



Energy and Mines

Petroleum

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

(204) 945-6577

March 30, 1989

New File
1989 Pressure
Maintenance Expansions

Samedan Oil of Canada Inc.
1505 - 505 - 3rd Street S.W.
CALGARY, Alberta
T2P 3E6

05590

Attention: E.R. New, Consultant
Production Operations Department

Re: East Routledge Unit No. 1

Dear Sir:

Enclosed is Oil and Natural Gas Conservation Board Order No. PM 60 authorizing pressure maintenance operations in the subject Unit. This Order replaces Board Order Nos. 20 and 28 and consolidates pressure maintenance approval. You are referred to provisions of this Order relating to monitoring and reporting (Pressure Maintenance Rules No. 3, 4, 6 and 7). We note that there has been minimal pressure maintenance monitoring and reporting over the last several years. In view of your plans to establish a pilot line drive, improved future monitoring and reporting as outlined in the Order is required.

Also enclosed is your approved application to convert the well, Samedan Routledge Prov. 6-11-9-25 (WPM) to a water injection well. Please contact the Virden District Office before commencing recompletion operations.

Yours sincerely,

Original Signed by
L. E. DUBARON

Chief Petroleum Engineer
Petroleum Branch

LRD:dah

cc: Virden Office

encl



Memorandum

Date March 15, 1989

To The Oil and Natural Gas
Conservation Board

From L. R. Dubreuil
Director
Petroleum Branch

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

Telephone

Re: Samedan Routledge Prov. 6-11-9-25 (WPM)
Conversion to Water Injection

Samedan Oil of Canada, Inc as operator of East Routledge Unit No. 1 has made application for approval to convert the well, Samedan Routledge Prov 6-11-9-25 (WPM), to a water injection well.

Recommendation:

It is recommended that the application be approved without advertisement for objections and that Board Order No. PM 60 (copy attached) be issued.

Discussion:

The East Routledge Unit No. 1 was formed on May 16, 1972 and a pressure maintenance project was established shortly afterwards. The pressure maintenance project involved water injection on combination of an inverted nine spot and a five spot injection pattern. This combination in injection pattern could lead to some areas of the reservoir not being effectively swept (see Fig No. 1).

Limited production response to water injection occurred within 6 months of commencement of injection. This response, however did not result in incremental reserves. A second response, resulting from expansion of the injection scheme, and occurred in 1976 clearly has resulted in incremental production (see Fig No. 2). Since response occurred, production has peaked (in 1977) and has declined at a constant rate of 7.15 percent per year (see Fig No. 3). Extrapolation of the current decline to estimated abandonment conditions results in a calculated remaining reserve of about 74 000m³. It is noted that Samedan is incorrectly estimating remaining reserves of 840,000m³ equivalent to over one hundred years of production at current rates.

Production from the well Samedan Routledge Prov 6-11-9-25 (WPM) has declined to the point where the well is uneconomic (see Fig No. 4). The rapid change in production in 1987 is likely due to inaccurate production data resulting from infrequent production testing. Samedan proposes conversion of the well to water injection instead of abandonment.

Conversion of 6-11 to water injection will result in a staggered line drive in a part of the Unit that may have received inadequate pressure support in the past (see Fig No. 5). It is likely, therefore, that the proposal will result in some incremental production.

The only operating non unit well within one half mile of the Unit is operated by Samedan [Samedan Routledge 13-2-9-25 (WPM)]. Further the proposed injector is remote from the Unit boundary. For these reasons, advertisement for objections is not necessary.

Monitoring of unit production performance over the last few years has been minimal. To properly evaluate the success of the conversion of 6-11 to injection, improved production and pressure data should be obtained.

Pressure maintenance operations in East Routledge Unit No. 1 are governed by Board Order No. PM 20 amended by Board Order No. PM 28. It is proposed to approve the application through a new Board Order. This would serve to consolidate and standardize the provisions of the approval. In addition, monitoring requirements reflecting the current pilot operation could be included. A proposed Board Order No. PM 60 is attached.

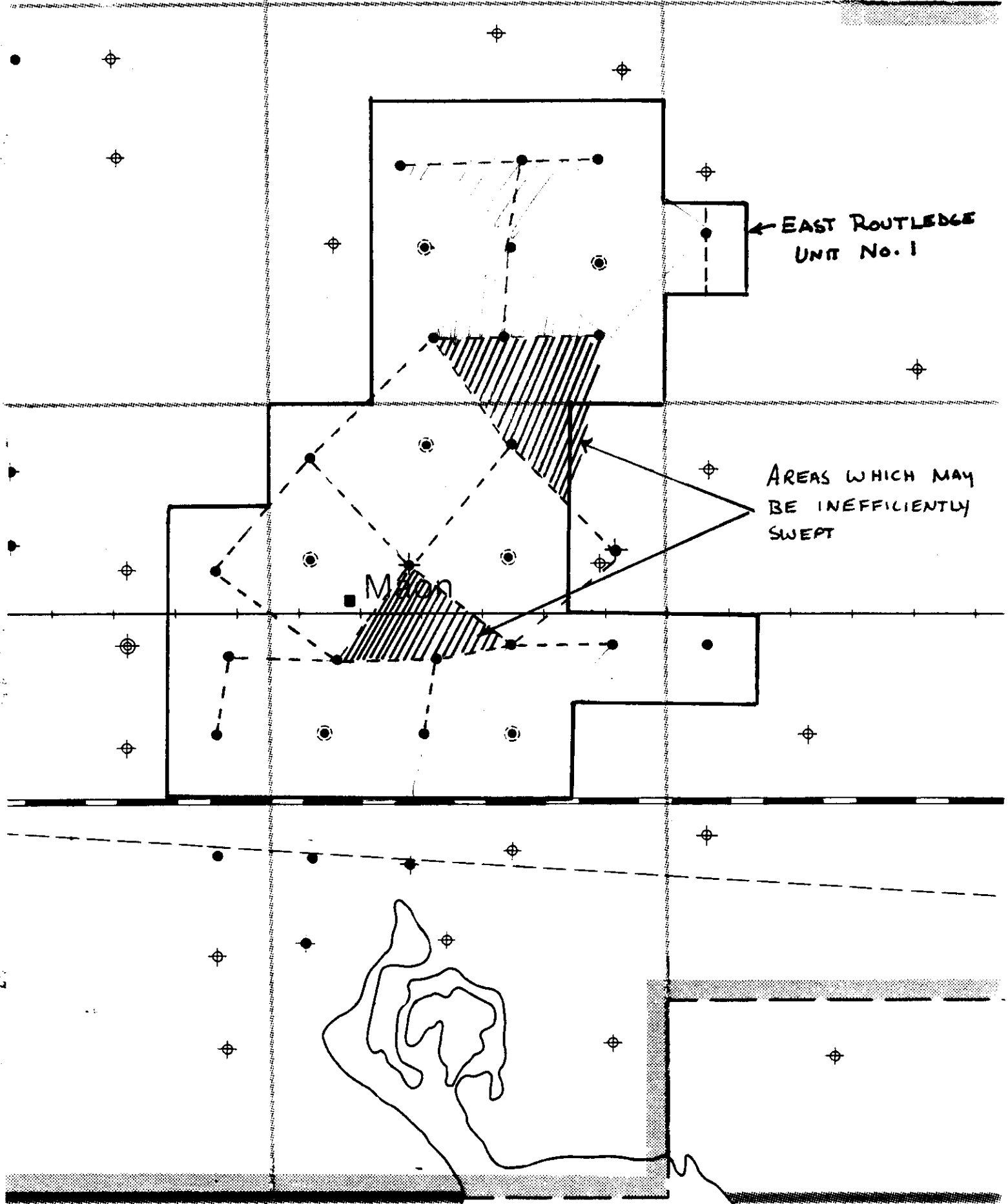
Other factors relating to conversion of the 6-11 well to injection (e.g. injection flowline, well testing requirements etc.) are within the scope of the Petroleum Drilling and Production Regulation and will be handled through the normal inspection and approval process.

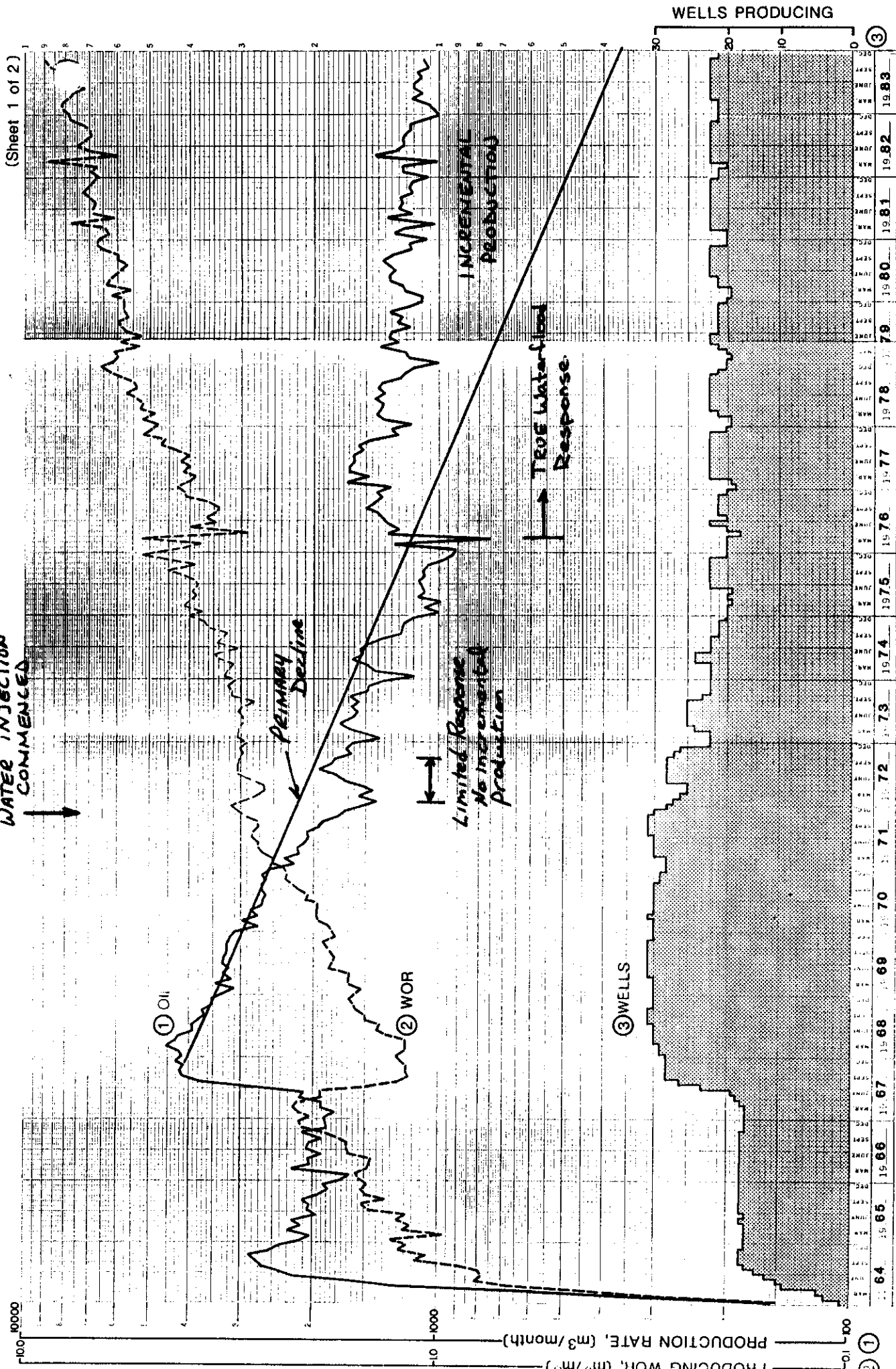


L. R. Dubreuil

LRD:jtb

FIG. No. 1
ORIGINAL INJECTION
PATTERNS





RESERVOIR PERFORMANCE CHART POOL: LODGEPOLE D
FIELD: VIRDEN

Fig. No. 3

EAST ROUTLEDGE UNIT NO. 1

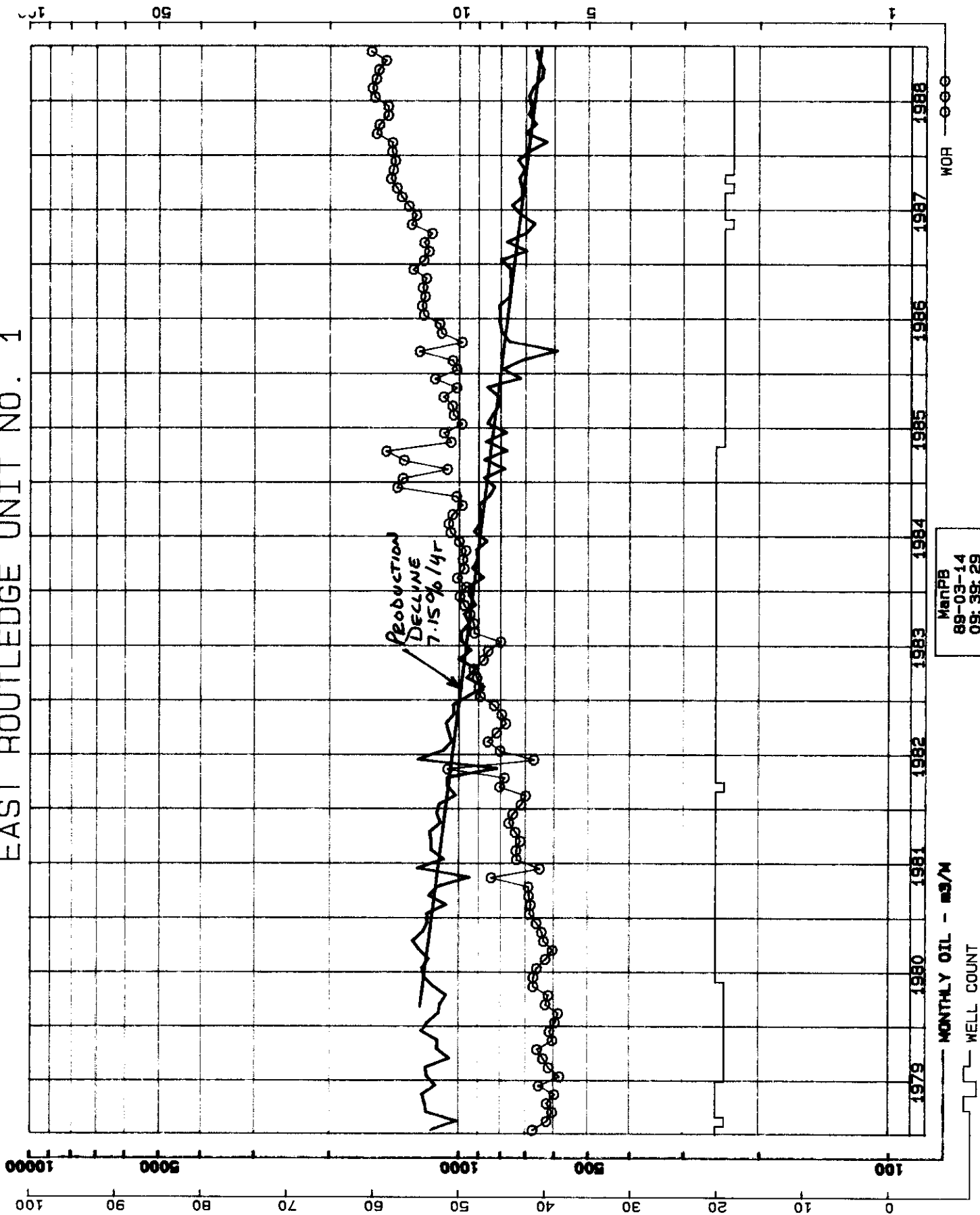
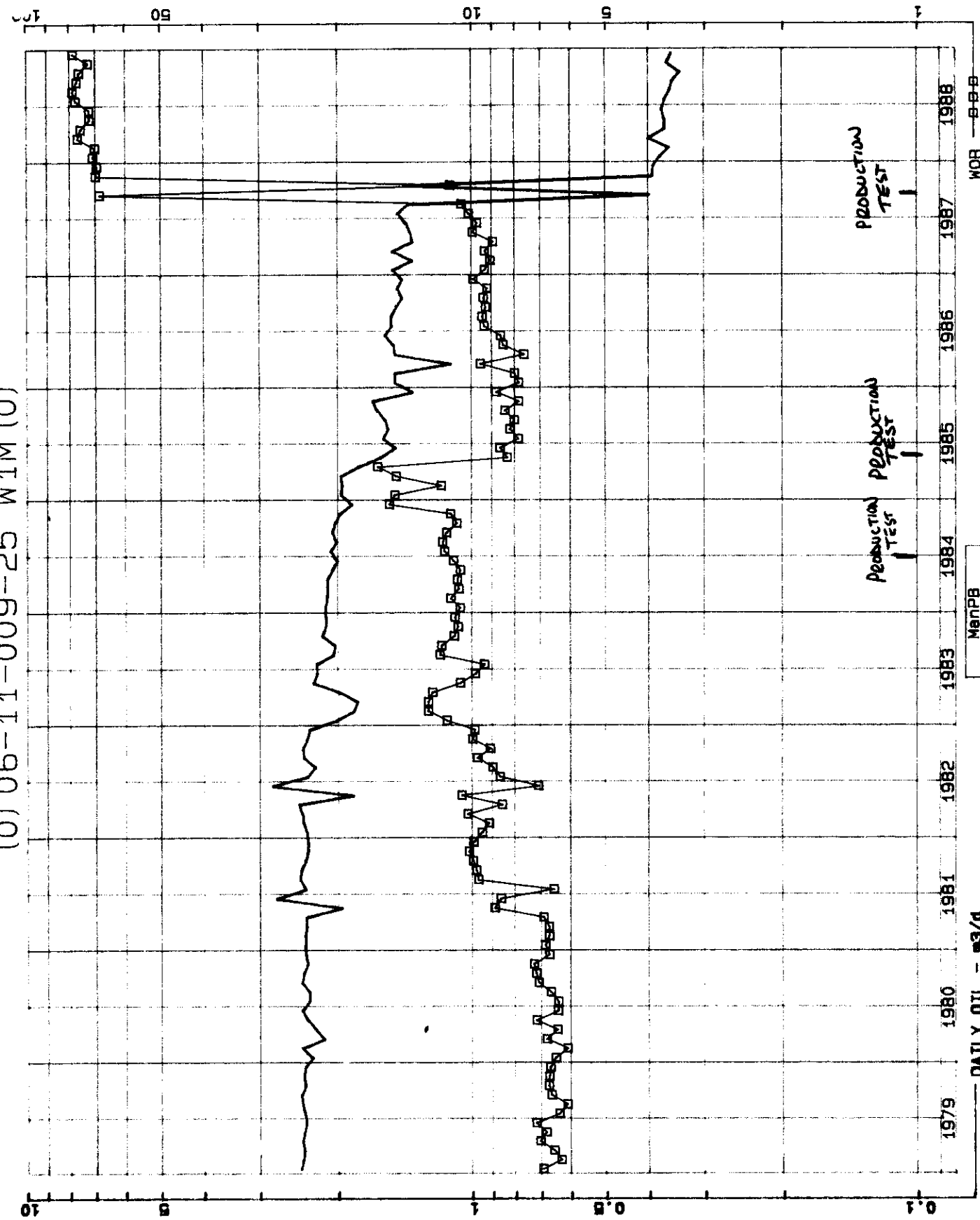


FIGURE No. 4

(0) 06-11-009-25 W1M (0)

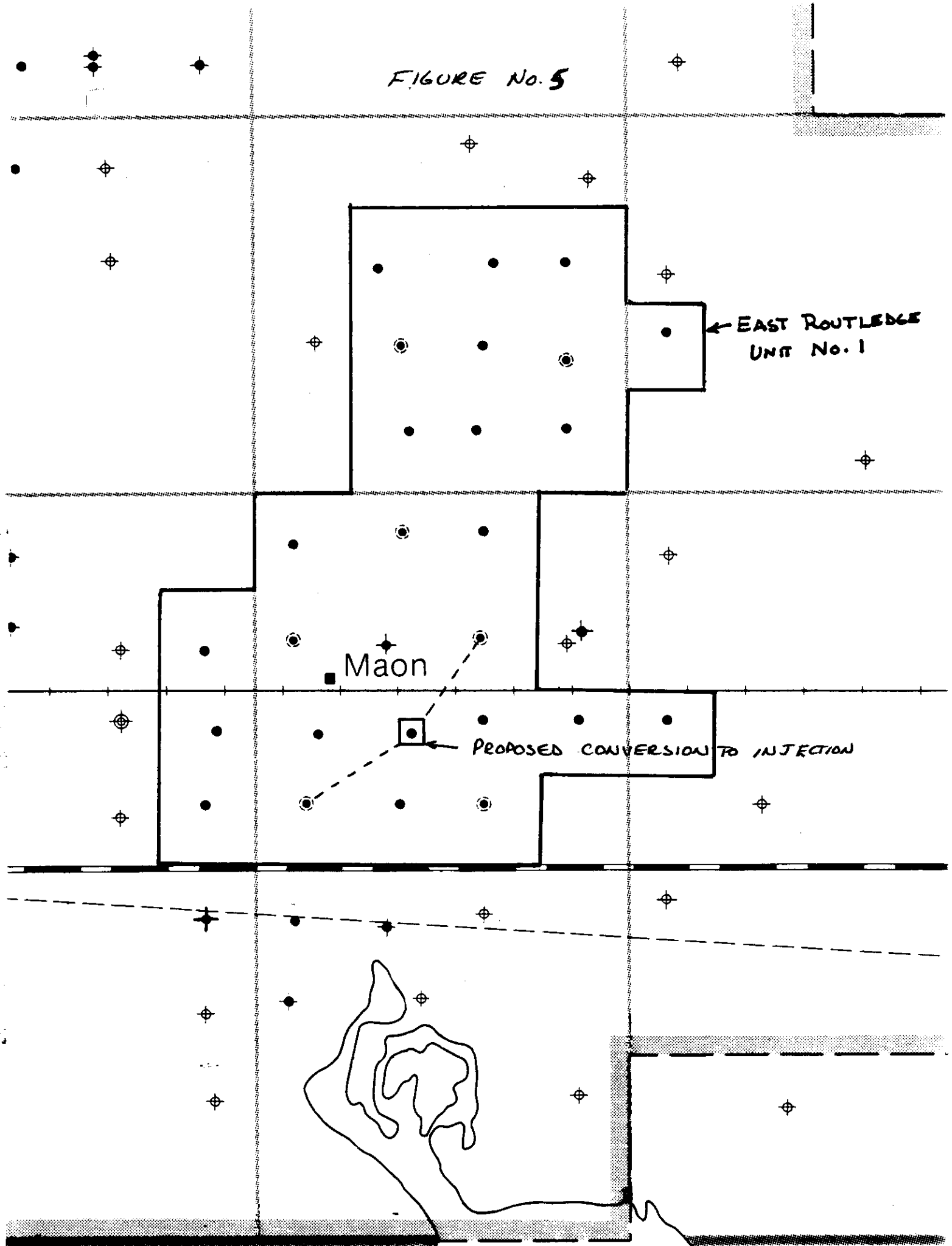


DAILY OIL - m³/d

ManPB
89-03-14
10: 09: 51

WOR - m³/d

FIGURE No. 5



Decline

$$\begin{aligned} q_i &= 1000 \text{ m}^3/\text{mon} &= & 32.9 \text{ m}^3/\text{d} \\ q_t &= 690 \text{ m}^3/\text{mon} &= & 22.7 \text{ m}^3/\text{d} \\ t &= 5 \text{ years} \end{aligned}$$

$$A_i = 7.15 \% / \text{year}$$

1- Assume all wells with $q_{\text{ave}} < 1.0 \text{ m}^3/\text{d}$ are abandoned prior to pool abandonment. Twelve wells left at abandonment

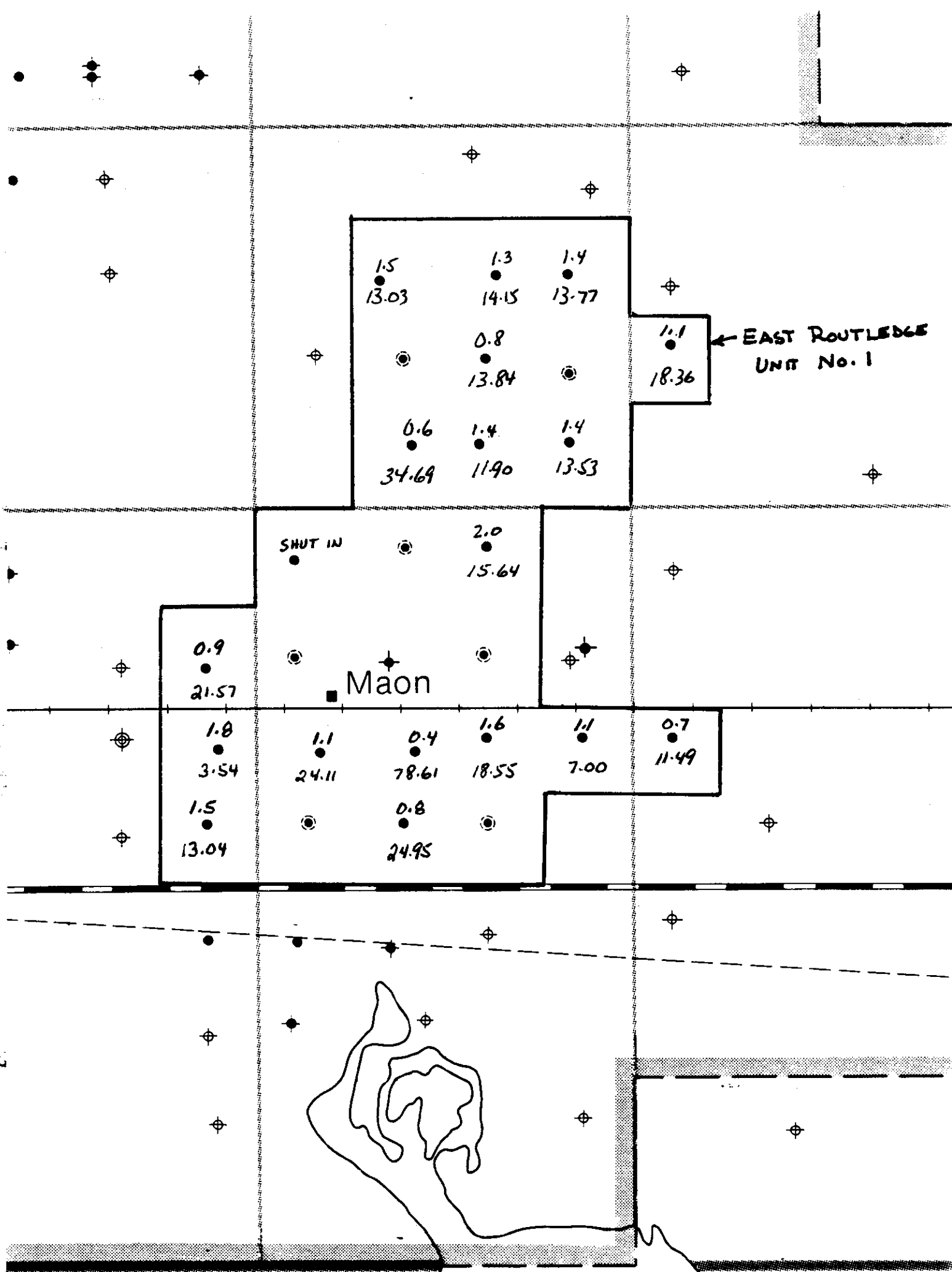
2- Assume $q_{\text{abd}} = 0.5 \text{ m}^3/\text{d} / \text{well}$
 $= 6.0 \text{ m}^3/\text{d} / \text{unit}.$

$$q_i = 641 \text{ m}^3/\text{mon} = 21.1 \text{ m}^3/\text{d}.$$

$$A_i = 7.15 \% / \text{yr}.$$

$$q_t = 6.0 \text{ m}^3/\text{d}$$

$q_t =$	$t =$	$N_p =$
4	22.4	84134
6	17.0	74294
8	13.1	64454
10	10.1	54614



PAGE NO. 1 *** S T O R E ***
 VIRDEN8
 MONTH REPORT: 1988-12

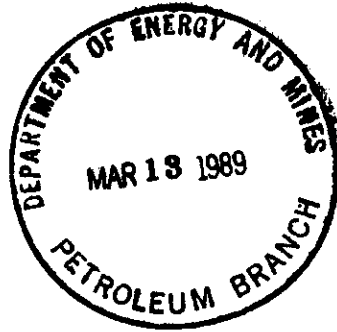
ManPB
 89-03-14
 10:06:02

WELL NAME	HOURS	DIL m3/M	WATER m3/M	DIL m3/d	WOR
(0)01-10-009-25 W1M(0)	744	48.0	625.9	1.5	13.04
(0)08-10-009-25 W1M(0)	744	54.6	193.4	1.8	3.54
(0)09-10-009-25 W1M(0)	744	28.3	610.5	0.9	21.57
(0)03-11-009-25 W1M(0)	744	26.1	651.2	0.8	24.95
(0)05-11-009-25 W1M(0)	744	32.7	788.5	1.1	24.11
(0)06-11-009-25 W1M(0)	744	11.0	864.7	0.4	78.61
(0)07-11-009-25 W1M(0)	744	50.2	931.0	1.6	18.55
(0)08-11-009-25 W1M(0)	744	32.7	228.9	1.1	7.00
(0)15-11-009-25 W1M(0)	744	63.1	987.0	2.0	15.64
(0)05-12-009-25 W1M(0)	744	21.7	249.4	0.7	11.49
(0)05-13-009-25 W1M(0)	744	34.9	640.9	1.1	18.36
(0)01-14-009-25 W1M(0)	744	43.6	590.0	1.4	13.53
(0)02-14-009-25 W1M(0)	744	43.6	519.0	1.4	11.90
(0)03-14-009-25 W1M(0)	744	17.6	610.5	0.6	34.69
(0)07-14-009-25 W1M(0)	744	26.1	361.1	0.8	13.84
(0)09-14-009-25 W1M(0)	744	43.6	600.3	1.4	13.77
(0)10-14-009-25 W1M(0)	744	39.2	554.5	1.3	14.15
(0)11-14-009-25 W1M(0)	744	45.7	595.4	1.5	13.03

TOTALS FOR THE MONTH:

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13392	10602.2	16.00
=====	=====	=====

662.7		
=====		



1505, 505 THIRD STREET SOUTH WEST, CALGARY, ALBERTA T2P 3E6
TELEPHONE (403) 265-7493

March 6, 1989

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

Attention: L.R. Dubreuil

Dear Mr. Dubreuil:

**Re: Converting Producing Well
6-11-9-25 WPM To An
Injection Well**

Under Section 126 of Manitoba Petroleum Regulations and your letter of January 6, 1989, we are applying to convert a producing oilwell 6-11-9-25 WPM to a Water Injection Well, this will result in one pattern being changed to active drive. The following should answer your questions:

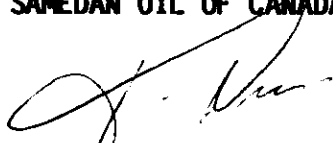
1. Production Rate and Ultimate Recoveries. The estimated units remaining recoverable reserves are $840 \times 10^3 \text{ m}^3$ and ultimate recoverable $.527 \times 10^3 \text{ m}^3$ without converting 6-11. We have not completed a detailed simulation of the effect of the conversion on the units reserves, however, we feel the net increase in recovery will be in the range of 4 to $10 \times 10^3 \text{ m}^3$ of oil. If the recovery approaches the higher level, we would investigate changing other patterns in the flood to line drives.
2. The only change in surface facilities that will be needed is to tie-into our injection header at 7-11-9-25 WPM and run to 6-11-9-25 WPM, see attached schematic. This will involve approximately 400m of 88.9mm pipe.
3. See copy of attached letter to land owner.
4. We will be testing and evaluating the offset producers on a routine basis to determine the effectiveness of the pattern change.
5. See attached schematic.

6. See attached form MG416RW84.

Thank you for your co-operation in this matter.

Yours very truly,

SAMEDAN OIL OF CANADA, INC.



E.R. (Ted) New
Consultant
Production Operations Department

ERTN/stl

c.c. C.S. Kang, Chairman
Room 309
Legislative Building
Winnipeg, Manitoba
R3C 0V8

DONNHOLE SCHEMATIC

EXISTING

178mm at 157m

BHP 51mm x 38mm x 2.5m

Plastic coated 60mm EUE at
+ 635m

60mm EUE at 630m
PSN at 620m

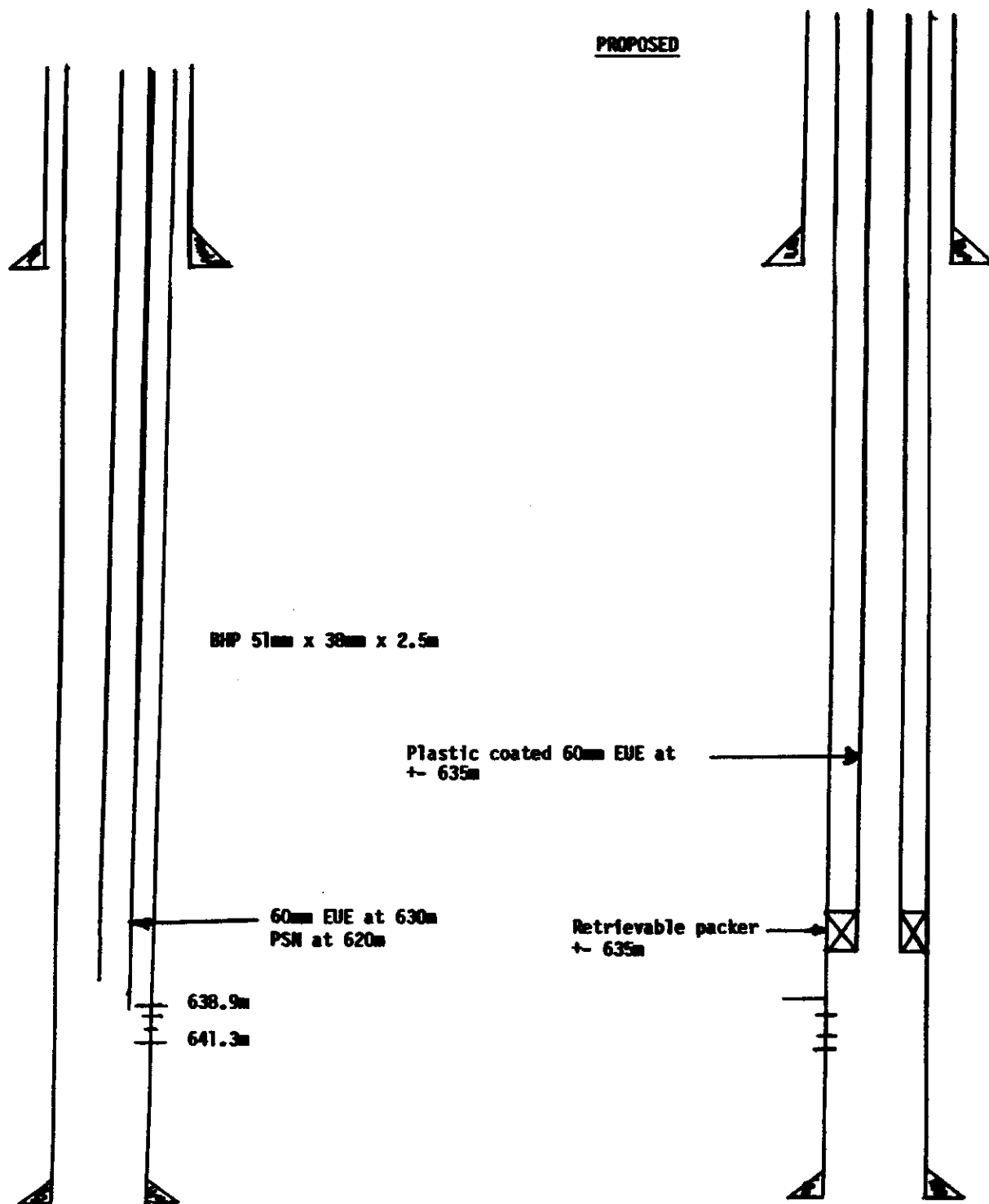
638.9m

641.3m

114mm at 662m

PROPOSED

Retrievable packer
+ 635m





Energy and Mines

Petroleum

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

(204) 945-6577

January 6, 1989

Samedan Oil of Canada Inc.
1505 — 505 — Third St. S.W.
Calgary, Alberta
T2P 3E6

Attention: E. R. New, Consultant
Production Operations Department

Dear Ted:

Re: East Routledge Unit No. 1

Your letter of December 29, 1988 regarding your plans for the subject Unit is acknowledged.

The proposed recompletions of three producing wells and one injection well do not require prior approval. This work can be proceeded with upon notification of the Virden District Office.

Your proposal to convert a well to water injection constitutes a change in the approved pressure maintenance operation for the Unit. Pressure maintenance operations in the Unit are authorized by The Oil and Natural Gas Conservation Board under Board Order No. PM 20 as modified by Board Order No. PM 28. An application to the Board under Section 34 and 126 of the Petroleum Drilling and Production Regulation is required. Because of the nature of your proposal, a number of the items listed in Section 126 may not apply. Your application should, however, include the following:

1. Prediction of production rates and ultimate recovery both with and without the proposed conversion of the 6-11 well to injection.
2. Schematic diagrams of any new or changes in surface facilities (including flow lines) that will be associated with the project.
3. Evidence of notification of the surface owner of your plans.
4. Proposed methods of monitoring performance of the modified project.

5. Schematic cross section of the wellbore showing the proposed completion of the well.
6. A copy of a completed application form (enclosed) for recompletion of the well.

The application should be addressed to:

The Oil and Natural Gas Conservation Board
Room 309
Legislative Building
Winnipeg, Manitoba
R3C 0V8

Attention: Mr. C. S. Kang, Chairman

To expedite processing of the application, I suggest that you also send me a copy directly at the letterhead address. If you have any questions, please contact me at (204) 945-6573.

Yours sincerely,

~~Original Signed By~~
L. R. DUBREUIL

L. R. Dubreuil
Director

LRD/sml

Enclosure

cc: H. C. Moster, Deputy Chairman,
- Oil and Natural Gas Conservation Board
Virden Office

8-10

Present Completion

621.8 - 624.2

625.5 - 627.6

2040 - 2048

2052 - 2059

PROPOSED

618.6 - 621.8

2029.5 - 2040

BOTH CURRENT AND PROPOSED PERFS ARE IN SCALLION

9-10

PRESENT COMPLETION

635.2 - 636.4 637.0 - 638.3

~~644.3 - 644.5~~

~~2084 - 2088~~ 2090 - 2094

~~2114 - 2114.5~~

PROPOSED COMPLETION

638.3 - 641.3

2094 - 2104

BOTH CURRENT AND PROPOSED PERFS ARE IN THE SCALLION

3-11

PRESENT COMPLETION

644.3 - 644.5

2114 - 2114.5

PROPOSED COMPLETION

636.4 644.3

2088 - 2114

PROPOSED COMPLETION IS IN BASE OF L. VIRGEN AND
TOP OF SCALLION

10-11 (injection well)

PRESENT COMPLETION

636.4 - 644.3

2088 - 2114

PROPOSED COMPLETION

644.3 - 645.6

2114 - 2118

BOTH CURRENT AND PROPOSED COMPLETIONS ARE IN
THE SCALLION

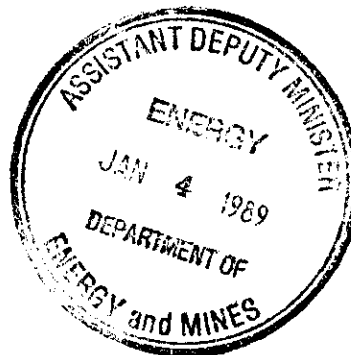
December 29, 1988



1505, 505 THIRD STREET SOUTH WEST, CALGARY, ALBERTA T2P 3E6
TELEPHONE (403) 265-7493

Manitoba Energy and Mines
555 - 330 Graham Avenue
Winnipeg, Manitoba
R3C 4E3

Attention: H. Clare Moster



Dear Mr. Moster:

Re: East Routledge Unit No. 1

Pursuant to Section 117 of the Manitoba Petroleum regulations, it is our intention to re-perforate four wells and modify the water flood scheme by converting a producing well to a water injector. The June, 1988 "Evaluation of the Waterflood" report highlighted the need to attempt to maximize the oil recovery over the next few years. It is expected that with the workovers and recompletion, the economic life of the project may be extended until 1992. We look forward to hearing a response from your Department. It is our intention to commence the field work shortly after your response is obtained.

8-10-9-25 WPM Producing Oilwell

2.0m³/day oil 80% BS&W

Present perforations: 621.8m - 624.2m, 625.5m - 627.6m

Proposed perforations: 618.6m - 621.8m.

9-10-9-25 WPM Producing Oilwell

1.0m³/day oil 90% BS&W

Present perforations: 635.2m - 636.4m, 637.0m - 638.3m

Proposed perforations: 638.3m - 641.3m.

3-11-9-25 WPM Producing Oilwell

1.0m³/day oil 90% BS&W

Present perforations: 644.3m - 644.5m

Proposed perforations: 636.4m - 644.3m.

10-11-9-25 WPM Injection well

Present Injection rate 20m³ water/day

Present perforations: 636.4m - 644.3m

Proposed perforations: 644.3m - 645.6m.

.../2

In addition, we would propose to convert 6-11-9-25 WPM to an injection well. This would set up a partial 5 spot pattern and should recover additional oil from offsets. The results of 6-11 would be utilized to indicate whether further conversions would be successful. The well would be reperforated from 635.8 to 642.5 (present 635.8 to 638.9). The well would be configured to conform with Manitoba regulations, for injection purposes.

Yours very truly,

SAMEDAN OIL OF CANADA, INC.



E.R. (Ted) New
Consultant
Production Operations Department

ERTN/stl