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Report to the Lieutenant Governor in Council With Respect to the Merged Applications  
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Government of the Province of Alberta

# The Petroleum and Natural Gas Conservation Board

## Report to


### The Lieutenant Governor in Council

*With Respect to the Merged Applications under The  
Gas Resources Preservation Act of:*

- (a) Trans-Canada Pipe Lines Limited, Trans-Canada  
Grid of Alberta Ltd., and Canadian Delhi Oil Ltd.,  
and*
- (b) Western Pipe Lines*

*Under the name of Trans-Canada Pipe Lines Limited*

Price - \$1.00



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*The Petroleum and Natural Gas Conservation Board, having publicly heard the application under The Gas Resources Preservation Act of Trans-Canada Pipe Lines Limited, having studied the evidence submitted at the public hearings, and having regard to the advice of its staff, to its own knowledge, and to its responsibilities under the Act, finds as follows :*

#### **I — IN THE MATTER OF THE ESTABLISHED RESERVES OF NATURAL GAS IN THE PROVINCE OF ALBERTA**

*The Board estimates the established reserves of natural gas in the Province of Alberta as of March 31, 1954, to be 13.4 trillion cubic feet.*

The present estimate compares with the Interim Report estimate of 4.7 trillion cubic feet (December 31, 1950), the March, 1952, Report estimate of 6.8 trillion cubic feet (December 31, 1951) and the November, 1953, Report estimate of 11.5 trillion cubic feet (June 30, 1953). The increase in estimated reserves is due principally to new discoveries which have occurred at a rate in excess of the rate forecasted by the Board in both the March, 1952, Report and the November, 1953, Report. Table A-1 summarizes the additions to reserves since June 30, 1953. This table should be considered as a supplement to Table A-1 in the November, 1953, Report. All figures have been corrected for production to December 31, 1953.

#### **II — IN THE MATTER OF THE PRESENT AND FUTURE REQUIREMENTS OF THE PROVINCE OF ALBERTA FOR NATURAL GAS**

*The Board estimates the actual requirements for the Province of Alberta for natural gas for the 30-year period, January 1, 1954 to December 31, 1983, to be 4.6 trillion cubic feet with a 1983 peak day requirement of some 1,200 million cubic feet. These figures will have to be revised from time to time.*

The present estimate is based upon an extension of the estimate in the November, 1953, Report. Details appear in Appendix B.

#### **III — IN THE MATTER OF MEETING THE 1954 - 1983 REQUIREMENTS OF THE PROVINCE OF ALBERTA FOR NATURAL GAS TOGETHER WITH THE PRESENT EXPORT COMMITMENTS OF THE PROVINCE**

*The Board estimates that established reserves of the order of 6.6 trillion cubic feet are necessary to meet the annual and peak day requirements of the Province for the 30-year period, 1954-1983 inclusive. A further reserve of 244 billion cubic feet is required to meet the present export commitments of the Province, being 11.9 billion cubic feet to Dawson*



*Creek, B.C.; 210 billion cubic feet to the Pacific Northwest via Westcoast Transmission Company Limited; and 22.5 billion cubic feet (under The Gas Export Act) to the State of Montana via the Canadian-Montana Pipeline Company.*

The manner in which the 1954 - 1983 requirements of the Province together with present export commitments might be met is discussed in Appendix C. Illustrative deliverability schedules presented in Tables C-2 and C-3 are based upon the development of the "Trunk-Line" system previously recommended by the Board, by the newly formed Alberta Gas Trunk Line Company.

#### IV — IN THE MATTER OF THE NATURAL GAS SURPLUS TO THE 1954 - 1983 REQUIREMENTS OF THE PROVINCE OF ALBERTA AND IN EXCESS OF THE PRESENT EXPORT COMMITMENTS OF THE PROVINCE

*From the present established reserve of 13.4 trillion cubic feet, some 6.8 trillion cubic feet are estimated to be surplus to the 1954 - 1983 requirements of the Province and to present export commitments of the Province.*

Of this surplus some 386 billion cubic feet lie in the Pakowki Lake Fields. In accordance with the November, 1953, Report, the Board is prepared, with the approval of the Lieutenant-Governor-in-Council, to issue an export permit to Canadian-Montana Pipeline Company covering the export of gas from this area. Assuming such an allocation to the Canadian-Montana Pipeline Company, there will be a remaining surplus of some 6.4 trillion cubic feet of which some 600 billion cubic feet lie in the Peace River area of the Province, while some 500 billion cubic feet is scattered throughout the central and northern Alberta areas and is presently considered beyond economic reach. The net surplus available for an eastern market is estimated to be 5.3 trillion cubic feet.

#### V — IN THE MATTER OF THE MARKET FOR ALBERTA NATURAL GAS EAST OF THE PROVINCE

*The Board has received testimony to the effect that substantial markets for Alberta gas exist in Saskatchewan, Manitoba, Ontario and Quebec and also in the sales area of the Northern Natural Gas Company in the United States. The amended application for Trans-Canada Pipe Lines Limited requests permission to remove 4.35 trillion cubic feet from the Province over a period of 25 years with a daily maximum of 540 million cubic feet. Of the 4.35 trillion cubic feet, 3.02 trillion is to meet the requirements of the Canadian markets which are essentially the same as proposed by Trans-Canada in their original application. The balance of the gas applied for, 1.33 trillion cubic feet, is to supply United States markets through the facilities of the Northern Natural Gas Company.*

Evidence was given to the effect that through an agreement between Consumers' Gas Company of Toronto, Trans-Canada Pipe Lines Limited and Tennessee Gas Transmission Company, gas from the United States would be made available to the Toronto market in the season 1954 - 1955, some two years before Canadian gas could be made available. This gas would be utilized to build up the Toronto market until the arrival of Alberta gas and would materially assist in improving the earnings of the Trans-Canada Pipe Lines Limited project during its first three or four years of operation.

Evidence was also given by officials of Imperial Oil Limited and Union Gas Company of Canada relative to the use of gas fields in southwestern Ontario for storage purposes.

Union Gas Company of Canada who have an agreement with Imperial Oil Limited for the purchase of gas from these fields stated that it would be willing to enter into an agreement with Trans-Canada Pipe Lines Limited for the use of these fields for storage purposes.

The Quebec Hydro-Electric Commission, through one of its officials, Mr. Cross, presented additional information with respect to the requirements of the Montreal area. Mr. Cross explained that the Commission was still unable to give the Board a definite statement regarding its policy with respect to natural gas as the economic survey with respect to the distribution of gas prepared by its consultants had just recently been received and the Commission had not had an opportunity to study it in detail. This is now being done prior to making a recommendation to the Quebec Provincial Government.

While the Board has not received the concrete evidence that it had asked for in its report dated November 24, 1953, it is satisfied that the new Trans-Canada project has a good chance of being economically feasible. This, however, can be determined only when contracts have been signed for the purchase of gas and the marketing of the gas.

## VI — IN THE MATTER OF MEETING THE 1955 - 1980 NATURAL GAS REQUIREMENTS OF TRANS-CANADA PIPE LINES LIMITED

*The requirements of Trans-Canada Pipe Lines Limited for the 25-year period covered by its application amount to a total of 4.35 trillion cubic feet at a maximum daily rate of 540 million cubic feet. Some 4.23 trillion cubic feet of this requirement may be met from the present net surplus of 5.3 trillion cubic feet. The remaining requirement of some 118 billion cubic feet may be met from new surplus gas to be established before mid 1955.*

Details of the manner in which these requirements may be met through facilities of The Alberta Gas Trunk Line Company appear in Table C-4. This tabulation indicates through an illustrative deliverability schedule that the full requirements for the first 21 years of export together with partial requirements for the remaining years may be met through the indicated withdrawals from the following fields.

Field	Withdrawal BCF
Medicine Hat*	242.5
Cessford	821.3
Princess	170.1
Duchess	11.4
Countess	52.4
Sibbald	26.1
Oyen	15.6
Hamilton Lake	34.9
Provost	417.4
Kessler	26.1
Pincher Creek	1,384.8
Nevis	323.3
Homeglen-Rimbey	518.3
Other Small Fields	191.8

\* From that portion of the field not required to meet 30 years' requirements of Medicine Hat - Redcliff systems.

## VII — IN THE MATTER OF THE APPLICATION OF TRANS-CANADA PIPE LINES LIMITED

*The Board is prepared, with the approval of the Lieutenant-Governor-in-Council, and subject to certain terms and conditions, to issue an export permit to Trans-Canada Pipe Lines Limited for the export of not more than 4.35 trillion cubic feet of gas.*

In view of the present lack of proof of financibility the Board considers that an essential condition of such a permit should be confirmation by Trans-Canada Pipe Lines Limited of the financibility of its project by a specified date.

Respectfully submitted,

I. N. McKinnon, Chairman.

D. P. Goodall, P. Eng., Deputy Chairman.

G. W. Govier, P. Eng., Board Member.

DATED at the City of Calgary, in the Province of Alberta, this 10th day of May, A. D., 1954.

## APPENDIX A

**IN THE MATTER OF THE ESTABLISHED RESERVES OF NATURAL GAS  
IN THE PROVINCE OF ALBERTA**

The Board's estimate of established natural gas reserves within the Province as at June 30, 1953, was published in its report of November 24, 1953. The report indicated that the reserve as at June 30, with production deducted to December 31, 1952, was 11.5 trillion cubic feet.

Additional evidence with respect to the reserves of certain fields and areas was submitted at the recent hearing by the consulting firm of DeGolyer and McNaughton on behalf of Trans-Canada Pipe Lines Limited. The Board's own staff has also made a study of the major developments during the period July 1, 1953, to March 31, 1954, in order to assist the Board in revising its estimate of established reserves of gas in the Province.

After considering all evidence and information from other sources, the Board now finds the established reserves of natural gas in the Province to be 13.4 trillion cubic feet as of March 31, 1954, (not corrected for 1954 production). This is an increase of 1.9 trillion cubic feet over the previous estimate. About half of this increase is attributable to new discoveries and the other half is due to expansion of previously known reserves.

Table A-1 is similar to the corresponding table in the November, 1953, Report with the exception that an additional column has been added to indicate the net increase in reserves by fields over the period July 1, 1953, to March 31, 1954. The table has been considerably shortened by individually designating only those fields in which a significant change in reserves has been found. The smaller changes have been grouped at the bottom of the tabulation. Certain small fields have not been reassessed since the November, 1953, Report.

Table A-1

The Petroleum and Natural Gas Conservation Board  
**ESTABLISHED RESERVES OF NATURAL GAS IN THE PROVINCE OF ALBERTA, MARCH 31, 1954 (3)**

1	2	3	4	5	6	7	8
FIELD	ZONE	Estimated Original Gas in Place Billions of cubic feet	Discount for Reservoir Loss per cent	Discount for Surface Loss, etc. per cent	Disposable Gas (3) Billions of cubic feet	Increase Since June 30, 1953	REMARKS
Elkton Area	Mississippian	392.5	10	15 (i)	300.0	300.0	Tentative (i) wet, may require processing.
Etzikom	Bow Island	148.5	15	5	120.0	60.0	
Fort Saskatchewan	Viking	161.0	15	5	130.0	30.0	
Gordondale	Peace River	62.0	15	5	50.0	14.0	
Hamelin Creek	Cadomin	11.7	10	5	10.0	10.0	
Homeglen Rimbey	Cadomin	46.9	10	5	40.0	-30.0	
	Leduc Gas Cap	883.0	15	20 (i)	600.0	100.0	(i) wet, may require processing.
Jumping Pound	Rundle	731.0 (i) 707.1 (ii)	10 (i) 13 (ii)	17	525.0	150.0	(i) original. (ii) less 23.9 BCF produced to Jan. 1/54.
Kessler	Viking	42.1	25	5	30.0	17.0	(i) wet, may require processing.
Minnehik-Buck Lake	Rundle	61.7	10	10 (i)	50.0	30.0	(i) wet, requires processing.
Olds	Wabamun	97.2	10	20 (i)	70.0	30.0	
Pembina	Cardium	625.0	40	20	300.0	300.0	
Pouce Coupe	Cadotte	248.0	15	5	200.0	140.0	
Pouce Coupe South	Cadotte	198.2	15	5	160.0	160.0	
Provost	Viking	625.0	20	5	475.0	345.0	
Rossington	Viking	39.5	20	5	30.0	30.0	
Sarcee	Rundle	208.5	10	20	150.0	150.0	
St. Albert	Lower Cretaceous	105.0	10	5	90.0	30.0	
Sub Total					3,300.0	1,866.0	
All other Reserves Listed in Table A-1, November, 1953, Report					10,056.6	68.1	
GENERAL NOTES :					13,386.8	1,934.1	

(1) Unless otherwise noted reservoir loss is calculated as 10% of original gas in place except in particular cases where the following losses pertain :

Sand thickness 10-15 feet  
 Sand thickness 5-10 feet  
 Sand thickness 0-5 feet

Reservoir loss — 15%  
 Reservoir loss — 20%  
 Reservoir loss — 25%

(2) Surface loss is taken as 5% for all dry gas, and varies for wet gas depending upon its composition.

(3) Disposable reserves as at March 31, 1954, with production deducted to December 31, 1953, only.

**APPENDIX B****PRESENT AND FUTURE REQUIREMENTS OF THE PROVINCE**

No additional evidence was submitted at the hearing with respect to the present and future requirements of the Province. The Board has examined the projections published in the November, 1953, Report and in the light of all available information believes that no changes are required at this time.

Table B-1 shows the estimated natural gas requirements of the Province for the 30-year period January 1, 1954, to December 31, 1983. The table shows the domestic, commercial, industrial and total requirements by years and for the total 30-year period. It is in effect Table C-1 of the November, 1953, Report, with the projections extended one year.

Table B-2, which corresponds to Table C-2 of the November, 1953, Report indicates the manner in which the total requirements shown in Table B-1 are distributed within the Province. Annual and peak day requirements with resulting load factors are shown for each of the areas tributary to the Canadian Western Natural Gas Company Limited system, the areas tributary to the Northwestern Utilities, Limited system, the Peace River area, the Medicine Hat area and the remainder of the Province.

As shown in Tables B-1 and B-2, the Board currently estimates the total 30-year requirements of the Province to be some 4,573 billion cubic feet. This compares with 4,445 billion cubic feet estimated in the previous report. The increase is due entirely to having advanced the 30-year requirement period by one year.

**Table B-1**  
**The Petroleum and Natural Gas Conservation Board**  
**ESTIMATE OF NATURAL GAS REQUIREMENTS**  
**Province of Alberta, January 1, 1954 - December 31, 1983**  
**(Corresponds with Table C-1 of November, 1953, Report)**

1	2	3	4	5
Year	DOMESTIC Billions of cubic feet	COMMERCIAL Billions of cubic feet	INDUSTRIAL Billions of cubic feet	TOTAL Billions of cubic feet
1954.....	24.3	16.5	46.0	86.8
1955.....	26.3	17.8	52.7	96.8
1956.....	28.4	19.2	57.5	105.1
1957.....	30.2	20.7	62.6	113.5
1958.....	32.0	21.6	65.6	119.2
1959.....	33.9	22.7	68.8	125.4
1960.....	36.0	23.8	72.0	131.8
1961.....	36.7	24.3	73.5	134.5
1962.....	37.5	24.8	74.9	137.2
1963.....	38.2	25.3	76.5	140.0
1964.....	39.0	25.8	78.0	142.8
1965.....	39.8	26.3	79.5	145.6
1966.....	40.6	26.8	81.1	148.5
1967.....	41.4	27.3	82.7	151.4
1968.....	42.2	27.9	84.4	154.5
1969.....	43.0	28.5	86.1	157.6
1970.....	43.9	29.0	87.8	160.7
1971.....	44.5	29.4	89.1	163.0
1972.....	45.2	29.9	90.4	165.5
1973.....	45.9	30.3	91.8	168.0
1974.....	46.6	30.8	93.2	170.6
1975.....	47.3	31.3	94.6	173.2
1976.....	48.0	31.7	96.0	175.7
1977.....	48.7	32.2	97.4	178.3
1978.....	49.4	32.7	98.9	181.0
1979.....	50.2	33.2	100.4	183.8
1980.....	50.9	33.7	101.9	186.5
1981.....	51.7	34.2	103.4	189.3
1982.....	52.5	34.7	104.9	192.1
1983.....	53.3	35.2	106.4	194.9
<b>Totals..</b>	<b>1247.6</b>	<b>827.6</b>	<b>2498.1</b>	<b>4573.3</b>





APPENDIX B

Table B-2

The Petroleum and Natural Gas Conservation Board  
 ESTIMATE OF NATURAL GAS REQUIREMENTS  
 Province of Alberta, January 1, 1954 - December 31, 1983  
 Allocation between Areas Tributary to the Distributing Systems  
 (Corresponds with Table C-2 of November, 1953, Report)

Year	Area Tributary to C.W.N.G. System			Area Tributary to N.U.L. System			Peace River Area			Medicine Hat - Redcliff Area			Remainder of the Province			Total Provincial Requirements		
	Annual billions of cubic feet	Peak day millions of cubic feet	Load factor per cent	Annual billions of cubic feet	Peak day millions of cubic feet	Load factor per cent	Annual billions of cubic feet	Peak day millions of cubic feet	Load factor per cent	Annual billions of cubic feet	Peak day millions of cubic feet	Load factor per cent	Annual billions of cubic feet	Peak day millions of cubic feet	Load factor per cent	Annual billions of cubic feet	Peak day millions of cubic feet	Load factor per cent
1954	30.0	196	42	43.6	249	48	0.8	5	7.4	37	55	5.0	34	40	86.8	521	45.6	
1955	31.6	206	42	50.0	285	48	1.2	8	7.7	38	55	6.3	43	40	96.8	580	45.7	
1956	33.0	215	42	55.6	311	49	1.6	11	7.9	39	55	7.0	48	40	105.1	624	46.1	
1957	34.3	227	42	61.1	335	50	2.0	14	8.1	40	55	7.5	51	40	113.5	667	46.4	
1958	36.4	237	42	64.0	351	50	2.4	16	8.3	41	55	8.1	55	40	119.2	700	46.4	
1959	37.8	247	42	67.0	367	50	2.8	19	8.6	43	55	9.2	63	40	125.4	739	46.4	
1960	39.6	258	42	70.2	385	50	3.2	22	8.9	44	55	9.9	68	40	131.8	777	46.4	
1961	40.7	269	42	71.4	391	50	3.3	23	9.0	45	55	10.1	69	40	134.5	783	46.4	
1962	41.3	269	42	72.7	398	50	3.4	23	9.3	46	55	10.5	72	40	137.2	788	46.4	
1963	42.0	274	42	74.2	407	50	3.4	24	9.4	47	55	11.0	75	40	140.0	808	46.4	
1964	42.8	279	42	75.5	414	50	3.5	24	9.7	48	55	11.3	77	40	142.8	826	46.4	
1965	43.7	285	42	76.8	421	50	3.7	25	9.8	49	55	11.6	79	40	145.6	842	46.4	
1966	44.5	290	42	78.3	429	50	3.7	25	9.8	50	55	12.0	82	40	148.5	859	46.4	
1967	45.4	296	42	79.8	437	50	3.9	27	10.0	50	55	12.0	82	40	151.4	876	46.4	
1968	46.4	303	42	81.2	445	50	3.9	27	10.2	51	55	12.5	86	40	154.5	894	46.4	
1969	47.3	309	42	82.8	454	50	4.0	27	10.5	52	55	12.5	86	40	157.6	913	46.4	
1970	48.3	315	42	84.2	461	50	4.1	28	10.7	53	55	13.3	88	40	160.7	949	46.4	
1971	48.9	319	42	85.4	468	50	4.1	28	10.8	54	55	13.8	91	40	163.0	963	46.4	
1972	49.6	324	42	86.6	475	50	4.2	29	11.0	55	55	13.9	95	40	165.5	979	46.4	
1973	50.4	329	42	87.8	481	50	4.4	30	11.2	56	55	14.1	97	40	168.0	993	46.4	
1974	51.1	333	42	89.1	488	50	4.5	31	11.5	57	55	14.4	99	40	170.6	1008	46.4	
1975	51.8	338	42	90.4	495	50	4.5	31	11.7	58	55	14.8	101	40	173.2	1023	46.4	
1976	52.7	344	42	91.6	502	50	4.6	32	11.9	59	55	14.9	102	40	175.7	1039	46.4	
1977	53.4	348	42	92.9	509	50	4.6	32	12.1	60	55	15.3	105	40	178.3	1054	46.4	
1978	54.3	354	42	94.1	516	50	4.7	32	12.2	61	55	15.7	108	40	181.0	1071	46.4	
1979	55.1	359	42	95.6	524	50	4.8	33	12.4	62	55	15.9	109	40	183.8	1087	46.4	
1980	55.8	364	42	96.9	531	50	4.8	34	12.6	63	55	16.3	112	40	186.5	1104	46.4	
1981	56.7	370	42	98.2	538	50	4.9	34	12.8	64	55	16.7	114	40	189.3	1120	46.4	
1982	57.5	375	42	99.7	546	50	5.1	35	12.9	64	55	16.9	116	40	192.1	1136	46.4	
1983	58.3	380	42	101.1	554	50	5.1	35	13.1	65	55	17.3	118	40	194.9	1151	46.4	
Total	1381.2	.....	.....	2397.8	.....	.....	111.3	.....	813.0	.....	.....	370.0	.....	.....	4573.3	.....	.....	



## APPENDIX C

**IN THE MATTER OF MEETING THE PRESENT AND FUTURE REQUIREMENTS OF THE PROVINCE, ITS PRESENT EXPORT COMMITMENTS AND THOSE OF THE TRANS-CANADA PIPE LINES LIMITED APPLICATION**

This Appendix corresponds to a combination of Appendices D, E and F of the November, 1953, Report in which were shown illustrative deliverability schedules indicating the manner in which the various natural gas reserves could be combined to supply gas to meet Provincial and export requirements.

In the previous report there were shown methods by which the estimated present and future requirements of the Province together with present export commitments could be met. Illustrative deliverability schedules were presented to show how the requirements of the areas tributary to the systems of the Canadian Western Natural Gas Company Limited and Northwestern Utilities, Limited together with one-third of the "Local Requirements" could be met from an integrated gathering system also serving easterly export. In this report are shown separate deliverability schedules for meeting Provincial requirements and the meeting of Trans-Canada's requirements although it is planned that both would be met from an overall integrated system. While the schedules indicate that certain fields will be used to meet Alberta requirements and others to meet Trans-Canada's requirements, it is expected that future events will require that reasonably interchangeable gas be transferred to and from the respective schedules. An example of such an exchange would be the moving of certain oil field gas, presently shown supplying the Alberta requirements, to export in the summer months when local markets could not absorb the entire output and the replacement of that gas in the winter months from the fields shown as supplying Trans-Canada Pipe Lines Limited.

Table C-1 indicates the requirements within the Province of Alberta which will be met by gas supplied through facilities of The Alberta Gas Trunk Line Company and interconnected systems of the major Utilities. The table, as does its counterpart Table F-1 of the November, 1953, Report, totals the requirements of the areas tributary to The Canadian Western Natural Gas Company Limited, the areas tributary to the Northwestern Utilities, Limited, and one-third of the Total Local Requirements exclusive of Peace River area and Medicine Hat-Redcliffe systems as being those requirements which would be supplied by the integrated pipeline systems.

Table C-2 illustrates the manner in which it is expected that gas will become available from the oil fields in the Edmonton area. It corresponds to Tables D-1 and D-2 of the November, 1953, Report. The projections for Bonnie Glen, Wizard Lake and Redwater fields have been revised by reason of signi-

ficant changes in the crude oil projections for these fields. Joseph Lake and Armena-Camrose fields have not been included in the current table inasmuch as the economics of gathering the gas now appear less attractive. On the other hand, the development of the Pembina field since the date of the previous report has resulted in the inclusion of a schedule for that field. Columns 20, 21 and 22 of Table C-2 show the total amount of oil field gas expected to be available from those fields in the Edmonton area listed in the table.

Table C-3 contains an illustrative deliverability schedule showing the manner in which the Alberta requirements which are to be supplied from the integrated systems can be met. Columns 2, 3 and 4 show the total requirements as projected in Table C-1. Columns 5 to 41 inclusive project the annual and peak day volumes which are expected to be available from fields either presently connected to or located reasonably close to the proposed facilities of The Alberta Gas Trunk Line Company and the facilities of the utility companies. As may be seen from the schedule, the 30-year requirements exclusive of Peace River area and Medicine Hat - Redcliff systems can be met from these fields except for the years 1982 and 1983. In those years the resulting deficiencies are shown as being met from the fields listed in Table C-4. The manner in which it is proposed to meet the requirements of the Peace River area and the Medicine Hat - Redcliff systems has been shown in Appendix D of the November, 1953, Report. No change in the schedules as shown is presently contemplated.

The requirements of Trans-Canada Pipe Lines Limited as shown in its amended application and in exhibits presented at the recent hearing are shown in Columns 2, 3 and 4 of Table C-4. The manner in which it is proposed that these requirements be met is indicated in the table. Columns 5, 6 and 7 show deliveries from that portion of the Medicine Hat reserves which are excess to the requirements of the Medicine Hat - Redcliff systems. The increase in deliveries over those shown in the November, 1953, Report, is accounted for by a new deliverability-reserve relationship obtained by assuming an ultimate 300 producing wells instead of the 208 previously estimated. The basic deliverability data for this and other fields of the table are shown in Table C-5.

The projected volumes to be obtained from the Cessford Composite are shown in Columns 8, 9 and 10 and are based on the deliverability-reserve relationship shown in Figure D-5 of the previous report.

The manner in which it is expected that gas will be produced from the Provost Composite Fields is shown in Columns 11, 12 and 13. The basic deliverability data for the composite is shown in Table C-5 and the deliverability-reserves relationship is shown in Figure C-1.

The expected deliveries from the Pincher Creek field are shown in Columns 14, 15 and 16. The projection differs from that shown in Table F-3 of the previous report by reason of the expected attainment of a higher load factor. The deliverability-reserves relationship as shown in Figure D-4 of the November, 1953, Report has not been changed.

The illustrative projections for the Nevis field as shown in Columns 17, 18 and 19 of Table C-4 are based on the same reserves as used in the previous report but have been changed slightly through the use of a higher load factor.

In the case of the Homeglen-Rimbey field, the annual and peak day volumes which are expected to be available, as shown in Columns 20, 21 and 22, have been altered from those shown in the November, 1953, Report due to an increase in the available reserves and through use of a higher load factor.

Columns 23, 24 and 25 of Table C-4 show the amounts of gas which it is expected will be available from small fields connected to the gathering system. The basic deliverability data for this composite is shown in Table C-5 and the deliverability-reserve relationship in Figure C-2.

The illustrative deliverability schedule indicate that the annual and peak day volumes of gas for which Trans-Canada Pipe Lines Limited has applied can be met from the fields shown in the table, for the period 1955 to 1975. Annual and peak day deficiencies commencing in the year 1976 are shown. While a theoretical total deficiency of some 118 billion cubic feet with a peak day deficiency of 150 million cubic feet in 1980 is indicated, the amounts are relatively negligible and within the range of error in forecasting Alberta's 30-year requirements. It is confidently expected that discoveries prior to mid 1955 will enable the Board to designate reserves which will meet the indicated deficiencies.

Columns 29, 30 and 31 show the amounts of gas which will be available from the Trans-Canada Pipe Lines Limited supply fields after the period of the application. As indicated in Table C-3, a portion of this gas is required to meet Alberta requirements in the years 1982 and 1983.

Table C-1  
The Petroleum and Natural Gas Conservation Board  
COMPOSITE ALBERTA REQUIREMENTS FOR INTEGRATED SYSTEM  
(Corresponds to Table F-1, November, 1953, Report)

Year	Canadian Western Natural Gas Co.			Northwestern Utilities Ltd.			Local (at 1/3 Total* Local Requirements)			Total Requirements		
	Annual B.C.F.	Peak MMCFD	Load factor per cent	Annual B.C.F.	Peak MMCFD	Load factor per cent	Annual B.C.F.	Peak MMCFD	Load factor per cent	Annual B.C.F.	Peak MMCFD	Load factor per cent
1954	30.0	196	42	43.6	249	48	1.7	12	40	75.3	457	45.2
1955	31.6	206	42	50.0	285	48	2.1	14	40	83.7	505	45.5
1956	33.0	215	42	55.6	311	49	2.3	16	40	90.9	542	46.0
1957	34.8	227	42	61.1	335	50	2.5	17	40	98.4	579	46.5
1958	36.4	237	42	64.0	351	50	2.7	19	40	103.1	607	46.5
1959	37.8	247	42	67.0	367	50	3.1	21	40	107.9	635	46.5
1960	39.6	258	42	70.2	385	50	3.3	23	40	113.1	666	46.5
1961	40.7	265	42	71.4	391	50	3.4	23	40	115.5	679	46.5
1962	41.3	269	42	72.7	398	50	3.5	24	40	117.5	691	46.5
1963	42.0	274	42	74.2	407	50	3.7	25	40	119.9	706	46.5
1964	42.8	279	42	75.5	414	50	3.8	26	40	122.1	719	46.5
1965	43.7	285	42	76.8	421	50	3.9	27	40	124.4	733	46.5
1966	44.5	290	42	78.3	429	50	4.0	27	40	126.8	746	46.5
1967	45.4	296	42	79.8	437	50	4.1	28	40	129.3	761	46.5
1968	46.4	303	42	81.2	445	50	4.2	29	40	131.8	777	46.5
1969	47.3	309	42	82.8	454	50	4.3	29	40	134.4	792	46.5
1970	48.3	315	42	84.2	461	50	4.4	30	40	136.9	806	46.5
1971	48.9	319	42	85.4	468	50	4.5	31	40	138.8	818	46.5
1972	49.6	324	42	86.6	475	50	4.6	31	40	140.8	830	46.5
1973	50.4	329	42	87.8	481	50	4.7	32	40	142.9	842	46.5
1974	51.1	333	42	89.1	488	50	4.8	33	40	145.0	854	46.5
1975	51.8	338	42	90.4	495	50	4.9	34	40	147.1	867	46.5
1976	52.7	344	42	91.6	502	50	5.0	34	40	149.3	880	46.5
1977	53.4	348	42	92.9	509	50	5.1	35	40	151.4	892	46.5
1978	54.3	354	42	94.1	516	50	5.2	36	40	153.6	906	46.5
1979	55.1	359	42	95.6	524	50	5.3	36	40	156.0	919	46.5
1980	55.8	364	42	96.9	531	50	5.4	37	40	158.1	932	46.5
1981	56.7	370	42	98.2	538	50	5.6	38	40	160.5	946	46.5
1982	57.5	375	42	99.7	546	50	5.6	38	40	162.8	959	46.5
1983	58.3	380	42	101.1	554	50	5.8	39	40	165.2	973	46.5
Total	1381.2			2397.8			123.5			3902.5		

\* Exclusive of Peace River and Medicine Hat - Redcliff Areas.

APPENDIX C

Table C-2

The Petroleum and Natural Gas Conservation Board

FORECAST OF RESIDUE GAS AVAILABLE FROM OIL FIELDS ADJACENT TO THE EDMONTON AREA (ON 1000 BTU/CU. FT. BASIS\*)

(Corresponds to Tables D-1 and D-2 of the November, 1953, Report)

Year	Leduc - Woodbend**			Bonnie Glen and Wizard Lake Fields			Acheson Field			Redwater Field			Campbell and Namao Fields			Pembina Field			Total Oil Field Gas		
	Annual B.C.F.	Peak MMCFD	Load factor Per cent	Annual B.C.F.	Peak MMCFD	Load factor Per cent	Annual B.C.F.	Peak MMCFD	Load factor Per cent	Annual B.C.F.	Peak MMCFD	Load factor Per cent	Annual B.C.F.	Peak MMCFD	Load factor Per cent	Annual B.C.F.	Peak MMCFD	Load factor Per cent	Annual B.C.F.	Peak MMCFD	Load factor Per cent
1954	8.2	21.4	105	7.1	17.6	110	0.6	4.4	105	5.5	110	1.0	2.6	105	8.8	25.8	105	8.8	25.8	105	
1955	9.8	25.6	105	8.3	20.7	110	1.8	4.7	105	6.0	110	1.0	3.1	105	20.9	53.4	107	20.9	53.4	107	
1956	16.6	43.3	105	10.1	25.1	110	1.9	5.0	105	6.0	110	2.6	3.1	105	29.2	75.0	107	29.2	75.0	107	
1957	19.5	50.9	105	12.3	30.6	110	1.8	4.7	105	6.5	110	1.2	3.4	105	34.9	89.6	107	34.9	89.6	107	
1958	19.5	50.9	105	14.2	35.3	110	1.8	4.7	105	7.5	110	1.3	3.6	105	44.5	112.7	108	44.5	112.7	108	
1959	19.5	50.9	105	14.2	35.3	110	1.8	4.7	105	8.0	110	1.4	3.6	105	48.9	123.5	108	48.9	123.5	108	
1960	19.5	50.9	105	14.2	35.3	110	1.9	5.0	105	7.7	110	1.4	3.6	105	51.5	129.7	109	51.5	129.7	109	
1961	18.9	49.2	105	13.7	34.2	110	1.9	5.0	105	7.0	110	1.4	3.6	105	55.0	138.0	109	55.0	138.0	109	
1962	18.9	49.2	105	13.7	34.2	110	2.0	5.2	105	7.0	110	1.4	3.6	105	59.9	149.5	110	59.9	149.5	110	
1963	18.5	48.3	105	13.1	32.6	110	2.0	5.2	105	6.7	110	1.6	4.2	105	61.6	156.0	108	61.6	156.0	108	
1964	18.5	48.3	105	12.8	32.0	110	2.0	5.2	105	6.7	110	1.8	4.7	105	64.8	170.9	104	64.8	170.9	104	
1965	18.5	48.3	105	12.7	32.0	110	2.0	5.2	105	6.5	110	1.8	4.7	105	64.6	170.7	104	64.6	170.7	104	
1966	18.5	48.3	105	12.2	30.4	110	1.8	4.7	105	6.5	110	1.8	4.7	105	64.6	170.7	104	64.6	170.7	104	
1967	18.5	48.3	105	12.0	30.0	110	1.7	4.4	105	6.5	110	1.8	4.7	105	63.9	168.6	104	63.9	168.6	104	
1968	9.1	31.1	80	11.8	29.4	110	1.8	4.7	105	6.2	110	1.8	4.7	105	60.3	158.9	104	60.3	158.9	104	
1969	7.2	24.6	80	11.6	28.9	110	1.9	5.0	105	6.0	110	1.8	4.7	105	50.3	139.8	98	50.3	139.8	98	
1970	5.7	19.4	80	12.0	29.9	110	1.9	5.0	105	5.7	110	1.8	4.7	105	44.4	125.4	97	44.4	125.4	97	
1971	4.5	15.4	80	12.1	30.2	110	1.9	5.0	105	5.5	110	1.8	4.7	105	39.1	109.1	98	39.1	109.1	98	
1972	3.4	11.8	80	12.4	30.8	110	1.9	5.0	105	5.5	110	1.8	4.7	105	33.9	83.6	99	33.9	83.6	99	
1973	2.2	7.5	80	12.9	32.1	110	1.9	5.0	105	5.2	110	1.8	4.7	105	29.6	80.6	100	29.6	80.6	100	
1974	1.4	4.9	80	13.2	32.9	110	1.9	5.0	105	5.0	110	1.8	4.7	105	24.6	65.7	102	24.6	65.7	102	
1975	0.7	2.4	80	14.2	35.3	110	1.6	4.2	105	5.0	110	1.8	4.7	105	22.7	60.0	103	22.7	60.0	103	
1976	0.2	0.7	80	16.0	55.0	80	1.3	3.2	110	4.0	110	1.8	4.7	105	22.4	56.2	106	22.4	56.2	106	
1977				23.4	80.0	80	1.1	2.7	110	3.2	110	1.8	4.7	105	27.5	72.5	85	27.5	72.5	85	
1978				35.0	120.0	80	0.8	2.0	110	2.7	110	1.8	4.7	105	37.6	128.7	81	37.6	128.7	81	
1979				35.0	120.0	80	0.5	1.2	110	2.0	110	1.8	4.7	105	37.0	125.1	81	37.0	125.1	81	
1980				35.0	120.0	80	0.4	1.0	110	1.2	110	1.5	3.9	105	35.4	121.0	80	35.4	121.0	80	
1981				35.0	120.0	80				1.2	110				35.0	120.0	80	35.0	120.0	80	
1982				35.0	120.0	80				1.0	110				35.0	120.0	80	35.0	120.0	80	
1983				35.0	120.0	80				1.0	110				35.0	120.0	80	35.0	120.0	80	
Total	277.9			506.5			34.3		55.9	37.8		287.6		1200.0				1200.0			
Waste Prior to Plant Comp.				6.7			1.1		2.1	2.2		12.4		24.5				24.5			
Est. Res. Available for Disposal	437.8			824.1			35.8		58.6	40.0		300.0		1696.3				1696.3			
Per Cent Withdrawn	63.5			66.5			99.0		99.0	100.0		95.8		70.9				70.9			
* BTU Conversion Factor	1.16			1.23			1.20		1.25	1.00		1.07									

\*\* Projections taken from Table D-1 of Board's 1953 Report.













**Table C-5**  
**The Petroleum and Natural Gas Conservation Board**  
**BASIC DELIVERABILITY DATA FOR FIELDS OF TABLES C-3 AND C-4**

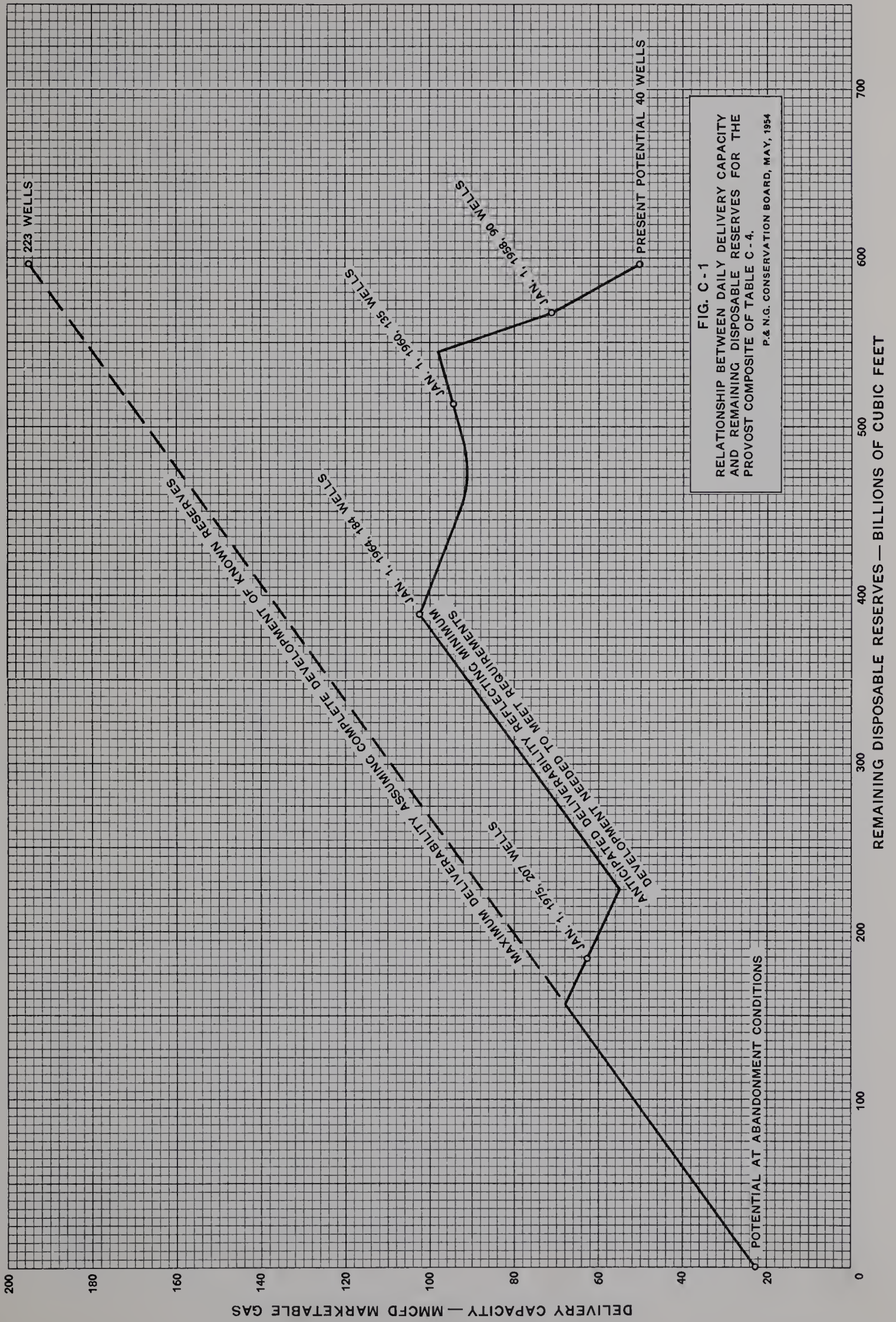
1	2	3	4	5
Name of Field	Zone	Present No. of Wells	Estimated No. of Wells (Field Fully Developed)	Absolute Open Flow Per Well Disposable Gas Millions of Cubic Feet Per Day
Jumping Pound	Rundle	10	13	23.2
Foremost	Bow Island	6	6	12.4
Okotoks	Wabamun	7	12	4.8
Sarcee	Rundle	1	5	16.0
Elkton	Rundle	3	10	17.0
Olds	Wabamun	4	8	4.7
Minnehik-Buck Lake	Mississippian	3	8	13.5
Viking-Kinsella	Viking	100	150	9.2
<b>Edmonton Dry Gas Composite</b>				
Beaverhill Lake	Viking	4	15	11.9
Calahoo	Basal Blairmore	1	1	7.6
Calmette	Viking	1	1	5.6
Fairydell-Bon Accord	Viking	19	48	17.6
	Basal Quartz	1	7	6.6
Fort Saskatchewan	Viking	18	40	28.5
Morinville	Basal Quartz	20	27	11.4
Picardville	Viking	3	11	6.7
Rossington	Viking	4	12	17.1
St. Albert	Lower Cretaceous	5	10	28.5
Villeneuve	Viking	1	3	9.5
Small Fields		9	18	5.5
Total Edmonton Dry Gas Composite		86	193	16.7 Ave.
<b>Edmonton Deferred Gas Composite</b>				
Acheson	Viking and Lower Cretaceous	0	10	5.5
Excelsior	Viking and Lower Cretaceous	2	6	9.0
Leduc	Leduc Gas Cap	0	70	25.5
Total Edmonton Deferred Gas Composite		2	86	22.0 Ave.
<b>Westerose Deferred Gas Composite</b>				
Pigeon Lake	Leduc	1	1	25.5
Westerose	Leduc	0	16	18.0
Westerose South	Leduc	2	2	14.4
Total Westerose Deferred Gas Composite		3	19	18.0 Ave.
<b>Medicine Hat Composite</b>				
Medicine Hat	Medicine Hat	96	292	2.5
	Bow Island	0	4	6.7
	Ellis	2	4	10.5
Total Medicine Hat Composite		98	300	2.7 Ave.

TABLE C-5—Continued.

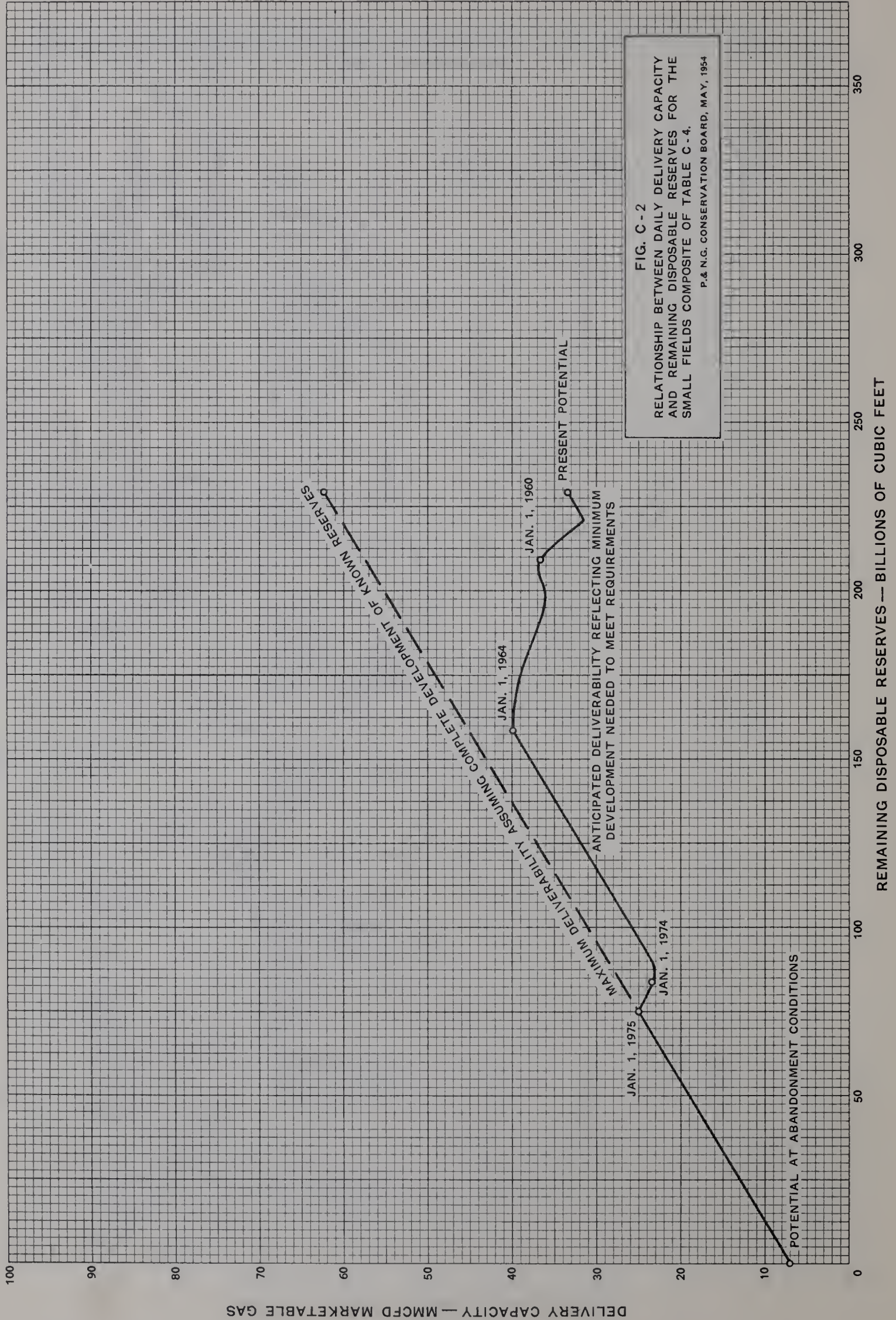
1	2	3	4	5
Name of Field	Zone	Present No. of Wells	Estimated No. of Wells (Field Fully Developed)	Absolute Open Flow Per Well Disposable Gas Millions of Cubic Feet Per Day
<b>Cessford Composite — Unassociated</b>				
Cessford, Sunnynook	Viking	5	18	3.9
Bullpound				
Cessford, Steveville	Basal Colorado	7	65	4.8
Sunnynook	(Unassoc.)			
Cessford, Sunnynook	Sunburst (Unassoc.)	2	9	6.8
Countess	Bow Island	3	7	2.8
Duchess	Basal Colorado	2	3	8.1
Patricia	Sunburst	1	1	3.8
Princess, Steveville	Basal Colorado	7	23	7.6
Denhart	Sunburst	7	9	7.6
	Rundle	3	4	5.7
	Jefferson	1	6	2.1
Total Cessford Composite (Unassoc.)		38	145	5.3 Ave.
<b>Cessford Composite — Associated</b>				
Cessford, Steveville	Basal Colorado	9	90	7.0
Sunnynook	(Assoc.)			
Cessford, Sunnynook	Sunburst (Assoc.)	7	50	7.4
Total Cessford Composite—Associated		16	140	7.1 Ave.
<b>Provost Composite</b>				
Hamilton Lake	Viking	1	14	3.8
Kessler	Viking	3	12	9.6
Oyen	Viking	2	9	7.1
Provost	Viking	26	170	2.8
	Lower Cretaceous	0	2	1.9
Sibbald	Viking	8	16	4.7
Total Provost Composite		40	223	3.5 Ave.
Pincher Creek	Rundle	9	24	55.5
Nevis	Lower Cretaceous	1	3	8.5
	Devonian	5	22	14.4
Homeglen Rimbey	Leduc	1	50	16.0
<b>Small Fields Composite</b>				
Alix	Lower Cretaceous	1	1	9.5
Bashaw				1.3*
Big Valley				1.8*
Chigwell	Basal Blairmore	1	1	13.3
Clive	Viking, Lower	0	2	1.9
	Cretaceous, Devonian			1.7*
Erskine	Lower Cretaceous and			1.8*
	Leduc			
Fenn-North Big Valley	Viking & Nisku			6.4*
Mirror	Leduc	1	1	10.0
Stettler	Nisku			3.3*
<b>Sylvan Lake Area</b>				
Evarts	Basal Blairmore	1	1	12.1
Evergreen	Basal Blairmore	1	1	18.0
Sylvan Lake	Basal Blairmore	1	1	9.0
Wildunn Creek	Viking	1	2	6.6
Other Small Fields		9	15	5.7
Total Small Fields Composite		16	31**	6.2 Ave.

\* Estimated average daily gas available from possible plants.

\*\* Includes six possible processing plants.



**FIG. C-1**  
 RELATIONSHIP BETWEEN DAILY DELIVERY CAPACITY AND REMAINING DISPOSABLE RESERVES FOR THE PROVOST COMPOSITE OF TABLE C-4.  
 P. & N.G. CONSERVATION BOARD, MAY, 1954



**FIG. C - 2**  
 RELATIONSHIP BETWEEN DAILY DELIVERY CAPACITY  
 AND REMAINING DISPOSABLE RESERVES FOR THE  
 SMALL FIELDS COMPOSITE OF TABLE C - 4.  
 P. & N.G. CONSERVATION BOARD, MAY, 1954





