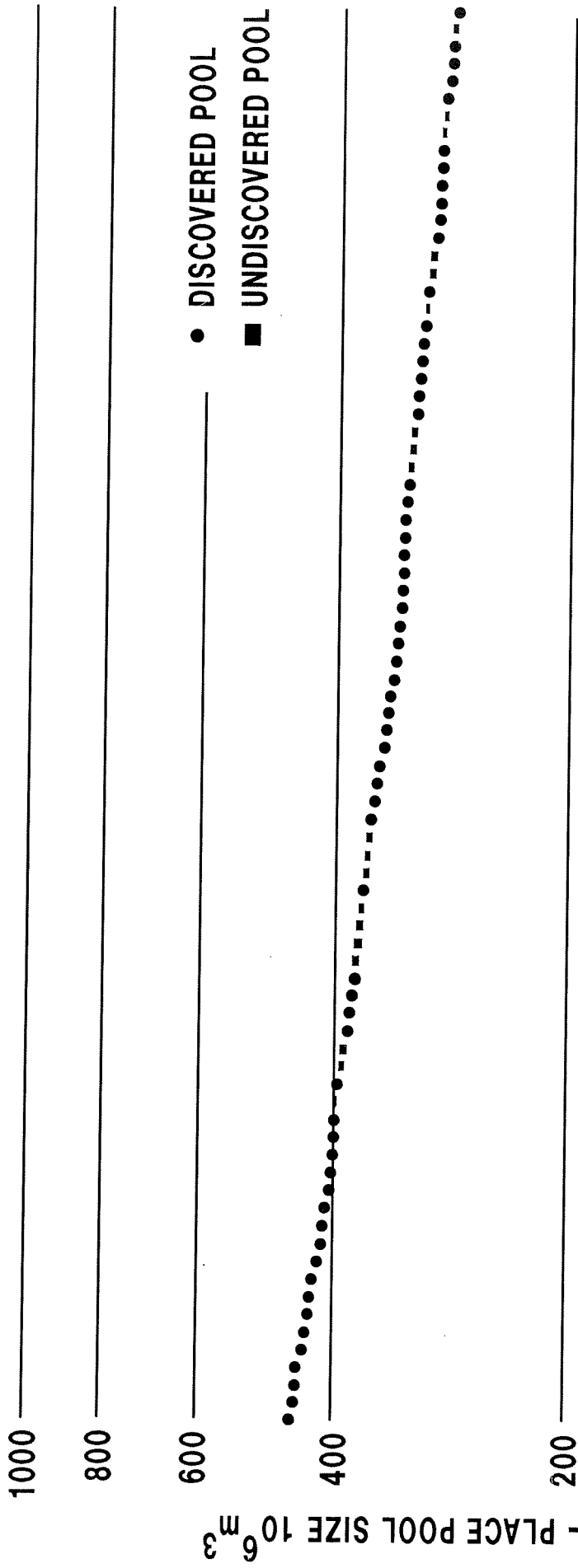
- SHALE
- SAND
- HIGH

PALEOGEOGRAPHY OF THE LOWER UPPER MANNVILLE & EQUIVALENTS

BARCLAY & SMITH 1992

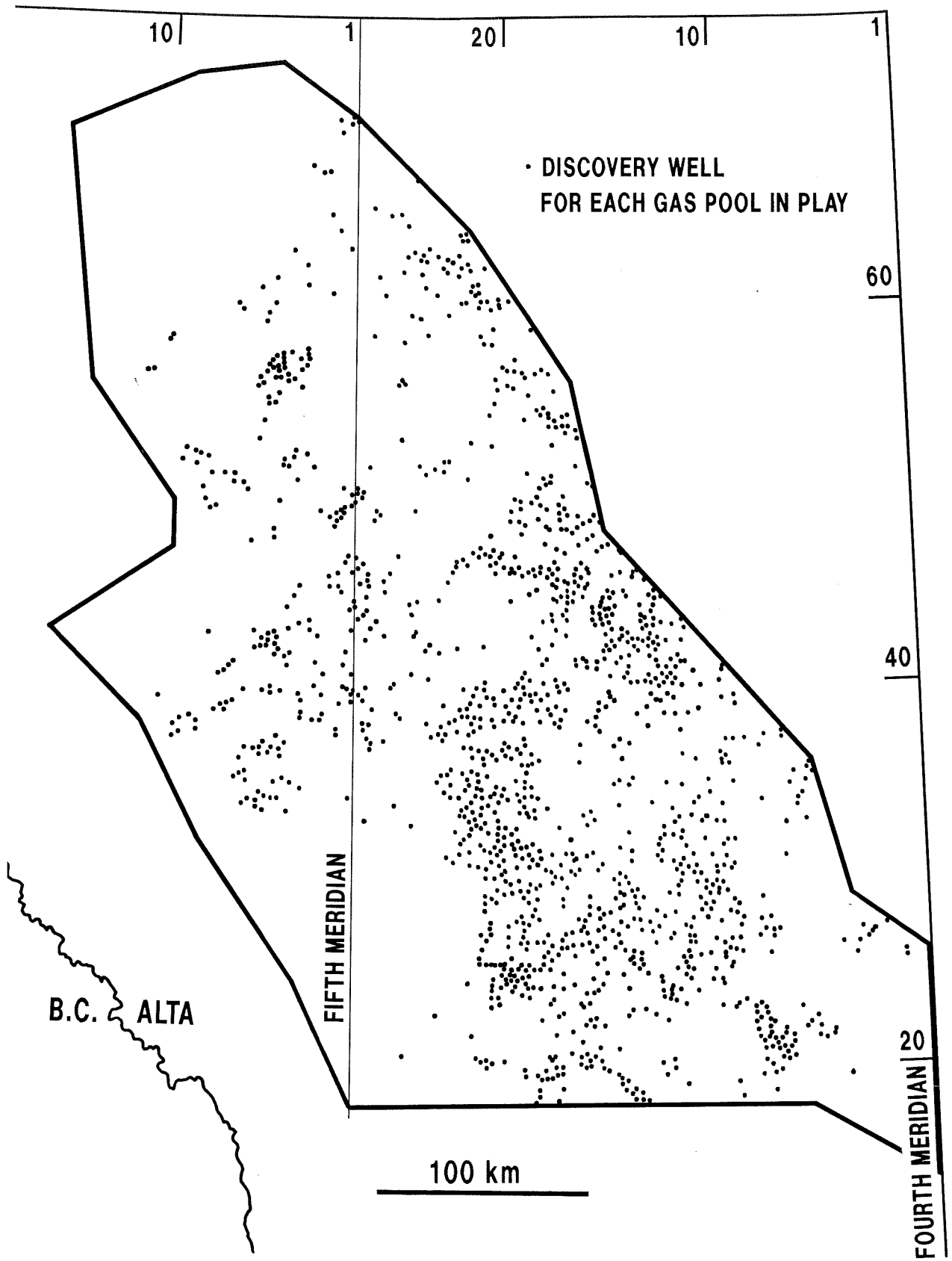


**PLAY MAP LLOYDMINSTER
COLONY TO REX**

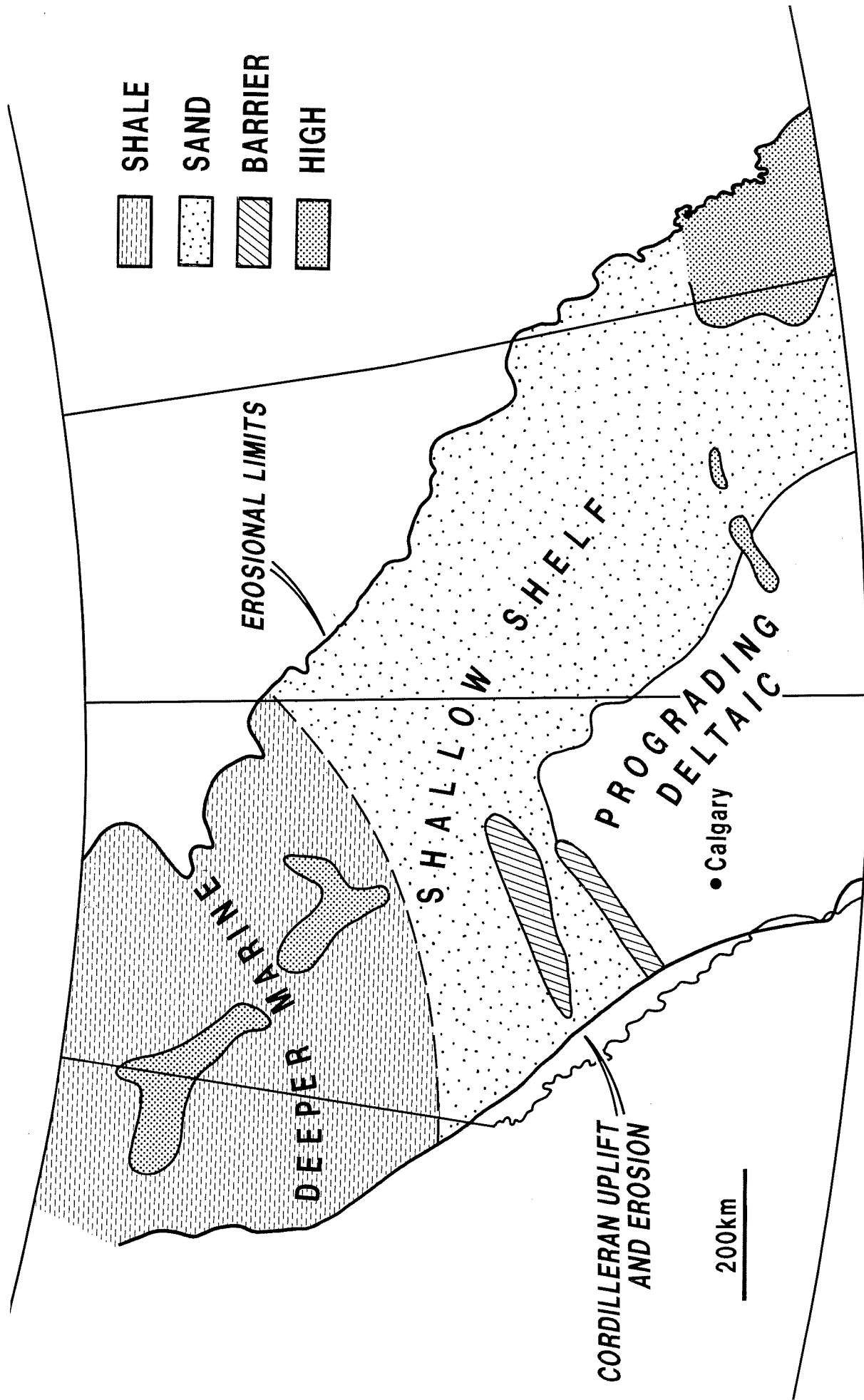


POOL SIZE BY RANK

POOL RANK PLOT CENTRAL ALBERTA - GLAUCONITE

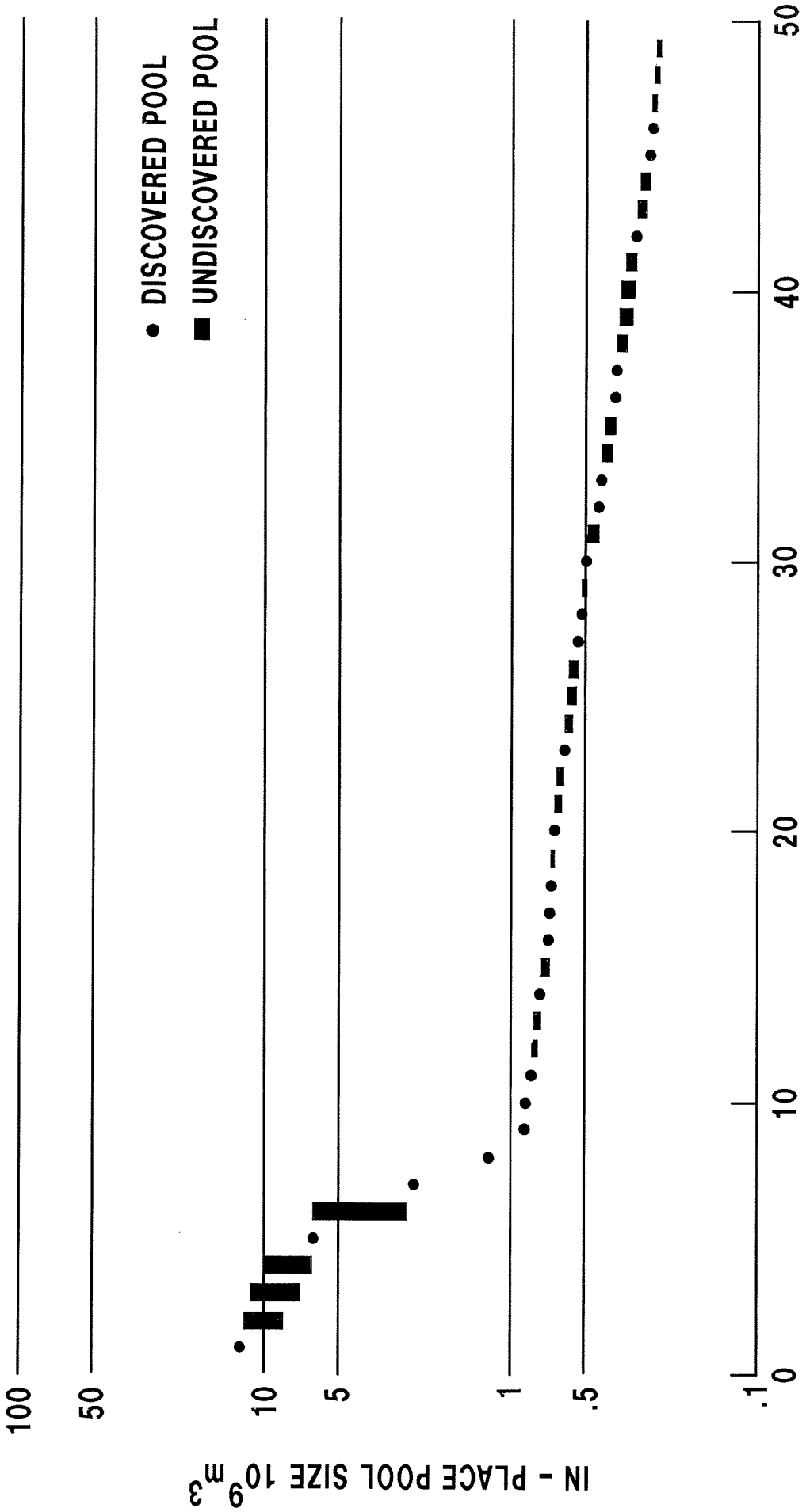


**PLAY MAP CENTRAL ALBERTA
GLAUCONITE**

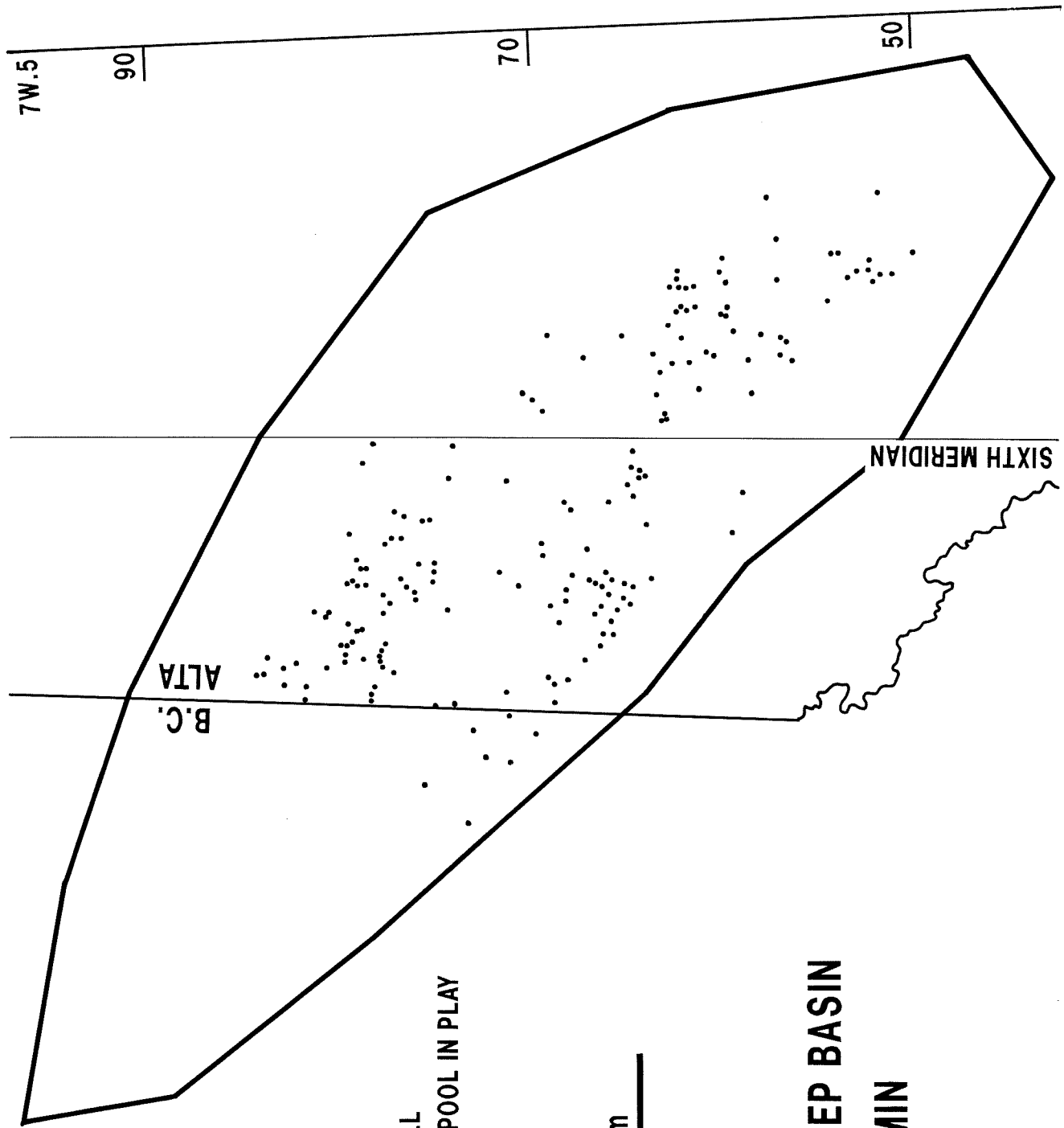


PALEOGEOGRAPHY OF THE GLAUCONITIC/LLOYDMINSTER

MODIFIED FROM BARCLAY & SMITH 1992



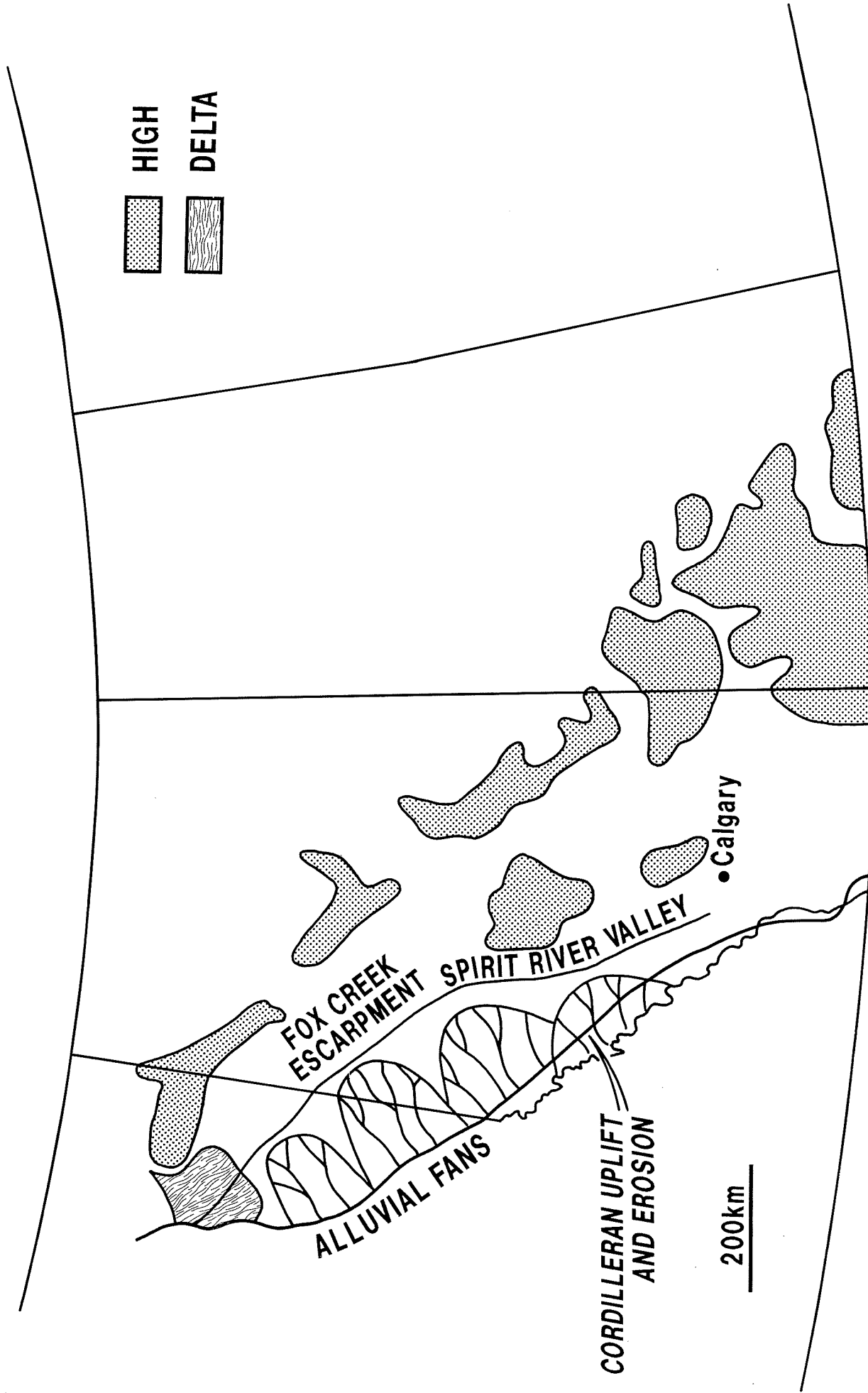
POOL RANK PLOT DEEP BASIN - CADOMIN



• DISCOVERY WELL
FOR EACH GAS POOL IN PLAY

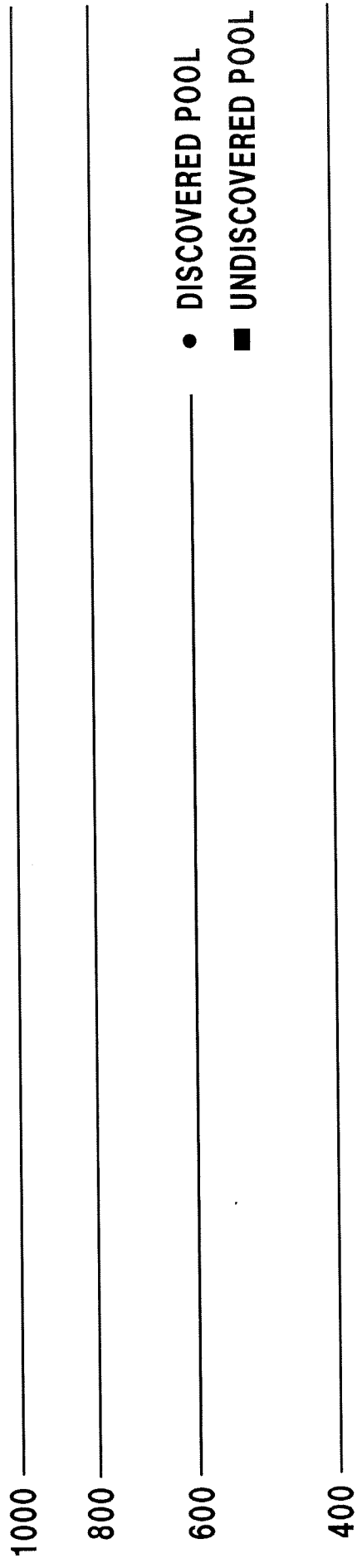
100 km

PLAY MAP DEEP BASIN CADOMIN

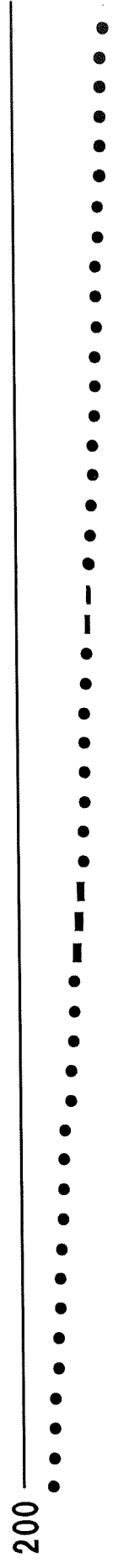


BARCLAY & SMITH 1992

PALEOGEOGRAPHY OF THE CADOMIN

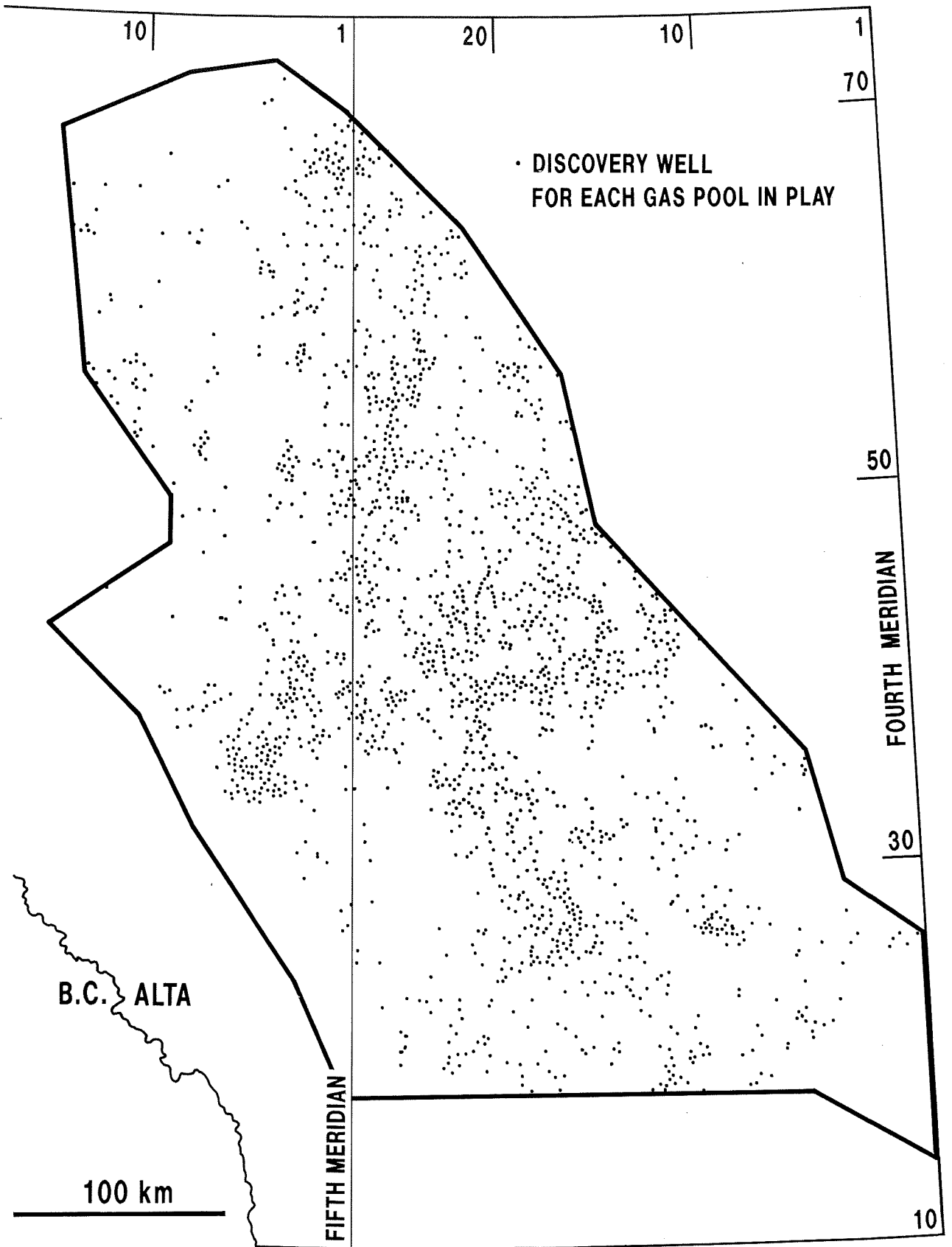


IN - PLACE POOL SIZE $10^6 m^3$

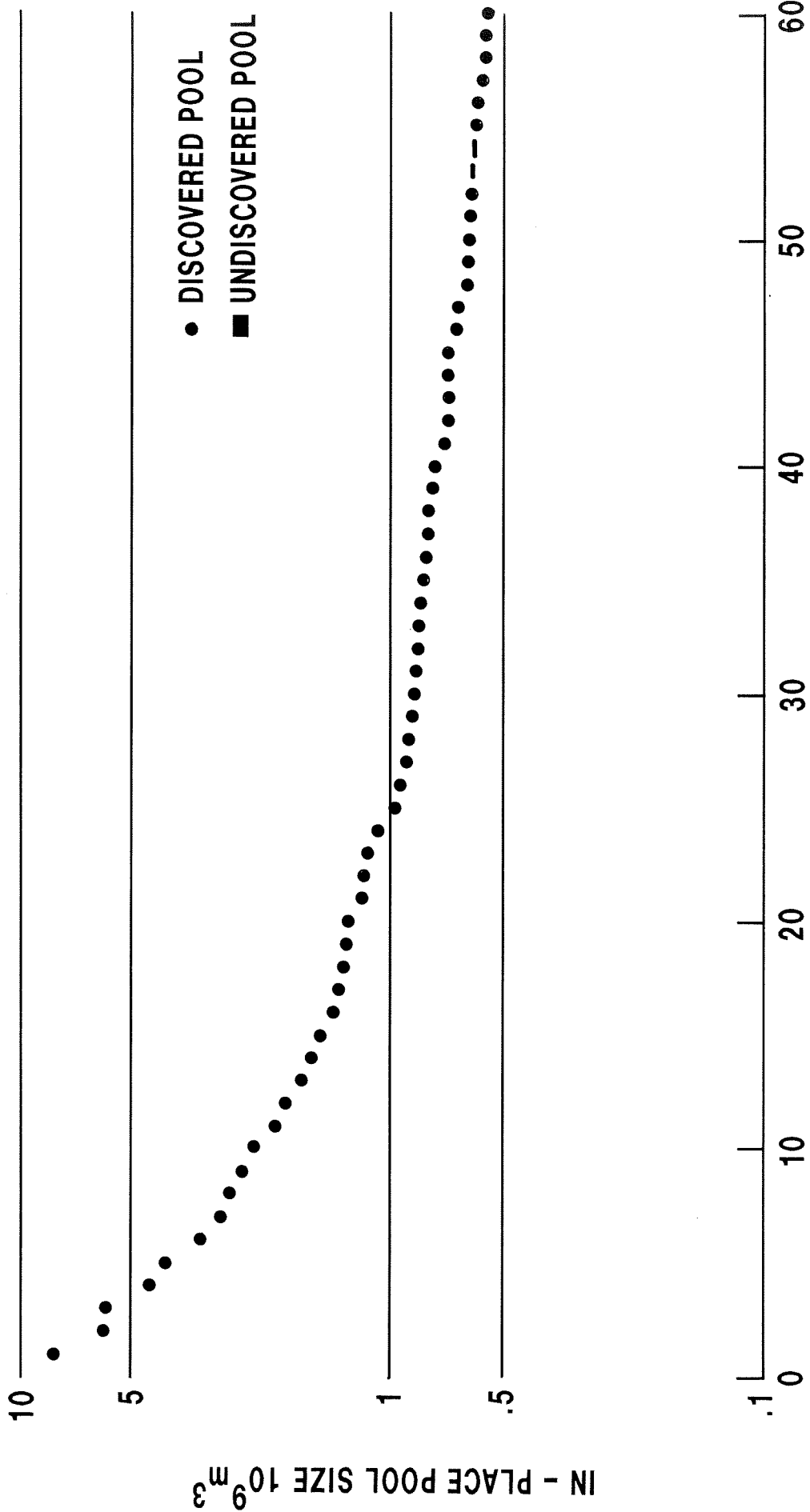


POOL SIZE BY RANK

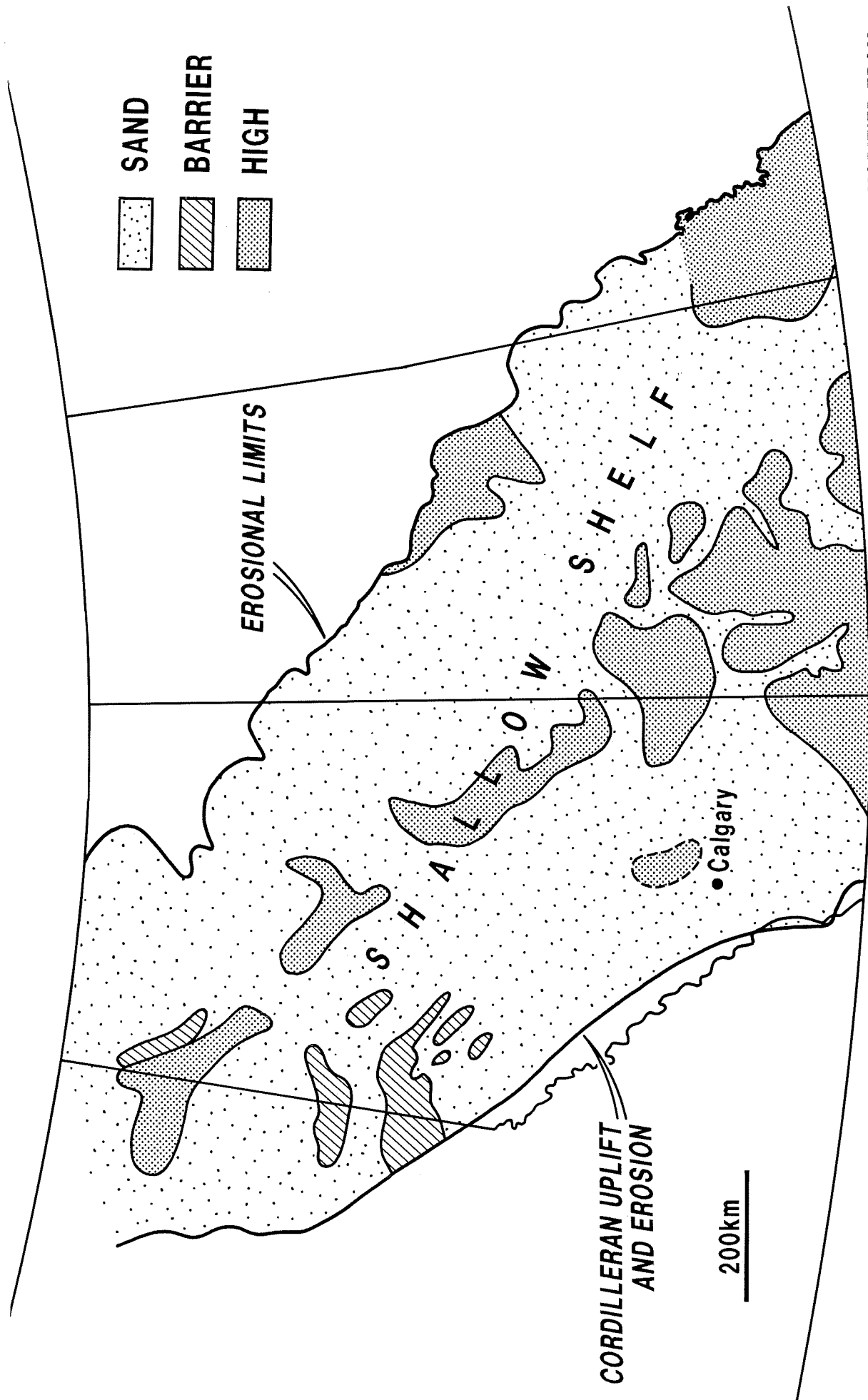
POOL RANK PLOT LLOYDMINSTER - COLONY TO REX



**PLAY MAP CENTRAL ALBERTA
ELLERSLIE/BASAL QUARTZ**

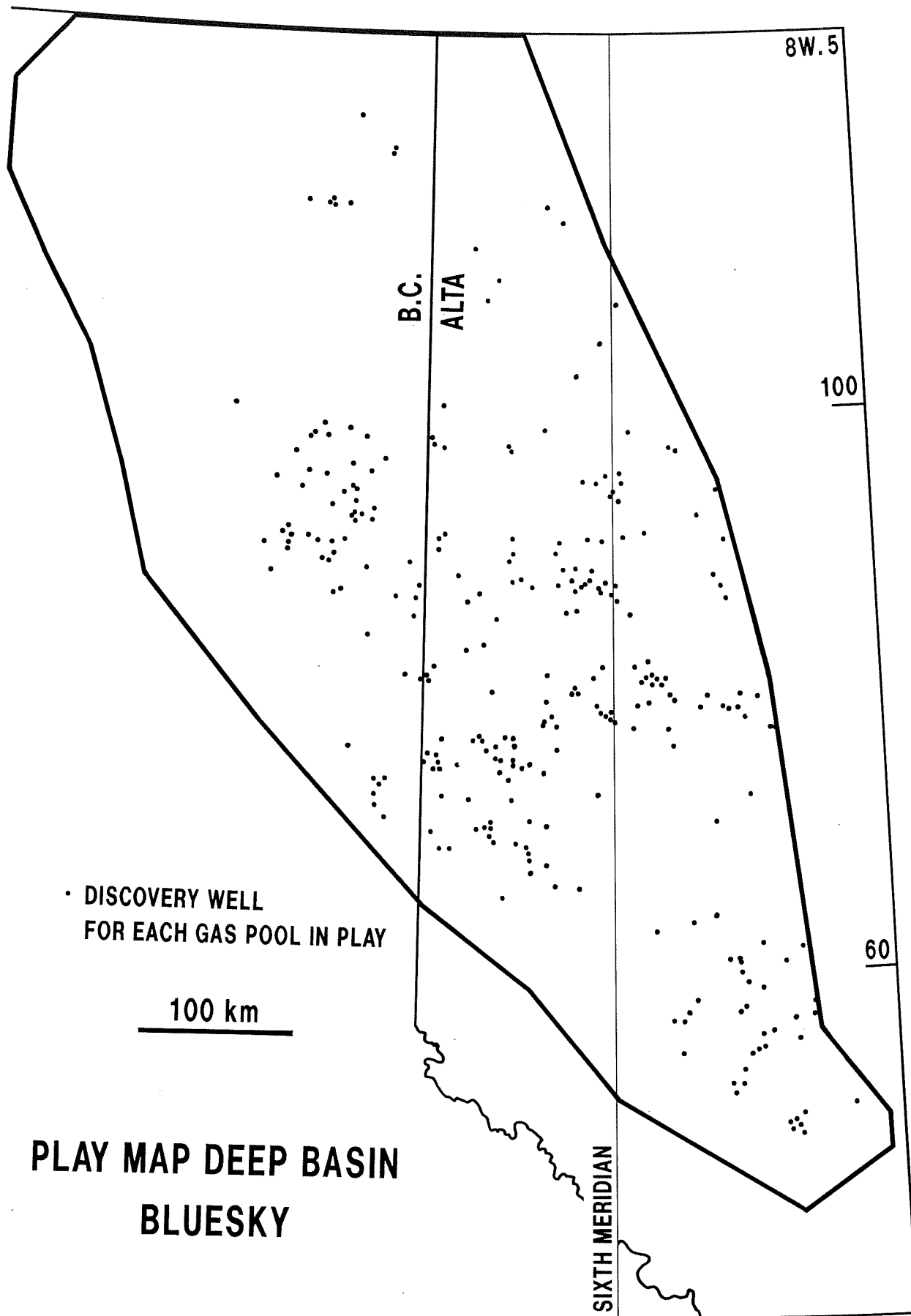


POOL RANK PLOT CENTRAL ALBERTA - ELLERSLIE/BASAL QUARTZ



MODIFIED FROM
 BARCLAY & SMITH 1992

PALEOGEOGRAPHY OF THE BLUESKY / OSTRACOD / WABISKAW / CUMMINGS



**PLAY MAP DEEP BASIN
BLUESKY**

• DISCOVERY WELL
FOR EACH GAS POOL IN PLAY

100 km

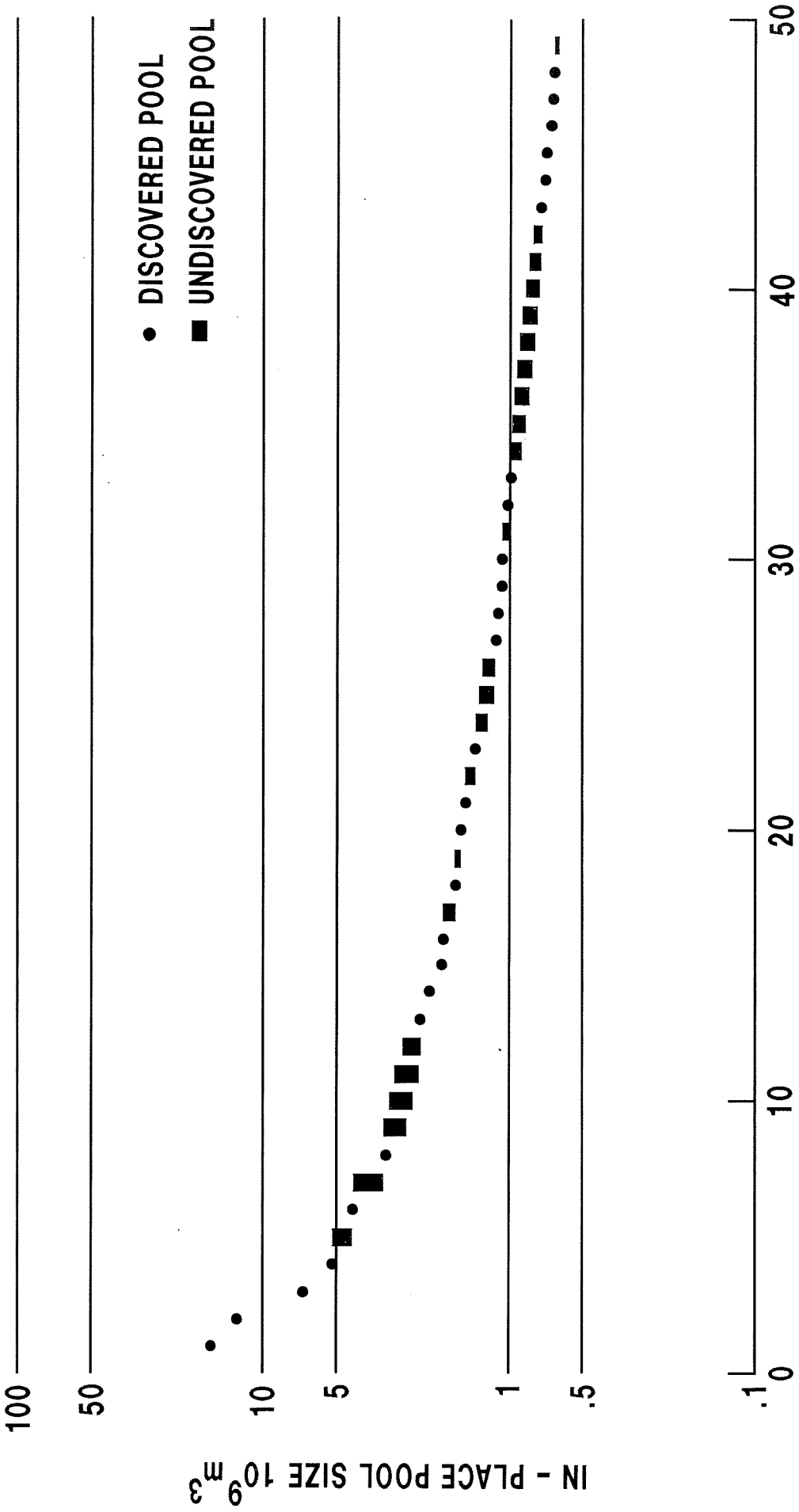
B.C.
ALTA

SIXTH MERIDIAN

8W.5

100

60



POOL SIZE BY RANK

POOL RANK PLOT DEEP BASIN - BLUESKY

CONCLUSIONS

THE DISCOVERED IN - PLACE VOLUME FROM ALL MANNVILLE PLAY TYPES IS 1,500,603.6 MILLION m³ (53 TCF) IN 13,671 POOLS.

THE UNDISCOVERED POTENTIAL GAS RESOURCE (EXPECTED VALUE) FROM ALL MANNVILLE PLAY TYPES IS 718,926 MILLION m³ (25.4 TCF).

32.4 % OF THE TOTAL RESOURCE REMAINS TO BE DISCOVERED.

References

Barclay, J.E. and Smith, D.G., 1992 Western Canada Foreland Basin Oil and Gas Plays, In: Macqueen, R.W. and Leckie, D.A., eds., Foreland Basins and Fold Belts, AAPG Memoir 55, P.191-228.

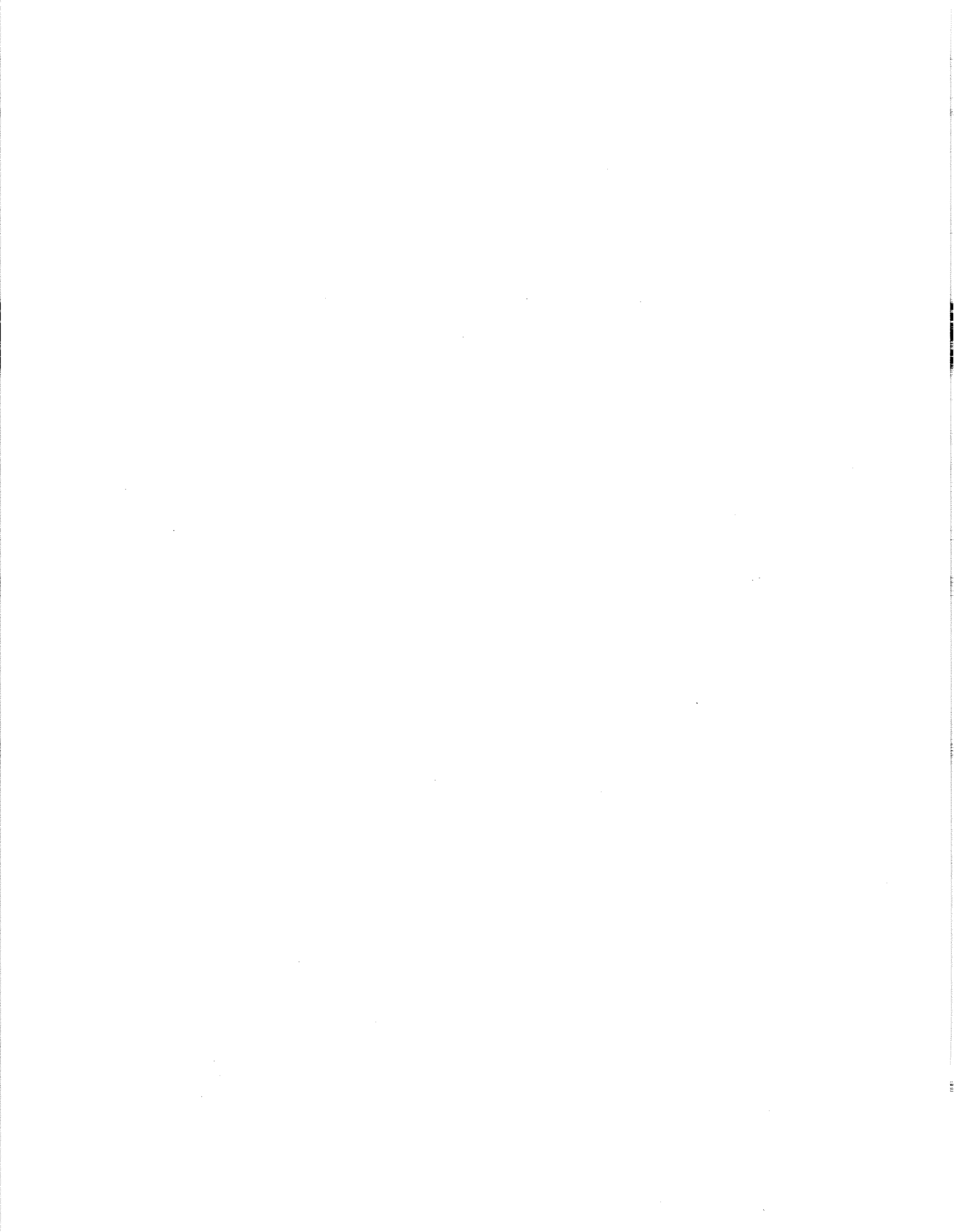
Energy Resources Conservation Board, 1992, Ultimate Potential and Supply of Natural Gas in Alberta, ERCB Report 92-A.

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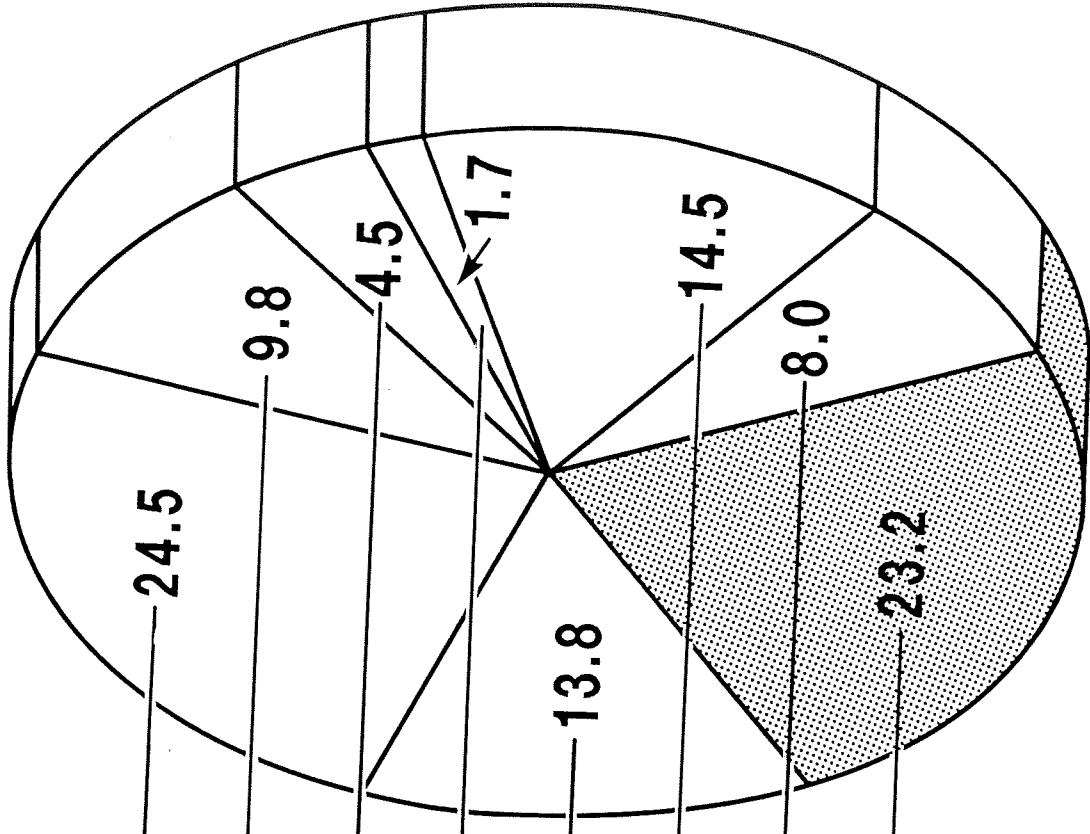
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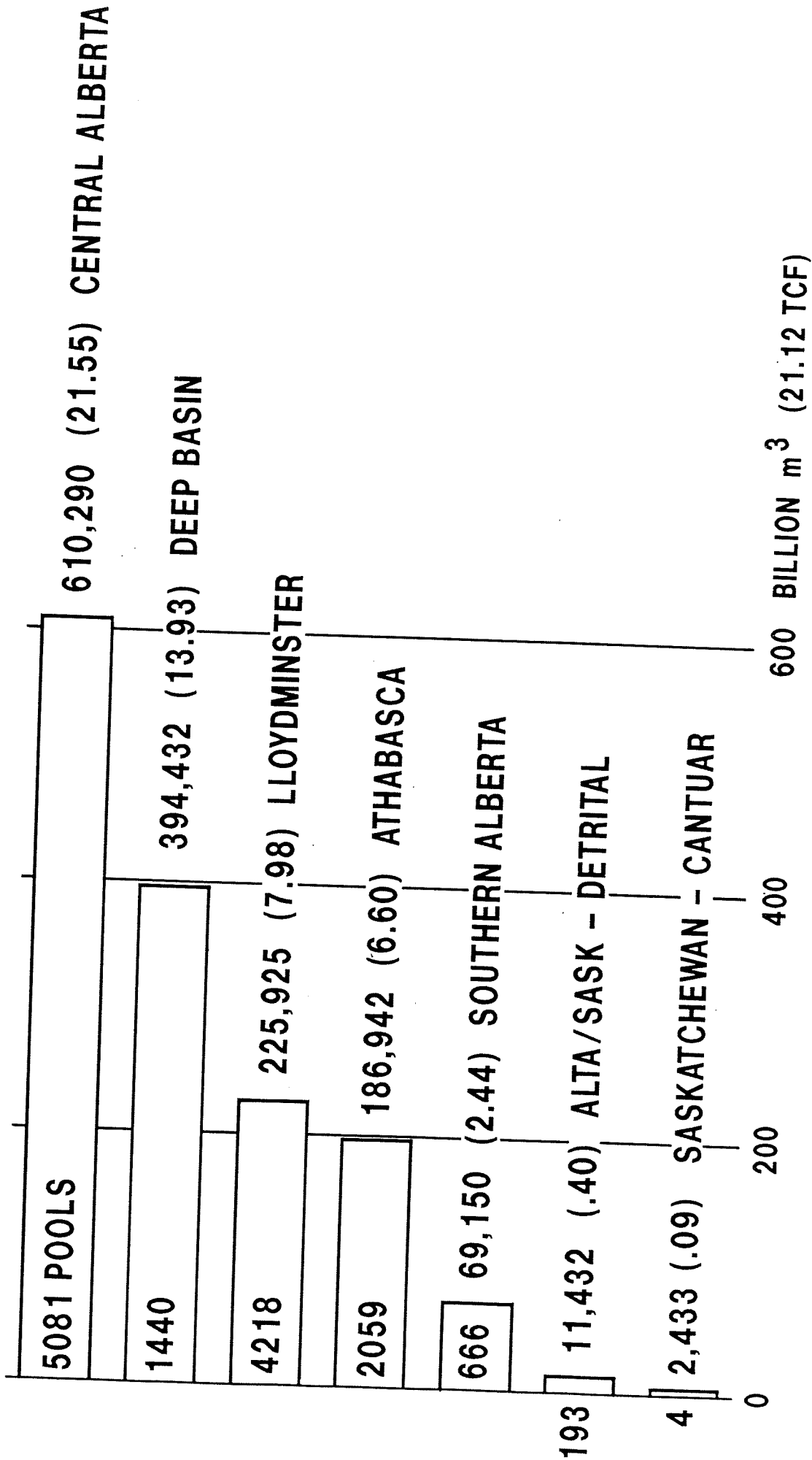
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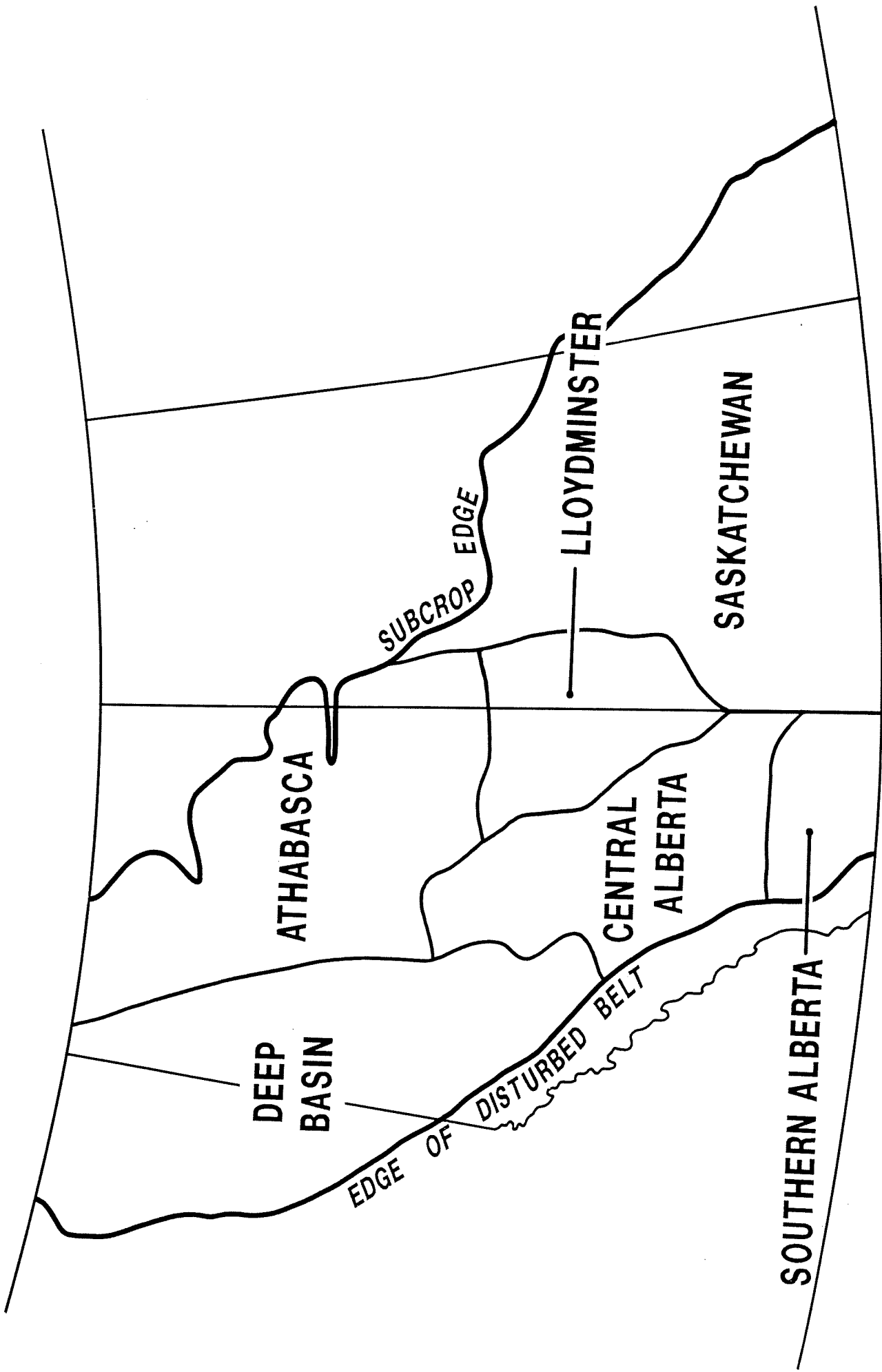
MANNVILLE 53.0 TCF

TOTAL 228.8 TCF

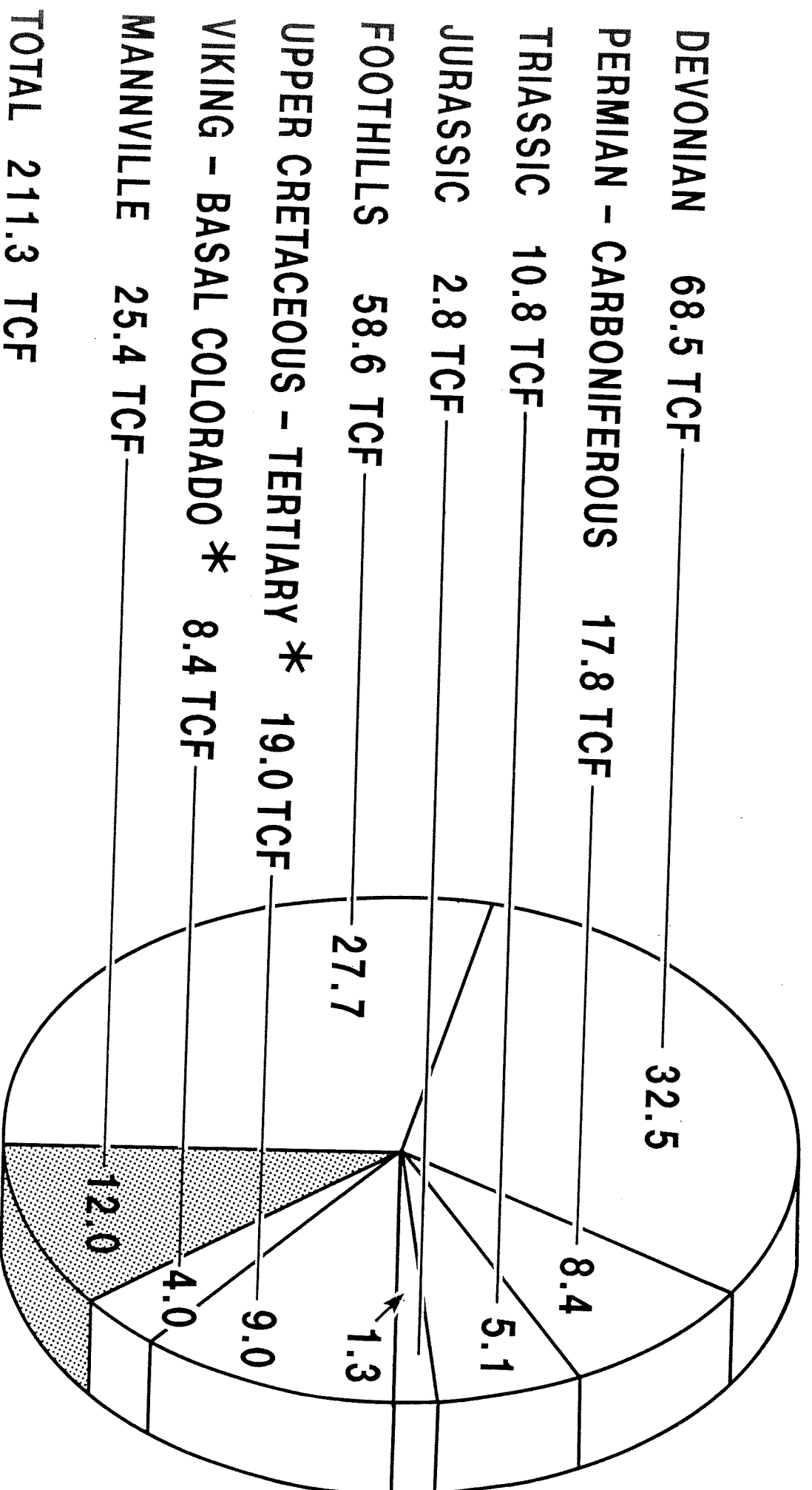
**WESTERN CANADA SEDIMENTARY BASIN
DISCOVERED GAS RESOURCE (%)**



**MANNVILLE GROUP AND EQUIVALENT
DISCOVERED GAS RESOURCE**

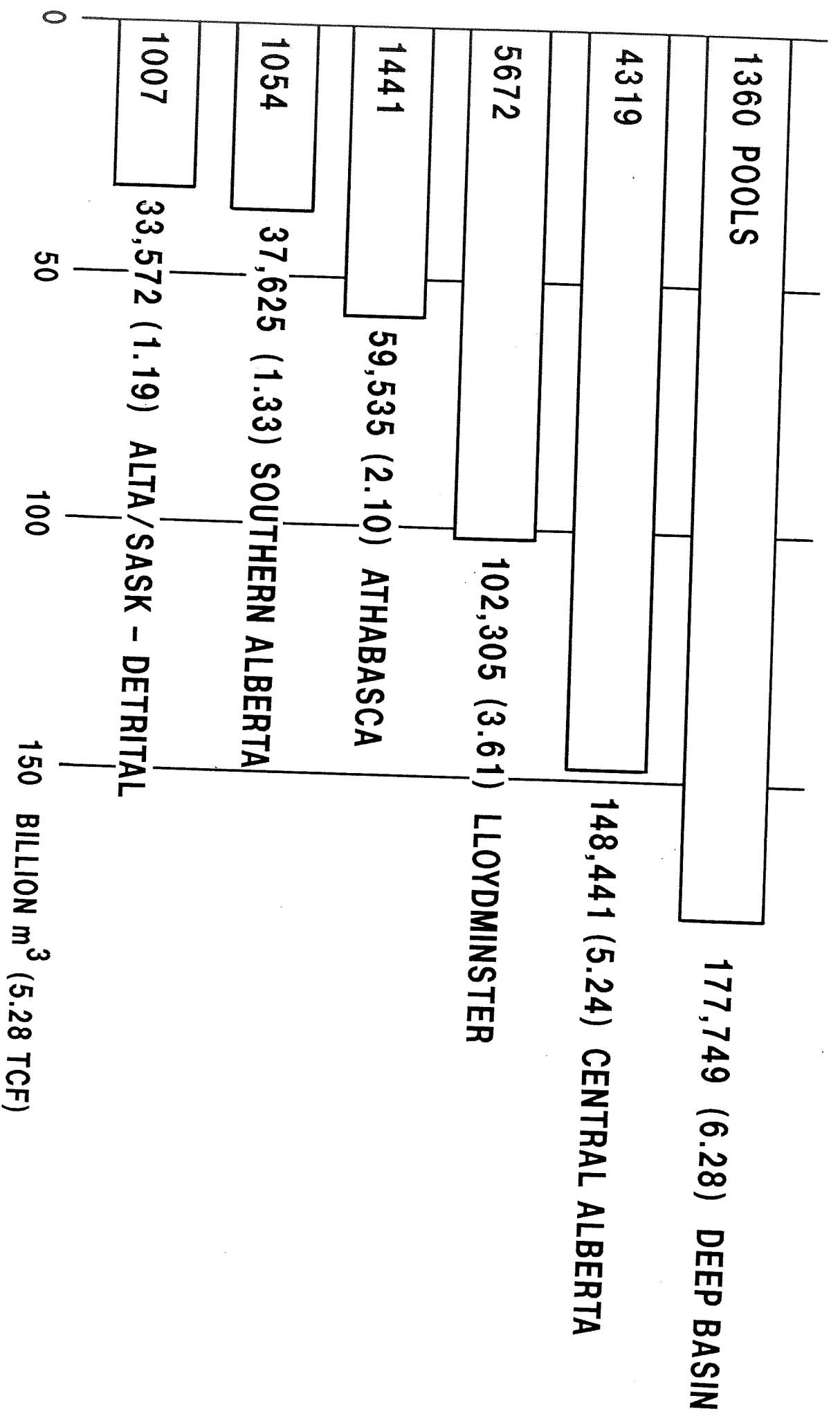


WESTERN CANADA SEDIMENTARY BASIN

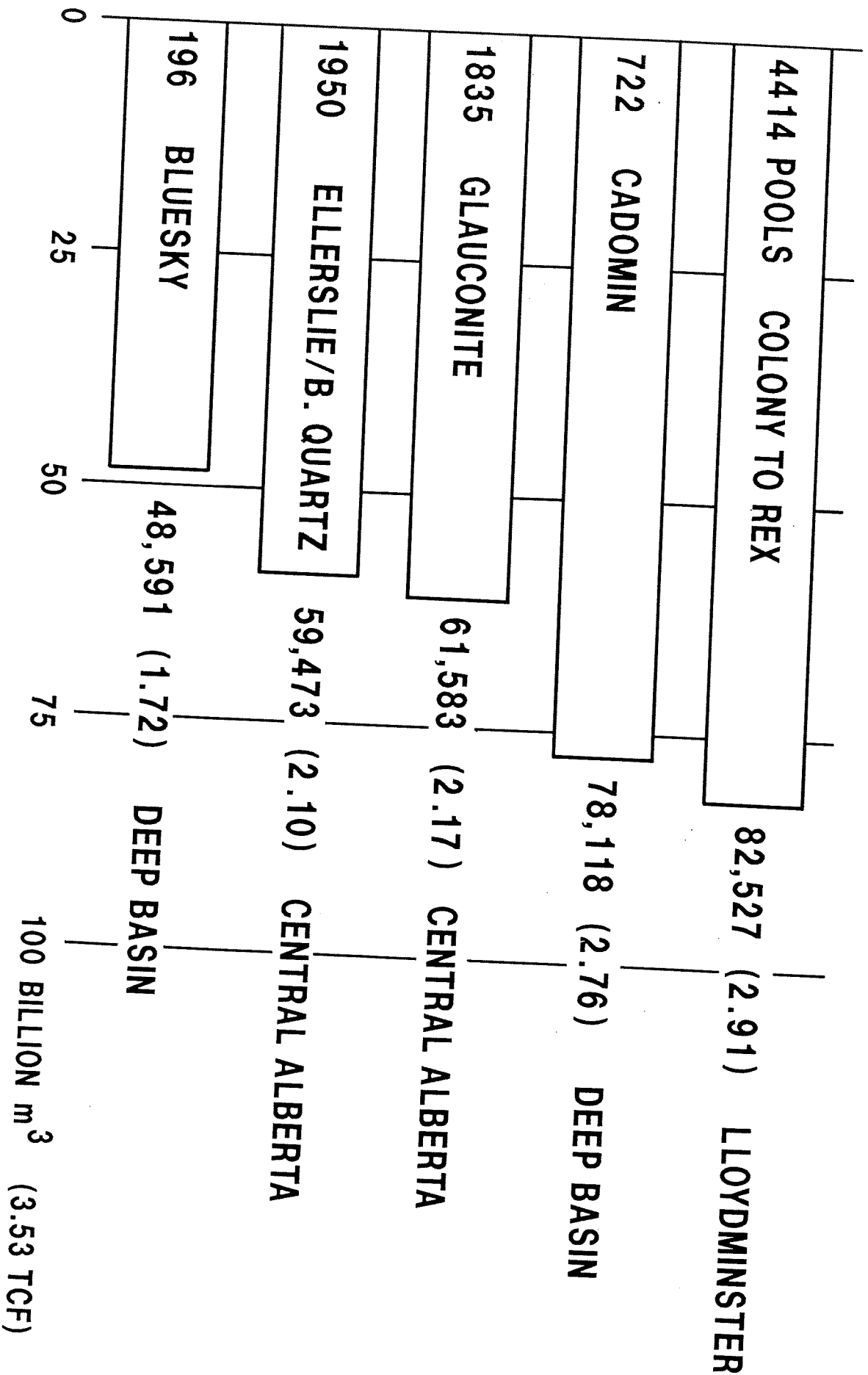


**WESTERN CANADA SEDIMENTARY BASIN
UNDISCOVERED POTENTIAL GAS RESOURCE (%)**

* ALBERTA ONLY (ERCb 1992)

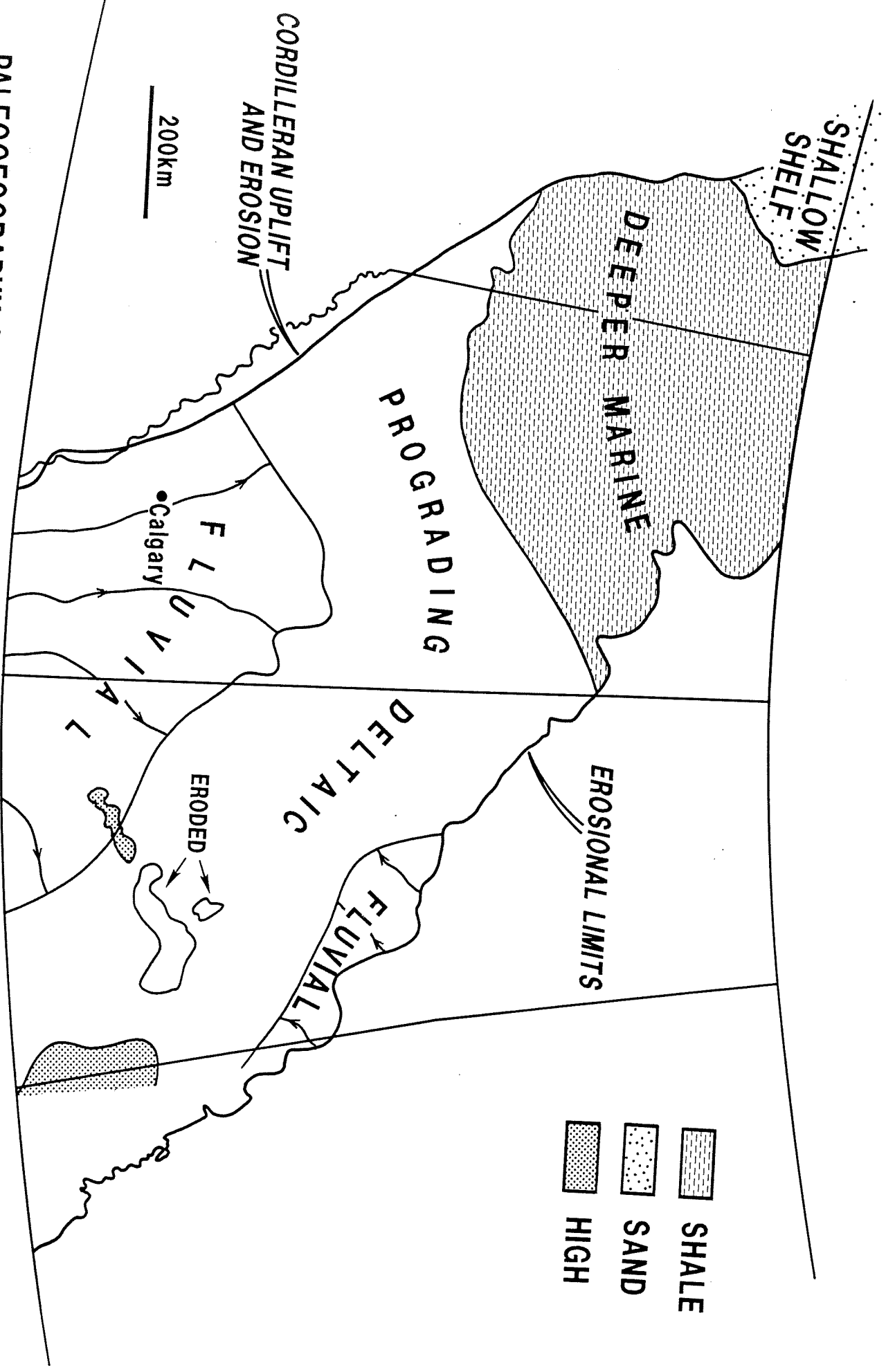


**MANNVILLE GROUP AND EQUIVALENT
POTENTIAL GAS RESOURCE**



**MANNVILLE GROUP AND EQUIVALENT
TOP 5 PLAYS - POTENTIAL GAS RESOURCE**

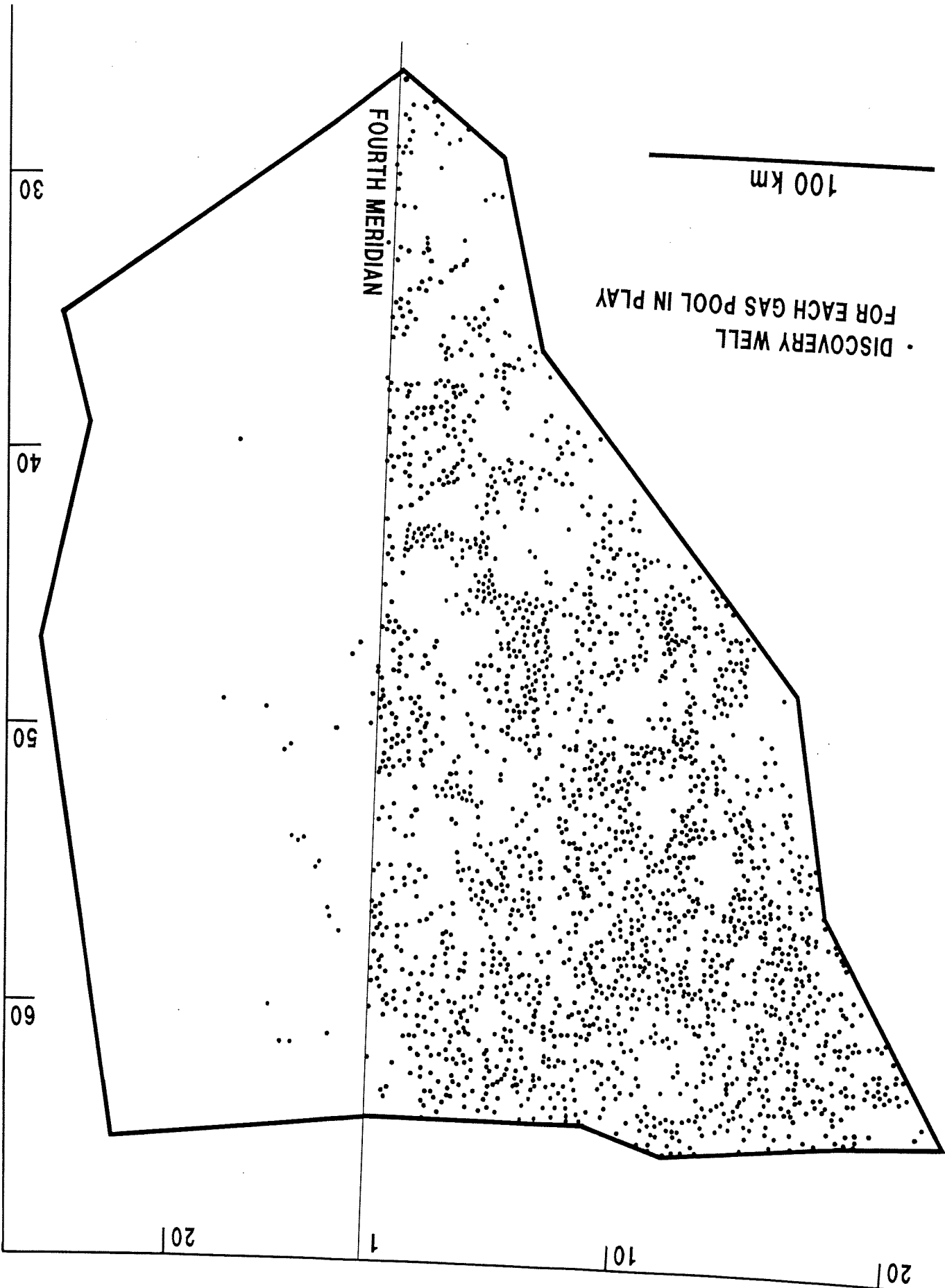
100 BILLION m³ (3.53 TCF)



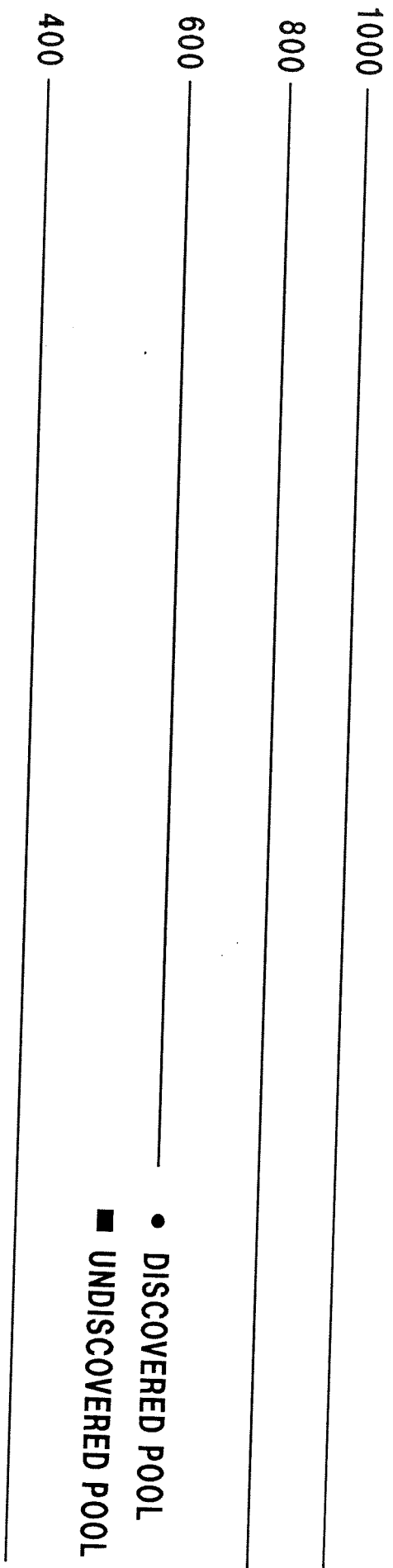
PALEOGEOGRAPHY OF THE LOWER UPPER MANNVILLE & EQUIVALENTS

BARCLAY & SMITH 1992

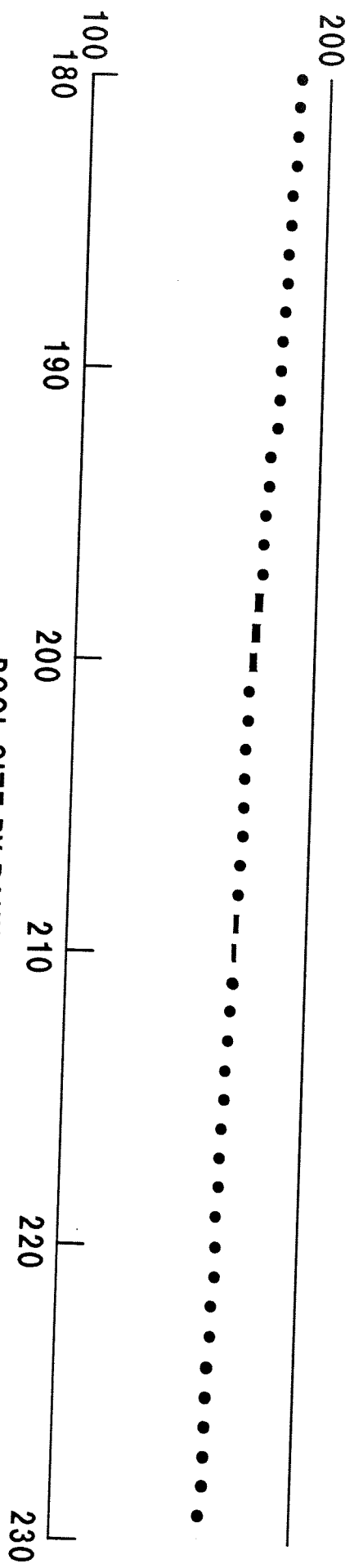
PLAY MAP LLOYDMINSTER
COLONY TO REX



IN - PLACE POOL SIZE 10^6 m^3

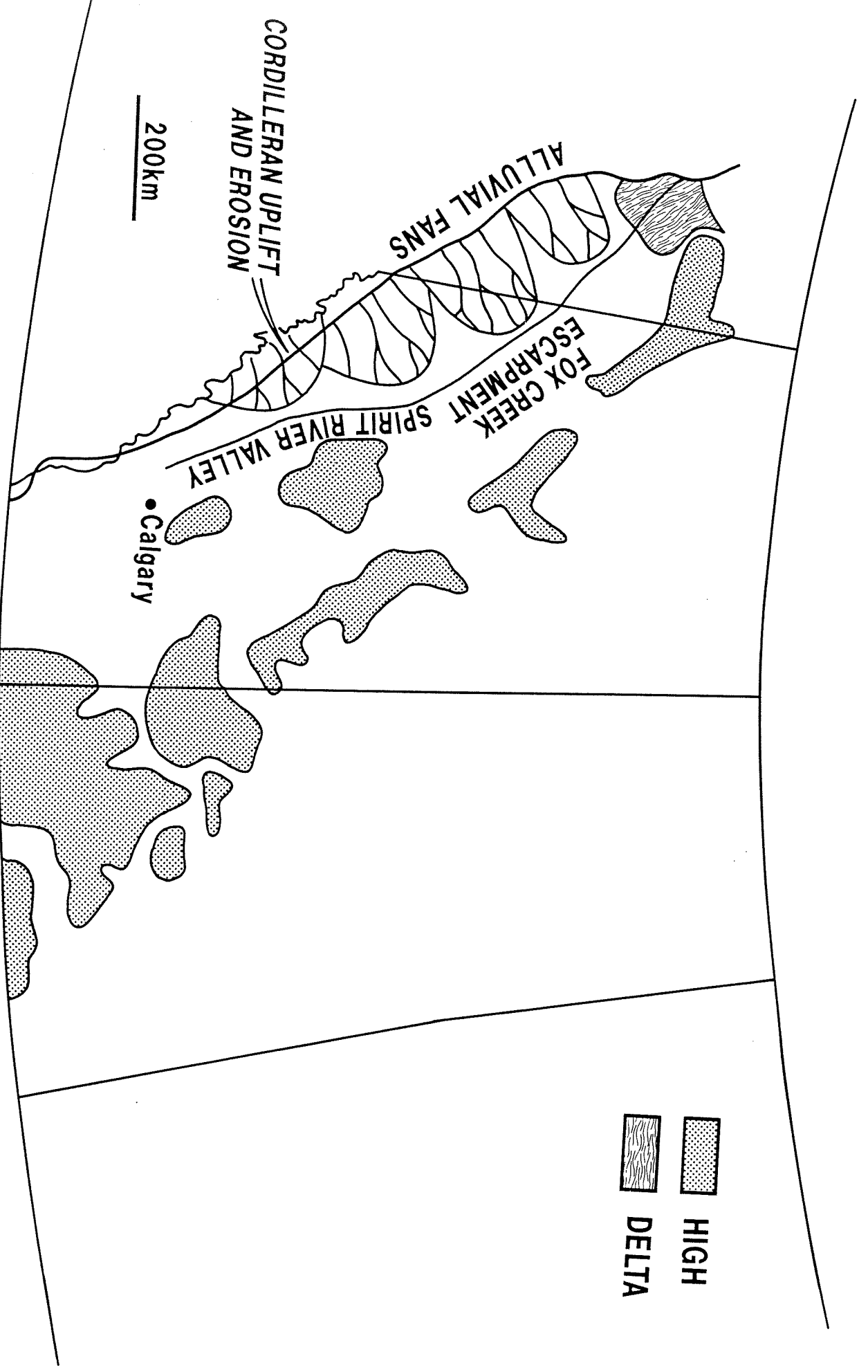


● DISCOVERED POOL
■ UNDISCOVERED POOL



POOL RANK PLOT LLOYDMINSTER - COLONY TO REX

PALEOGEOGRAPHY OF THE CADOMIN



200km

CORDILLERAN UPLIFT
AND EROSION

ALLUVIAL FANS

FOX CREEK
ESCARPMENT

SPIRIT RIVER VALLEY

• Calgary

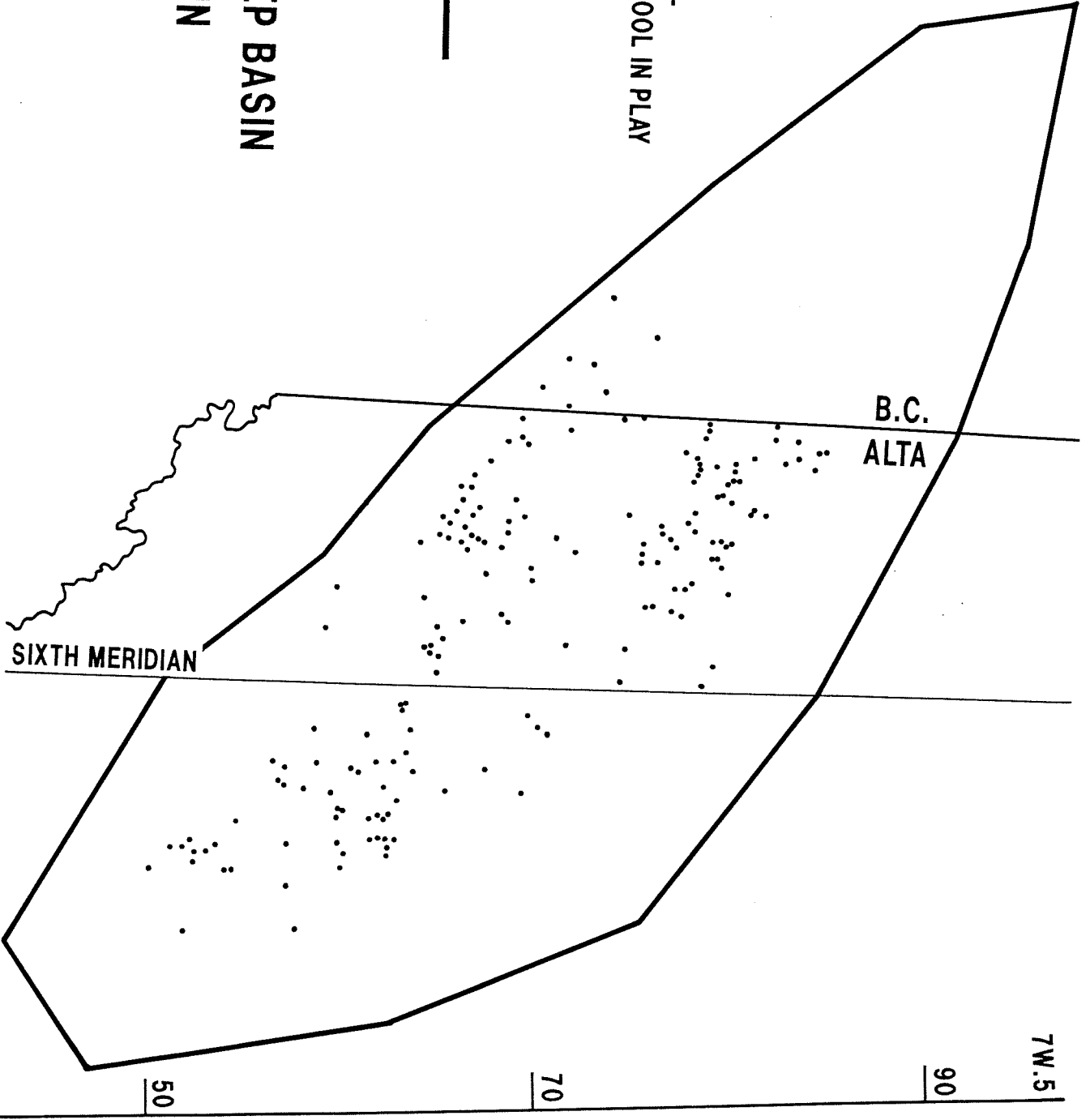
DELTA HIGH

BARCLAY & SMITH 1992

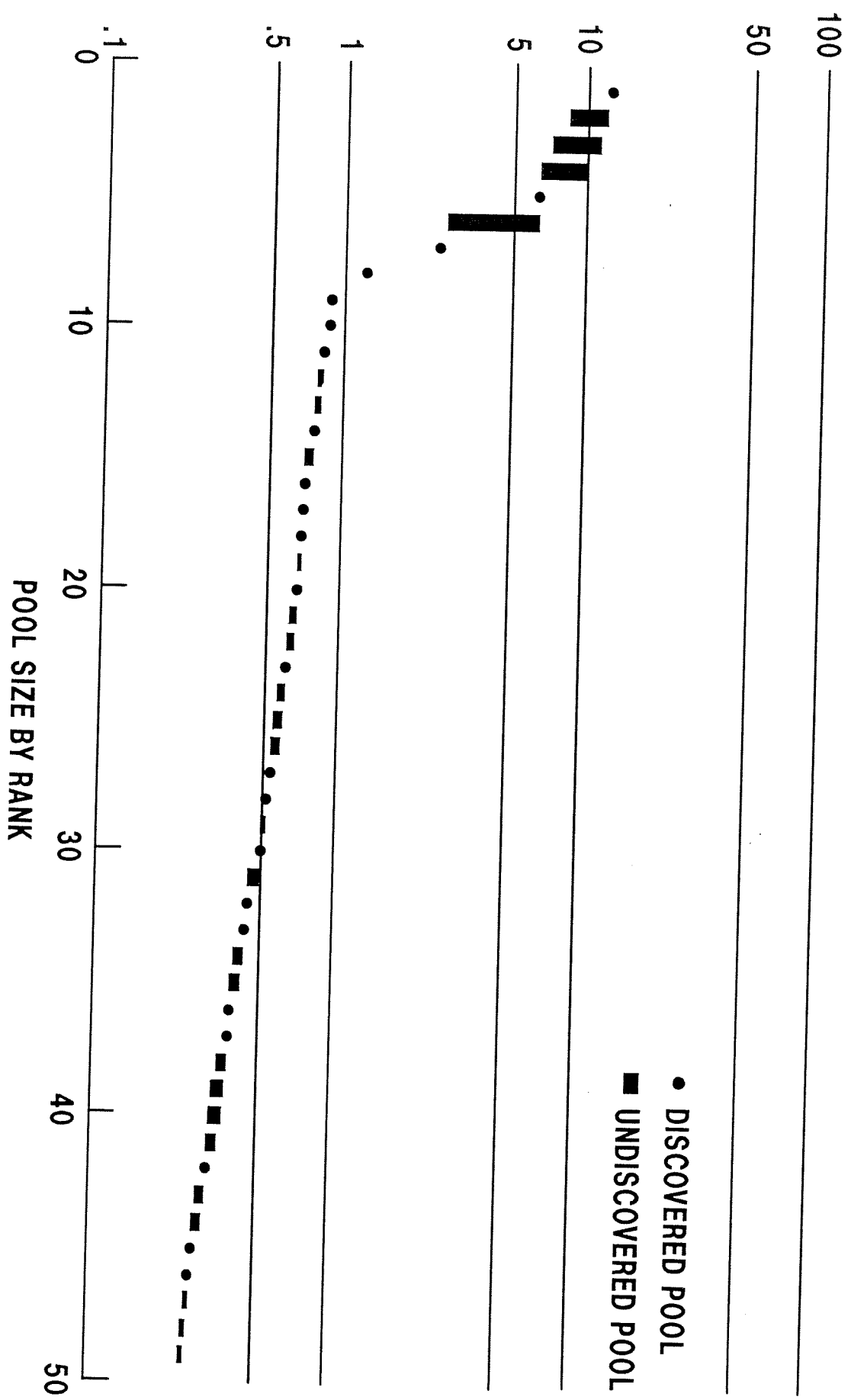
**PLAY MAP DEEP BASIN
CADOMIN**

• DISCOVERY WELL
FOR EACH GAS POOL IN PLAY

100 km



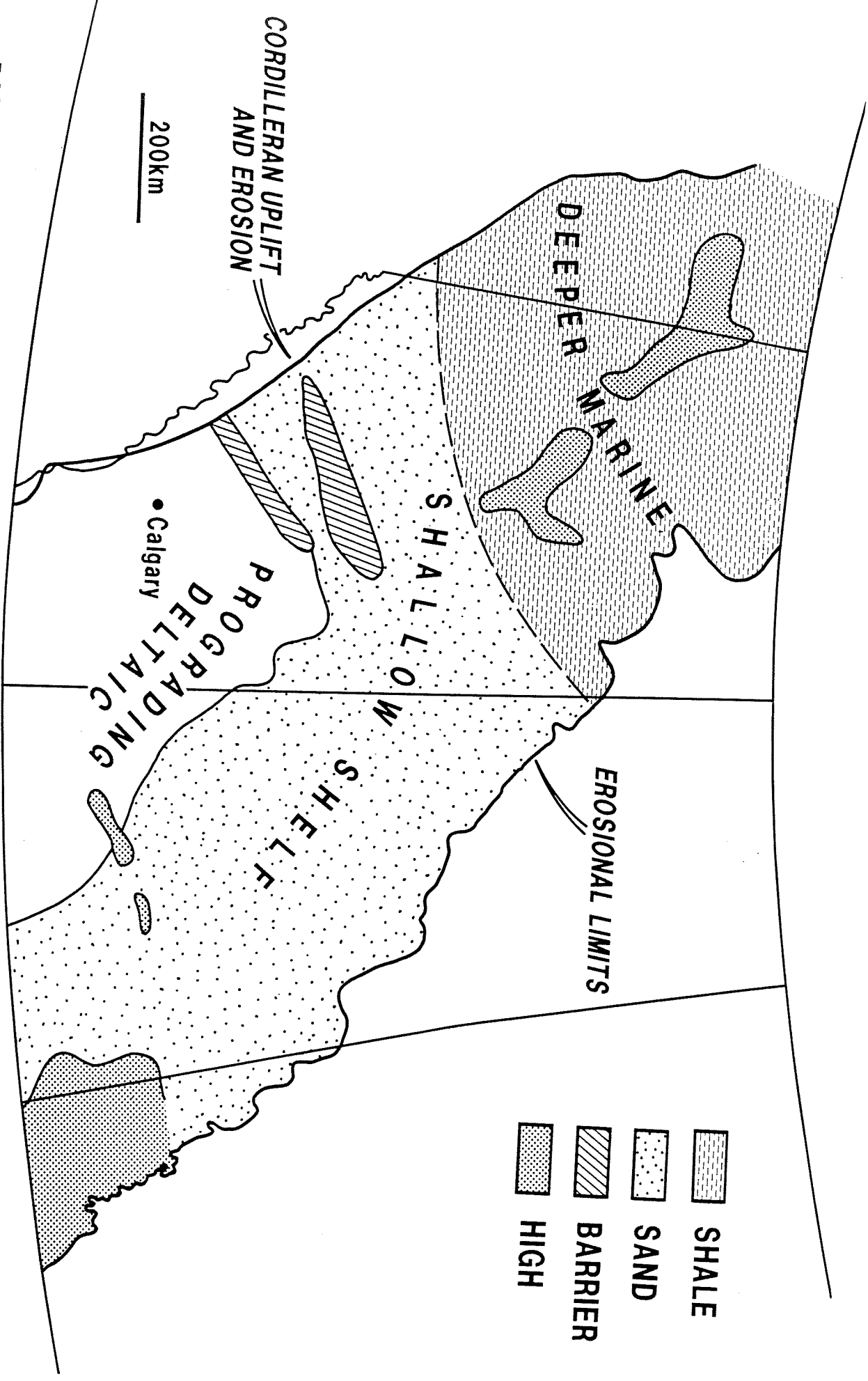
IN - PLACE POOL SIZE $10^9 m^3$



POOL RANK PLOT DEEP BASIN - CADOMIN

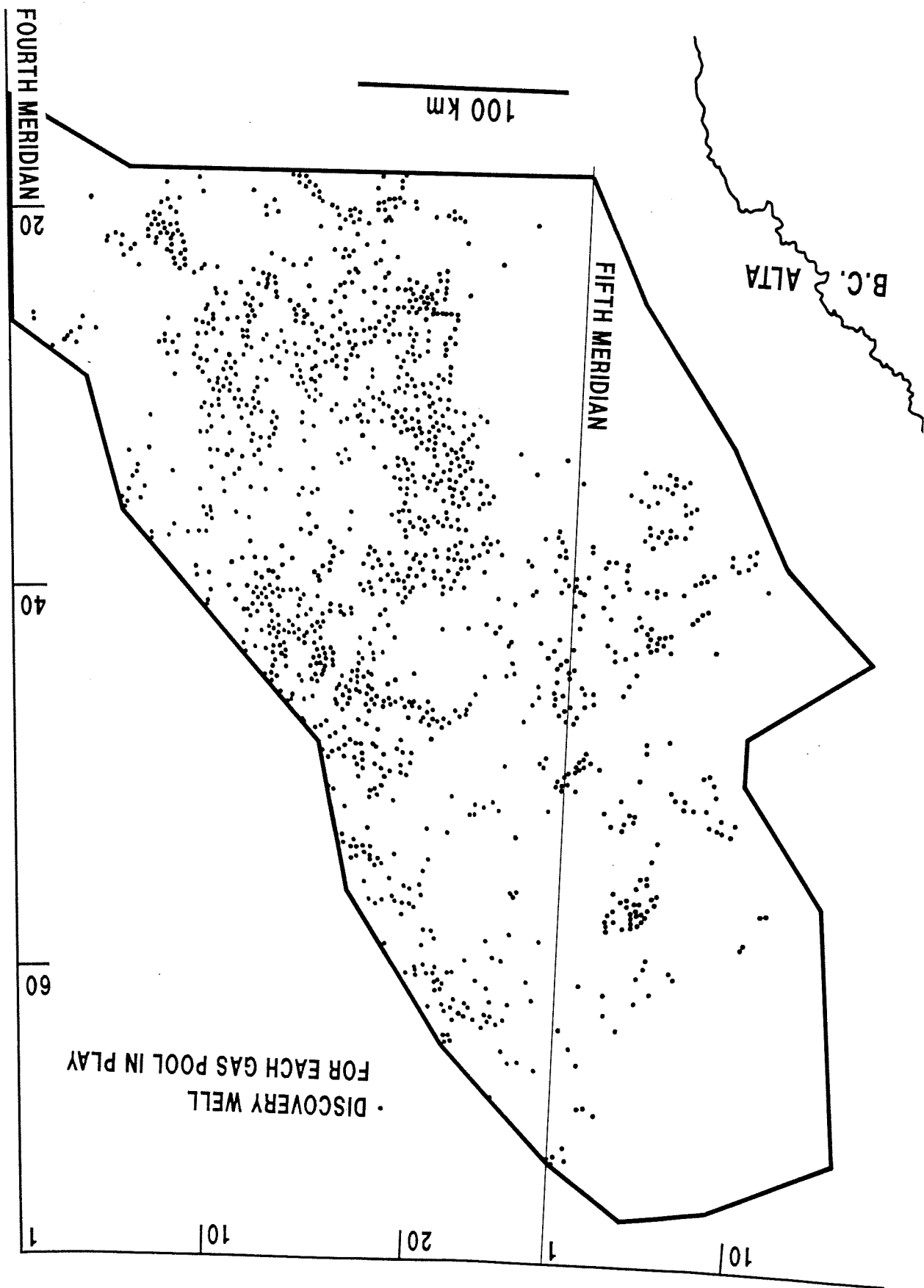
PALEOGEOGRAPHY OF THE GLAUCONITIC/LLOYDMINSTER

MODIFIED FROM BARCLAY & SMITH 1992

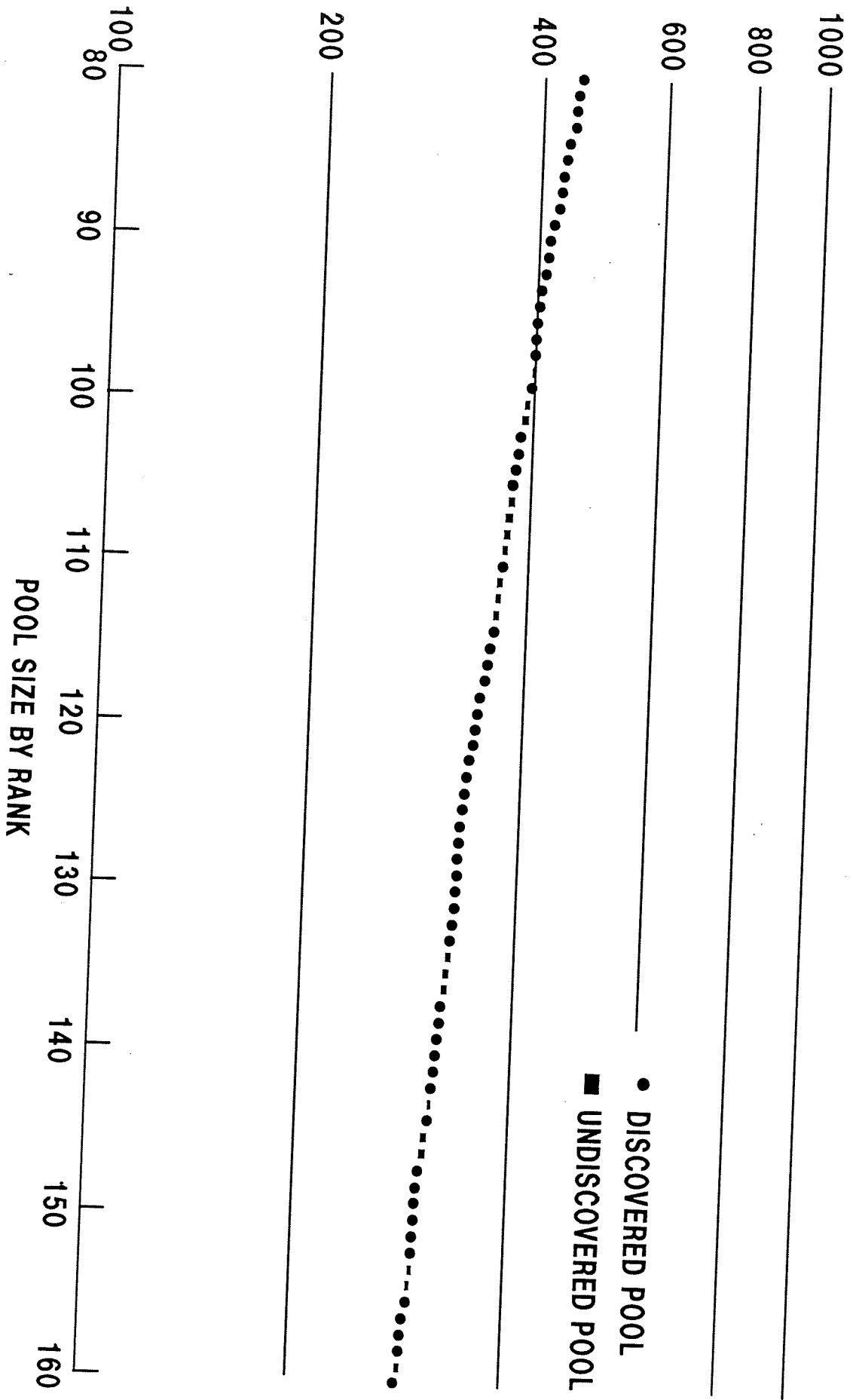


- SHALE
- SAND
- BARRIER
- HIGH

PLAY MAP CENTRAL ALBERTA GLAUCONITE



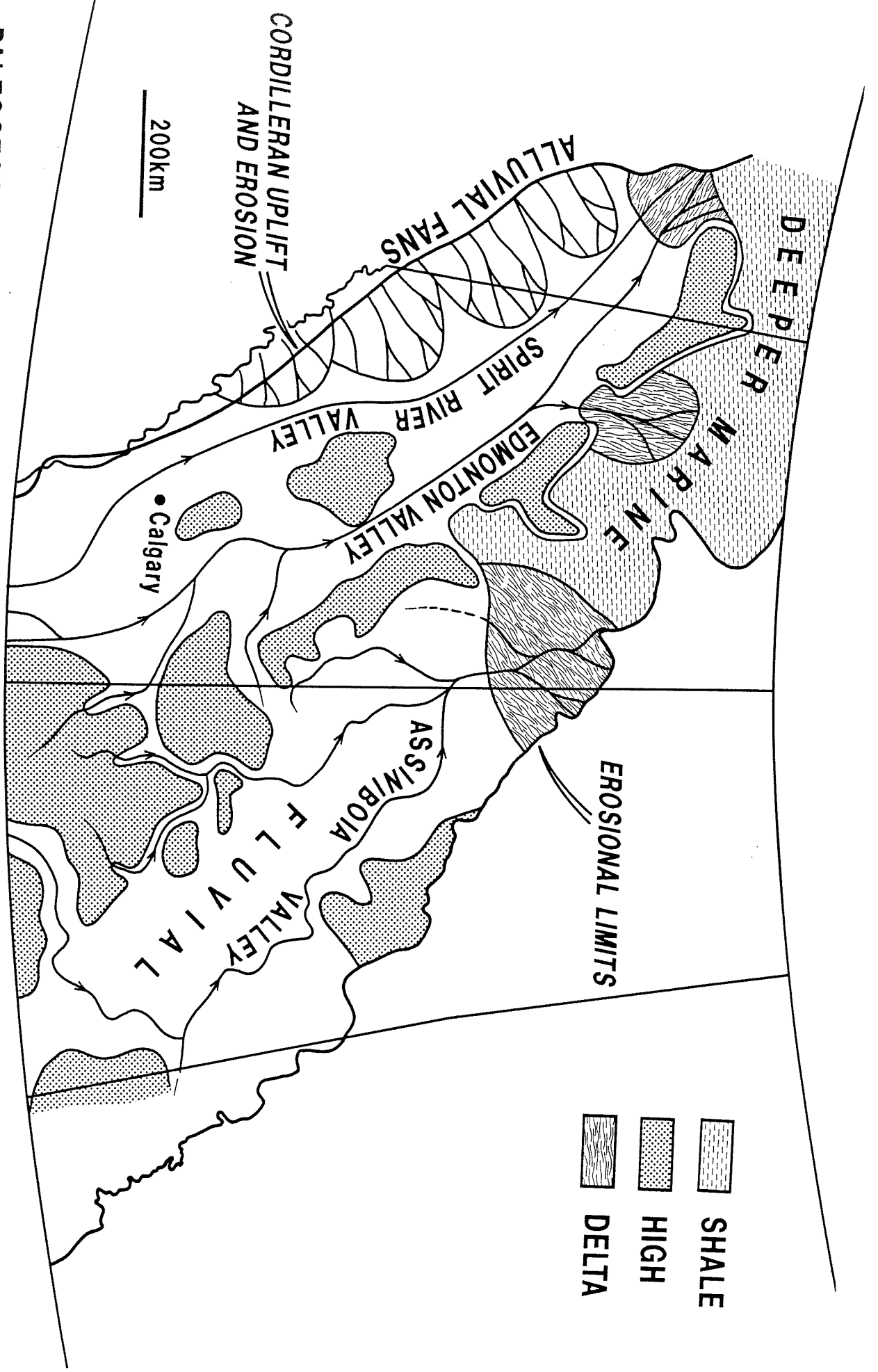
IN - PLACE POOL SIZE 10^6 m^3



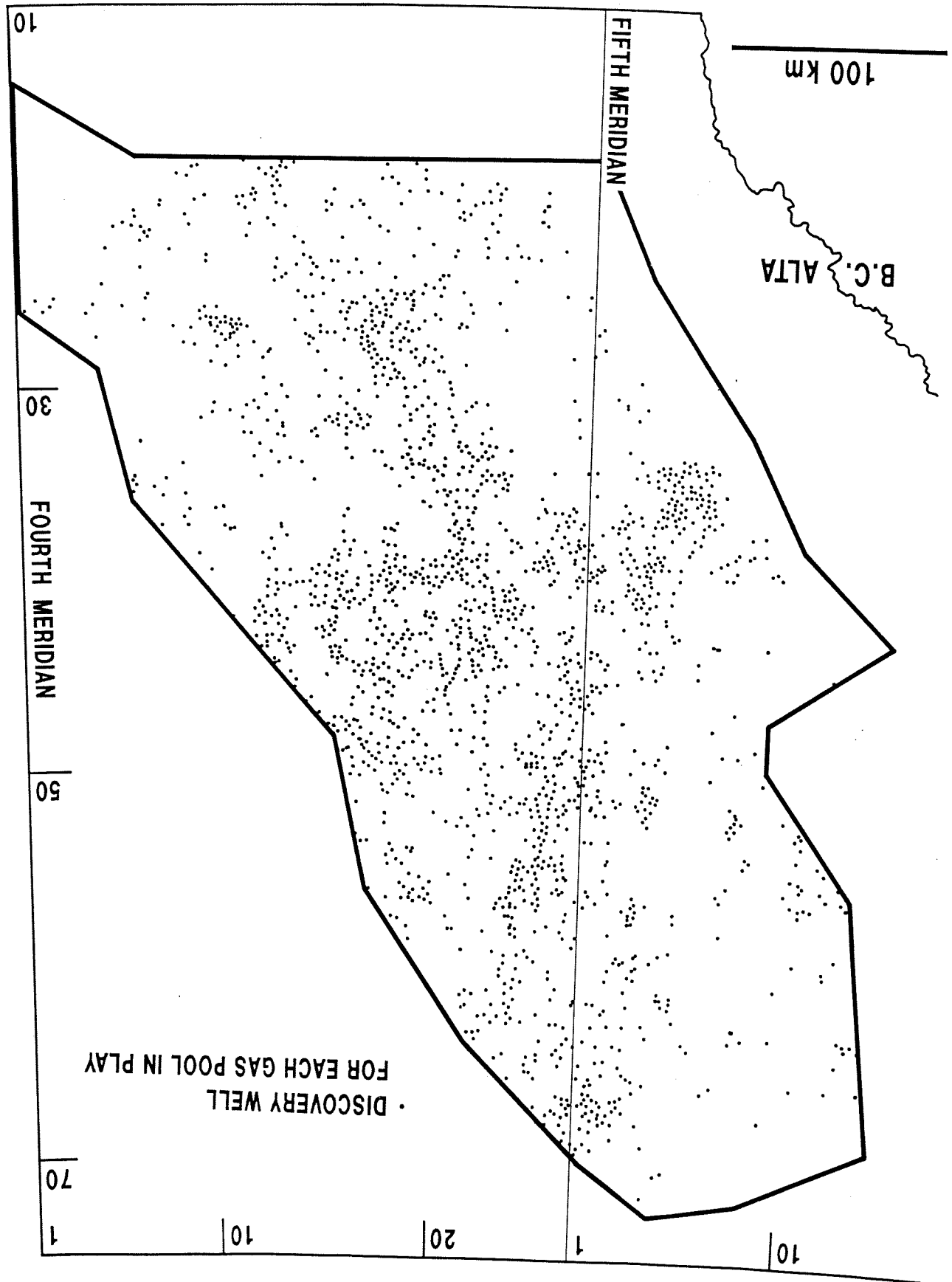
POOL RANK PLOT CENTRAL ALBERTA - GLAUCONITE

PALEOGEOGRAPHY OF THE GETTING/ELLERSLIE/BASAL QUARTZ/DINA

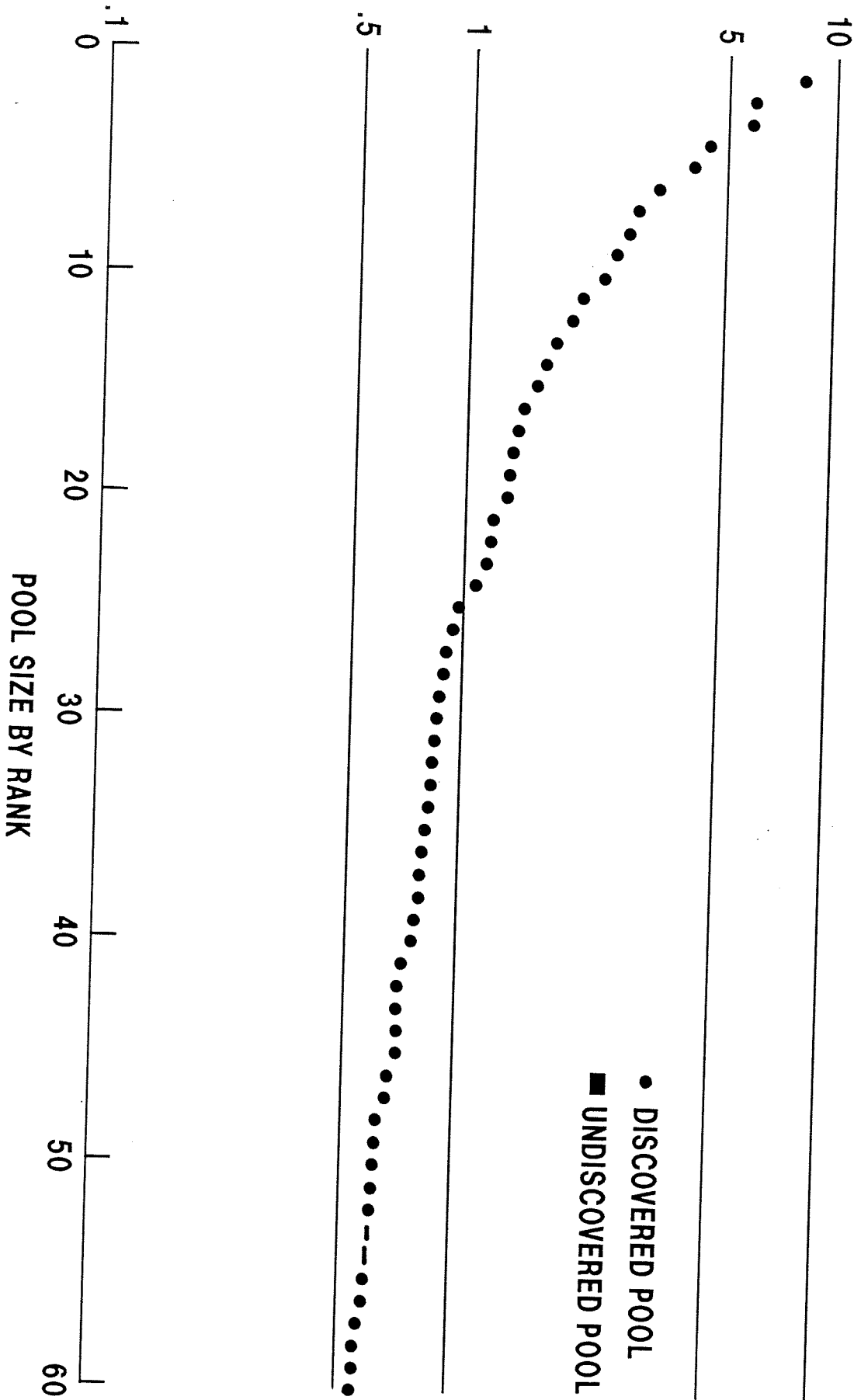
BARCLAY & SMITH 1992



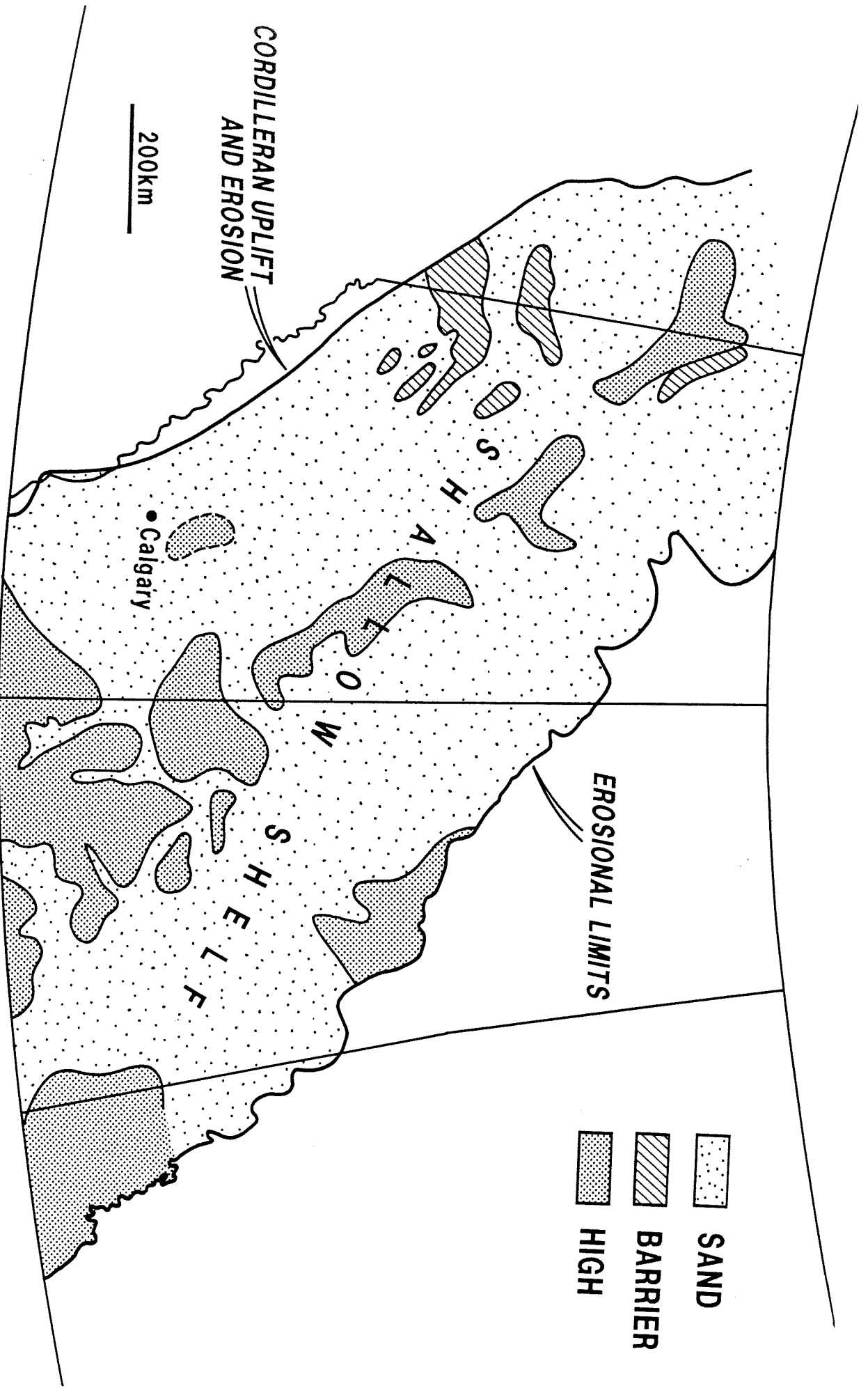
PLAY MAP CENTRAL ALBERTA ELLERSLIE/BASAL QUARTZ



IN - PLACE POOL SIZE 10^9 m^3



POOL RANK PLOT CENTRAL ALBERTA - ELLERSLIE/BASAL QUARTZ



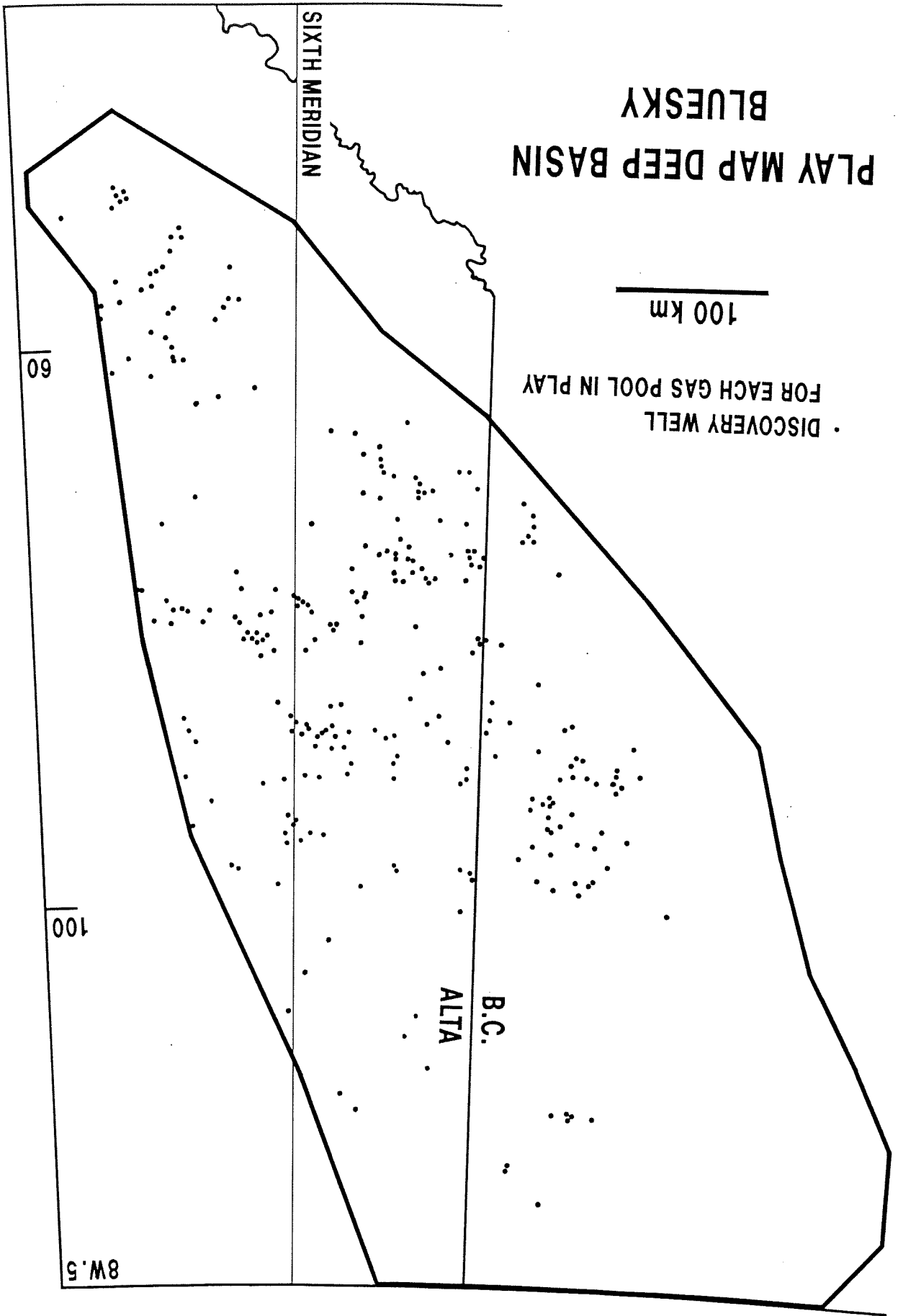
PALEOGEOGRAPHY OF THE BLUESKY / OSTRACOD / WABISKAW / CUMMINGS

MODIFIED FROM
 BARCLAY & SMITH 1992

PLAY MAP DEEP BASIN BLUESKY

100 km

DISCOVERY WELL
FOR EACH GAS POOL IN PLAY



SIXTH MERIDIAN

60

100

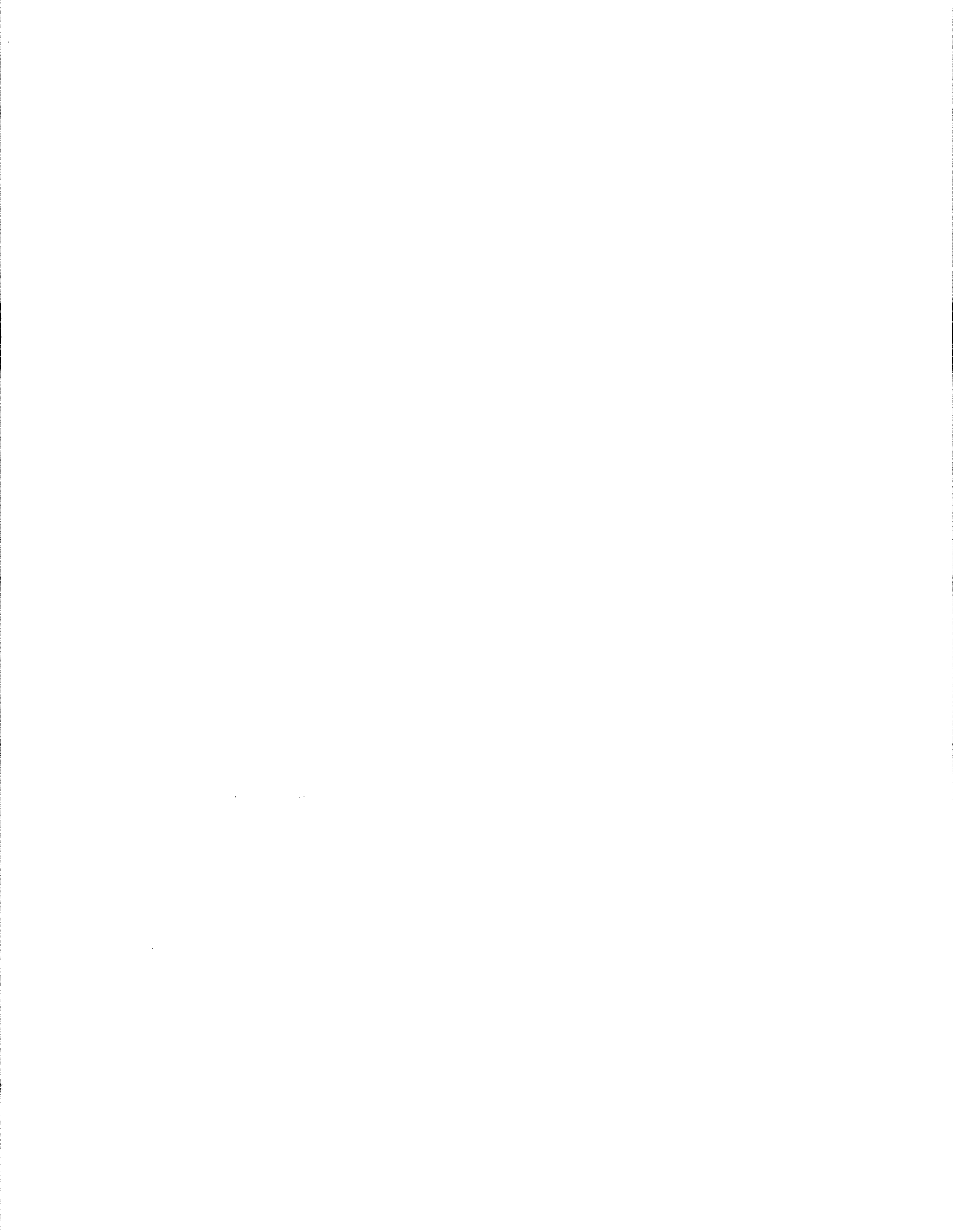
B.C.
ALTA

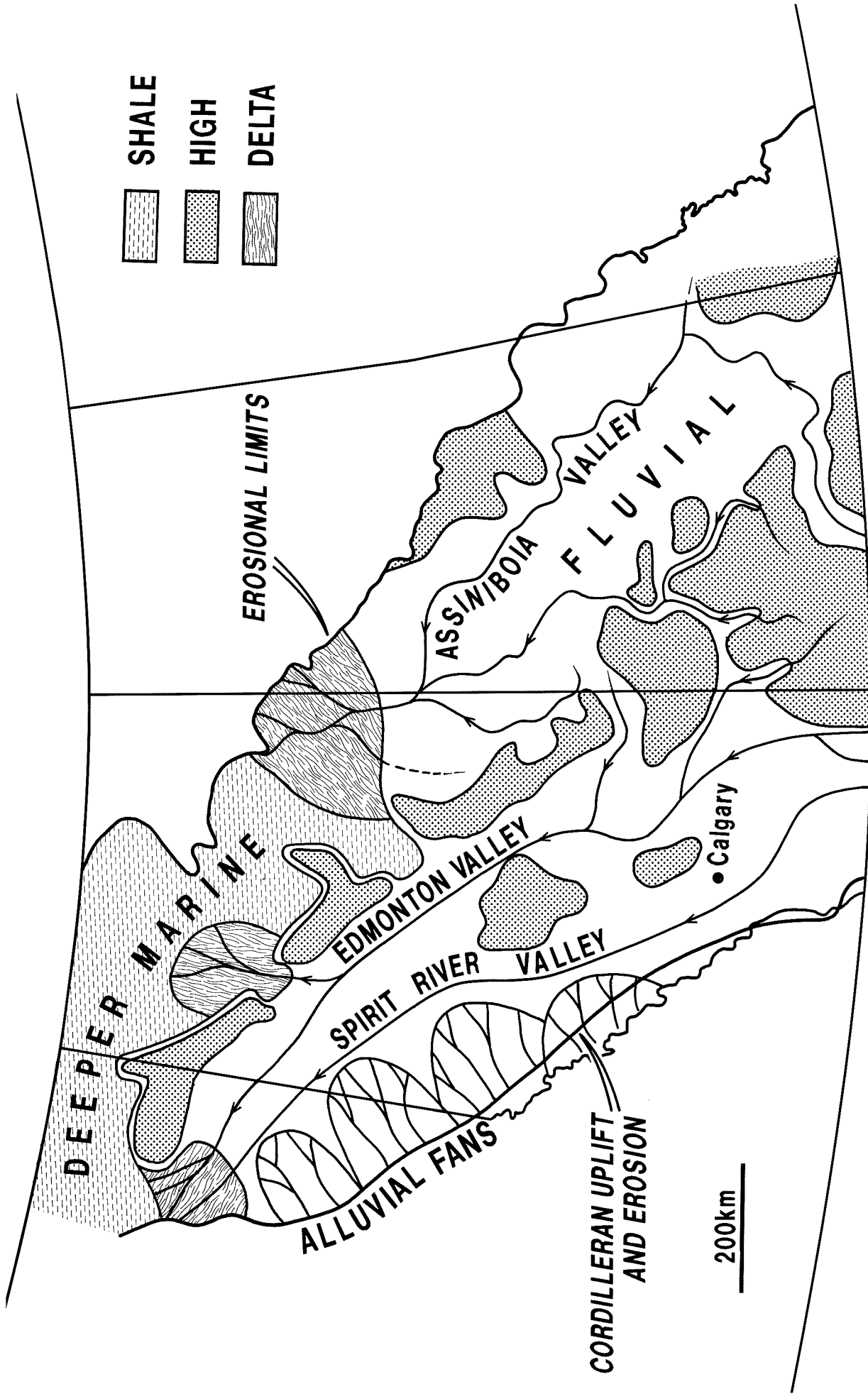
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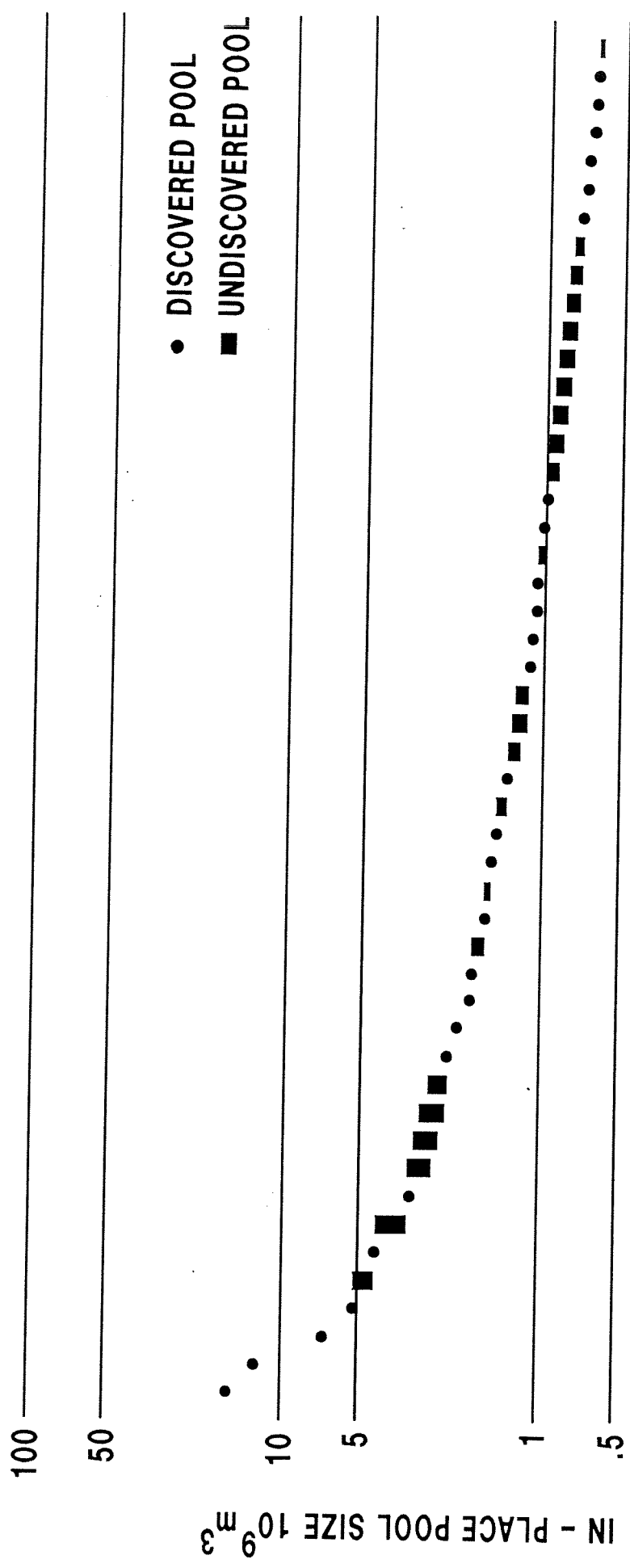
BARCLAY & SMITH 1992

CONCLUSIONS

THE DISCOVERED IN - PLACE VOLUME FROM ALL MANNVILLE PLAY TYPES IS 1,500,603.6 MILLION m³ (53 TCF) IN 13,671 POOLS.

THE UNDISCOVERED POTENTIAL GAS RESOURCE (EXPECTED VALUE) FROM ALL MANNVILLE PLAY TYPES IS 718,926 MILLION m³ (25.4 TCF).

32.4 % OF THE TOTAL RESOURCE REMAINS TO BE DISCOVERED.



POOL RANK PLOT DEEP BASIN - BLUESKY