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GAS RESOURCES OF WESTERN CANADA

by

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The report being open filed at this time is slightly modified from one prepared in the summer of 1979 for use within the Dept. of Energy, Mines and Resources. It was the intention at that time to release the new estimates in a publication including the costs related to development of the resources identified. Recognizing that some time will be taken to complete this process, a decision was made to open file the estimates to make the information available as early as possible.

The estimates of gas potential for western Canada, like those for all regions in Canada, are prepared by a committee consisting of personnel from the Geological Survey of Canada, the Resource Management Conservation Branch of EMR and from Indian and Northern Affairs. This Committee on Geological Potential, consisting of some 10 geologists and geophysicists, is responsible for the finalization of estimates of undiscovered resources. The responsibility for the preparation of the report rests with McCrossan and Procter.

R.M. Procter, Chairman

Geological Potential Committee

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S U M M A R Y

1. This report contains estimates of conventional gas resources of western Canada, recently prepared by the Geological Survey of Canada. The main emphasis is on undiscovered resources or potential; estimates of established reserves are compiled from provincial government agencies.

2. The estimates of gas resources, which are expressed in a probability context, indicate an average ultimate value for gas of about 157 TCF. This value included 92.5 TCF of discovered reserves, of which 27.5 have been produced, leaving 65 TCF of remaining established reserves. In addition there is an average expectation of 8 TCF by appreciation of existing reserves through revision and extensions, and 56 TCF by new discoveries. Maximum expectations at lowest levels of confidence indicate possible additions in the order of 100 TCF.

3. Established reserves as well as undiscovered resources vary in terms of quality of reservoir, deliverability, content of sour gas, difficulty of exploration and others. In this report an attempt is made to sort the resources into seven broad categories recognizing these differences. When the total resource is viewed in terms of these categories it becomes evident that the better quality resources have been discovered and developed earliest. Future reserves and resources will be largely of poorer quality, more difficult to locate and more expensive to produce.

INTRODUCTION

This report includes estimates of the gas resources recently completed by the Geological Survey of Canada. The estimates include only conventional gas resources and do not include possible gas supply associated with tight reservoirs in the "Deep Basin".

It became obvious during the current round of evaluations that the gas potential comprised very different types and for better understanding required classification. Compared to the 1976 estimates (EMR EP77-1)* the new estimates indicate an increase in the mean value of potential of approximately 16 TCF and in addition, the anticipated appreciation of existing reserves amounting to approximately 8 TCF has been included.

The reserve values quoted are as of December 31, 1977, which were the most current estimates available when the study was nearing completion in June, 1979. Additions to reserves at the end of 1978, plus projections to year-end 1979 account for the difference between these numbers and the 72 TCF reported by the National Energy Board in November, 1979.**

* "Oil and Natural Gas Resources of Canada, 1976"; Dept. of Energy, Mines and Resources, Canada; Report EP77-1; published in 1977

** "Reasons for Decision"; National Energy Board; November, 1979

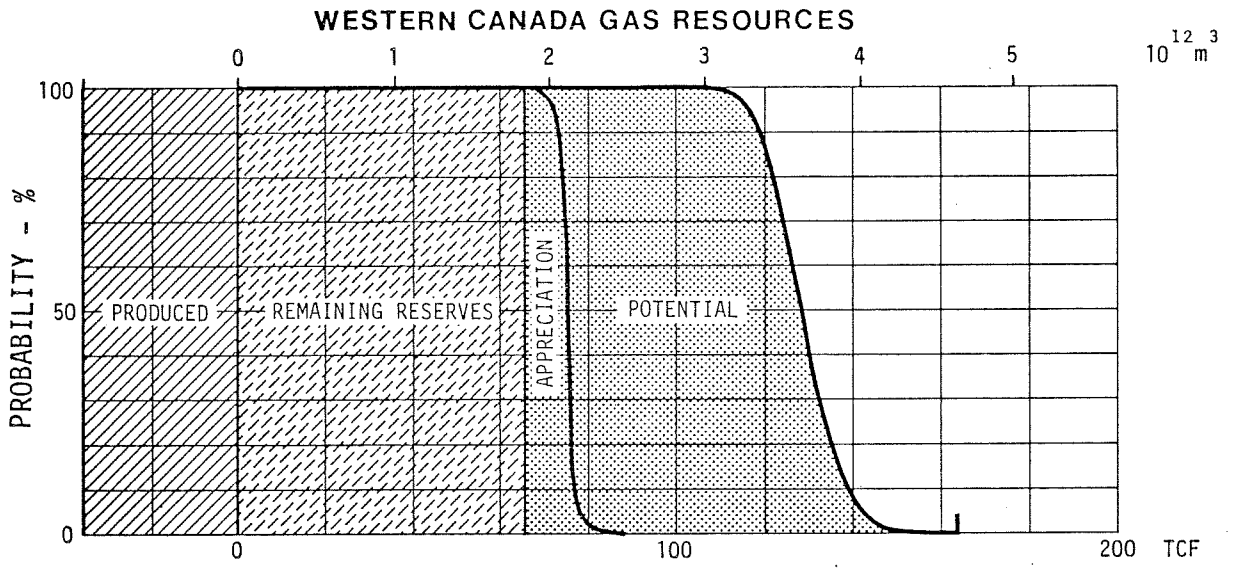

Figure 1

WESTERN CANADA ESTIMATE

Figure 1 shows the total Western Canada gas resource estimate broken into four parts including reserves, both produced and remaining, as well as their anticipated appreciation, and the potential. The estimates of reserves are taken from provincial government reports as of the end of 1977. The reserve numbers are close to those of the National Energy Board, but are not corrected to the 1000 BTU base, and are in the form of marketable gas.

APPRECIATION OF PROVED INITIAL RECOVERABLE RESERVES OF MARKETABLE GAS RELATIVE TO RESERVES AT END OF THE DISCOVERY YEAR

ENERGY RESOURCES CONSERVATION BOARD
ALBERTA, CANADA

Figure 2

Appreciation

In the process of evaluating the undiscovered resources in each of the exploration plays of Western Canada, an attempt has been made to quantify the

anticipated appreciation through extensions and revisions that will accrue to the existing reserves. Figure 2 is an illustration prepared by the Alberta Energy Resources Conservation Board* which illustrates the way in which reserves discovered in any given year have appreciated over a 20 year period. The figure indicates that there is a wide range in the appreciation factor with an average multiplier of approximately four. Because future appreciation is not included with reserve estimates an attempt has been made to quantify it during the estimation of potential. In Figure 1 the appreciation curve is shown within the estimate of potential curve. Because there is considerable uncertainty as to what the actual quantity of future appreciation will be, estimates are expressed in a range from approximately 5 TCF to a maximum value of 20 TCF.

* after "Reserves of Crude Oil, Gas, Natural Gas Liquids, and Sulphur of Alberta"; published by Alberta Energy Conservation Board, Report ERCB 76-18, 1976

Potential

The new estimates of potential prepared in June 1979, (Fig. 1) have been revised significantly upward from EP77-1. The latest potential estimate has a mean of 56 TCF compared to the previous value of 39 TCF. This change has involved an increase in the confidence levels of the previous estimates based largely on the intense and very successful exploratory activity that has occurred in the last two years. At the same time there still remains a significant maximum value to the distribution of estimates which indicate that, although at low confidence levels, opportunities do exist for large discoveries.

It must be emphasized that the estimates of potential have no economic connotation and some portion of this potential may not be achieved even when the Western Canada basin is fully drilled up.

Examination of some 62 plays in the Western Canada sedimentary basin has indicated as least some gas potential in almost all of them. Only 19, however, contain significant potential, accounting for 90% of the total. Plays having large potentials include: Milk River-Medicine Hat, Lower Mannville, Upper Mannville, Elmworth, Foothills structures and Beaverhill Lake.

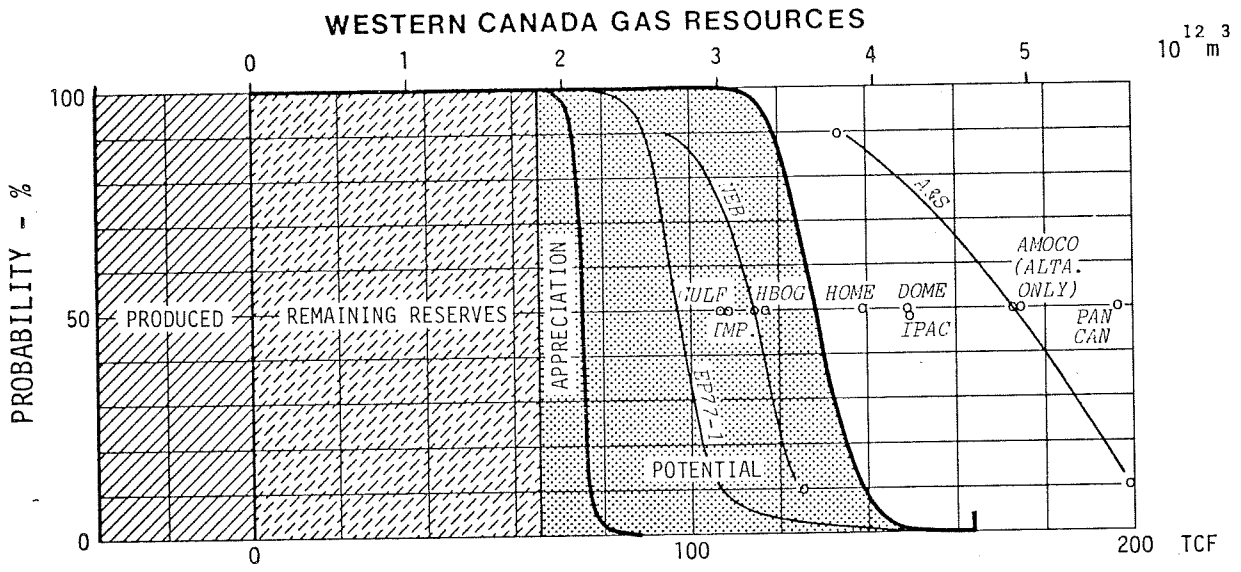

Figure 3

Comparison with Other Estimates

Figure 3 is the same curve as Figure 1 to which are added various estimates given in the Canadian gas Supply-Demand Hearings (fall of 1978) which led to a National Energy Board Report in February, 1979*. These are shown, where not otherwise specified, at the 50% level and where three values were given, they are shown at the 10, 50 and 90% deciles. Also for comparison the previous Geological Survey of Canada estimate from EP77-1 has been plotted.

* "Canadian Natural Gas, Supply and Requirements", published by National Energy Board, 1979

The estimates have a very large scatter. Only a few of the estimates are the result of play by play examination, most reflect a regional analysis. Some contain an exploration bias corresponding to the submitter's point of view. Lower estimates in all likelihood include some economic cutoff.

Reasons for the higher Geological Survey of Canada estimate this year are that first, the appreciation of existing reserves is now included whereas previously it had been left out. Secondly, estimates prepared in 1979 have placed a higher confidence on much of the shallow gas potential as a result of new and extensive well control. Thirdly, intensive exploratory drilling in the past two years has provided new data that improves the opportunities in selected plays.

GAS RESOURCE CATEGORIES

Seven categories of gas resources were set up on the basis of experience in working with the Western Canada plays over the last two years. It became evident that there was a need for sorting gas into quality groupings related especially to its producibility. The seven categories selected tried to take into account some of the following characteristics.

1. Differences in reservoir quality and resulting deliverability;
2. The gas composition and problems in processing;
3. Exploration problems encountered in the search for gas accumulations;
4. Any other factors that would affect either the resulting costs associated with the resource or the rate at which it would become available.

There are probably a number of ways in which the categories could have been set up. It was felt that this would at least in a gross way identify the main groupings to be considered in developing the economic overlays relevant to the supply issues. Because of the time involved and the way in which files were arranged, it was only possible to take entire plays and assign them to one or another of the categories.

As a result, within any given play falling into a particular category, it is almost certain there will be some pools having characteristics that would overlap into another category. The classification would be better if one dealt with individual pools and sorted these into categories. Hopefully the errors that might have resulted from some overlap would be compensating.

Definition - Gas Resource Categories

PREMIUM	- High deliverability, (generally better than 10 MMcf/d), sweet, predictable performance, can correct reservoir problems when they arise. Generally carbonates but some excellent sands.
B.C. SOUR	- High deliverability in general, like Alberta Sour but costing process different because transmission company handles most of sulphur removal, many pools may be equal to premium in deliverability.
ALBERTA SOUR	- Highly variable content in H_2S but requires plants for sulphur removal. This is a liability for low sulphur contents but in 15-20% range, value of sulphur offsets plant costs. Higher cuts diminish methane content to a point of lowering profitability. High deliverability generally. Almost all carbonate reservoirs.
STANDARD	- Moderate to good deliverability (2-10 MMcf/d). Reservoirs generally fairly uniform but some in this group can be patchy and unpredictable, especially in the late stages of production. Includes both sand and carbonate reservoirs.

SLOW DISCOVERY - These will be reserves of high deliverability and generally sour. Generally in remote areas. They will be difficult to locate with seismic and other tools. They include complex deep Foothills structure, Leduc and Beaverhill deep basin reefs enclosed in carbonate-rich highly compacted off-reef sediment. As a result, the reserves thus found will be costly and very slow in coming onstream.

LOW PRESSURE - Shallow sands of eastern Alberta especially in the Upper Mannville. Occur at shallow depths with pressure of 300 psi or less. Gas will require considerable compression. Reservoir sands are good quality.

LOW DELIVERABILITY - Reservoir of low transmissability, shallow with resulting low pressure and deliverability of below 150 Mcf/d average at less than 300 psi. This type of reserve will require at least two wells per section and extensive compression facilities to exploit it.

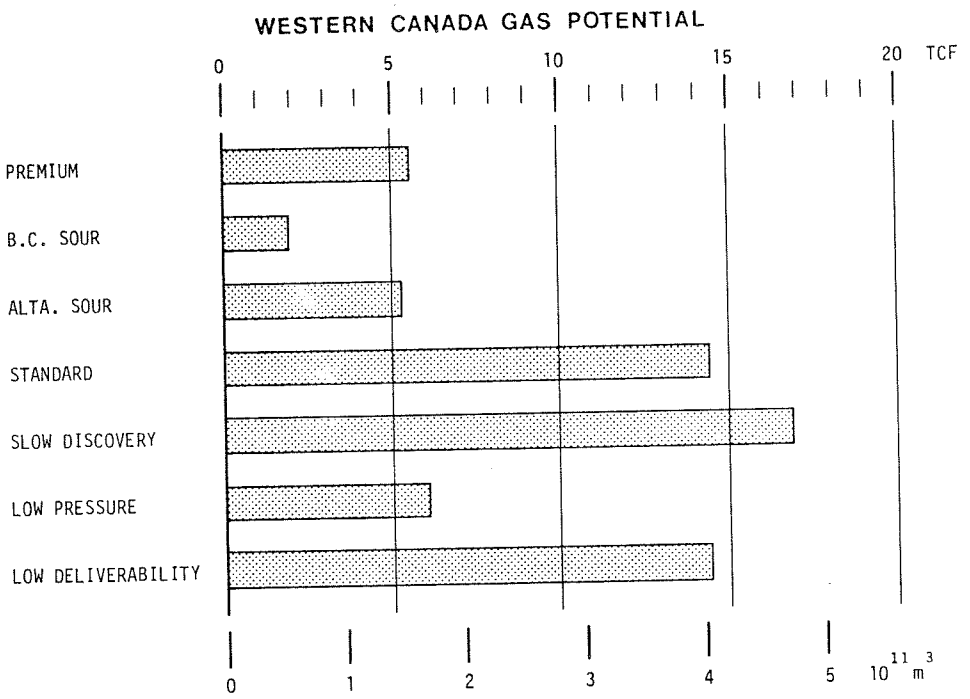

Figure 4

Gas Potential

Figure 4 shows the estimate of potential in each of the categories described in the proceeding section in the form of bar graphs. The bars represent the mean value of the total distributions (Figure 8 to 14). The larger part of the remaining potential appears to lie in the poorer categories of resource types. The largest block of potential is in the "slow to be discovered" category. The "low deliverability" category is

also large. This occurs primarily in southeastern Alberta and includes sands of very low permeability. These resources have the disadvantage of being at shallow depths and hence have low pressures and need considerable compression. The "standard" category is also a large one and contains a number of the conventional plays such as the Lower Mannville, Viking, Pekisko, Elmworth, etc. These are reservoirs of moderately good quality although some have patchy porosity distributions in complex facies patterns. Though they lack the superior characteristics of the "premium" category, in terms of very high permeabilities, they are the best of the remaining potential of any significance. Most of the "standard" category will probably be economic whereas it is very likely that both the reserves and potential of the "low deliverability" category will contain a good deal of gas on the economic borderline.

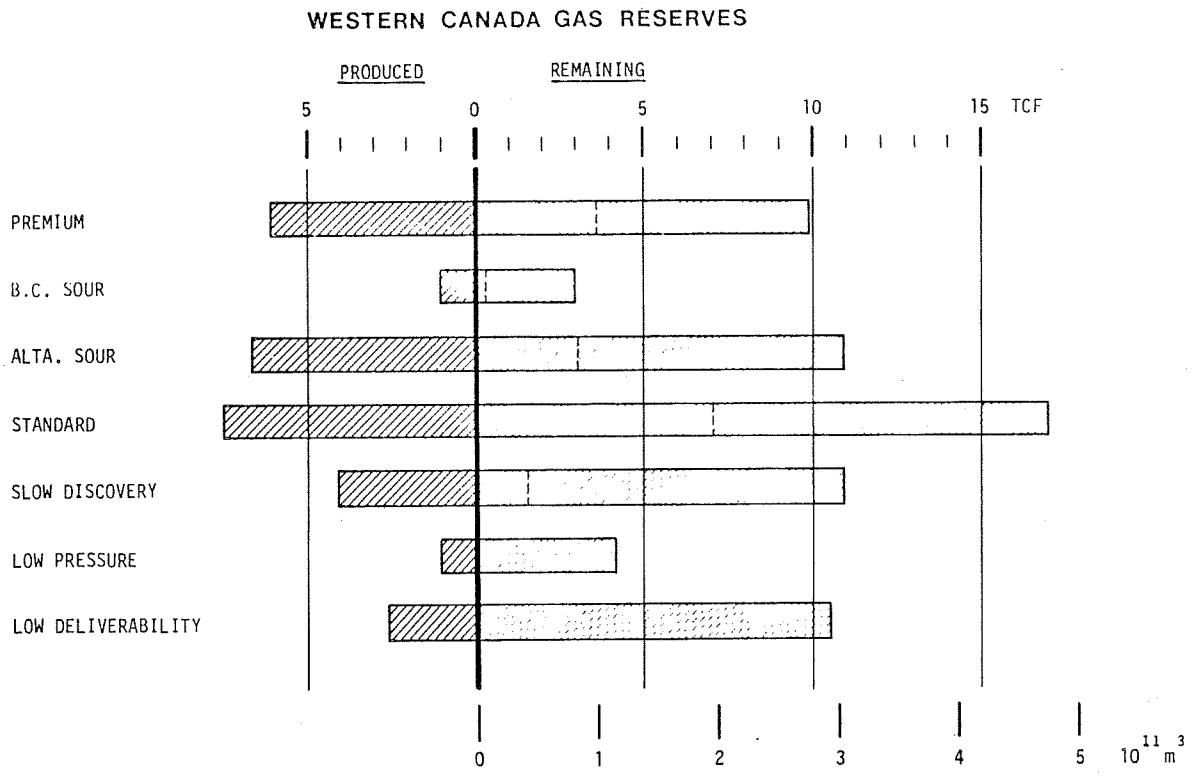

Figure 5

Reserves

Figure 5 shows the reserves by the same categories and at the same scale as the potential. Lying to the left of the centre line is the past production and to the right the remaining reserves. It is immediately clear that a large part of the best of the gas reserves have already been produced. Remaining reserves exist in all categories although there is a fairly large proportion of them remaining in the poorer categories. This reflects the tendency that one might expect that

the better types of reserves would be placed on production and depleted earliest. The dotted line on the remaining reserve bar separates the associated and solution gas on the left from the non-associated gas on the right.

Finding Rate

Although the cost analysis in quantitative terms has not yet been undertaken and will be done by Energy Policy Sector of Energy, Mines and Resources, certain qualitative impressions became obvious during the course of the assessment activity. Major concerns include the difficulty that will be encountered in locating remaining parts of the resource, particularly the large segment identified as the "slow discovery" category, as well as the multitude of much smaller pools associated with the long tails of the log normal pool size distributions for some of the larger plays. In general, for any play it is characteristic for the amount of gas being found per unit of exploratory drilling to decrease as the play matures. This results because there is a tendency to find the larger pools early in the development of a play, followed by the discovery of many smaller, usually more difficult to locate, pools. Many of the plays in Western Canada are now in the last half of their exploration maturity and the implication is that a very dramatic increase in the number of wells drilled per year will be needed to sustain the current level of reserves addition.

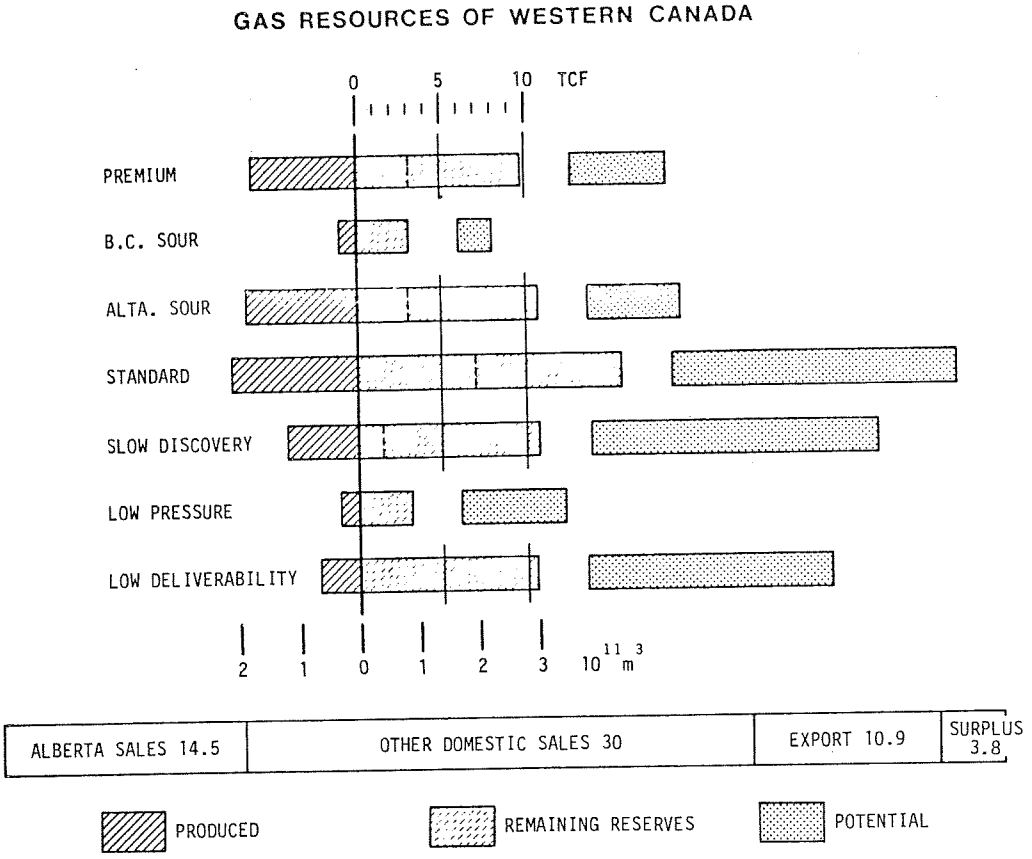

Figure 6

DISCUSSION

Figure 6 combines the two previous illustrations of reserves and potential at half the scale. Added to this is a bar graph showing the National Energy Board estimate of supply*. It is equivalent in length to the sum of all of the remaining reserves. Although the current estimates of gas potential have increased significantly in the past two years it may also be

* "Canadian Natural Gas, Supply and Requirements", published by National Energy Board, 1979

appropriate to consider the quality, cost, deliverability, and ultimate development of the component of potential which is being added at this time. If Figure 6 is viewed against the issue of self-sufficiency one must be concerned about:

1. The declining quality of both the remaining reserve inventory and of the potential that may be added.
2. The replacement cost of new reserves may be very much greater than that which is currently committed to market.
3. The finding rate will drop consistently with time, with predictable corresponding price increases for replacement reserves.

During the preparation of the current set of estimates of gas potential it became obvious that the release of those estimates without some comment about the character of the resources, and the costs associated with finding and development of them, was imcomplete. Hopefully the categorization attempted with this set of estimates will help to clarify some of the confusion that appears to exist regarding the size of existing and anticipated gas resources of western Canada. This is perhaps particularly important at this time when recent unparalleled industry activity, resulting in considerable success coupled with numerous pronouncements of optimism for the future, have resulted in an attitude that gas reserves will pose no

problem for the future supply picture. Most of these pronouncements have been made without regard for the nature or quality of future yet to be discovered gas resources. This could mistakenly lead to the assumption that the need for development of frontier resources is greatly reduced.

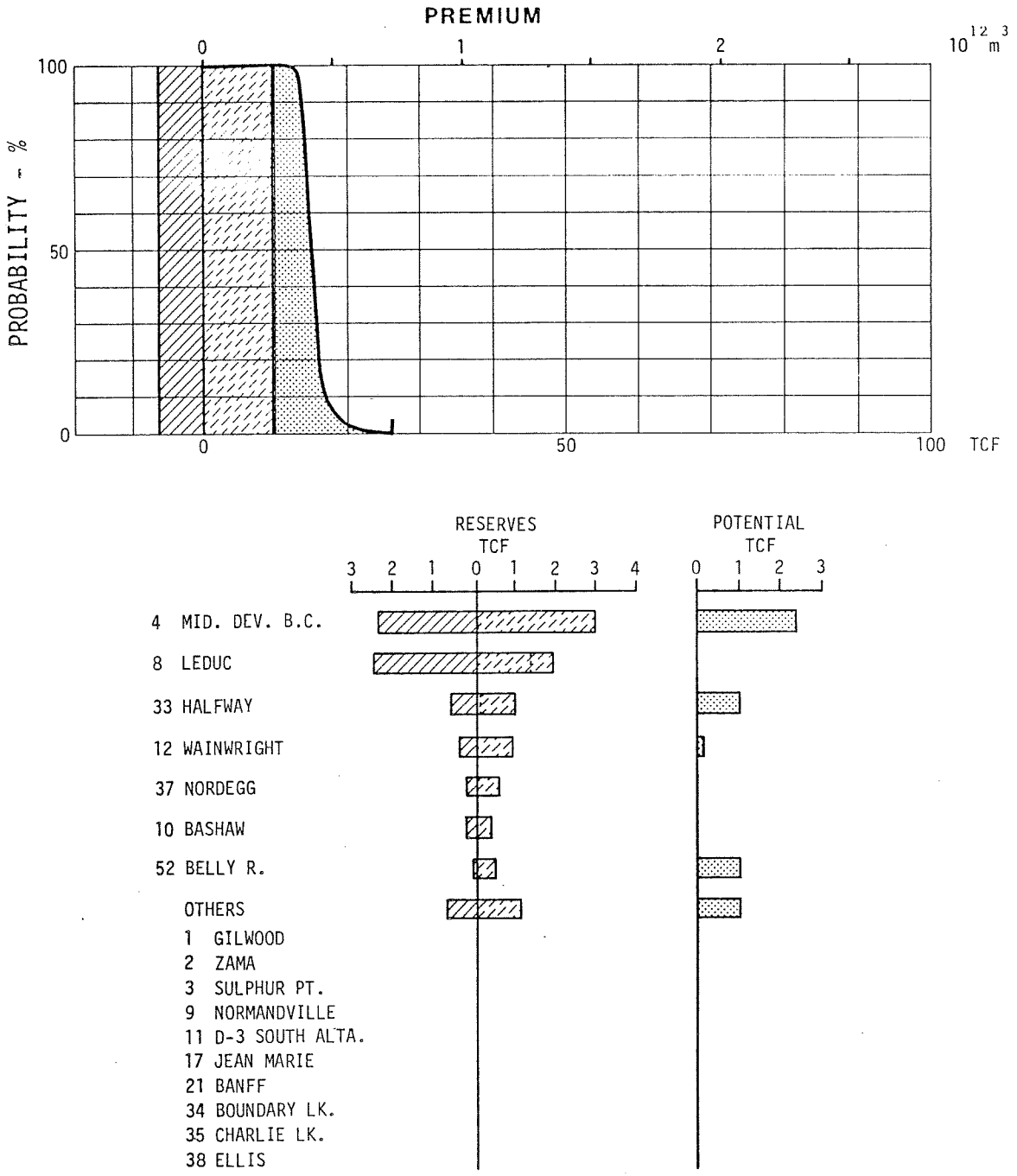
PREMIUM
0
1
2
10^{12} m^3
100
50
0
PROBABILITY - %
0
50
100 TCF
RESERVES
TCF
3 2 1 0 1 2 3 4
POTENTIAL
TCF
0 1 2 3
4 MID. DEV. B.C.
8 LEDUC
33 HALFWAY
12 WAINWRIGHT
37 NORDEGG
10 BASHAW
52 BELLY R.
OTHERS
1 GILWOOD
2 ZAMA
3 SULPHUR PT.
9 NORMANDVILLE
11 D-3 SOUTH ALTA.
17 JEAN MARIE
21 BANFF
34 BOUNDARY LK.
35 CHARLIE LK.
38 ELLIS

Figure 7

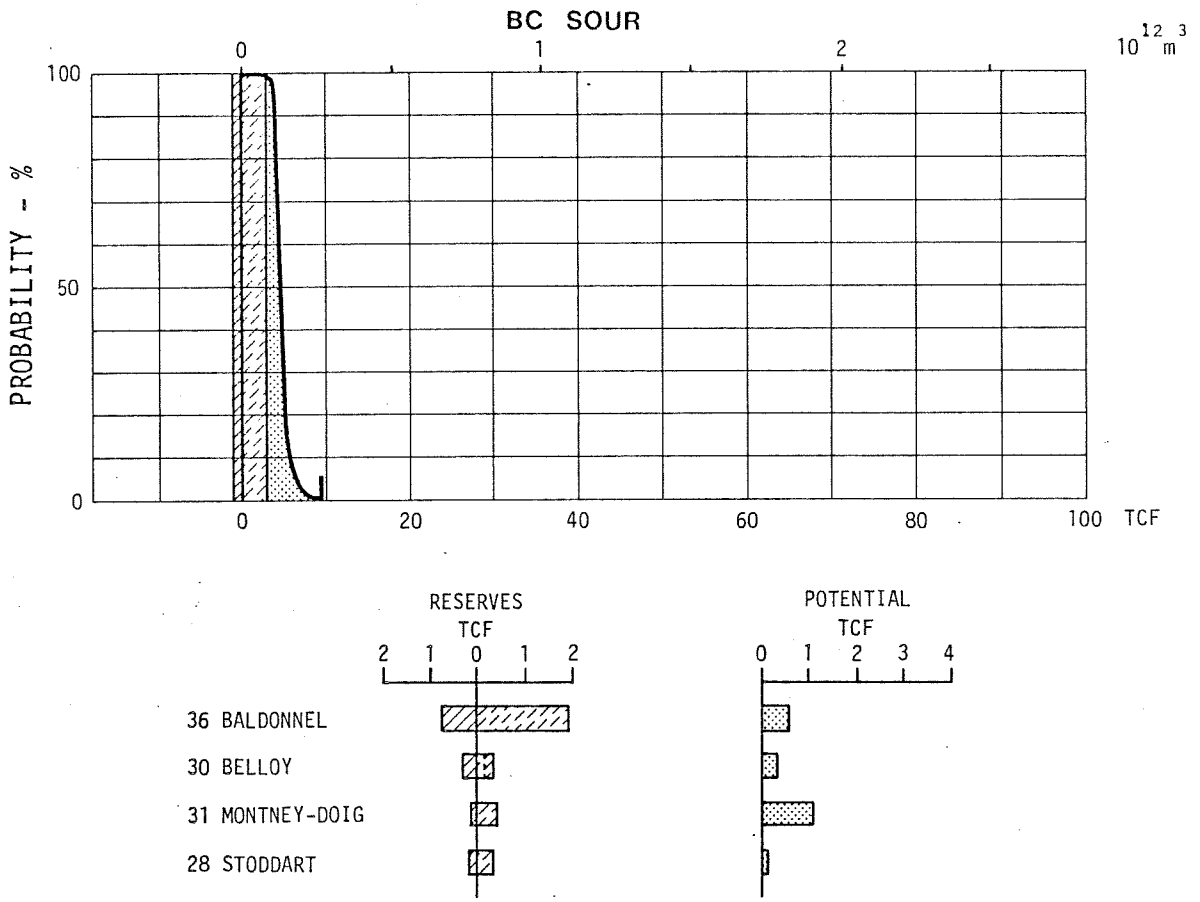
BC SOUR
0
1
2
10^{12} m^3
100
50
0
PROBABILITY - %
0
20
40
60
80
100 TCF
RESERVES
TCF
2 1 0 1 2
POTENTIAL
TCF
0 1 2 3 4
36 BALDONNEL
30 BELLOY
31 MONTNEY-DOIG
28 STODDART

Figure 8

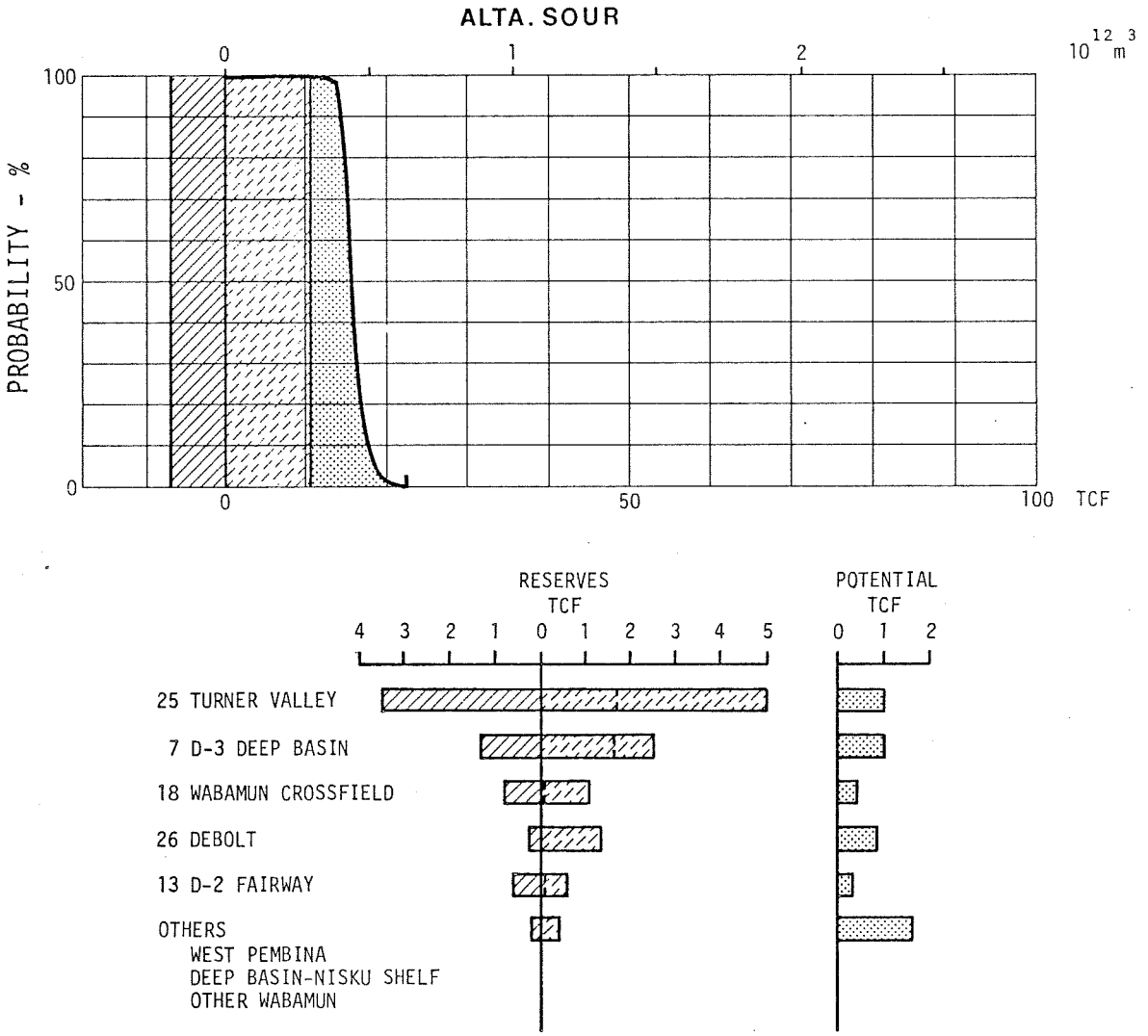
ALTA. SOUR
0
1
2
10^{12} m^3
100
50
0
PROBABILITY - %
0
50
100 TCF
RESERVES
TCF
4 3 2 1 0 1 2 3 4 5
POTENTIAL
TCF
0 1 2
25 TURNER VALLEY
7 D-3 DEEP BASIN
18 WABAMUN CROSSFIELD
26 DEBOLT
13 D-2 FAIRWAY
OTHERS
WEST PEMBINA
DEEP BASIN-NISKU SHELF
OTHER WABAMUN

Figure 9

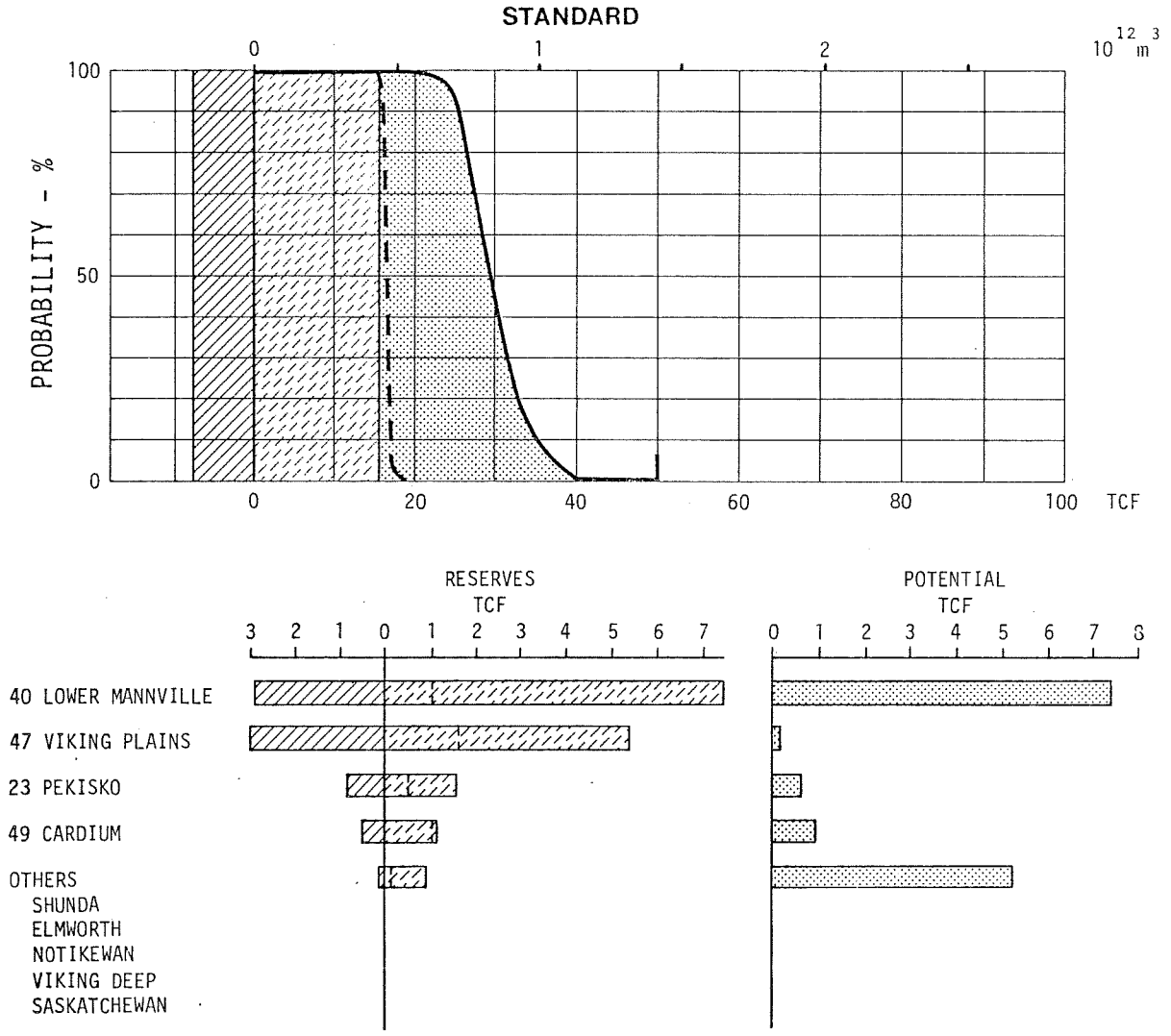
STANDARD
0
1
2
10^{12} m^3
100
50
0
PROBABILITY - %
0
20
40
60
80
100
TCF
RESERVES
TCF
3 2 1 0 1 2 3 4 5 6 7
POTENTIAL
TCF
0 1 2 3 4 5 6 7 8
40 LOWER MANNVILLE
47 VIKING PLAINS
23 PEKISKO
49 CARDIUM
OTHERS
SHUNDA
ELMWORTH
NOTIKEWAN
VIKING DEEP
SASKATCHEWAN

Figure 10

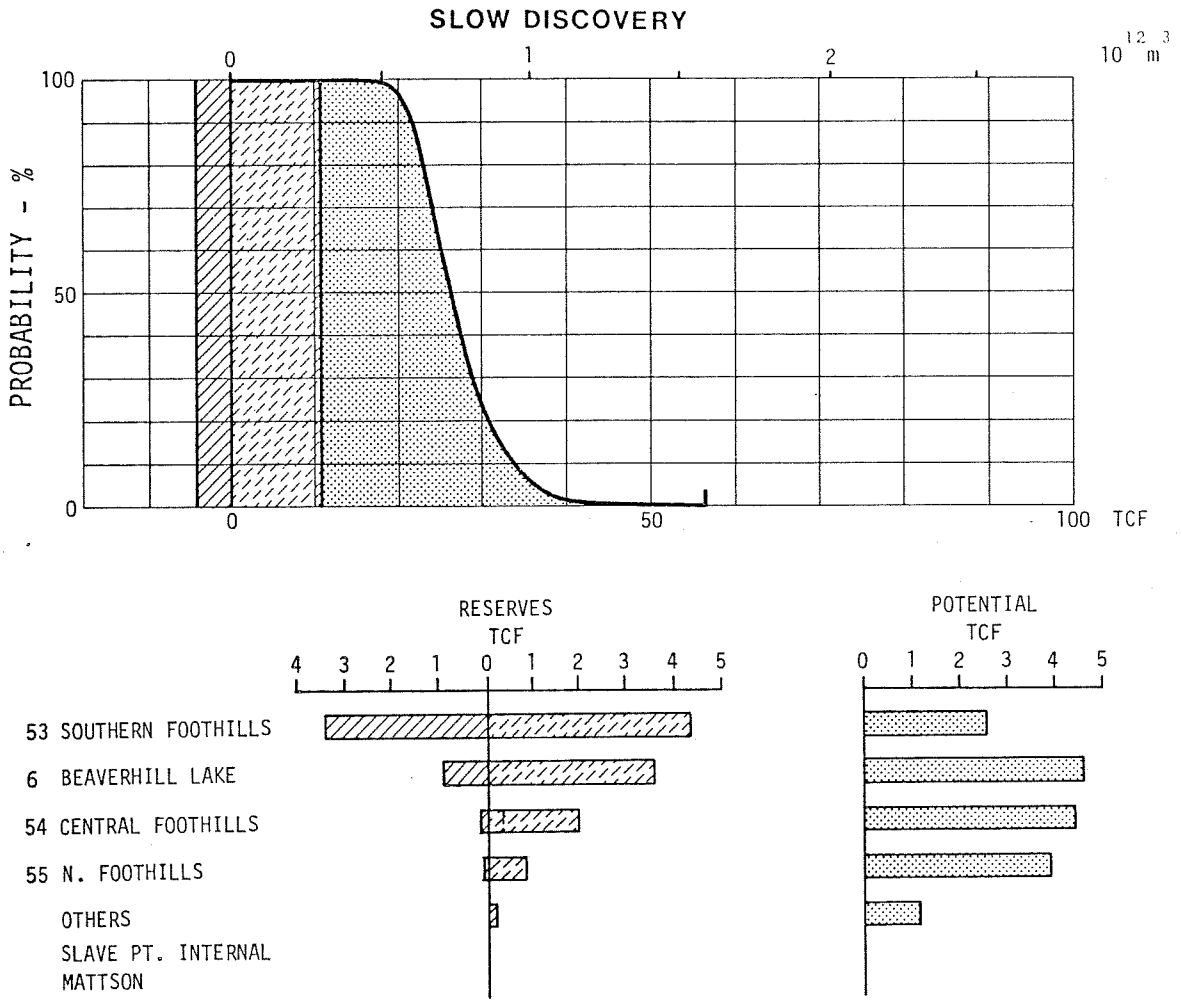
SLOW DISCOVERY
PROBABILITY - %
100
50
0
0
1
2
10 12 3 m
0
50
100 TCF
RESERVES
TCF
4 3 2 1 0 1 2 3 4 5
POTENTIAL
TCF
0 1 2 3 4 5
53 SOUTHERN FOOTHILLS
6 BEAVERHILL LAKE
54 CENTRAL FOOTHILLS
55 N. FOOTHILLS
OTHERS
SLAVE PT. INTERNAL
MATTSON

Figure 11

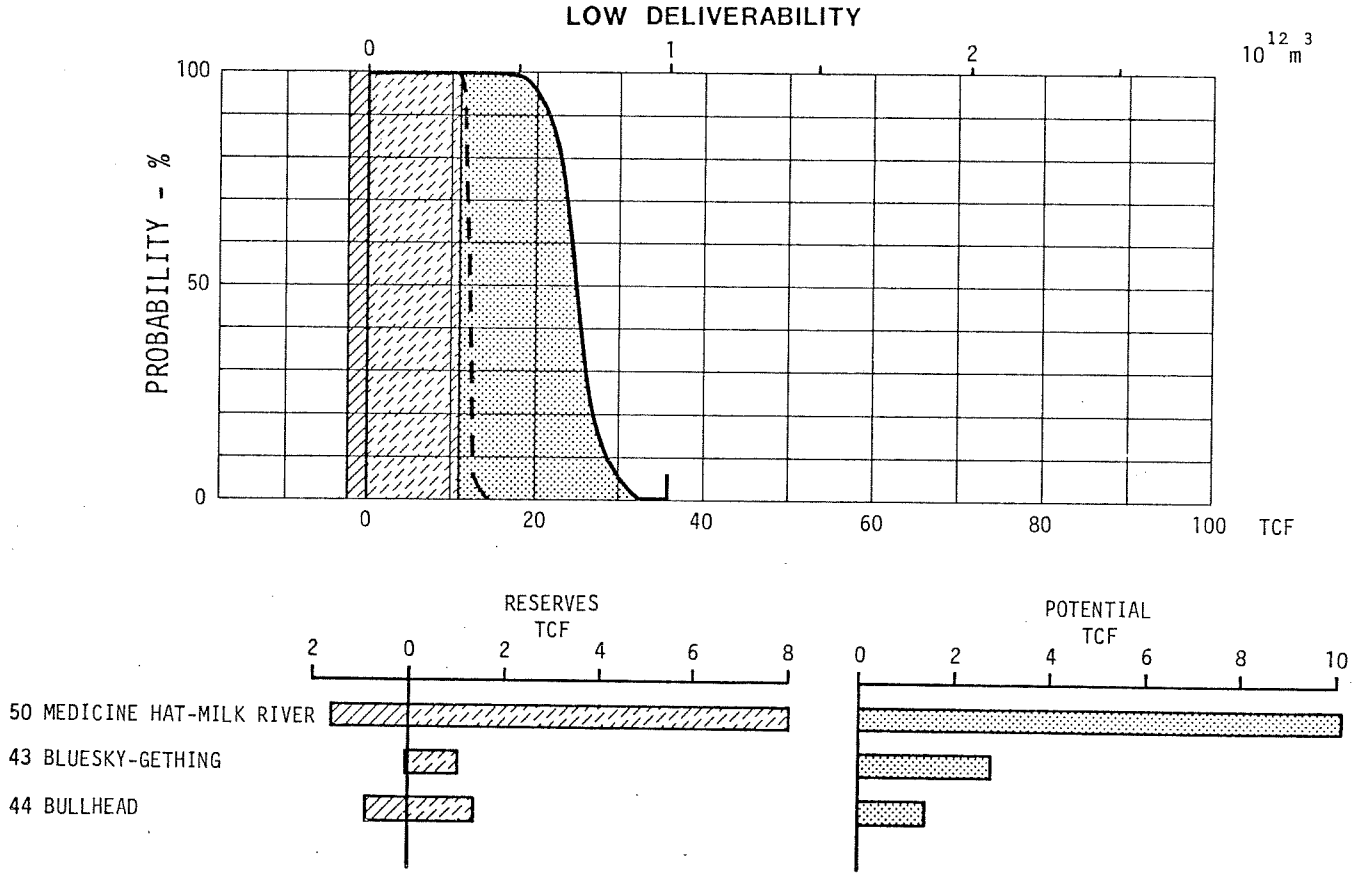
LOW DELIVERABILITY
PROBABILITY - %
100
50
0
0
1
2
10^{12} m^3
0
20
40
60
80
100
TCF
RESERVES
TCF
2
0
2
4
6
8
POTENTIAL
TCF
0
2
4
6
8
10
50 MEDICINE HAT-MILK RIVER
43 BLUESKY-GETHING
44 BULLHEAD

Figure 12

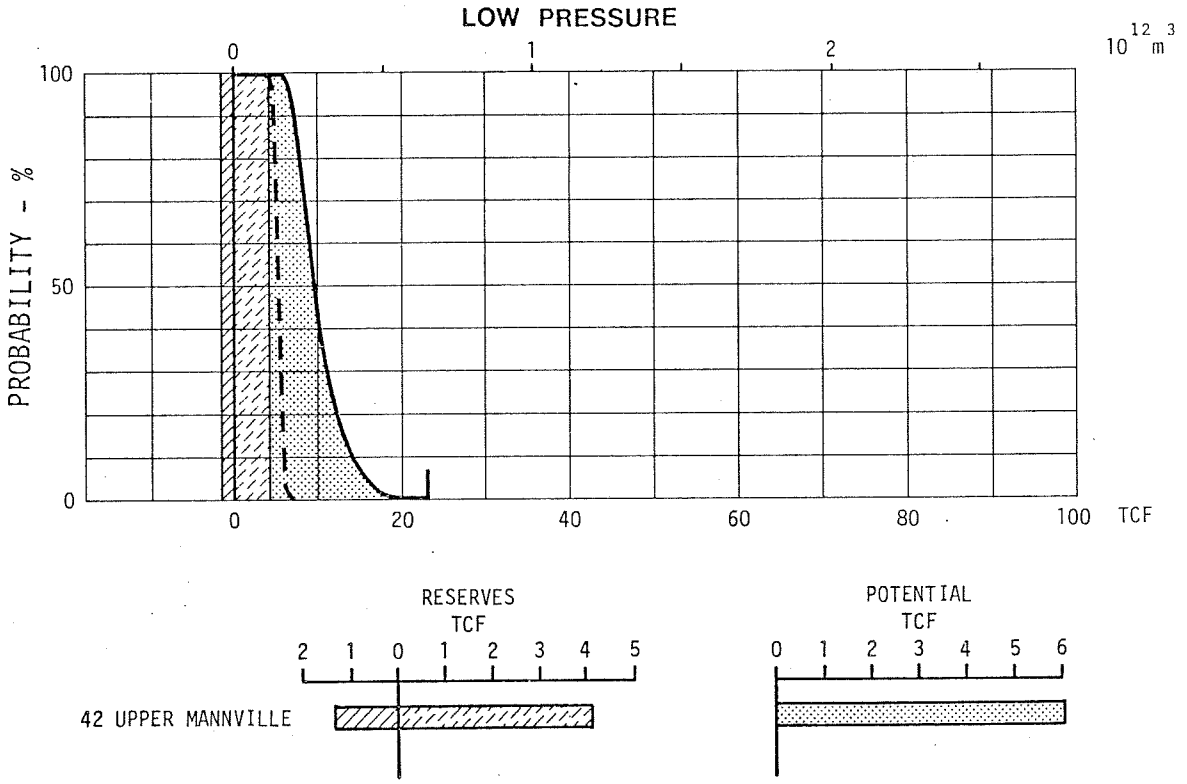
LOW PRESSURE
0
1
2
10^{12} m^3
100
50
0
PROBABILITY - %
0
20
40
60
80
100
TCF
RESERVES
TCF
2 1 0 1 2 3 4 5
42 UPPER MANNVILLE
POTENTIAL
TCF
0 1 2 3 4 5 6

Figure 13

APPENDIX I

1979 WESTERN CANADA GAS RESOURCES
(T.C.F.)

PLAY NO.	PLAY NAME	RESERVES ULTIMATE	RESERVES REMAINING	POTENTIAL (INCLUDING APPRECIATION) MEAN	POTENTIAL (INCLUDING APPRECIATION) MAX.
1	GILWOOD SAND	0.237	0.182	0.018	0.064
2	ZAMA-RAINBOW	0.491	0.414	0.033	0.190
3	SULPHUR PT., ALTA.	0.256	0.242	0.154	0.360
4	MID-DEVONIAN,B.C.	5.347	3.044	2.318	10.000
5	SLAVE POINT	0.115	0.115	0.079	0.290
6	BEAVERHILL LAKE	4.375	3.601	4.608	13.930
7	D3-DEEP BASIN	3.841	2.511	1.059	5.000
8	D3-FAIRWAY	3.804	1.935	0.011	0.050
9	D3-NORMANDVILLE	0.168	0.041	0.046	0.075
12	WAINWRIGHT RIDGE, D1,D2,D3 & GROSMONT	1.269	0.962	0.183	1.985
13	D2-FAIRWAY	1.126	0.526	0.298	0.957
14	W. PEMBINA PINNACLE			1.164	3.982
15	DEEP BASIN-NISKU SHELF	0.022	0.022	0.053	0.172
16	D2-OTHER			0.020	0.038
17	JEAN MARIE,B.C.	0.024	0.023	0.043	0.280
18	WABAMUN-CROSSFIELD	1.978	1.111	0.397	1.569
19	WABAMUN-STETTLER			0.078	0.725
20	WABAMUN-OTHER (EX. WAINWRIGHT RIDGE)	0.500	0.332	0.369	1.000
21	BANFF SAND & CLARKS MBR.	0.151	0.113	0.256	1.000
23	PEKISKO	2.241	1.475	0.622	2.500
24	SHUNDA	0.067	0.067	0.591	2.500
25	TURNER VALLEY	8.488	5.013	0.047	3.500
26	UPPER DEBOLT	1.629	1.348	0.870	3.350
27	MISCELLANEOUS & CONFIDENTIAL	0.912	0.599	0.521	5.000
28	STODDART	0.349	0.287	0.022	0.100

PLAY NO. ****	PLAY NAME *********	RESERVES ULTIMATE **********	RESERVES REMAINING **********	POTENTIAL (INCLUDING APPRECIATION) MEAN **********	POTENTIAL (INCLUDING APPRECIATION) MAX. **********
29	MATTSON,B.C.	0.026	0.024	1.159	5.000
30	BELLOY	0.640	0.338	0.288	1.000
31	MONTNEY-COQUINA & SAND	0.465	0.446	1.045	5.000
33	HALFWAY	1.571	1.000	1.034	4.000
34	BOUNDARY LAKE	0.214	0.094	0.159	0.798
35	CHARLIE LAKE STRAY SANDS,B.C.	0.317	0.192	0.317	1.000
36	BALDONNEL	2.626	1.888	0.562	2.000
37	NORDEGG	0.849	0.602	0.047	0.159
38	ELLIS GROUP	0.081	0.057	0.010	0.025
40	LOWER MANNVILLE	10.250	7.401	7.383	26.620
42	UPPER MANNVILLE	3.351	4.222	6.074	18.750
42	BLUESKY-GETHING	1.010	1.010	2.786	4.500
44	BULLHEAD GROUP	2.324	1.430	1.384	5.000
45	ELMWORTH-FAHLER	0.498	0.226	3.340	9.128
46	NOTIKEWIN,B.C.	0.002	0.002	0.112	0.935
47	VIKING PLAINS	8.288	5.271	0.204	0.400
48	VIKING DEEP BASIN	0.404	0.288	1.154	6.000
49	CARDIUM	1.569	1.056	0.942	1.900
50	MEDICINE HAT, MILK RIVER & 2ND WHITE SPECKS	9.771	8.087	10.213	20.510
52	BELLY RIVER	0.612	0.502	1.077	1.978
53	S. FOOTHILLS	7.620	4.316	2.624	11.000
54	CENTRAL FOOTHILLS	2.104	1.989	4.419	20.000
55	N. FOOTHILLS	0.760	0.760	3.902	15.000
	********** TOTAL **********	92.51	64.98	64.10	(99.33) *

* NOTE: SUM OF POTENTIAL MAXIMA IS A PROBABILISTIC AND NOT AN ALGEBRAIC TOTAL

APPENDIX II

1979 WESTERN CANADA GAS RESOURCES
(UNITS OF: BILLION CUBIC METRES)
****

PLAY NO. ****	PLAY NAME **********	RESERVES ULTIMATE **********	RESERVES REMAINING **********	POTENTIAL (INCLUDES APPRECIATION) MEAN **********	POTENTIAL (INCLUDES APPRECIATION) MAX. **********
1	GILWOOD SAND	6.677	5.128	.507	1.803
2	ZAMA-RAINBOW	13.833	11.664	.930	5.353
3	SULPHUR PT., ALTA.	7.212	6.818	4.339	10.143
4	MID-DEVONIAN,B.C.	150.645	85.761	65.307	281.738
5	SLAVE POINT	3.240	3.240	2.226	8.170
6	BEAVERHILL LAKE	123.260	101.454	129.825	392.461
7	D3-DEEP BASIN	108.215	70.744	29.836	140.869
8	D3-FAIRWAY	107.173	54.516	.310	1.409
9	D3-NORMANDVILLE	4.733	1.155	1.296	2.113
12	WAINWRIGHT RIDGE, D1,D2,D3 & GROSMONT	35.753	27.103	5.156	55.925
13	D2-FAIRWAY	31.724	14.819	8.396	26.962
14	W. PEMBINA PINNACLE	.000	.000	32.794	112.188
15	DEEP BASIN-NISKU SHELF	.620	.620	1.493	4.846
16	D2-OTHER	.000	.000	.563	1.071
17	JEAN MARIE,B.C.	.676	.648	1.211	7.889
18	WABAMUN-CROSSFIELD	55.728	31.301	11.185	44.205
19	WABAMUN-STETTLER	.000	.000	2.198	20.426
20	WABAMUN-OTHER (EX. WAINWRIGHT RIDGE)	14.087	9.354	10.396	28.174
21	BANFF SAND & CLARKS MBR.	4.254	3.184	7.212	28.174
23	PEKISKO	63.137	41.556	17.524	70.434
24	SHUNDA	1.888	1.888	16.651	70.434
25	TURNER VALLEY	239.139	141.235	1.324	98.608
26	UPPER DEBOLT	45.895	37.978	24.511	94.382
27	MISCELLANEOUS & CONFIDENTIAL	25.694	16.876	14.679	140.869
28	STODDART	9.833	8.086	.620	2.817

PLAY NO. ****	PLAY NAME **********	RESERVES ULTIMATE **********	RESERVES REMAINING **********	POTENTIAL (INCLUDES APPRECIATION) MEAN **********	POTENTIAL (INCLUDES APPRECIATION) MAX. **********
29	MATTSON,B.C.	.733	.676	32.653	140.869
30	BELLOY	18.031	9.523	8.114	28.174
31	MONTNEY-COQUINA & SAND	13.101	12.566	29.442	140.869
33	HALFWAY	44.261	28.174	29.132	112.695
34	BOUNDARY LAKE	6.029	2.648	4.480	22.483
35	CHARLIE LAKE STRAY SANDS,B.C.	8.931	5.409	8.931	28.174
36	BALDONNEL	73.984	53.192	15.834	56.348
37	NORDEGG	23.920	16.961	1.324	4.480
38	ELLIS GROUP	2.282	1.606	.282	.704
40	LOWER MANNVILLE	288.781	208.514	208.007	749.986
42	UPPER MANNVILLE	94.410	118.950	171.128	528.258
43	BLUESKY-GETHING	28.456	28.456	78.492	126.782
44	BULLHEAD GROUP	65.476	40.288	38.993	140.869
45	ELMWORTH-FAHLER	14.031	6.367	94.100	257.170
46	NOTIKEWIN,B.C.	.056	.056	3.155	26.342
47	VIKING PLAINS	233.504	148.504	5.747	11.270
48	VIKING DEEP BASIN	11.382	8.114	32.513	169.043
49	CARDIUM	44.205	29.752	26.540	53.530
50	MEDICINE HAT, MILK RIVER & 2ND WHITE SPECKS	275.286	227.841	287.739	577.844
52	BELLY RIVER	17.242	14.143	30.343	55.728
53	S. FOOTHILLS	214.684	121.598	73.928	309.912
54	CENTRAL FOOTHILLS	59.278	56.038	124.500	563.475
55	N. FOOTHILLS	21.412	21.412	109.934	422.607
	********** TOTAL **********	2606.356	1830.732	1805.939	(2798.501) *

* NOTE: SUM OF POTENTIAL MAXIMA IS A PROBABILISTIC AND NOT AN ALGEBRAIC TOTAL

METRIC CONVERSION:
1 CUBIC METRE (101.325 KILOPASCALS, 15 DEG. CELSIUS)
= 35.494 CUBIC FEET (14.65 PSIA, 60 DEG. F)