

MICROFILMED

TO .....

HERE .....

*June 179*



# D&S PETROLEUM CONSULTANTS (1974) LTD.

732 Calgary House—550—6 Avenue S.W. Calgary, Alberta T2P 0S2  
Telephone: 403-266-1601 Cable: Denescons Calgary

January 19, 1976

Omega Hydrocarbons Ltd.  
524, 330 Fifth Avenue S.W.  
CALGARY, Alberta.  
T2P 0L4.

EXHIBIT NO. 7  
OIL & N. GAS CONSERVATION BOARD  
DATE MARCH 12/76  
HEARING.....

Attention: Mr. T. Jack Hall

Dear Sir:

As requested, I have enclosed the information you outlined in your letter of January 5th. 1976. I trust this will be sufficient to answer the questions.

1) Bubble Point Pressure

Because there were indications of excess gas production from the commencement of production it was assumed that the reservoir was initially saturated. There are no PVT data to verify this assumption.

2) Waterflood Recovery Factor

The estimated waterflood recovery of 50 percent was based on an evaluation of displacement efficiency, areal conformance factor and vertical conformance factor. The displacement efficiency was based on data obtained from the literature and was believed to be representative of this type of reservoir. The relative permeability curves used in the study are shown on Figure 16 of the August 1, 1974 report. These curves were used to generate a fractional flow curve and the corresponding recovery factor for a homogeneous system.

The areal conformance factor was assumed to be represented by that of a five spot waterflood. A similar result would have occurred if an inverted nine spot pattern was considered.

.....Cont'd.

The vertical conformance accounts for the effects of stratification and was evaluated by a method similar to Pratts et al (Pratts, M. et al - Prediction of Injection Rate and Production History for Multi-fluid Five-Spot Floods - Journal of Petroleum Technology, Vol. 11, No. 5, 1959, P. 98 - 105). This approach divides the section into non-communicating layers of various permeability and assumes they are flooded individually with common pressure at the well. Water injection into the different layers progresses at different rates depending on the permeability of each layer. The total performance at any given time is obtained by a summation of the individual layers.

A summary of the three conformance factors at various water-oil ratios is shown below:

<u>WOR</u>	<u>Areal Conformance</u>	<u>Vertical Conformance</u>	<u>Displacement Efficiency</u>	<u>Total</u>
0.52	0.783	0.690	0.392	0.212
1.04	0.830	0.775	0.410	0.264
5.20	0.950	0.945	0.470	0.422
10.4	0.983	0.983	0.511	0.494
20.8	0.998	0.998	0.560	0.557
52.0	1.000	1.000	0.601	0.601

The total conformance factor indicates the recovery of remaining oil and assumes an initial gas saturation of 28 percent.

3) Performance

The production performance of the total field is divided into Omega and Copperhead wells as shown in the attached tables. Predictions are shown in the economic runs of the August 1, 1974 report.

If you require additional information please do not hesitate to call.

Yours truly,

D&S PETROLEUM CONSULTANTS (1974) LTD.

  
 W. G. Fisher, P. Eng.

WGF:rk

Manitoba Regulation /86

Being

The Oil and Natural Gas Conservation Board

Order No. PM 49

An Order Pertaining to Pressure Maintenance by Water Flooding

Waskada Mission Canyon 3b B Pool

Made and Passed Pursuant to "The Mines Act", Cap. M160, of the Continuing Consolidation of the Statutes of Manitoba, and Amendments Thereto, by The Oil and Natural Gas Conservation Board of Manitoba

(Filed: )

WHEREAS, subsection (9)(d) of Section 62 of "The Mines Act", being Chapter M160 of the Continuing Consolidation of the Statutes of Manitoba, provides as follows:

"62(9) Without restricting the generality of subsection (8) the board, with the approval of the minister, may make orders

(d) requiring the repressuring, recycling, or pressure maintenance, of any pool or portion thereof where it is economical so to do, and for that purpose where necessary requiring the introduction or injection into any pool or portion thereof of gas, air, water or other substance;"

AND WHEREAS, the Board received an application dated January 29, 1986 from Omega Hydrocarbons Ltd. for approval of a project to inject water into the Waskada Mission Canyon 3b B Pool ("the pool") in the Waskada Unit No. 9 area (Unit Area) in Manitoba.

AND WHEREAS, the Board has received no objections or interventions with respect to the application by Omega Hydrocarbons Ltd.

AND WHEREAS, Omega Hydrocarbons Ltd. is the Unit Operator of the Waskada Unit No. 9.

NOW THEREFORE, the Board orders that:

1. The Unit Operator shall conduct pressure maintenance operations by the injection of water into the pool underlying the Unit Area.
2. The pressure maintenance operation shall be in accordance with, and subject to, the following rules:

PRESSURE MAINTENANCE RULES

1(1) Water shall be injected into the pool through the wells:

Omega Waskada WIW 11-27-1-26 (WPM)  
Omega Waskada Prov. WIW 1-34-1-26 (WPM)

and such other wells in the Unit Area as the Board may approve.

- (2) After the commencement of injection, the Unit Operator shall, subject to any remedial work required to be performed on the wells referred to in subclause (1) of this clause, endeavour to maintain continuous injection.
- (3) Notwithstanding the provisions of subclause (2), the Board may, upon application by the Unit Operator, approve the suspension of water injection into any well or wells, provided that the Board is satisfied that pressure maintenance operations in the Unit Area will not be adversely affected.
- (4) The completion of the wells referred to in subclause (1) will be as prescribed by the Director of the Petroleum Branch.
2. The Unit Operator, upon the request of the Board, shall satisfy the Board as to the source, suitability and method of treatment of the water to be injected.
- 3(1) Before injection of water is commenced, the Unit Operator shall submit, to the Board, results of a survey conducted to determine the static reservoir pressure in a minimum of three wells in the Unit Area.
- (2) The Unit Operator shall, not less than six months nor more than 12 months after the commencement of injection, and at yearly intervals thereafter, conduct a survey to determine the static reservoir pressure in a minimum of three wells in the Unit Area.
- (3) The Unit Operator shall submit the details of the surveys described in subclauses (1) and (2) of this clause to the Petroleum Branch, including a list of the wells to be surveyed, the measurement technique to be used, and the intended shut-in periods for each well, and approval shall be obtained from the Director of the Petroleum Branch before the program is carried out. Within 30 days of the completion date of the surveys, a report shall be submitted to the Petroleum Branch including:
- (a) the static reservoir pressure data obtained from the survey, corrected to a common datum;

- (b) an isobaric map of the Pool within the Unit Area based on the data obtained; and
  - (c) a discussion of the survey results and pressure distribution within the Pool.
- (4) The Board may, at any time, require the Unit Operator to carry out such additional reservoir pressure surveys as it deems necessary.
4. The Unit Operator shall immediately report to the Board any indication of channelling or break-through of injected water to producing wells or any indication of other detrimental effects that may be attributable to the pressure maintenance operations.
5. The maximum wellhead pressure at which water is injected into the wells referred to in subclause (1) of clause 1 hereof shall not exceed 8 000 kPa or such other maximum pressure as the Board may prescribe. The Board may, from time to time, prescribe a maximum or minimum rate at which water shall be injected into any well in the Unit Area.
- 6(1) The Unit Operator shall, not later than the last day of each month, file with the Petroleum Branch, a report of the quantity, source and pressure of water injected during the preceding month into each well referred to in clause 1 hereof.
- (2) The Unit Operator shall, not later than the last day of each month, file with the Petroleum Branch a summary report of production and injection operations during the preceding month. This report shall include:
- (a) a tabulation of total oil, total water and total gas produced;
  - (b) a tabulation of the number of producing wells and injection wells which were active;
  - (c) the results of at least one twenty-four hour production test on each producing well in the Unit including volumes of oil, gas and water produced during the test;
  - (d) a summary of any remedial operations carried out on any well in the Unit Areas.
7. The Unit Operator, shall, within 60 days of the end of each calendar year, file with the Petroleum Branch a report of the pressure maintenance program, setting out graphically such interpretive information necessary to evaluate the efficacy of the waterflood.

OIL AND NATURAL GAS ORDER NO. PM 49,  
MADE AND PASSED THIS 27<sup>th</sup>. DAY OF  
MARCH A.D., 1986, AT THE CITY OF  
WINNIPEG, IN THE PROVINCE OF MANITOBA,  
BY THE OIL AND NATURAL GAS CONSERVATION BOARD



Charles S Kang, Chairman  
The Oil and Natural Gas  
Conservation Board



Wm. McDonald, Deputy Chairman  
The Oil and Natural Gas  
Conservation Board



J. F. Redgwell, Member  
The Oil and Natural Gas  
Conservation Board

Approved:



Wilson D. Parasiuk, Minister  
Department of Energy and Mines



The Oil and Natural Gas  
Conservation Board

Room 309  
Legislative Building  
Winnipeg, Manitoba, CANADA  
R3C 0V8

(204) 945-3130

December 2, 1988

Omega Hydrocarbons Ltd.  
1300, 112 - 4th Avenue S.W.  
CALGARY, Alberta  
T2P 0H3

Attention: R. A. Brekke, P. Eng.  
Manitoba District Engineer

Dear Sir:

Re: Suspension of Water Injection  
Waskada MC3b B Pool

Your application to suspend water injection in the subject Pool is approved subject to the following conditions:

1. The provisions of Board Order No. PM 49 relating to determination of reservoir pressures and reporting of production operations (monthly and annually) shall remain in force.
2. Omega shall submit to the Board not later than March 1, 1990, a report outlining the optimum depletion strategy for the Pool.
3. Omega shall apply to the Petroleum Branch for approval to suspend the well Omega Waskada Prov. WIW 1-34-1-26 (WPM).

Yours respectfully,

*Original Signed by H. C. Moster*

H. Clare Moster  
Deputy Chairman

cc: C. S. Kang  
Chairman

bc: Wm. McDonald,  
Member  
Petroleum Branch

LRD/HCM/sml

# Manitoba



## Memorandum

Date December 2, 1988

To The Oil and Natural Gas Conservation Board

From L. R. Dubreuil  
Director  
Petroleum Branch

Subject Charles S. Kang - Chairman  
H.C. Moster - Deputy Chairman  
Wm. McDonald - Member

Telephone

Re: **Suspension of Water Injection**  
**Omega Waskada WIW 11-27-1-26 (WPM)**  
**Omega Waskada Prov. WIW 1-34-1-26 (WPM)**

Omega Hydrocarbons Ltd., operator of the Waskada Unit No. 9 has made application under Pressure Maintenance Rule No. 1(3) of Board Order No. PM 49 to temporarily suspend water injection into the subject wells.

**Recommendation:**

It is recommended that the application be approved. A proposed letter of approval is attached.

**Discussion:**

Board Order No. PM 49 provides for pressure maintenance operations in the Waskada Unit No. 9. The Unit includes several producers in the Waskada MC3b B Pool and the two subject injectors. Note, however, that Omega Waskada 11-27-1-26 (WPM) has already been reconverted from injection to production (see Fig. No. 1).

Pressure maintenance by water injection in the Waskada MC3b B Pool commenced in May 1985 and continued until December 1987.

Fig. No. 2 is a plot of Unit performance and Table No. 1 shows current producing characteristics of wells in the Unit. Water injection appears to have accelerated water production. Increased production in late 1987 and early 1988 does not appear to be a result of water injection. Based on these observations, we concur with Omega that water injection has not been an effective enhanced recovery agent. Omega's plans to review Pool performance at year end 1989 to develop an effective reservoir depletion strategy represents a logical approach. On this basis, approval of the application is recommended.

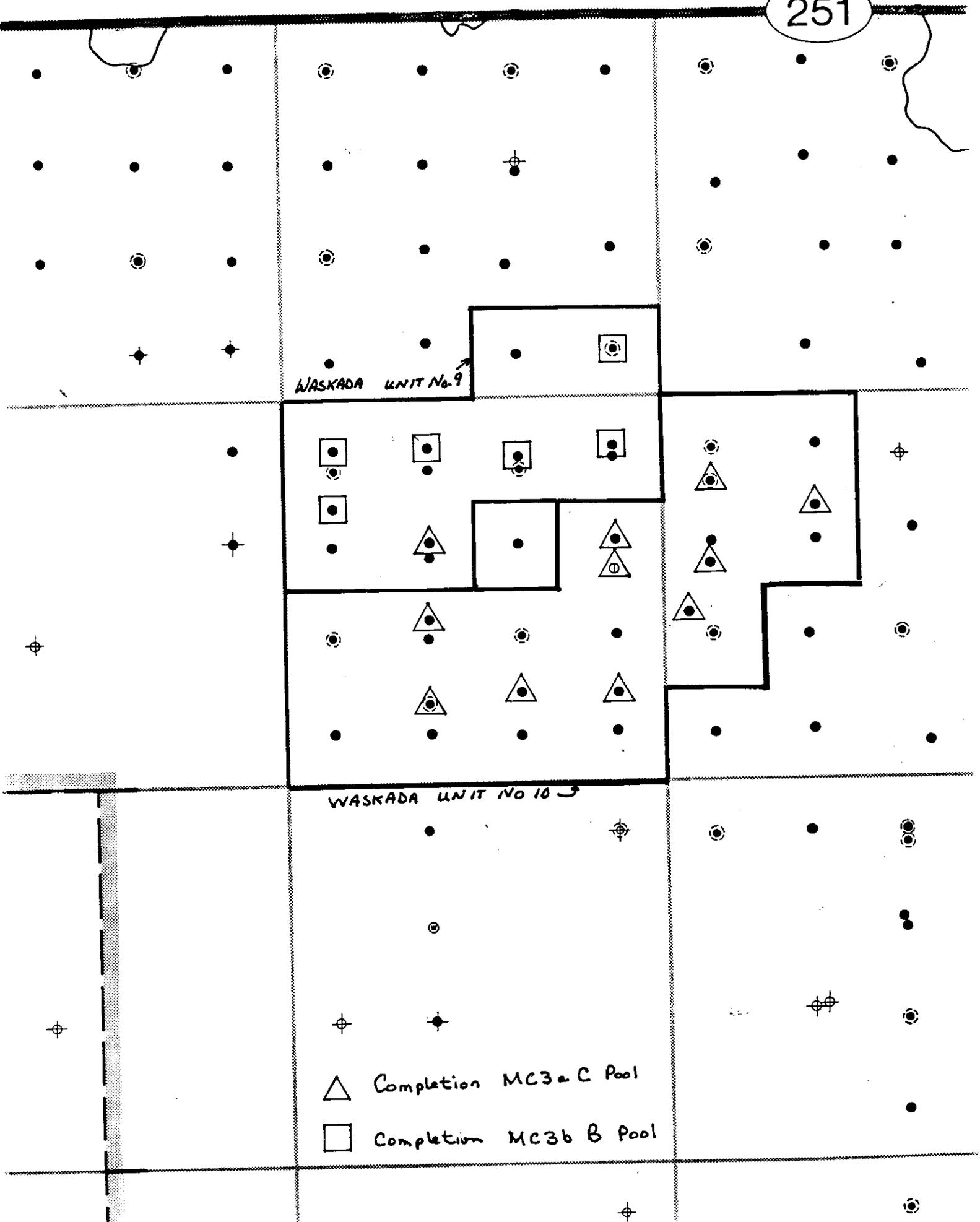
Attached is a proposed letter of approval requiring continued pressure monitoring and progress reporting as required in Board Order No. PM 49.

~~Original~~  
L. R. Dubreuil

L. R. Dubreuil

LRD/sml

Attachments

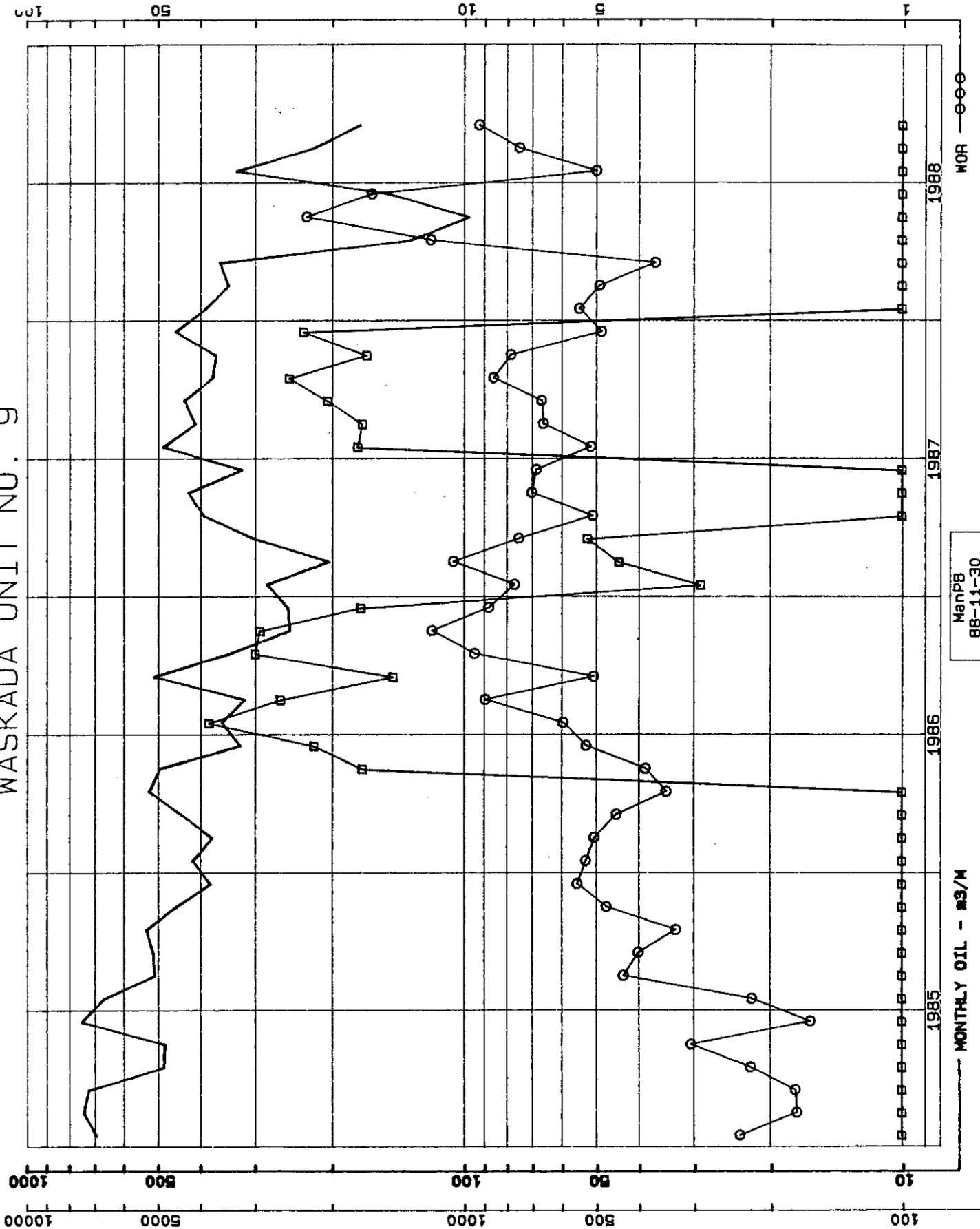


WASKADA UNIT No. 9

WASKADA UNIT NO 10

- △ Completion MC3a C Pool
- Completion MC3b B Pool

WASKADA UNIT NO. 9



ManPB  
88-11-30  
14:08:14

MONTHLY OIL - m3/M  
MONTHLY I.M - m3/M

WDR ---o-o-o

TABLE No.1

PAGE No. 1      \*\*\* STORE \*\*\*      ManPB  
 WASKADA3      88-12-02  
 MONTH REPORT: 1988-09      15:10:43

WELL NAME	HOURS	OIL m3/M	WATER m3/M	OIL m3/d	WOR
(0)11-27-001-26 WIM(0)	696	11.9	437.2	0.4	36.74
(2)12-27-001-26 WIM(2)	720	20.5	331.7	0.7	16.18
(0)13-27-001-26 WIM(0)	672	107.2	747.8	3.8	6.99
(0)14-27-001-26 WIM(0)	552	33.5	85.1	1.5	2.54

TOTALS FOR THE MONTH:

2640	1601.8	9.25
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173.1



HYDROCARBONS LTD.

1300 SUN LIFE PLAZA III  
112 - 4th AVENUE S.W.  
CALGARY, ALBERTA, CANADA T2P 0H3  
TELEPHONE (403) 261-0743



November 28, 1988

The Oil and Natural Gas  
Conservation Board  
555 - 330 Graham Avenue  
Winnipeg, Manitoba  
R3C 4E3

Attention: Mr. Charles S. Kang  
Chairman

Dear Sir:

Re: Board Order No. PM49  
Waskada MC3b B Pool

The purpose of this letter is to request approval to suspend water injection at wells:

Omega Waskada WIW 11-27-1-26 WPM  
Omega Waskada Prov. WIW 1-34-1-26 WPM

During the past year Omega Hydrocarbons Ltd. has observed an increasing water/oil ratio trend within Waskada Unit No. 9 refer to Attachment 1. It is this company's opinion that water breakthrough has been accelerated by water injection into the previously mentioned wells. We also now believe that there is an active aquifer to the north of the subject pool. In order to confirm this suspicion Omega plans to terminate water injection into wells 11-27 and 1-34-1-26 WPM and to monitor the pool pressure under conditions of continued production. By the end of 1989 we will have gathered sufficient data to decide on the optimum reservoir depletion strategy to maximize oil recovery from this Upper Alida pool.

If you have any comments or questions related to this letter please contact the undersigned at (403) 261-0743.

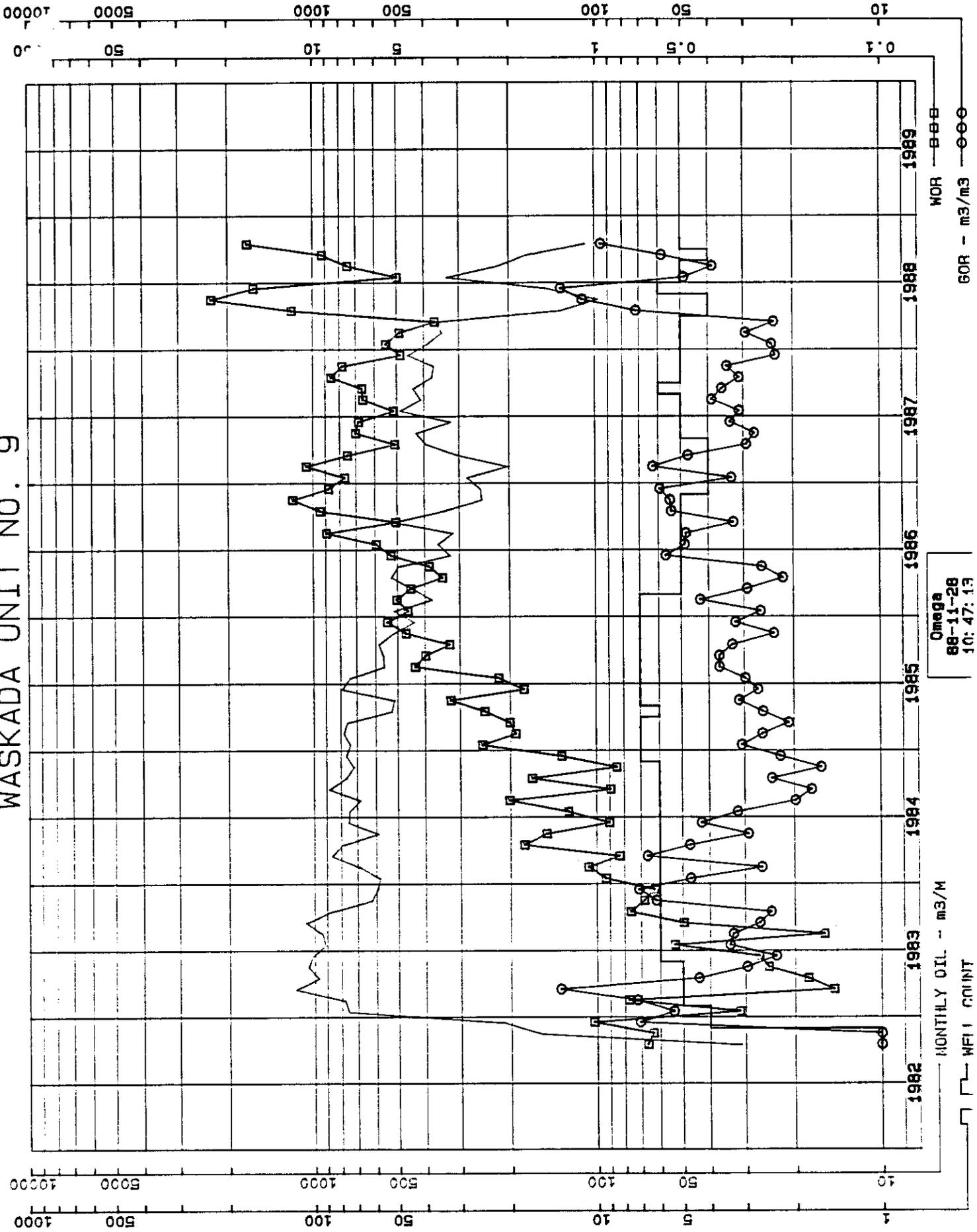
Yours truly,

OMEGA HYDROCARBONS LTD.

R.A. Brekke, P. Eng.  
Manitoba District Engineer

c.c.: B. Dubreuil - Petroleum Branch  
W. Sharp  
Waskada (Mission Canyon) Pressure Maintenance Approvals File

# WASKADA UNIT NO. 9



Omega  
88-11-28  
10:47:13

MONTHLY OIL - m3/M  
WELL COUNT

GOR - m3/m3  
WOR - BBB

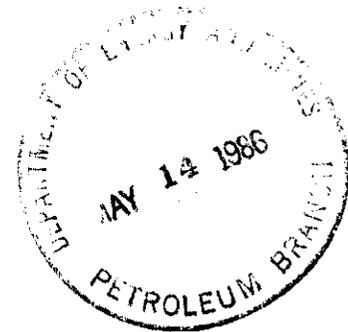


OMEGA HYDROCARBONS LTD.  
 100 SUN LIFE PLAZA III  
 1000 RIVERVIEW S.W.  
 CALGARY, ALBERTA, CANADA T2P 1K1  
 TEL: (403) 243-1111

*File  
 Pressure Maintenance  
 Application  
 Waskada MC36 B  
 0342B*

May 8, 1986

Petroleum Resources Branch  
 Energy, Mines and Resources Canada  
 28th Floor  
 580 Booth Street  
 Ottawa, Ontario  
 K1A 0E4



**Attention: Mr. S.A. Kanik**  
**Chief, PGRT Exemptions**

Dear Sir:

**Re: Request for Certification  
 Production PGRT Exemption  
 Waskada Unit No. 9**

Omega Hydrocarbons Ltd. hereby submits for your approval a request for Certification for the new Production PGRT Exemption for the Upper Alida Zone waterflood project recently implemented in Waskada Unit No. 9. It is this Company's opinion that 55.71% of the total oil production produced from Waskada Unit No. 9 is entitled to PGRT Exemption based on the incremental oil reserves arising from the implementation of the previously mentioned waterflood.

The information supplied is in accordance with Information Letter EMR/PRB 86-01, following the general guidelines for a waterflood project and the specific guidelines for Manitoba.

Waskada Unit No. 9 was formed effective April 1, 1986 and a waterflood was instituted by converting to water injection the following wells:

<u>Location</u>	<u>Date on Injection</u>
11-27-1-26 WPM	1986-05-08
1-34-1-26 WPM	Not on injection yet

It is anticipated that the effective date of exemption will be 1986-05-08.

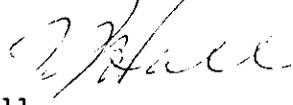
Omega Hydrocarbons Ltd. is operator of this Unit and owns a 100% working interest in all tracts. The production from all wells is classified as New by the Manitoba Government. All wells in the Unit were drilled prior to April 1, 1985.

The following are enclosed in support of this request for certification:

- a) Well Location Map
- b) Attachment No. 1 - Incremental Production Calculation by the Fixed Ratio Method
- c) Attachment No. 2 - Copy of the order approving pressure maintenance (Manitoba Board Order No. PM 49 dated April 3, 1986)
- d) Attachment No. 3 - Copy of the letter approving the Effective Date of the Unit (Manitoba Board letter dated March 20, 1986)
- e) Attachment No. 4 - List of wells and their status

Respectfully submitted,

OMEGA HYDROCARBONS LTD.



T.J. Hall  
President

RAB:vb

Encl.

c.c. Bob Dubreuil - Manitoba Petroleum Branch  
J. Maclagan  
Waskada PGRT Exemption Applications File

R. 26 W. 1. M.



TP.  
1

- SPEAR FISH OIL WELL
- UPPER ALIDA (MC 3b) WELL
- ◐ LOWER ALIDA (MC 3a) WELL
- ◑ TILSTON (MC 1) WELL
- ✕ WATER INJECTION WELL
- ⊕ WATER SOURCE WELL
- ⊖ SUSPENDED WELL
- ⊙ ABANDONED WELL

UNIT OUTLINE

<b>WASKADA UNIT 9 WELL LOCATION MAP</b>	
Scale 1:25,000	Date APR. '86
Geology:	Contour Interval:
Revised:	File:   Drafting: PAB

\*\*\* STORE \*\*\*  
 OMEGA PRODUCTION DATA BASE  
 WASKADA UNIT NO. 9

Omega  
 86-05-06  
 13:52:13

MONTH	PRDN	WELL COUNT				HOURS	OIL	WATER	GAS	I.WATER	NOR	GOR	CUM.OIL	CUM.WAT	CUM.GAS	C.I.WAT
		INJN	P/IN	S/AB	m3/M		m3/M	km3/M	m3/M	m3/m3	m3	m3	m3	m3	km3	m3
1982-10	1	0	0	0	168	31.2	20.8	0.0	0.0	0.67	0	31.2	20.8	0.0	0.0	
1982-11	1	0	0	0	678	157.2	100.2	0.0	0.0	0.64	0	188.4	121.0	0.0	0.0	
1982-12	4	0	0	0	1278	212.7	218.8	15.1	0.0	1.03	71	401.1	339.8	15.1	0.0	
1983-01	4	0	0	0	2878	757.2	239.3	40.9	0.0	0.32	54	1158.3	575.1	56.0	0.0	
1983-02	5	0	0	0	2814	781.4	606.1	56.7	0.0	0.78	73	1939.7	1185.2	112.7	0.0	
1983-03	5	0	0	0	3648	1172.1	171.5	157.6	0.0	0.15	134	3111.3	1358.7	270.3	0.0	
1983-04	5	0	0	0	3312	970.0	175.1	42.7	0.0	0.18	44	4081.8	1531.8	313.0	0.0	
1983-05	5	0	0	0	3580	1056.9	263.0	31.4	0.0	0.25	30	5138.7	1794.8	344.4	0.0	
1983-06	6	0	0	0	3743	1018.8	273.7	23.8	0.0	0.27	23	6157.5	2069.5	368.2	0.0	
1983-07	6	0	0	0	4069	915.3	489.2	31.2	0.0	0.53	34	7072.8	2557.7	399.4	0.0	
1983-08	6	0	0	0	3591	940.4	148.8	31.2	0.0	0.16	33	8013.2	2706.5	430.6	0.0	
1983-09	6	0	0	1	4183	1075.3	535.2	28.7	0.0	0.50	27	9088.5	3241.7	459.3	0.0	
1983-10	6	0	0	1	4226	876.0	667.7	21.3	0.0	0.76	24	9964.5	3909.4	480.6	0.0	
1983-11	6	0	0	1	3872	626.9	428.1	38.9	0.0	0.68	62	10591.4	4337.5	519.5	0.0	
1983-12	6	0	0	1	4128	595.7	374.9	42.5	0.0	0.63	71	11187.1	4712.4	562.0	0.0	
1984-01	6	0	0	1	4172	584.1	543.8	27.4	0.0	0.93	47	11771.2	5256.2	589.4	0.0	
1984-02	6	0	0	1	4063	687.4	735.1	18.0	0.0	1.07	26	12458.6	5991.3	607.4	0.0	
1984-03	6	0	0	1	4120	864.2	722.8	57.4	0.0	0.34	66	13322.8	6714.1	664.8	0.0	
1984-04	6	0	0	1	4229	792.6	1420.0	37.4	0.0	1.79	47	14115.4	8134.1	702.2	0.0	
1984-05	6	0	0	1	3102	591.1	885.1	17.3	0.0	1.50	29	14706.5	9019.2	719.5	0.0	
1984-06	6	0	0	1	3255	751.7	630.3	32.2	0.0	0.91	43	15438.2	9899.5	751.7	0.0	
1984-07	6	0	0	1	3924	748.6	941.0	23.9	0.0	1.26	32	16206.8	10640.5	775.6	0.0	
1984-08	6	0	0	1	4177	683.5	1331.8	13.6	0.0	2.02	20	16890.3	12022.3	789.2	0.0	
1984-09	6	0	0	1	4010	881.3	789.9	15.4	0.0	0.90	17	17771.6	12812.2	804.6	0.0	
1984-10	6	0	0	1	3981	766.8	1291.7	18.5	0.0	1.68	24	18540.4	14103.9	823.1	0.0	
1984-11	6	0	0	1	3882	719.1	612.3	11.6	0.0	0.85	16	19259.5	14716.2	834.7	0.0	
1984-12	7	0	0	1	3981	766.0	1016.5	17.2	0.0	1.33	22	20025.5	15732.7	851.9	0.0	
1985-01	7	0	0	1	4952	740.5	1860.8	22.8	0.0	2.51	31	20766.0	17593.5	874.7	0.0	
1985-02	7	0	0	1	4602	781.1	1497.8	20.3	0.0	1.92	26	21547.1	19091.3	895.0	0.0	
1985-03	7	0	0	1	4536	757.9	1524.3	15.9	0.0	2.01	21	22305.0	20615.6	910.9	0.0	
1985-04	6	0	0	2	4156	526.7	1300.1	13.6	0.0	2.47	26	22831.7	21915.7	914.5	0.0	
1985-05	7	0	0	1	4330	515.3	1672.0	16.2	0.0	3.24	31	23347.0	23557.8	940.7	0.0	
1985-06	7	0	0	1	4805	791.5	1420.0	21.3	0.0	1.79	27	24138.5	25007.8	962.0	0.0	
1985-07	7	0	0	1	4961	740.2	1630.4	22.1	0.0	2.20	30	24878.7	26638.2	984.1	0.0	
1985-08	7	0	0	1	5126	559.8	2429.9	20.5	0.0	4.34	37	25438.5	29095.1	1004.7	0.0	
1985-09	7	0	0	1	4983	564.3	2357.1	20.8	0.0	3.99	37	26002.8	31321.2	1025.5	0.0	
1985-10	7	0	0	1	4769	585.2	1915.2	19.4	0.0	3.27	33	26588.0	33137.4	1044.9	0.0	
1985-11	7	0	0	1	4767	517.9	2426.1	12.2	0.0	4.68	24	27105.9	35663.5	1057.1	0.0	
1985-12	7	0	0	1	4847	437.0	2380.8	14.1	0.0	5.45	22	27542.9	38044.3	1071.2	0.0	
1986-01	7	0	0	1	4933	517.3	2381.8	13.6	0.0	4.60	26	28060.2	40426.1	1084.8	0.0	
1986-02	7	0	0	1	3622	377.3	1904.2	16.2	0.0	5.05	43	28437.5	42330.3	1101.0	0.0	
1986-03	5	0	0	3	3492	443.3	1995.8	13.0	0.0	4.50	29	28890.8	44326.1	1114.0	0.0	

LIST OF WELLS

- (0)11-27-001-26 WIM(0)
- (0)12-27-001-26 WIM(0)
- (0)13-27-001-26 WIM(0)
- (0)14-27-001-26 WIM(0)
- (0)15-27-001-26 WIM(0)
- (0)16-27-001-26 WIM(0)
- (0)01-34-001-26 WIM(0)
- (0)02-34-001-26 WIM(0)

**Waskada Unit No. 9**  
**PGRT Exemption Calculation**

Original Oil In Place Determination (Based on Log Evaluation)

Assuming that  $A\phi h = 50.02 \text{ ha-m}$   $Sw_i = 0.50$   $Bo_i = 1.15 \text{ Rm}^3/\text{m}^3$

Waskada Unit No. 9 Original Oil In Place  $= \frac{10000 A\phi h(1-Sw_i)}{Bo_i} = 217478\text{m}^3$

The reservoir parameters used in this calculation are the same as those used in the determination of the Unit tract participation factors.

Recoverable Oil Calculations

Based on decline curve analysis it is anticipated that the primary recovery factor for Waskada Unit No. 9 will be 22.9% OOIP. <sup>(1)</sup> Using secondary recovery estimates for similar types of reservoirs we expect an ultimate recovery after waterflooding of approximately 35.0% OOIP. Given the above mentioned assumptions one can calculate the following recoverable reserves,

Waskada Unit No. 9 Primary Oil Reserves  $= (0.229)(217478) = 49802\text{m}^3$

Waskada Unit No. 9 Ultimate Oil Reserves  $= (0.35)(217478) = 76117\text{m}^3$

PGRT Exemption Calculation

The cumulative oil production up to 1986 03 31 for Waskada Unit No. 9 was 28881m<sup>3</sup>.

Remaining Recoverable Oil  $= 76117 - 28881 = 47236\text{m}^3$

Remaining Recoverable Incremental Oil  $= 76117 - 49802 = 26315\text{m}^3$

PGRT Exempt Percentage  $= \frac{(26315)(100)}{(47236)} = 55.71\%$

Based on the guidelines contained within Information Letter EMR/PRB 86-01, this calculation indicates that 55.71% of the total oil production produced from Waskada Unit No. 9 is entitled to PGRT Exemption.

(1) Omega Hydrocarbons Ltd., "Waskada Mission Canyon 3bB Pool, Waterflood Application", January, 1986.

April 3, 1986

Omega Hydrocarbons Ltd.  
1300 Sun Life Plaza III  
112 - 4th Avenue S.W.  
CALGARY, Alberta  
T2P 0H3

Attention: R.A. Beamish  
Manager, Engineering

Dear Sir:

Re: Board Order No. PM49  
Waskada MC3b B Pool

Enclosed is Oil and Natural Gas Conservation Board Order No. PM49 authorizing pressure maintenance in the subject Pool.

You are referred to Pressure Maintenance Rule No. 5 which limits the injection wellhead pressure to 8 000 kPa.

Please notify the Waskada District office of the Petroleum Branch prior to initiating water injection.

Yours sincerely,

Original of  
L. R. Dubreuil

L.R. Dubreuil  
Chief Petroleum Engineer  
Petroleum Branch

LRD:dah

encl

cc: Waskada Office

*Marc*



## Memorandum

Date March 17, 1986

To The Oil and Natural Gas  
Conservation Board

From H. Clare Moster  
Director, Petroleum Branch

Charles S. Kang - Chairman  
Wm. McDonald - Deputy Chairman  
J. F. Redgwell - Member

Telephone

Subject Waskada Mission Canyon 3b B Pool  
Pressure Maintenance Operations

First Fold

Omega Hydrocarbons Ltd. have made application for approval to conduct pressure maintenance operations in the subject Pool by conversion of two wells to water injection. Notice of the application was published in the Manitoba Gazette (February 22, 1986) and the Melita New Era (February 20, 1986) and was sent to the offsetting working interest owners. No objection to the application was received.

Recommendation:

It is recommended that the application be approved and that Board Order No. PM 49 (copies attached) be issued.

Discussion:

The proposed Board Order No. PM 49 includes all the normal relevant provisions included in recent pressure maintenance Board Orders. Note that Pressure Maintenance Rule No. 5 limits wellhead pressure to 8 000 kPa to ensure reservoir fracturing does not occur.

~~Original signed by H. C. Moster~~

H. Clare Moster

MA/lk

# Cards Of Thanks

The family of the late Clayton wish to express their heartfelt thanks and appreciation for the love and many acts of kindness during the loss of our beloved husband, father and grandfather. Our many thanks to our friends and relatives who made charitable donations, sent cards, baked and visited or phoned during our bereavement. Special thanks to the Friends House and Reverend Donald for their comforting words; the active and honorary members; organist, Laura Furtak and the choir; the Legion Ladies Auxiliary who served in the Royal Canadian Legion (Melita Branch and Waskada Branch) who came as a body to the ones who drove cars; Dizon and the nurses at the hospital; Evers-Nestibo Funeral Home for their kindness and understanding in all the arrangements. Our deepest appreciation. —Betty Griffith and families

We would like to thank all our friends from Medora and area who donated towards our farewell gift. A special thanks to Kent Deb for hosting the party and to everyone who attended and helped in any way. We will always remember the friends we have made and look forward to visiting the area. We welcome visitors in our new home in Melita, Manitoba. —Pat and Darlene Titchkosky

The Napinka Rink Committee would like to extend a big thank-you to the community of Napinka and area for their generous support during the Mixed Bonspiel. Your help in the kitchen,

the monetary and food donations are greatly appreciated. We realize without your help the bonspiel would not be the event it is. —Napinka Rink Committee

The Napinka Rink Committee wishes to thank the following businesses for their generous donations to our Mixed Bonspiel: Manitoba Pool Elevators, Earl Line Esso, Ev-n-Del, Barkers, Hair We Are, Souris Valley Processors, Royal Bank, Stewart's Lumber, T S & M Supply, Cornish's, White Owl, Trendsetter, Rennie's Solo, Melita Bakery, C & C Agencies, Blossom Boutique, Carel's Red & White, Circle M, New Era, Macleods, Morricks, Neffs, Credit Union, Russell's Electric, Delmar's Pro Hardware, Dando's, Rod's Auto, Melita Motors, Melita Auction Mart, Triple G Sales,

## LOOK

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**The New Era Publishing Co. Ltd.**

*"Your Home Video Rental Centre"*

*All our tapes have been purchased NEW since March 1, 1985*

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From Noon Friday to Noon Monday .....	<b>\$1250</b>
From Noon Saturday to Noon Monday .....	<b>\$950</b>



PRICE

## 18 The New Era, Melita, Manitoba, Thursday, February 20, 1986

B & J Gulf, Critchlow Trucking, D & H Sales, Gordon's Tire Shop, U.G.G., Tweed's Melita, R. Holmes, H & R Block, New Holland, Massey Ferguson, D. Clarkson, Melita, Tweed's, Medora Trading, Manitoba Pool, Mosset Seeds, Ralph Edwards Drilling Ltd. Medora, Bodkin's Grocers and the individuals of Napinka. We thank you all, as without these donations our bonspiel would not be the success it is. We would also like to thank all the participants because with-

out you there would be no bonspiel.

—Napinka Rink Committee

Real friendship is when two people get so thick they can see through each other but don't.

### LONG WAIT

The man who waits to put his great idea into action until no one can find fault with it will have a long wait indeed.

### NOTICE

### NOTICE

Omega Hydrocarbons Ltd., as operator of the proposed Waskada Unit No. 9, has made application under The Mines Act for approval to conduct pressure maintenance operations in a portion of the Waskada Mission Canyon 3b B Pool. It is proposed to convert the following wells to water injection:

Omega Waskada 11-27-1-26 (WPM)

Omega Waskada Prov. 1-34-1-26 (WPM)

If no intervention or objection in writing is received by the Board at Room 309, Legislative Building, Winnipeg, Manitoba, R3C 0V8, within 14 days of the publication of this notice, the Board may approve the application.

Dated at Winnipeg, this 5th day of February, 1986.

Wm. McDonald  
Deputy Chairman

Omega Hydrocarbons Ltd., as operator of the proposed Waskada Unit No. 12, has made application under The Mines Act for approval to conduct pressure maintenance operations in a portion of the Waskada Mission Canyon 3a A Pool. It is proposed to convert the following wells to water injection:

Omega Waskada 15-23MC3a-1-26 (WPM)

Omega S. Waskada Prov. 1-24-1-26 (WPM)

Omega Waskada 1-25-1-26 (WPM)

If no intervention or objection in writing is received by the Board at Room 309, Legislative Building, Winnipeg, Manitoba, R3C 0V8, within 14 days of the publication of this notice, the Board may approve the application.

Dated at Winnipeg, this 3rd day of February, 1986.

Wm. McDonald  
Deputy Chairman

## CASH Auction Sale

**Mr., Mrs. Bob Grierson & Other Consignors**  
**Monday, February 24th, 1:00 p.m.**  
at the Garage, 129 Front Street, Melita, Man.

**Having received instructions, we will sell by Public Auction items including the following:**

**KITCHEN**—30" Findlay Electric Range (avacado); 17 cu. ft. Moffat Refrigerator (avacado); 30" Kelvinator Electric Range (older, good condition); Chrome Suite, Large Brown Table, 5 Chairs; Chrome Suite, Small Brown Table, 3 Chairs; Avacado Cannister Set, Bread Box, Trip Can; G.E. Kettle; Electric Deep Fryer; Corn Popper; Warming Tray; Electric Can Opener; Clock Radio; Antique Sealers and Bottles; Miscellaneous Dishes, Bowls, Spoon Rack, Jars.

**LIVING ROOM**—Antique Cabinet Victrola Radio-Phonograph (radio works good); Green Rocking Chair; Green Foot Stool; Floral Arm Chair; Records; Table Lamps; Orange Occasional Chair; Antique Coat Oil Lamp; Barometer; 12" Bookcase with Glass Doors; 3—Swag Lamps; Magazine Rack; 2—Ben

has been filed by a Respondent, his  
ment of Opposition will be struck. All  
ications in which a Statement of  
ition has been accepted will be set for  
hearing.

Notice that the Manitoba Motor  
port Board has received the following  
ation for approval of the transfer of  
tion authority.

cket 12787 (20/85)  
Holmes, o/a  
1 Building Mover,  
ll, Manitoba.

lication for approval for the purchase  
tain assets and transfer of the Public  
e Vehicle Certificate presently held  
Province of Manitoba by Aime G.  
l, Notre Dame de Lourdes, Manitoba.  
certificate to be transferred reads as  
s:

te: to and from various points. Via:  
as highways.

uthorized to transport buildings only  
various points to various points in  
oba.

Interested party wishing to oppose  
ove application shall file a Statement  
osition setting forth the grounds of  
osition with the Secretary of the  
1, 200-301 Weston Street, Winnipeg,  
oba, R3E 3H4, before 4:30 P.M., Mon-  
March 17, 1986. Late opposition will not  
epected.

Notice that the Manitoba Motor  
port Board intends to grant the fol-  
g authority to transport handicapped  
ns in Rural Manitoba.

cket 12803 (20/85)  
Municipality of Hamiota and  
ota Handy Transit,  
ota, Manitoba.

Application for Public Service Vehicle  
rity for the transportation of handi-  
d persons in Rural Manitoba, pur-  
to Manitoba Regulation 110/84, being  
l Order No. 38/84.

Person wishing to oppose this  
ation must file a statement of opposi-  
in no particular form, indicating in  
the grounds for opposition, with the  
tary of the Board, 200-301 Weston  
t, Winnipeg, Manitoba, R3E 3H4,  
e 4:30 P.M., Monday, March 10, 1986.

Board will consider all material filed  
etermine whether the application  
d be granted to direct that a public  
ng be held.

L. G. OLIJNEK,  
Secretary,  
THE MANITOBA MOTOR  
TRANSPORT BOARD.

UNDER THE MINES ACT

Omega Hydrocarbons Ltd., as operator  
of the proposed Waskada Unit No. 9, has  
made application under The Mines Act for  
approval to conduct pressure maintenance  
operations in a portion of the Waskada Mis-  
sion Canyon 3b B Pool. It is proposed to  
convert the following wells to water injec-  
tion:

Omega Waskada 11-27-1-26 (WPM)  
Omega Waskada Prov. 1-34-1-26 (WPM)

If no intervention or objection in writing  
is received by the Board at Room 309, Leg-  
islative Building, Winnipeg, Manitoba, R3C  
0V8, within 14 days of the publication of this  
notice, the Board may approve the applica-  
tion.

Dated at Winnipeg, this 5th day of Febru-  
ary, 1986.

—8 Wm. McDONALD,  
Deputy Chairman.

UNDER THE ELECTIONS FINANCES ACT

Pursuant to Section 53 of The Elections  
Finances Act, Public Notice is hereby  
given of the (maximum amounts) which  
candidates and registered political parties  
may spend on election expenses and adver-  
tising expenses in the general election to be  
held on March 18, 1986, in the Province of  
Manitoba.

Section 52 of The Elections Finances Act  
specifies, that for each voter on the revised  
voters' lists, no more than the following  
amounts may be spent:

<b>By Registered Political Parties</b>	
Overall Election Expenses	
Spending Limit . . . . .	\$ .98
Advertising Expenses Spending	
Limit . . . . .	\$ .49
<b>By Candidates</b>	
Overall Election Expenses	
Spending Limit . . . . .	\$1.54
Overall Election Expenses	
Spending Limit for the Elec- toral Divisions of Rupertsland and Churchill . . . . .	\$2.46
Advertising Expenses Spending	
Limit . . . . .	\$ .31

Dated at the City of Winnipeg, this 11th  
day of February, 1986.

—8 RICHARD T. WILLIS,  
Chief Electoral Officer.

FINANCEMENT DES CAMPAGNES  
ELECTORALES

Conformément à l'article 53 de la Loi sur  
la financement des campagnes électorales,  
avis est donné par les présentes relative-  
ment aux montants maximaux que les candi-  
dat(e)s et les partis politiques inscrits  
peuvent dépenser à titre de dépenses élec-  
torales et de dépenses de publicité pour les  
élections générales qui auront lieu le 18  
mars 1986 dans la province du Manitoba.

L'article 52 de la Loi sur le financement  
des campagnes électorales précise que,  
pour chaque électeur inscrit sur les listes  
électorales révisées, les dépenses ne peu-  
vent excéder les montants suivants :

<b>Pour les partis politiques inscrits</b>	
Limite des dépenses électorales	
globales . . . . .	0,98 \$
Limite des dépenses de pu- blicité . . . . .	0,49 \$
<b>Pour les candidat(e)s</b>	
Limite des dépenses électorales	
globales . . . . .	1,54 \$
Limite des dépenses électorales	
globales pour les circonscrip- tions électorales de Ruperts- land et de Churchill . . . . .	2,46 \$
Limite des dépenses de pu- blicité . . . . .	0,31 \$

Fait en la Ville de Winnipeg, ce 11<sup>e</sup> jour de  
février 1986.

—8 Le directeur général des élections,  
RICHARD T. WILLIS.



## Memorandum

Date February 5, 1986

To The Oil and Natural Gas  
Conservation Board

From H. Clare Moster  
Director, Petroleum Branch

Charles S. Kang - Chairman  
Wm. McDonald - Deputy Chairman Telephone  
J. F. Redgwell - Member

Subject Pressure Maintenance - Waskada MC3b B Pool

Omega Hydrocarbons Ltd., as operator of the proposed Waskada Unit No. 9, has made application for approval to conduct pressure maintenance operations in the Waskada MC3b B Pool. Omega proposes to inject water in two wells (located in Lsd 11 of Section 27-1-26 and in Lsd 1 of Section 34-1-26).

### Recommendations:

It is recommended that notice of the application be published in the Manitoba Gazette and the Melita New Era and sent to offsetting working interest owners. A proposed notice is attached.

In the absence of objections to the notice, it is recommended that the application be approved, and that an appropriate Board Order be issued.

### Discussion:

The Waskada MC3b B Pool was discovered in September, 1982 with the completion of the well Omega Waskada 11-27-1-26 in the Mission Canyon 3b zone over the interval 927.0 to 930.0 m KB. The Pool has since been developed over an area of 720 acres (288 ha) and currently includes 11 producing wells (see Figure No. 1).

The Mission Canyon 3b zone is the upper porous unit of the Mission Canyon 3 member. This zone can be defined as the interval 943.5 to 949.5 m KB on the BHC Sonic Log for the well Chevron Waskada Prov. 4-20-1-25 (WPM). Where wells are drilled deep enough to penetrate the MC-2 marker (975m KB on Fig. No. 2), it is usually quite easy to distinguish the MC3b zone from the underlying MC3a zone.

Figure No. 3 shows Pool Oil Production in m<sup>3</sup> per month. Pool production peaked at approximately 1 200 m<sup>3</sup>/month at the beginning of 1983 and has since declined to about 700 m<sup>3</sup>/month. Projecting an average decline curve to abandonment conditions (120 m<sup>3</sup>/month - per Omega's application) a remaining primary reserve (as per October 31, 1985) of approximately 33 000 m<sup>3</sup> is estimated. This is approximately 60% greater than the primary reserves estimated by Omega.

First | Fold

Although it is difficult to quantify the incremental reserves that would be realized through waterflooding, the performance of the only other waterflood in the Mission Canyon (Waskada MC3b A Pool) and the apparent good reservoir continuity suggests that an increase in recoverable reserves may be significant.

While the proposed waterflood area is wholly owned by Omega (i.e. - 100% working interest), several offset tracts are operated by other companies (see Figure No. 4). Because of this and evidence from the MC3b A Pool waterflood that injection response occurs quite dramatically and could affect wells more than one location removed from injection, notice of the application should be published. It is proposed that the notice be published in the Manitoba Gazette, and the Melita New Era and sent to offsetting working interest owners (see Table No. 1).

Completion of the wells and proposed surface facilities are similar to current facilities in use for the Waskada Lower Amaranth A Pool Waterflood and are acceptable.

Fractures gradient calculations indicate reservoir fracturing could occur at pressure of 7 900 kPa or greater. Inasmuch as it is not normally necessary to fracture the Mississippian on completion, injection pressures should not exceed this pressure. A limiting injection pressure of 7 000 kPa is proposed to provide a margin of safety. This compares to Omega's proposed maximum injection wellhead pressure of 10 000 kPa.

*H. CLARE MOSTER*

H. Clare Moster

MA/lk



The Oil and Natural Gas  
Conservation Board

Room 309  
Legislative Building  
Winnipeg, Manitoba, CANADA  
R3C 0V8

(204) 945-3130

## NOTICE

Omega Hydrocarbons Ltd., as operator of the proposed Waskada Unit No. 9, has made application under The Mines Act for approval to conduct pressure maintenance operations in a portion of the Waskada Mission Canyon 3b B Pool. It is proposed to convert the following wells to water injection:

Omega Waskada 11-27-1-26 (WPM)

Omega Waskada Prov. 1-34-1-26 (WPM)

If no intervention or objection in writing is received by the Board at Room 309, Legislative Building, Winnipeg, Manitoba, R3C 0V8, within 14 days of the publication of this notice, the Board may approve the application.

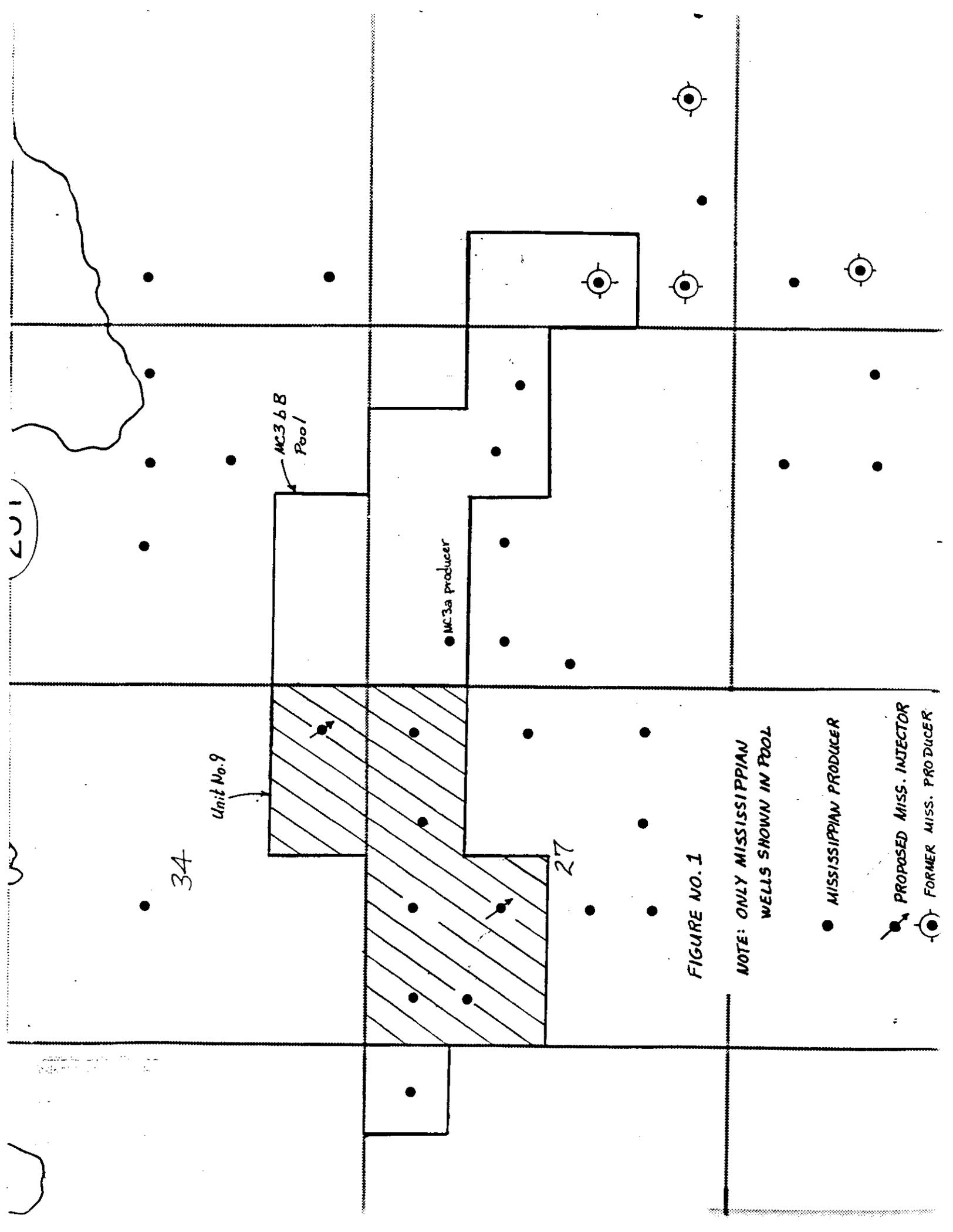
Dated at Winnipeg, this            day of February, 1986.

Wm. McDonald  
Deputy Chairman

TABLE NO. 1

WASKADA UNIT NO. 9  
OFFSETTING WORKING INTEREST OWNERS

<u>Working Interest Owner</u>	<u>Area</u>
Andex Oil Co. Ltd.	NE $\frac{1}{4}$ -28
Chauvco Resources Ltd.	NE $\frac{1}{4}$ -28
Chevron Canada Resources Ltd.	SE $\frac{1}{4}$ -33, SW $\frac{1}{4}$ -34
Petrostar Petroleum Ltd.	NE $\frac{1}{4}$ -28
Roxy Petroleum Ltd.	NE $\frac{1}{4}$ -28
Shell Canada Resources Ltd.	NE $\frac{1}{4}$ -28



34

Unit No. 9

MC36B Pool

MC3a producer

27

FIGURE NO. 1

NOTE: ONLY MISSISSIPPIAN WELLS SHOWN IN POOL

● MISSISSIPPIAN PRODUCER

⊙ PROPOSED MISS. INJECTOR

○ FORMER MISS. PRODUCER

FIG. No. 2  
Gamma Ray - BHC Sonic  
Log.  
Chevron Washkade Prov  
4-20-1-25 (WAM)

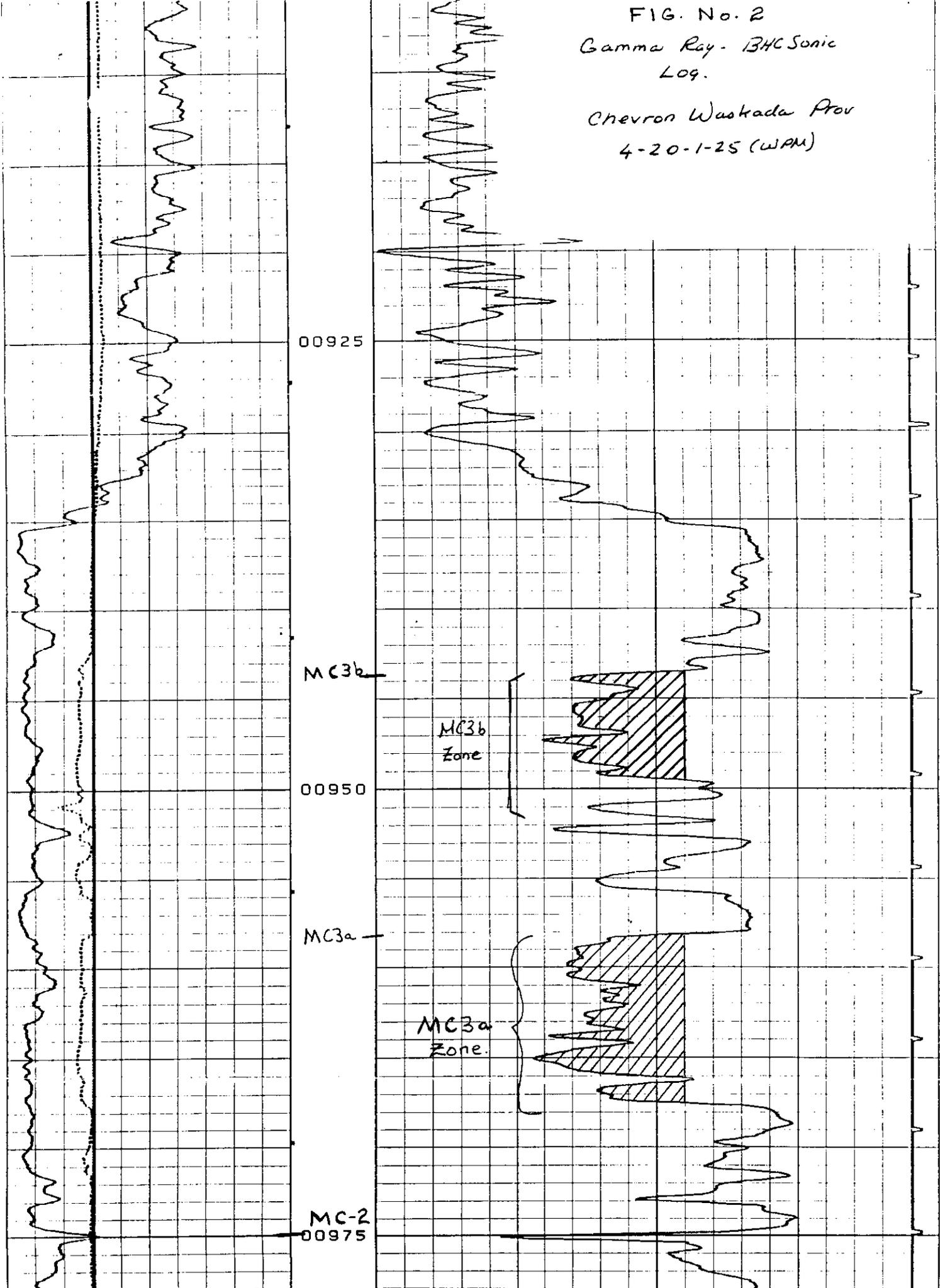
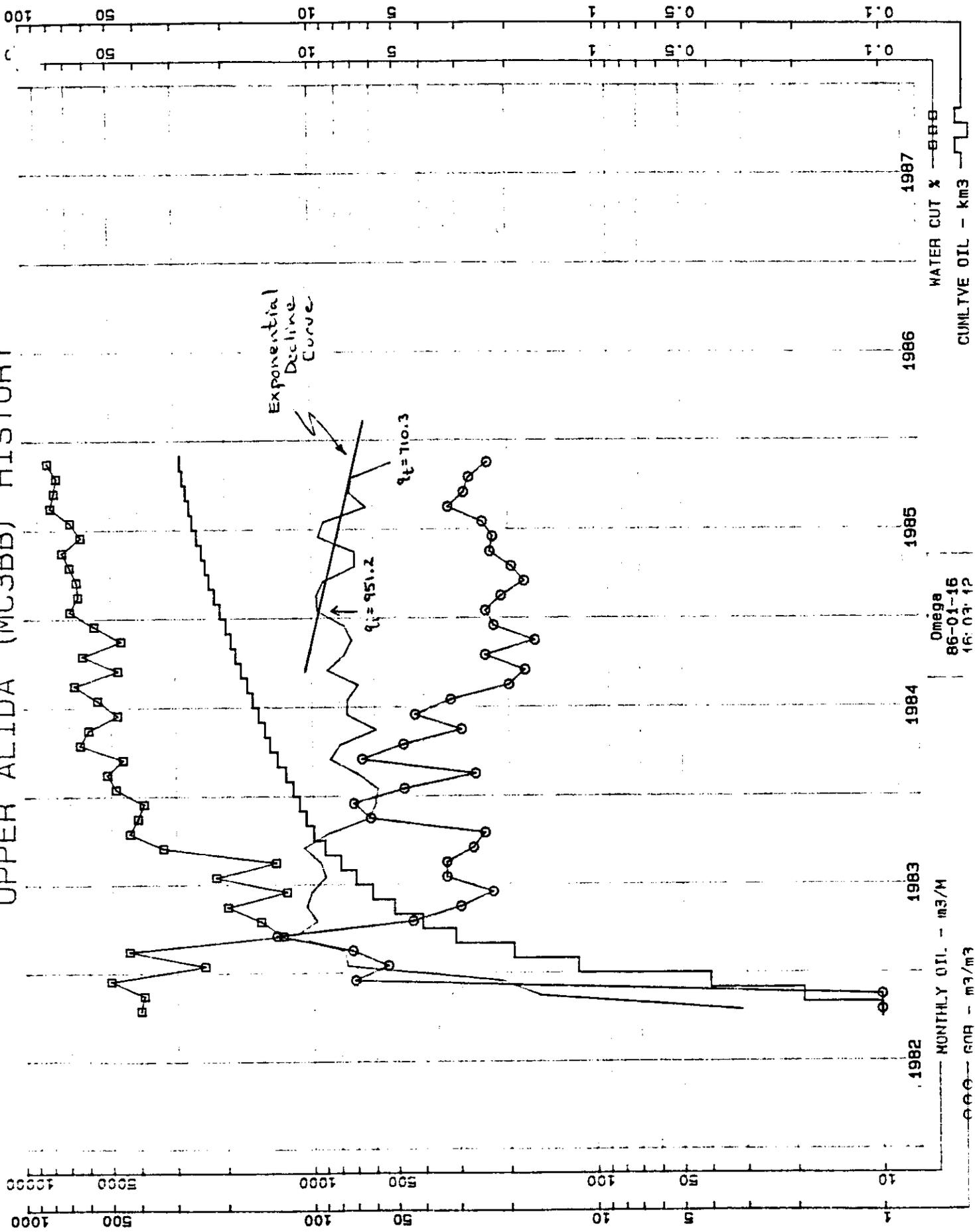
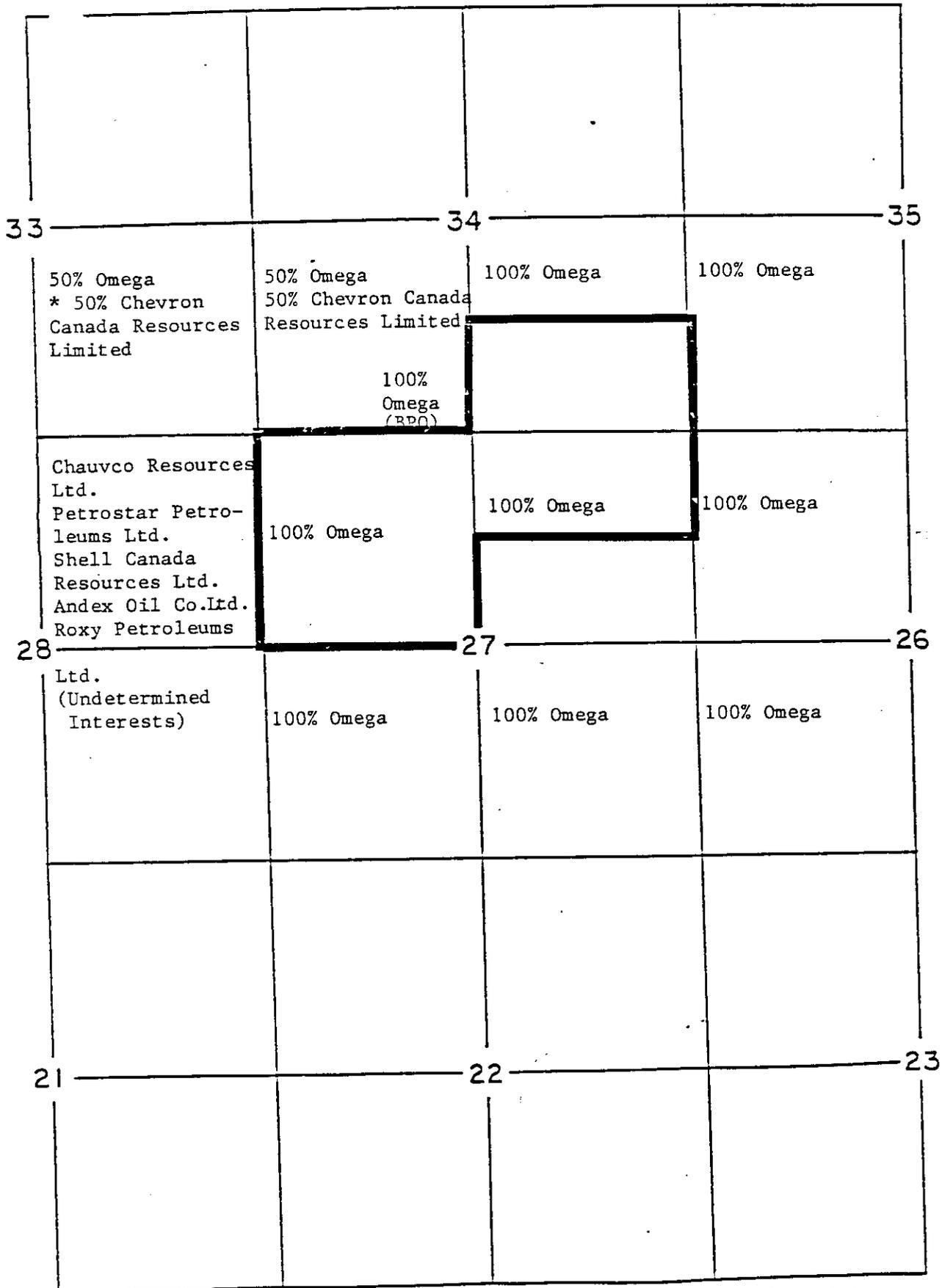


FIGURE NO.3

# UPPER ALIDA (MC3BB) HISTORY



**FIGURE NO. 4**  
 Lessee Map In and Adjoining  
 The Proposed Waskada Unit No. 9



T  
W  
P  
1

RGE 26 WPM

\* Chevron Farmed Out their 50% W.I. to Sasko Oil & Gas Limited, However Omega has not signed the novation agreement.

Proposed Waskada Unit No. 9



1300 SUN LIFE PLAZA III  
 112 - 4th AVENUE S.W.  
 CALGARY, ALBERTA, CANADA T2P 0H3  
 TELEPHONE (403) 261-0743

January 28, 1986



The Oil and Natural Gas  
 Conservation Board  
 555-330 Graham Avenue  
 Winnipeg, Manitoba  
 R3C 4E3

**Attention: Mr. Charles S. Kang**  
**Chairman**

Dear Sir:

**Re: Waskada Mission Canyon 3bB Pool**  
**Pressure Maintenance Application**

With this submission Omega Hydrocarbons Ltd. hereby makes application to conduct a pressure maintenance scheme by the injection of water into the above mentioned pool. The effective area of the MC3bB pool is shown in Attachment 1 and work is underway to unitize the subject formation. The proposed Waskada Unit No. 9 will consist of 8 tracts and contain LSD's 11-27, 12-27, 13-27, 14-27, 15-27, 16-27, 1-34 and 2-34-1-26 WPM. Based on the performance of the waterflood this Unit may require a future expansion. At present the Unit agreement is being circulated for final approval to all parties involved. Omega Hydrocarbons Ltd. requests permission to inject water into wells;

Omega Waskada	11-27-1-26	WPM
Omega Waskada Prov.	1-34-1-26	WPM

coincident with the effective date of the new Unit.

As operator of both the proposed Unit and other existing pressure maintenance schemes within the Waskada area we intend to continue operating in accordance with the current pressure maintenance rules. Therefore, prior to the commencement of water injection, bottomhole pressure measurements will be taken at each of the proposed injectors. A maximum allowable wellhead pressure of 10000 kPa will be set for all the new water injection wells and the additional production/injection data will be reported monthly in the same manner as the existing schemes.

Corrosion prevention methods within Waskada Unit No. 9 will include cathodic protection, internally coated flowlines and well treatments. In an effort to extend the life of the water injection system all injection lines and injection well tubing strings will be internally coated. Regular chemical treatments (XC-320) at each production well are also planned, to combat bacterial corrosion which has been an ongoing problem in Waskada.

At present, both produced water plus makeup water from the Blairmore formation is being used for injection purposes. Current water production has been averaging  $1100\text{m}^3/\text{d}$  while the two (2) existing source water wells are capable of producing an additional  $500\text{m}^3/\text{d}$  of water. Since these water volumes will be insufficient to handle the injection requirements once injection begins at the new Unit, Omega intends to increase the source water capacity. Work is currently underway to convert wells 11-30-1-25 and 11-22-1-26 WPM into Blairmore source water wells. The existing injection facilities are being expanded at the 11-30-1-25 WPM battery and a high pressure injection pump capable of handling an additional  $700\text{m}^3/\text{d}$  of water has been installed at satellite 7-27-1-26 WPM to accommodate the increased injection volumes. Since, water analyses taken from the Mission Canyon and Lower Amaranth formations are very similar it is felt that the water compatibility tests done previously for the Lower Amaranth pressure maintenance schemes are applicable here.

The original oil in place for the MC3bB pool is estimated to be  $230,826\text{m}^3$  based on the following assumptions,

- 1) a total porous rock volume of 53.09 ha-m obtained from the  $\emptyset$ h map contained in Attachment 1 (this volume consists of 50.02 ha-m located inside the Unit boundary plus 3.07 ha-m allocated to LSD 16-28-1-26 WPM),
- 2) an average water saturation of 50%, and
- 3) an initial oil formation volume factor of 1.150 (obtained from a previously submitted Mission Canyon PVT study)

Under the current primary producing mechanism the cumulative oil production to the end of October, 1985 is  $32,483.4\text{m}^3$  (including well 16-28-1-26 WPM) and it is estimated that the ultimate primary recovery will be  $52806\text{m}^3$  or 22.9% of the original oil in place. This ultimate recovery value was derived from a decline curve analysis done on the total pool's production (including well 16-28-1-26 WPM) during 1985. Based on secondary recovery estimates for similar pools we anticipate an ultimate recovery after waterflooding of approximately  $80789\text{m}^3$  or 35.0% of the original oil in place.

In further support of this application please find attached the following information:

- 1) Lessor Map of the New Unit Area
- 2) Lessee Map of the New Unit Area
- 3) Well Status Summary
- 4) Surface Lease Owner Notification
- 5) Schematic Diagram of the Proposed Water Injection System
- 6) OOIP and Primary Recovery Calculations

Should you have any comments or questions related to the application, please contact either myself or Mr. Richard Brekke at (403) 261-0743.

We would appreciate your earliest attention to this matter.

Yours truly,

OMEGA HYDROCARBONS LTD.



*for*

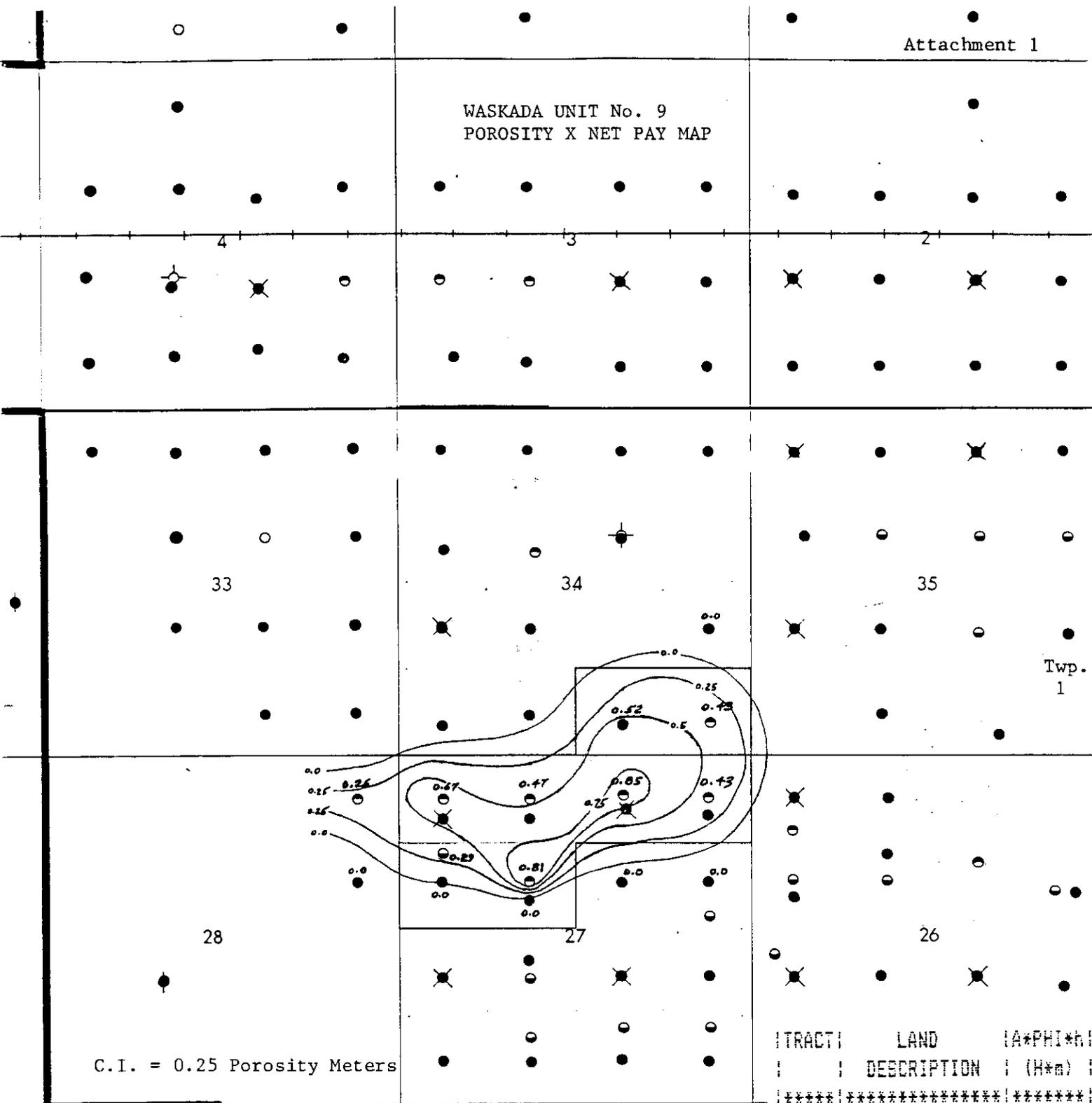
R.A. Beamish, P. Eng.  
Manager - Engineering

RAB:vb

Encl.

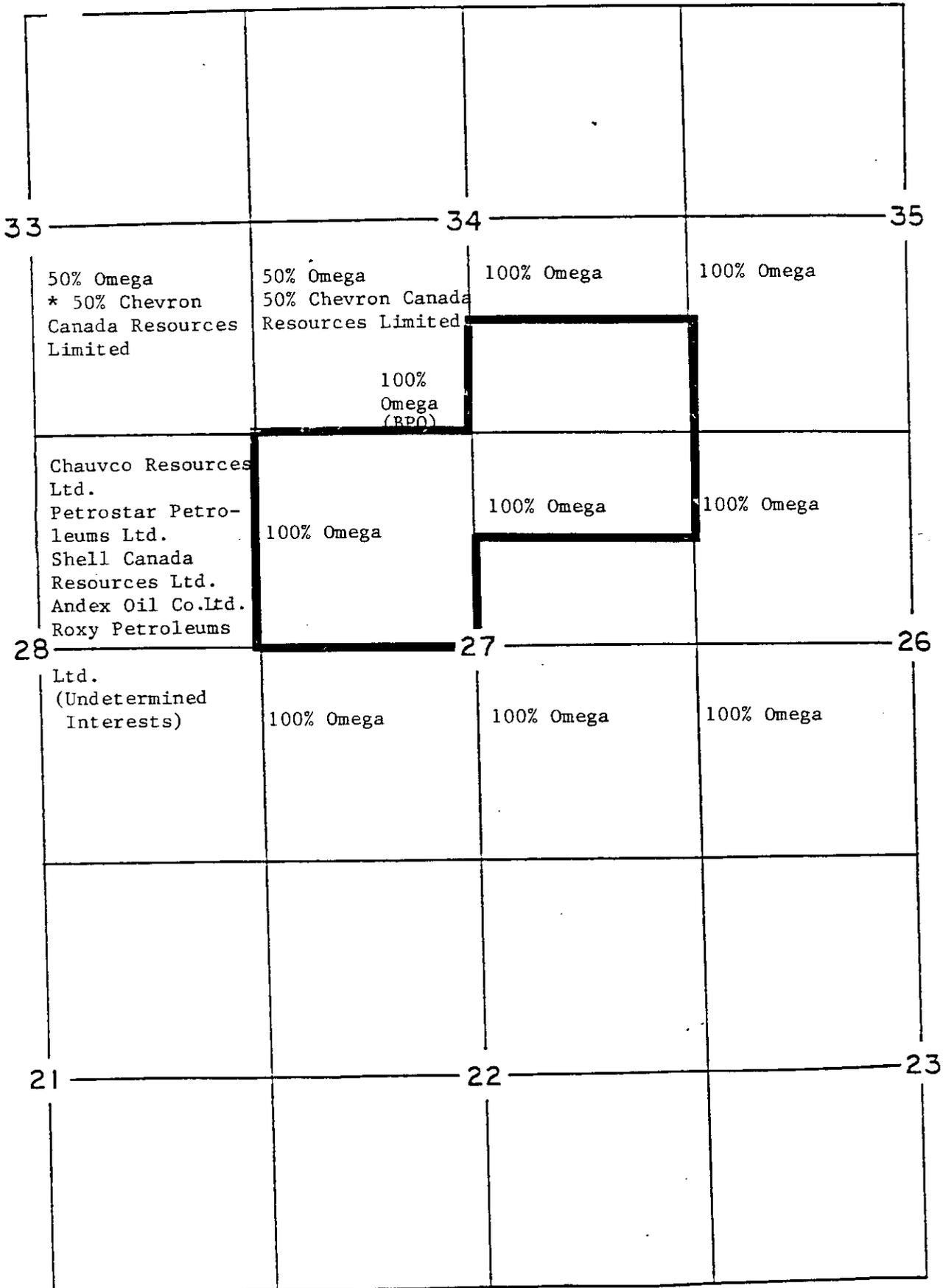
c.c. R. Dubreuil - Man. Pet. Branch  
Waskada (Miss) Waterflood  
Approvals File

WASKADA UNIT No. 9  
POROSITY X NET PAY MAP





Lessee Map In and Adjoining  
The Proposed Waskada Unit No. 9



T  
W  
P  
I

RGE 26 WPM

\* Chevron Farmed Out their 50% W.I. to Sasko Oil & Gas Limited, However Omega has not signed the novation agreement.

Proposed Waskada Unit No. 9

**Well Status Summary  
For Wells In and Adjoining  
The Proposed Waskada Unit No. 9**

<u>Well</u>	<u>Completed Zone</u>	<u>Status</u>
12-26-1-26 WPM	Lower Alida	Producing Oil Well
12A-26-1-26 WPM	Lower Amaranth	Producing Oil Well
13-26-1-26 WPM	Lower Amaranth	Water Injector
13A-26-1-26 WPM	Lower Alida	Producing Oil Well
5-27-1-26 WPM	Lower Amaranth	Water Injector
6-27-1-26 WPM	Lower Alida	Producing Oil Well
6A-27-1-26 WPM	Lower Amaranth	Producing Oil Well
7-27-1-26 WPM	Lower Amaranth	Water Injector
9-27-1-26 WPM	Lower Amaranth	Producing Oil Well
9A-27-1-26 WPM	Lower Alida	Suspended Oil Well
10-27-1-26 WPM	Lower Amaranth	Producing Oil Well
11-27-1-26 WPM	Upper Alida	Producing Oil Well
11A-27-1-26 WPM	Lower Amaranth	Producing Oil Well
12-27-1-26 WPM	Lower Amaranth	Producing Oil Well
12A-27-1-26 WPM	Upper Alida	Producing Oil Well
13-27-1-26 WPM	Upper Alida	Producing Oil Well
13A-27-1-26 WPM	Lower Amaranth	Water Injector
14-27-1-26 WPM	Upper Alida	Producing Oil Well
14A-27-1-26 WPM	Lower Amaranth	Producing Oil Well
15-27-1-26 WPM	Upper Alida	Producing Oil Well
15A-27-1-26 WPM	Lower Amaranth	Water Injector
16-27-1-26 WPM	Upper Alida	Producing Oil Well
16A-27-1-26 WPM	Lower Amaranth	Producing Oil Well
9-28-1-26 WPM	Lower Amaranth	Suspended Oil Well
16-28-1-26 WPM	Upper Alida	Producing Oil Well
1-33-1-26 WPM	Lower Amaranth	Producing Oil Well
1-34-1-26 WPM	Upper Alida	Producing Oil Well
2-34-1-26 WPM	Lower Amaranth	Producing Oil Well
3-34-1-26 WPM	Lower Amaranth	Producing Oil Well
4-34-1-26 WPM	Lower Amaranth	Producing Oil Well
6-34-1-26 WPM	Lower Amaranth	Producing Oil Well
8-34-1-26 WPM	Lower Amaranth	Producing Oil Well
5-35-1-26 WPM	Lower Amaranth	Water Injector



1300 SUN LIFE PLAZA III  
112 - 4TH AVENUE S.W.  
CALGARY, ALBERTA, CANADA T2P 0H3  
TELEPHONE (403) 261-0743

January 28, 1986

Proposed Waskada Unit No. 9  
Surface Owners  
(Addressee List Attached)

Dear Sir/Madam:

**Re: Proposed Waskada Unit No. 9**  
**Sections 27 and 34 Twp. 1, Rge 26 WPM**

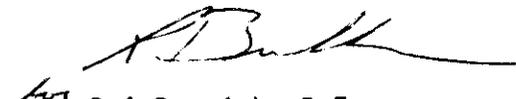
The purpose of this letter is to inform you that Omega Hydrocarbons Ltd. intends to initiate a pressure maintenance scheme within the above mentioned Unit area. The proposed Unit will contain LSD's 11-27, 12-27, 13-27, 14-27, 15-27, 16-27, 1-34, and 2-34-1-26 WPM.

The proposed pressure maintenance scheme will involve the injection of produced water into the Mission Canyon 3bB formation through wells 11-27 and 1-34-1-26 WPM to maintain reservoir pressure and "sweep" oil towards the offsetting production wells. The performance of the waterflood will be evaluated by continually monitoring injection and production data. Any decisions regarding future development drilling and further waterflood expansions in this area will be made based on the results of this project.

If you have any comments or questions related to the proposed project please contact either myself or Mr. Richard Brekke at (403) 261-0743.

Yours truly,

OMEGA HYDROCARBONS LTD.

  
R.A. Beamish, P.Eng.  
Manager - Engineering

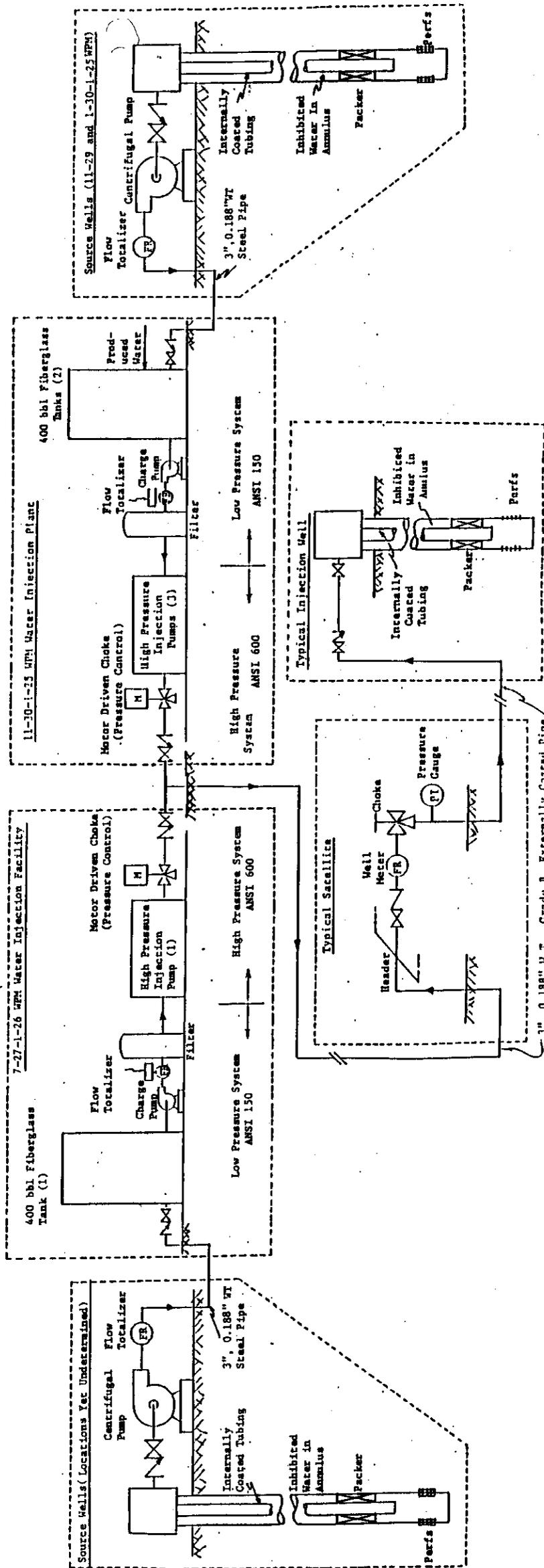
RAB:vb

c.c. C. Kang - Man. Board  
R. Dubreuil - Man. Pet. Branch  
Waskada Unit No. 12 File  
Land Dept.  
Waskada (Mission Canyon)  
Waterflood Approvals File

**Proposed Waskada Unit No. 9  
Surface Owners  
Addressee List**

Larry Millar  
Box 104  
Deloraine, Manitoba  
ROM 0M0

Murray Lyle Lee  
Box 239  
Waskada, Manitoba  
ROM 2E0



**WASKADA UNIT NO. 9**  
**OOIP and PRIMARY RECOVERY CALCULATIONS**

Original Oil in Place Determination

$$OOIP = \frac{10000 A\phi h (1-S_w)}{Boi} = \frac{10000 (53.09) (1-.5)}{1.15} = 230826m^3$$

Where  $S_w = 50\%$  (average)  $Boi = 1.15Rm^3/m$   $A\phi h = 53.09$  ha-m

$A\phi h$  was obtained by planimentering the  $\phi h$  map contained in Attachment 1. The total pore volume used in this calculation consists of 50.02 ha-m inside the Unit area and 3.07 ha-m outside the Unit area.

Primary Recovery Determination

An ultimate oil recovery under primary depletion of the MC3BB pool was obtained by using commonly accepted decline curve analysis techniques. The first step involved gathering and plotting all the historical production data (the oil and water production for well 16-28-1-26 WPM was included for the period January, 1985 to October, 1985 only). Using the attached data a best fit straight line was determined. This line represents the anticipated decline rate for the subject reservoir assuming an exponential ( $n=0$ ) or a constant percentage decline over time. From the attached data we can obtain the following values;

$$\begin{aligned} q_i &= 951.2m^3/\text{month} \text{ (initial production rate at the start of decline)} \\ q_t &= 710.3m^3/\text{month} \text{ (final production rate on the decline curve)} \\ q_e &= 120.0m^3/\text{month} \text{ (economic limit assuming 8 wells x .5m}^3/\text{day)} \\ Q_i &= 24343.6m^3 \text{ (cumulative production to the start of decline,} \\ &\quad \text{16-28 included)} \\ Q_t &= 8139.8m^3 \text{ (cumulative production between } q_i \text{ and } q_t, \text{ 16-28} \\ &\quad \text{included)} \\ t &= 10 \text{ months (time between } q_i \text{ and } q_t) \end{aligned}$$

$$D \text{ (decline rate)} = \frac{\ln(q_i/q_t)}{t} = \frac{\ln(951.2/710.3)}{10} = .02920 \text{ month}^{-1}$$

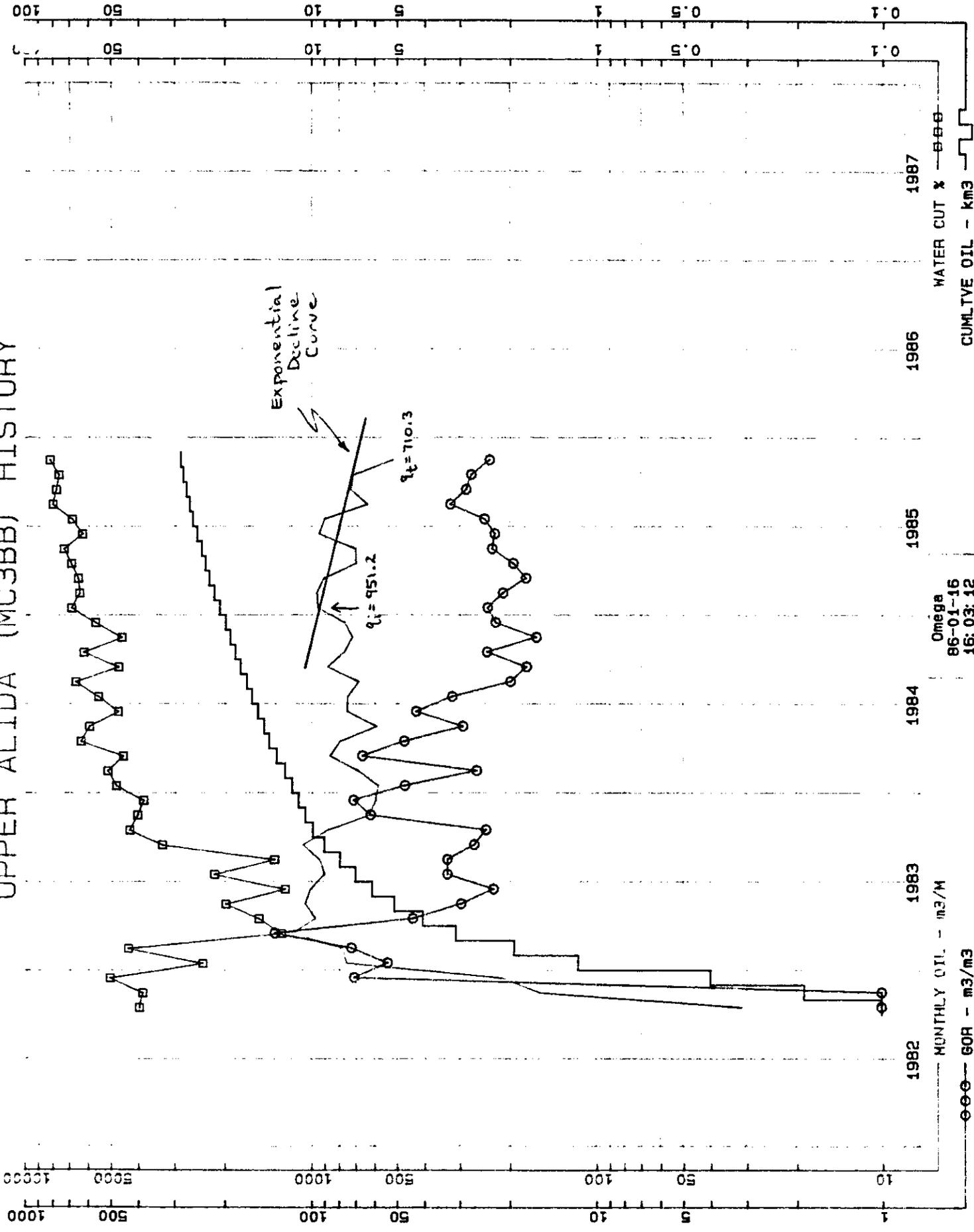
$$t_e \text{ (time remaining to economic limit)} = \frac{\ln(q_i/q_e)}{D} = \frac{\ln(951.2/120)}{.02920} = 70.89 \text{ months}$$

$$Q_e \text{ (expected recovery from } q_i \text{ to } q_e) = q_i (t_e) \left( \frac{1-(q_i/q_e)^{-1}}{\ln(q_i/q_e)} \right) = 28462.4m^3$$

$$Q_{\text{Total}} \text{ (total expected recovery)} = Q_i + Q_e = 52806.0m^3$$

$$\text{Primary Recovery (\%)} = \frac{Q_{\text{Total}}}{OOIP} = \frac{52806}{230826} = 22.9\% \text{ of OOIP}$$

# UPPER ALIDA (MC3BB) HISTORY



Omega  
86-01-16  
16: 03: 12

MONTHLY OIL - m<sup>3</sup>/M  
GOR - m<sup>3</sup>/m<sup>3</sup>

WATER CUT % - B-B-B  
CUMULATIVE OIL - km<sup>3</sup>

\*\*\* STORE \*\*\*  
 OMEGA PRODUCTION DATA BASE  
 UPPER ALIDA (MCS66) HISTORY

Ganga  
 86-01-16  
 16:03:12

MONTH	WELL COUNT			S/AB	OIL m3/M	WATER m3/M	GAS ka3/M	WOR	GOR	DIL m3/B	CUM. OIL m3	CUM. NAT m3	CUM. GAS ka3	I. WATER m3/M	I. GAS ka3/M	C.I. NAT m3	C.I. GAS ka3
	PRDN	INJN	P/IN														
1982-10	1	0	0	0	31.2	20.8	0.0	0.67	0	1.0	31.2	20.8	0.0	0.0	0.0	0.0	0.0
1982-11	1	0	0	0	157.2	100.2	0.0	0.64	0	5.2	188.4	121.0	0.0	0.0	0.0	0.0	0.0
1982-12	4	0	0	0	212.7	218.8	15.1	1.03	71	6.9	401.1	339.8	15.1	0.0	0.0	0.0	0.0
1983-01	4	0	0	0	757.2	239.3	40.9	0.32	54	24.4	1158.3	579.1	56.0	0.0	0.0	0.0	0.0
1983-02	5	0	0	0	781.4	606.1	56.7	0.78	73	27.9	1939.7	1185.2	112.7	0.0	0.0	0.0	0.0
1983-03	5	0	0	0	1172.1	171.5	157.6	0.15	134	37.8	3111.8	1356.7	270.3	0.0	0.0	0.0	0.0
1983-04	5	0	0	0	970.0	175.1	42.7	0.18	44	32.3	4081.8	1531.8	313.0	0.0	0.0	0.0	0.0
1983-05	5	0	0	0	1056.9	263.0	31.4	0.28	30	34.1	5138.7	1794.8	344.4	0.0	0.0	0.0	0.0
1983-06	5	0	0	0	1011.6	143.1	23.1	0.14	23	33.7	6150.3	1937.9	367.5	0.0	0.0	0.0	0.0
1983-07	5	0	0	0	903.0	252.5	30.0	0.28	33	29.1	7053.3	2190.4	397.5	0.0	0.0	0.0	0.0
1983-08	5	0	0	0	939.2	146.6	31.2	0.16	33	30.3	7992.5	2337.0	428.7	0.0	0.0	0.0	0.0
1983-09	6	0	0	0	1075.3	335.2	28.7	0.50	27	35.8	9067.8	2872.2	457.4	0.0	0.0	0.0	0.0
1983-10	6	0	0	0	876.0	667.7	21.3	0.76	24	28.3	9943.8	3539.9	476.7	0.0	0.0	0.0	0.0
1983-11	6	0	0	0	626.9	428.1	38.9	0.68	62	20.9	10570.7	3968.0	517.6	0.0	0.0	0.0	0.0
1983-12	6	0	0	0	595.7	374.9	42.5	0.63	71	19.2	11166.4	4342.9	560.1	0.0	0.0	0.0	0.0
1984-01	6	0	0	0	584.1	543.8	27.4	0.93	47	18.8	11750.5	4886.7	587.5	0.0	0.0	0.0	0.0
1984-02	6	0	0	0	687.4	735.1	18.0	1.07	26	23.7	12437.9	5621.8	605.5	0.0	0.0	0.0	0.0
1984-03	6	0	0	0	864.2	722.8	57.4	0.84	66	27.9	13302.1	6344.6	662.9	0.0	0.0	0.0	0.0
1984-04	6	0	0	0	792.6	1420.0	37.4	1.79	47	26.4	14094.7	7764.6	700.3	0.0	0.0	0.0	0.0
1984-05	6	0	0	0	591.1	885.1	17.3	1.50	29	19.1	14625.8	8649.7	717.6	0.0	0.0	0.0	0.0
1984-06	6	0	0	0	751.7	680.3	32.2	0.91	43	25.1	15437.5	9330.0	749.8	0.0	0.0	0.0	0.0
1984-07	6	0	0	0	746.6	941.0	23.9	1.26	32	24.1	16186.1	10271.0	775.7	0.0	0.0	0.0	0.0
1984-08	6	0	0	0	683.5	1381.8	13.6	2.02	20	22.0	16869.6	11652.8	787.3	0.0	0.0	0.0	0.0
1984-09	6	0	0	0	881.3	789.9	15.4	0.90	17	29.4	17750.9	12442.7	802.7	0.0	0.0	0.0	0.0
1984-10	6	0	0	0	768.8	1291.7	18.5	1.68	24	24.8	18519.7	13734.4	821.2	0.0	0.0	0.0	0.0
1984-11	6	0	0	0	719.1	612.3	11.6	0.85	16	24.0	19238.8	14346.7	832.8	0.0	0.0	0.0	0.0
1984-12	7	0	0	0	766.0	1016.5	17.2	1.33	22	24.7	20004.8	15363.2	850.0	0.0	0.0	0.0	0.0
1985-01	8	0	0	0	951.2	2143.0	22.8	2.25	24	36.7	20956.0	17506.2	872.8	0.0	0.0	0.0	0.0
1985-02	8	0	0	0	961.0	1767.4	20.3	1.84	21	34.3	21917.0	19273.6	893.1	0.0	0.0	0.0	0.0
1985-03	8	0	0	0	906.3	1729.8	15.9	1.91	18	29.2	22823.3	21003.4	909.0	0.0	0.0	0.0	0.0
1985-04	7	0	0	1	699.8	1584.6	13.6	2.26	19	23.3	23523.1	22588.0	922.6	0.0	0.0	0.0	0.0
1985-05	8	0	0	0	701.6	1962.9	16.2	2.80	23	22.6	24224.7	24550.9	938.6	0.0	0.0	0.0	0.0
1985-06	8	0	0	0	942.6	1627.8	21.3	1.73	23	31.4	25167.3	26178.7	960.1	0.0	0.0	0.0	0.0
1985-07	8	0	0	0	900.3	1972.9	22.1	2.21	25	29.0	26067.6	28171.6	982.2	0.0	0.0	0.0	0.0
1985-08	8	0	0	0	836.1	2449.0	20.6	4.16	32	20.5	26705.7	30820.6	1002.8	0.0	0.0	0.0	0.0
1985-09	8	0	0	0	730.6	2641.6	20.8	4.62	39	24.4	27434.3	33462.2	1023.6	0.0	0.0	0.0	0.0
1985-10	8	0	0	0	710.3	2354.9	19.4	3.29	27	22.8	28144.6	35797.1	1043.0	0.0	0.0	0.0	0.0
1985-11	8	0	0	0	519.9	2426.1	12.2	4.58	26	17.3	28664.5	38223.2	1055.2	0.0	0.0	0.0	0.0

LIST OF WELLS

- (0111-27-001-26 WIM(0)) (0112-27-001-26 WIM(0)) (0113-27-001-26 WIM(0))
- (0114-27-001-26 WIM(0)) (0115-27-001-26 WIM(0)) (0116-27-001-26 WIM(0))
- (0118-28-001-26 WIM(0)) (0101-34-001-26 WIM(0))

includes data for Jan/85 - Oct/85 only  
 Cum Oil (Dec 31/84) = 4338.6 m<sup>3</sup>  
 for 16-28  
 Cum Water (Dec 31/84) = 5000.1 m<sup>3</sup>  
 for 16-28

February 10, 1986

Queen's Printer  
Statutory Publications  
200 Vaughan Street

L. R. Dubreuil  
Chief Petroleum Engineer  
Petroleum Branch

MANITOBA GAZETTE

Please have the attached Notice appear in the next issue of the Manitoba Gazette under The Mines Act.

L. R. Dubreuil

LRD/ch  
Attachment



The Oil and Natural Gas  
Conservation Board

Room 309  
Legislative Building  
Winnipeg, Manitoba, CANADA  
R3C 0V8

(204) 945-3100

## NOTICE

Omega Hydrocarbons Ltd., as operator of the proposed Waskada Unit No. 9, has made application under The Mines Act for approval to conduct pressure maintenance operations in a portion of the Waskada Mission Canyon 3b B Pool. It is proposed to convert the following wells to water injection:

Omega Waskada 11-27-1-26 (WPM)

Omega Waskada Prov. 1-34-1-26 (WPM)

If no intervention or objection in writing is received by the Board at Room 309, Legislative Building, Winnipeg, Manitoba, R3C 0V8, within 14 days of the publication of this notice, the Board may approve the application.

Dated at Winnipeg, this 5<sup>th</sup> day of February, 1986.

A handwritten signature in cursive script, appearing to read "Wm. McDonald".

Wm. McDonald  
Deputy Chairman