Manitoba Regulation /86

Being

The Oil and Natural Gas Conservation Board

Order No. PM 48

An Order Pertaining to Pressure Maintenance by Water Flooding

Waskada Mission Canyon 3a A Pool

Made and Passed Pursuant to "The Mines Act", Cap. Ml60, 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 Ml60 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 23, 1986 from Omega Hydrocarbons Ltd. for approval of a project to inject water into the Waskada Mission Canyon 3a A Pool ("the pool") in the Waskada Unit No. 12 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. 12

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 15-23MC3a-1-26 (WPM)
Omega S. Waskada Prov. WIW 1-24-1-26 (WPM)
Omega Waskada WIW 1-25-1-26 (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 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 48,
MADE AND PASSED THIS 27th 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 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 Parasiuk, Minister
Department of Energy and Mines

Manitoba

The Oil and Natural Gas Conservation Board

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

(204) 945-3130

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

Attention: Mark Mawdsley,
Production Engineer

Dear Sirs:

Re: Omega Waskada 9-23MC3a-1-26 (WPM)
Conversion to Water Injection

With respect to your application dated December 9, 1986, you are hereby authorized to utilize the subject well as a water injection well and such approval is subject to the terms and conditions contained in The Oil and Natural Gas Conservation Board Order No. 48 and to the following:

1. In accordance with clause 126(d) of The Petroleum Drilling and Production Regulations, 1984, you are required to submit, prior to injection, proof that the surface owner of the subject wellsite has been made aware of your plans.

2. You are also required to submit an MG 416 recompletion application form detailing your recompletion plan on the subject well.

3. Notification of the Waskada District Office of the Petroleum Division, prior to recompletion and initiation of injection at the subject well.

Yours sincerely,

Wm. McDonald
Deputy Chairman

MA/lk

b.c. Charles S. Kang
B. Ball
Petroleum

Manitoba

Memorandum

Date December 16, 1986

To The Oil and Natural Gas
Conservation Board

Charles S. Kang - Chairman
Wm. McDonald - Deputy Chairman
B. Ball - Member

Subject

From H. Clare Moster
Executive Director
Petroleum Division

Telephone

First | Fold

Pressure Maintenance - Waskada MC3a A Pool

Omega Hydrocarbons Ltd., as operator of the Waskada Unit No. 12, has made application for approval to convert the well Omega Waskada 9-23MC3a-1-26 (WPM) to a water injection well.

Recommendation:

It is recommended that the application be approved without advertisement for objections. A draft letter of approval is attached.

Discussion:

The Waskada MC3a A Pool was discoverd in January, 1981 with the completion of the well Omega Waskada 1-24-1-26 (WPM) in the Mission Canyon 3a zone. the Pool has since developed over an area of 880 acres (352 ha) and was unitized in early 1986. Currently included in the Unit Area are 5 producers, 2 injectors, 1 shut-in well (9-23M3a) and 3 former producers (see Fig. No. 1).

The Mission Canyon 3a zone is the lower porous unit of the Mission Canyon 3 Member. This zone can be defined as the interval 958.0 to 967.5 mKb on the BHC Sonic Log for the well Chevron Waskada Prov. 4-20-1-25 WPM (see Figure No. 2).

Table No. 1 illustrates the severity of the primary production decline in the Waskada MC3a A Pool and emphasizes the need for pressure maintenance operations. The Table lists average daily oil production in the first month which each well produced at least 20 days and the corresponding rate for March, 1986 (or earlier, if shut-in) for each well. In April and May 1986, waterflooding began in the Pool. The average length of production prior to water injection is about 25 months, but over this time, oil rates have declined to 36% of the initial rates.

Only two wells in Unit No. 12 are currently being used as water injection wells: 15-23 and 1-24 (see Figure No. 1). The well 10-23, which is directly offset by the injector 15-23, has favourably responded to only four months of water injection, by increasing its average daily oil production from 0.8 m^3/day in March, 1986 to 3.6 m^3/day in September, 1986. The well 8-24

has also favourably responded to only 6 months of water injection at 1-24 by increasing its average daily oil production from 0.2 m^3/day in March, 1986 to 2.1 m^3/day in September, 1986. By converting the proposed water injection well 9-23MC3a-1-26 (WPM) to an injector, it is likely that similar increases in oil production will result at 8-23 and 13-24, as well as 10-23.

Table No. 2 shows the production history of the subject well. The well produced for only six months in 1984. With the exception of the first month of production, the average daily production of oil was 0.14 m^3 with a water-oil-ratio of over 200 m^3/m^3. As well, 9-23MC3a-1-26 WPM is structurally low within Unit No. 12. These factors indicate that the subject well is a good candidate for water injection.

The proposed injection well is offset on all sides by areas in which Omega is the working interest owner or operator. It is therefore felt that advertisement for objections is not necessary.

Fracture reservoir calculations indicate fracturing could occur at pressures exceecing 10 000 kPa. The Oil and Natural Gas Conservation Board Order No. PM 48 (80/86) sets the upper limit for injection pressure at 8 000 kPa for the MC3a A Pool. This value is based on calcualtions of reservoir fracturing pressures in the Mississippian. A limiting injection pressure of 8 000 kPa is proposed to provide a margin of safety.

Details on the completion of the subject well have not been forwarded to the Petroleum Division as of yet and will be required prior to final approval of the proposed conversion.

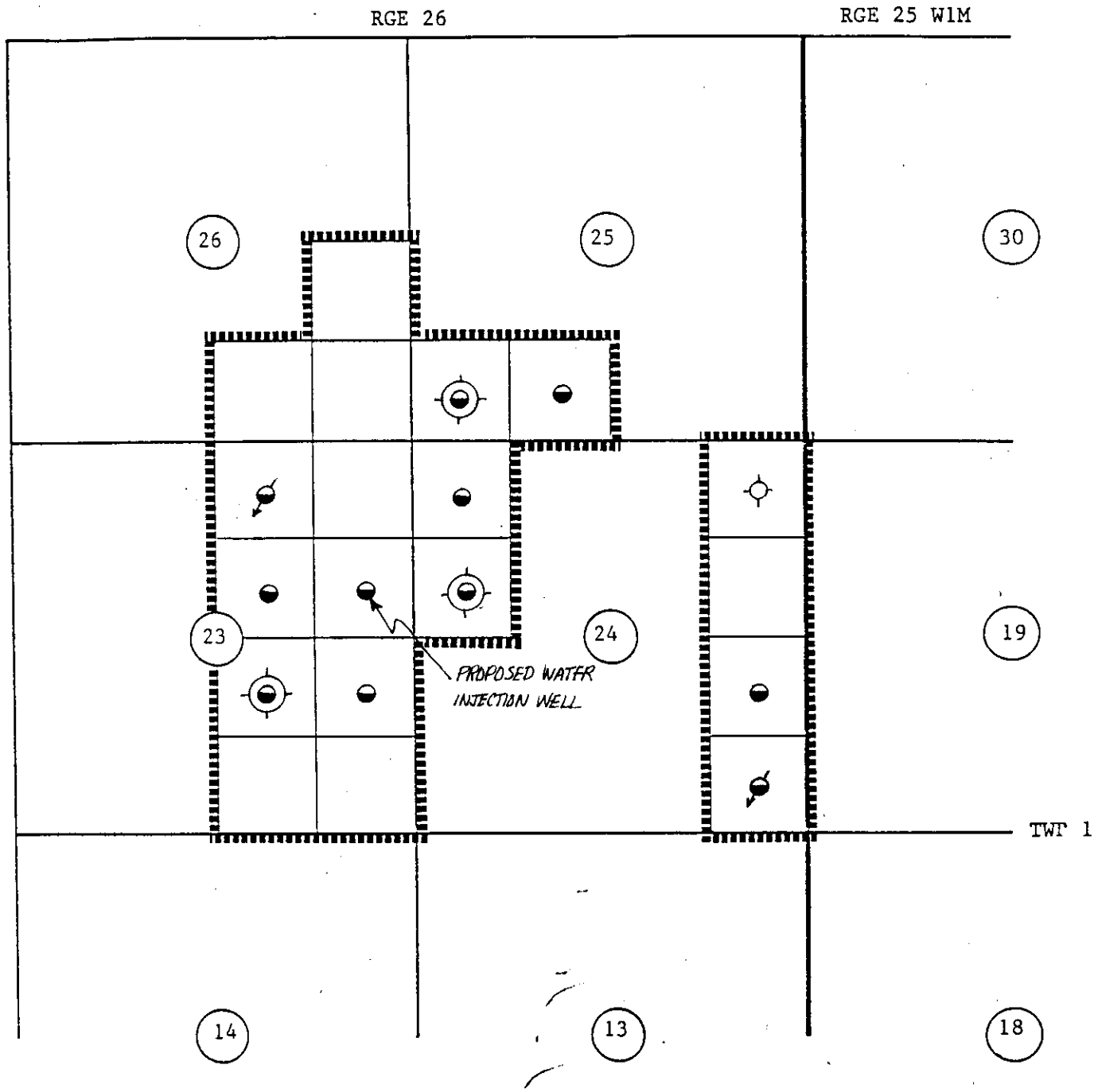
Subclause 1(1) of The Oil and Natural Gas Conservation Board Order No. PM 48 (80/86) states that water shall be injected into the pool through "any such other wells in the Unit Area as the Board may approve". It is recommended that the subject well be converted to a water injection well according to this subclause of Board Order No. PM 48 (80/86)

Original Signed by H. C. Moster

H. Clare Moster

MA/lk

FIGURE NO.1



MISSISSIPPIAN COMPLETION

FORMER MISSISSIPPIAN PRODUCER CONVERTED TO SPEARFISH PRODUCER

DRY AND ABANDONED

MISSISSIPPIAN INJECTOR

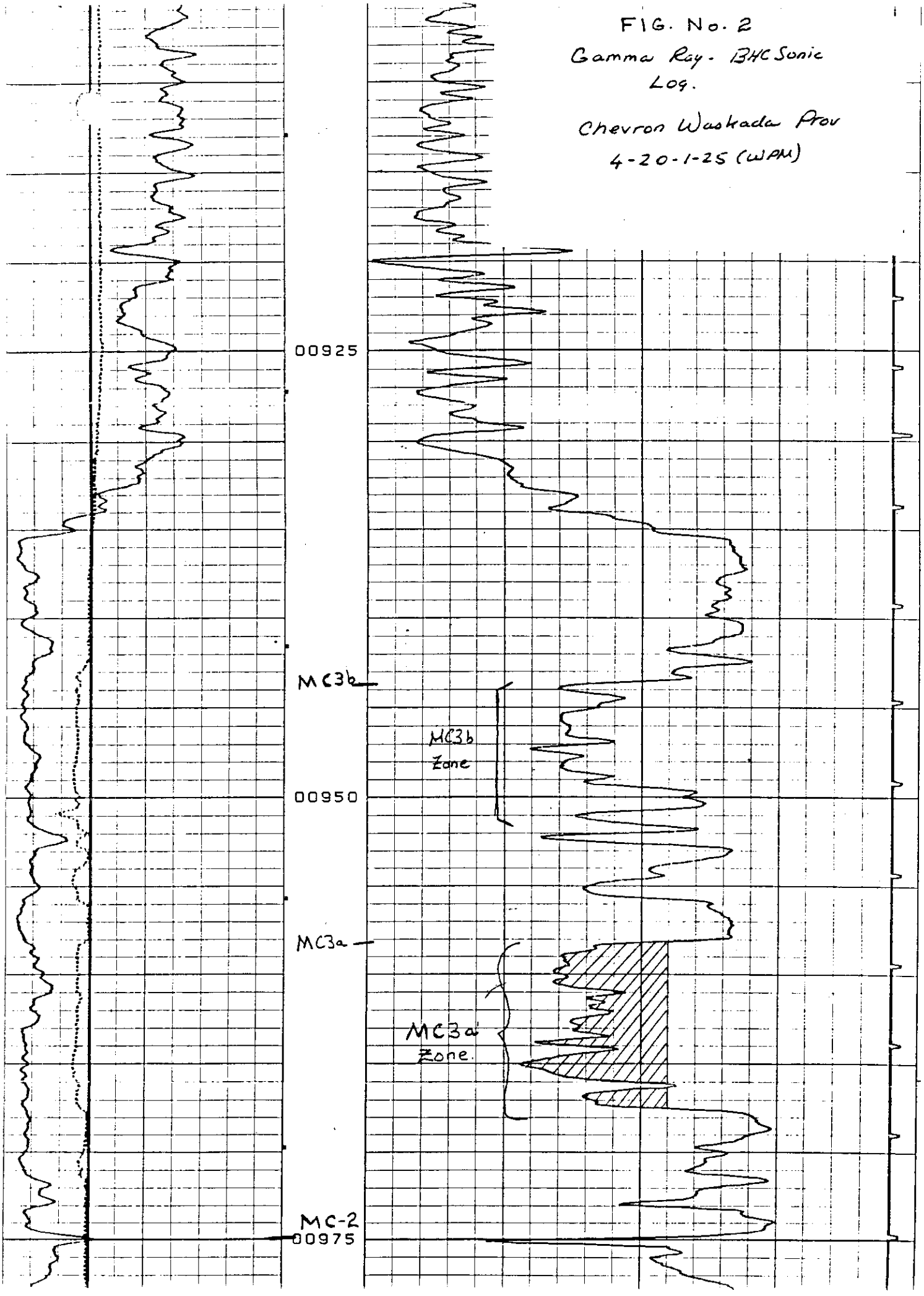


FIG. No. 2

Gamma Ray - BHC Sonic Log.

Chevron Waskada Prov 4-20-1-25 (WPM)

TABLE NO. 1

UNIT NO. 12
PRIMARY PRODUCTION DECLINE

Location (1-26 WPM)	Initial Oil Rate (m^3/d)*	Initial Month	Months Produced	Oil Rate Prior to Injection (March/86) or Prior to Shut-in (m^3/d)
7-23	2.2	83-05	6	0.1(83-11)
8-23	8.0	82-12	39	3.0
9-23	3.6	84-04	6	0.2(84-09)
10-23	4.7	83-01	18	0.8
15-23	5.5	83-08	6	0.4(84-01)
1-24	4.0	81-07	57	0.2
8-24	2.1	81-12	52	1.3
9-24	0.2	82-03	10	0.2(82-12)
12-24	2.1	82-05	8	0.1(82-12)
13-24	1.4	82-05	47	5.2
3-25	2.0	83-01	39	1.7
4-25	3.6	81-09	14	1.6(82-10)
Average:	33		25.2	1.2

* Calculated for first month in which the well produced for 20 or more days.

TABLE NO. 2

PAGE NO. 1 *** STORE *** ManPB
WASKADA 86-12-16
WELL (2)09-23-001-26 W1M(0) 10:26:03

FIELD 3 PROVINCE MAN. LAND#1 2
POOL 43 WORKING INTEREST 100.00000% LAND#2 0
BLOCK 1 ON PROD 1984-04-04 LAND#3 0
ACCTG 12 ON INJN NOT ON YET

MONTH	HOURS	OIL m3/M	CUM.OIL m3	WATER m3/M	CUM.WAT m3	OIL m3/d	WOR	WATER m3/d	WATER CUT %
1984-04	648	96.7	96.7	183.4	183.4	3.6	1.90	6.8	65.5
1984-05	740	7.5	104.2	356.0	539.4	0.2	47.47	11.5	97.9
1984-06	713	0.5	104.7	298.2	837.6	0.0	596.4	10.0	99.8
1984-07	738	1.0	105.7	299.7	1137.3	0.0	299.7	9.7	99.7
1984-08	768	9.0	114.7	328.6	1465.9	0.3	36.51	10.3	97.3
1984-09	72	0.7	115.4	19.1	1485.0	0.2	27.29	6.4	96.5

OMEGA
HYDROCARBONS LTD.

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

December 9, 1986

Manitoba Department of Energy
and Mines
Petroleum Branch
555 - 330 Graham Avenue
Winnipeg, Manitoba
R3C 4E3

Attention: Mr. Bob Dubreuil
Chief Petroleum Engineer

Dear Sir:

Re: Water Injection Conversion
9A-23-1-26 WPM

The subject well is a member of Waskada Unit No. 12 and has been shut in since September 1984 due to uneconomic oil production coupled with excessive water production. The enclosed map "Structure an Tilston Marker" shows that the well is 10 to 15 metres lower than the neighboring wells and has likely been overrun by the oil-water contact. In Omega's original Unit 12 flood design, it was decided to test the pool's floodability at 15-23-1-26 WPM and based on its success, follow with conversion of 9A-23-1-26 WPM. The 10-23-1-26 WPM well has shown good response beginning in August 1986 and is currently producing better than it ever has. The addition of 9A-23-1-26 WPM as an injector will allow more efficient flooding of this side of the pool. Since Omega owns all of the direct offsetting wells we feel that there should be no detrimental effect to other operators. With this letter, Omega Hydrocarbons Ltd. hereby requests an amendment to Board Order No. PM48 to include 9A-23-1-26 WPM as a water injection location.

Thank you for your attention to this matter.

Yours truly,
OMEGA HYDROCARBONS LTD.

D. Mark Mawdsley
Production Engineer

cc: R.A. Brekke
R.A. Beamish
Waskada Unit No. 12

DMM/tct


OMEGA HYDROCARBONS LTD.
STRUCTURE ON TILSTON MARKER
UNIT 12 BOUNDARY
Scale:
Date: NOV. 1986
Geology:
Contour Interval: 10 metres
Revised:
File:
Drafting:
R. 26 W1
NDE
ER
LOW
HI
(-513?)
15
14
13

File
Pressure Maintenance
Application
Waskada MC3aA
03 43A

OMEGA
HYDROCARBONS LTD
2000 MANULIFE PLAZA II
10180 - 101 AVENUE S.W.
EDMONTON, ALBERTA, CANADA T5J 3S4
TELEPHONE (403) 429-1581

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. 12

Omega Hydrocarbons Ltd. hereby submits for your approval a request for Certification for the new Production PGRT Exemption for the Lower Alida Zone waterflood project recently implemented in Waskada Unit No. 12. It is this Company's opinion that 95.86% of the total oil production produced from Waskada Unit No. 12 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. 12 was formed effective April 1, 1986 and a waterflood was instituted by converting to water injection the following wells:

Location	Date on Injection
15-23MC3a-1-26 WPM	Not on injection yet
1-24-1-26 WPM	1986-04-11

It is anticipated that the effective date of exemption will be 1986-04-11.

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 48 dated April 3, 1986)

d) Attachment No. 3 - Copy of the letter approving the Effective Date of the Unit (Manitoba Board letter dated April 1, 1986)

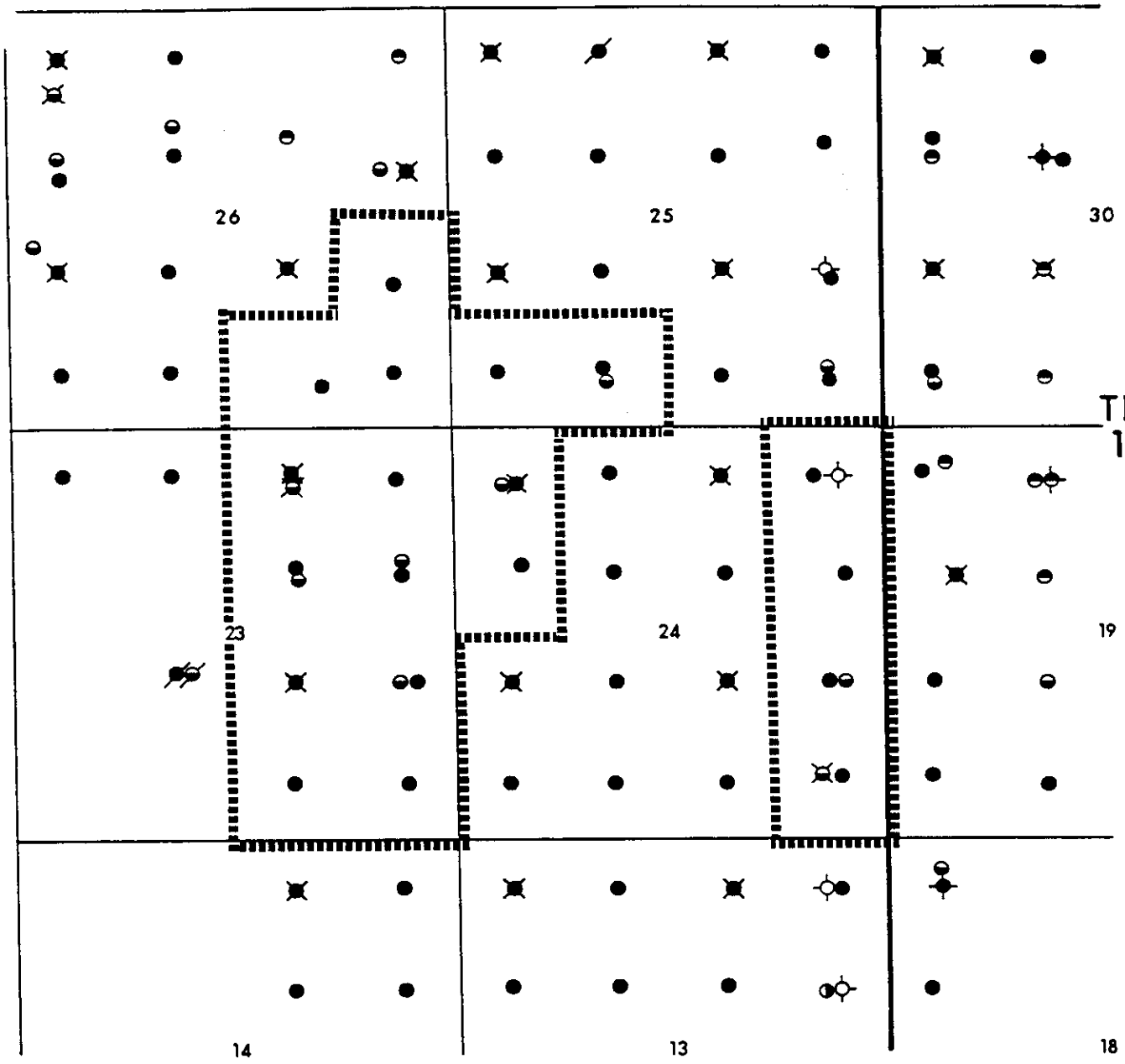
e) Attachment No. 4 - List of wells and their status

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



UNIT OUTLINE

- SPEAR FISH OIL WELL
- UPPER ALIDA(MC 3b) WELL
- LOWER ALIDA(MC3a) WELL
- TILSTON(MC1) WELL
- WATER INJECTION WELL
- WATER SOURCE WELL
- SUSPENDED WELL
- ABANDONED WELL

OMEGA HYDROCARBONS LTD

WASKADA UNIT 12
WELL LOCATION MAP

Scale 1:25,000	Date APR. '86	
Geology	Contour Interval	
Revised	File	Drafting PAB

Waskada Unit No. 12
PGRT Exemption Calculation

Original Oil In Place Determination (Based on Log Evaluation)

Assuming that $A\emptyset h = 156.60$ ha-m $Sw_i = 0.50$ $Bo_i = 1.15$ Rm^3/m^3

Waskada Unit No. 12 Original Oil In Place $= \frac{10000\ A\emptyset h(1-Sw_i)}{Boi} = 680870m^3$

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. 12 will be 3.2% OOIP. (1) Using secondary recovery estimates for similar types of reservoirs we expect an ultimate recovery after waterflooding of approximately 10% OOIP. Given the above mentioned assumptions one can calculate the following recoverable reserves,

Waskada Unit No. 12 Primary Oil Reserves $= (0.032)(680870) = 21788m^3$

Waskada Unit No. 12 Ultimate Oil Reserves $= (0.10)(680870) = 68087m^3$

PGRT Exemption Calculation

The cumulative oil production up to 1986 03 31 for Waskada Unit No. 12 was $19789m^3$.

Remaining Recoverable Oil $= 68087 - 19789 = 48298m^3$

Remaining Recoverable Incremental Oil $= 68087 - 21788 = 46299m^3$

PGRT Exempt Percentage $= \frac{(46299)(100)}{(48298)} = 95.86\%$

Based on the guidelines contained within Information Letter EMR/PRB 86-01, this calculation indicates that 95.86% of the total oil production produced from Waskada Unit No. 12 is entitled to PGRT Exemption.

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

* * * STORE * * *
OMEGA PRODUCTION DATA BASE
WASKADA UNIT NO. 12

Omega
86-05-06
13:55:04

MONTH	WELL COUNT PRDN	INJN	P/IN	S/AB	HOURS	OIL m3/M	WATER m3/M	GAS km3/M	I.WATER m3/M	WOR	SCR m3/m3	CUM.OIL m3	CUM.WAT m3	CUM.GAS km3	C.I.WAT m3
1981-02	1	0	0	0	360	12.0	1.3	0.0	0.0	0.11	0	12.0	1.3	0.0	0.0
1981-03	1	0	0	0	456	7.6	10.1	0.0	0.0	1.33	0	19.6	11.4	0.0	0.0
1981-04	1	0	0	0	48	0.8	1.0	0.0	0.0	1.25	0	20.4	12.4	0.0	0.0
1981-05	1	0	0	0	24	0.4	0.5	0.0	0.0	1.25	0	20.8	12.9	0.0	0.0
1981-06	1	0	0	0	720	12.0	15.0	0.0	0.0	1.25	0	32.8	27.9	0.0	0.0
1981-07	2	0	0	0	840	144.8	15.8	0.0	0.0	0.11	0	177.6	43.8	0.0	0.0
1981-08	2	0	0	0	1224	288.2	37.1	0.0	0.0	0.13	0	465.8	80.6	0.0	0.0
1981-09	3	0	0	0	2088	493.2	140.1	0.0	0.0	0.28	0	959.0	220.7	0.0	0.0
1981-10	3	0	0	0	2040	227.6	127.5	0.0	0.0	0.56	0	1186.6	348.2	0.0	0.0
1981-11	5	0	0	0	2520	261.8	70.3	0.0	0.0	0.27	0	1448.4	418.5	0.0	0.0
1981-12	5	0	0	0	2352	318.7	354.9	0.0	0.0	1.11	0	1767.1	773.4	0.0	0.0
1982-01	4	0	0	1	1920	293.6	291.8	0.0	0.0	0.98	0	2060.7	1065.2	0.0	0.0
1982-02	5	0	0	1	2904	261.1	77.2	0.0	0.0	0.30	0	2321.8	1132.4	0.0	0.0
1982-03	5	0	0	1	3672	280.2	58.7	0.0	0.0	0.21	0	2602.0	1191.1	0.0	0.0
1982-04	7	0	0	0	3984	358.5	177.3	0.0	0.0	0.49	0	2960.5	1368.4	0.0	0.0
1982-05	7	0	0	0	4728	368.2	233.6	0.0	0.0	0.63	0	3328.7	1602.0	0.0	0.0
1982-06	7	0	0	0	4944	757.7	242.3	0.0	0.0	0.32	0	4086.4	1844.3	0.0	0.0
1982-07	7	0	0	0	5160	777.3	68.1	0.0	0.0	0.09	0	4863.7	1912.4	0.0	0.0
1982-08	7	0	0	0	5184	659.1	98.8	0.0	0.0	0.15	0	5522.8	2011.2	0.0	0.0
1982-09	7	0	0	0	4728	518.3	257.0	0.0	0.0	0.50	0	6041.1	2268.2	0.0	0.0
1982-10	7	0	0	0	4703	451.3	347.2	0.0	0.0	0.77	0	6492.4	2615.4	0.0	0.0
1982-11	6	0	0	1	3959	250.4	475.1	0.0	0.0	1.90	0	6742.8	3090.5	0.0	0.0
1982-12	9	0	0	1	3518	348.6	187.4	22.9	0.0	0.54	66	7091.4	3277.9	22.9	0.0
1983-01	7	0	0	4	4681	440.6	303.0	26.2	0.0	0.69	59	7532.0	3580.9	49.1	0.0
1983-02	7	0	0	4	3973	346.3	190.0	12.8	0.0	0.55	37	7878.3	3770.9	61.9	0.0
1983-03	7	0	0	4	3568	366.0	167.1	15.4	0.0	0.46	42	8244.3	3938.0	77.3	0.0
1983-04	7	0	0	4	4826	328.5	538.4	44.2	0.0	1.64	135	8572.8	4476.4	121.5	0.0
1983-05	7	0	0	4	4538	324.6	792.6	38.6	0.0	2.44	119	8897.4	5269.0	160.1	0.0
1983-06	7	0	0	4	4734	438.2	595.1	47.8	0.0	1.36	109	9335.6	5864.1	207.9	0.0
1983-07	7	0	0	4	4268	416.4	413.1	48.6	0.0	0.99	117	9752.0	6277.2	256.5	0.0
1983-08	8	0	0	4	5895	609.0	1138.1	79.8	0.0	1.87	131	10361.0	7415.3	336.3	0.0
1983-09	8	0	0	4	5512	484.1	655.1	67.8	0.0	1.35	140	10845.1	8066.4	404.1	0.0
1983-10	7	0	0	5	4940	484.4	378.7	47.2	0.0	0.78	97	11329.5	8447.1	451.3	0.0
1983-11	8	0	0	4	4819	492.1	549.7	77.9	0.0	1.12	158	11821.6	8996.8	529.2	0.0
1983-12	7	0	0	5	4950	395.4	947.2	61.3	0.0	2.39	155	12217.0	9944.0	590.5	0.0
1984-01	7	0	0	5	4893	317.4	575.5	101.7	0.0	1.85	321	12434.4	10519.5	692.2	0.0
1984-02	6	0	0	6	4002	369.3	266.5	79.0	0.0	0.73	212	12803.7	10786.0	771.2	0.0
1984-03	6	0	0	6	4204	382.5	296.4	60.1	0.0	0.77	157	13186.2	11082.4	832.3	0.0
1984-04	7	0	0	6	4480	435.2	446.0	85.5	0.0	1.02	196	13620.4	11528.4	917.8	0.0
1984-05	7	0	0	6	4415	351.8	672.8	73.7	0.0	1.91	209	13972.2	12199.2	991.5	0.0
1984-06	6	0	0	7	3891	371.4	534.5	98.3	0.0	1.44	265	14343.6	12733.7	1089.8	0.0
1984-07	6	0	0	7	4125	328.4	492.2	70.5	0.0	1.50	215	14672.0	13225.9	1160.3	0.0
1984-08	6	0	0	7	4262	286.7	606.5	82.3	0.0	2.12	287	14958.7	13832.4	1242.6	0.0
1984-09	6	0	0	7	2837	175.3	273.1	35.1	0.0	1.56	200	15134.0	14105.5	1277.7	0.0
1984-10	5	0	0	8	3067	303.4	320.3	113.6	0.0	1.06	374	15437.4	14425.8	1391.3	0.0
1984-11	4	0	0	9	2730	205.3	118.3	63.2	0.0	0.58	308	15642.7	14544.1	1454.5	0.0
1984-12	6	0	0	7	3649	385.7	267.7	66.5	0.0	0.69	172	16028.4	14811.8	1521.0	0.0
1985-01	5	0	0	8	3455	348.7	419.6	62.4	0.0	1.20	179	16377.1	15231.4	1583.4	0.0

* * * S T O R E * * *
ONEGA PRODUCTION DATA BASE
WASKADA UNIT NO. 12

Onega
86-05-06
13:55:04

MONTH	WELL COUNT PRDN	INJN	P/IN	S/AB	HOURS	OIL m3/M	WATER m3/M	GAS km3/M	I.WATER m3/M	WOR	GOR m3/m3	CUM.OIL m3	CUM.WAT m3	CUM.GAS km3	C.I.WAT m3
1985-02	5	0	0	8	2924	278.8	347.6	52.5	0.0	1.25	188	16655.9	15579.0	1635.9	0.0
1985-03	5	0	0	8	3484	334.8	480.8	61.9	0.0	1.44	185	16990.7	16059.8	1697.8	0.0
1985-04	5	0	0	8	3441	297.7	438.2	28.4	0.0	1.54	95	17288.4	16518.0	1726.2	0.0
1985-05	5	0	0	8	3080	239.0	364.8	39.9	0.0	1.53	168	17528.4	16882.8	1766.1	0.0
1985-06	5	0	0	8	3427	175.4	280.1	25.2	0.0	1.60	144	17701.8	17162.9	1791.3	0.0
1985-07	5	0	0	8	3397	138.1	216.3	19.5	0.0	1.57	141	17839.9	17379.2	1810.8	0.0
1985-08	5	0	0	8	3524	201.1	238.3	21.3	0.0	1.18	106	18041.0	17617.5	1832.1	0.0
1985-09	5	0	0	8	3189	164.5	465.1	21.5	0.0	2.83	131	18205.5	18082.6	1853.6	0.0
1985-10	5	0	0	8	3604	236.4	608.3	28.7	0.0	2.57	121	18441.9	18690.9	1882.3	0.0
1985-11	5	0	0	8	3496	224.3	601.7	29.8	0.0	2.68	133	18666.2	19292.6	1912.1	0.0
1985-12	5	0	0	8	3629	263.6	584.0	36.6	0.0	2.22	139	18929.8	19876.6	1948.7	0.0
1986-01	5	0	0	8	3445	246.9	705.1	24.3	0.0	2.86	98	19176.7	20581.7	1973.0	0.0
1986-02	5	0	0	8	3024	255.2	394.3	15.4	0.0	1.55	60	19431.9	20976.0	1988.4	0.0
1986-03	6	0	0	7	3968	357.2	534.1	28.9	0.0	1.50	81	19789.1	21510.1	2017.3	0.0

LIST OF WELLS

(0)07-23-001-26 W1M(0) (0)08-23-001-26 W1M(0) (2)09-23-001-26 W1M(0)
(0)10-23-001-26 W1M(0) (2)15-23-001-26 W1M(0) (0)01-24-001-26 W1M(0)
(0)08-24-001-26 W1M(0) (0)09-24-001-26 W1M(0) (0)12-24-001-26 W1M(0)
(0)13-24-001-26 W1M(0) (0)03-25-001-26 W1M(0) (2)03-25-001-26 W1M(0)
(0)04-25-001-26 W1M(0)

OMEGA
HYDROCARBONS LTD

[illegible] SUN LIFE PLAZA III
[illegible] 4th AVENUE S.W.
[illegible] ARY, ALBERTA, CANADA T2P 0H3
TELEPHONE (403) 261-0743

April 4, 1986

The Oil & Natural Gas Conservation Board
309 Legislative Building
450 Broadway Avenue
Winnipeg, Manitoba
R3C 0V8

Attention: Mr. Charles S. Kang
Chairman

Dear Sir:

Re: Waskada Unit No. 12
Pressure Maintenance Operations

The purpose of this letter is to amend a previous application submitted by Omega Hydrocarbons Ltd. for pressure maintenance of the Waskada Mission Canyon 3aA Pool.

One of the freehold royalty owners has advised us that he will not execute the Unit Agreement for Unit No. 12 at this time. In order to accomplish unitization and institute pressure maintenance it was necessary to exclude Lsd's 1 and 2 of Section 25-1-26 WPM from the unit. We believe that upon resolution of some other matters we should be able to enlarge the unit to include these two Lsd's.

We had originally planned and requested approval to inject water into three wells, one of which was Omega Waskada 1-25-1-26 WPM. Omega requests ammendment of the pressure maintenance approval to allow injection into wells:

Omega Waskada	15-23MC3a-1-26 WPM
Omega Waskada Prov.	1-24-1-26 WPM

Should you have any comments or questions relating to this ammendment please contact Mr. Bob Beamish or Mr. Richard Brekke at (403) 261-0743.

Yours truly,

OMEGA HYDROCARBONS LTD.

G.E. Patey
Vice President - Production

GEP:vb
c.c. R. Dubreuil - Man. Pet. Branch
R.A. Beamish
Waskada (LAm) Waterflood
Approvals File

Manitoba

Energy and Mines | Petroleum

555 — 330 Graham Avenue
Winnipeg, Manitoba, CANADA
R3C 4E3

(204) 945-6577

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. PM48
Waskada MC3a A Pool

Enclosed is Oil and Natural Gas Conservation Board Order No. PM48 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 note that injection of water in the well Omega Waskada 1-25-1-26 (WPM) is not authorized until this tract has qualified for inclusion in Unit No. 12.

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

Yours sincerely,

L.R. Dubreuil
Chief Petroleum Engineer
Petroleum Branch

LRD:dah
Encl
cc: Waskada Office

Manitoba

Memorandum

Date March 11, 1986

To The Oil and Natural Gas Conservation Board

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

From H. Clare Moster
Director, Petroleum Branch

Telephone

Subject Waskada Mission Canyon 3a A 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 three wells to water injection. Notice of the application was published in the Manitoba Gazette (February 15, 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 48 (copies attached) be issued.

Discussion:

The proposed Board Order No. PM 48 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

e family of the late Clayton ith wish to express their felt thanks and appreciation he love and many acts of ness during the loss of our ed husband, father and father. Our many thanks to riends and relatives who charitable donations, sent ers, cards, baking and vis- or phoned during our be- ement. Special thanks to rend House and Reverend donald for their comforting ls; the active and honorary earers; organist, Laura Furt- and the choir; the Legion es Auxiliary who served n, the Royal Canadian Le- s (Melita Branch and Waska- ranch) who came as a body to the ones who drove cars; Dizon and the nurses at the ital; Eyers-Nestibo Funeral e for their kindness and rstanding in all the arrange- ts. Our deepest appreciation.
—Betty Griffith and families

---

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

---

he Napinka Rink Committee ld like to extend a big thank- to the community of Na- a and area for their generous port during the Mixed Bon- l. 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, Morrows, Neffs, Credit Union, Russell's Electric, Delmar's Pro Hardware, Dando's, Rod's Auto, Melita Motors, Melita Auction Mart, Triple G Sales, 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 without 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

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 OV8, 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

NOTICE

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 OV8, 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

Price

Manitoba

Bob Mc

Action / Route Slip

Date: March 7, 1986

To: P. Bentz
Legal Translation
6th Floor
177 Lombard Ave.

From: H. Clare Moster
Petroleum Branch
Dept. of Energy & Mines
Telephone: 945-6573

- [X] Take Action
- [ ] Per Your Request
- [ ] Circulate, Initial and Return
- [ ] For Approval and Signature
- [ ] Make ____ Copies
- [ ] May We Discuss
- [ ] For Your Information
- [ ] Return With Comments or Revisions
- [ ] Draft Reply for Signature
- [ ] Please File

Comments: Attached is Oil and Natural Gas Conservation Board Order No. PM 48 which requires translation into French.

Please provide us with a French translation of the Order, the necessary French Certificate and return our English copies of the Order & Certificate.

MG-1298 PS-1-182

The Highway Traffic Board, Room 200-301 Weston Street, Winnipeg, Manitoba, R3E 3H4.
Phone: 945-8912

A. POLTARUK, MMM CD
Secretary,
—7 THE HIGHWAY TRAFFIC BOARD.

UNDER THE MINES ACT

To: All Purchasers of Manitoba Crude Oil
Re: Nominations for Crude Oil

All persons intending to purchase Manitoba crude oil in the month of April will be required to file a nomination with the Petroleum Branch, Department of Energy and Mines on or before March 15, 1986.

Copies of nomination forms may be obtained from the Petroleum Branch, Department of Energy and Mines.

No public inquiry will be held.

A tabulation of the said nomination will be published in the monthly Production Statistics Report.

Dated at Winnipeg, Manitoba, this 31st day of January, 1986.

H. CLARE MOSTER,
—7 Director, Petroleum Branch.

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,
—7 Deputy Chairman.

February 5, 1986

Queen's Printer
Statuatory Publications
200 Vaughan Street

L. R. Dubreuil
Chief Petroleum Engineer
Petroleum Branch
555 - 330 Graham Avenue

MANITOBA GAZETTE

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

Marc Ashley for
L. R. Dubreuil

LRD/ch
Attachment

Manitoba

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. 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

Manitoba

Memorandum

Date: January 31, 1986

To: The Oil and Natural Gas Conservation Board
Charles S. Kang - Chairman
Wm. McDonald - Deputy Chairman
J. F. Redgwell - Member

From: H. Clare Moster
Director, Petroleum Branch

Telephone:

Subject: Pressure Maintenance - Waskada MC3a A Pool

First | Fold

Omega Hydrocarbons Ltd., as operator of the proposed Waskada Unit No. 12, has made application for approval to conduct pressure maintenance operations in the Waskada MC3a A Pool. Omega proposes to inject water in three wells (15-23MC3a-1-26, 1-24-1-26 and 1-25-1-26) ~~and 1-25-1-26).~~

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 MC3a A Pool was discovered in January, 1981 with the completion of the well Omega Waskada 1-24-1-26 (WPM) in the Mission Canyon 3a zone. The Pool has since been developed over an area of 880 acres (352 ha) and currently includes 9 producing wells (see Figure No. 1).

The Mission Canyon 3a zone is the lower porous unit of the Mission Canyon 3 member. This zone can be defined as the interval 958.0 to 967.5 m KB on the BHC Sonic Log for the well Chevron Waskada Prov. 4-20-1-25 (WPM)(see Figure No.2).

Figure No. 3 shows the Pool's production in m^3 per month. Pool production peaked at approximately 700 m^3/month at the beginning of 1982 and has since declined to about 200 to 250 m^3/month. Projecting an average decline curve to abandonment conditions (0.5 m^3 oil per day per well or 90 m^3/month for 6 wells) a remaining primary reserve (as per October 31, 1985) of 9 240 m^3 is estimated. This is approximately equivalent to the primary reserves estimated by Omega.

....2

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

The proposed waterflood area is wholly owned and operated by Omega (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 in both 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.

Fracture reservoir calculations indicate reservoir fracturing could occur at pressures exceeding 7 700 kPa. 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 KB is proposed to provide a margin of safety. This compares to Omega's proposed maximum injection wellhead pressure of 10 000 kPa.

The proposed project area includes a number of spacing units in which there is no well completed in the Waskada MC3a A Pool. With the proposed injection pattern, it may be necessary to drill or recomplete additional wells in the Pool to ensure areal sweep is maximized. It is proposed that Omega's comments in this regard be requested in the letter of approval of the application.

Original signed by H. C. Moster

H. Clare Moster

MA/LRD/lk

Manitoba

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. 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 day of , 1986.

Wm. McDonald
Deputy Chairman

TABLE NO. 1

WASKADA MC3a A POOL

OFFSETTING WORKING

INTEREST OWNERS

Working Interest Owner	Area	Interest
Andex Oil Company Ltd.	NE¼-26 - SW¼-24	25%
Roxy Petroleum Ltd.	SW¼-23	Undetermined
Tundra Trading Ltd. - Brosco Fund Ltd.	NW¼-18	Undetermined
Voyager Energy Co.	W½-19	Undetermined
	NW¼-14	Undetermined

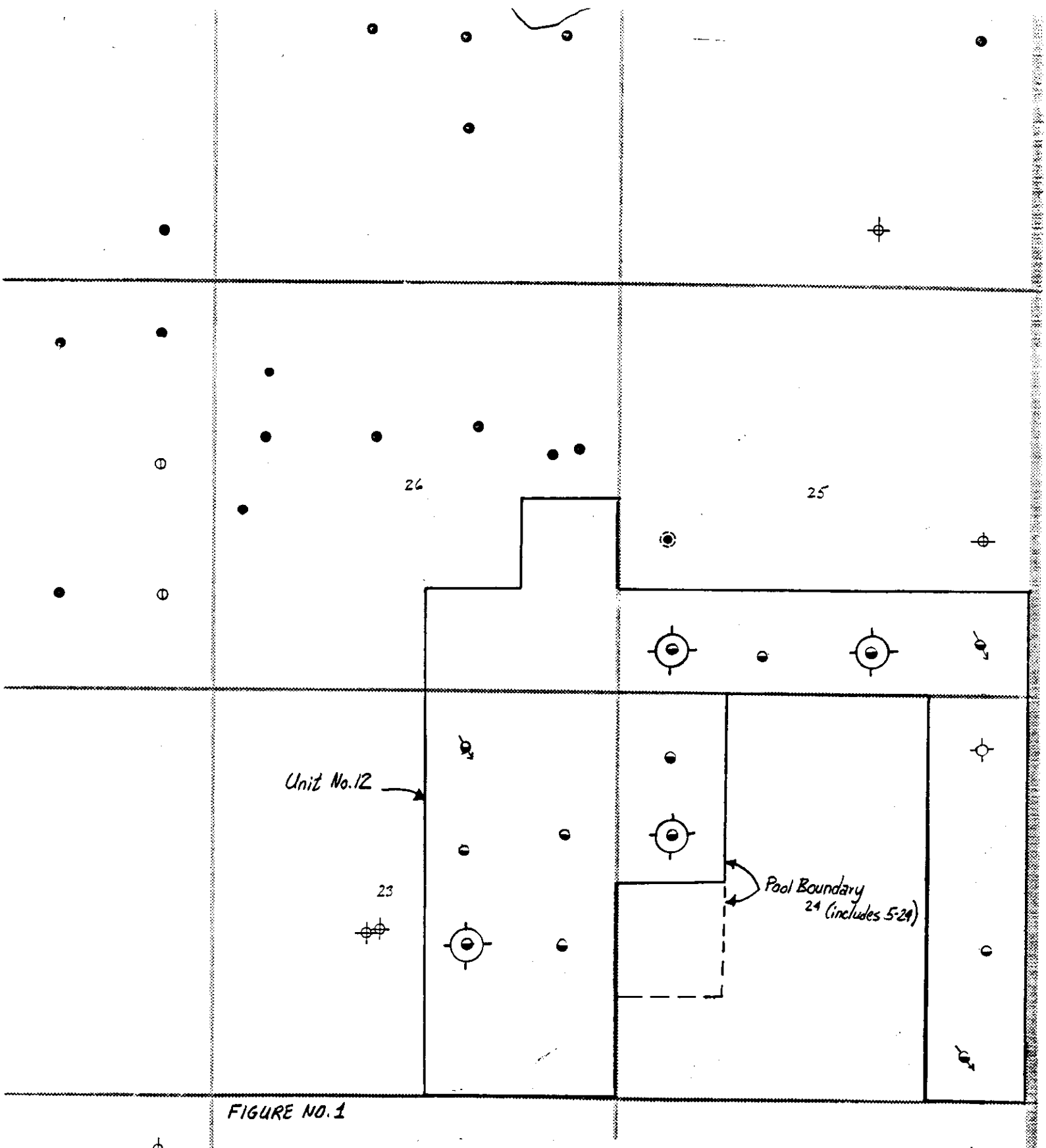


FIGURE NO. 1

MISSISSIPPIAN COMPLETION

PROPOSED MISSISSIPPIAN INJECTOR

FORMER MISSISSIPPIAN PRODUCER CONVERTED TO SPEARFISH PRODUCER

DRY AND ABANDONED

NOTE: Spearfish producers not shown in Unit #12

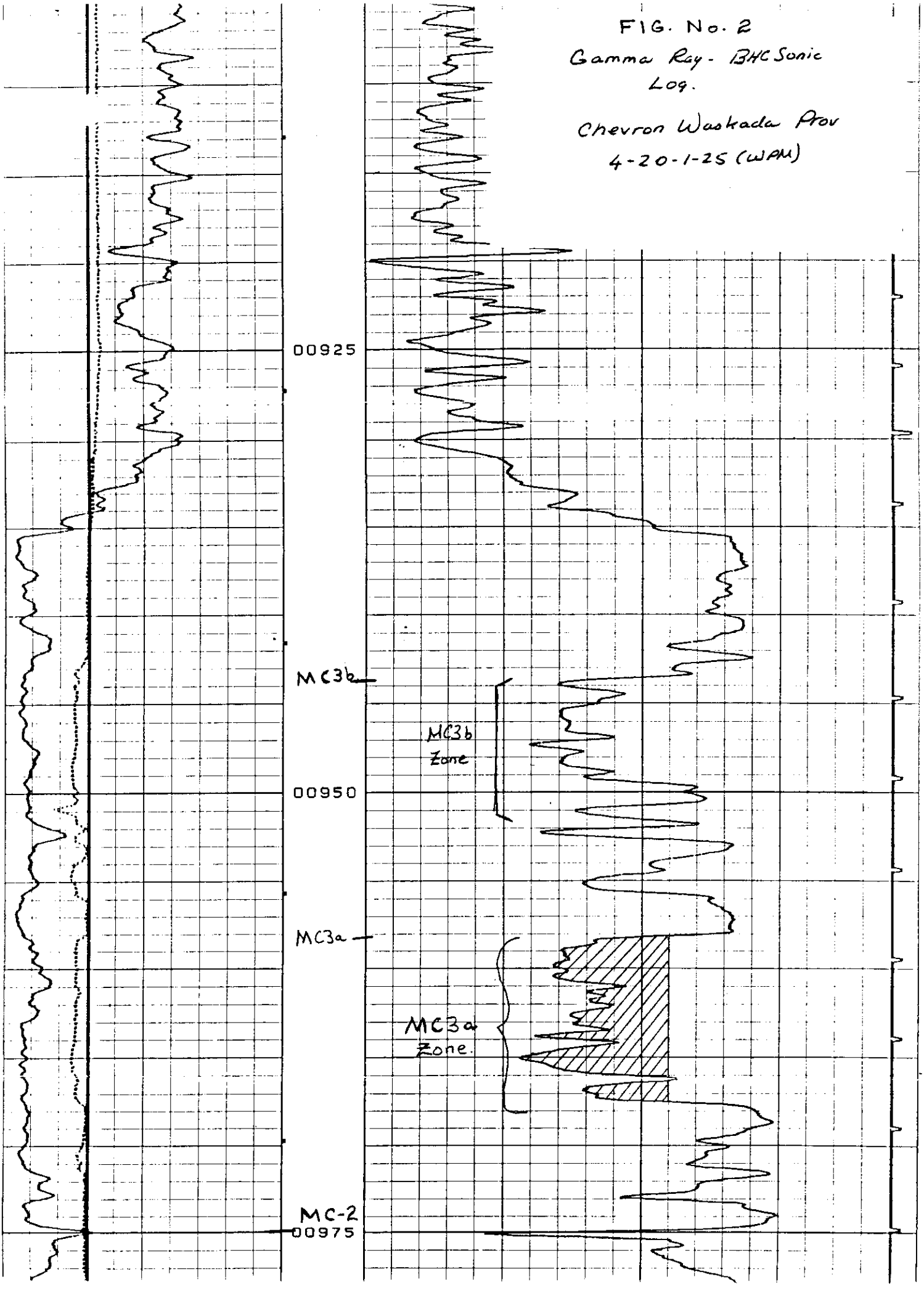


FIG. No. 2
Gamma Ray - BHC Sonic
Log.
Chevron Waskada Prov
4-20-1-25 (WPM)
00925
MC3b
MC3b
Zone
00950
MC3a
MC3a
Zone.
MC-2
00975

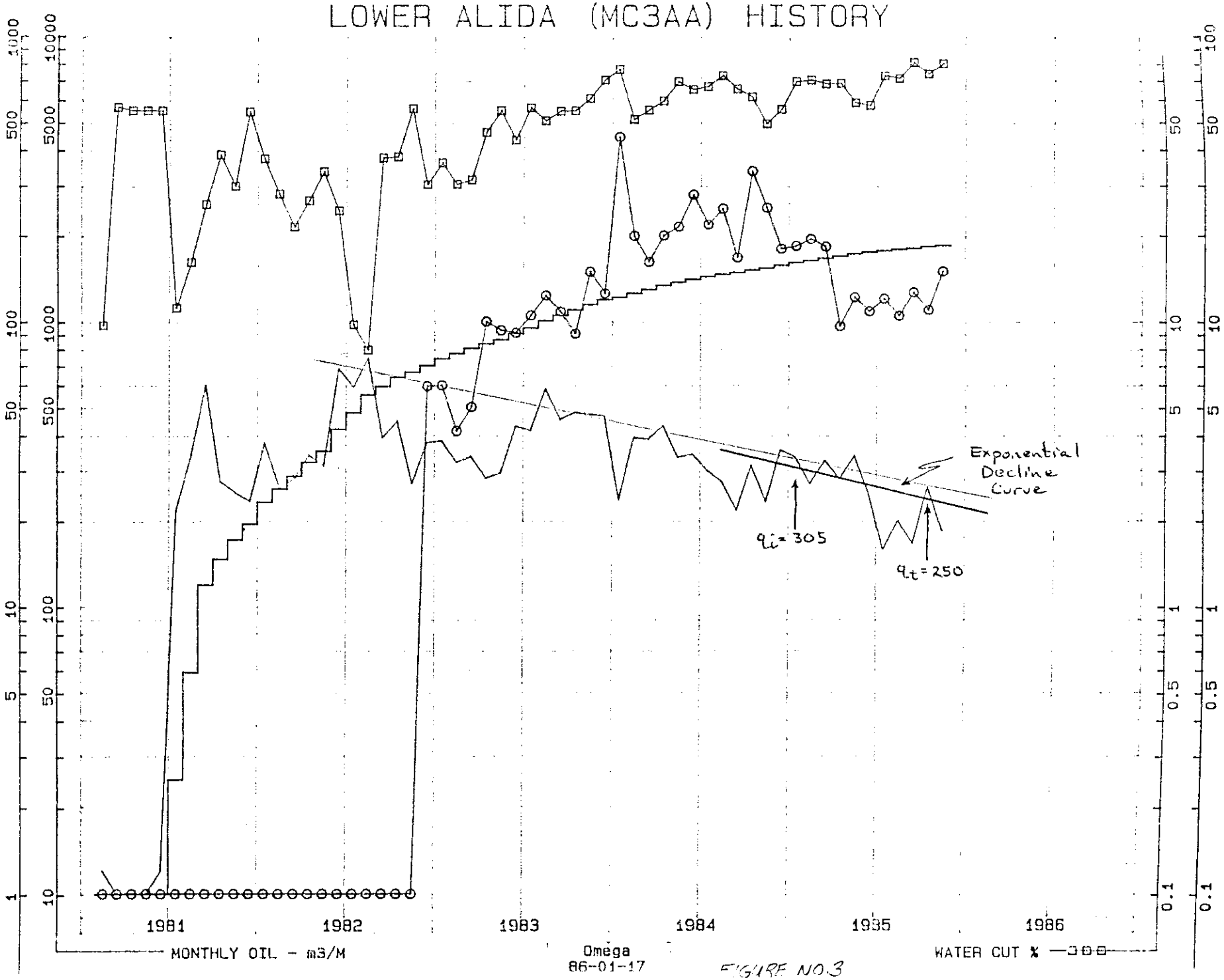

LOWER ALIDA (MC3AA) HISTORY
1000
500
100
50
10
1
10000
5000
1000
500
100
50
10
1981
1982
1983
1984
1985
1986
Exponential Decline Curve
qi = 305
qt = 250
MONTHLY OIL - m3/M
Omega
86-01-17
WATER CUT %
100
50
10
5
1
0.5
0.1

FIGURE NO.3

Lessee Map In and Adjoining
The Proposed Waskada Unit No. 12

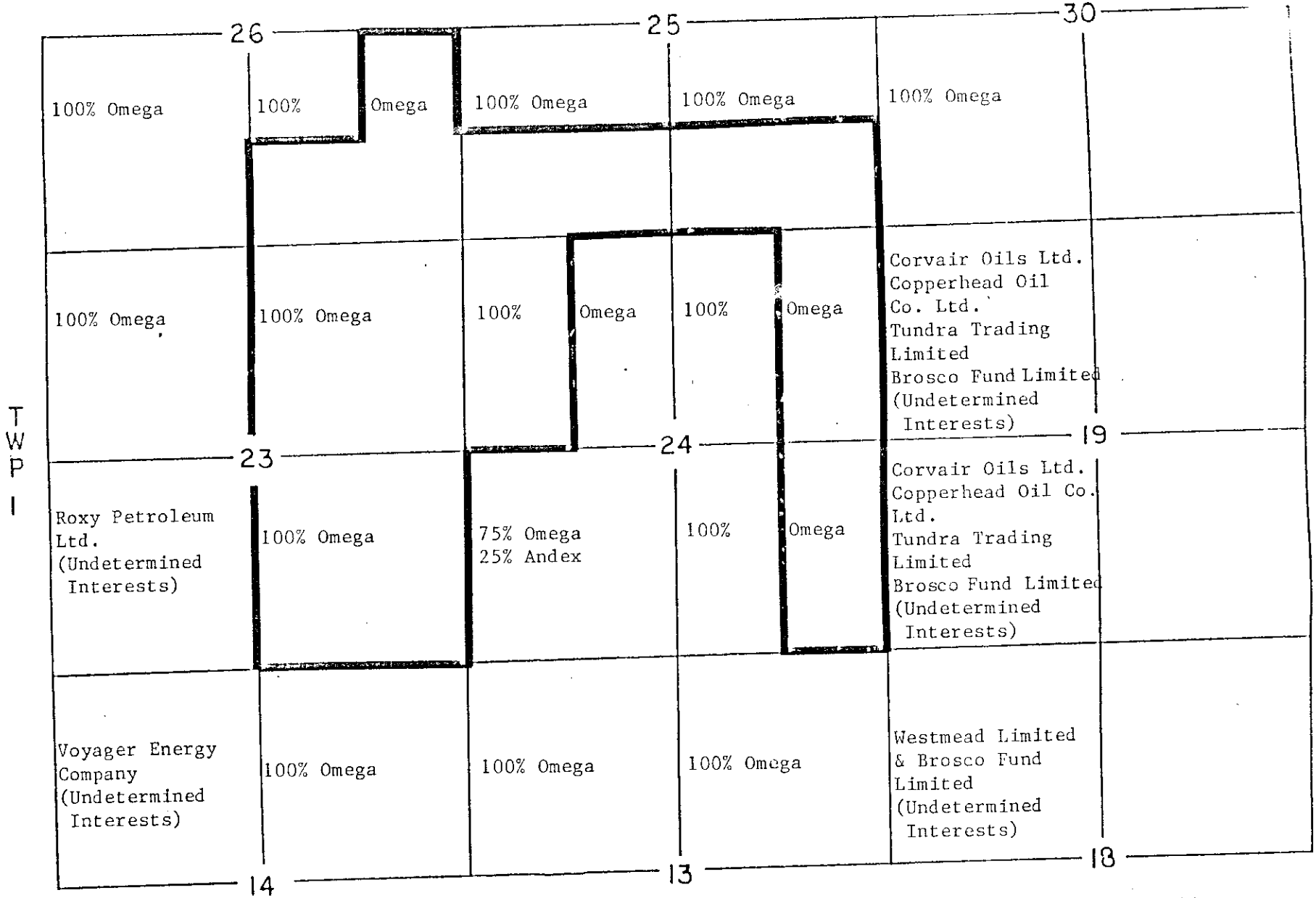


FIGURE NO.4

Proposed Waskada Unit No. 12

Attachment 3

OMEGA
HYDROCARBONS LTD.

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

January 23, 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 3aA 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 MC3aA pool is shown in Attachment 1 and work is underway to unitize the subject formation. The proposed Waskada Unit No. 12 will consist of 21 tracts and contain LSD's 1-23, 2-23, 7-23, 8-23 9-23, 10-23, 15-23, 16-23, 1-24, 8-24, 9-24, 12-24, 13-24, 16-24, 1-25, 2-25, 3-25, 4-25, 1-26, 2-26, and 8-26-1-26 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	15-23MC3a-1-26	WPM
Omega S. Waskada Prov.	1-24-1-26	WPM
Omega Waskada	1-25-1-26	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. 12 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 1100m^3/d while the two (2) existing source water wells are capable of producing an additional 500m^3/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 700m^3/d of water has been installed at satellite 7-27-1-26 WPM to accomodate 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 MC3aA pool is estimated to be 839,304m^3 based on the following assumptions,

1) a total porous rock volume of 193.04 ha-m obtained from the Øh map contained in Attachment 1 (this volume consists of 187.49 ha-m located inside the Unit boundary plus 5.55 ha-m allocated to LSD 9-26-1-26 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 cummulative oil production to the end of October, 1985 is 18,748.3m^3 (including well 9-26-1-26 WPM) and it is estimated that the ultimate primary recovery will be 26963m^3 or 3.2% 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 9-26-1-26 WPM) during 1985. Based on secondary recovery estimates for similar pools we anticipate an ultimate recovery after waterflooding of approximately 83930 or 10.0% 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,

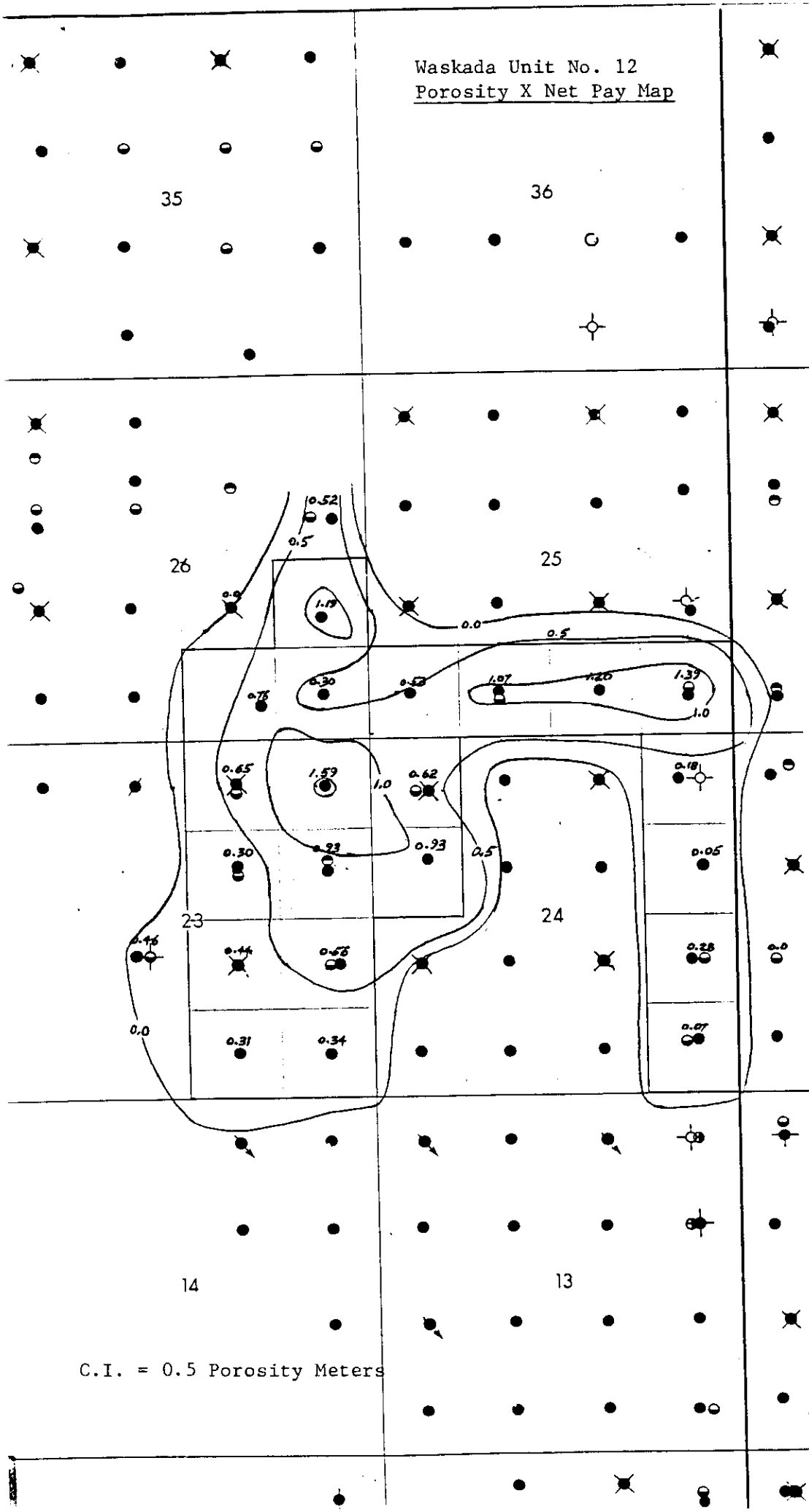
OMEGA HYDROCARBONS LTD.

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

RAB:vb
Encl.
c.c. R. Dubreuil - Man. Pet. Branch
Waskada (Miss) Waterflood
Approvals File

Attachment 1

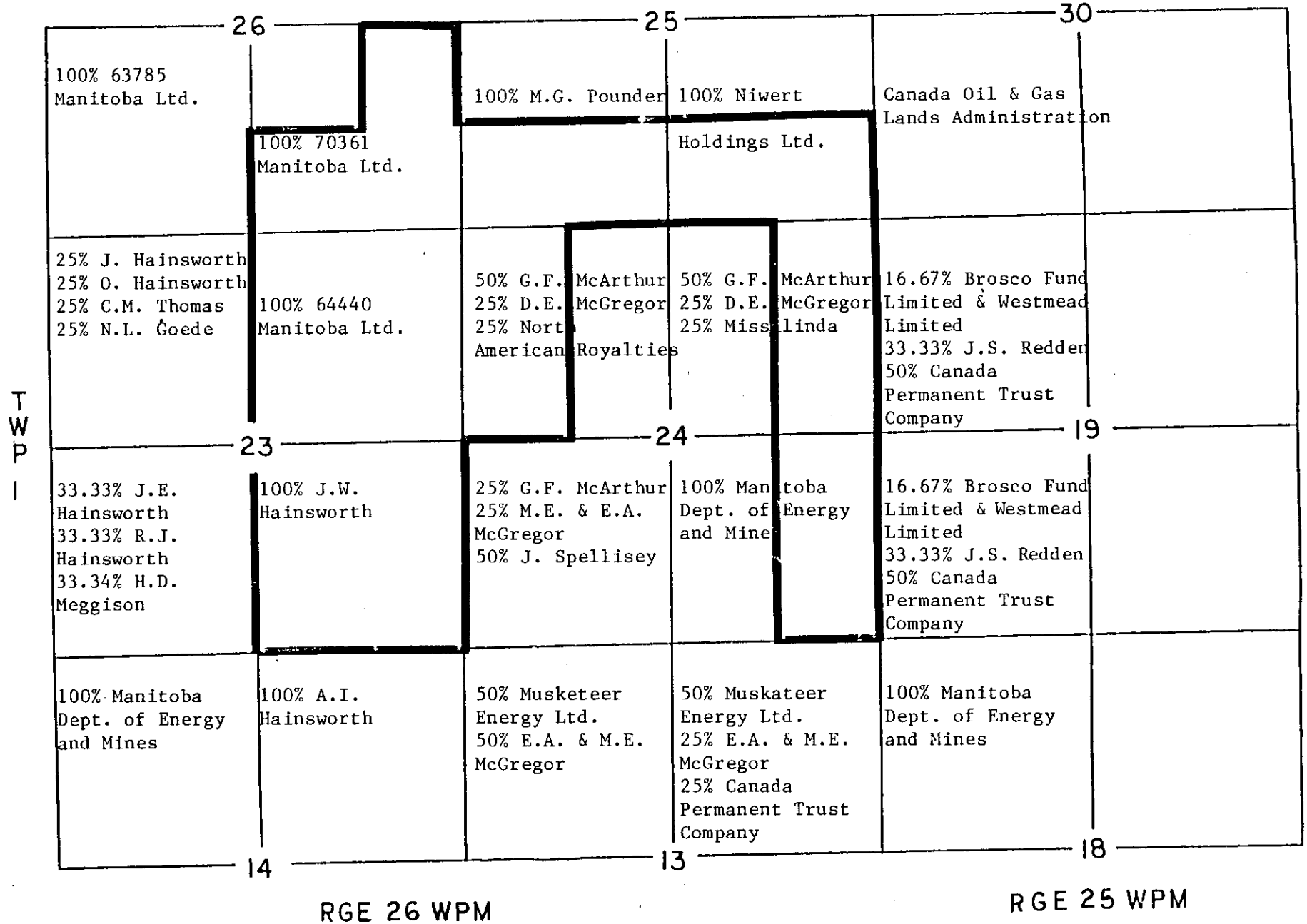
Waskada Unit No. 12
Porosity X Net Pay Map



C.I. = 0.5 Porosity Meters

TRACT	LAND DESCRIPTION	A*PHI*h (h*m)
1	1-23-1-26 WPM	3.82
2	2-23-1-26 WPM	3.71
3	7-23-1-26 WPM	7.16
4	8-23-1-26 WPM	8.30
5	9-23-1-26 WPM	14.29
6	10-23-1-26 WPM	5.45
7	15-23-1-26 WPM	9.44
8	16-23-1-26 WPM	20.23
9	1-24-1-26 WPM	0.68
10	8-24-1-26 WPM	2.12
11	9-24-1-26 WPM	0.62
12	12-24-1-26 WPM	13.20
13	13-24-1-26 WPM	12.23
14	16-24-1-26 WPM	3.84
15	1-25-1-26 WPM	15.74
16	2-25-1-26 WPM	15.15
17	3-25-1-26 WPM	13.18
18	4-25-1-26 WPM	8.42
19	1-26-1-26 WPM	9.59
20	2-26-1-26 WPM	7.35
21	8-26-1-26 WPM	12.97
TOTALS:		187.49

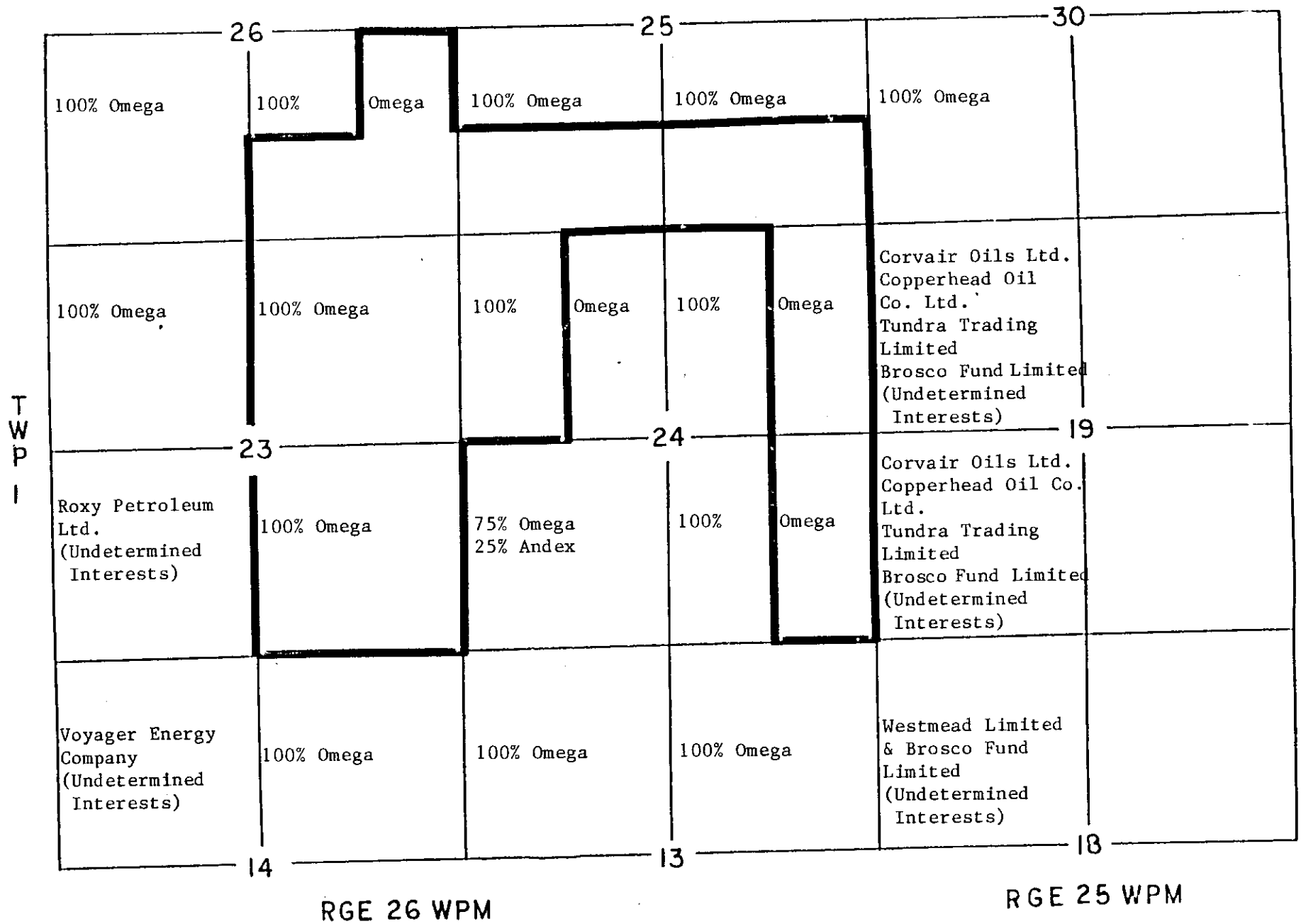
Lessor Map In and Adjoining
The Proposed Waskada Unit No. 12



Proposed Waskada Unit No. 12

Attachment 2

Lessee Map In and Adjoining
The Proposed Waskada Unit No. 12



Proposed Waskada Unit No. 12

Attachment 3

Well Status Summary
For Wells In and Adjoining
The Proposed Waskada Unit No. 12

Well	Completed Zone	Status
13-18-1-25 WPM	Tilston	Suspended Well
4-19-1-25 WPM	Lower Amaranth	Producing Oil Well
5-19-1-25 WPM	Lower Amaranth	Producing Oil Well
12-19-1-25 WPM	N/A	Abandoned Well
13-19-1-25 WPM	Upper Alida	Producing Oil Well
13A-19-1-25 WPM	Lower Amaranth	Producing Oil Well
4-30-1-25 WPM	Upper Alida	Producing Oil Well
4A-30-1-25 WPM	Lower Amaranth	Producing Oil Well
5-30-1-25 WPM	Lower Amaranth	Water Injector
1-23-1-26 WPM	Lower Amaranth	Producing Oil Well
2-23-1-26 WPM	Lower Amaranth	Producing Oil Well
6-23-1-26 WPM	N/A	Abandoned Well
7-23-1-26 WPM	Lower Amaranth	Water Injector
8-23-1-26 WPM	Lower Alida	Producing Oil Well
8A-23-1-26 WPM	Lower Amaranth	Producing Oil Well
9-23-1-26 WPM	Lower Amaranth	Producing Oil Well
9A-23-1-26 WPM	Lower Alida	Suspended Oil Well
10-23-1-26 WPM	Lower Alida	Suspended Oil Well
10A-23-1-26 WPM	Lower Amaranth	Producing Oil Well
14-23-1-26 WPM	Lower Amaranth	Producing Oil Well
15-23-1-26 WPM	Lower Amaranth	Water Injector
15A-23-1-26 WPM	Lower Alida	Suspended Oil Well
16-23-1-26 WPM	Lower Amaranth	Producing Oil Well
1-24-1-26 WPM	Lower Alida	Producing Oil Well
1A-24-1-26 WPM	Lower Amaranth	Producing Oil Well
2-24-1-26 WPM	Lower Amaranth	Producing Oil Well
4-24-1-26 WPM	Lower Amaranth	Producing Oil Well
5-24-1-26 WPM	Lower Amaranth	Water Injector
6-24-1-26 WPM	Lower Amaranth	Producing Oil Well
7-24-1-26 WPM	Lower Amaranth	Water Injector
8-24-1-26 WPM	Lower Alida	Producing Oil Well
8A-24-1-26 WPM	Lower Amaranth	Producing Oil Well
9-24-1-26 WPM	Lower Amaranth	Producing Oil Well
10-24-1-26 WPM	Lower Amaranth	Producing Oil Well
11-24-1-26 WPM	Lower Amaranth	Producing Oil Well
12-24-1-26 WPM	Lower Amaranth	Producing Oil Well
13-24-1-26 WPM	Lower Alida	Producing Oil Well
13A-24-1-26 WPM	Lower Amaranth	Water Injector
14-24-1-26 WPM	Lower Amaranth	Producing Oil Well
15-24-1-26 WPM	Lower Amaranth	Water Injector
16-24-1-26 WPM	Lower Amaranth	Producing Oil Well
1-25-1-26 WPM	Lower Alida	Producing Oil Well
1A-25-1-26 WPM	Lower Amaranth	Producing Oil Well
2-25-1-26 WPM	Lower Amaranth	Producing Oil Well
3-25-1-26 WPM	Lower Amaranth	Producing Oil Well
3A-25-1-26 WPM	Lower Alida	Producing Oil Well

4-25-1-26	WPM	Lower Amaranth	Producing Oil Well
5-25-1-26	WPM	Lower Amaranth	Water Injector
6-25-1-26	WPM	Lower Amaranth	Producing Oil Well
7-25-1-26	WPM	Lower Amaranth	Water Injector
8-25-1-26	WPM	Lower Amaranth	Producing Oil Well
12-25-1-26	WPM	Lower Amaranth	Producing Oil Well
1-26-1-26	WPM	Lower Amaranth	Producing Oil Well
2-26-1-26	WPM	Lower Amaranth	Producing Oil Well
3-26-1-26	WPM	Lower Amaranth	Producing Oil Well
6-26-1-26	WPM	Lower Amaranth	Producing Oil Well
7-26-1-26	WPM	Lower Amaranth	Water Injector
8-26-1-26	WPM	Lower Amaranth	Producing Oil Well
9-26-1-26	WPM	Lower Amaranth	Suspended Well
9A-26-1-26	WPM	Lower Alida	Producing Oil Well
10-26-1-26	WPM	Upper Alida	Producing Oil Well

Attachment 5

OMEGA
HYDROCARBONS LTD

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

January 23, 1986

Proposed Waskada Unit No. 12
Surface Owners
(Addressee List Attached)

Dear Sir/Madam:

Re: Proposed Waskada Unit No. 12
Sections 23, 24, 25 and 26, 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 1-23, 2-23, 7-23, 8-23, 9-23, 10-23, 15-23, 16-23, 1-24, 8-24, 9-24, 12-24, 13-24, 16-24, 1-25, 2-25, 3-25, 4-25, 1-26, 2-26, and 8-26-1-26 WPM.

The proposed pressure maintenance scheme will involve the injection of produced water into the Mission Canyon 3aA formation through wells 15-23, 1-24, and 1-25-1-26 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. 12
Surface Owners
Addressee List

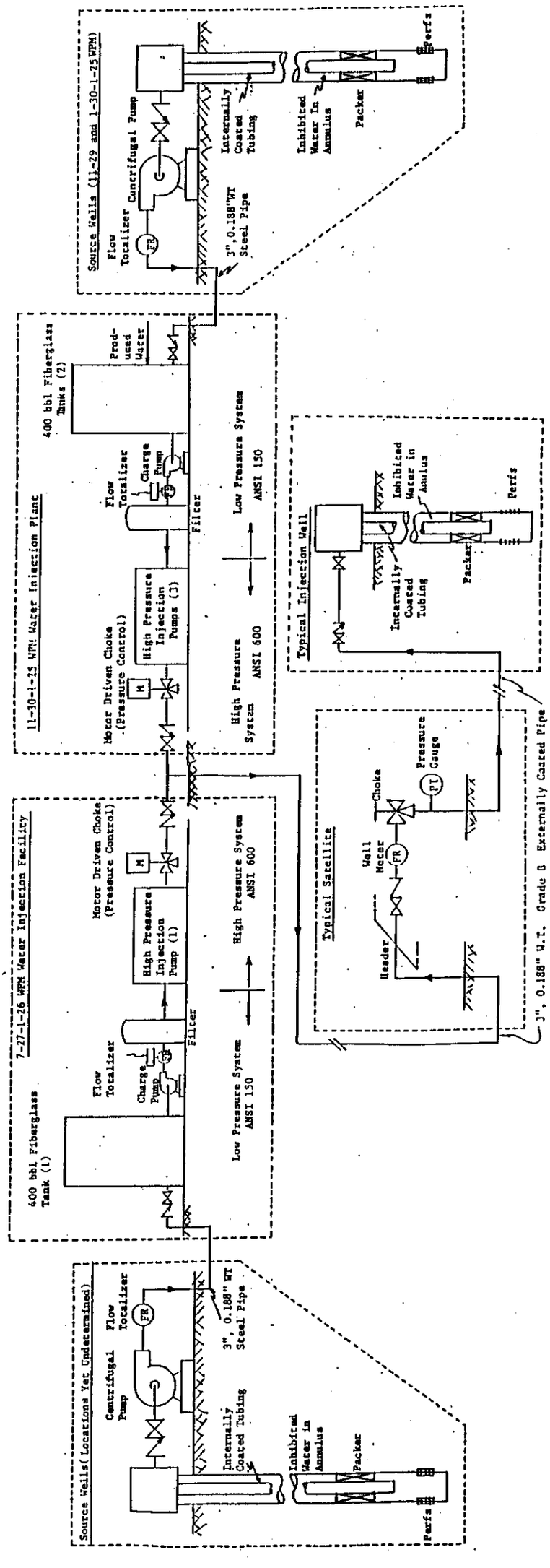
Joyce Hainsworth
Box 99
Waskada, Manitoba
ROM 2E0

Donald Edmund McGregor
Waskada, Manitoba
ROM 2E0

E.A. McGregor and M.E. McGregor
Box 164
Waskada, Manitoba
ROM 2E0

James F. Trewin
Box 52
Waskada, Manitoba
ROM 2E0

R.J. Hainsworth
Box 99
Waskada, Manitoba
ROM 2E0


Source Wells (11-29 and 1-30-1-25 WPM)
Flow Totalizer
Centrifugal Pump
Internally Coated Tubing
Inhibited Water in Annulus
Packer
Perfs
3", 0.188"WT Steel Pipe
11-30-1-25 WPM Water Injection Plant
400 bbl Fiberglass Tanks (2)
Produced Water
Flow Totalizer
Charge Pump
Filter
Low Pressure System ANSI 150
High Pressure System ANSI 600
High Pressure Injection Pumps (3)
Motor Driven Choke (Pressure Control)
Typical Injection Well
Inhibited Water in Annulus
Perfs
Packer
Internally Coated Tubing
7-27-1-26 WPM Water Injection Facility
400 bbl Fiberglass Tank (1)
High Pressure Injection Pump (1)
Typical Satellite
Choke
Pressure Gauge
Wall Meter
Header
3", 0.188" W.T. Grade B Externally Coated Pipe
Source Wells (Locations Yet Undetermined)
Centrifugal Pump
3", 0.188" WT Steel Pipe

WASKADA UNIT NO. 12

OOIP and PRIMARY RECOVERY CALCULATIONS

Original Oil in Place Determination

$$OOIP = \frac{10000\ A\emptyset h\ (1-Sw)}{Boi} = \frac{10000\ (193.04)\ (1-.5)}{1.15} = 839304 m^3$$

Where Sw = 50% (average) Boi = 1.15Rm^3/m A$\emptyset$h = 193.04 ha-m.

A$\emptyset$h was obtained by planimetering the $\emptyset$h map contained in Attachement 1. The total pore volume used in this calculation consists of 187.49 ha-m inside the Unit area and 5.55 ha-m outside the Unit area.

Primary Recovery Determination

An ultimate oil recovery under primary depletion for the MC3aA 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 9-26-1-26 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=o) or a constant percentage decline over time. From the attached data we can obtain the following values;

- qi = 305.0m^3/month (initial production rate at the start of decline)
- qt = 250.0m^3/month (final production rate on the decline curve)
- qe = 90.0m^3/month (economic limit assuming 6 wells x .5m^3/day)
- Qi = 16150.5m^3 (cumulative production to the start of decline, 9-26 included)
- Qt = 2597.8m^3 (cumulative production between qi and qt, 9-26 included)
- t = 10 months (time between qi and qt)

$$D \text{ (decline rate)} = \frac{\ln (qi/qt)}{t} = \frac{\ln (305/250)}{10} = .01989 \text{ month}^{-1}$$

$$te \text{ (time remaining to economic limit)} = \frac{\ln (qi/qe)}{D} = \frac{\ln (305/90)}{.01989} = 61.38 \text{ months}$$

$$Qe \text{ (expected recovery from qi to qe)} = qi\ (te)\ \frac{1-(qi/qe)^{-1}}{\ln (qi/qe)} = 10812.1 m^3$$

$$QTotal \text{ (total expected recovery)} = Qi + Qe = 26962.6 m^3$$

$$\text{Primary Recovery (\%)} = \frac{QTotal}{OOIP} = \frac{26962.6}{839304} = 3.2\% \text{ of OOIP}$$

*** STORE ***
OMEGA PRODUCTION DATA BASE
LOWER ALIDA (MCJAA) HISTORY

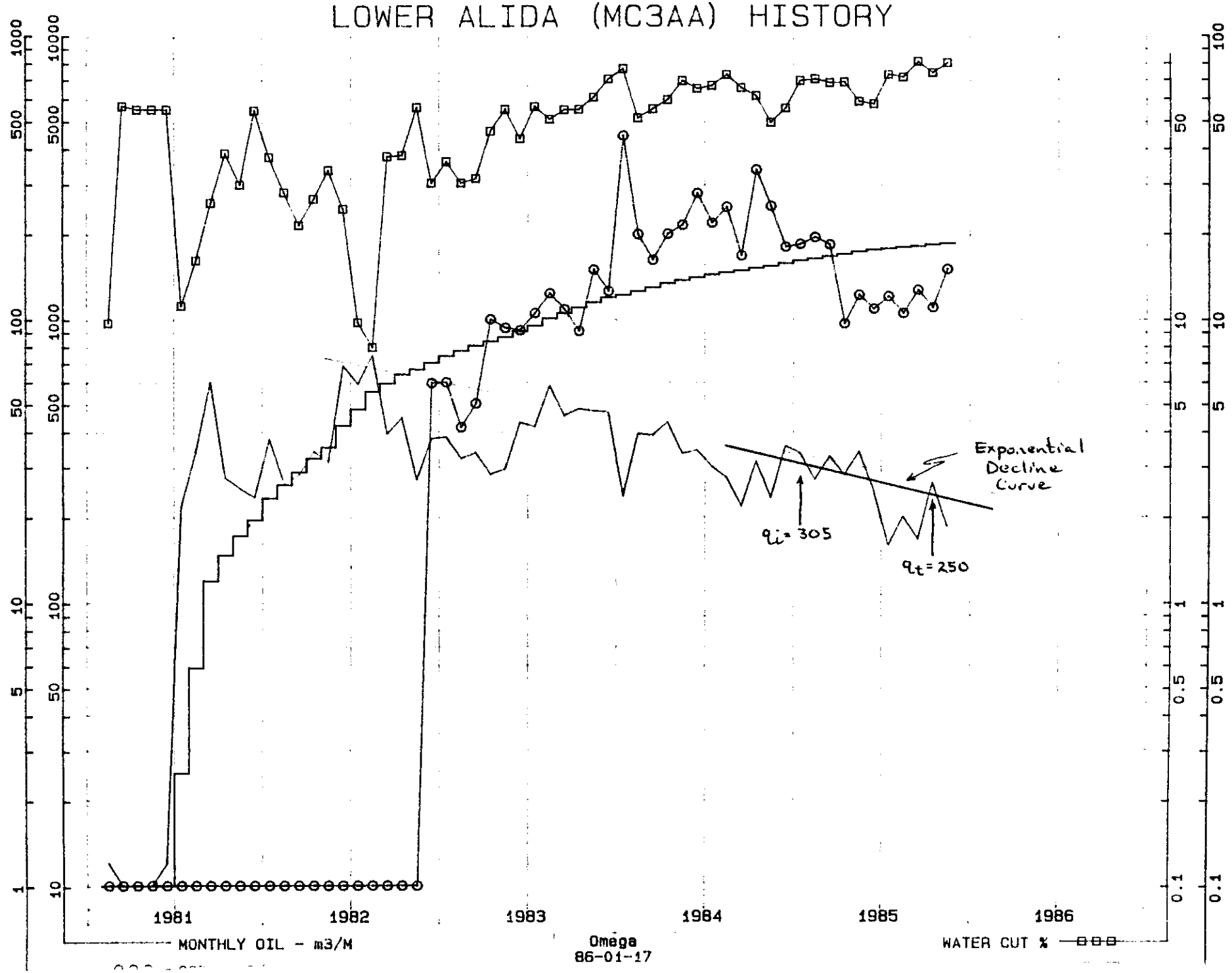
Omega
86-01-16
16:12:23

MONTH	WELL COUNT PROD	INJN	P/IN	S/AB	OIL m3/M	WATER m3/M	GAS km3/M	WOR	GOR m3/m3	OIL m3/D	CUM.OIL m3	CUM.WAT m3	CUM.GAS km3	I.WATER m3/M	I.GAS km3/M	C.I.WAT m3	C.I.GAS km3
1981-02	1	0	0	0	12.0	1.3	0.0	0.11	0	0.4	12.0	1.3	0.0	0.0	0.0	0.0	0.0
1981-03	1	0	0	0	7.6	10.1	0.0	1.33	0	0.2	19.6	11.4	0.0	0.0	0.0	0.0	0.0
1981-04	1	0	0	0	0.8	1.0	0.0	1.25	0	0.0	20.4	12.4	0.0	0.0	0.0	0.0	0.0
1981-05	1	0	0	0	0.4	0.5	0.0	1.25	0	0.0	20.8	12.9	0.0	0.0	0.0	0.0	0.0
1981-06	1	0	0	0	12.0	15.0	0.0	1.25	0	0.4	32.8	27.9	0.0	0.0	0.0	0.0	0.0
1981-07	3	0	0	0	216.4	27.4	0.0	0.13	0	7.0	249.2	55.3	0.0	0.0	0.0	0.0	0.0
1981-08	3	0	0	0	340.4	66.1	0.0	0.19	0	11.0	589.6	121.4	0.0	0.0	0.0	0.0	0.0
1981-09	3	0	0	0	606.0	213.0	0.0	0.35	0	20.2	1195.6	334.4	0.0	0.0	0.0	0.0	0.0
1981-10	3	0	0	0	276.2	175.8	0.0	0.64	0	8.9	1471.8	510.2	0.0	0.0	0.0	0.0	0.0
1981-11	4	0	0	0	252.5	108.9	0.0	0.43	0	8.4	1724.3	619.1	0.0	0.0	0.0	0.0	0.0
1981-12	4	0	0	0	235.3	287.8	0.0	1.22	0	7.6	1959.6	906.9	0.0	0.0	0.0	0.0	0.0
1982-01	4	0	0	0	379.3	229.1	0.0	0.60	0	12.2	2338.9	1136.0	0.0	0.0	0.0	0.0	0.0
1982-02	4	0	0	0	263.1	103.7	0.0	0.39	0	9.4	2602.0	1239.7	0.0	0.0	0.0	0.0	0.0
1982-03	4	0	0	0	283.2	78.2	0.0	0.28	0	9.1	2885.2	1317.9	0.0	0.0	0.0	0.0	0.0
1982-04	5	0	0	0	342.5	125.3	0.0	0.37	0	11.4	3227.7	1443.2	0.0	0.0	0.0	0.0	0.0
1982-05	5	0	0	0	314.1	160.6	0.0	0.51	0	10.1	3541.8	1603.8	0.0	0.0	0.0	0.0	0.0
1982-06	5	0	0	0	690.1	226.0	0.0	0.33	0	23.0	4231.9	1829.8	0.0	0.0	0.0	0.0	0.0
1982-07	5	0	0	0	590.9	64.2	0.0	0.11	0	19.1	4822.8	1894.0	0.0	0.0	0.0	0.0	0.0
1982-08	5	0	0	0	751.8	65.4	0.0	0.09	0	24.3	5574.6	1959.4	0.0	0.0	0.0	0.0	0.0
1982-09	5	0	0	0	394.1	239.7	0.0	0.61	0	13.1	5968.7	2199.1	0.0	0.0	0.0	0.0	0.0
1982-10	5	0	0	0	451.6	279.1	0.0	0.62	0	14.6	6420.3	2478.2	0.0	0.0	0.0	0.0	0.0
1982-11	5	0	0	0	271.3	351.5	0.0	1.30	0	9.0	6691.6	2829.7	0.0	0.0	0.0	0.0	0.0
1982-12	6	0	0	0	380.4	167.1	22.7	0.44	60	12.3	7072.0	2996.8	22.7	0.0	0.0	0.0	0.0
1983-01	6	0	0	1	384.9	219.6	23.1	0.57	60	12.4	7456.9	3216.4	45.8	0.0	0.0	0.0	0.0
1983-02	6	0	0	1	322.1	141.6	13.4	0.44	42	11.5	7779.0	3358.0	59.2	0.0	0.0	0.0	0.0
1983-03	6	0	0	1	338.8	157.1	17.1	0.46	50	10.9	8117.8	3515.1	76.3	0.0	0.0	0.0	0.0
1983-04	6	0	0	1	283.1	247.1	28.4	0.87	100	9.4	8400.9	3762.2	104.7	0.0	0.0	0.0	0.0
1983-05	6	0	0	1	296.3	370.9	27.7	1.25	93	9.6	8697.2	4133.1	132.4	0.0	0.0	0.0	0.0
1983-06	6	0	0	1	432.7	337.7	39.7	0.78	92	14.4	9129.9	4470.8	172.1	0.0	0.0	0.0	0.0
1983-07	6	0	0	1	417.8	550.3	44.1	1.32	106	13.5	9547.7	5021.1	216.2	0.0	0.0	0.0	0.0
1983-08	7	0	0	1	585.9	614.9	72.6	1.05	124	18.9	10133.6	5636.0	288.8	0.0	0.0	0.0	0.0
1983-09	7	0	0	1	457.3	566.8	49.8	1.24	109	15.2	10590.9	6202.8	338.6	0.0	0.0	0.0	0.0
1983-10	7	0	0	1	484.2	603.9	44.1	1.25	91	15.6	11075.1	6806.7	382.7	0.0	0.0	0.0	0.0
1983-11	7	0	0	1	476.6	751.0	71.6	1.58	150	15.9	11551.7	7557.7	454.3	0.0	0.0	0.0	0.0
1983-12	7	0	0	1	470.1	1148.3	59.3	2.44	126	15.2	12021.8	8706.0	513.6	0.0	0.0	0.0	0.0
1984-01	7	0	0	1	237.1	801.6	106.1	3.38	447	7.6	12258.9	9507.6	619.7	0.0	0.0	0.0	0.0
1984-02	6	0	0	2	394.9	423.5	79.2	1.07	201	13.6	12653.8	9931.1	698.9	0.0	0.0	0.0	0.0
1984-03	6	0	0	2	389.3	490.9	63.3	1.26	163	12.6	13043.1	10422.0	762.2	0.0	0.0	0.0	0.0
1984-04	7	0	0	2	434.8	652.6	87.5	1.50	201	14.5	13477.9	11074.6	849.7	0.0	0.0	0.0	0.0
1984-05	7	0	0	2	335.9	782.6	72.6	2.33	216	10.8	13813.8	11857.2	922.3	0.0	0.0	0.0	0.0
1984-06	6	0	0	3	348.8	660.6	96.6	1.92	280	11.5	14158.6	12517.8	1018.9	0.0	0.0	0.0	0.0
1984-07	6	0	0	3	301.6	620.5	66.4	2.06	220	9.7	14460.2	13138.3	1085.3	0.0	0.0	0.0	0.0
1984-08	6	0	0	3	274.8	761.2	68.8	2.77	250	8.9	14735.0	13899.5	1154.1	0.0	0.0	0.0	0.0
1984-09	6	0	0	3	218.3	423.7	36.8	1.94	169	7.3	14953.3	14323.2	1190.9	0.0	0.0	0.0	0.0
1984-10	5	0	0	4	315.7	512.2	107.0	1.62	339	10.2	15269.0	14835.4	1297.9	0.0	0.0	0.0	0.0
1984-11	4	0	0	5	233.5	232.5	58.8	1.00	252	7.8	15502.5	15067.9	1356.7	0.0	0.0	0.0	0.0
1984-12	5	0	0	3	356.5	453.9	64.4	1.27	181	11.5	15859.0	15521.8	1421.1	0.0	0.0	0.0	0.0
1985-01	6	0	0	4	336.8	783.3	62.3	2.33	185	10.9	16195.8	16305.1	1483.4	0.0	0.0	0.0	0.0
1985-02	6	0	0	4	270.6	658.3	52.9	2.43	195	9.7	16466.4	16963.4	1536.3	0.0	0.0	0.0	0.0
1985-03	6	0	0	4	328.1	720.5	60.4	2.20	184	10.6	16794.5	17683.9	1596.7	0.0	0.0	0.0	0.0
1985-04	6	0	0	4	281.1	629.4	27.2	2.24	97	9.4	17075.6	18313.3	1623.9	0.0	0.0	0.0	0.0
1985-05	6	0	0	4	340.4	491.3	41.6	1.44	122	11.0	17416.0	18804.6	1665.5	0.0	0.0	0.0	0.0
1985-06	6	0	0	4	248.3	341.2	27.1	1.37	109	8.3	17664.3	19145.8	1692.6	0.0	0.0	0.0	0.0
1985-07	6	0	0	4	159.0	436.1	19.2	2.74	121	5.1	17823.3	19581.9	1711.8	0.0	0.0	0.0	0.0
1985-08	6	0	0	4	201.3	512.4	21.2	2.55	105	6.5	18024.6	20094.3	1733.0	0.0	0.0	0.0	0.0
1985-09	6	0	0	4	166.7	734.7	21.2	4.41	127	5.6	18191.3	20829.0	1754.2	0.0	0.0	0.0	0.0
1985-10	6	0	0	4	265.5	776.8	29.3	2.93	110	8.6	18456.8	21605.8	1783.5	0.0	0.0	0.0	0.0
1985-11	5	0	0	5	185.4	774.4	27.9	4.18	150	6.2	18642.2	22380.2	1811.4	0.0	0.0	0.0	0.0

LIST OF WELLS

(0)08-23-001-26 W1M(0) (2)09-23-001-26 W1M(0) (0)10-23-001-26 W1M(0)
(2)15-23-001-26 W1M(0) (0)01-24-001-26 W1M(0) (0)08-24-001-26 W1M(0)
(0)13-24-001-26 W1M(0) (0)01-25-001-26 W1M(0) (0)03-25-001-26 W1M(0)
(0)09-26-001-26 W1M(0) includes data for Jan/85 - Oct/85 only

Cumm Oil (Dec31/84) = 291.5 m^3
for 9-26
Cumm Water (Dec31/84) = 1119.0 m^3
for 9-26


LOWER ALIDA (MC3AA) HISTORY
1000
500
100
50
10
1
10000
5000
1000
500
100
50
10
1981
1982
1983
1984
1985
1986
Exponential Decline Curve
qi = 305
qt = 250
MONTHLY OIL - m3/M
Omega
86-01-17
WATER CUT %
100
50
10
5
1
0.5
0.1