Reduced Spacing Application
for
Virden Roselea Unit No. 1
Virden Lodgepole B Pool

Chevron Canada Resources
January 1991

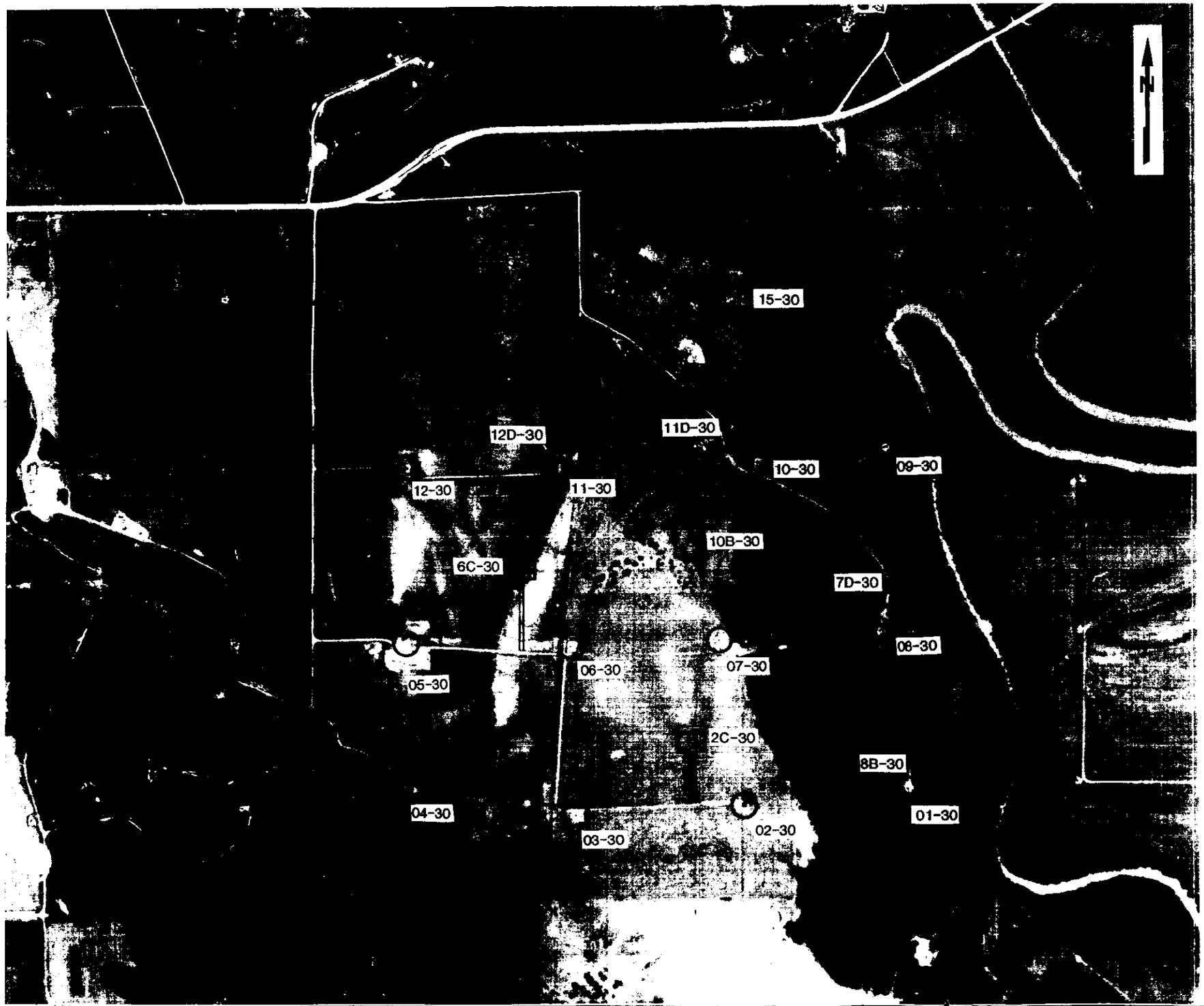

FIGURE 4

AERIAL PHOTOGRAPH OF REDUCED SPACING PROJECT AREA

KEY:

- EXISTING WELLS
- PROPOSED WELLS
- PROPOSED LEASE TRAILS

SCALE

0 100 200 300 400 500

METRES

100 m

100 m

DRILLING LEASE SIZE (TO SCALE)

Chevron

Chevron Canada Resources

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Phone (403) 234-5000 Fax (403) 234-5947

D.M. Clementz
Manager, Engineering

Calgary, Alberta
January 18, 1991

Virden Lodgepole "B" Pool
Virden Roselea Unit No. 1
Reduced Spacing Project

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

Attention: Dr. Ian Haugh, Chairman

Gentlemen:

Chevron Canada Resources, a Partnership by its managing partner, Chevron Canada Resources Limited, as operator of Virden Roselea Unit No. 1 (VRU No. 1) hereby requests:

1. Pursuant to sections 20(1) and 21(3) of the Manitoba Petroleum Drilling and Production Regulations, approval to decrease the size of drilling spacing units from 16 ha (40 acres) to 8 ha (20 acres) within the south half and LSDs 9, 10, 11, 12 and 15 of Section 30-10-25 WPM. The proposed target areas will be square with sides 65 m from the sides of the 8 ha drilling spacing units.

2. Pursuant to section 64 of the Manitoba Petroleum Drilling and Production Regulations, amendment of section 1(1) of pressure maintenance order No. PM 55 to include the addition of two unit water injection wells as listed on Attachment 2. 2 copy

The proposed reduced spacing project area is part of VRU No. 1 which is wholly contained within the Virden Lodgepole "B" Pool. The following sections and attachments contain all the supporting information associated with the above requests.

A. Technical Details

1. The seven proposed infill wells will increase Unit production from 92 m^3/d to 119 m^3/d and increase reserves from 2.76 10^6m^3 to 2.85 10^6m^3. The estimated incremental production of 87 300 m is 3.2% of the project area OOIP. $12.5 \times 10^3 m^3/d$

2. Attachment 1 shows the proposed reduced spacing project within the Virden Roselea Unit No. 1.

3. Attachment 2 contains a list of proposed infill wells and injection well conversions.

4. Attachment 3 contains the following geological information for the reduced spacing project area:

   a. type log showing reservoir units,
   b. cross section illustrating pay continuity,
   c. maps of porosity-thickness,
   d. maps of permeability-thickness.

5. Attachment 4 outlines the technical justification for the reduced spacing project.

6. Attachment 5 is an analysis of the North Virden Scallion Unit No. 1 reduced spacing pilot.

7. Attachment 6 shows the results of the 1987 and 1990 reservoir pressure surveys for VRU No. 1.

B. Benefits to Crown and Lessors

1. Crown royalties and Mineral tax payments will be calculated in the same manner as used in North Virden Scallion Unit No. 1. Production from infill wells will be classified as new oil.

2. Attachment 7 shows plots of the expected benefits to the Crown and Freehold mineral rights owners due to incremental royalties and mineral taxes as a result of the reduced spacing project. The increased income will be distributed in an equitable fashion to all Lessees and Lessors.

C. Surface Considerations

1. Attachment 8 is an environmental impact assessment of the proposed project.

2. Attachment 9 contains an analysis of the modifications required to the battery at 10-25-10-26 WPM, and design of flowlines, tie-ins and injection lines. An aerial photograph of the infill area is part of this attachment. Maps showing the locations of the pipelines are also included. → revise 10-25 to 2-6 water transfer [illegible] recommendations

D. Correspondence with Surface Owners

1. Attachment 10 shows the surface owners on land impacted by the infill pilot.

2. Attachment 11 contains the consent-to-survey forms signed by the landowners who will have proposed infill wells located on their property.

3. Attachment 12 contains the notification sent to landowners who will have proposed injection well conversions on their property.

E. Drilling Precautions

Attachment 13 contains a list of precautions that will be taken during drilling operations.

F. Water Injection

1. Attachment 14 summarizes the water injection details.

2. Fracturing of the formation will not be a problem in the wells converted to injection. A frac treatment done on 9-14-10-26 during January 1990 showed an instantaneous shut-in pressure of approximately 9 600 kPa at the wellhead with a column of produced water. The discharge pressure at the 10-25 plant is expected to be 7 000 kPa (see Attachment 11). Therefore, the wellhead, and consequently, formation pressures will be well below frac pressure.

3. Attachment 15 shows typical wellbore diagrams for the proposed injection well conversions.

G. Corrosion Control

Attachment 16 summarizes the methods of corrosion control that will be used.

H. Equity Considerations for Non-Unit Producers

The infill pilot project will not cause any equity concerns for non-unit producers. The wells which will be drilled closest to the Unit boundary will be drilled in the truncated spacing units shown in Attachment 17. These well locations are 11D-30 and 12D-30-10-25 WPM. They will be drilled at least 100 m from the Unit Boundary to conform to 22(2)b of the Petroleum Regulations. There are no offsetting wells capable of production. Wells in LSDs 13 and 14 have been abandoned. - recent abandoned wells

If there are any questions regarding this application, please contact Kelly Edwards at (403) 234-5388 or Len Marchand at (403) 234-5046 in our Calgary office, or Lyle Martinson at (204) 748-1334 in our Virden Office. Additional copies of the Application may be requested from our Information Centre (403) 234-5580.

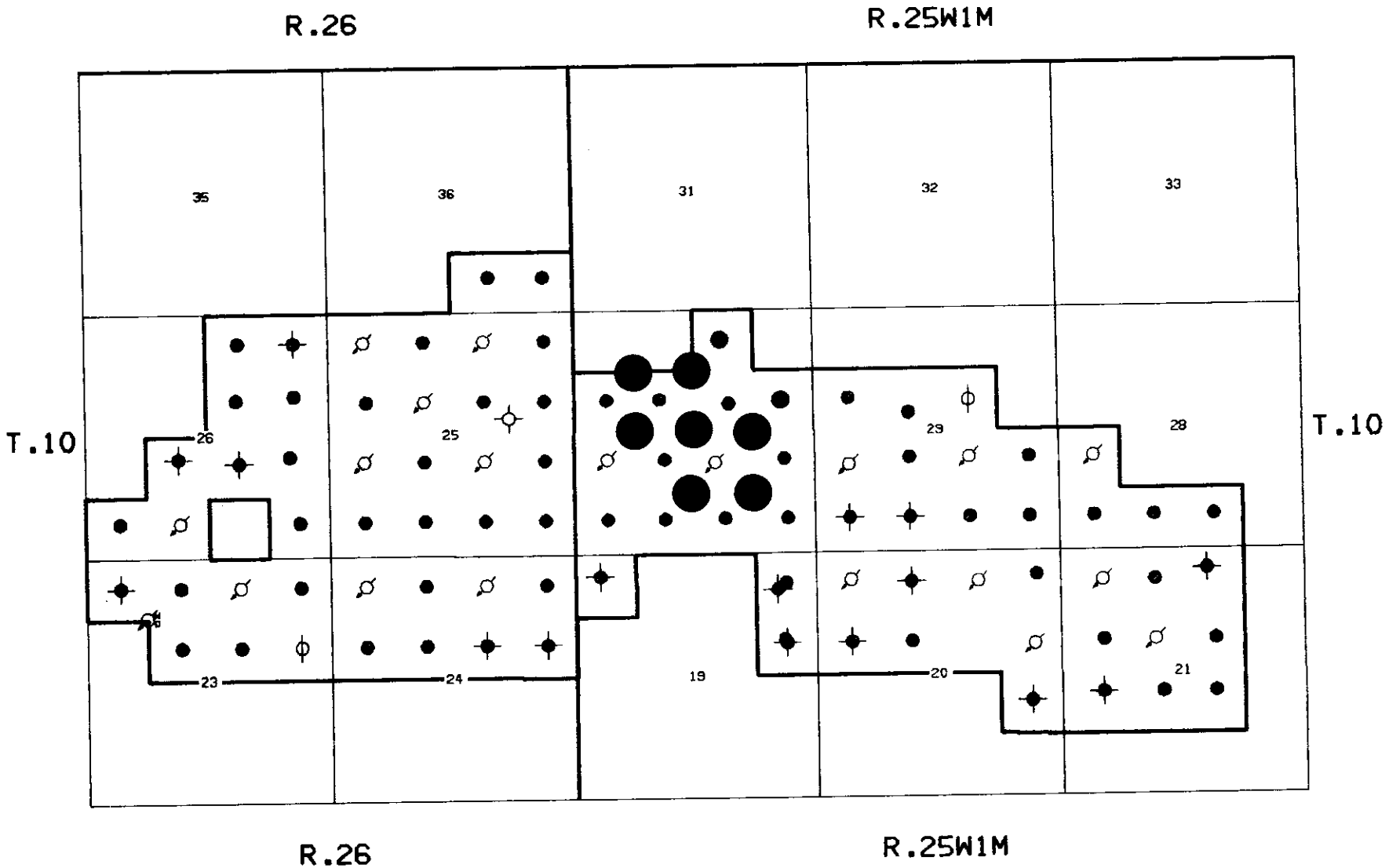
Yours very truly,

Kelly Edwards P.Eng.

for C. G. FOLDEN, P.Eng.
Manager
Reservoir Engineering

KAE/er

VIRDEN ROSELEA UNIT NO.1
UNIT AREA MAP



G03377

PROPOSED INFILL WELLS AND CONVERSIONS
VIRDEN ROSELEA UNIT NO. 1 REDUCED SPACING PILOT

Proposed Infill Producing Wells

1. Chevron VRU No. 1 02C-30-10-25 WPM
2. Chevron VRU No. 1 06C-30-10-25 WPM
3. Chevron VRU No. 1 07D-30-10-25 WPM
4. Chevron VRU No. 1 08B-30-10-25 WPM
5. Chevron VRU No. 1 10B-30-10-25 WPM
6. Chevron VRU No. 1 11D-30-10-25 WPM
7. Chevron VRU No. 1 12D-30-10-25 WPM

Proposed Injection Well Conversions

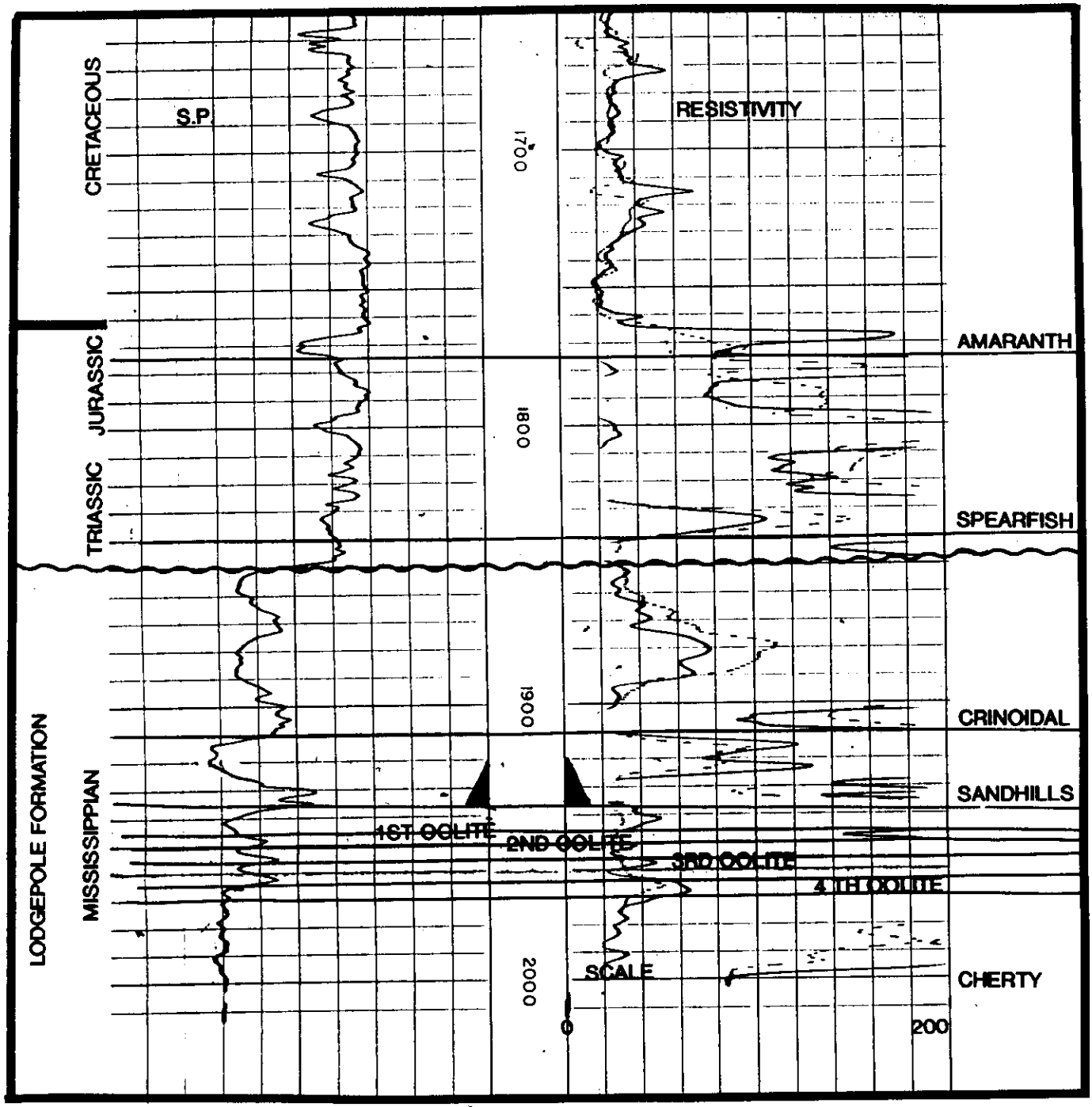
1. CEGO Virden 09-30-10-25 WPM
2 CEGO Virden 15-30-10-25 WPM

ROSELEA UNIT No 1

TYPE LOG

CALSTAN VIRDEN

09-25-10-26W1



CHEVRON VIRDEN C P R 9 25 10 25

09-25-010-26W1

PLACER VIRDEN 12-30-10-25

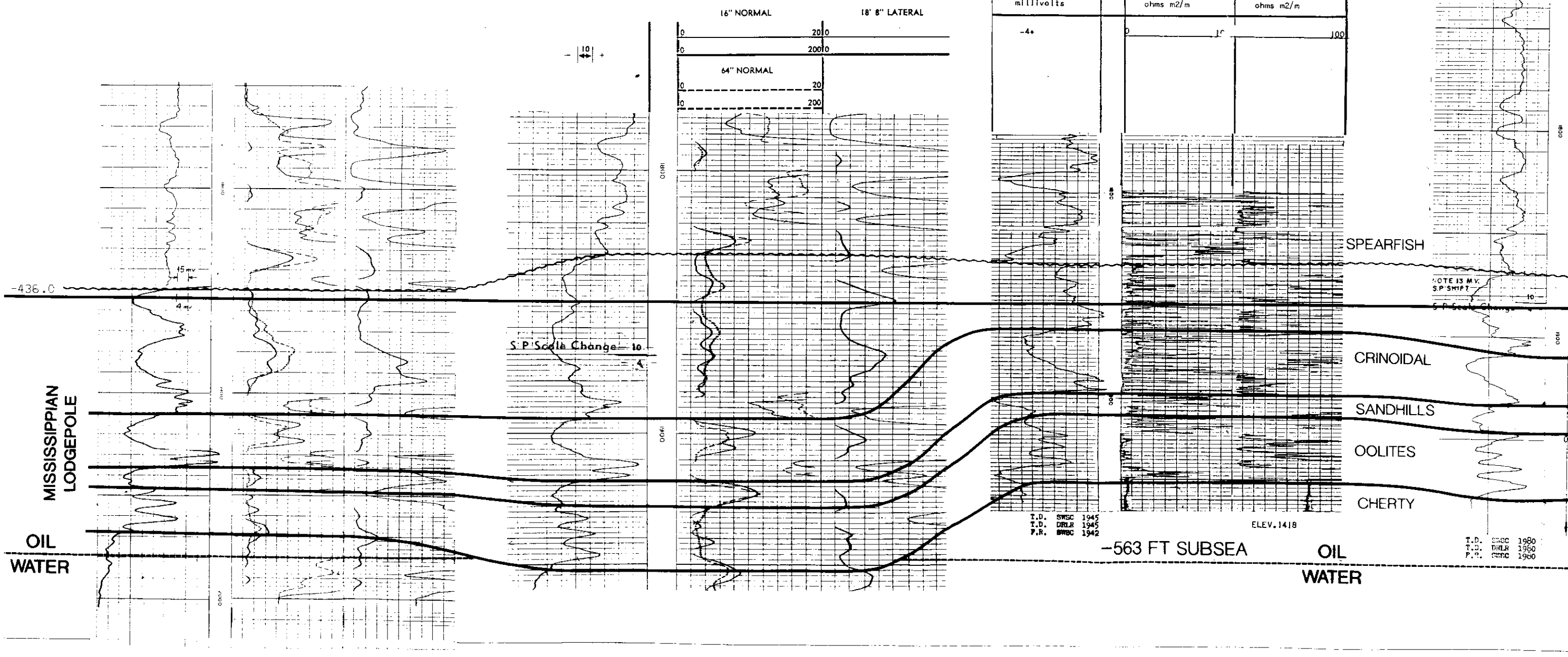
12-30-010-25W1

PLACER VIRDEN 11-30-10-25

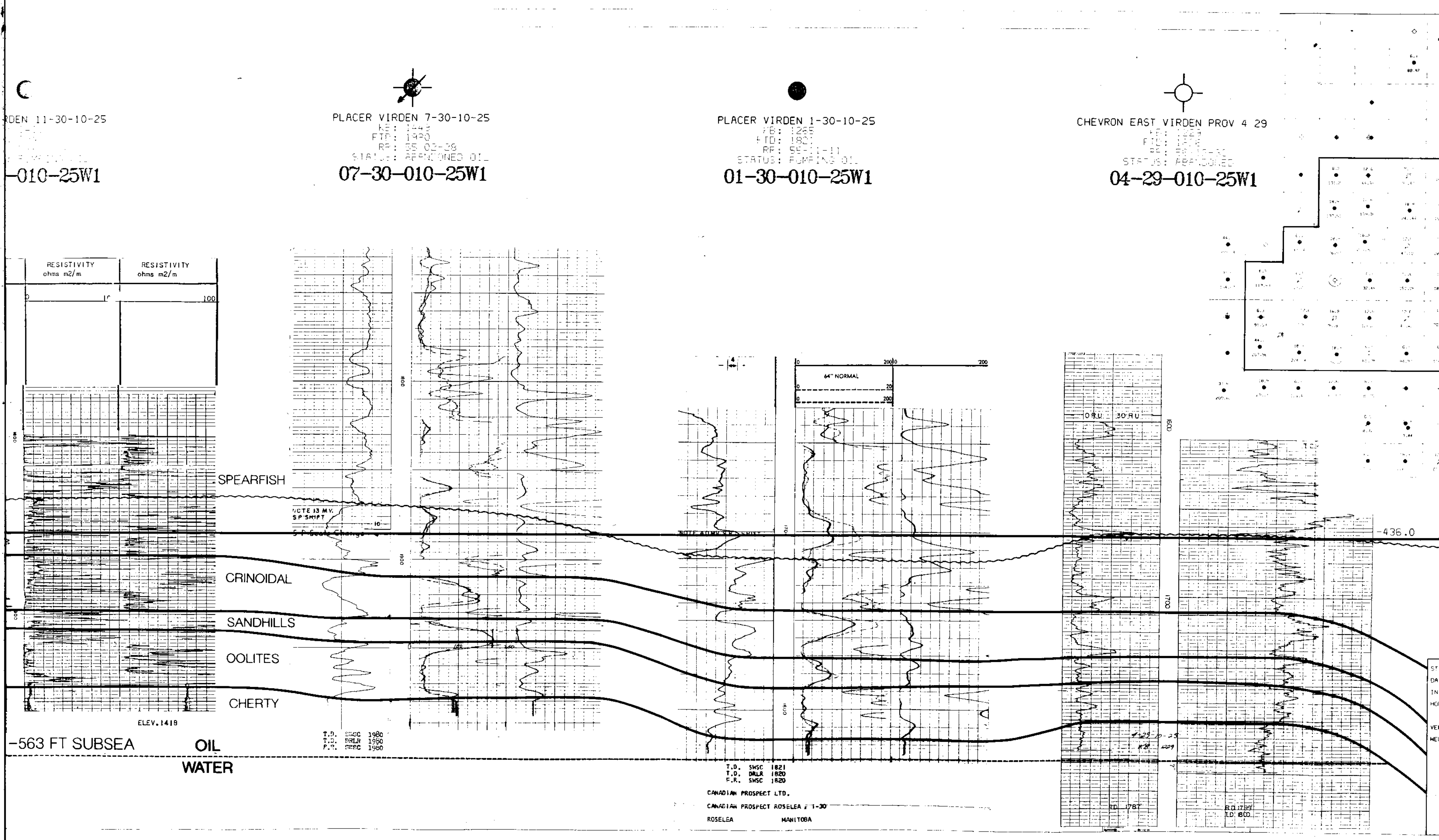
11-30-010-25W1

PLACER VIRDE

07-30-



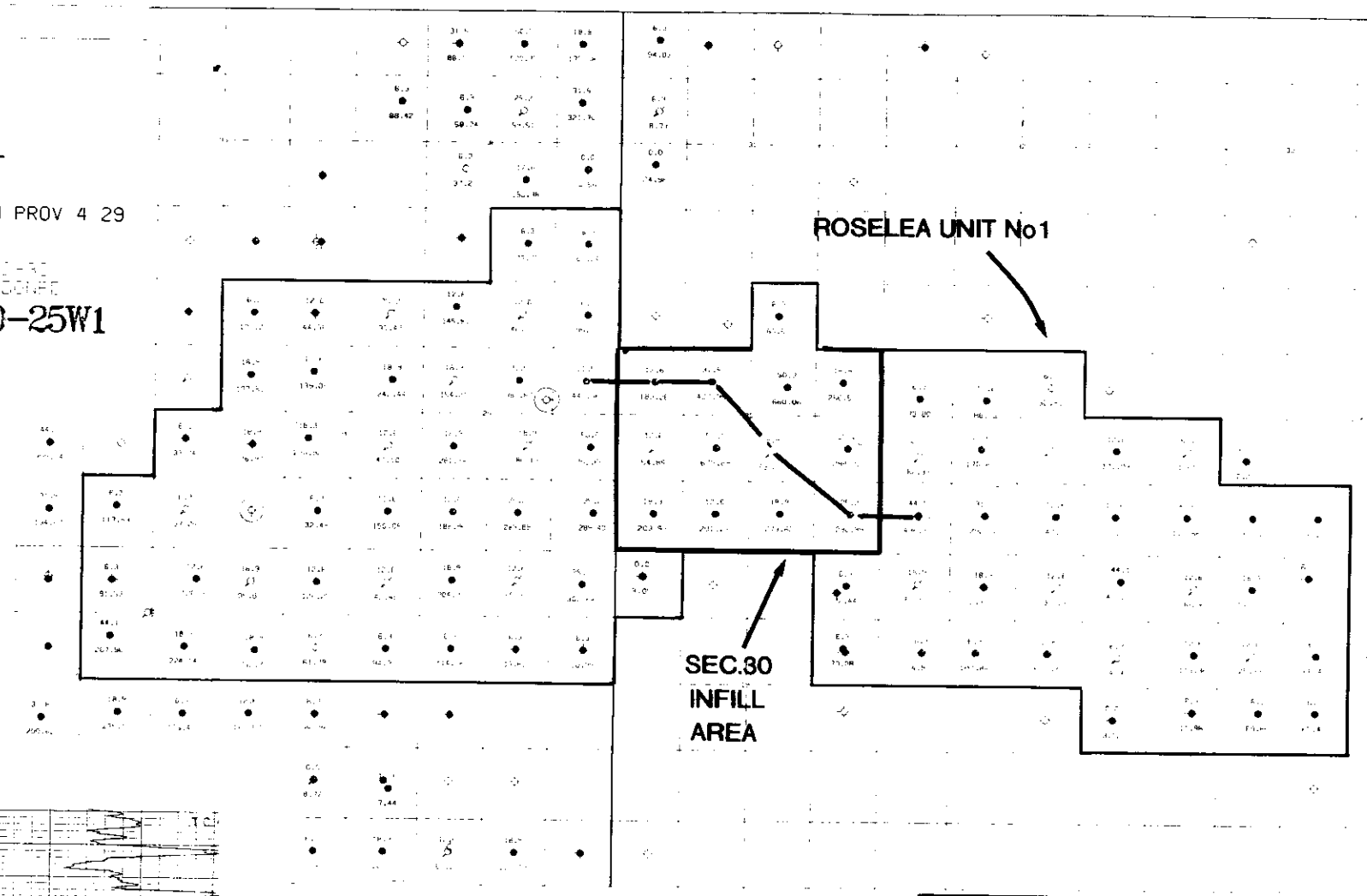
Log scale for RICHARD FORES', Rm 1341, local 5017, job: LUCASEL, created: 90-12-17

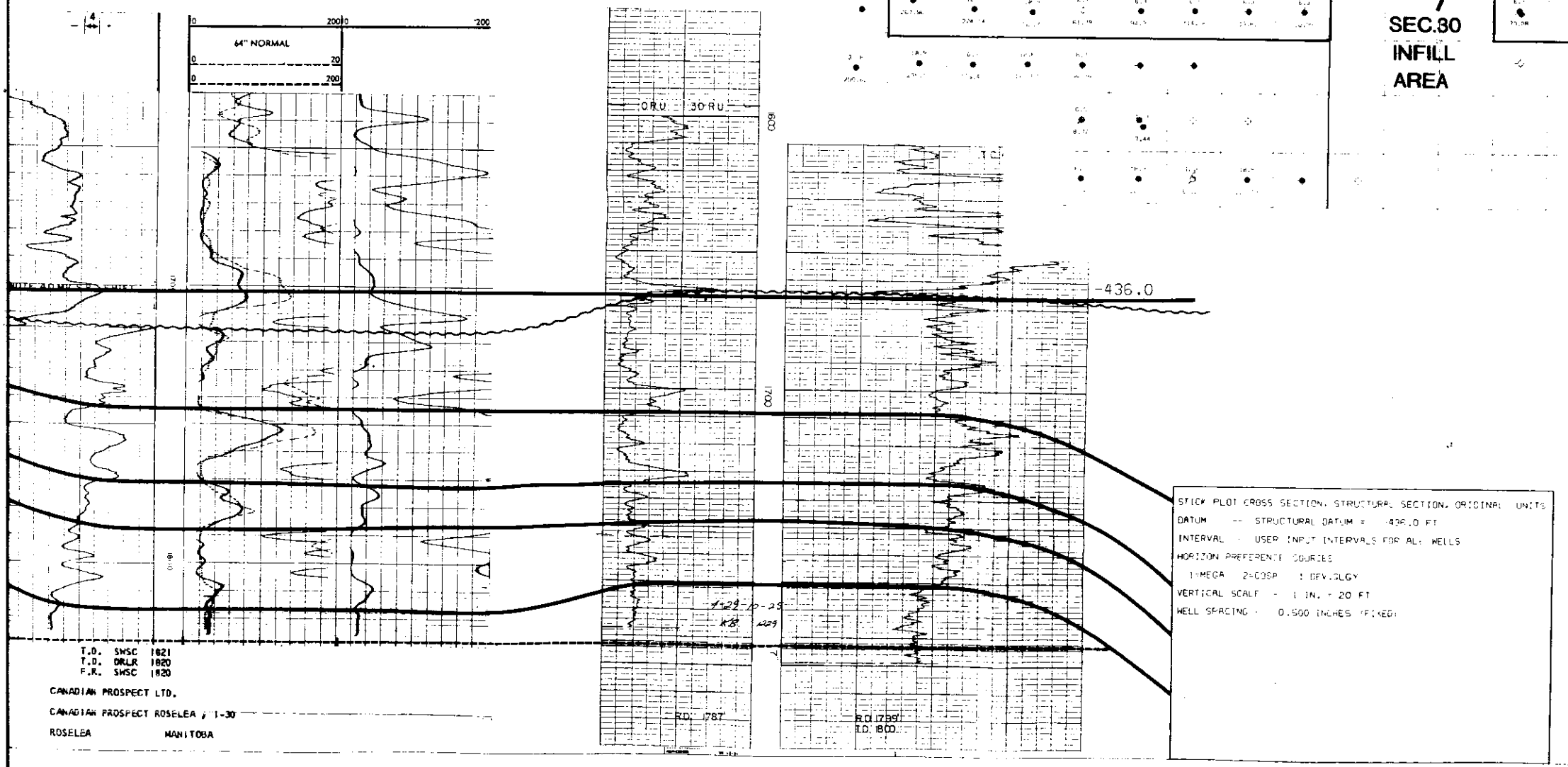


RDEN 11-30-10-25
-010-25W1
PLACER VIRDEN 7-30-10-25
07-30-010-25W1
PLACER VIRDEN 1-30-10-25
01-30-010-25W1
CHEVRON EAST VIRDEN PROV 4 29
04-29-010-25W1
RESISTIVITY ohms m2/m
RESISTIVITY ohms m2/m
SPEARFISH
CRINOIDAL
SANDHILLS
OOLITES
CHERTY
ELEV. 1418
-563 FT SUBSEA
OIL
WATER
-436.0
T.D. SWSC 1980
T.D. DRLR 1980
F.R. SWSC 1980
64" NORMAL
T.D. SWSC 1821
T.D. DRLR 1820
F.R. SWSC 1820
CANADIAN PROSPECT LTD.
CANADIAN PROSPECT ROSELEA # 1-30
ROSELEA MANITOBA

PLACER VIRDEN 1-30-10-25
KB: 1265
FTD: 1821
PF: 55-11-11
STATUS: PUMPING OIL
01-30-010-25W1

CHEVRON EAST VIRDEN PROV 4 29
KB: 1259
FTD: 1479
PF: 55-11-11
STATUS: ABANDONED
04-29-010-25W1





STICK PLOT CROSS SECTION, STRUCTURAL SECTION, ORIGINAL UNITS
DATUM -- STRUCTURAL DATUM = -436.0 FT
INTERVAL -- USER INPUT INTERVALS FOR ALL WELLS
HORIZON PREFERENCE SOURCES
1=MEGA 2=DSP : DEV.GLGY
VERTICAL SCALE = 1 IN. = 20 FT
WELL SPACING = 0.500 INCHES (FIXED)

Chevron Canada Resources

MAN VIRDEN

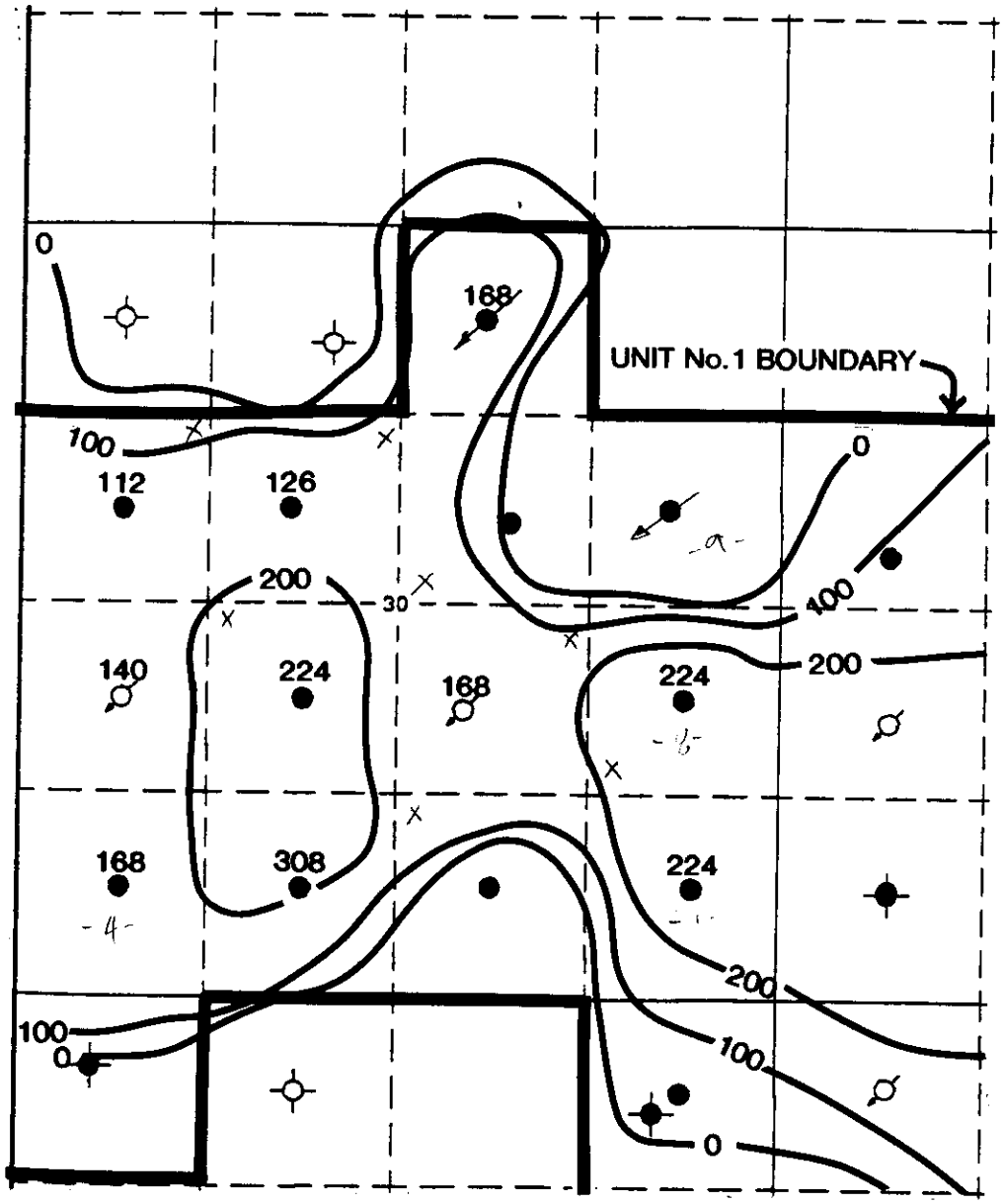
STRUCTURAL X-SECTION

STICK

ISOPOROSITY (øh) MAP

SANDHILL MEMBER

ROSELEA UNIT No.1 INFILL AREA



LEGEND

CONTOUR EVERY 100 UNITS

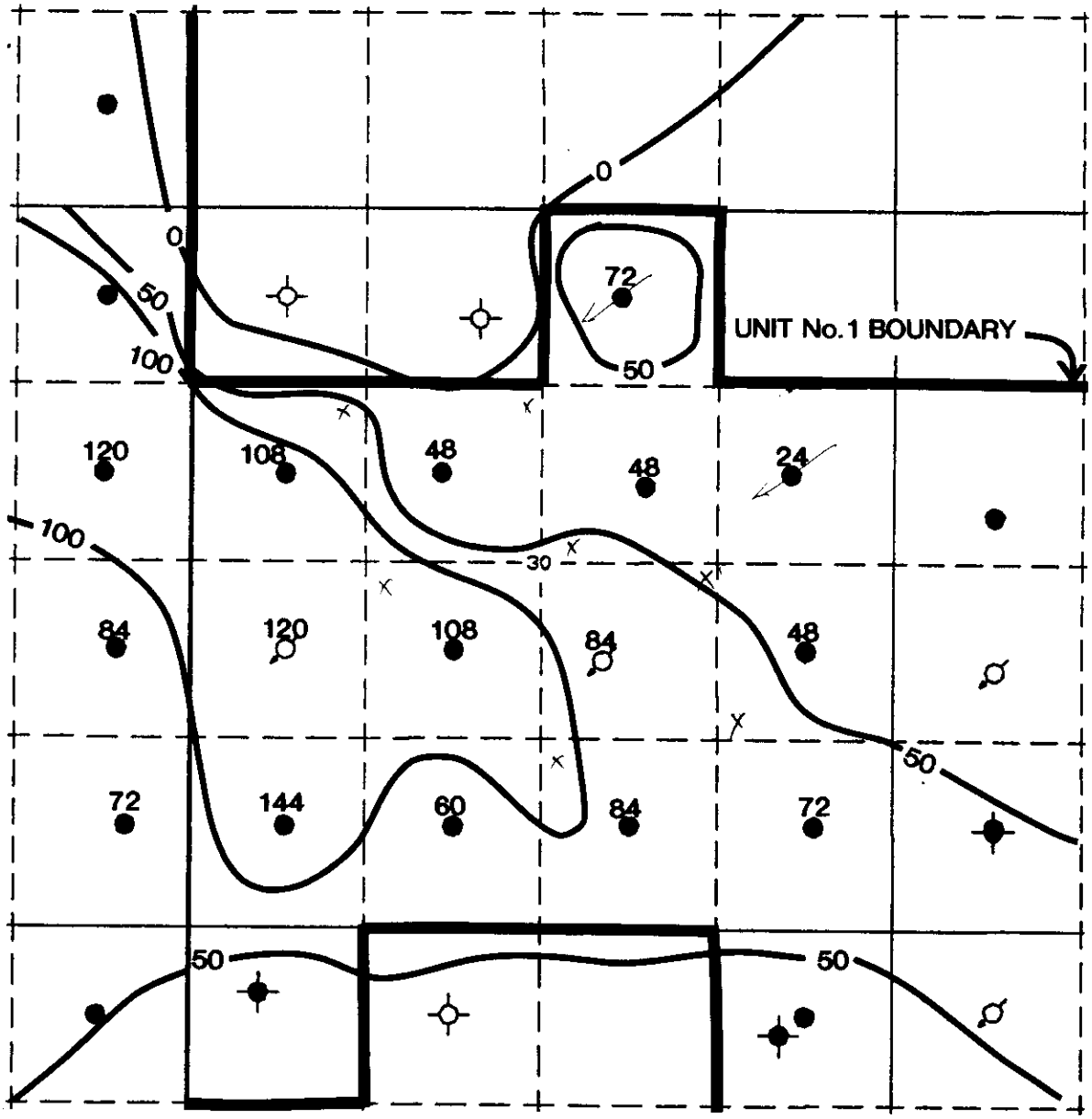
UNITS: % - ft.

NOTE: AVERAGE WEIGHTED SANDHILL POROSITY CALCULATED USING 7-30,8-30,9-30 CORE ANALYSIS øAV=14%

ISOPOROSITY (øh) MAP

1st-2nd & 3rd OOLITE

ROSELEA UNIT No.1 INFILL AREA



LEGEND

CONTOUR EVERY 50 UNITS

UNITS: % - ft.

0 1/2 MILE

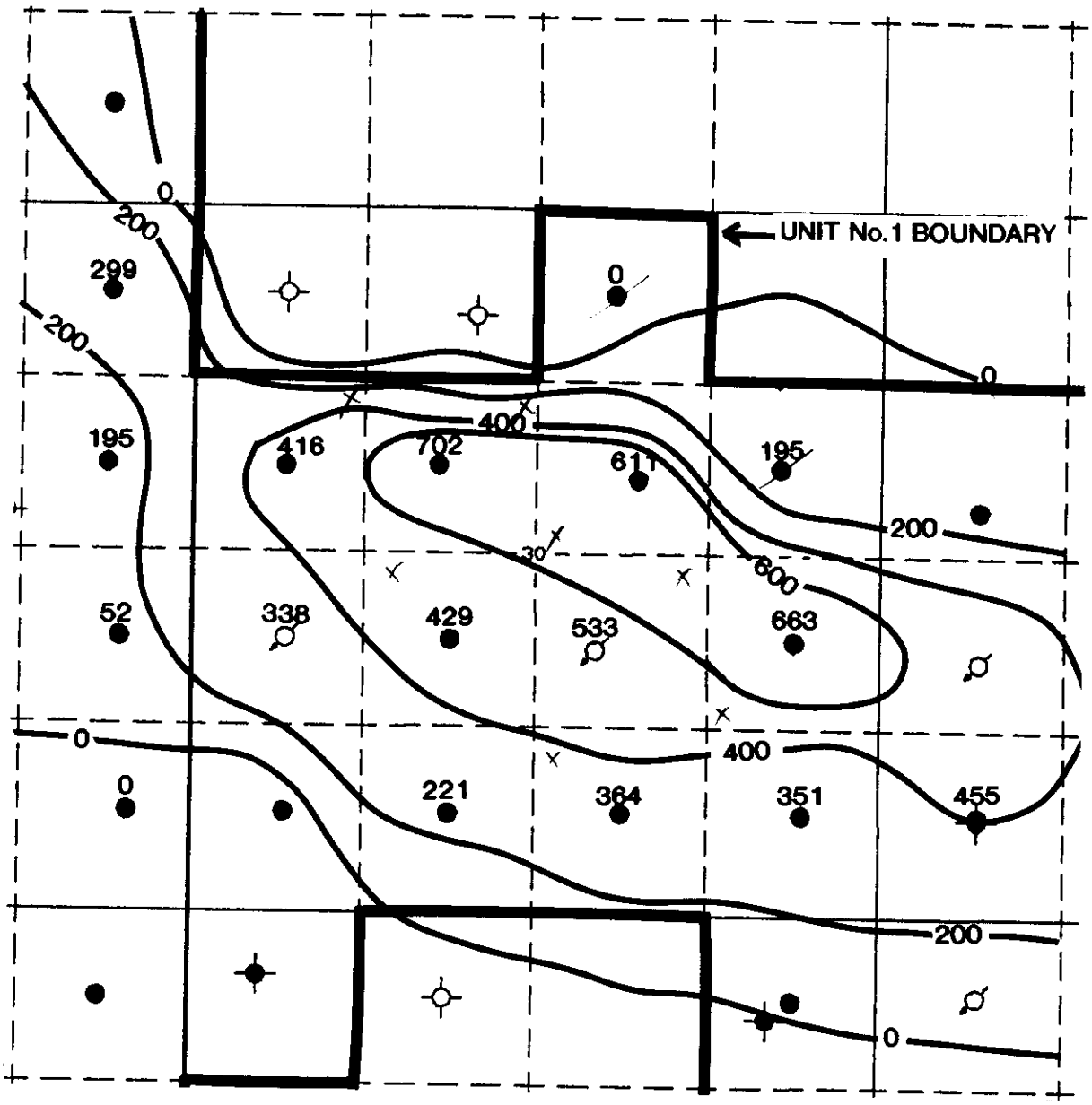
NOTE: AVERAGE OOLITE POROSITY CALCULATED USING 7-30,8-30,9-30 CORE ANALYSIS

øAV=12%

ISOPOROSITY (øh) MAP

4th OOLITE & CHERTY ZONE

ROSELEA UNIT No.1 INFILL AREA



LEGEND

CONTOUR EVERY 200 UNITS

UNITS: % - ft.

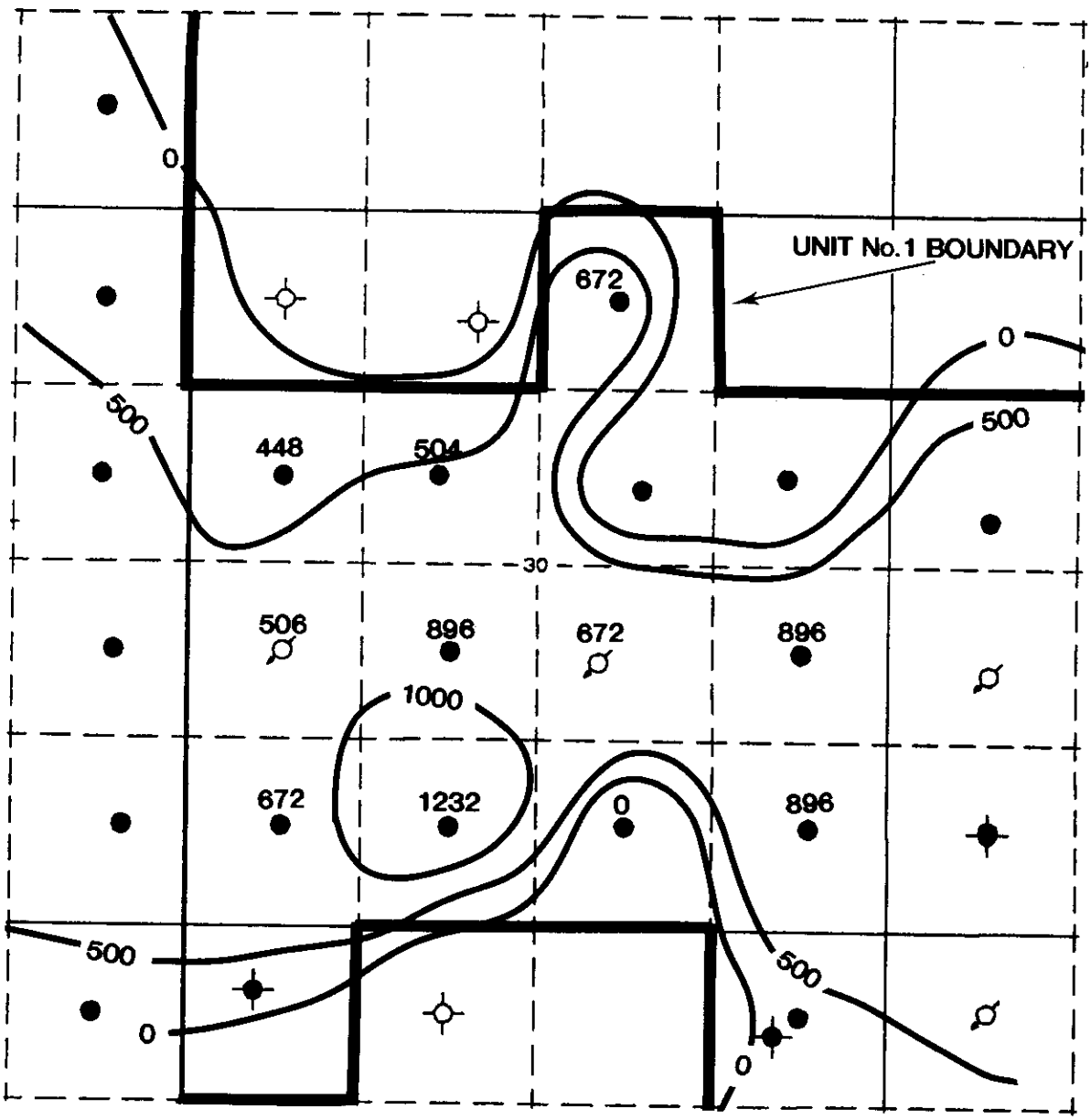
0 — 1/2 MILE

NOTE: AVERAGE WEIGHTED 4th OOLITE AND CHERTY POROSITY CALCULATED USING 7-30,8-30,9-30 CORE ANALYSIS øAV=13%

ISOPERMEABILITY (Kh) MAP

SANDHILL MEMBER

ROSELEA UNIT No.1 INFILL AREA



LEGEND

CONTOUR EVERY 500 UNITS

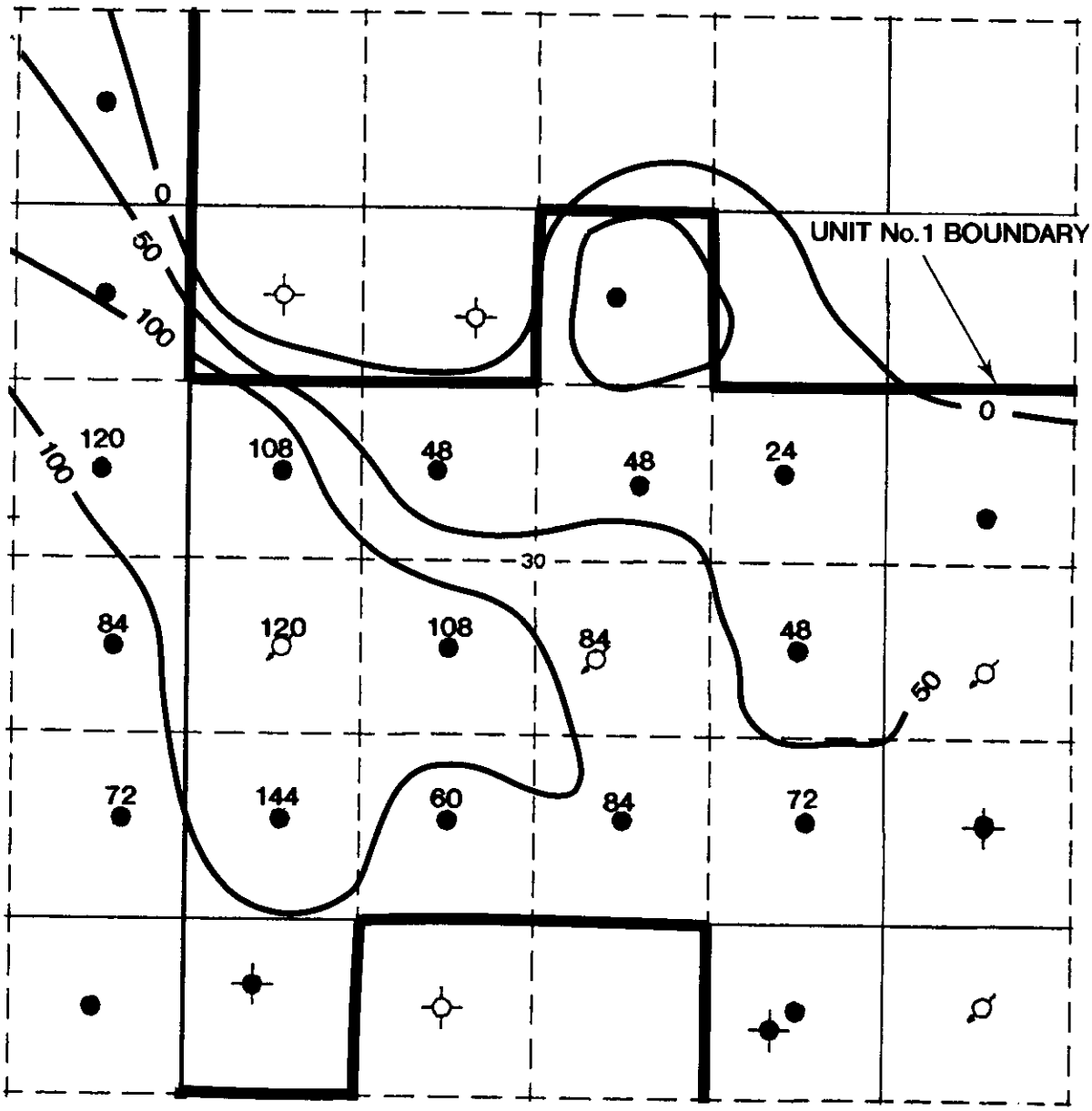
UNITS: md. - ft.

NOTE: AVERAGE WEIGHTED SANDHILL PERMEABILITY CALCULATED USING 7-30,8-30,9-30 CORE ANALYSIS (K_{AV}=56mD)

ISOPERMEABILITY (Kh) MAP

1st,2nd & 3rd OOLITE

ROSELEA UNIT No.1 INFILL AREA



LEGEND

CONTOUR EVERY 50 UNITS

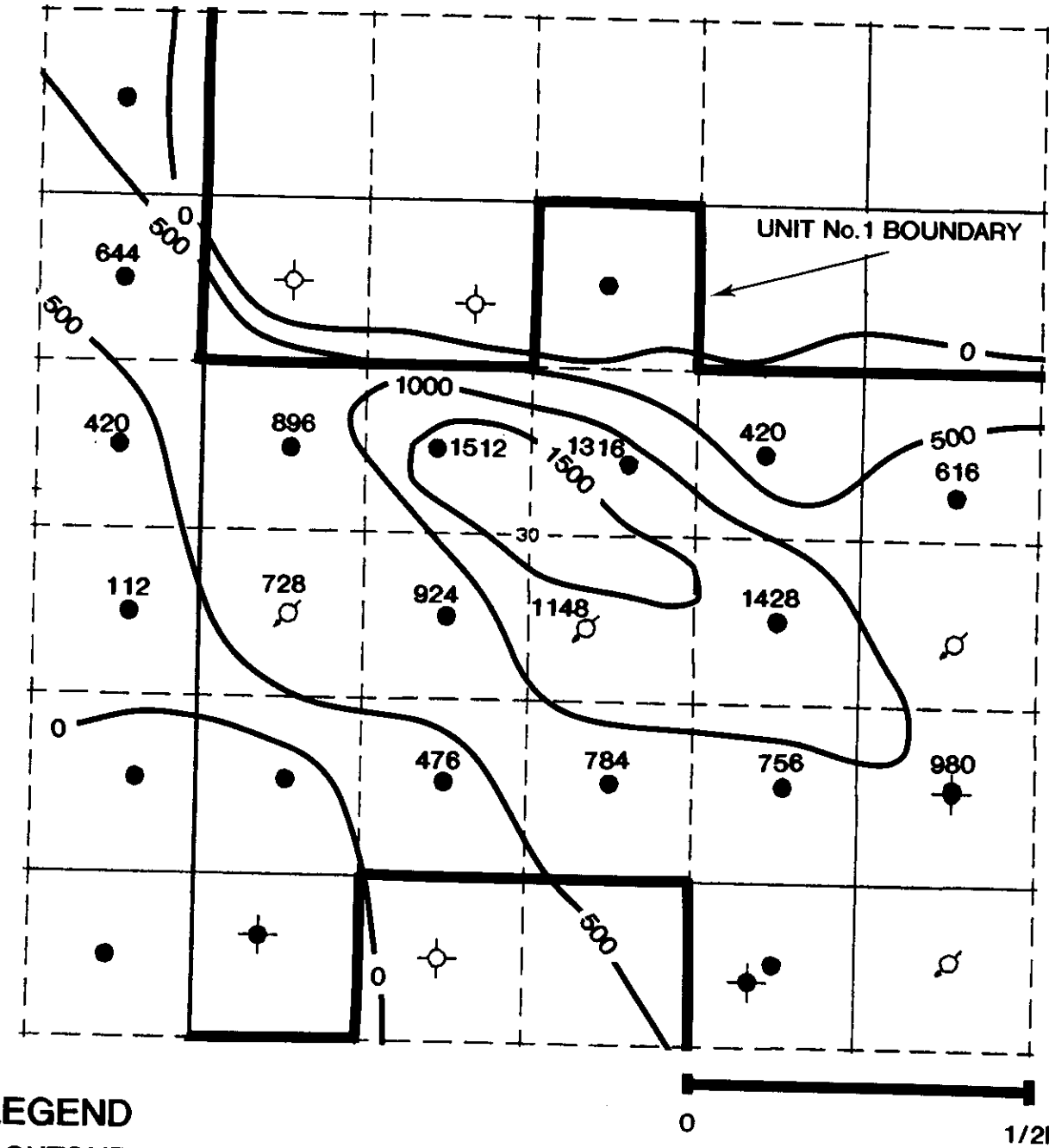
UNITS: md. - ft.

NOTE: AVERAGE WEIGHTED OOLITE PERMEABILITY
CALCULATED USING 7-30,8-30,9-30 CORE ANALYSIS
(K_{AV}=12mD)

ISOPERMEABILITY (Kh) MAP

4th OOLITE AND CHERTY

ROSELEA UNIT No.1 INFILL AREA



LEGEND

CONTOUR EVERY 500 UNITS

UNITS: md. - ft.

NOTE: AVERAGE WEIGHTED 4th OOLITE AND CHERTY PERMEABILITY CALCULATED USING 7-30,8-30,9-30 CORE ANALYSIS (K_{AV}=28mD)

TECHNICAL DISCUSSION OF THE VIRDEN ROSELEA UNIT NO. 1 REDUCED SPACING PILOT

HISTORY

The Virden Roselea oilfield was discovered in 1953 and produced on primary with pressure support being provided by the aquifer to the southwest. Virden Roselea Unit No. 1 was created in 1965-07-01 and has been on waterflood with 16 ha spacing since 1965-10. The current recovery from the unit is 27.3% OOIP. A plot of historical unit production is given in Figure 1.

PROJECT AREA SELECTION

An evaluation of the North Virden Scallion Unit (NVSU) No. 1 infill drilling pilot indicated that infill drilling in the Virden area should be concentrated in areas with the following characteristics:

1. structurally high,
2. moderate to high oil rate,
3. low watercut,
4. low to moderate reservoir depletion.

A review of the Virden Roselea Unit (VRU) No. 1 showed that Section 30-10-25 WPM met these criteria. A geological review showed that this area falls on the apex of reservoir structure in Unit No. 1. Oil rates are relatively higher and watercuts are relatively lower in Section 30 than in other areas of Unit No. 1. Although cumulative oil production in Section 30 is significantly greater than the rest of VRU No. 1, reservoir depletion is moderate because of oil migration. The final factor in the selection of the project area was the likelihood of encountering incremental reserves in the Cherty member. Because it is not penetrated by all wells, the Cherty is an attractive target for the infill wells.

A net pay map showing the proposed infill locations and injection well conversions is shown in Figure 2.

DISCUSSION

Project-Area Geology

1. Producing Zones

   Virden Roselea Unit No. 1 produces from three members of the Lodgepole Formation. In the selected infill area, the main members are the Cherty and Sandhill, with additional production from the Oolites. This compares to NVSU No. 1 where production is primarily from the Oolite and Cherty members.

2. Reservoir Continuity

   Reservoir continuity of the producing members is high within the proposed area. They are laterally continuous, but vertically separated by tight shale streaks.

3. Incremental Oil in Cherty Reservoir

Six of the original 11 wells in the selected infill area have TD'd above the Cherty member and, therefore, have not drained the Cherty oil reserves. It is likely that the proposed infill wells will encounter a thick Cherty member and produce incremental oil.

4. Roselea Structure

The selected Roselea infill area overlies a dome-like structure orientated NW-SE, with the apex centred on LSD's 6, 7, 8, 9, 10, 11-30 (Figures 5 and 6).

5. Reservoir Parameters and Volumetric Reserves

Reservoir parameters and OOIP were determined using core analyses and electrical logs. Table 1 summarizes the reservoir parameters and OOIP for each zone in the proposed infill area.

TABLE 1

Reservoir Parameters and OOIP

	Sw	ϕ	OOIP (E^3m^3)	% OOIP
Crinoidal	0.35	0.10	268.0[1]	10
Sandhill and First Oolite	0.26	0.14	689.6	26
Second and Third Oolite	0.42	0.12	270.6	10
Fourth Oolite and Cherty	0.50	0.13	1 467.6[2]	54
Total			2 695.8	
(Exc. Crinoidal)			2 427.8	
Production to Date			529.0	
Recovery Factor			21.9	
FVF			1.06	
P_{BP} (kPag)			1170.0	
GOR (m^3/m^3)			13.8	
μ_{oil} (cp)			3.7	

Note: [1] Crinoidal member has not been produced by existing wells
[2] OOIP assuming O/W contact at -563 feet subsea

Project Area Waterflood Performance

The project area is a prolific area of VRU No. 1. It accounts for 34% of unit oil production from 13% of the unit area and 16% of the unit wells. The productivity of the project area is seen in Figure 3 which shows cumulative oil production for VRU No. 1. Figure 4 shows the historical production of the project area. The project area and unit production characteristics are compared in Table 2.

TABLE 2

Virden Roselea Unit No. 1

	Project Area	Unit
Area (ha)	192 ~ 12 x 16 ha	1 488
OOIP (E^3m^3)	2 700	7 930
Recovery (%)	21.9	27.3
Oil Rate (m^3/d)	33	101
WOR	1.5	10.4
Production Decline (%/yr)	2.6	4.6

A review of waterflood performance in Section 30 revealed that waterflooding has been affected by the structure in this area. The injected water has apparently flowed down structure because the downdip locations have typically produced more water and have higher WOR's than locations on the apex of the structure. This is demonstrated in Figures 5 and 6, which illustrate the influence of structure on cumulative water production and WOR. Although the aquifer may also be influencing the performance of the downdip wells, the injectors at 5-30 and 7-30 have injected 7.0 and 2.5 times their 16 ha HCPV's. Any influence of the aquifer on most of the pilot area will have been negated by the substantial injection into these two injectors.

The reservoir development of the VRU No. 1 project area has been somewhat inconsistent. Approximately 63% of the area's completed ϕh is in the Sandhill and Oolite members, and the Cherty has not been penetrated by all wells. All of the injection in the pilot area is into the Sandhill and Oolite members. Furthermore, two locations in the apex of the reservoir structure, 6 and 10-30, have recovered greater than 50% OOIP, and yet are only producing from a fraction of their total pay (Cherty not penetrated). From this analysis, two targets exist for infill drilling:

1. Undrained reserves in the Cherty member. These reserves will be incremental production.
2. Migrated oil in the apex of the structure. This oil represents both incremental and accelerated production.

Infill Locations and Conversions

A review was completed of all potential infill locations in Section 30. A project size of five to ten infill locations was chosen to obtain representative infill results and to reduce drilling, completion, and tie-in costs by economies of scale.

The final infill drilling locations were selected based on the following criteria:

1. average elevation of the Lodgepole in offset wells,
2. average offset-well oil rate,
3. average offset-well watercut,
4. potential pay and proximity to undrained Cherty,
5. reservoir quality.

The infill well locations ranked in order of increasing risk are:

1. 10B-30-10-25 W1M
2. 07D-30-10-25 W1M
3. 06C-30-10-25 W1M
4. 11D-30-10-25 W1M
5. 08B-30-10-25 W1M
6. 02C-30-10-25 W1M
7. 12D-30-10-25 W1M

Wells 11D-30 and 12D-30 will be drilled slightly off pattern in order to meet the requirement that wells be drilled at least 100 m from a unit boundary. This is desirable because the wells will likely be in better pay.

Initially, only two wells will be converted to water injection for these reasons:

1. Potential pattern injectors on the apex of the structure are producing at high oil rates.

2. The effects of structure may negate any benefits of pattern waterflooding. Updip water injection could cause fingering and premature water breakthrough.

3. Only two conversions are required to replace voidage in an effective manner.

The converted wells will be 9-30 and 15-30, as shown in Figure 2. Both wells produce at low oil rates and high watercuts, and should have good injectivity. If voidage cannot be maintained with only two injectors, then a third conversion may become necessary.

Infill Well Completions

Present plans are to complete the infill wells open hole. However, the Sandhill and Oolites (middle zones) may be swept and drained, so it is possible that water may be produced preferentially over Cherty and Crinoidal oil in an open hole completion. If this is the case, an inflatable dual packer will be set in the open hole to prevent this problem from occurring. This completion technique would be used when logs show a watered-out pay interval.

Contingency Plans

If, after drilling the four highest ranked infill locations it appears that unswept zones, particularly in the Crinoidal and Cherty, do not exist, two assumptions will be proven false:

1. the existence of incremental reserves,
2. oil migration into the pilot area.

Should this be the case, further drilling may be halted.

Also, due to the proximity of dolomitized (tight) pay to the high structure infill locations at 11D-30 and 12D-30, the drilling of the latter well should be contingent upon the results at 11D-30.

Production Forecasts

Production forecasts for the infill wells were generated assuming average initial oil rates of 3.96 m^3/d/well at a WOR of 1.5. Incremental oil recovery of 87 300 m^3 (3.2% of the project OOIP) was also included in the forecasts. Oil production was assumed to start in June 1991. Production forecasts and percentage of new oil are tabulated yearly in Figure 7. Base case and incremental forecasts for both the project area and Unit are plotted in Figure 8.

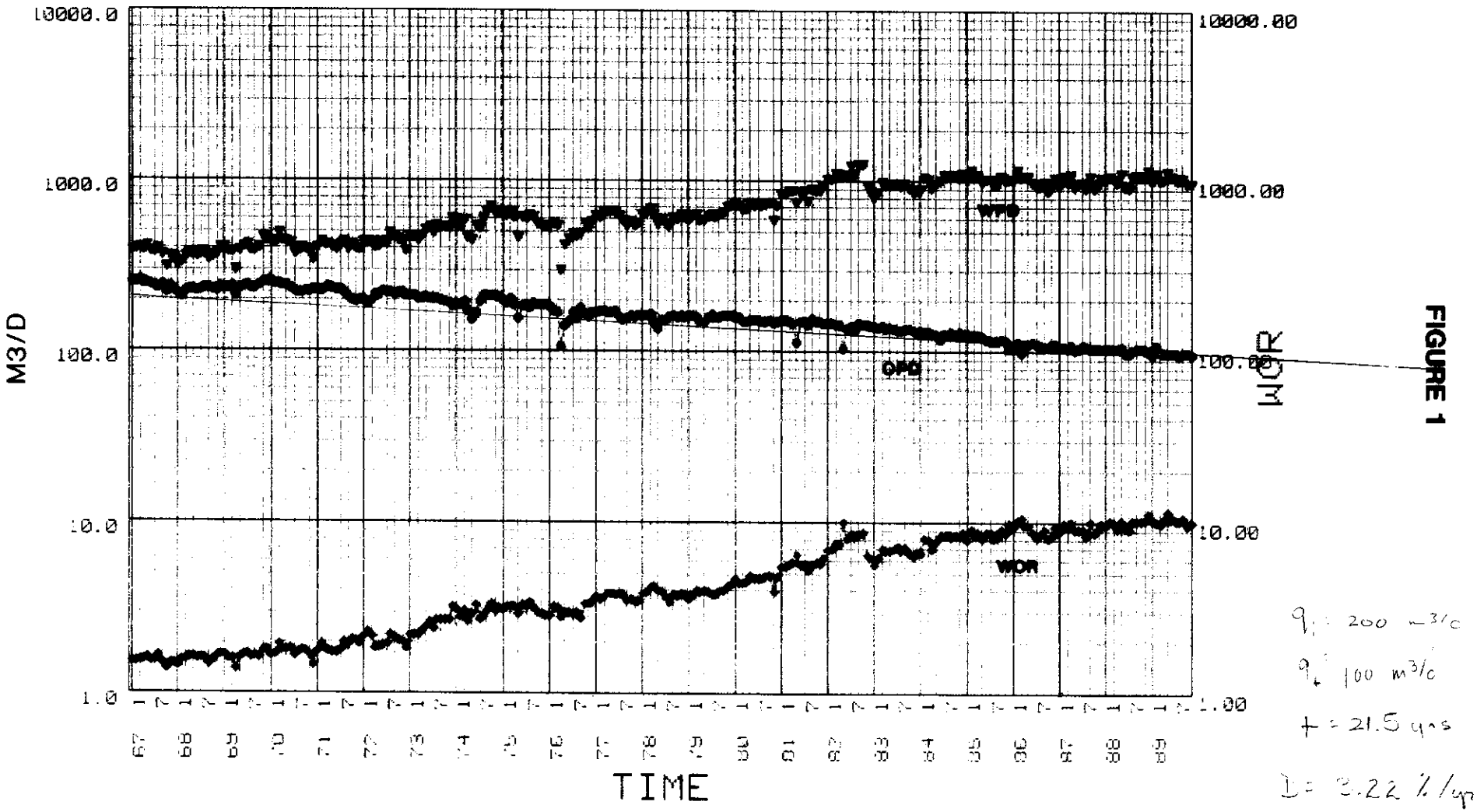


FIGURE 1

q_i = 200 m^3/d

q_f = 100 m^3/d

t = 21.5 yrs

D = 3.22 %/yr

VIRDEN ROSELEA UNIT NO. 1

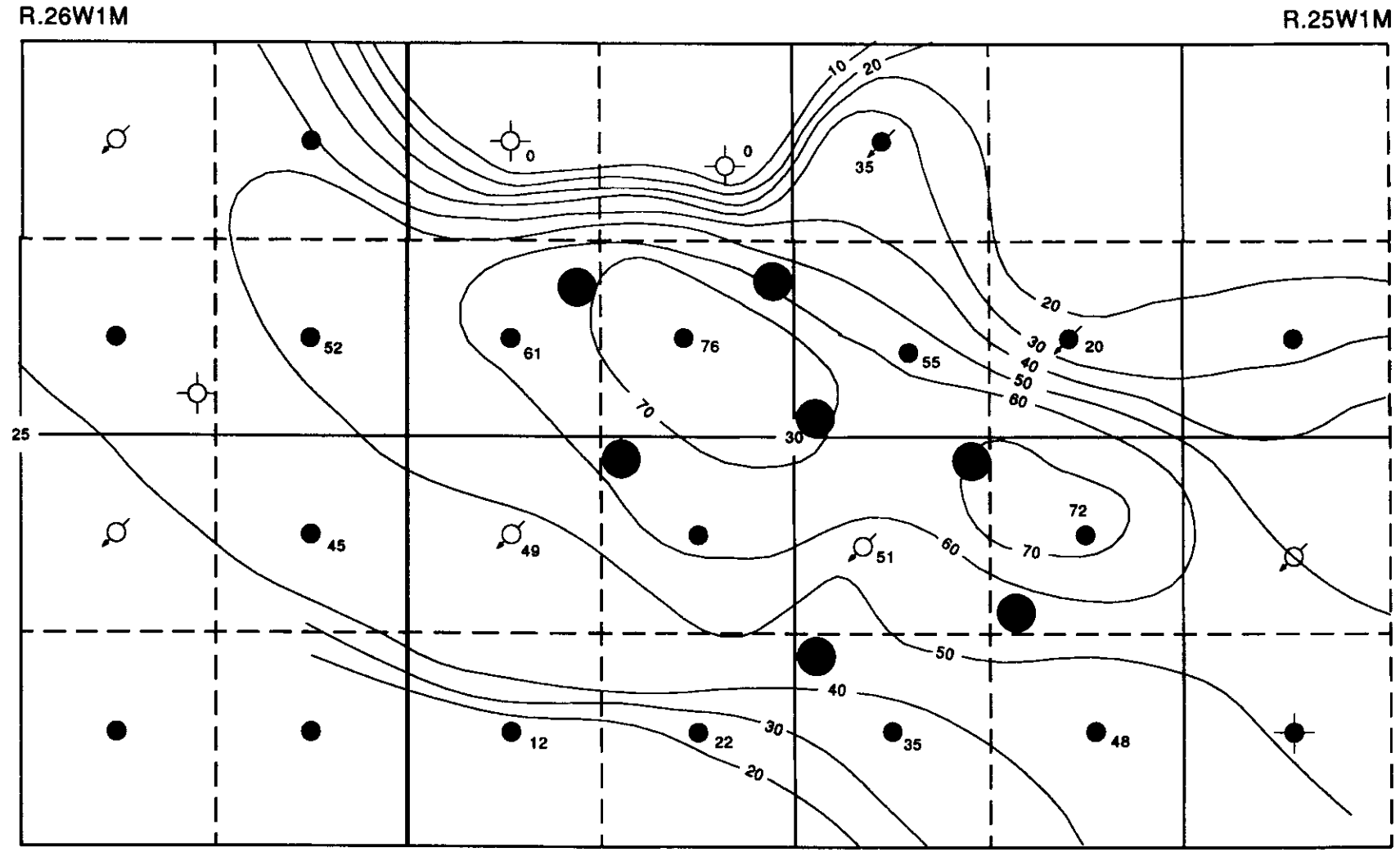


FIGURE 2

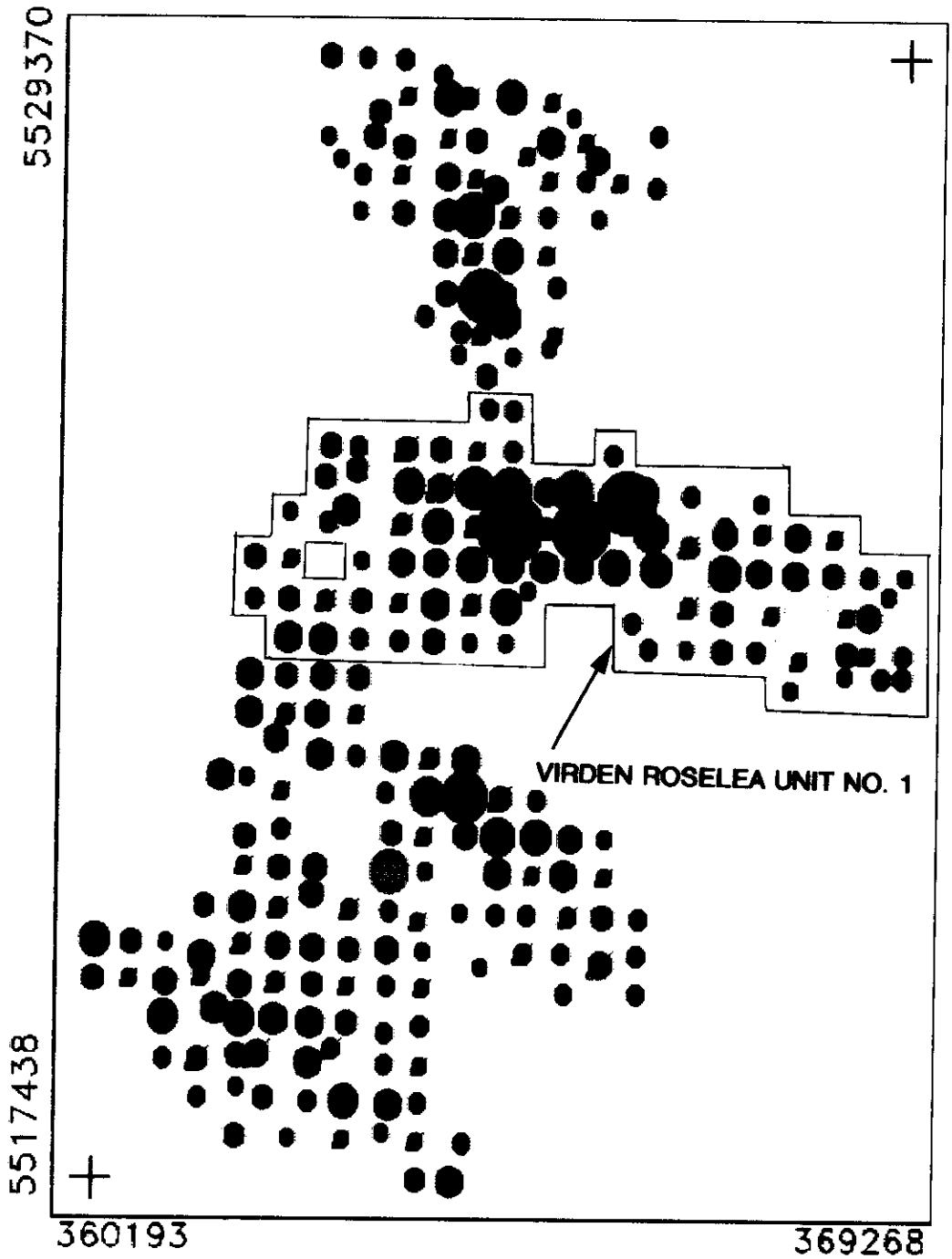
INFILL WELLS

CONVERTED TO WATER INJECTION

ORIGINAL NET PAY MAP
(FEET)

G04540_04

FIGURE 3



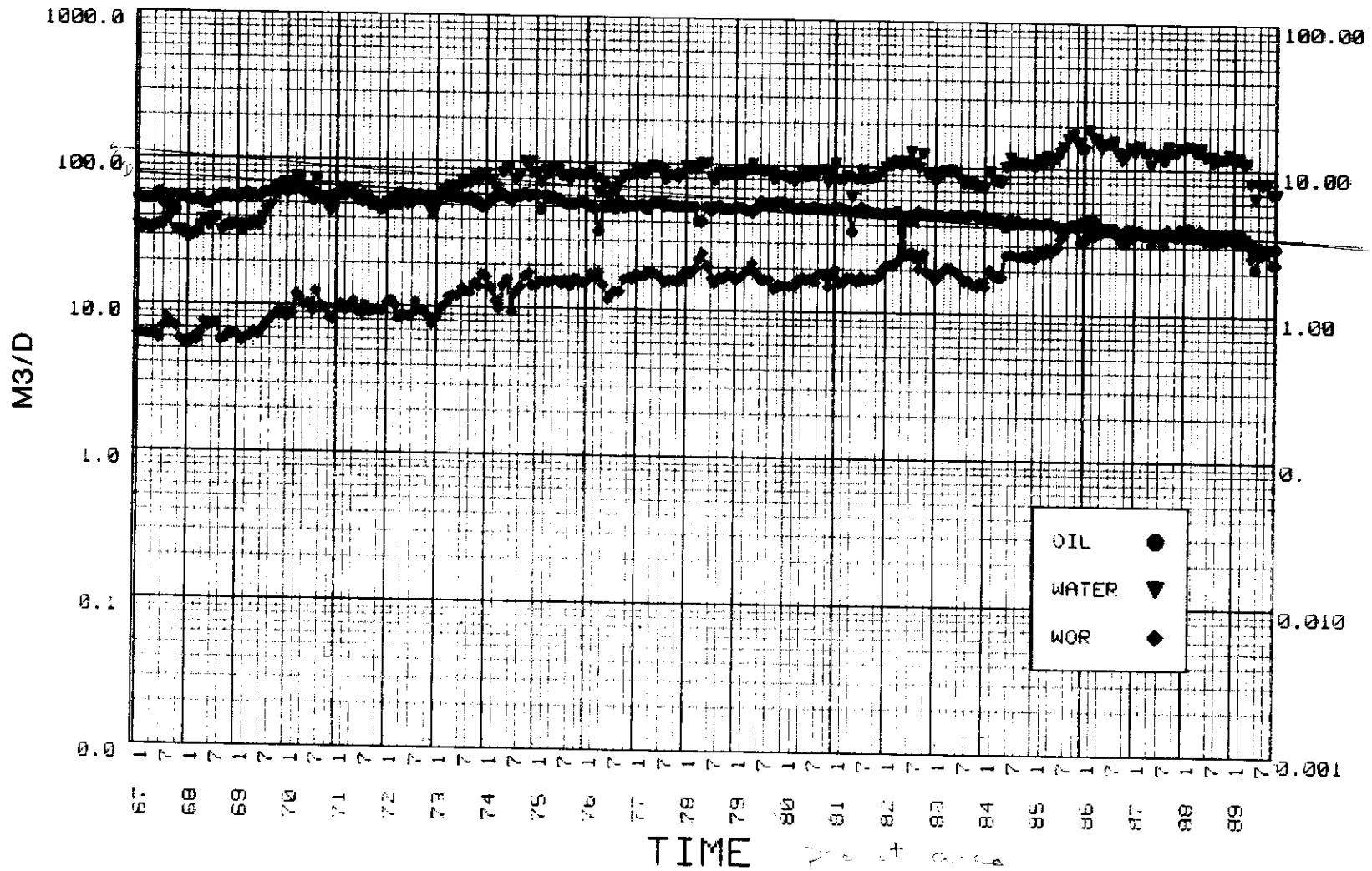
OIL CUM

119310
82599
5888
9177

OIL CUM

119310

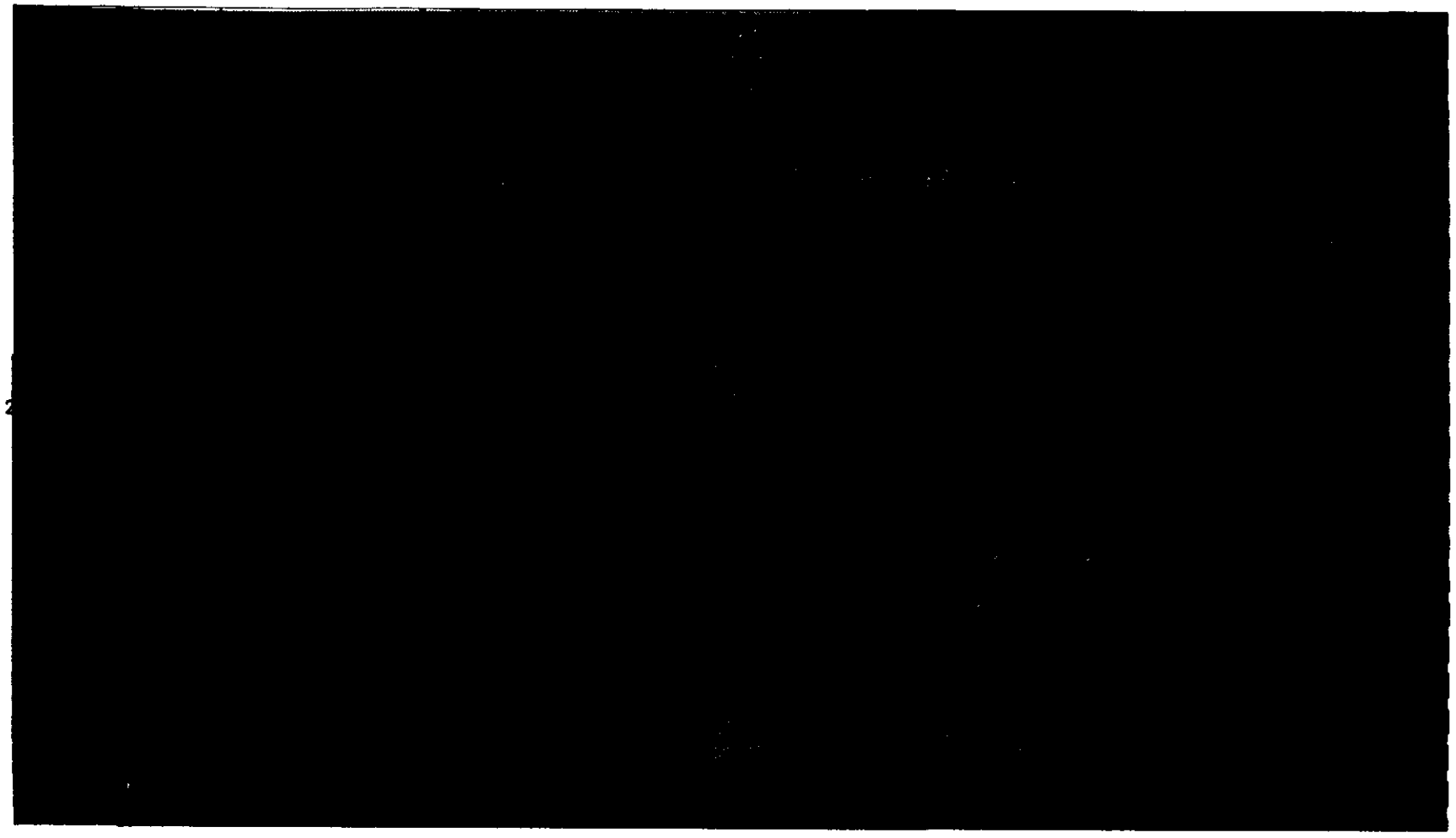
0


1000.0
100.0
10.0
1.0
0.1
0.0
M3/D
100.00
10.00
1.00
0.
0.010
0.001
OIL
WATER
WOR
TIME

VIRDEN ROSELEA UNIT NO. 1
CUMULATIVE WATER PRODUCTION

R.26W1M

R.25W1M



T.10

LEGEND

- 0 - 40 000 m^3
- 40 000 - 80 000 m^3
- 80 000 - 250 000 m^3
- > 250 000 m^3

CUMULATIVE WATER INJECTION
500 000 m^3

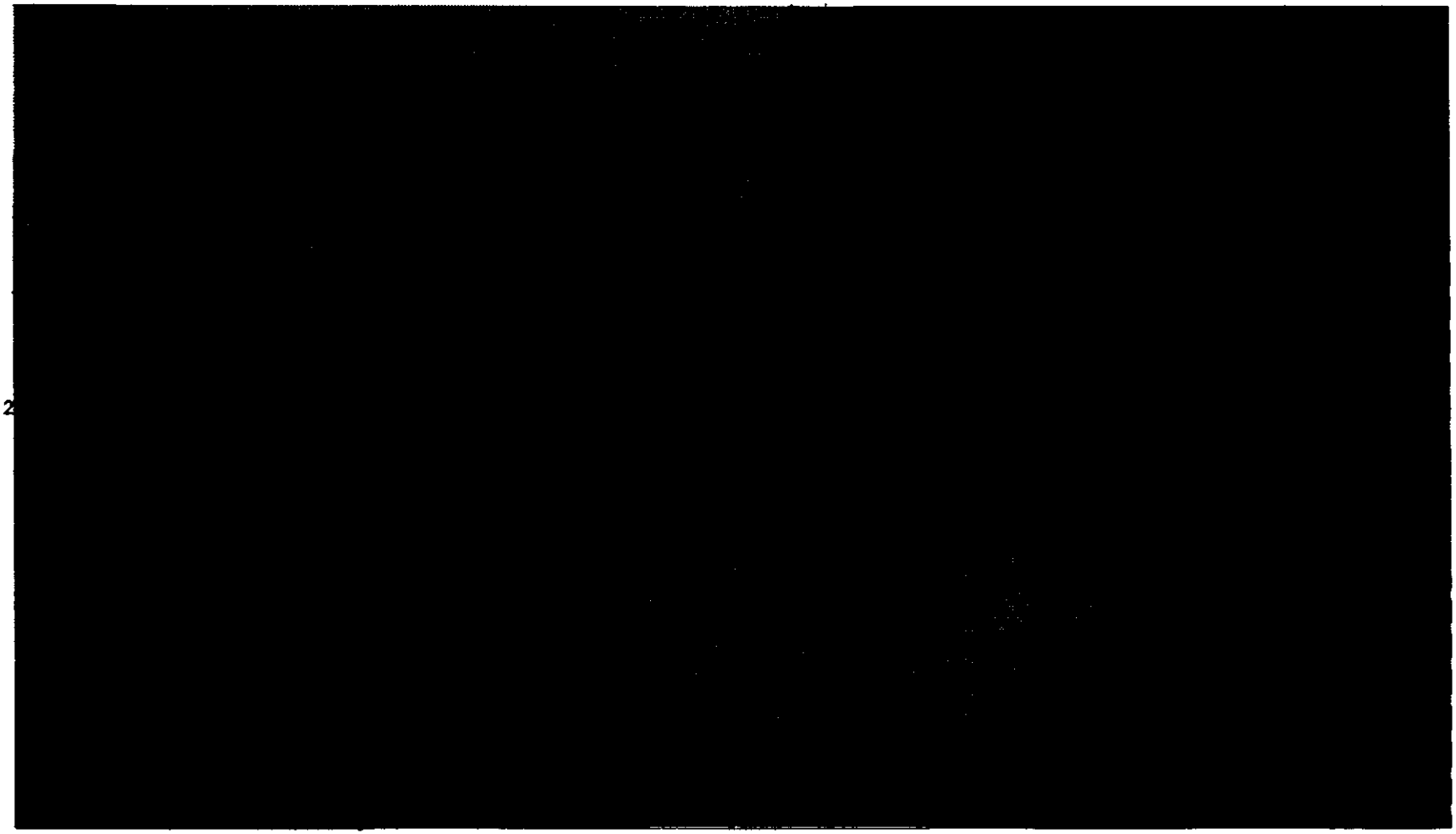
FIGURE 5

G04540_03

VIRDEN ROSELEA UNIT NO. 1
CUMULATIVE WATER-OIL RATIO

R.26W 1M

R.25W 1M



T.10

LEGEND

- 0 - 1
- 1 - 2
- 2 - 4
- > 4

FIGURE 6

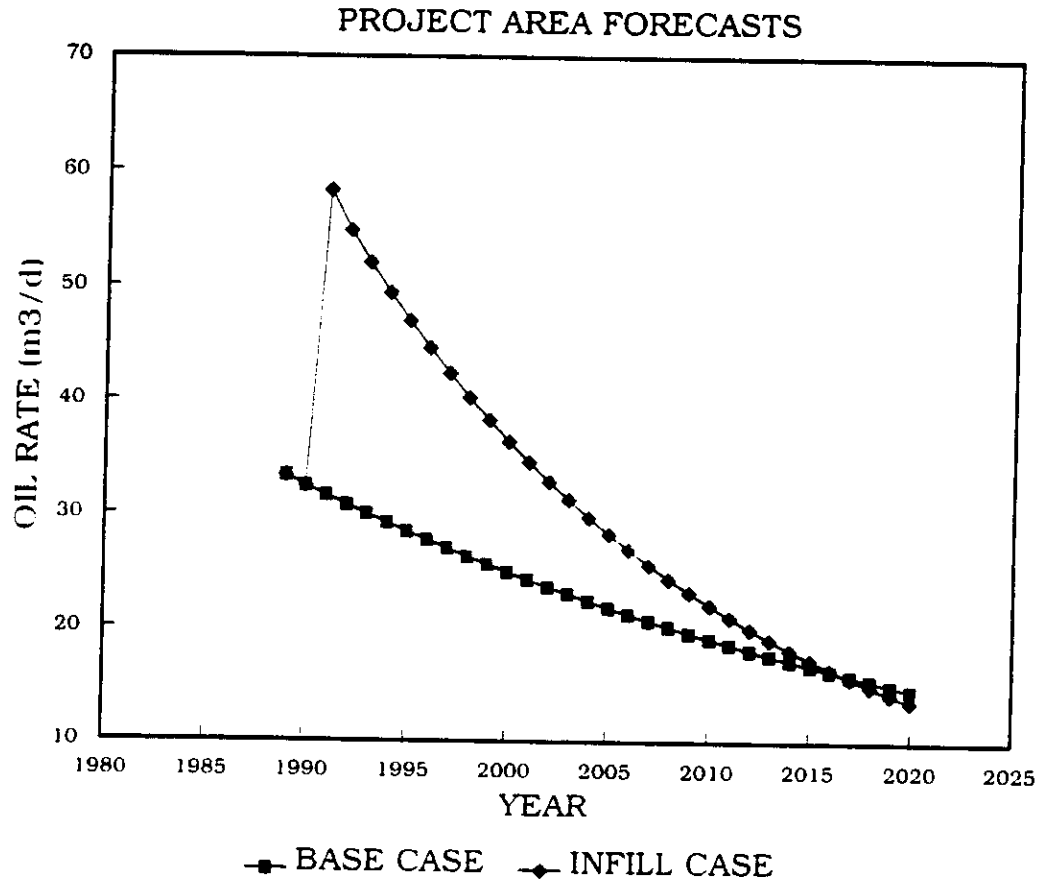
G04540_02

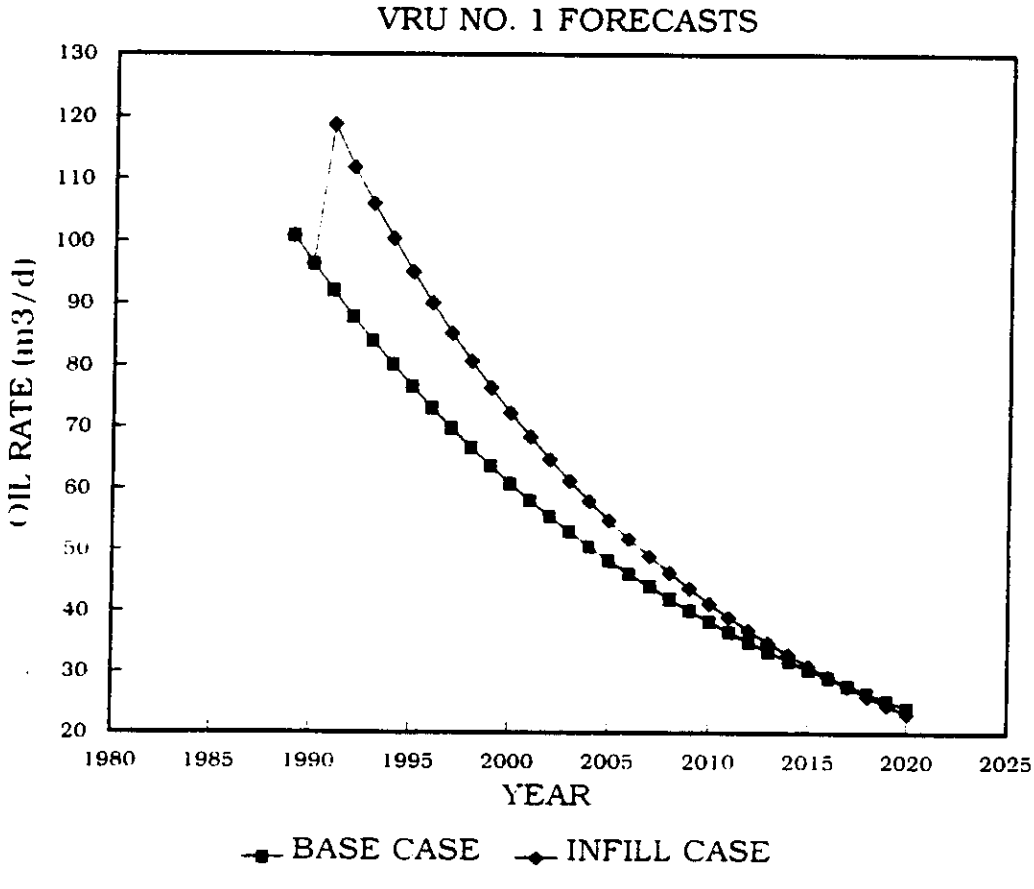
FIGURE 7

VIRDEN ROSELEA UNIT NO. 1
REDUCED SPACING FORECASTS

	INFILL PROJECT AREA			VRU NO. 1		
	Base Case (m^3/d)	Infill Production (m^3/d)	Infill Case (m^3/d)	Base Case (m^3/d)	Infill Case (m^3/d)	% New Oil (%)
1991-06	31.68	27.72	58.40	92.12	118.84	23.32
1992	30.85	25.98	54.88	87.98	112.01	23.19
1993	30.04	24.34	52.11	84.03	106.10	22.94
1994	29.26	22.81	49.49	80.25	100.48	22.70
1995	28.49	21.37	47.00	76.64	95.15	22.46
1996	27.75	20.03	44.66	73.19	90.11	22.23
1997	27.02	18.77	42.43	69.90	85.31	22.00
1998	26.31	17.59	40.32	66.76	80.77	21.78
1999	25.62	16.48	38.32	63.76	76.46	21.56
2000	24.95	15.44	36.43	60.89	72.37	21.34
2001	24.30	14.47	34.63	58.16	68.48	21.13
2002	23.67	13.56	32.93	55.54	64.80	20.92
2003	23.05	12.71	31.32	53.04	61.31	20.72
2004	22.44	11.91	29.79	50.66	58.00	20.53
2005	21.86	11.16	28.34	48.38	54.86	20.34
2006	21.29	10.46	26.97	46.21	51.89	20.15
2007	20.73	9.80	25.66	44.13	49.06	19.97
2008	20.19	9.18	24.42	42.15	46.38	19.80
2009	19.66	8.60	23.24	40.25	43.83	19.63
2010	19.15	8.06	22.13	38.44	41.43	19.46
2011	18.64	7.55	21.07	36.71	39.14	19.30
2012	18.16	7.08	20.07	35.06	36.97	19.15
2013	17.68	6.63	19.11	33.49	34.92	19.00
2014	17.22	6.22	18.21	31.98	32.97	18.86
2015	16.77	5.82	17.34	30.54	31.12	18.72
2016	16.33	5.46	16.53	29.17	29.37	18.59
2017	15.90	5.11	15.74	27.86	27.70	18.47
2018	15.49	4.79	15.00	26.61	26.12	18.35
2019	15.08	4.49	14.30	25.41	24.63	18.24
2020	14.69	4.21	13.64	24.27	23.22	18.13
		137,897 m^3	46556			

FIGURE 8


PROJECT AREA FORECASTS
OIL RATE (m3/d)
70
60
50
40
30
20
10
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
YEAR
BASE CASE
INFILL CASE


VRU NO. 1 FORECASTS
OIL RATE (m3/d)
130
120
110
100
90
80
70
60
50
40
30
20
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
YEAR
BASE CASE
INFILL CASE

INITIAL RESULTS AND ANALYSIS OF THE NORTH VIRDEN SCALLION UNIT NO. 1 REDUCED SPACING PILOT

INTRODUCTION

The application for a Reduced Spacing Pilot in the North Virden Scallion Unit (NVSU) No. 1 was approved in 1989-06. The purpose of the pilot was to evaluate pattern waterflooding with reduced 8 ha well spacing. The original design called for drilling nine infill wells and converting eleven existing producers to injectors. Figure 1 shows the proposed development on a map of NVSU No. 1. Nine infill wells were drilled but only three wells were converted to water injection when it became apparent that conversion of the other eight wells would result in an uneconomic project.

RECOMMENDATION

Subsequent infill programs should focus on areas with the following characteristics:

1. Local structural high.
2. Moderate to high oil rates.
3. Relatively low watercuts.
4. Low to moderate reservoir depletion.

ORIGINAL ASSUMPTIONS & DESIGN

The NVSU No. 1 Infill Drilling Pilot Project was initiated in 1988. Incremental reserves of 100 000 m^3 were predicted. The project involved drilling nine infill wells and converting eleven existing producers to injection to obtain the well configuration shown in Figure 2.

The project area location was selected primarily on the basis of relatively low current recovery from the Recovery Map shown in Figure 3. Other factors which contributed to the area's selection were:

1. good net pay,
2. low water production,
3. poor ultimate recovery,
4. supportive land owners.

The pilot project production forecast was developed based on the following assumptions:

1. Constant fluid rate of 125 m^3/d.
2. WOR in infill wells would be 30% of current project-area WOR.
3. Initial oil rate from infill wells would be equal to original oil rate from existing wells (6.8 m^3 opd/well).
4. Infill oil production would decline approximately 15%/yr after waterflood breakthrough time of one year.
5. Incremental recovery of 100 000 m^3 (7.6% OOIP).

INFILL RESULTS

Reserves Before and After Infill Program

The North Virden Scallion Unit #1 produces from the Cherty and Oolites members of the Lodgepole Formation. These members are laterally continuous, but vertically separated by tight shale streaks. Thus, the calculated OOIP after infill drilling of 2 164 300 m^3 was very similar to the calculated OOIP for 2 119 600 m^3 before infill drilling. Table 1 summarizes the geological results of the infill locations.

TABLE 1

Infill Geological Results

Well Location	Struct 4th Oolite (ft ss)	OOIP (m^3)	Original Paythick (m)	Current Paythick (m)	ROIP (m^3)	Current O/W Contact (ft ss)	Depletion (D)[1]
09D-23	-485	92 088	10.4	4.9	53 237	-511	42%
10D-23	-495	93 895	11.3	3.9	49 540	-511	48%
11D-23	-517	138 293	15.5	3.7	39 854	-523	72%
14D-23	-531	42 701	4.6	2.2	21 350	?	?
15D-23	-501	108 139	8.8	1.0	8 104	-507	93%
13C-24	-492	123 481	16.4	3.8	32 663	-498	74%
01D-26	-454	312 401	25.9	5.4	59 393	-467	81%
02D-26	-455	165 691	17.0	3.2	31 055	-459	81%
03D-26	-472	83 184	10.0	6.1	54 487	-504	45%

[1] $D = (1 - ROIP/OOIP) \times 100$

Infill Well Production Rates

After drilling, logging, and producing the NVSU No. 1 infill wells it was apparent that a large part of the project areas reservoir had been depleted by the existing producers and injectors. This was due to the high continuity of the main reservoir, the Cherty member. Depletion was indicated by the low oil productivity and high watercuts observed in most of the infills.

The initial production of the nine infill wells was 20 m^3 opd, or 2.2 m^3 opd/well. The average watercut was approximately 82%, equal to the 82% watercut of the project area prior to drilling. Although the reservoir was generally well swept, incremental oil was encountered at 10D-23-11-26 and 03D-26-11-26 indicated by relatively high oil rates, low watercuts and minimal sweep based on log analysis. A summary of NVSU No. 1 infill well performance is given in Table 2.

TABLE 2

Infill Well IP Characteristics

Location	Oil (m^3/d)	Water (m^3/d)	Watercut (%)
09D-23-11-26	3.2	15.4	83
10D-23-11-26	6.8	12.9	66
11D-23-11-26	1.3	15.7	92
14D-23-11-26	0.3	12.3	98
15D-23-11-26	0.5	15.0	97
13C-24-11-26	1.0	2.6	72
01D-26-11-26	1.1	8.1	88
02D-26-11-26	0.4	10.2	96
03D-26-11-26	5.2	0.6	10
	19.8	92.8	82

In order to prevent the project from becoming uneconomic, only three interior wells of the eleven existing producers were converted to injectors. This effectively reduced the cost of the project and maintained oil production in the area while providing the required voidage replacement for the new wells. The actual project development is shown in Figure 4. Other cost saving measures were realized in the drilling and completion of the infill wells, enabling the project to meet economic hurdles. A complete summary of the initial project design and actual results of the infill project is given in Table 3.

TABLE 3

NVSU No. 1 Infill Drilling Pilot Project

		Prior to Infill	After Infill
Project Area:	OOIP (m^3)	2 119 600	2 164 300
	Decline Analysis Reserves (m^3)	105 000	141 800
	ϕ(%)	12.3	-
	S_{oi} (%)	56	-
	Continuity (%)	82	-
	RF (%)	23.9	23.4
	Ultimate Recovery (%)	28.9	29.9
	opd (m^3/d)	22.2	38.4
	Watercut (%)	82	82
		Forecast	Actual
	# of Wells Drilled	9	9
	# Conversions	11	3
	Average Initial Oil Rate (m^3/d/well)	6.8	2.2
	Average Watercut (%)	57	82
	Incremental Recovery	100 000 m^3	36 800

ANALYSIS OF RESULTS

Two key assumptions used in forecasting the infill pilot performance were not attained. First, the average WOR of the infill wells was the same as that of the existing wells in the project area, instead of 30% of the existing WOR. Second, initial oil rates averaged 2.2 m^3/d instead of the forecasted 6.8 m^3/d, although total fluid rates were close to the assumed rate of 125 m^3/d. These poor infill results led to a detailed study of the past history and geology of the pilot area.

The main tool used to select the infill area was the Recovery Map shown in Figure 3. The map shows relatively low recovery in the area of between 20 and 25%. A review of geology and OOIP showed that the project area has a recovery of 23.4%, which is consistent with the Recovery Map. However, this map did not show how well swept much of the pilot area was due to the high withdrawals at 7-26. The 07-26 offset well has produced over 54% of the 16 ha reserves and drained LSD's 01D-26 and 02D-26 due to excellent reservoir parameters and efficient sweep. This accounts for the low oil rates, high WOR's, and high depletion seen in 01D-26 and 02D-26. Thus, the past producing history of 07-26 was important to the performance of some of the infill wells.

Structure was also found to be important to the producing performance and reservoir quality. Highly depleted wells (see Table 1 for depletion calculations) initially produced at an average oil rate of 1 m^3/d oil and high water cuts (WOR > 10). They are also structurally low (i.e., 11D-23, 14D-23, 15D-23, 13C-24) suggesting rapid water encroachment compared to structurally high wells. Moderately depleted wells produced between 3 to 6 m^3 oil per day with WOR of 1 to 5 (i.e., 9D-23, 10D-23 and 03D-26). These wells are located at an intermediate structural elevation where the offset wells have not produced more than 35% of OOIP (Table 1 & 2).

Incremental oil was found in the pilot area in spite of reservoir depletion in the surrounding area by 07-26 and the effects of low structure. 3D-26, although structurally high, is close to 7-26 but still produced 5.1 m^3/d oil at a WOR of 1.3. 10D-23 is located structurally low but produced 6.6 m^3/d oil at a WOR of 1.9. The production from both these wells was felt to include incremental production because these areas of the reservoir were not well swept by the waterflood, as indicated by the high oil rates and low WOR's.

In general, therefore, infill wells drilled on local structural highs will tend to be the best producers because they will encounter thicker pay. This typically was the case in Scallion. The effects of offsetting wells that may have drained a disproportionate share of the reservoir must also be considered.

RESULTS AND CONCLUSIONS

Results of the infill project at North Virden Scallion Unit No. 1 include:

1. The average infill initial producing rate was approximately one third of that forecasted, and equal to the existing average offset rate.

2. A large part of the project area had been depleted by the existing wells, and particularly 7-26. This was one of the causes of the poor results of this program.

3. Incremental oil was found at 10D-23-11-26 and 03D-26-11-26.

4. Wells located on structural highs typically produce at higher oil rates and lower watercuts because oil pay is thicker.

5. The projects' economic viability was maintained because:

   a. drilling costs were significantly less than forecasted,
   b. completion costs were reduced by the use of old artificial lift equipment,
   c. only three of the eleven proposed conversions were completed.

Future infill programs may take into consideration some or all of the following:

1. Infill wells should be located on structural highs to maximize oil pay and well productivity, and to avoid rapid water encroachment.

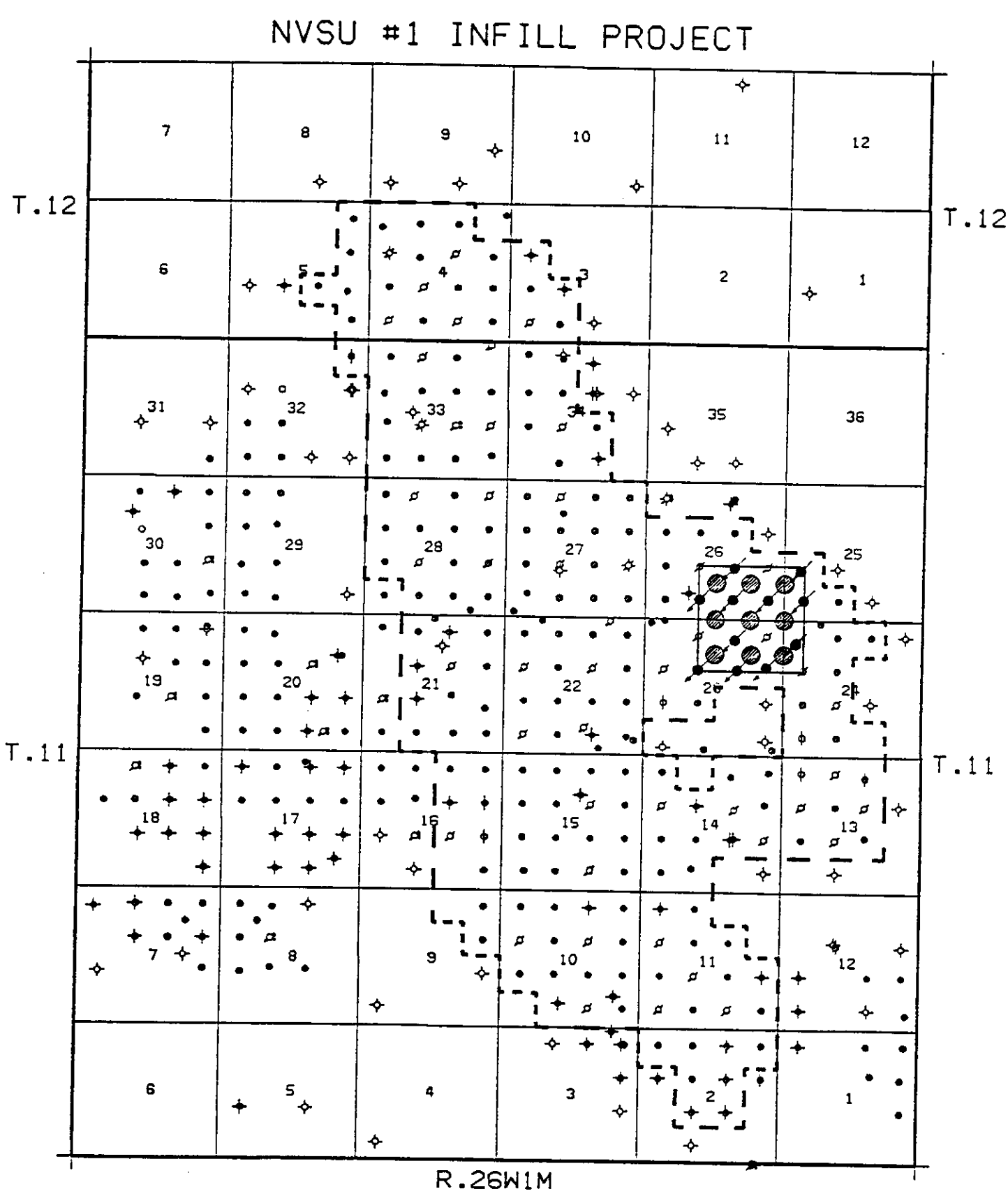
2. Areas with good reservoir parameters (high ϕ and k) and low to moderate recovery should be selected.

3. Drilling structurally lower than water injectors or near wells with anomalously high oil recovery.

4. All productive horizons may not be completed in existing wells. This could lead to identification of incremental oil in some areas.

5. Conversion of producers to injectors should be kept to a minimum because of the loss in oil production and the long response times typical of Manitoba reservoirs.

FIGURE 1



NORTH VIRDEN SCALLION UNIT NO. 1

AS OF 1989-01-25

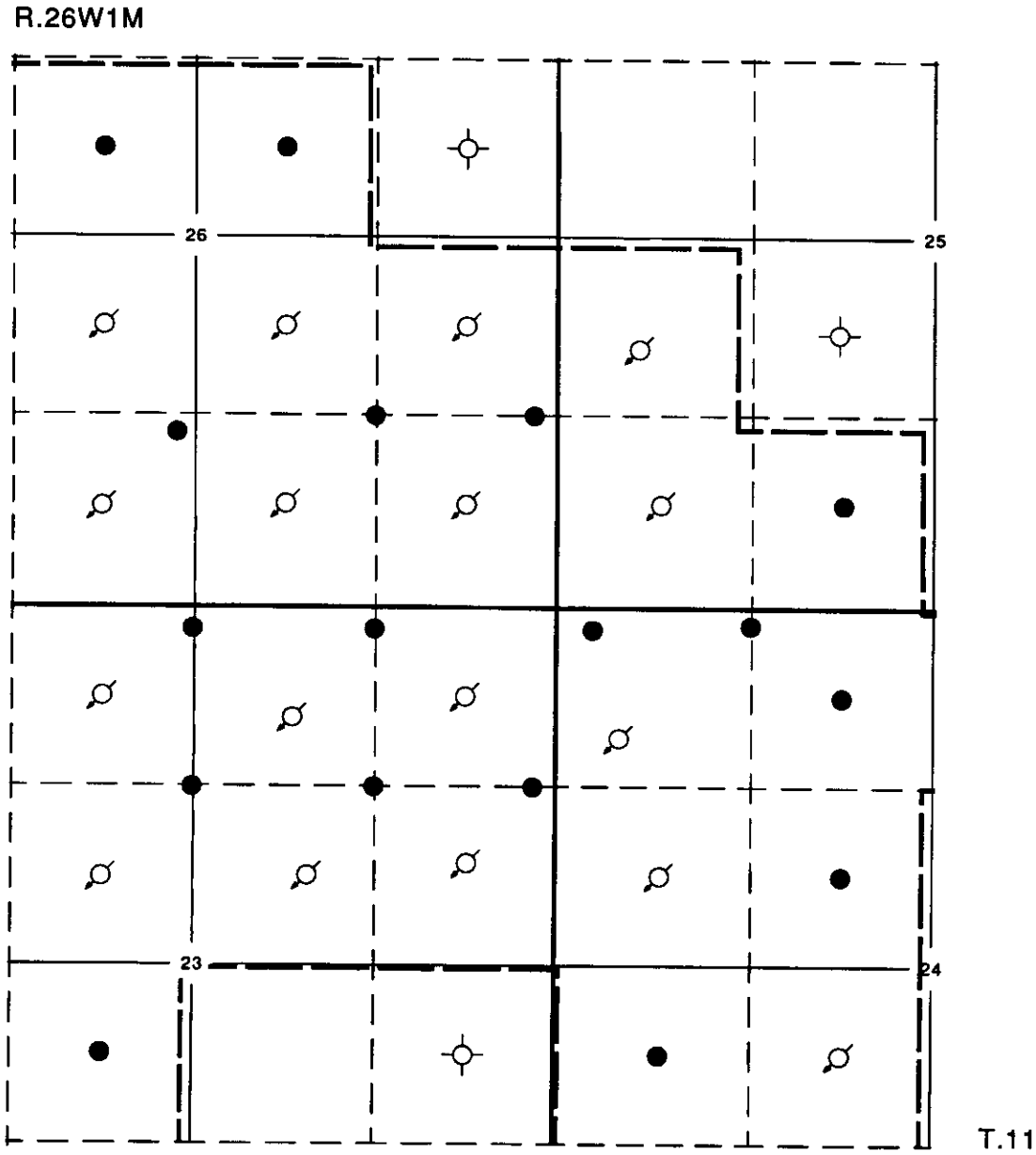
SCALE 1" = 1 MILE

PROJECT BOUNDARY

PROPOSED INFILL SITES

PROPOSED CONVERSIONS

FIGURE 2



NORTH VIRDEN SCALLION UNIT NO. 1

PROPOSED INFILL PILOT PROJECT

G04539_01

FIGURE 3

NORTH VIRDEN SCALLION UNIT #1

RECOVERY MAP

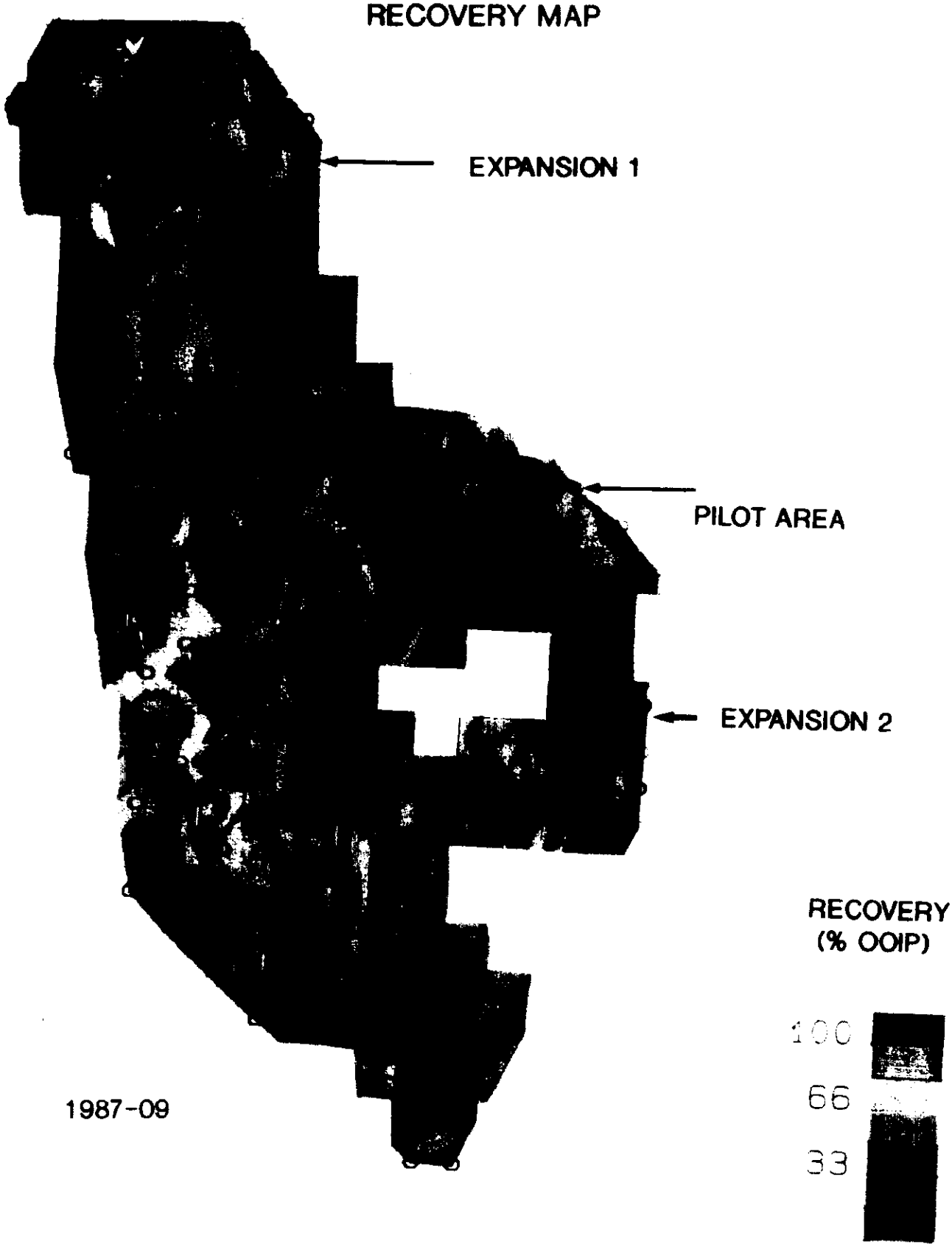
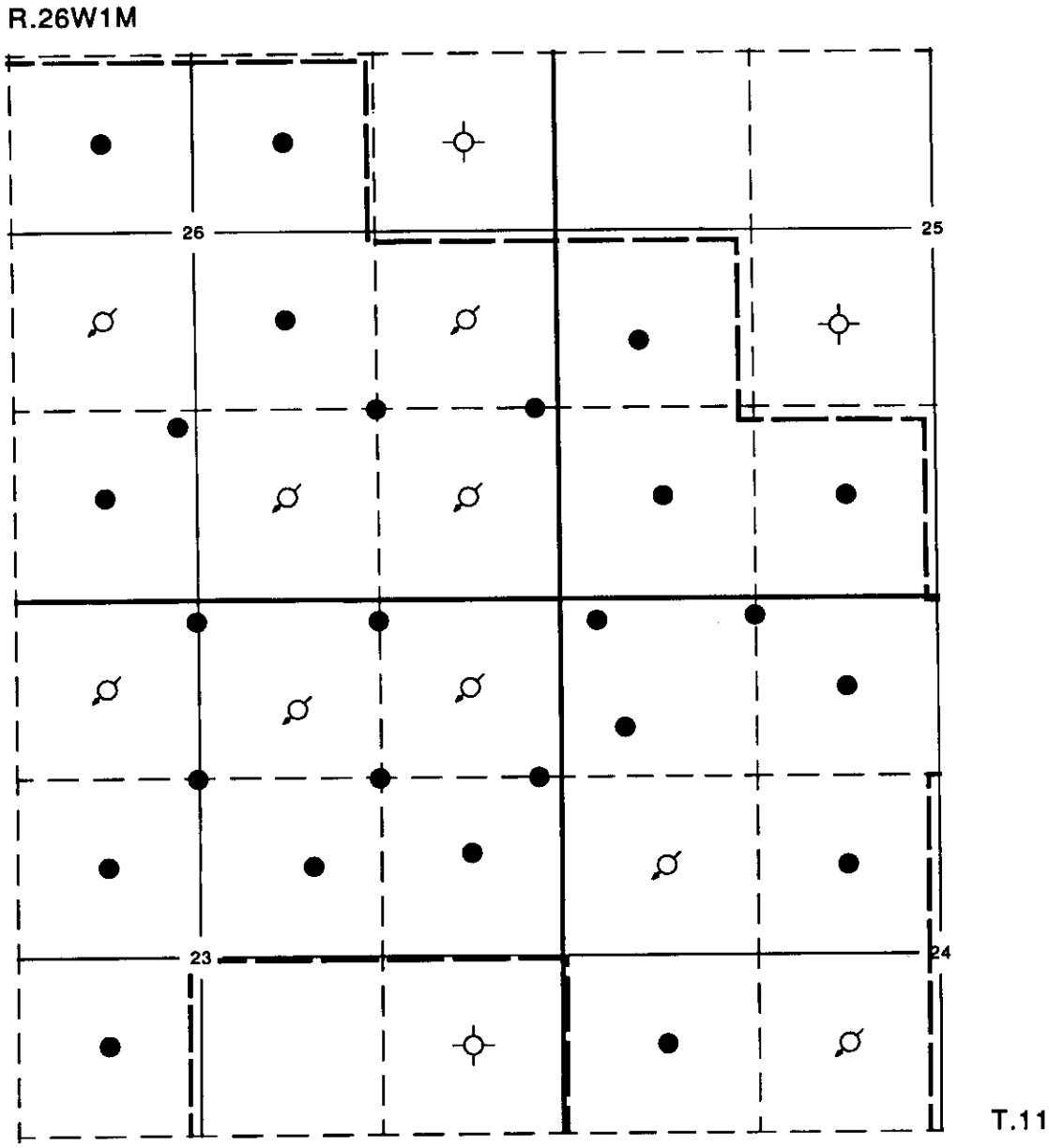


FIGURE 4



NORTH VIRDEN SCALLION UNIT NO. 1

ACTUAL INFILL PILOT PROJECT

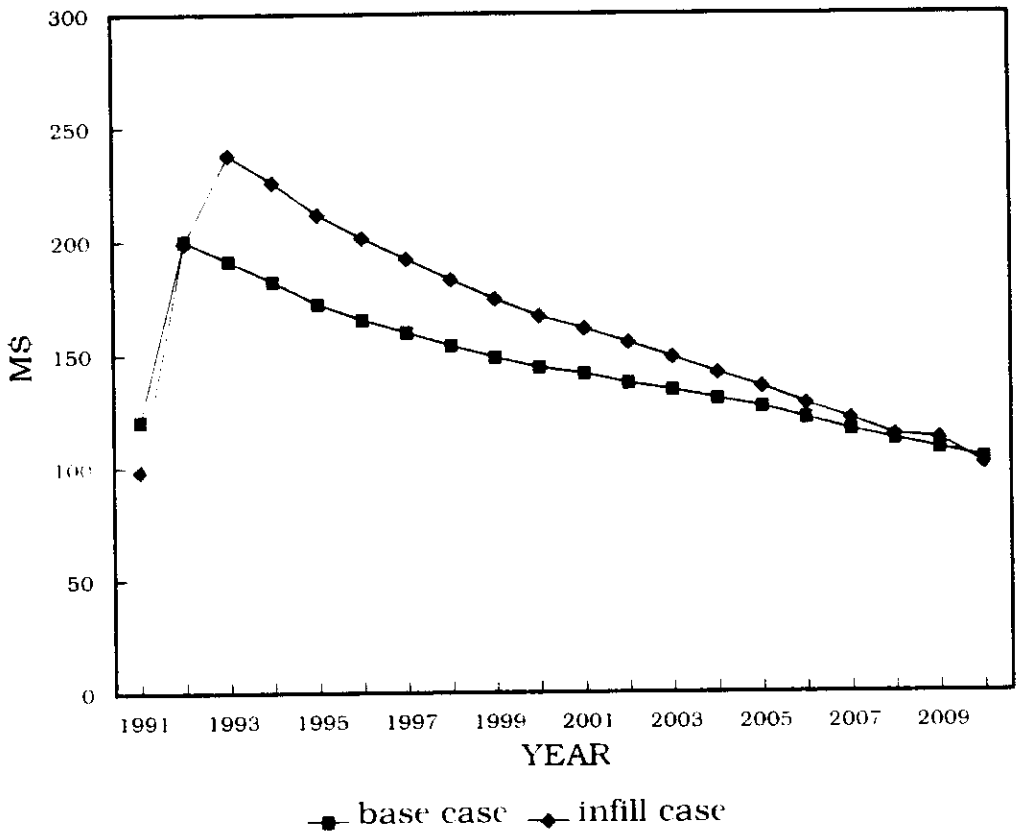
G04539

PRESSURE SURVEY RESULTS
VIRDEN ROSELEA UNIT NO. 1

Well Location	Type of Survey	Datum Depth Pressures (kPa)	
		1987	1990
11-20-10-25	Sonolog	8 690	9 200
13-21-10-25 W1M	Fall Off Test	8 800	8 875
02-28-10-25	Sonolog	7 815	8 100
10-29-10-25	Sonolog	8 935	8 550
07-30-10-25 W1M	Fall Off Test	8 500	N/A
12-30-10-25	Sonolog	9 585	10 300
15-23-10-26 W1W	Fall Off Test	8 100	7 900
15-24-10-26 W1W	Fall Off Test	8 100	9 120
05-25-10-26 W1W	Fall Off Test	-----	7 160
15-25-10-26 W1W	Fall Off Test	8 300	N/A
09-26-10-26	Sonolog	-----	4 200

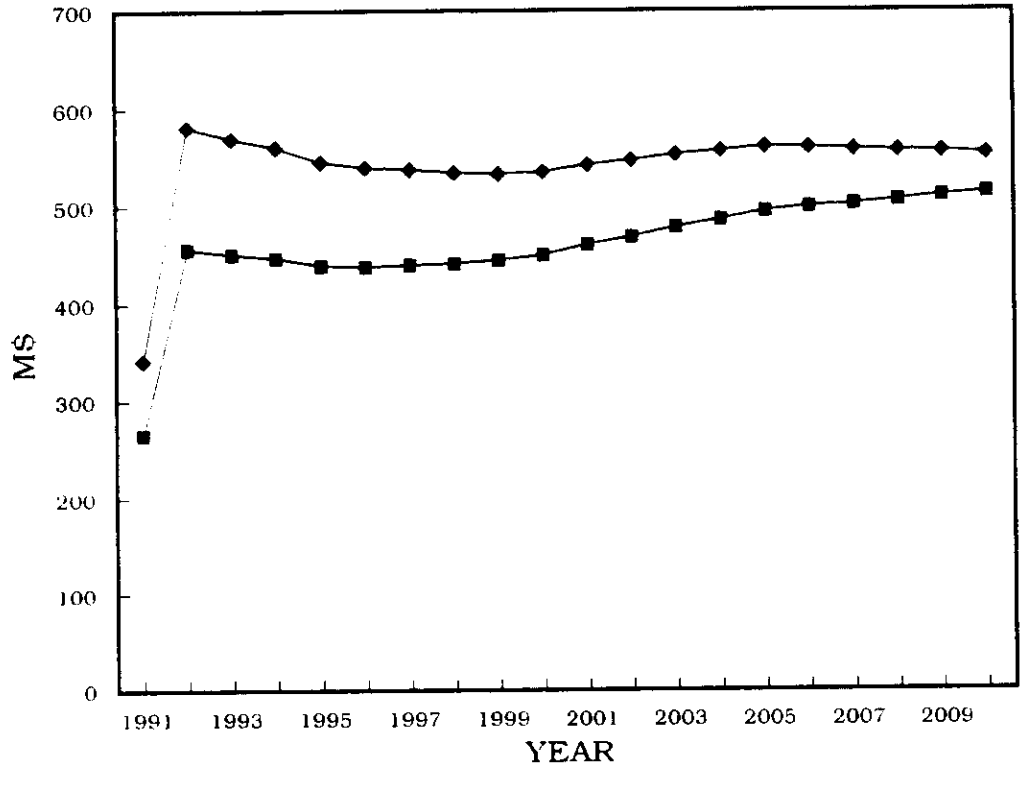
VIRDEN ROSELEA UNIT No.1

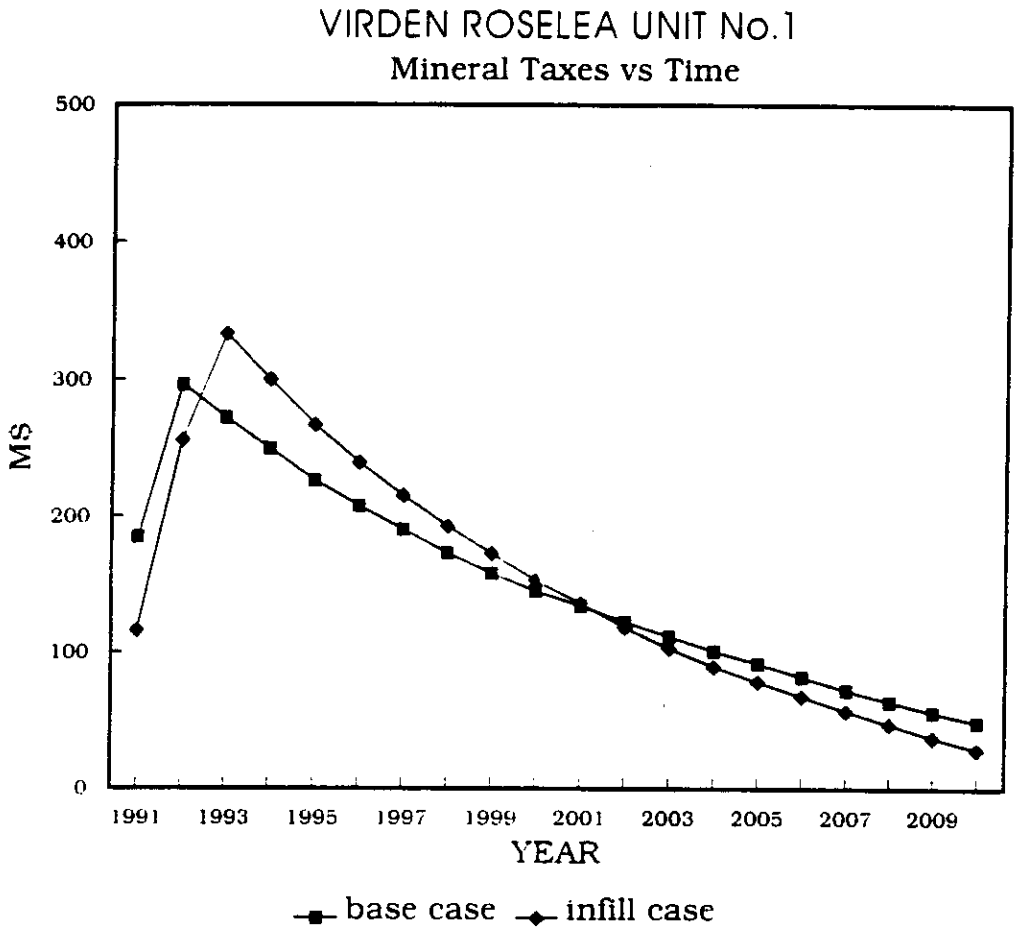
Crown Royalties vs Time.



VIRDEN ROSELEA UNIT No.1

Freehold Royalties vs Time




VIRDEN ROSELEA UNIT No.1
Mineral Taxes vs Time
500
400
300
200
100
0
M$
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
YEAR
base case
infill case

ENVIRONMENTAL IMPACT ASSESSMENT OF THE VIRDEN ROSELEA UNIT NO. 1 REDUCED SPACING PILOT

The purpose of this assessment is to evaluate impacts which may result on the surrounding environment from the proposed Chevron Canada Resources reduced spacing project in Virden Roselea Unit No. 1.

The following are the main issues which must be addressed:

1. Disposal of drilling fluids on drill sites;
2. Risk to water supplies from drilling operations;
3. Surface impact from the installation of flowlines;
4. Oil and salt water spills from flowline and water injection line failures;
5. Risk to water supplies from oil and salt water spills;
6. Control of weed growth around production facilities.
7. Impact on surface operations.

The following preventative measures and contingency actions were successfully employed by Chevron in the August 1989 North Virden Scallion Unit No. 1 reduced spacing project to address these issues and will be employed in the Virden Roselea Unit No. 1 reduced spacing project:

1. DISPOSAL OF DRILLING FLUIDS ON DRILL SITES

Chevron and our contractors will strictly adhere to the Manitoba Energy and Mines Petroleum Drilling and Production Regulations which ensure that drilling fluids are disposed of in an environmentally safe manner and that the drill site is fully restored. All lease topsoil will be conserved and stockpiled in the preparation of the drilling lease. After the well has been drilled, the lease will be recontoured to the surrounding land, rocks will be removed, weeds will be controlled and topsoil will be replaced resulting in the lease being left ready to be incorporated into the normal agricultural operation of the surrounding land. As with other existing wells in Virden Roselea Unit No. 1, water based drilling muds will be used in the reduced spacing project and the use of oil and salt based muds is not anticipated.

2. RISK TO WATER SUPPLIES FROM DRILLING OPERATIONS

It is the policy of Chevron and our contractors to strictly adhere to surface casing requirements and cementing procedures during drilling operations as are presented in the Manitoba Energy and Mines Petroleum Drilling and Production Regulations. These requirements during drilling operations ensure the protection of shallow aquifers used for domestic potable water.

3. SURFACE IMPACT FROM THE INSTALLATION OF FLOWLINES

The possible impacts to agricultural soil during flowline installation are mixing of topsoil with subsoil, compaction of the topsoil and loss of topsoil. To address these concerns, Chevron will institute procedures wherever possible, in consultation with the landowner, to strip and stockpile the topsoil before the flowline is installed because much of the land in the reduced spacing project has little topsoil. These procedures to prevent soil mixing and topsoil compaction will ensure topsoil is conserved so that the productive capability of the soil is

maintained. Chevron in consultation with the landowner will ensure construction activities are conducted within the flowline right of way.

4. **OIL AND SALT WATER SPILLS FROM FLOWLINE AND WATER INJECTION LINE FAILURES**

To repair equipment and to reclaim land damaged by a spill is very costly. It is in the best interest of Chevron to institute programs which will minimize the probability of spills occurring. The major cause of spills in the Virden area is corrosion of steel in flowlines.

To greatly reduce the probability of corrosion in flowlines Chevron will utilize top grade construction materials and will employ well qualified inspectors to oversee construction activities and to ensure quality control is maintained throughout construction.

Chevron wherever practical will construct flowlines and water injection lines of non-corrodible fibreglass pipe. Remaining flowlines and water injection lines will be constructed of steel. Steel flowlines and water injection lines will have non-corrodible polyethylene outer jackets and, as an extra safeguard, will be cathodically protected from external corrosion. Steel on the inside of the flowline and water injection lines will be protected by corrosion inhibitor chemical. Water injection lines which are to transport highly corrosive product will also be internally lined with corrosion resistant cement.

Another possible cause of spills is through flowline failure due to over pressure. Wax buildup is the main cause of pressure build-up in the flowline. Pigging facilities will be installed on all flowlines in the reduced spacing project so that they can be cleaned regularly to prevent wax build-up. In addition, high-pressure shutdown switches will be installed on all producing wells to shut down pumps and to prevent excessive build-up of pressure. As is Chevron's standard practice, close monitoring of facility integrity and production rates will be a high priority in the reduced spacing project to ensure a spill does not occur.

If a flowline is not buried deep enough, frost heaving of the flowline can sometimes result in breakage of the flowline. Chevron, wherever possible, will bury flowlines in the reduced spacing project to a depth of 1.2 metres to stabilize the position of the flowline and to help prevent flowline breakage from frost heaving. Much of the land in the reduced spacing project is composed of large rocks and to bury flowlines to this depth is not always practical.

Although unlikely, a spill may occur even though the above preventative measures have been implemented. Should a spill occur, it is/will be Chevron's standard practice to conduct the following spill response procedure:

a. Isolate the pipeline leak by shutting in the well or valves at either end of the line;
b. Notify the landowner and the Petroleum Branch;
c. Isolate and remove spilled fluid;
d. Conduct an on-site inspection and evaluation of the spill damage;
e. Repair the pipeline and evaluate the cause of the pipeline failure;
f. Apply first aid chemical treatment to damaged soil;
g. Complete the required Petroleum Branch spill report;
h. Conduct an ongoing site reclamation program for the spill area;
i. Pay annual compensation to the landowner for losses due to the spill.

Chevron will continue its aerial surveillance program to detect a spill early if one should occur. Twice a week a low flying aircraft will fly over the project area. Early detection of a spill will minimize the amount of material spilled and the resulting damage. In addition, signs will be installed at all road crossings to mark the existence of flowlines. Each road sign will state the product type the flowline is transporting and will provide a Chevron emergency number to phone if a flowline leak or other problem is observed.

5. RISK TO WATER SUPPLIES FROM OIL AND SALT WATER SPILLS

As discussed in Section 4, Chevron will take all preventative measures to ensure a spill does not occur by installing non-corrodible fibreglass flowlines and employing internal and external corrosion protection on water injection lines. The probability of a spill occurring in the reduced spacing project is very low. If a spill should occur, however, such that the use of a landowner's dugout or drinking water is inhibited, Chevron will implement procedures to delineate the extent of damage and will provide assistance to the landowner.

6. CONTROL OF WEED GROWTH AROUND PRODUCTION FACILITIES

An ongoing program to control weeds around production facilities in the reduced spacing project will be instituted to ensure weeds do not infest surrounding land areas.

7. IMPACT ON SURFACE OPERATIONS

Introduction

Much of the proposed Roselea Unit No. 1 reduced spacing project area will be on cultivated lands. The intent of this assessment is to highlight Chevron's efforts to minimize the impact of the project on surface operations in the area.

Discussion

A. Project Location

The location of the proposed Roselea Unit No. 1 reduced spacing project area is discussed in the "Technical Justification" section of the application. The area was chosen primarily on the basis of favourable geologic and reservoir characteristics for evaluating eight hectare well spacing on ultimate recovery. Other considerations in choosing the area were the impact on surface operations and the expected reaction of the affected landowners.

B. Well Spacing

A map showing the orientation and size of drilling spacing units within the proposed reduced spacing area is shown in Attachment 17. Target areas within the eight hectare DSUs will be consistent with target areas established by The Oil and Natural Gas Conservation Board in previous reduced spacing orders. That is, the target areas will be square areas having sides 65 m from and parallel to the sides of the DSUs. (Note that the north halves of two DSUs have been truncated to keep the DSUs within the Unit).

C. Well Locations

The existing wells in Section 30 are located close to the centre of each Legal Subdivision. In an effort to form ideal drainage patterns, the infill wells will be located as close to the corners of the Legal Subdivisions as possible (see the aerial photograph in Attachment 9). The final locations may be moved slightly from the ideal pattern locations to:

a. Minimize surface impact.
b. Minimize lease construction costs.
c. Maintain a 100 m buffer from the Unit boundary.
d. Avoid pipelines and other facilities in the area.

A discussion of each well location follows:

1. 2C, 6C and 10B-30
   All of these infill locations are on cultivated lands. Movement of the locations off of cultivated lands would result in off-target wells and an unsatisfactory drainage pattern. Since none of the wells are close to the Unit boundary, the locations will be as close to ideal corner locations as possible.

2. 11D-30
   The 11D-30 well is to be located on the edge of cultivated lands and will, therefore, have a negligible surface impact. The location will be South of the ideal corner location to stay 100 m away from the Unit boundary.

3. 12D-30
   The 12D-30 well will be located on cultivated lands. To minimize surface impact, the well could be moved North towards a modestly forested area. Unfortunately, such a move would bring the well within 100 m of the Unit boundary. Therefore, the well must remain in the location shown.

4. 7D and 8B-30
   These locations are on non-cultivated lands and will, therefore, have no effect on agricultural operations in the area. Neither location is close to the Unit boundary but both are on a gully slope. They may be moved East to the base of the gully to reduce lease construction costs.

D. Minimization of Surface Impacts

1. Location Access

   With the well locations fixed by the constraints discussed above, Chevron will endeavour to minimize disruption of surface operations in the area by:

   a. Maximizing use of existing lease roads to access new locations.

   b. Using non-built up trails from existing lease roads to the new locations. (The landowners will, therefore, be able to farm over the lease trails and close to the wellheads.)

2. Pad Drilling

With eight hectare spacing and well depths averaging 650 m, Chevron does not consider directionally drilling the proposed locations from a pad to be feasible. Though surface impacts would be reduced, the increased drilling and operating costs would make the project uneconomic.

3. Facilities

To handle production from the proposed infill drilling program, new pipelines will be laid and the battery at 10-25 will be upgraded. Chevron's efforts to minimize the surface impact of the new pipelines has already been discussed. The battery upgrade will have no surface impact as the battery area itself will not be expanded.

E. Land Owner Consent

Chevron has discussed the proposed infill drilling program with the affected landowners. The landowners will be compensated for the impact Chevron's installations will have on their agricultural operations and they support the infill drilling program.

Conclusion

Chevron believes that agricultural and petroleum operations can coexist on the same lands. Such coexistence will maximize development of Manitoba's resources above and below the surface. Chevron will make every reasonable effort to minimize the impact of the proposed Roselea Unit No. 1 reduced spacing project on surface operations and will not proceed without the full consent of the affected landowners.

SURFACE FACILITIES FOR
VIRDEN ROSELEA UNIT NO. 1 REDUCED SPACING PILOT

INTRODUCTION

Section 30 (of 10-25 W1M) in Virden Roselea Unit 1 currently contains eleven producing wells and two water injection wells.

A network of flowlines and field headers tie these wells into a battery and water injection pumping plant at 10-25-10-26 W1M (refer to Figures 1, 2 and 3).

In Spring of 1991, seven infill wells will be drilled in Section 30. The following surface facilities modifications are proposed to handle new fluids:

1. Tie-in infill wells at existing field headers.
2. Twin the group gathering flowline from 5-30 field header to the 10-25 battery.
3. Upgrade FWKO at the 10-25 battery.
4. Add a new injection pump at the 10-25 water plant.
5. Tie-in two existing section 30 wells (9-30 and 15-30) as new water injection wells.

Figure 4 is an aerial photograph showing the locations of existing leases and roads, and the proposed leases and roads for the infill pilot.

FACILITIES DESIGN

Gathering System

Infill Well Tie-Ins

Tie-ins are to closest existing field headers. Routes are shown on Figure 2.

Pipe will be 60.3 mm OD. Chevron is currently investigating the tradeoffs between steel and fibreglass pipe. Fibreglass will be utilized were practical because of its superior corrosion resistance. Steel pipe, where used, will be yellow-jacket coated and integrated into existing cathodic protection and inhibitor programs.

Group Gathering Line Twinning

The group line from 5-30 field header to 10-25 battery will be twinned with 88.9 mm OD steel linepipe to accommodate the increased flow.

The new line will be trenched parallel to the existing group flowline, as shown on Figure 2.

Multi-Phase Booster Pump

Chevron is currently investigating the possibility of installing a multi-phase booster pump at 5-30 as an alternative to group line twinning.

10-25 Battery

Major Battery Equipment

1. A new FWKO will be installed parallel to the existing vessel to handle incremental fluids. The new vessel will be 66" DIA x 15' s/s long (minimum).

2. All other major equipment and associated piping at the 10-25 battery is adequately sized for the added infill production. No changes will be made.

Metering and Testing

No changes will be made to the existing setup.

Individual well metering is done at the test treater discharge. Overall oil production is metered with level gauges on the oil storage tanks. Overall water production is metered at the transfer pump.

Manitoba Petroleum Board regulations stipulate one 24 hour test per producing well per month for the first year of any well's life, and one 24 hour test per quarter for all subsequent years. Twenty-three existing wells and seven new infill wells will be tested at the 10-25 battery.

Total tests required: 15 tests per month in Year 1, 10 tests per month in subsequent years.

The existing facilities can accommodate 15 tests per month. Facilities will not be changed.

10-25 Water Plant

Disposal Pumps

Existing Pumps:

Two National J-100-L Triplex Plunger Pumps
66.7 mm (2 5/8") plungers
56 kW (75 HP) 3/60/480 electric motors
Operated at 400 rpm, 24 hours per day
Flow apr. 1 205 m^3/day (603 m^3/day/pump) at 7 000 kPa discharge

Flow to be added (new infill production): 110 m^3/day at 7 000 kPa discharge

New pump:

National J-100-L with 66.7 mm (2 5/8") plungers
75 HP 3/60/480 motor

All three pumps will operate at 380 rpm, 18 hours/day. Maximum available plant capacity, with all pumps at 400 rpm 24 hours per day, is 1 750 m^3/day.

Installation

Original construction of the 10-25 water plant included provision for a third pump to be installed parallel to the two existing pumps. Foundation, enclosure and piping headers are already in place.

The future flowrate is only a 9% increase over present rates. All accessory equipment is adequate for this increase. Tanks, pit, filters, and booster/chemical injection pumps will not be changed.

Injection Well Tie-Ins

Existing wells 9-30 and 15-30 are to be tied-in as shown in Figure 3.

Water lines will be 60.3 mm OD x 3.2 mm steel linepipe. Pipe will have external yellow jacket and 4.8 mm internal cement lining.

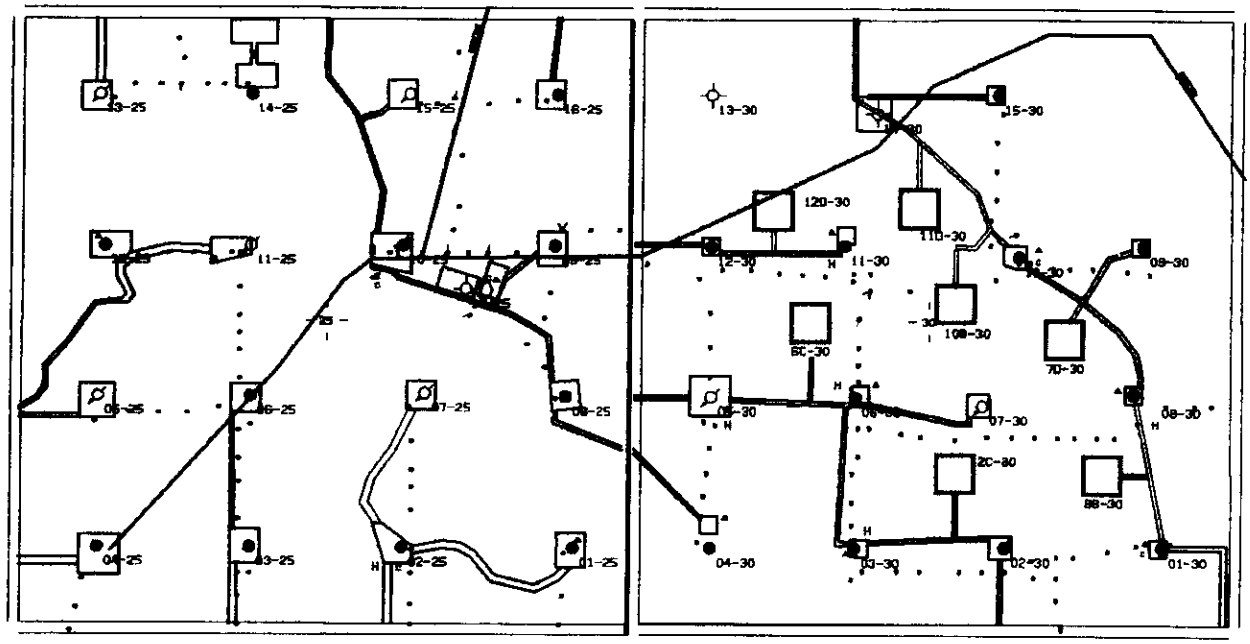
The pipe manufacturer recommends a maximum flow velocity of 5 fps to prevent lining erosion. Anticipated flow velocities are less than 5 fps in all cases.

Pipeline will be licensed to 9 930 kPa to match ANSI 600 valves.

R.26W1M

R.25W1M

T.10



EXISTING LEASE

PROPOSED LEASE

ROAD/LEASE TRAIL

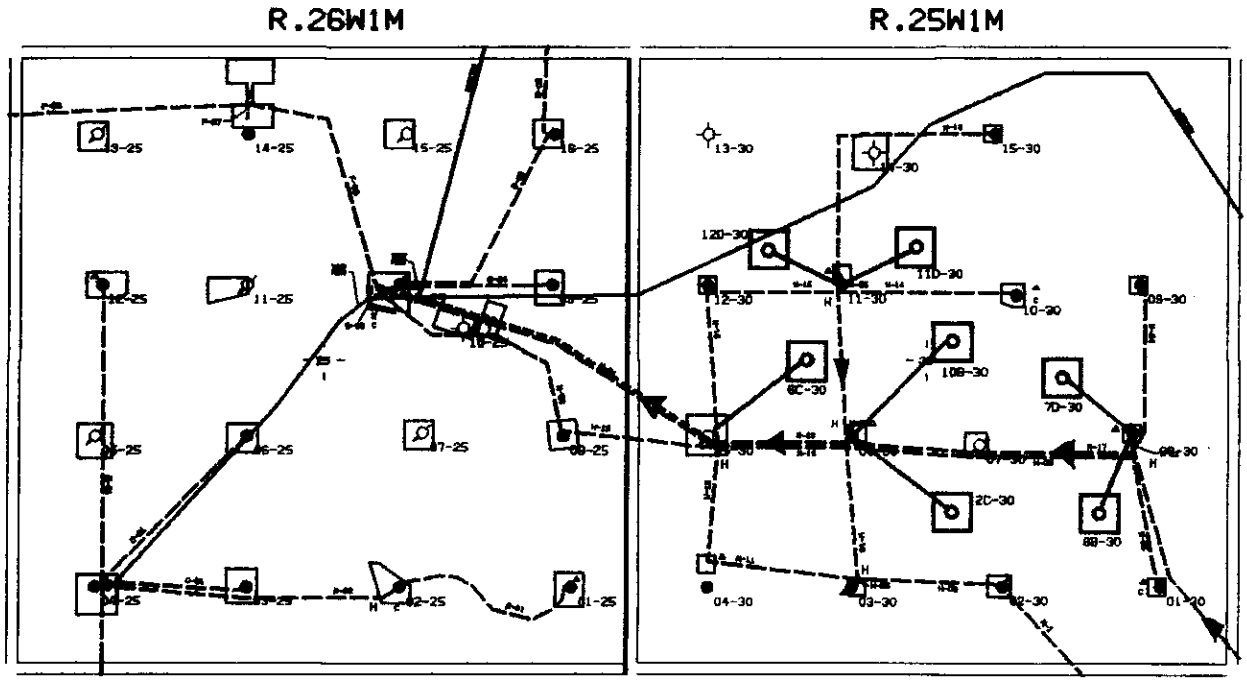
POWER POLE ON LEASE/LEASE ROAD

POWER POLE OFF LEASE/LEASE ROAD

SCALE 1 : 20000

FIGURE 1

DRAWN T.D.P.	DATE 10/31/90	Chevron Canada Resources
CHECKED	DATE	VIRDEN-ROSELEA AREA COMPOSITE SURVEY SHOWING LEASES, ACCESS ROADS, POWER POLES
ENG.	DATE	
FILE		
IBM		
AD380 F01672-1	SCALE 1:20000	REV. A



H HEADER

RECTIFER

RECTIFIER AND GROUNDBED

INJECTION WELL

OIL WELL

INJECTION PLANT

EXISTING LEASE

PROPOSED INFILL WELL

PROPOSED PRODUCTION LINE (88.9MM)

PROPOSED PRODUCTION LINE (60.3MM)

EXISTING PRODUCTION LINE

FOREIGN PIPELINES

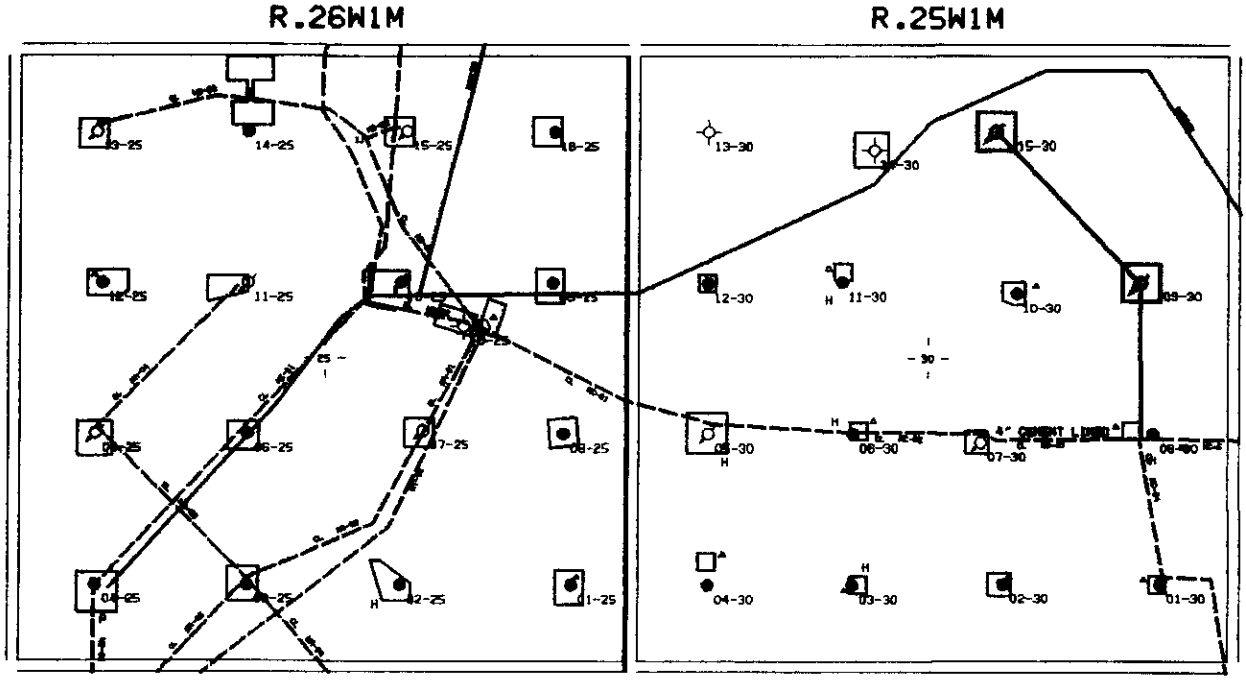
MILES

KILOMETRES

SCALE 1 : 20000

FIGURE 2

DRAWN T.D.P.	DATE 10/31/90	Chevron	Chevron Canada Resources
CHECKED	DATE	VIRDEN-ROSELEA AREA COMPOSITE SURVEY SHOWING LEASES, FOREIGN LINES PRODUCTION PIPELINES	
ENG.	DATE		
FILE			
IBM			
AD380 F01673-1		SCALE 1:20000	REV. A



INJECTION WELL

OIL WELL

INJECTION PLANT

EXISTING LEASE

PROPOSED RECOMPLETION (NEW INJECTION WELL)

60.3mm PROPOSED FERROUS CEMENT-LINED WATER DISPOSAL LINE

EXISTING WATER DISPOSAL LINE

FOREIGN PIPELINES

MILES

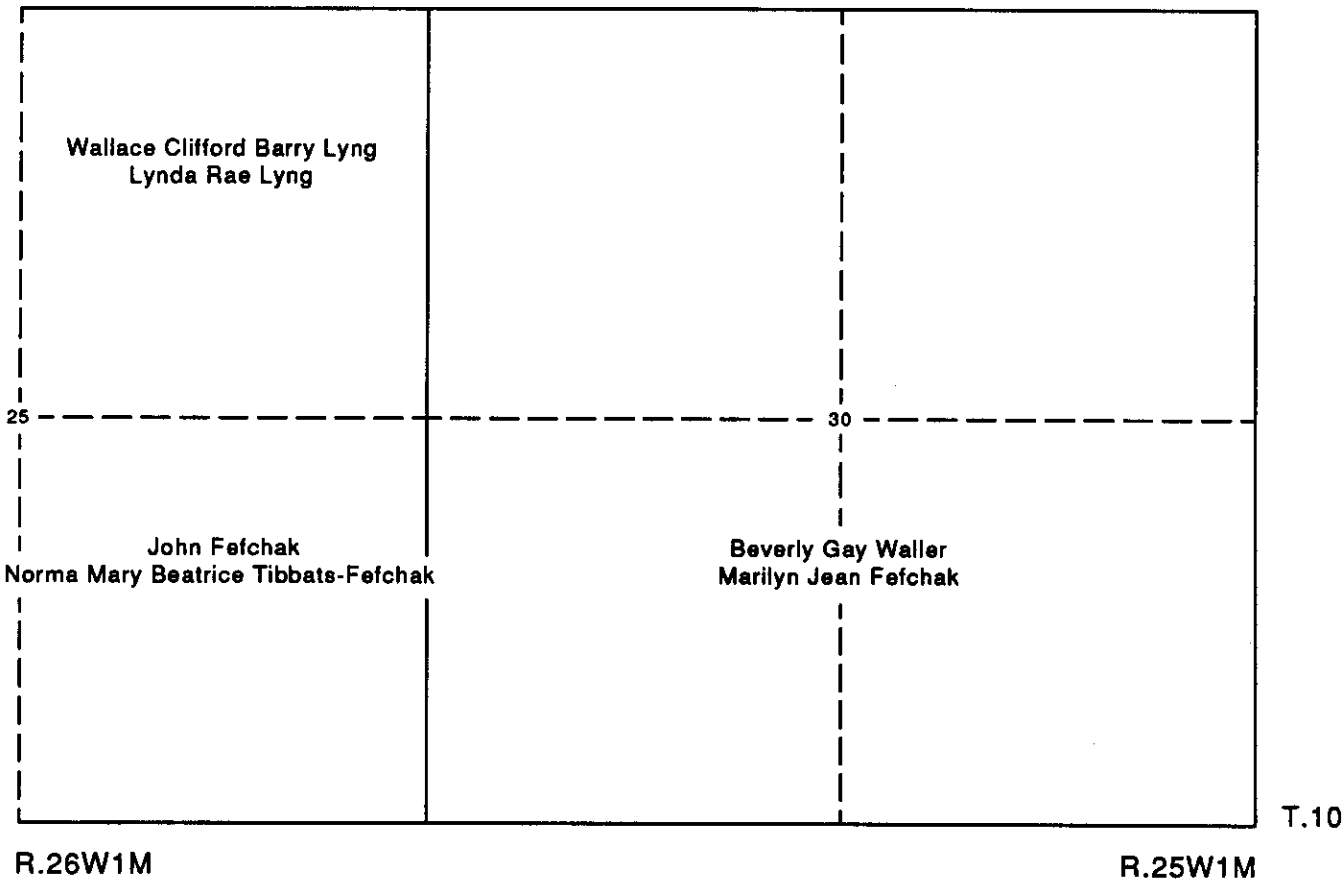
KILOMETRES

SCALE 1 : 20000

FIGURE 3

DRAWN T.D.P.	DATE 10/31/90	Chevron Canada Resources
CHECKED	DATE	VIRDEN-ROSELEA AREA COMPOSITE SURVEY SHOWING FOREIGN LINES WATER DISPOSAL PIPELINES
ENG.	DATE	
FILE		
IBM		
AD380 F01674-1		SCALE 1:20000 — REV. A

SURFACE OWNERS IN THE
EAST 1/2 25-10-26 AND 30-10-25W1M



G04743

Nov 21 19 90.

Chevron Canada Resources Limited
500 - 5th Avenue S.W.
Calgary, Alberta
T2P 0L7

Landowner Contact Report

I, the undersigned, hereby grant you permission to do survey work and the removal of trees where necessary on the following lands (~~owned~~, ~~leased~~, ~~purchased~~) by me and described as follows:

SECTION 30-10-25 WPM

This permission is granted in consideration of your promise as follows:

All work under this permit will be conducted at the risk and expense of Chevron Canada Resources Limited

Also I, the undersigned, hereby acknowledge that I am in agreement with the proposed route as shown on the sketch.

Special Requirements:

Contact David Fefchak prior to entry.

SEE ATTACHED SKETCH

Nature of land likely to be crossed:

Pasture & cultivated.

AS TO AN UNDIVIDED 1/2 INTEREST.

Registered Owner: MARILYN FEFCHAK Address: Box 1403 VIRDEN, AB ROM 2C0.
PH-748-2874.

Occupant: DAVID FEFCHAK Address: SAME AS ABOVE

Witness

(Person Granting Permit)

1 copy to Landowner
1 copy to Contractor
1 copy to District Office

Nov 21 19 90

Chevron Canada Resources Limited
500 - 5th Avenue S.W.
Calgary, Alberta
T2P 0L7

Landowner Contact Report

I, the undersigned, hereby grant you permission to do survey work and the removal of trees where necessary on the following lands (owned, ~~leased, purchased~~) by me and described as follows:

SECTION 30 - 10 - 25 WPM

This permission is granted in consideration of your promise as follows:

All work under this permit will be conducted at the risk and expense of Chevron Canada Resources Limited

Also I, the undersigned, hereby acknowledge that I am in agreement with the proposed route as shown on the sketch.

Special Requirements:

Contact David Fofahak prior to entry.

SEE ATTACHED SKETCH.

Nature of land likely to be crossed:

Pasture & cultivated.

AS TO AN UNDIVIDED ½ INTEREST.

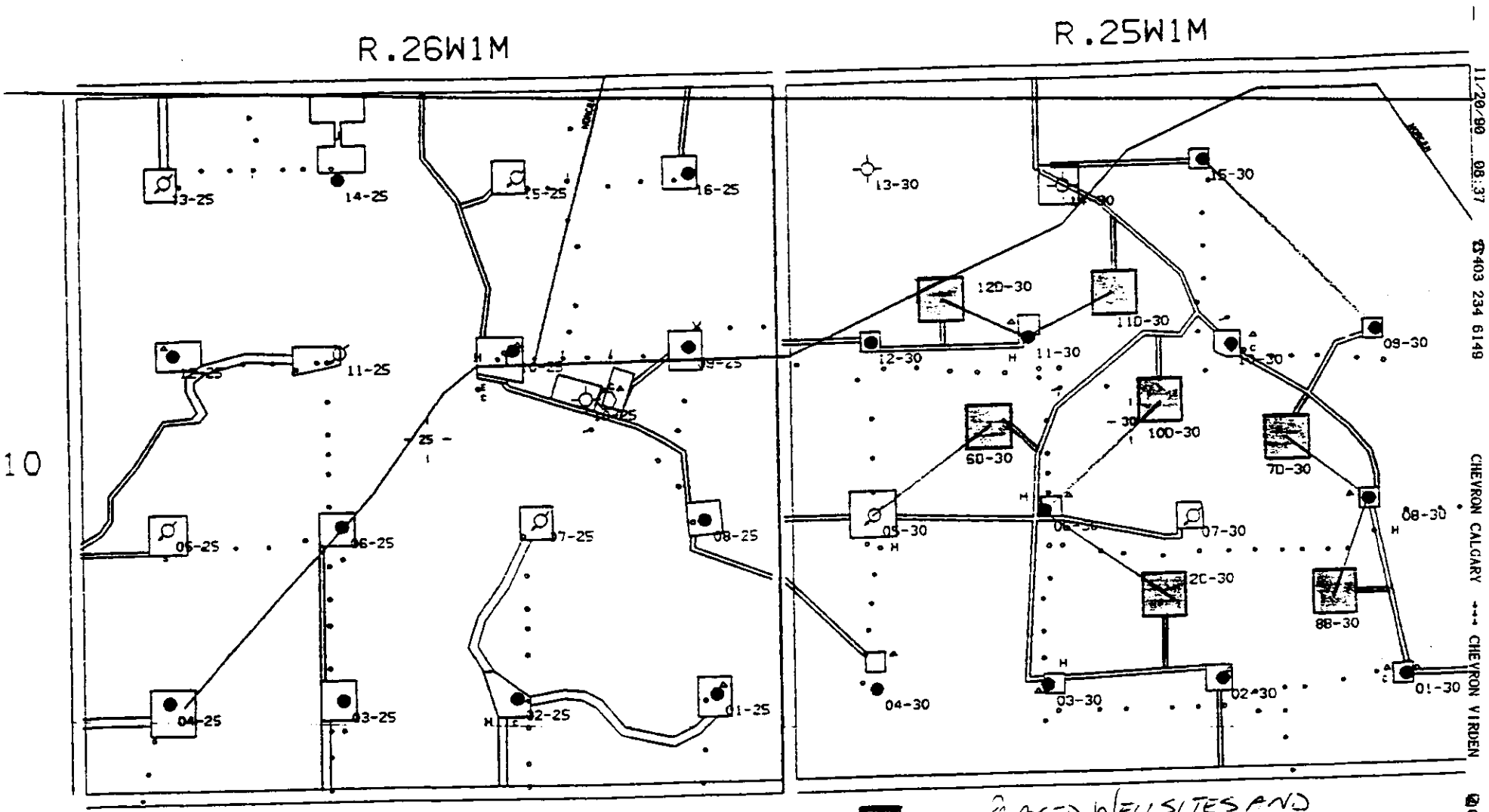
Registered Owner: BEVERLY WALLER Address: Box 961 LENORE, MAN. R0M 1E0
PH-838-2074.

Occupant: DAVID FEECHAK Address: Box 1403 VIRDEN, MAN. R0M 2C0.
PH 748-2874

Witness

Beverley Waller.
(Person Granting Permit)

1 copy to Landowner
1 copy to Contractor
1 copy to District Office



10

December 7, 1990

Virden Roselea Unit No. 1
Twp. 10, Rge. 25 WPM; NE-¼ 30

Mrs. Beverly Waller
P.O. Box No. 981
Lenore, Manitoba
R0M 1E0

Dear Beverly:

Chevron Canada Resources Limited is in the process or applying for reduced spacing in the Virden Roselea Unit No. 1. As part of this infill and conversion project, Chevron will be converting some existing producing wells to water injection wells.

This letter is to inform you, the landowner, that upon approval of the proposed project, the following wells are to be converted:

15-30-10-25 WPM
9-30-10-25 WPM

Enclosed, for your information, is a sketch of the above proposed conversion.

Yours very truly,

H. H. POCKRANT
Supervisor
Field Land Operations

ICR/sig
Enclosure

pc: Mrs. Marilyn Fefchak
P.O. Box No. 1403
Virden, Manitoba
R0M 2C0

bpc: K. A. Edwards
M. McBride

December 7, 1990

Virden Roselea Unit No. 1
Twp. 10, Rge. 25 WPM: NE-¼ 30

Mrs. Marilyn Fefchak
P.O. Box No. 1403
Virden, Manitoba
R0M 2C0

Dear Marilyn:

Chevron Canada Resources Limited is in the process or applying for reduced spacing in the Virden Roselea Unit No. 1. As part of this infill and conversion project, Chevron will be converting some existing producing wells to water injection wells.

This letter is to inform you, the landowner, that upon approval of the proposed project, the following wells are to be converted:

15-30-10-25 WPM
9-30-10-25 WPM

Enclosed, for your information, is a sketch of the above proposed conversion.

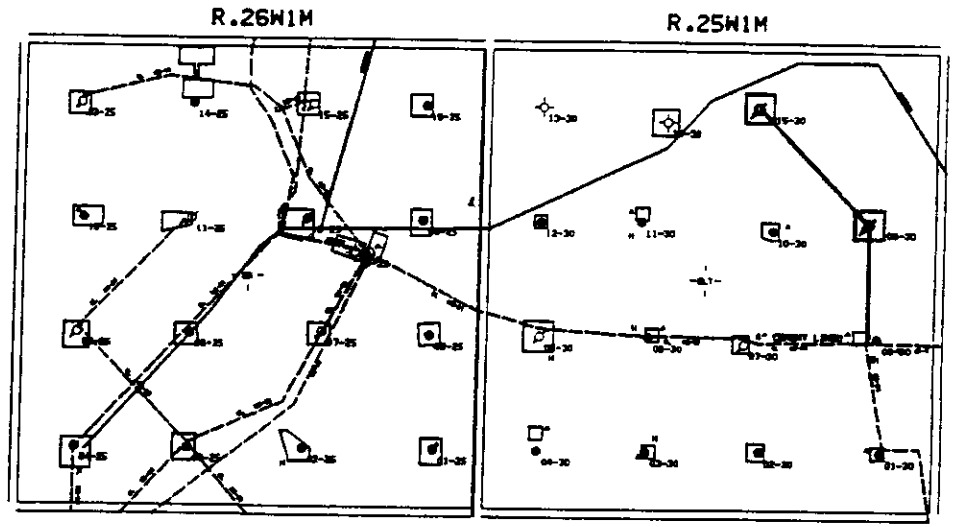
Yours very truly,

H. H. POCKRANT
Supervisor
Field Land Operations

ICS/sig
Enclosure

pc: Mrs. Beverly Waller
P.O. Box No. 981
Lenore, Manitoba
R0M 1E0

bpc: K. A. Edwards
M. McBride



H HEADER
RECTIFER
RECTIFIER AND GROUNDBED
INJECTION WELL
OIL WELL
INJECTION PLANT
EXISTING LEASE
PROPOSED RECOMPLETION (NEW INJECTION WELL)
PROPOSED FERROUS CEMENT LINED WATER DISPOSAL LINE
EXISTING WATER DISPOSAL LINE
FOREIGN PIPELINES

SCALE 1 : 20000

DRAWN T.D.P.	DATE 10/31/90
CHECKED	DATE
ENG.	DATE
FILE	
IBM	
AD380 F01672-1	

Chevron Canada Resources

VIRDEN-ROSELEA AREA
COMPOSITE SURVEY SHOWING
FOREIGN LINES
WATER DISPOSAL PIPELINES

SCALE 1:20000

REV. A

DRILLING PRECAUTIONS
VIRDEN ROSELEA UNIT NO. 1 REDUCED SPACING PILOT

The following precautions will be taken during drilling operations:

a. The wells will initially be drilled to approximately 15 m above the high-pressure Lodgepole reservoir.

b. A 177.8 mm casing string will then be run and cemented in place at this depth.

c. A heavy mud system of approximately 1 900 kg/m^3 will be used to drill the Lodgepole Zone (an overbalance of approximately 1 000 to 1 400 kPa will be used).

d. The drilling mud will remain in the wellbore until the well is completed (open hole completion).

e. The wells will be secured prior to moving the drilling rig.

These procedures are similar to those used during the 1989 North Virden Scallion Unit No. 1 Reduced Spacing Project.

WATER INJECTION DETAILS
VIRDEN ROSELEA UNIT NO. 1 REDUCED SPACING PILOT

1. The reduced spacing project's injection water will be from the Lodgepole B pool.

2. All injection water will be filtered at the 10-25 plant.

3. Injection volumes will be measured at each injection wellhead using 25.4 mm Flotrac turbine meters.

4. Injection rates will be sufficient to maintain 100% voidage replacement on a reduced spacing project area basis.

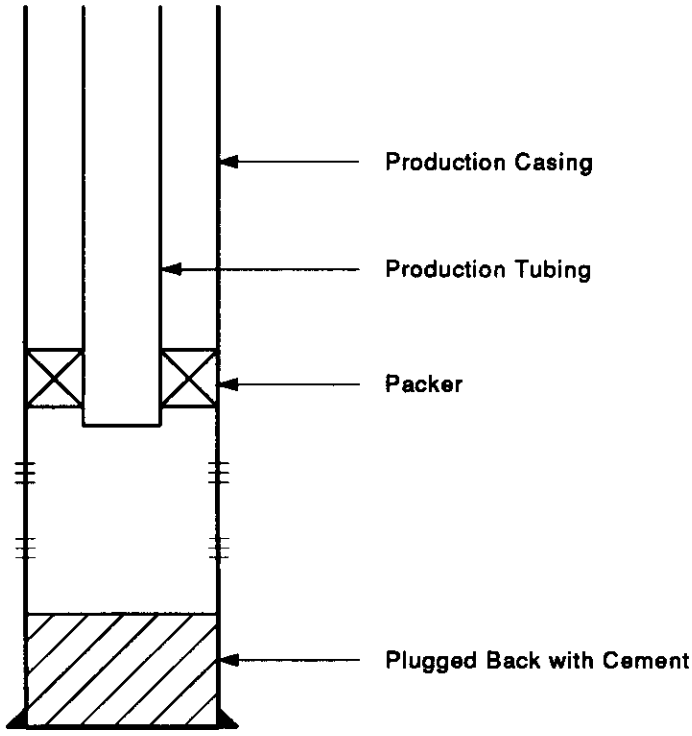
5. Injection wellhead pressures will not exceed 8 000 kPag.

6. Sweep efficiency will be maximized in the reduced spacing project area by completing all infill wells in all oil bearing members of the Mississippian Lodgepole B pool.

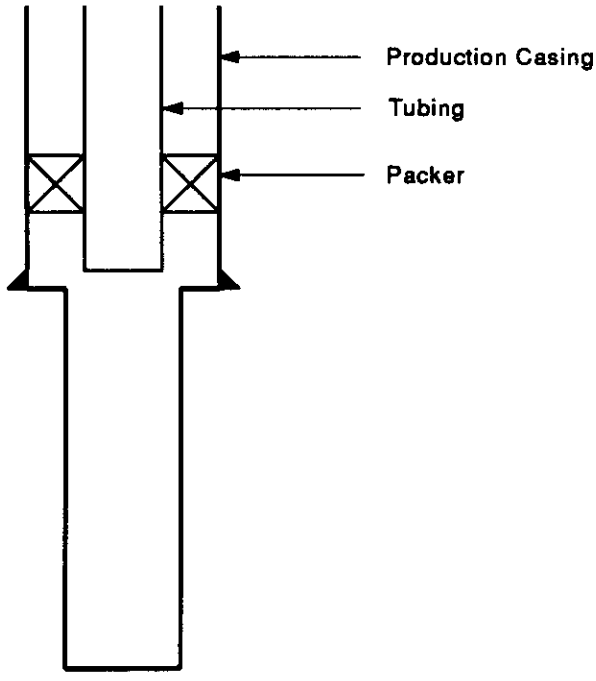
7. Injection in the reduced spacing project is expected to commence as soon as possible after infill wells are placed on production (approximately 1991-08).

TYPICAL INJECTOR COMPLETIONS

Cased:



Open Hole:



G04719

CORROSION CONTROL
VIRDEN ROSELEA UNIT NO. 1 REDUCED SPACING PROJECT

1. Corrosion of injection wellbores will be controlled by:

    a. installing a coated packer above the injection zone,
    b. installing plastic-coated or cement-lined tubing,
    c. filling the annulus with inhibited fresh water,
    d. cathodically protecting casing,
    e. using stainless steel surface fittings,
    f. installing cement-lined surface pipe.

2. Corrosion of producing wellbores will be controlled by cathodically protecting and chemically inhibiting the casing.

3. Corrosion of flowlines will be controlled by:

    a. cathodically protecting and chemically inhibiting steel lines, or
    b. installing fibreglass flowlines

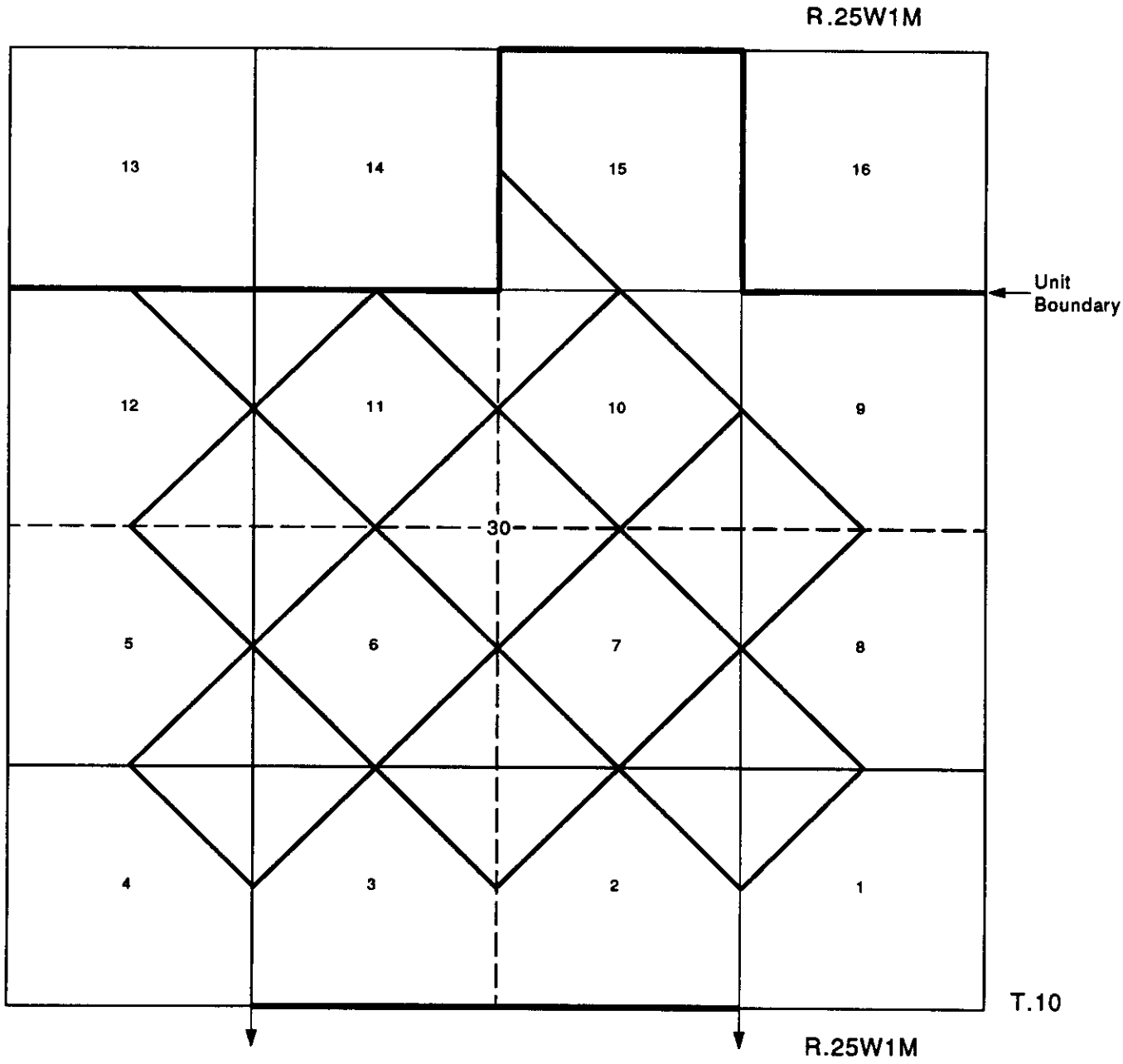
4. Corrosion of surface facilities will be controlled by:

    a. using corrosion resistant piping and fittings (fibreglass, stainless steel and cement lined),
    b. inhibiting with corrosion chemical,
    c. internally coating all vessels,
    d. installing sacrificial anodes in all vessels.

FIGURE 1

REDUCED SPACING AREA
VIRDEN ROSELEA UNIT NO. 1

SECTION 30-10-25W1M



G04742

VIRDEN LODGEPOLE "B" POOL
Virden Roselea Unit No. 1

Reduced Spacing Application

$900/well Virden Lenden

$3300 - $4800 / battery

CRINOIDAL = Upper Virden

SANDHILL = Lower Virden

OOLITES = " "

CHERTY : Scallion

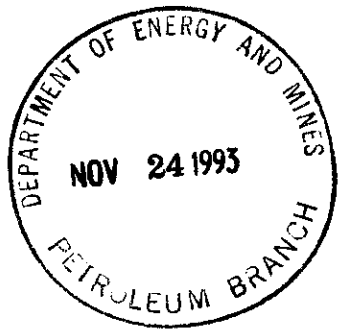
Chevron

Calgary, Alberta
November 10, 1993

Chevron Canada Resources
500 - Fifth Avenue S.W.
Calgary, Alberta T2P 0L7
Phone (403) 234-5000
Fax (403) 234-6206

K. G. Matieshin
Manager
Environment, Safety and Regulations

Oil and Natural Gas Conservation Board
Attention: Mr. John Fox
Room 309
Legislative Building
Winnipeg, Manitoba
R3C 0V8



VIRDEN LODGEPOLE "B" POOL
VIRDEN ROSELEA UNIT NO. 1
REDUCED SPACING APPLICATION

Dear Mr. Fox,

Attached are six copies of the subject application for your review.

If there are any questions regarding this application, please contact Jan Major in our Calgary office at (403) 234-5034.

Yours very truly,

K. G. MATIESHIN, P.Eng.

/jrm
Attach.

Calgary, Alberta
November 10, 1993

Oil and Natural Gas Conservation Board
Attention: Mr. John Fox
Room 309
Legislative Building
Winnipeg, Manitoba
R3C 0V8

VIRDEN LODGEPOLE "B" POOL
VIRDEN ROSELEA UNIT NO. 1
REDUCED SPACING APPLICATION

Dear Mr. Fox,

Chevron Canada Resources (Chevron) as operator of Virden Roselea Unit No. 1 (VRU No. 1) hereby requests:

1. Under section 20(1) and 21(3) of the Manitoba Petroleum Drilling and Production Regulations (the Regulations), approval to decrease the size of drilling spacing units from 16 ha (40 acres) to 8 ha (20 acres) for Virden Roselea Unit 1 (Appendix 1). The proposed target areas will be square with sides 65 m from the sides of the 8 ha drilling spacing units (DSU).

2. Under section 64 of the Regulations, amendment of section 1(1) of pressure maintenance Order No. PM 55 to include the addition of two Unit water injection wells as listed on page six of the application submission.

The precedent for 8 ha spacing has already been established in VRU No. 1 which is wholly contained within the Virden Lodgepole "B" Pool. The following outline and list of appendices contain the supporting information associated with the above requests.

If there are any questions regarding this application, please contact Jan Major in our Calgary office at (403) 234-5034.

Yours very truly,

fax

J Major

60

K. G. MATIESHIN, P.Eng.

/jrm
Attach.

LIST OF APPENDICES

I. ANALYSIS OF THE 1991 VIRDEN ROSELEA UNIT 1 REDUCED SPACING PILOT

A. Introduction

The application for a Reduced Spacing Pilot in Virden Roselea Unit (VRU) No.1 was approved in May, 1991 and the wells were drilled during June, July and August, 1991. The program resulted in the drilling of seven infill wells and two conversions to water injection. Appendix 2 shows the resultant infill wells and conversions on a unit map.

B. Conclusions

The 1991 Virden Roselea Unit No.1 infill drilling pilot was a technical and economic success.

C. Discussion

1. Original Assumptions and Design

An evaluation of the North Virden Scallion Unit (NVSU) No.1 infill drilling pilot indicated that infill drilling in the Virden area should be concentrated in areas with the following characteristics:

a. structurally high
b. moderate to high oil rate
c. low watercut
d. low to moderate reservoir depletion.

A review of VRU No.1 showed that Section 30-10-25WPM met these criteria.[1]

The infill wells were expected to encounter thick pay in the Cherty and produce incremental oil.

2. Results

Log-pay was identified in the Crinoidal, Sandhill, Oolites and Cherty zones. All seven wells drilled were completed open-hole across these four zones. Not all wells had log-pay in each zone. The well at 11B-30 has log-pay but produced only water and is suspended. The infill wells show variability in both current pay thickness and oil production rate. The top three producing wells, 8B-30, 8C-30 and 10C-30, have 8.0 m or more of log-pay in the Cherty. The remaining four wells have no log-pay in the Cherty. No relationship between structure and production is evident.

Ooils project area

2695 B $10^3 m^3$

Appendix 3 is a copy of the net pay map submitted with the application for reduced spacing. Appendix 4 presents the structure, log-pay thickness, and oil-in-place values for the infill wells. Oil-in-place estimates were made using a drainage area of 8 ha.

Appendix 5 compares actual and forecasted characteristics of the infill program. Decline analysis shows the infill program resulted in an incremental increase in reserves of 90 10^3m^3, with no acceleration. The average initial oil production rate was 3.5 m^3/day/well, close to the predicted 4.0 m^3/day/well. The average watercut was 40%, lower than the predicted 60%.

Oil and water production rates for the infill wells are presented in Appendix 6.

Since none of the infill wells penetrated the oil-water contact, its depth cannot be confirmed. However, the contact is at least -180 meters MSL, based on the deepest well, 10C-30, being drilled to that depth.

The proposed injection wells at 9-30 and 15-30 were converted as planned and are injecting at a rate of 57 m^3/day. With the added injection capacity the project area cumulative voidage replacement ratio is 2.2.

[1] "Reduced Spacing Application for Virden Roselea Unit No.1 Virden Lodgepole B Pool", January 1991

II. VIRDEN ROSELEA UNIT 1 REDUCED SPACING 1993 TECHNICAL DISCUSSION

A. History

The Virden Roselea oil field was discovered in 1953 and produced on primary depletion with pressure support being provided by the aquifer to the Southwest. The field was developed on 16 hectare spacing. Virden Roselea Unit No. 1 was created on July 1, 1965. A waterflood scheme was implemented in October, 1965. In 1991, a program to drill infill wells on 8 hectare spacing in the central part of the Unit (Section 30-10-25 WPM) was successful in recovering incremental reserves. The results of the 1991 drilling program were discussed previously in Section I. Current recovery from the entire Virden Roselea Unit No. 1 up to July, 1993 is 2,297 x 10^3 m^3 oil or an estimated 29 % of the OOIP. From the plot of the historical production shown in Appendix 7, the increased production is evident from the initial waterflood and from the 1991 infill drilling program.

OOIP - 7920

B. Infill Well Selection

As indicated by the results of both the 1989 North Virden Scallion Unit No. 1 and the 1991 Virden Roselea Unit No.1 drilling programs, infill drilling should first be considered in the following areas which are:

1. structurally high,
2. have a moderate to high oil rate,
3. have a low watercut
4. have low to moderate reservoir depletion

A review of the current well performance does indicate that the 1991 pilot program did meet these criteria. Presently the average oil rate for all producing wells in Section 30-10-25 is 2.5 m^3 opd with a watercut of 75 % compared to the Unit average of 1.6 m^3 opd and 80 % watercut.

Existing wells are located close to the centre of each Legal Subdivision (LSD). In an effort to form ideal drainage patterns, infill wells will be located as close to the corners of the LSD's as possible. Final locations may be moved slightly from the ideal pattern locations to minimize surface impact, avoid pipelines and facilities, maintain a 100 meter buffer from the Unit boundary, and minimize lease construction costs.

According to the above considerations, Chevron has identified a second phase of infill drilling which includes up to fourteen new wells being drilled and two producers being converted to injection. This second phase of infill drilling targets two areas within the Unit. The first area extends the 1991 Pilot program eastward and the second area is in Section 21 and 28-10-25 WPM where there has been low reservoir depletion compared to the Unit average. This is evident in Appendix 8 which is a map of the remaining oil in place (Original Oil in Place, Cumulative Production and Watercut maps are also included). Production is expected to increase by 24 m^3opd from the current 99 m^3opd to 123 m^3opd. Based on the results of the previous infill wells, incremental reserves from this second phase of drilling are estimated to be 125 000 m^3 oil.

The estimated ultimate recovery from the existing wells in Virden Roselea Unit 1 is estimated to be 34 % of the OOIP. This recovery was based on decline curve analysis assuming an economic limit of 30 m^3opd for the total Unit 1. The incremental recovery from the second phase of infill drilling is expected to improve recovery an additional 2 % of the OOIP. Production forecasts for the Unit with and without infill drilling are also presented in Appendix 9A/9B. A similar number of reduced spacing locations also exist west of the Pilot program in Unit 1.

C. **Discussion**

1. **Geological Summary**

Oil production at Virden Roselea comes from the Upper Virden (Crinoidal), Lower Virden (Sandhill and Oolites), and Scallion (Cherty) members of the Lodgepole Formation. The application for reduced spacing for the 1991 pilot should be referred to for further stratigraphic information. A type log and cross-section were included with the 1991 application.

The success of the original waterfloods in the area testifies to the degree of lateral continuity within each of the producing zones, but we feel that 8 hectare spacing is required to adequately drain the pool. This interpretation is supported by the 1991 pilot, where several wells encountered unswept pay and are still producing at high rates with low water cut.

The extent of pay in Roselea Unit 1 is partially controlled by structure and an oil-water contact. As the Cherty structure map shows (Appendix 10), regional dip is down to the west, but there is a high trending nose extending into Township 10-25W1. The dominant apex of the structure was targeted in the 1991 program, but a second culmination is seen in Sections 21 and 28-10-25W1. The oil-water contacts along the Virden trend are complex and hard to define precisely. We strongly believe that there is a regional tilt to the west in the oil- water contact at Roselea #1, and that there may be potential to the west of the pilot as well as to the east.

The second control on pay at Roselea Unit 1 is a permeability pinchout. Permeability is controlled by the "stratigraphic depth" of a tight dolomitic and anhydritic caprock. In general, the caprock penetrates into progressively lower reservoir zones to the east.

Pay maps and porosity feet maps for each of the reservoir zones are presented in Appendix 11. Given the vintage of most of the core/logs in the area, accurate pay determination is difficult. For the current mapping, we have used pay cutoffs of .07 for porosity, 50% for water saturation, and 1 mD for permeability. In wells where core analysis is not available, or where log quality is unreliable, core descriptions were used as pay indicators. Based on experience in the area, any zone that is described as oil stained with poor porosity or better is considered to be pay.

2. Infill Location and Conversions

Based on the success of the 1991 pilot program Chevron is requesting reduced spacing for the entire Virden Roselea Unit 1. The sequence of drilling the reduced spacing (8 ha) locations is yet to be finalized. In this second phase of drilling Chevron has identified the following fourteen locations according to the current guidelines. By drilling up to fourteen wells we are able to confirm representative infill results, reduce drilling, completion and tie-in costs through economies of scale and develop several inverted nine-spot patterns. The inverted nine-spot pattern was selected because it allowed all new wells to be completed as producers and required the minimum number of well conversions to achieve repeated patterns.

Potential well locations for the Phase 2 program are:

			OOIP (16 ha)
1.	Chevron VRU No. 1	11 A -21-10-25 WPM	500
2.	Chevron VRU No. 1	13 B -21-10-25 WPM SLOPE	700
3.	Chevron VRU No. 1	14 A -21-10-25 WPM	450
4.	Chevron VRU No. 1	14 B -21-10-25 WPM	700
5.	Chevron VRU No. 1	02 B -28-10-25 WPM.	550
6.	Chevron VRU No. 1	03 B -28-10-25 WPM	750
7.	Chevron VRU No. 1	04 B -28-10-25 WPM SLOPE	750
8.	Chevron VRU No. 1	04 C -28-10-25 WPM SLOPE	600
9.	Chevron VRU No. 1	01 B -29-10-25 WPM	550
10.	Chevron VRU No. 1	05 A -29-10-25 WPM	650
11.	Chevron VRU No. 1	05 C -29-10-25 WPM RIVER	400
12.	Chevron VRU No. 1	05 D -29-10-25 WPM	450
13.	Chevron VRU No. 1	08 B -29-10-25 WPM	550
14.	Chevron VRU No. 1	08 A -30-10-25 WPM RIVER	600
			7550 $\times 10^3$ bbls
			1199.76 $10^3 m^3$

The two wells proposed for conversion to water injection are:

1.	Chevron East Virden	02-28-10-25 WPM
2.	Calstan East Virden Prov	01-29-10-25 WPM

3. **Waterflood Performance**

Waterflood response has been seen in all areas of the Unit. However the eastern portion of the Unit 1 which encompasses 36 percent of the total Unit area, only accounts for 17 percent of current Unit 1 production from 20 of the 62 (32 %) active producing Unit 1 wells. Historical production of the Phase 2 area and total Unit No. 1 are shown in Appendix 12.

4. **Voidage Replacement**

Current and potential completions in the current and proposed injectors are presented below. Each potential completion will be evaluated on an individual basis to optimize recovery.

Well	Status	Current Completions		Potential Recompletions
		Zone	Type	Zone
09-20-10-25	Inj	Cherty	Perf	1st,3rd,4th
13-20-10-25	Inj	SH, 1st,2nd,3rd,Cherty	Perf	4th
15-20-10-25	Inj	SH, 1st,2nd,3rd,Cherty	Perf	4th
11-21-10-25	Inj	Cherty	Perf	4th
13-21-10-25	Inj	2nd,3rd,4th,Cherty	Perf	SH,1st
05-28-10-25	Inj	2nd,3rd,Cherty	Perf	4th
05-29-10-25	Inj	4th, Cherty	Perf	SH,1st,2nd,3rd
07-29-10-25	Inj	4th, Cherty	Perf	SH,1st,2nd,3rd
09-30-10-25	Inj	4th, Cherty	OH	
02-28-10-25	Prod	Cherty	OH	
01-29-10-25	Prod	4th, Cherty	Perf	Cr, SH,1st, 2nd, 3rd
			Nomenclature	
	Cr	Crinoidal	2nd	Second Oolite
	SH	Sandhill	3rd	Third Oolite
	1st	First Oolite	4th	Fourth Oolite

Initially, only two wells are required to be converted from producers to injectors. The 02-28 conversion will provide pressure support from the pool edge and the 01-29 conversion will complete an inverted nine-spot pattern.

Current combined production from 02-28 and 01-29 is 6 and 8 m^3 total fluid per day, respectively. Based on previous conversions of producers to injectors in the Virden Roselea Unit 1, injection rates are expected to be approximately five times the total production rate. This means injection can be expected to be approximately 70 m^3pd for 02-28 and 01-29 combined. 01-29-10-25 is has already been hydraulically fractured, whereas 03-28 has only been acid stimulated.

The following table summarises the current and proposed voidage replacement.

Voidage Replacement

		Current	**Proposed**
Producers	no of wells	20	32
Total Liquid Production	m^3pd	168	250
Oil Production	m^3opd	17	40
Injectors	no of wells	9	11
Total Water Injection	m^3pd	240	310
Voidage Replacement Ratio	fraction	1.4	1.2

Injection pressures will be similar to those currently seen in the Unit. If the proposed conversions do not meet initial injection requirements, we have the option of stimulating 02-28 , cutting back wells with relatively higher water production , or converting an additional existing producer to injection, depending on where the injection is deemed necessary.

5. Well Completions

Present plans are to case the wells to TD and perforate. This will allow the zones to be selectively completed and stimulated.

Chevron plans to initially complete the Cherty zone in any new wells because this is the zone with 76 % of the potential. Completion of other intervals above the Cherty will be treated on an individual basis once logs are evaluated. It is Chevrons intent to complete all zones with effective pay which will allow optimum recovery.

It should be noted that the uphole zones contain about 30,000 m^3 reserves or 24 % of the Phase 2 area incremental reserve target. Appendix 8 is a map of the remaining OIP by LSD.

6. Contingency Plans

Unit wide development to 8 ha spacing is expected to occur in several phases. The 1991 pilot was the first phase and the second phase consists of the fourteen locations previously listed. If at any time, continued development becomes uneconomic, Chevron may postpone or cancel further activity within Virden Roselea Unit 1.

7. Production Forecast

Production forecasts for the infill wells were generated assuming an average rate initial production of 2 m^3opd with a 50 % watercut. These initial production figures are better than the current Unit average 1.6 m^3opd and 80 % watercut. Incremental reserves are estimated to be 125 000 m^3. The rates and reserves are comparable to the relative rates and incremental reserves seen in the 1991 Infill Pilot area. Base and increased production forecasts are presented in Appendix 9A/9B.

This incremental target of 125,000 m^3 in the second phase will be produced from all Lodgepole members, 95 000 m^3 being from the Cherty. Incremental reserves are allocated to the various members based on their relative OOIP figures. These incremental reserves are summarised in Appendix 13.

8. Monitoring

Bottom hole pressure surveys will be conducted in new wells to establish the current reservoir pressures. Thereafter, we will revert to our present system of monitoring pressures which includes both fluid level surveys in producing wells and falloff tests in injectors.

9. Horizontal Drilling

Chevron has evaluated the use of horizontal (or highly deviated) wells and feels they are not economically feasible in this instance because of the increased cost, the risk of uneconomic oil production, and increased well servicing costs. The estimated cost to drill and complete a horizontal well is $600 M compared to $200 M to drill and complete a vertical well. The existence of natural fractures presents the risk of the horizontal section encountering fractures already filled with injected water, thereby drastically reducing oil flow. This situation has been encountered in the Midale, Saskatchewan area where 1 in 3 horizontal wells are successfully completed. If there are zones which produce excessive water, it would be difficult to work this well over to shut off the water. There are no readily available coiled tubing units in the Virden area which would be required to service the wells. If artificial lift via insert pumps is installed, there will be increased well maintenance fees for tubing replacement due to rod wear.

Chevron feels that with reduced 8-hectare spacing, vertical wells will be as effective as horizontal wells in producing incremental reserves.

1991 infill project mud wt
2000 kg/m³ +

III. DRILLING PRECAUTIONS

A. The following precautions will be taken during drilling operations:

1. The wells will have 177.8 mm surface casing set to a minimum depth of 250 metres.

= .561 psi/ft

2. A weighted GypMud (1300 kg/m³) will be used to drill the Lodgepole Zone (an overbalance of approximately 700 kpa will be used).

chk k → mud hydrostatic 7651 kPa.

Reservoir Pressure kg/m3
8400 - 11700 kPa

3. If the well flows while drilling, drilling mud of sufficient kill weight will be circulated into the well. It is not anticipated that the wells will kick even in areas swept by the waterflood.

4. The wells will be cased to TD with 114.3 mm production casing.

The Chevron drilling plan is designed to handle the present reservoir pressure. We do not anticipate having any problems, therefore, our intention is not to shut in injection wells because production would have to be suspended because of a lack of water handling capacity. Conditions will be closely monitored and if needed, water injection could be stopped.

103-3-1-25 23 kPa/m

average well depth. 600 m.

① 600 m = 820 psi

based 1 psi/ft

worst case scenario 1A-29 ✦ WTI

bu'd-up

IV. ENVIRONMENTAL IMPACT ASSESSMENT OF THE VIRDEN ROSELEA UNIT NO. 1 REDUCED SPACING PROGRAM

The purpose of this assessment is to evaluate impacts which may result on the surrounding environment from the proposed Chevron Canada Resources reduced spacing in Virden Roselea Unit No. 1.

The following preventative measures and contingency actions were successfully employed by Chevron in the 1991 Virden Roselea Unit No. 1 reduced spacing pilot to address these issues and will continue to be employed in the Virden Roselea Unit No. 1 reduced spacing program.

A. Disposal of Drilling Fluids on Drill Sites

Chevron and our contractors will strictly adhere to the Manitoba Energy and Mines Petroleum Drilling and Production Regulations which ensure that drilling fluids are disposed of in an environmentally safe manner and that the drill site is fully restored. All lease topsoil will be conserved and stockpiled in the preparation of the drilling lease. After the well has been drilled, the lease will be recontoured to the surrounding land, rocks will be removed, weeds will be controlled and topsoil will be replaced resulting in the lease being left ready to be incorporated into the normal agricultural operation of the surrounding land. As with other existing wells in Virden Roselea Unit No. 1, water based drilling muds will be used in the reduced spacing project and the use of oil and salt based muds is not anticipated.

B. Risk to Water Supplied from Drilling Operations

It is the policy of Chevron and our contractors to strictly adhere to surface casing requirements and cementing procedures during drilling operations as are presented in the Manitoba Energy and Mines Petroleum Drilling and Production Regulations. These requirements during drilling operations ensure the protection of shallow aquifers used for domestic potable water.

C. Surface Impact from the Installation of Flowlines

The possible impacts to agricultural soil during flowline installation are mixing of topsoil with subsoil, compaction of the topsoil and loss of topsoil. To address these concerns, Chevron will institute procedures wherever possible, in consultation with the landowner, to strip and stockpile the topsoil separately before the flowline is installed and replace the topsoil over the compacted subsoil and re-seed. These procedures to prevent soil mixing and topsoil compaction will ensure topsoil is conserved so that the productive capability of the soil is maintained. Chevron in consultation with the landowner will ensure construction activities are conducted within the flowline right of way (refer to Appendix 14).

Electrical power will be run underground to areas that are cultivated. In pasture area, overhead power lines will be used. In areas where it is extremely rocky, it is difficult to bury power lines.

To minimize erosion at these leases, the following will be observed:

1. minimum amount of disturbance of lease site and road
2. clear minimum amount of bush
3. restore and seed lease
4. attempt to detour water around lease area
5. continue to monitor and take further action as required.

D. **Oil and Salt Water Spills from Flowline and Water Injection Line Failures**

To repair equipment and to reclaim land damaged by a spill is very costly. It is in the best interest of Chevron to institute programs which will minimize the probability of spills occurring. The major cause of spills in the Virden area is corrosion of steel in flowlines.

To greatly reduce the probability of corrosion in flowlines Chevron will utilize top grade construction materials and will employ well-qualified inspectors to oversee construction activities and to ensure quality control is maintained throughout construction.

Chevron will construct flowlines and water injection lines of non-corrodible fibreglass pipe. Fiberglass pipe is used for its corrosion resistance which reduces inhibitor cost. Fiberglass pipe will require proper sand padding and rock shielding.

Another possible cause of spills is through flowline failure due to overpressure. Wax buildup is the main cause of pressure build-up in the flowline. Pigging facilities will be installed on all flowlines in the reduced spacing project so that they can be cleaned regularly to prevent wax build-up. In addition, high-pressure shutdown switches will be installed on all producing wells to shut down pumps and to prevent excessive build-up of pressure. As is Chevron's standard practice, close monitoring of facility integrity and production rates will be a high priority in the reduced spacing project to ensure a spill does not occur.

If a flowline is not buried deep enough, frost heaving of the flowline can sometimes result in breakage of the flowline. Chevron, wherever possible, will bury flowlines in the reduced spacing project to a depth of 1.2 metres to stabilize the position of the flowline and to help prevent flowline breakage from frost heaving. Much of the land in the reduced spacing project is composed of large rocks and to bury flowlines to this depth is not always practical.

Although unlikely, a spill may occur even though the above preventative measures have been implemented. Should a spill occur, it is/will be Chevron's standard practice to conduct the following spill response procedure:

1. Isolate the pipeline leak by shutting in the well or valves at either end of the line. There are high pressure shutdown valves at all well sites and all new flowlines will have check valves installed at the headers;
2. Notify the landowner and the Petroleum Branch;
3. Isolate and remove spilled fluid;
4. Conduct an on-site inspection and evaluation of the spill damage;
5. Repair the pipeline and evaluate the cause of the pipeline failure;
6. Apply first aid chemical treatment to damaged sod;
7. Complete the required Petroleum Branch spill report;
8. Conduct an ongoing site reclamation program for the spill area;
9. Pay annual compensation to the landowner for losses due to the spill.

Chevron will continue its aerial surveillance program to detect a spill early if one should occur. Twice a week a low flying aircraft will fly over the entire Unit. Early detection of a spill will minimize the amount of material spilled and the resulting damage. In addition, signs will be installed at all road crossings to mark the existence of flowlines. Each road sign will state the product type the flowline is transporting and will provide a Chevron emergency number to phone if a flowline leak or other problem is observed.

E. Risk to Water Supplies from Oil and Salt Water Spills

As discussed in Section D, Chevron will take all preventative measures to ensure a spill does not occur by installing non-corrodible fibreglass flowlines. The probability of a spill occurring in the reduced spacing project is very low. If a spill should occur, however, such that the use of a landowner's dugout or drinking water is inhibited, Chevron will implement procedures to delineate the extent of damage and will provide assistance to the landowner.

F. Control of Weed Growth Around Production Facilities

An ongoing program to control weeds around production facilities will be instituted to ensure weeds do not infest surrounding land areas.

V. IMPACT ON SURFACE OPERATIONS

A. Introduction

Much of the proposed Roselea Unit No. 1 reduced spacing project area will be on cultivated lands. The intent of this assessment is to highlight Chevron's efforts to minimize the impact of the project an surface operations in the area.

B. Discussion

1. Project Location

The location of the proposed Roselea Unit No. 1 reduced spacing project area is discussed in the "Technical Discussion" in Section II. The area was chosen primarily on the basis of favourable geologic and reservoir characteristics for evaluating eight hectare well spacing on ultimate recovery. Other considerations in choosing the area were the impact on surface operations and the expected reaction of the affected landowners.

2. Well Spacing

A map showing the orientation and size of drilling spacing units within the proposed reduced spacing area is shown in Appendix 1. Target areas within the eight hectare DSUs will be consistent with target areas established by The Oil and Natural Gas Conservation Board in previous reduced spacing orders. That is, the target areas will be square areas having sides 65 m from and parallel to the sides of the DSUs. (Note that several DSUs have been truncated to keep the DSUs within the Unit).

3. Minimization of Surface Impacts

a. Location Access

With the well locations fixed by the constraints discussed above, Chevron will endeavour to minimize disruption of surface operations in the area by:

(1) Maximizing use of existing lease roads to access new locations.

(2) Using non-built up trails from existing lease roads to the new locations. (The landowners will, therefore, be able to farm over the lease trails and close to the wellheads.)

b. **Pad Drilling/Horizontal Drilling**

With eight hectare spacing and well depths averaging 600 m, Chevron does not consider directionally drilling the proposed locations from a pad to be feasible. Though surface impacts would be reduced, the increased drilling and operating costs would make the project uneconomic.

4. **Land Owner Consent**

Chevron has discussed the proposed infill drilling program with the affected landowners. The landowners will be compensated for the impact Chevron's installations will have on their agricultural operations and they support the infill drilling program. Appendix 15 contains surface owner information including the owners impacted by the infill pilot, consent to survey forms signed by the landowners and notfication sent to landowners who will have proposed injection well conversions on their property.

C. **Conclusion**

Chevron believes that agricultural and petroleum operations can coexist on the same lands. Such coexistence will maximize development of Manitoba's resources above and below the surface. Chevron will make every reasonable effort to minimize the impact of the proposed Roselea Unit No. 1 reduced spacing project on surface operations and will not proceed without the full consent of the affected landowners.

VI. SURFACE FACILITIES FOR VIRDEN ROSELEA UNIT NO. 1 1994 REDUCED SPACING PROGRAM

A. Introduction

To handle production from the proposed Phase II infill drilling program, new pipelines will be laid and the battery at 1-29 will be upgraded. Chevron's efforts to minimize the surface impact of the new pipelines has already been discussed. The battery upgrade will have no surface impact as the battery area itself will not be expanded.

B. Facilities Design

1. Gathering System

a. Infill Well Tie-Ins

Tie-ins are to closest existing field headers or wells. Routing decisions will be made in conjuction with the landowners.

Pipe will be 60.3 mm OD. Fibreglass will be utilized where practical because of its superior corrosion resistance.

2. 1-29 Battery

The flowlines all flow to the existing 1-29 Unit battery.

a. Major Battery Equipment

(1) If necessary, a new FWKO will be installed parallel to the existing vessel to handle incremental fluids and the existing water disposal pump will be upgraded.

(2) All other major equipment and associated piping at the 1-29 battery is adequately sized for the added infill production. No changes will be made.

b. Metering and Testing

No changes will be made to the existing setup.

As in the existing operation, portable wellhead test apparatus will be used where fluid from more than one well is commingled on a single flowline.

The battery test apparatus will be used for other wells.

3. **Injection Well Tie-Ins**

Water lines will be 60.3 mm OD high pressure fiberglass linepipe.

Pipeline will be licensed to 9930 kPa to match ANSI 600 valves.

VII. CORROSION CONTROL

A. Corrosion of injection wellbores will be controlled by:

1. installing a coated packer above the injection zone,
2. installing plastic-coated or cement-lined tubing,
3. filling the annulus with inhibited fresh water,
4. catholically protecting casing,
5. using stainless steel surface fittings,

B. Corrosion of producing wellbores will be controlled by catholically protecting the casing and chemically inhibiting the casing, tubing and rod string.

C. Corrosion of flowlines will be controlled by installing fiberglass flowlines.

D. Corrosion of surface facilities will be controlled by:

1. using corrosion resistant piping and fittings (fibreglass, stainless steel) for produced water service.

E. Existing surface facilities are also protected by:

1. inhibiting with corrosion chemical,
2. internally coating all vessels,
3. installing sacrificial anodes in all vessels.

VIII. LESSOR, LESSEE, AND WORKING INTEREST INFORMATION

A. Appendix 16 lists the Lessors adjoining the area of application. The Working Interest Owners for the Unit are as follows:

Chevron Canada Resources
Amerada Hess Canada Ltd.
Trilogy Resource Corporation
Frontenac Petroleum Co. Ltd.
Murphy Oil Company Ltd.
Prairie Oil Royalties Company, Ltd.
Frazier, C.M.
Calex Resources Ltd.
Corvair Oils Ltd.
K & N Oil Development Co. Ltd.
North West Exploration Company Ltd.
Shannon Oils Ltd.

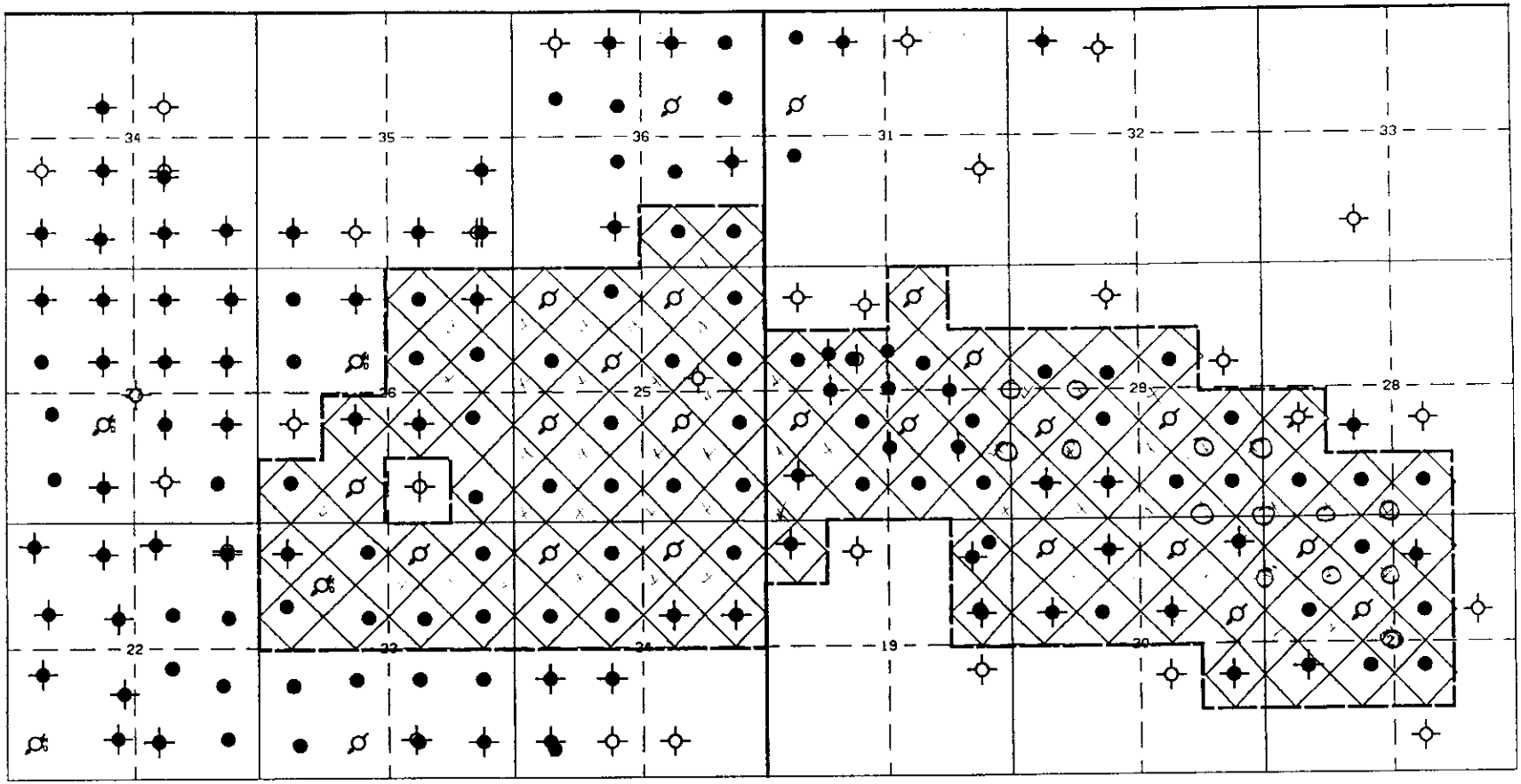
The Working Interest Owners outside the Unit are:

Frontenac Petroleum Ltd.
PanCanadian Petroleum Limited
PetroCanada Inc.
Murphy Oil Company Ltd.
Omega Hydrocarbons Ltd.

PostFax
MONTREAL, H1J 2K9
CR213-31

R.26W1M

R.25W1M



APPENDIX 1

T.10

T.10

R.26W1M

R.25W1M

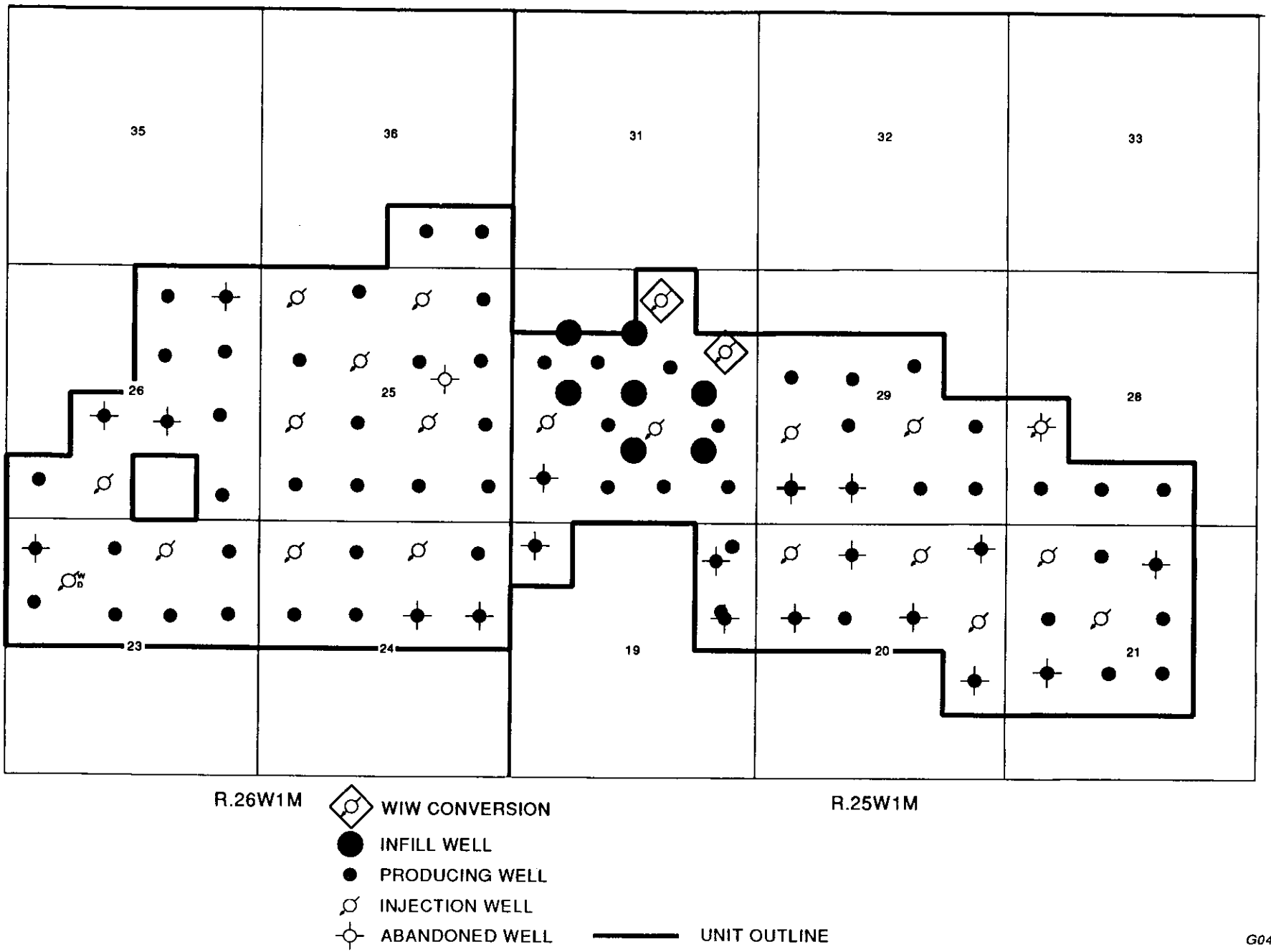
VIRDEN ROSELEA UNIT 1

8 HECTARE DRILLING SPACING UNITS

55 undrilled 8 ha DSU

VIRDEN ROSELEA UNIT NO. 1

FIGURE 1



APPENDIX 2

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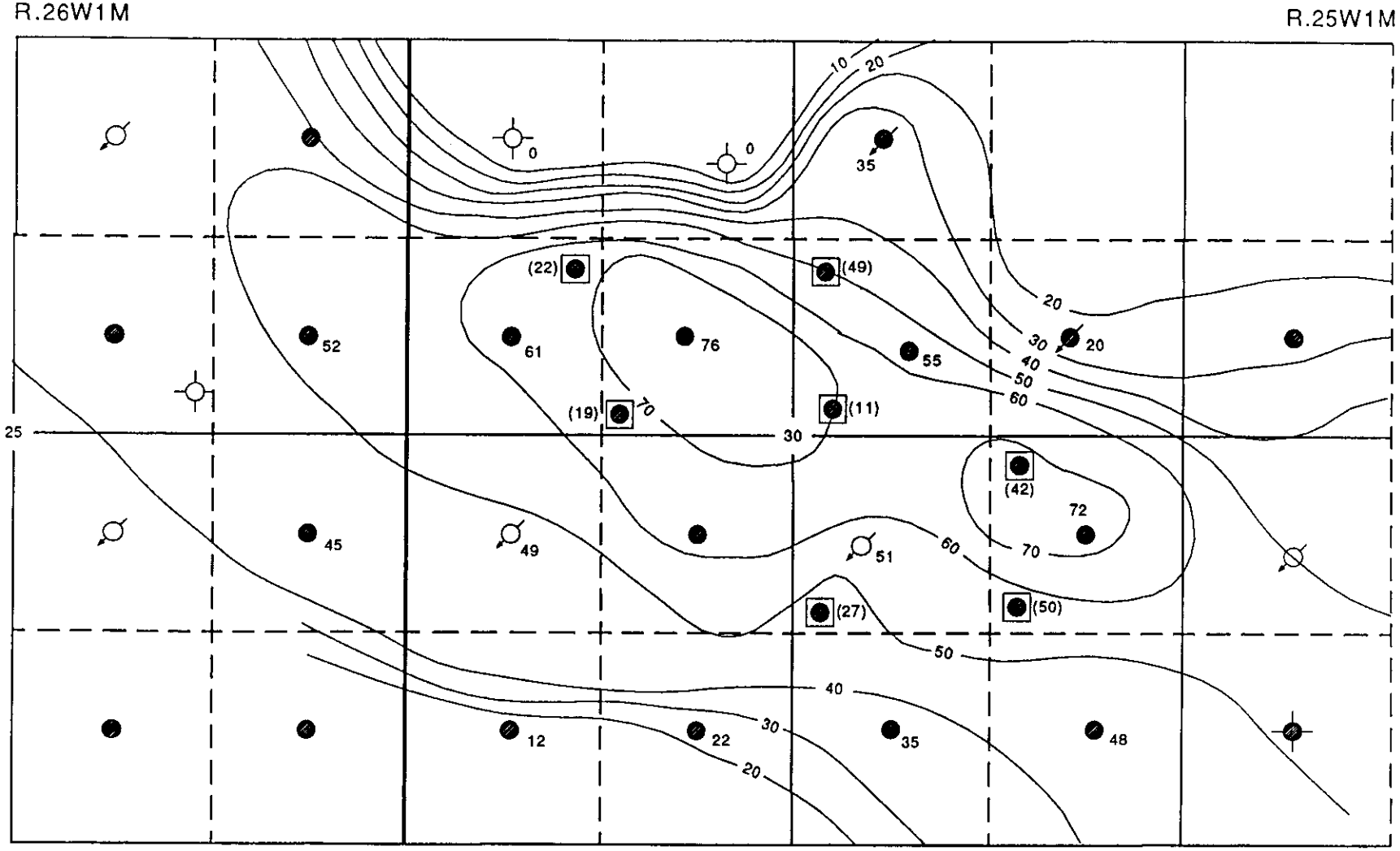
VIRDEN ROSELEA UNIT NO. 1

FIGURE 2



CONVERTED TO WATER INJECTION

INFILL WELLS

NOTE: "NET PAY AT TIME OF DRILLING INDICATED IN PARENTHESES"

ORIGINAL NET PAY MAP
(FEET)

APPENDIX 3

G04540_04

Appendix 4. Infill Geological Results

Well	Structure (m ss)	Original* Paythick (m)	OOIP (m3)	Current('91) Paythick (m)	ROIP ('91) (m3)
07B-30-10-25W1	-163.1	14.5	83574	8.1	46686
08B-30-10-25W1	-162.2	17.0	117527	15.3	105775
10B-30-10-25W1	-158.3	22.0	104779	3.3	15717
08C-30-10-25W1	-159.7	21.6	141908	12.7	83437
10C-30-10-25W1	-156.4	16.0	95890	14.8	88699
11B-30-10-25W1	-160.0	20.0	99698	5.9	29411
12D-30-10-25W1	-158.4	20.0	84787	6.7	78428

723163 448153 ≈ 20% of ROIP

*estimated from original net pay map (Appendix 3)

Δ recovery

~0.8 % of OOIP

Appendix 5. Summary of Infill Results

	Forecast	Actual
number of wells drilled	7	7
number of conversions	2	2
incremental reserves (e3m3)	87.3	90.0
avg initial OPD/well (m3/day/well)	4.0	3.5
avg watercut	60.0	40.5

38.5%

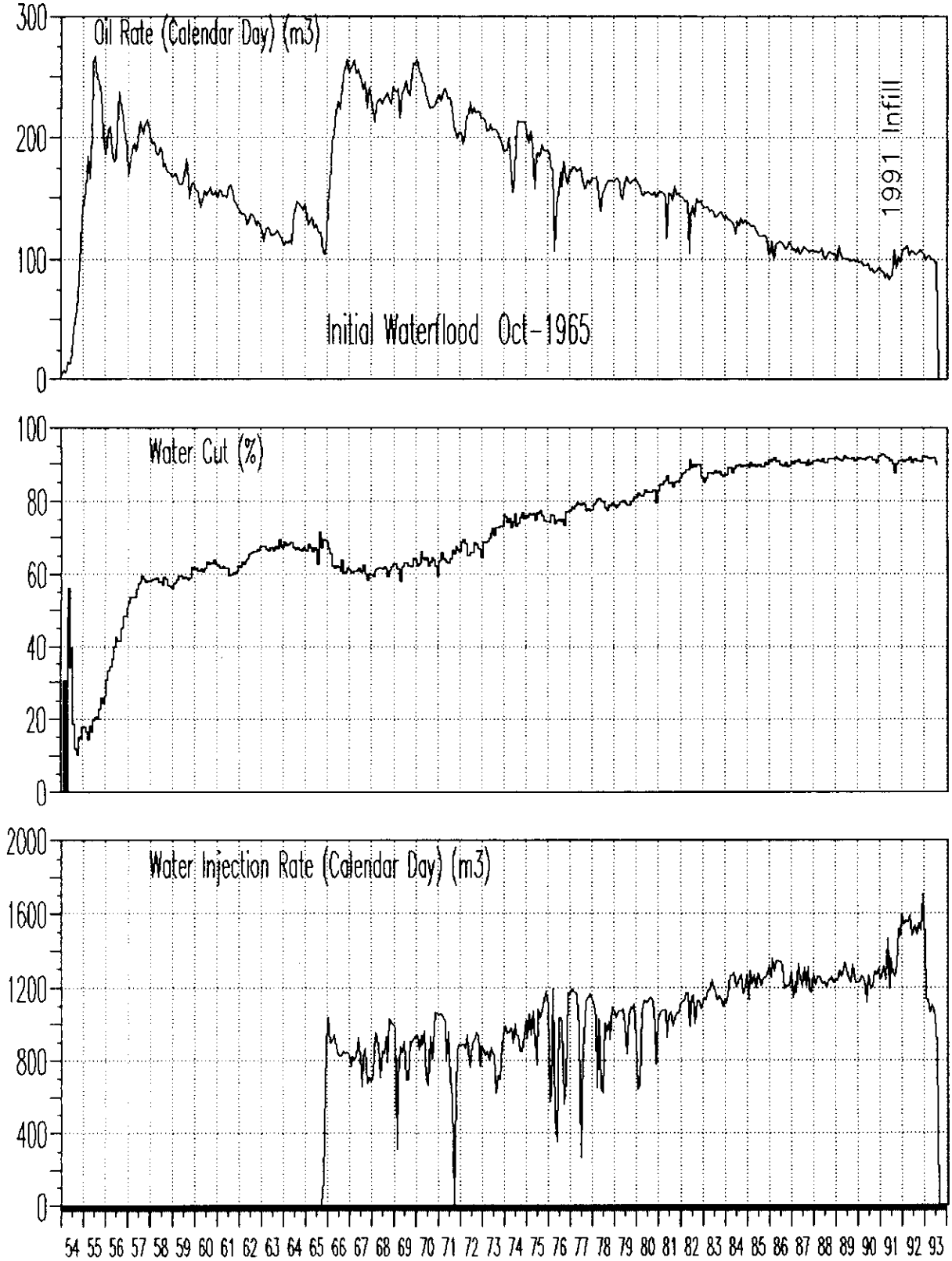
Appendix 6. Infill Well Production

Well	Initial OPD (m3/day)	WPD (m3/day)	Watercut (%)	Current OPD (m3/day)	WPD (m3/day)	Watercut (%)
07B-30-10-25W1	0.2	7.2	97.3	0.2	1.0	83.3
08B-30-10-25W1	9.0	0.5	5.3	4.8	0.4	7.7
10B-30-10-25W1	0.5	6.0	92.3	0.5	6.0	92.3
08C-30-10-25W1	3.3	1.0	23.3	2.8	1.0	26.3
10C-30-10-25W1	9.4	1.0	9.6	9.4	0.7	6.9
11B-30-10-25W1	0.0		100.0	0.0		100.0
12D-30-10-25W1	2.0	0.9	31.0	1.8	0.5	21.7
Total	24.4	16.6	40.5	19.5	9.6	33.0

7

Virden Rosela Unit 1

APPENDIX 7



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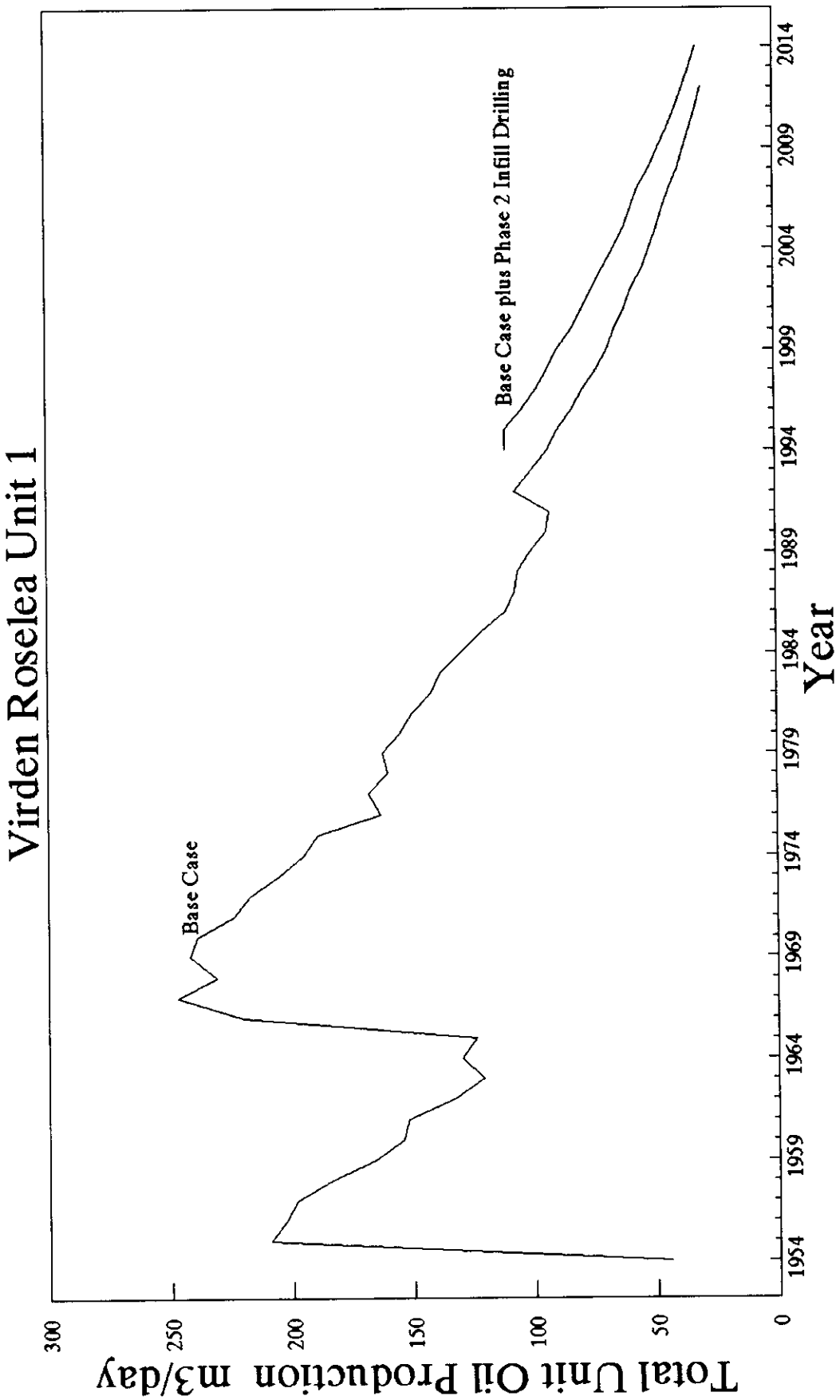
APPENDIX 9A

Virden Rosela Unit 1
Production Forecasts

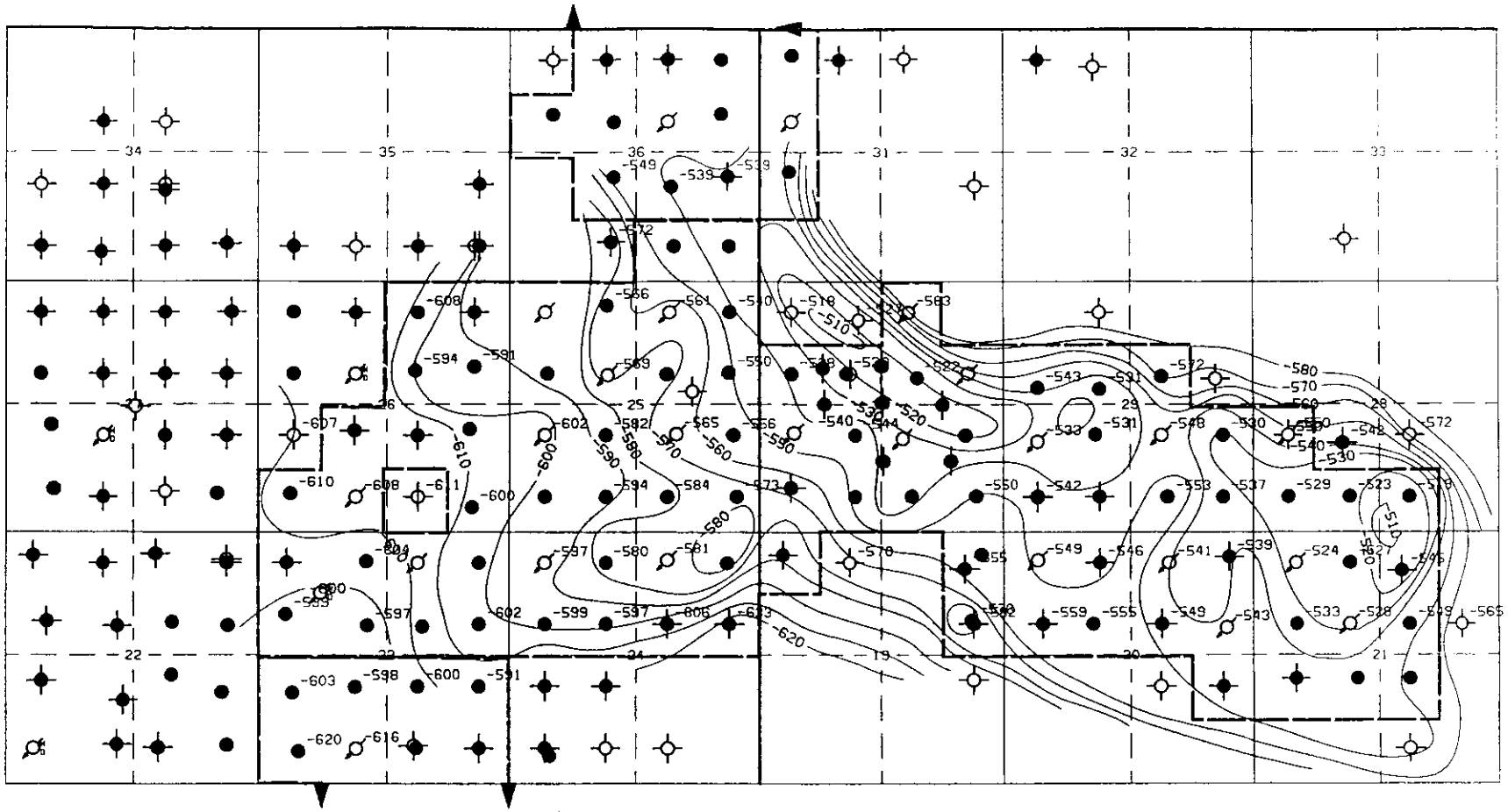
YEAR	Base Case Existing wells Oil Rate m3opd	Base Case plus Infills Total Oil Rate m3opd
1994	93	111
1995	89	111
1996	83	104
1997	79	98
1998	73	93
1999	69	89
2000	66	83
2001	61	79
2002	58	74
2003	54	70
2004	51	66
2005	48	61
2006	45	58
2007	42	55
2008	39	51
2009	37	47
2010	34	43
2011	32	40
2012	30	37
2013		34
2014		32
Remaining Reserves	400	525

APPENDIX 9B


Virden Roselea Unit 1
Total Unit Oil Production m3/day
Year
Base Case
Base Case plus Phase 2 Infill Drilling
300
250
200
150
100
50
0
1954
1959
1964
1969
1974
1979
1984
1989
1994
1999
2004
2009
2014

R.26W1M

R.25W1M



T.10

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R.25W1M

APPENDIX 10

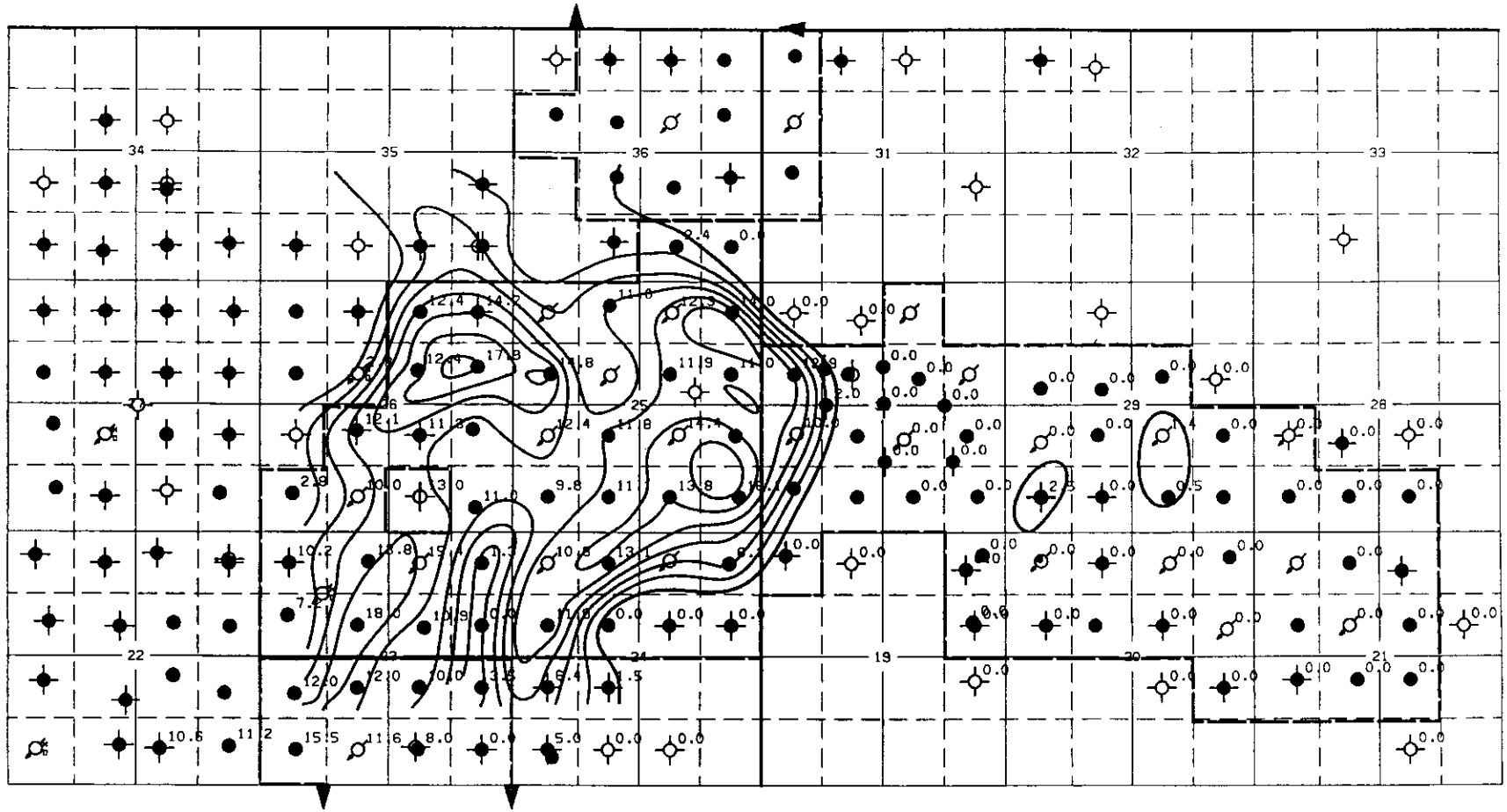
VIRDEN ROSELEA UNIT 1
STRUCTURE TOP OF CHERTY
(meters MSL)

Wells Selec

SEE SIDE BAR

R.26W1M

R.25W1M



APPENDIX 11A

T.10

T.1

R.26W1M

R.25W1M

VIRDEN ROSELEA UNIT 1

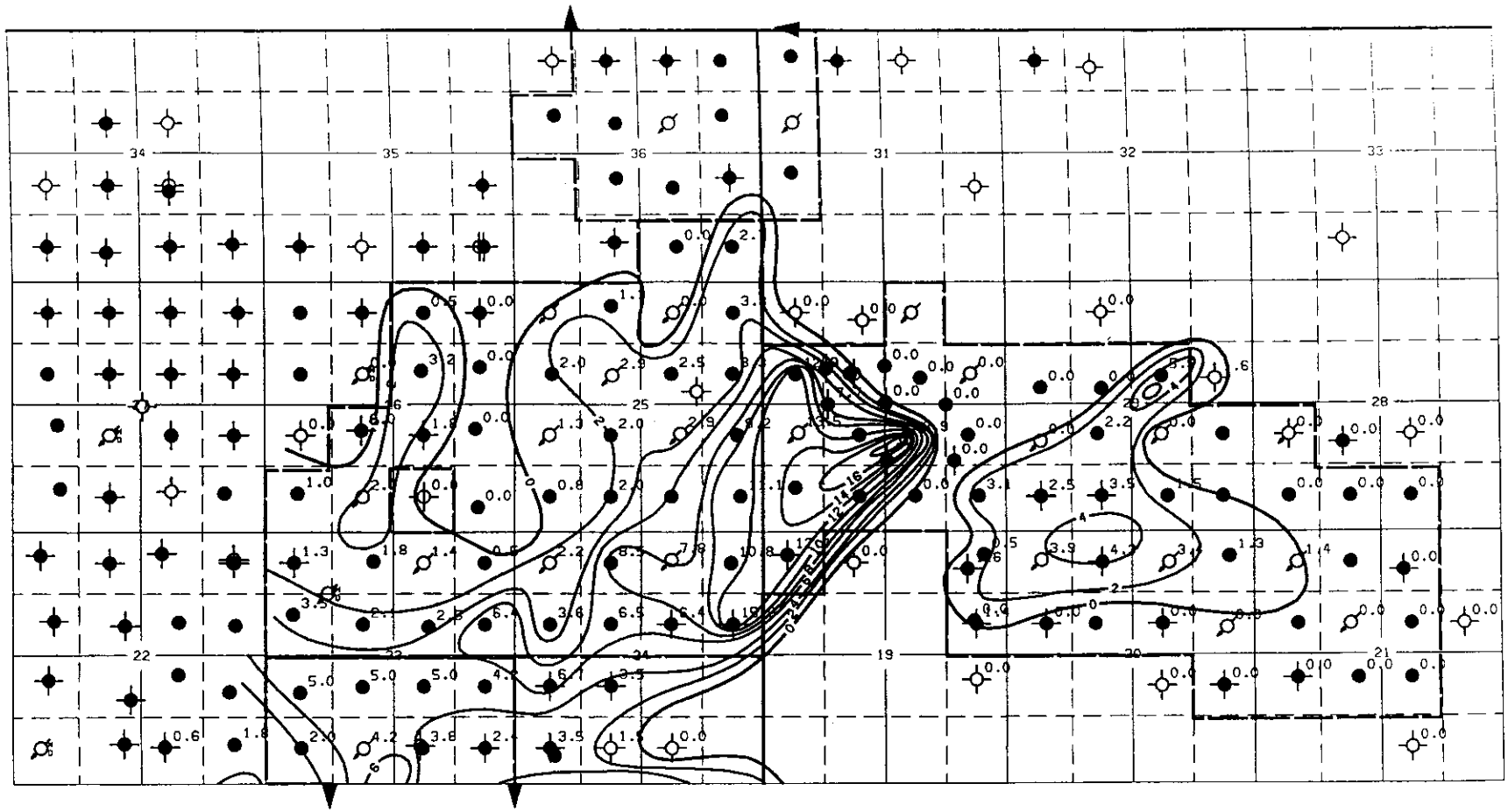
CRINOIDAL NET PAY IN FEET

Wells Se

SEE SIDE

R.26W1M

R.25W1M



APPENDIX 11B

T.10

T.1(

R.26W1M

R.25W1M

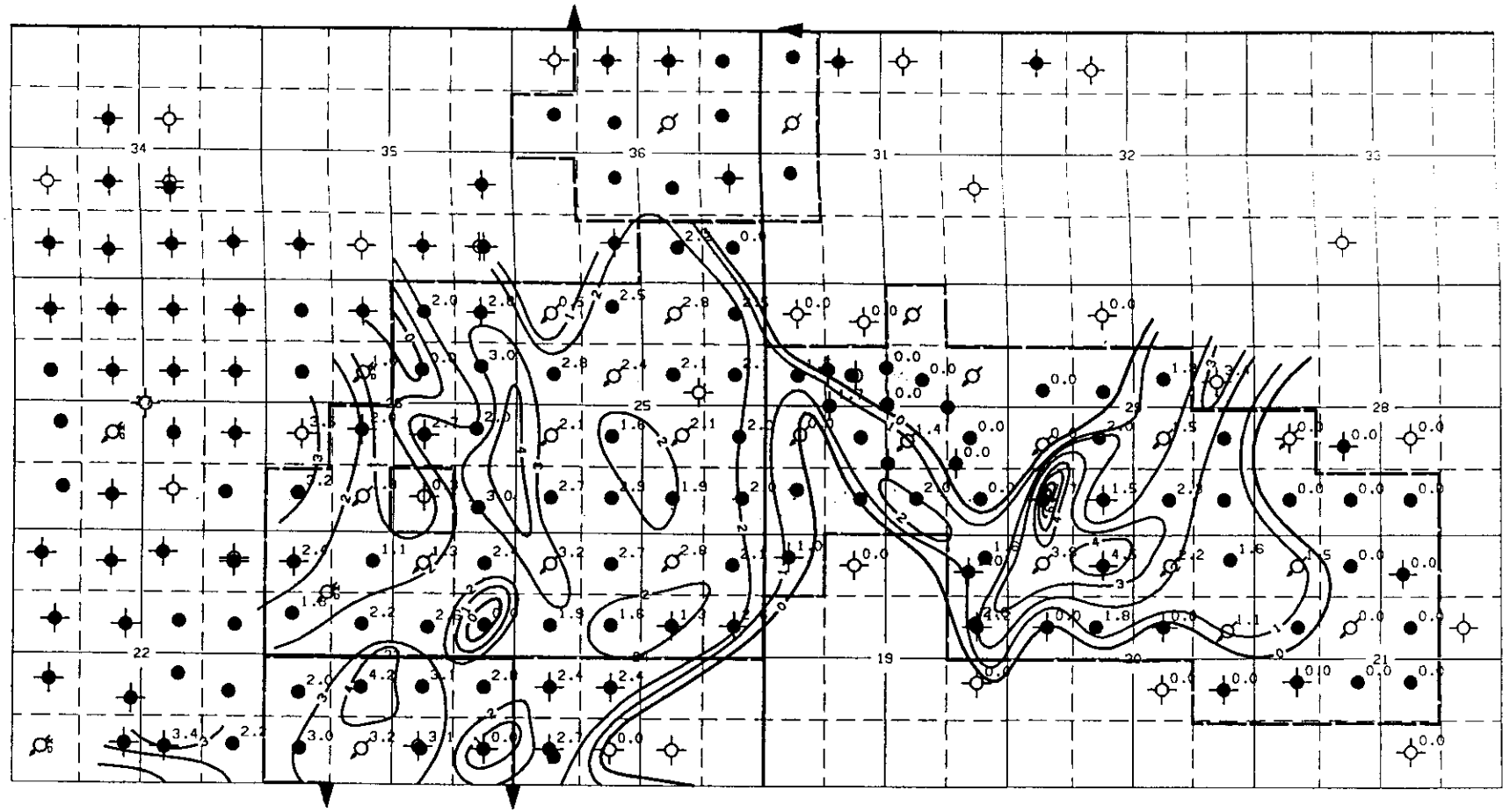
VIRDEN ROSELEA UNIT 1
SANDHILL NET PAY IN FEET

Wells Sel

SEE SIDE B

R.26W1M

R.25W1M



APPENDIX 11C

T.10

T.10

R.26W1M

R.25W1M

VIRDEN ROSELEA UNIT 1

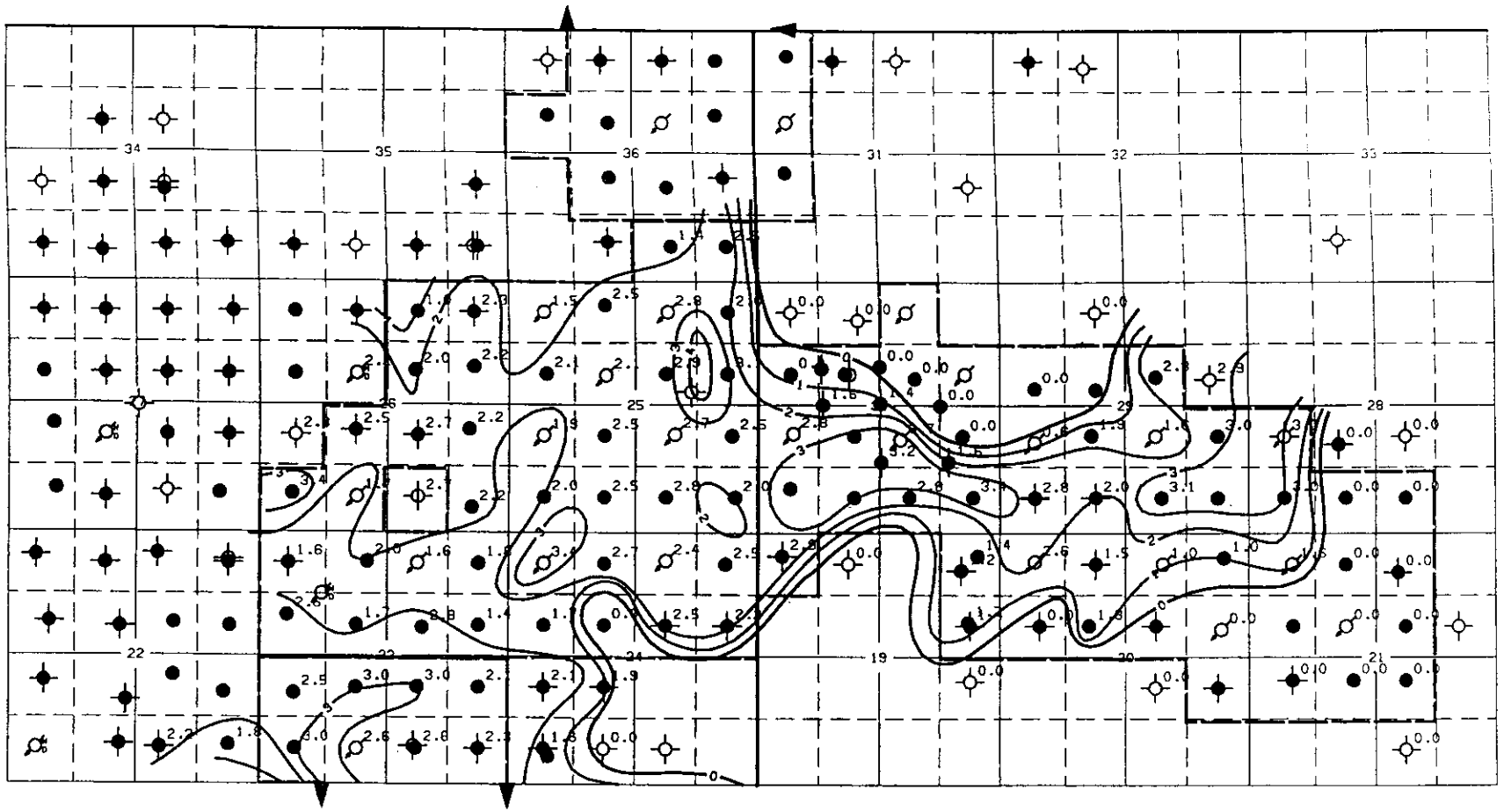
1ST OOLITE NET PAY IN FEET

Wells Selec

SEE SIDE BAR

R.26W1M

R.25W1M



APPENDIX 11D

T.10

T.1(

R.26W1M

R.25W1M

VIRDEN ROSELEA UNIT 1

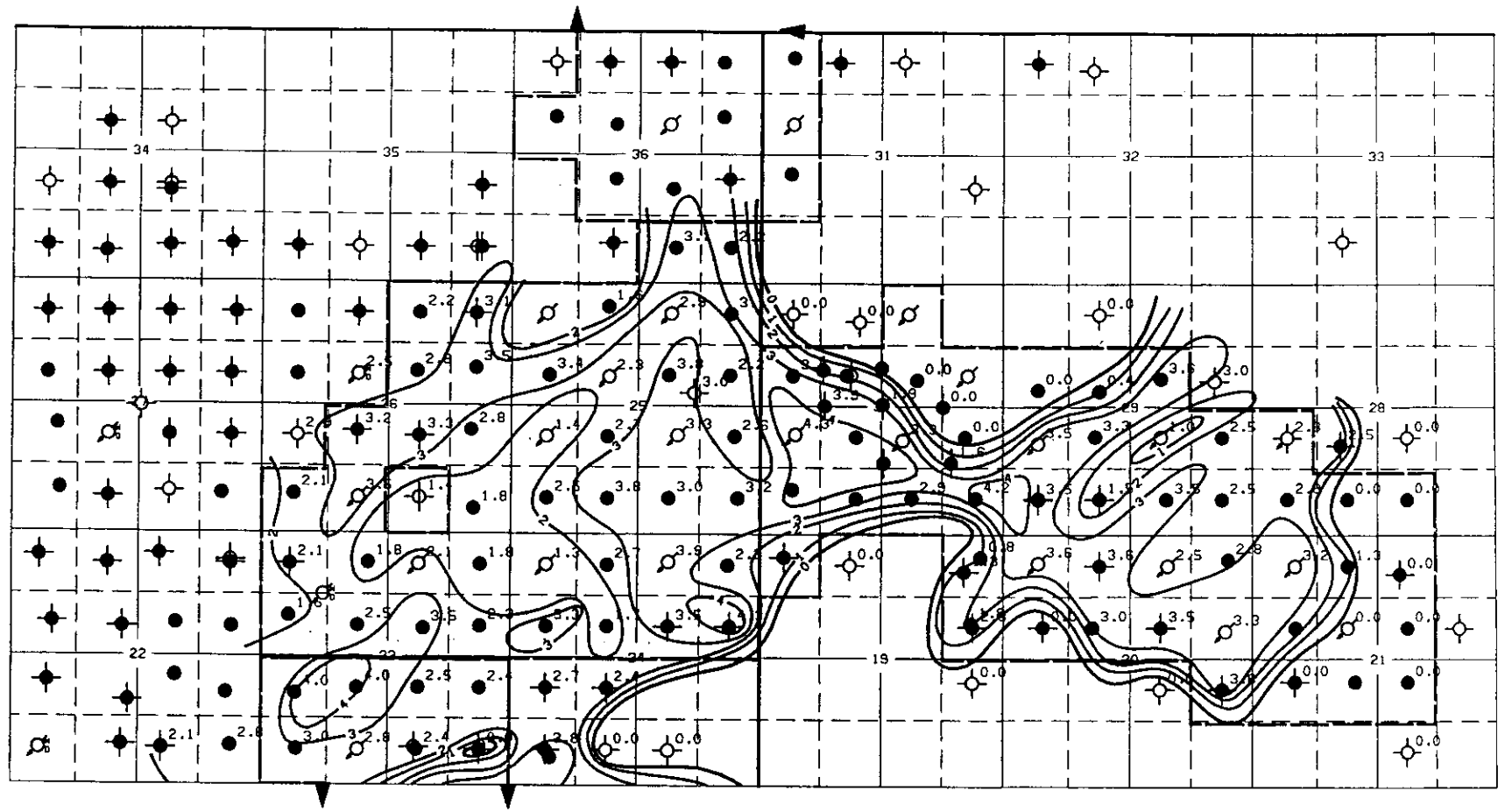
2ND OOLITE NET PAY IN FEET

Wells Sel

SEE SIDE B

R.26W1M

R.25W1M



APPENDIX 11E

T.10

T.10

R.26W1M

R.25W1M

VIRDEN ROSELEA UNIT 1

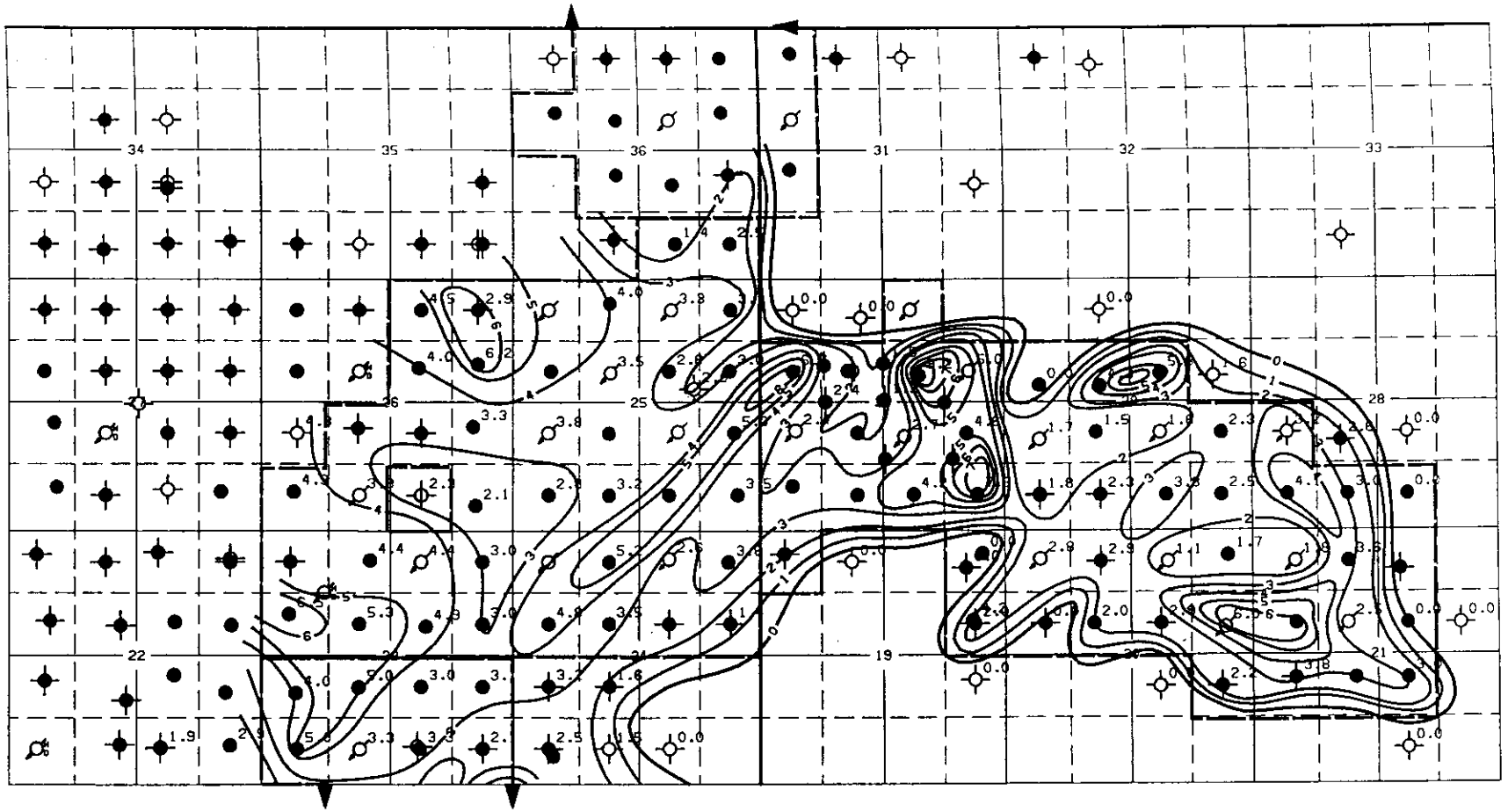
3RD OOLITE NET PAY IN FEET

Wells Selec

SEE SIDE BAR

R.26W1M

R.25W1M



APPENDIX 11F

T.10

T.10

R.26W1M

R.25W1M

VIRDEN ROSELEA UNIT 1

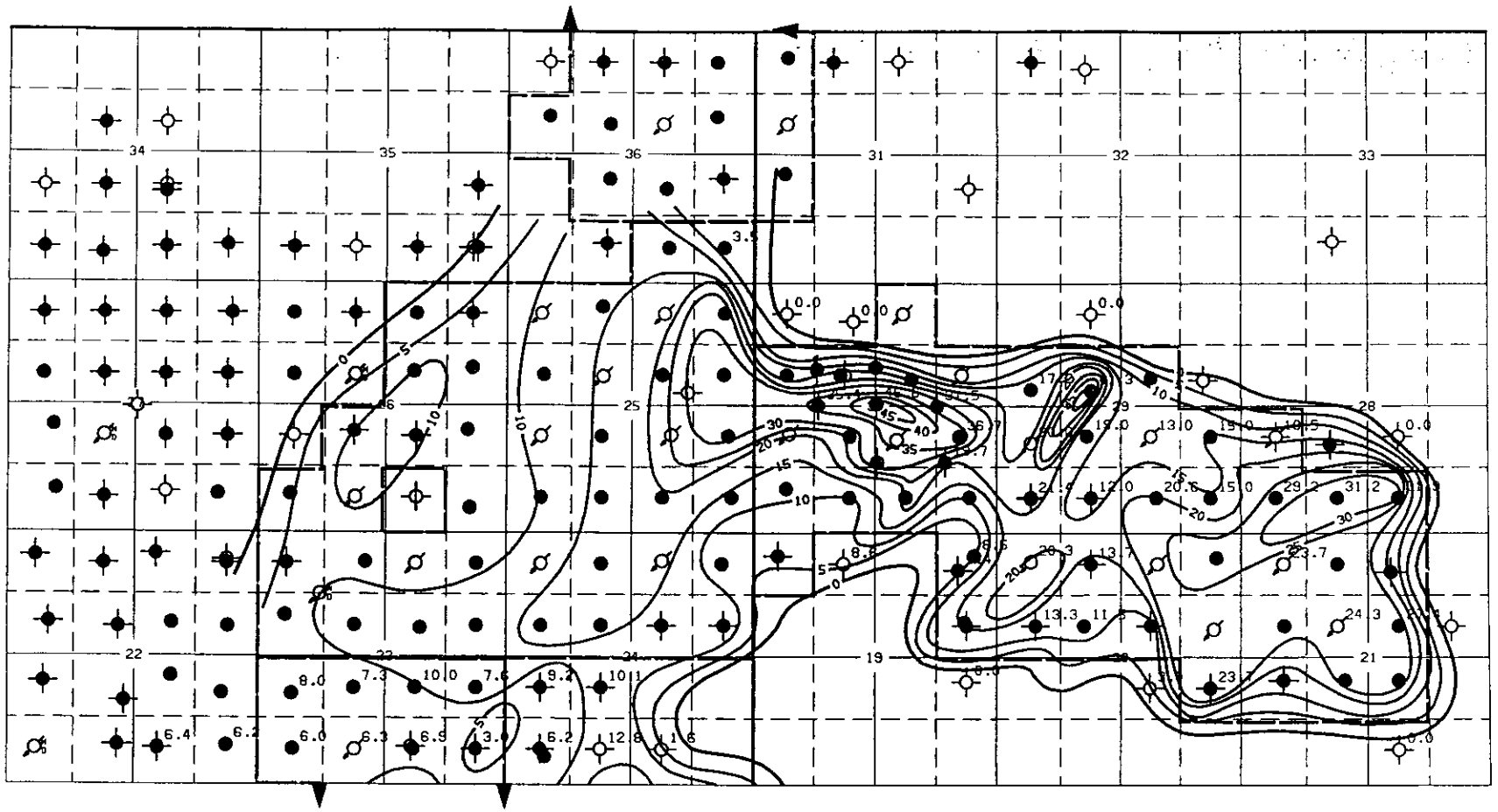
4TH OOLITE NET PAY IN FEET

Wells Sele

SEE SIDE BA

R.26W1M

R.25W1M



T.10

R.26W1M

T.10

R.25W1M

APPENDIX 11G

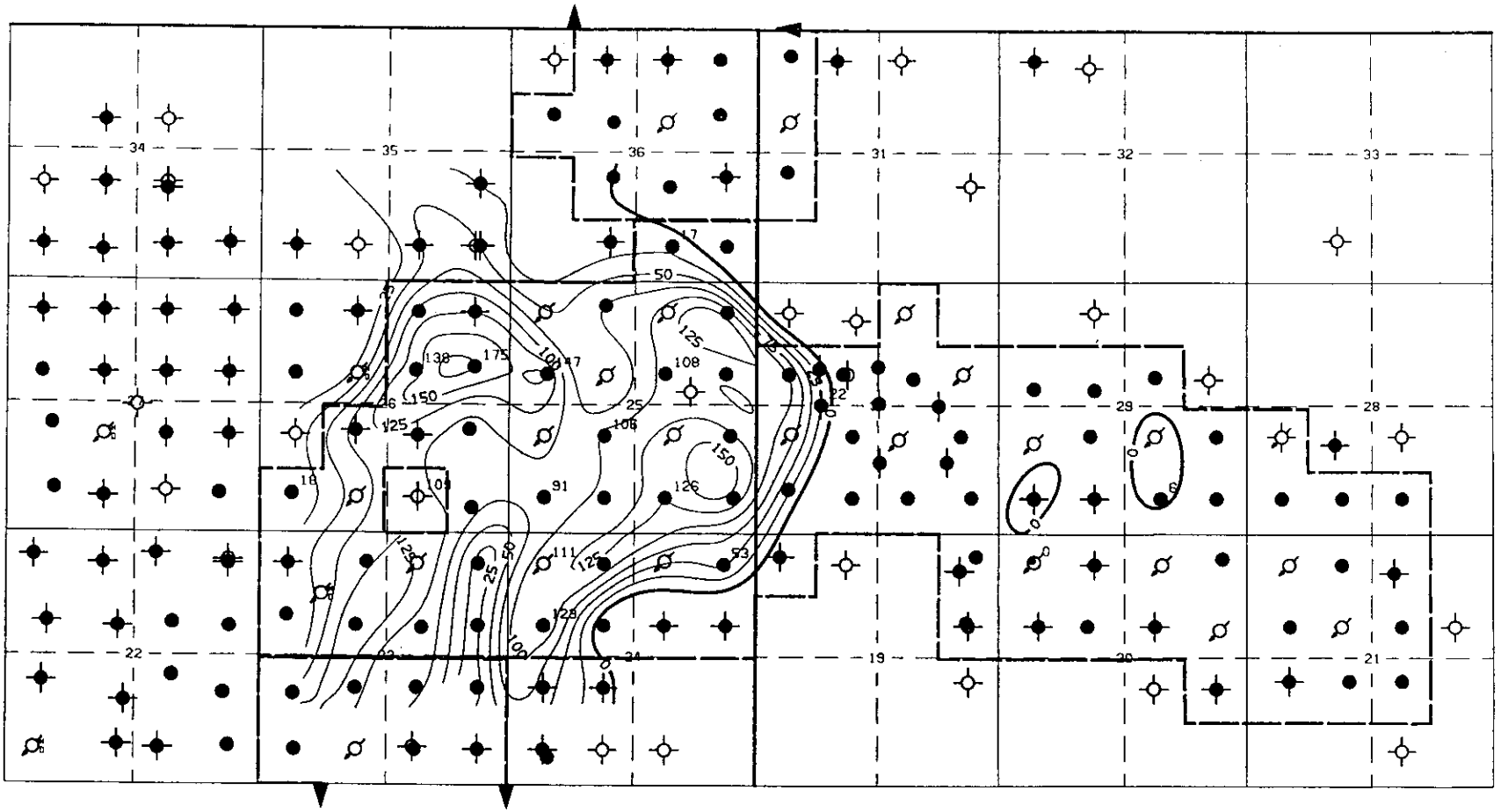
VIRDEN ROSELEA UNIT 1
CHERTY NET PAY IN FEET

Wells Selecte

SEE SIDE BAR F

R.26W1M

R.25W1M



APPENDIX 11H

T.10

T.1(

R.26W1M

R.25W1M

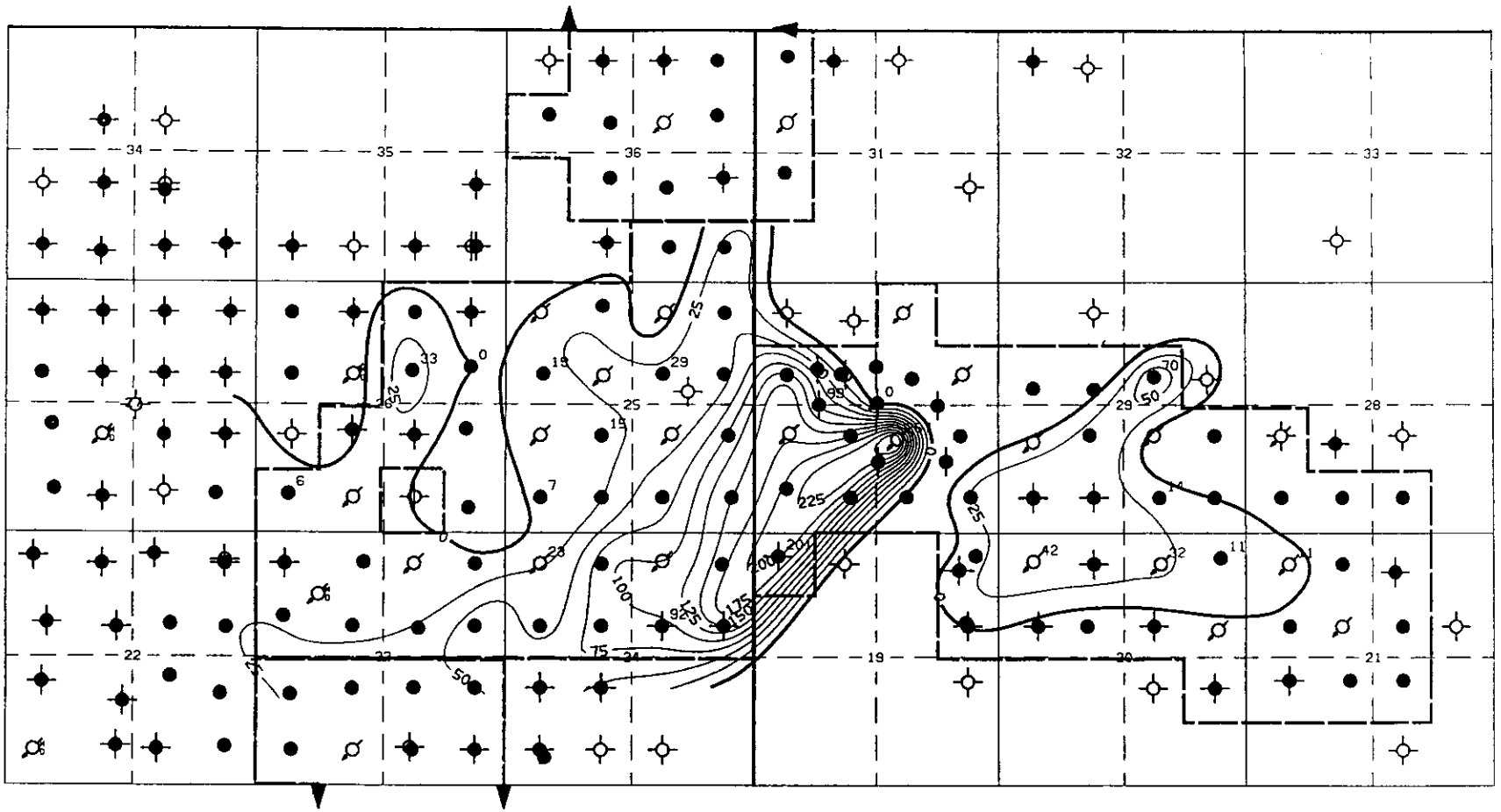
VIRDEN ROSELEA UNIT 1
CRINOIDAL NET PHIH IN %FEET

Wells Sele

SEE SIDE B

R.26W1M

R.25W1M



R.26W1M

R.25W1M

APPENDIX 11

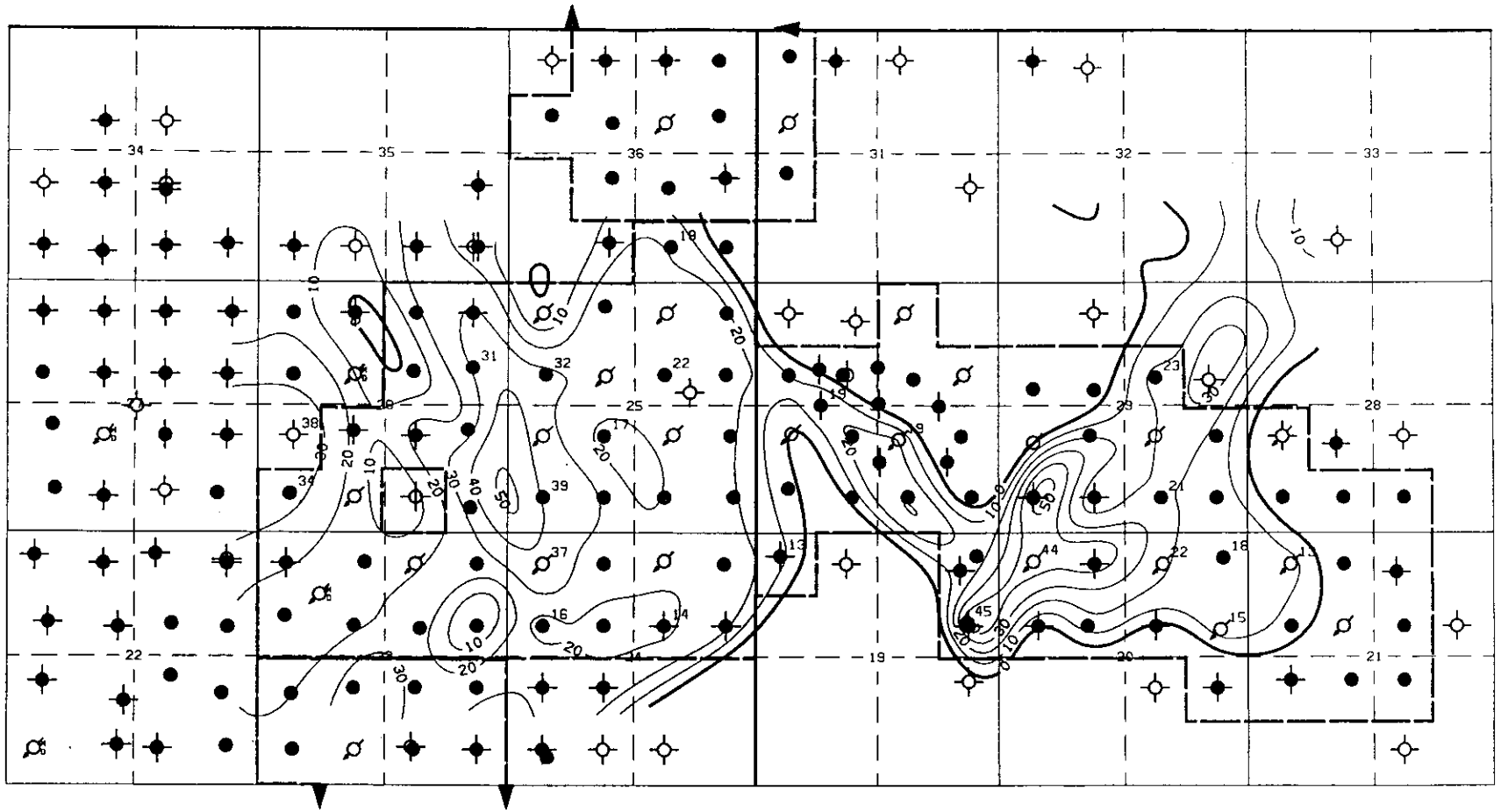
VIRDEN ROSELEA UNIT 1
SANDHILL NET PHIH IN %FEET

Wells Selec

SEE SIDE BAR

R.26W1M

R.25W1M



T.10

T.10

R.26W1M

R.25W1M

APPENDIX 11J

VIRDEN ROSELEA UNIT 1

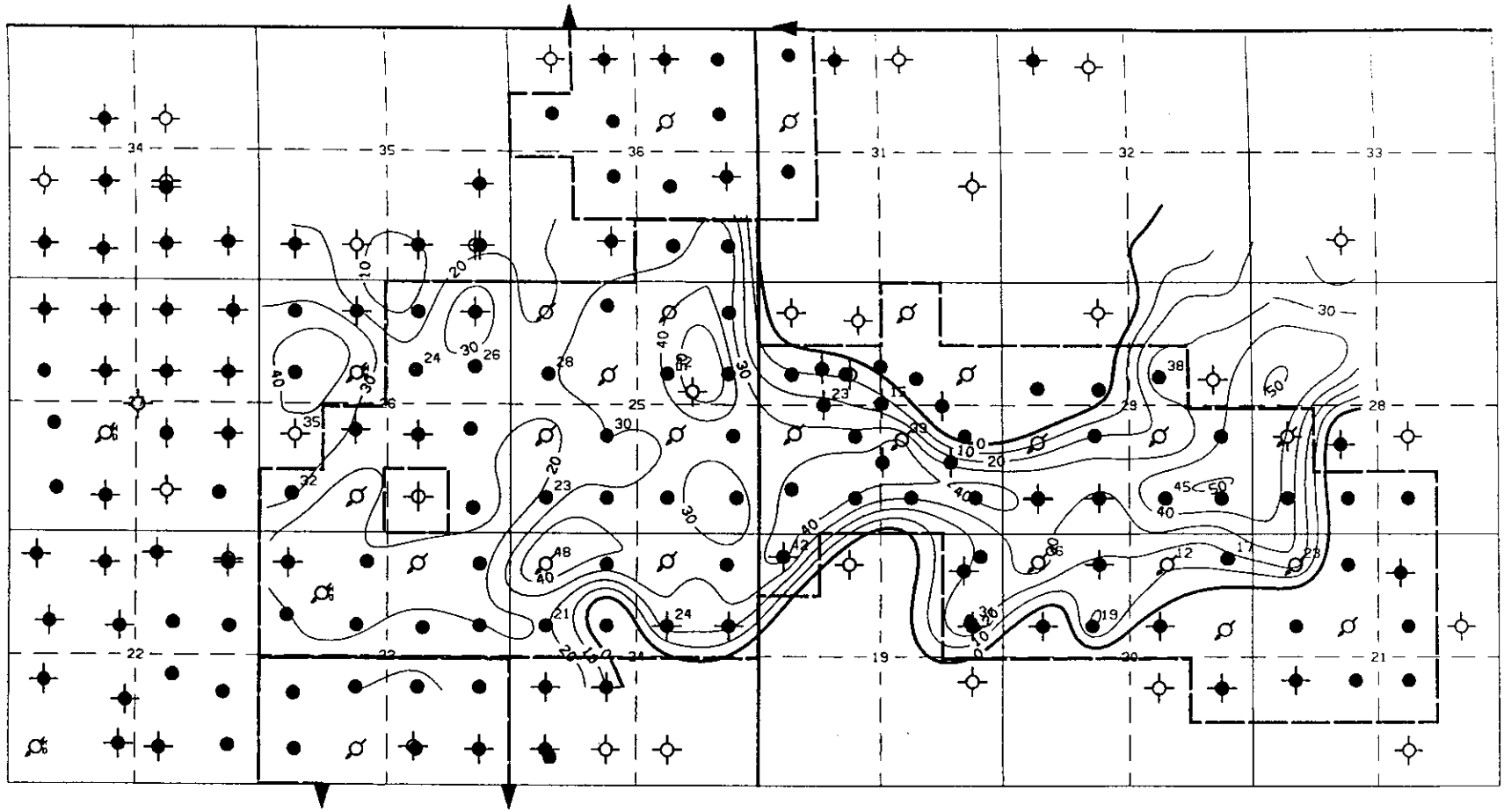
1ST NET PHIH IN %FEET

Wells Select

SEE SIDE BAR

R.26W1M

R.25W1M



T.10

T.1(

R.26W1M

R.25W1M

APPENDIX 11K

VIRDEN ROSELEA UNIT 1

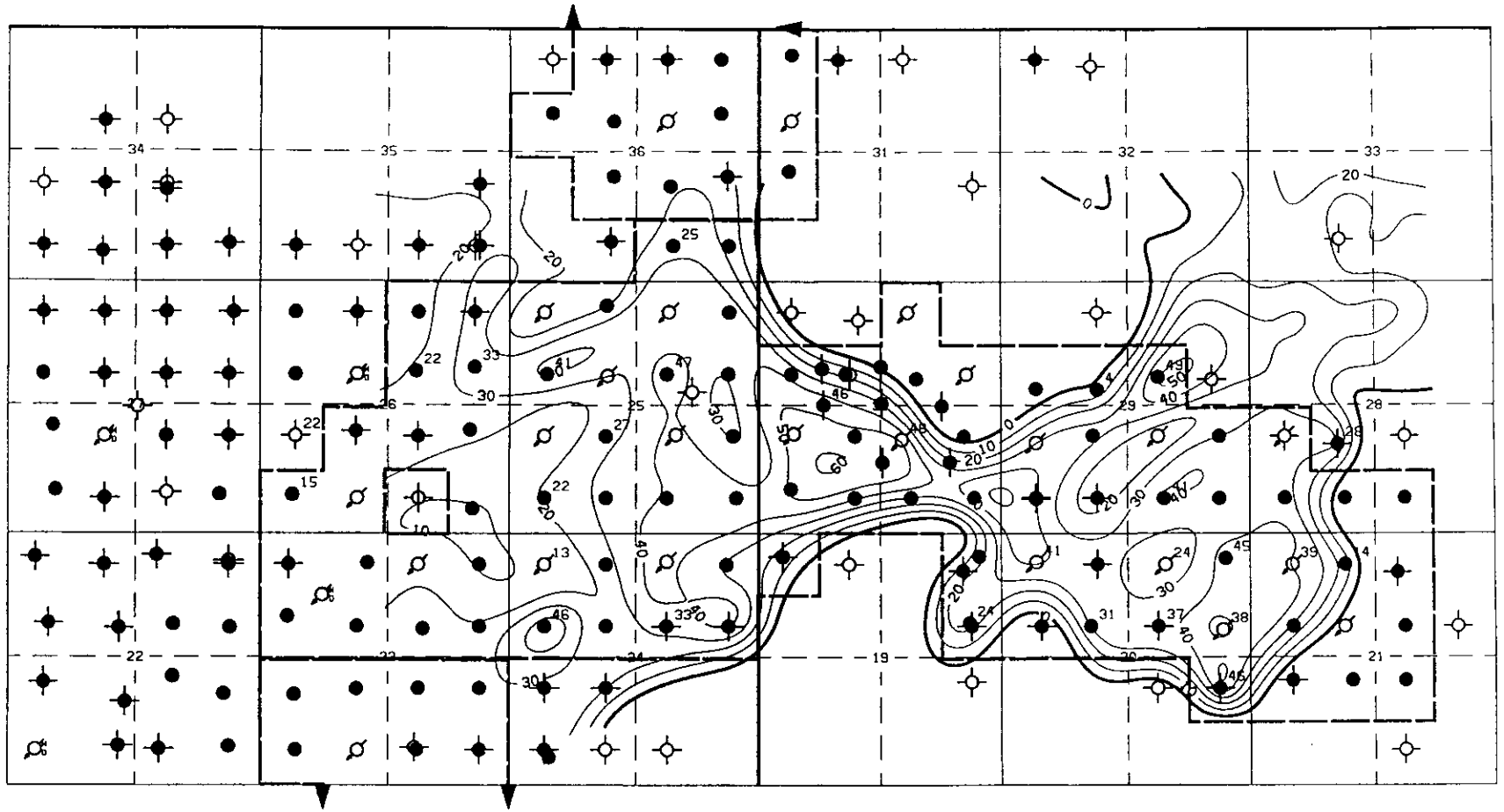
2ND NET PHIH IN %FEET

Wells Sel

SEE SIDE B

R.26W1M

R.25W1M



T.10

T.1(

R.26W1M

R.25W1M

VIRDEN ROSELEA UNIT 1

3RD NET PHIH IN %FEET

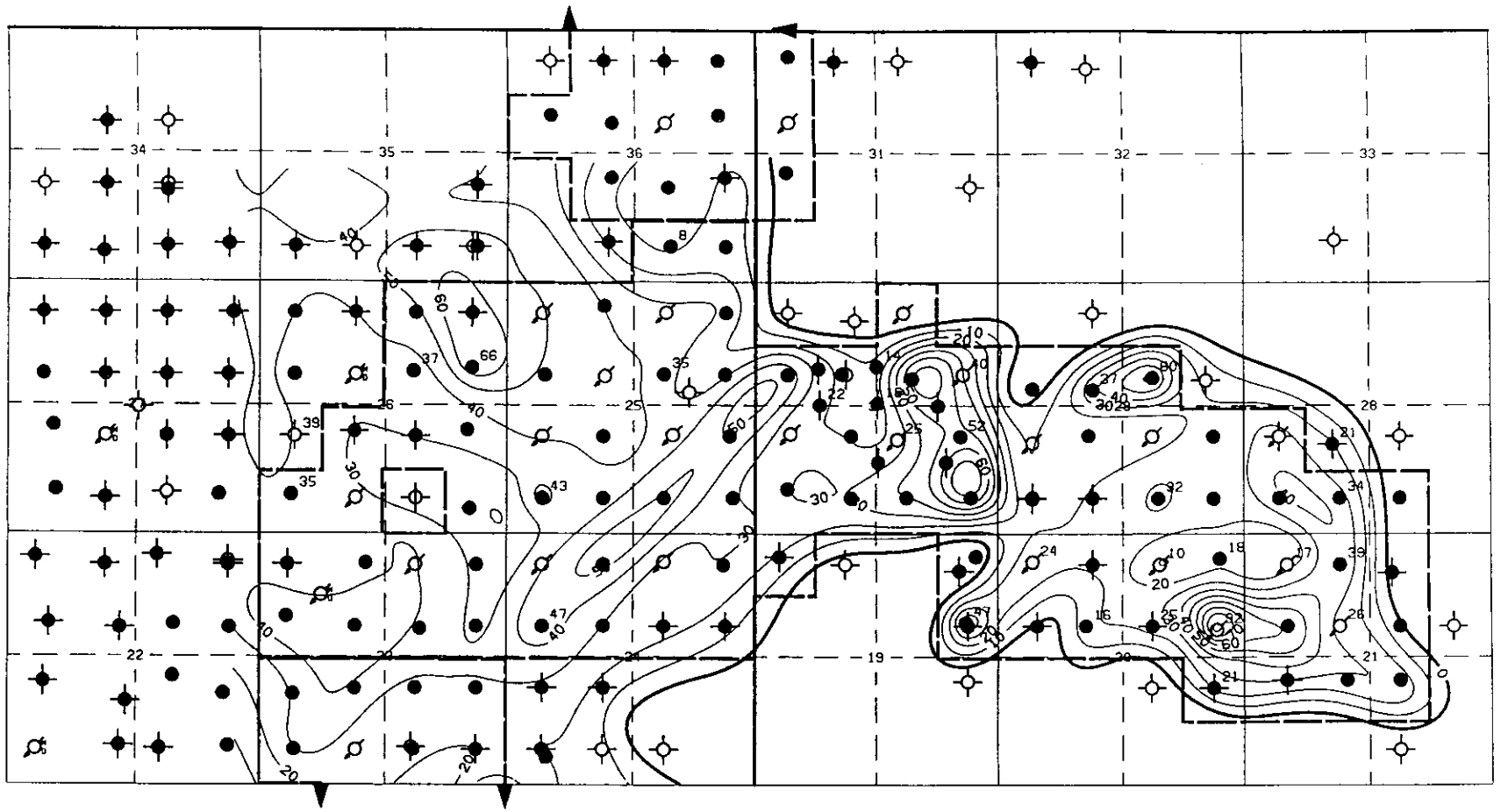
APPENDIX 11L

Wells Selc

SEE SIDE B

R.26W1M

R.25W1M



T.10

T.1(

R.26W1M

R.25W1M

APPENDIX 11M

VIRDEN ROSELEA UNIT 1

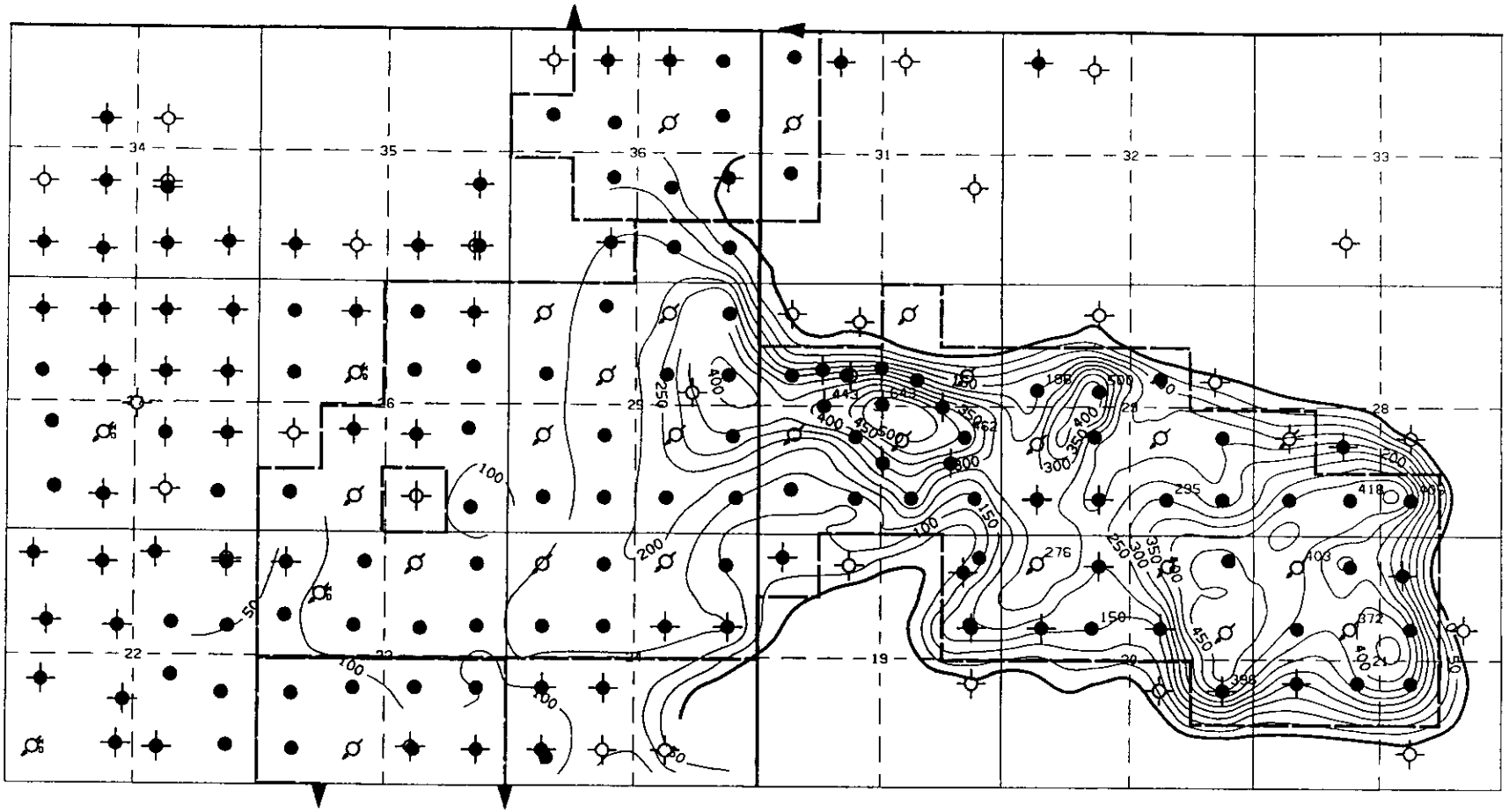
4TH NET PHIH IN %FEET

Wells Sel

SEE SIDE B

R.26W1M

R.25W1M



R.26W1M

R.25W1M

APPENDIX 11N

VIRDEN ROSELEA UNIT 1

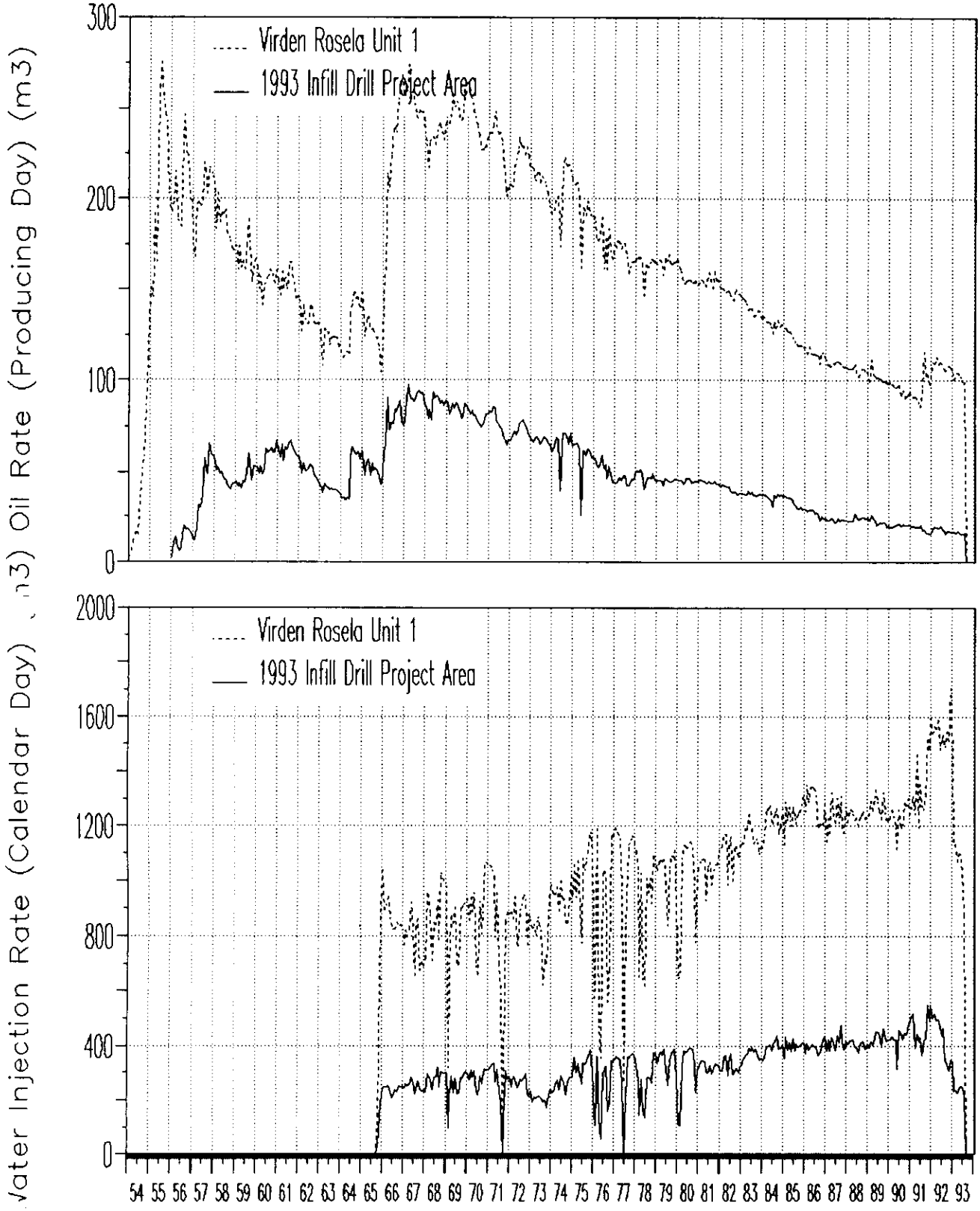
CHERTY NET PHIH IN %FEET

Wells Se

SEE SIDE

Virden Roselea Unit 1

APPENDIX 12



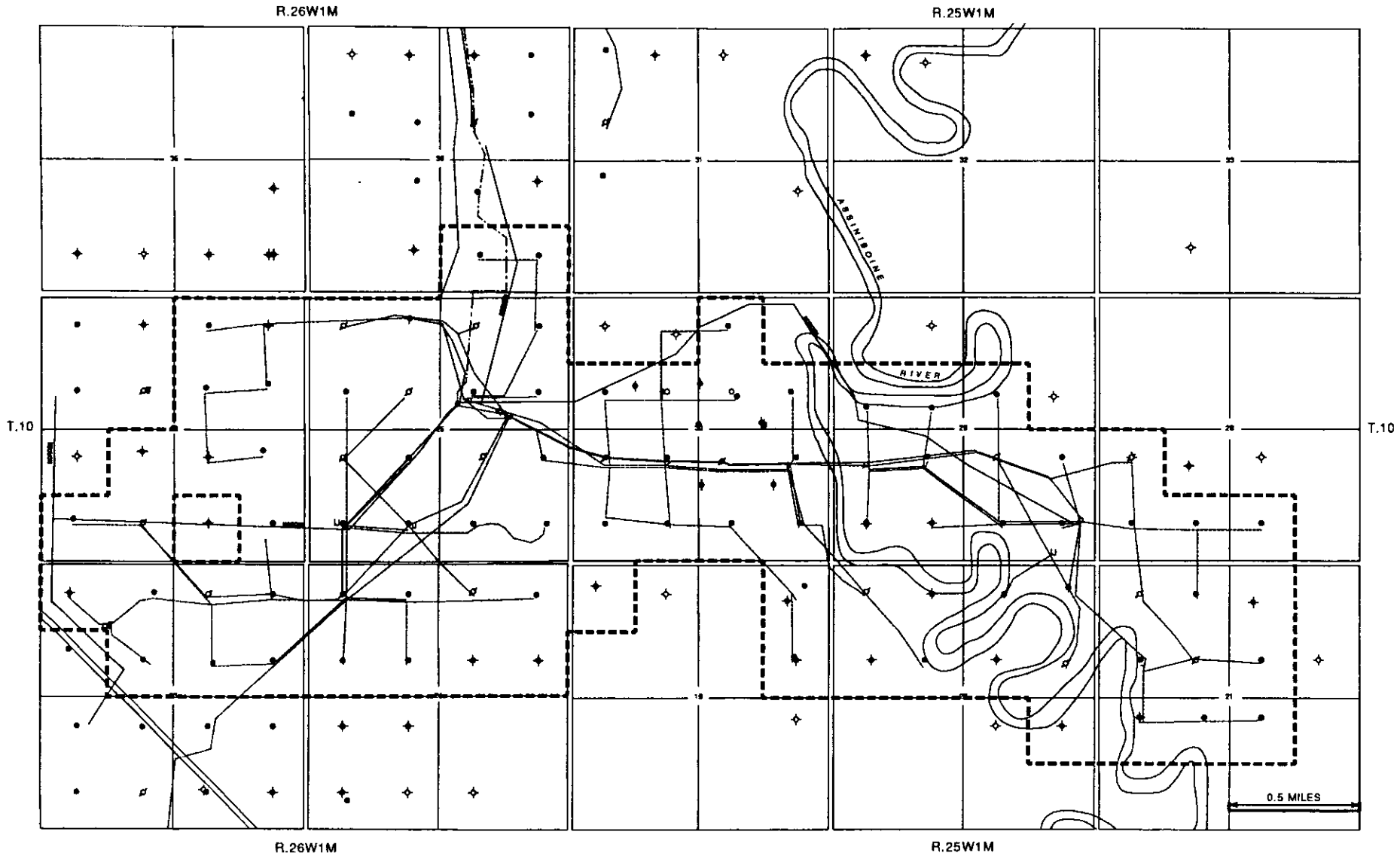
DWS Mon Sep 27 10:17:48 1993

APPENDIX 13

Virden Roselea Unit 1 1993 Infill Area

Estimate Incremental Recovery by Zone 10^3 m^3

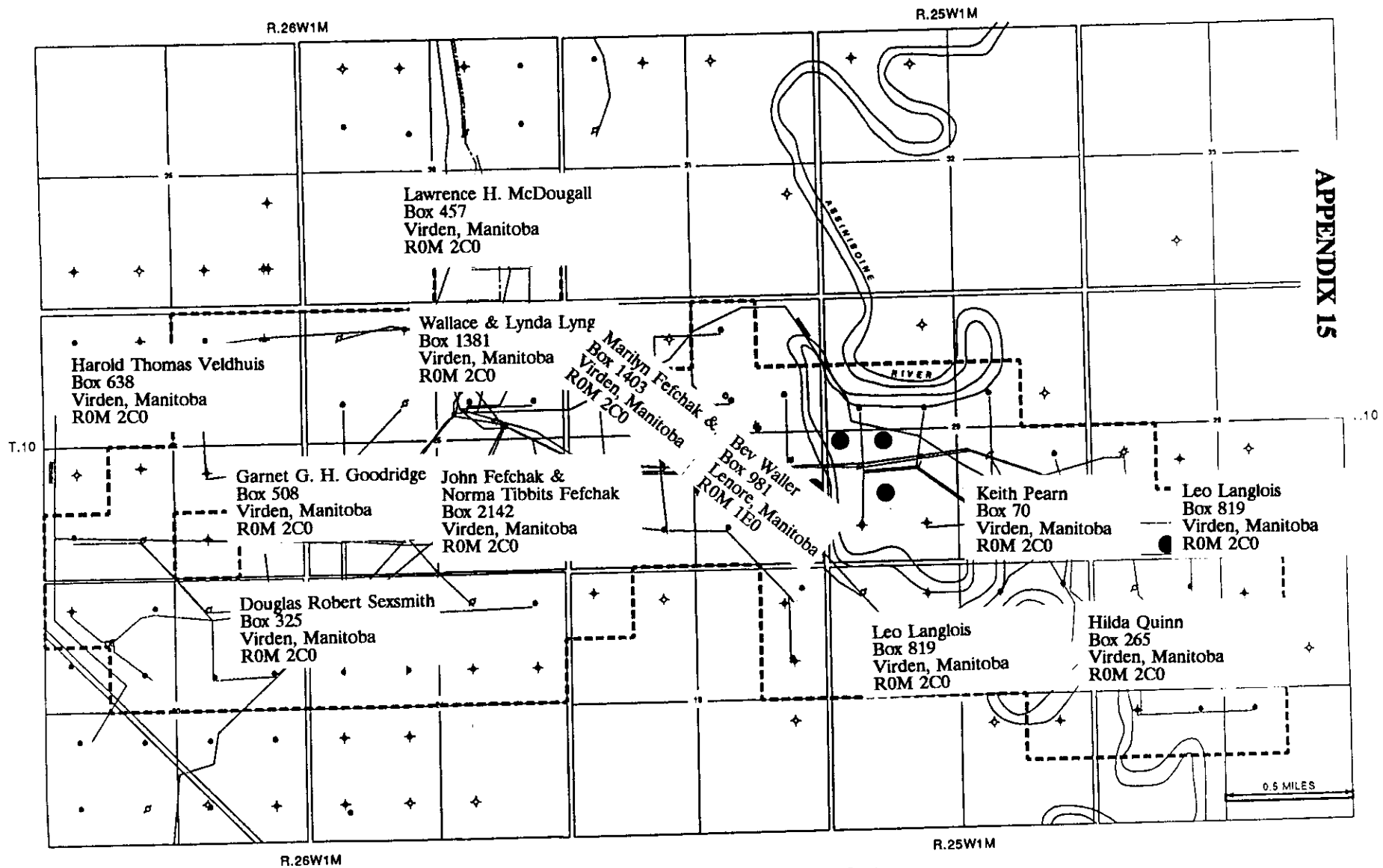
LSD	Sec	Stat	Crin	Sand	Oolites				Cherty	Total
					1st	2nd	3rd	4th		
9	19	P			0	0	0	0	2	3
16	19	P		0	0	0	0		1	2
8	20	A					0	0	3	4
9	20	I			0	1	1	5		6
10	20	A					0	0	3	4
11	20	P			0	0	0	0	2	2
12	20	A			0				2	2
13	20	I		1	1	0	0	0	3	5
14	20	A		0	0	0	0	0	3	4
15	20	I		0	0	0	0	0	4	5
16	20	A		0	0	0	1	0	5	6
5	21	A						0	2	3
6	21	P						0	3	3
7	21	P						0	3	3
10	21	P							3	3
11	21	I						0	4	4
12	21	P					0	1	5	6
13	21	I			0	0	1	0	5	6
14	21	P					0	0	4	4
15	21	A							2	2
2	28	P							3	3
3	28	P						0	5	5
4	28	P				0	0	0	5	6
5	28	I				0	0	0	2	3
1	29	P			0	1	1	0	3	5
2	29	P		0	0	1	0	0	4	5
3	29	A		1	0	0	0	0	3	5
4	29	A		1	0	1	1	0	4	6
5	29	I		0		0	0	0	4	4
6	29	P		0	0	0	0	0	3	4
7	29	I		0	0	0	0	0	2	3
8	29	P			0	1	0	0	2	3
10	29	P		0	0	0	0	0	1	3
11	29	P						0	3	3
12	29	P							2	2
1	30	P		0		0	0	1	2	4
8	30	P						1	4	5
9	30	I						0	1	2



VIRDEN-ROSELEA UNIT NO.1
FLOW LINES

October 1993

APPENDIX 14



APPENDIX 15

VIRDEN-ROSELEA UNIT NO.1

LANDOWNERS

October 1983

About Landowners Recd'd Notice

+ Shirley Welch Box 1191 Virden

+ Roy Reed Gen. Delivery Virden

+ Terry Hayward " "

6 October 19 93

Chevron Canada Resources Limited
500 - 5th Avenue S.W.
Calgary, Alberta
T2P 0L7

Landowner Contact Report

I, the undersigned, hereby grant you permission to do survey work and the removal of trees where necessary on the following lands (owned, leased, purchased) by me and described as follows:

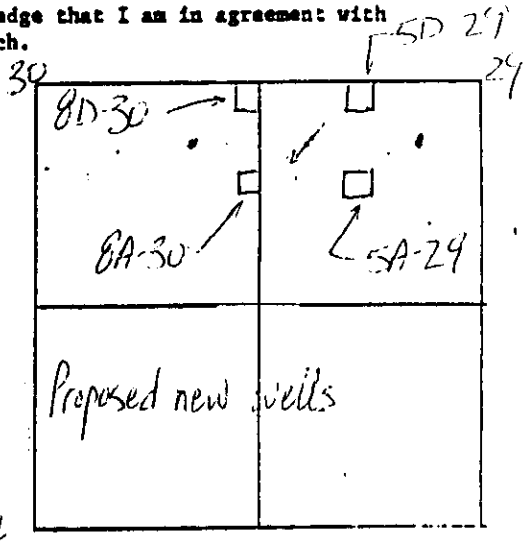
SE¼-30-6 SW¼-29-10-25 W1M

This permission is granted in consideration of your promise as follows:

All work under this permit will be conducted at the risk and expense of Chevron Canada Resources Limited

Also I, the undersigned, hereby acknowledge that I am in agreement with the proposed route as shown on the sketch.

Special Requirements:



Nature of land likely to be crossed:

Cultivated / Pasture.

Registered Owner: Marilyn Fefchak / Bev Waller Address: % Box 1403, Virden, Man R0M 2C0

Occupant: Dave Fefchak Address: as above

Witness (Person Granting Permit)

Oct 15/93

1 copy to Landowner
1 copy to Contractor
1 copy to District Office

cc - J May/02

7 October 19 93

Chevron Canada Resources Limited
500 - 5th Avenue S.W.
Calgary, Alberta
T2P 0L7

Landowner Contact Report

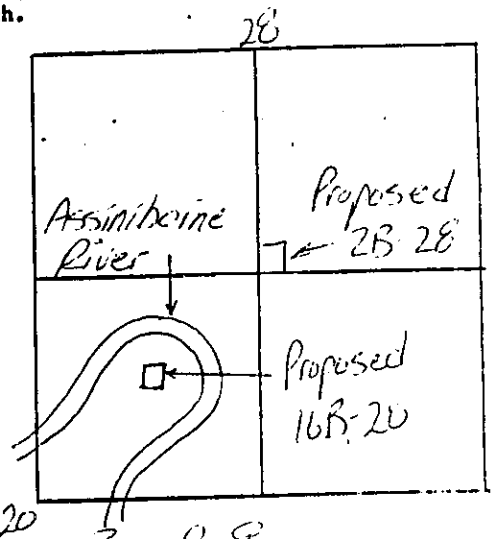
I, the undersigned, hereby grant you permission to do survey-work and the removal of trees where necessary on the following lands (owned, leased, purchased) by me and described as follows:

SE1/4-28-10-25WPM
NE1/4-20-10-25WPM

This permission is granted in consideration of your promise as follows:

All work under this permit will be conducted at the risk and expense of Chevron Canada Resources Limited

Also I, the undersigned, hereby acknowledge that I am in agreement with the proposed route as shown on the sketch.



Special Requirements:

Contact owner prior to entry to finalize access routes.

Nature of land likely to be crossed:

Cultivated

Registered Owner: Leo Langlois Address: Box 619
Virden, Man. R0M 2C0

Occupant: Same Address: _____

_____

Witness

Leo Langlois
(Person Granting Permit)

Oct 15/93

1 copy to Landowner
1 copy to Contractor
1 copy to District Office

E. October 19 93

Chevron Canada Resources Limited
500 - 5th Avenue S.W.
Calgary, Alberta
T2P 0L7

Landowner Contact Report

I, the undersigned, hereby grant you permission to do survey work and the removal of trees where necessary on the following Lands (owned,) leased, purchased) by me and described as follows:

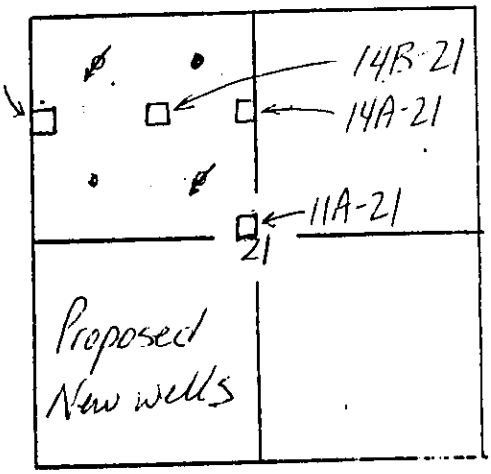
N.W.¼-21-10-25-W1PM

This permission is granted in consideration of your promise as follows:

All work under this permit will be conducted at the risk and expense of Chevron Canada Resources Limited

Also I, the undersigned, hereby acknowledge that I am in agreement with the proposed route as shown on the sketch.

Special Requirements:



Nature of land likely to be crossed:

Pasture.

Registered Owner: Estate of Hilda Quinn Address: Gordon Quinn-son
Gwen Clarke-daughter-Executors.

Occupant: N/A. Address: Box 1624, Virden, MB.
R0M 2C0.

Witness

Gwen

(Person Granting Permit)
Gordon

Oct 15/93
C. J. Mayor

1 copy to Landowner
1 copy to Contractor
1 copy to District Office

8 October 19 93

Chevron Canada Resources Limited
500 - 5th Avenue S.W.
Calgary, Alberta
T2P 0L7

Landowner Contact Report

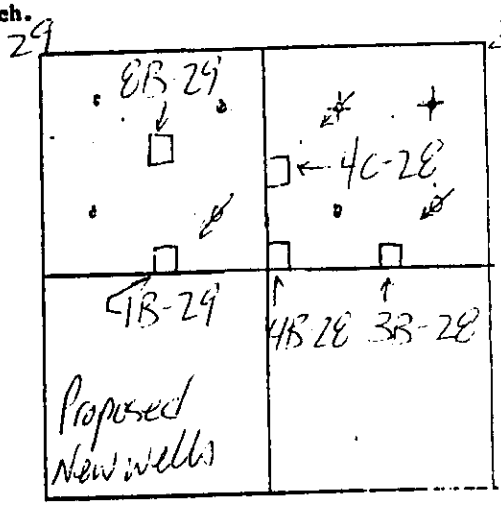
I, the undersigned, hereby grant you permission to do survey work and the removal of trees where necessary on the following lands (owned, leased, purchased) by me and described as follows:

SE 1/4 - 29 & SW 1/4 - 28 - 10 - 25 W/M

This permission is granted in consideration of your promise as follows:

All work under this permit will be conducted at the risk and expense of Chevron Canada Resources Limited

Also I, the undersigned, hereby acknowledge that I am in agreement with the proposed route as shown on the sketch.



Special Requirements:

No overhead hydro and no built-up roads. Routes and locations to be further agreed to in 1994.

Nature of land likely to be crossed:

Cultivated

Registered Owner: Keith and Marlene Pearn Address: Box 70, Virden, Man. R0M 2C0

Occupant: same as above. Address: _____

Witness

(Person Granting Permit)

Oct 15/93

1 copy to Landowner
1 copy to Contractor
1 copy to District Office

cc: J. Major

Nov 3 19 83

Chevron Canada Resources Limited
500 - 5th Avenue S.W.
Calgary, Alberta
T2P 0L7

Landowner Contact Report

I, the undersigned, hereby grant you permission to do survey work and the removal of trees where necessary on the following lands (owned, leased, purchased) by me and described as follows:

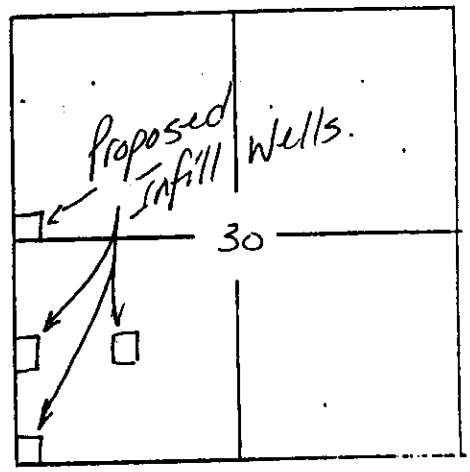
W½-30-10-25WPM

This permission is granted in consideration of your promise as follows:

All work under this permit will be conducted at the risk and expense of Chevron Canada Resources Limited

Also I, the undersigned, hereby acknowledge that I am in agreement with the proposed route as shown on the sketch.

Special Requirements:



Nature of land likely to be crossed:

Pasture & cultivated.

Registered Owner: Marilyn Fefchak & Bev Waller Address: Box 1403, Virden, MB. R0M 2C0

Occupant: Dave Fefchak Address: as above.

Witness

M. J. Fefchak
(Person Granting Permit)

1 copy to Landowner
1 copy to Contractor
1 copy to District Office

Nov 3 19 93

Chevron Canada Resources Limited
500 - 5th Avenue S.W.
Calgary, Alberta
T2P 0L7

Landowner Contact Report

I, the undersigned, hereby grant you permission to do survey work and the removal of trees where necessary on the following lands (owned,) leased, purchased) by me and described as follows:

NE ¼-26-10-25 WPM
6

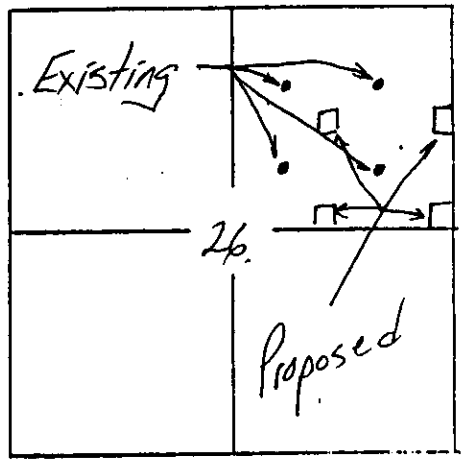
This permission is granted in consideration of your promise as follows:

All work under this permit will be conducted at the risk and expense of Chevron Canada Resources Limited

Also I, the undersigned, hereby acknowledge that I am in agreement with the proposed route as shown on the sketch.

Special Requirements:

Locations to be firmed up in 1994.



Nature of land likely to be crossed:

Hay and crop & trees.

Registered Owner: Harold Veldhuis Address: Box 638, Virden, MB. R0M 2C0

Occupant: N/A. Address:

Witness

(Person Granting Permit)

1 copy to Landowner
1 copy to Contractor
1 copy to District Office

Nov 4 19 93

Chevron Canada Resources Limited
500 - 5th Avenue S.W.
Calgary, Alberta
T2P 0L7

Landowner Contact Report

I, the undersigned, hereby grant you permission to do ~~survey work~~ and the removal of trees where necessary on the following lands (owned, leased, purchased) by me, and described as follows:

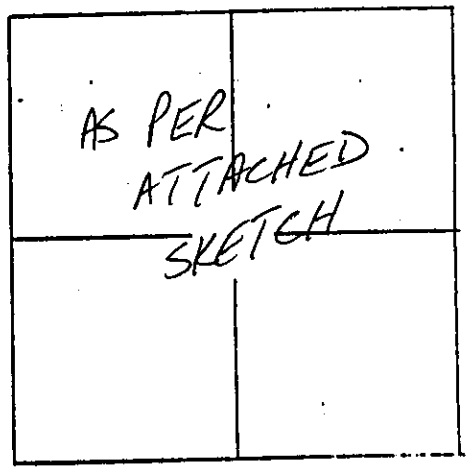
N½-23 & N½-24-10-26 WPM

This permission is granted in consideration of your promise as follows:

All work under this permit will be conducted at the risk and expense of Chevron Canada Resources Limited

Also I, the undersigned, hereby acknowledge that I am in agreemen: with the proposed route as shown on the sketch.

Special Requirements:



Nature of land likely to be crossed:

Pasture & cultivated

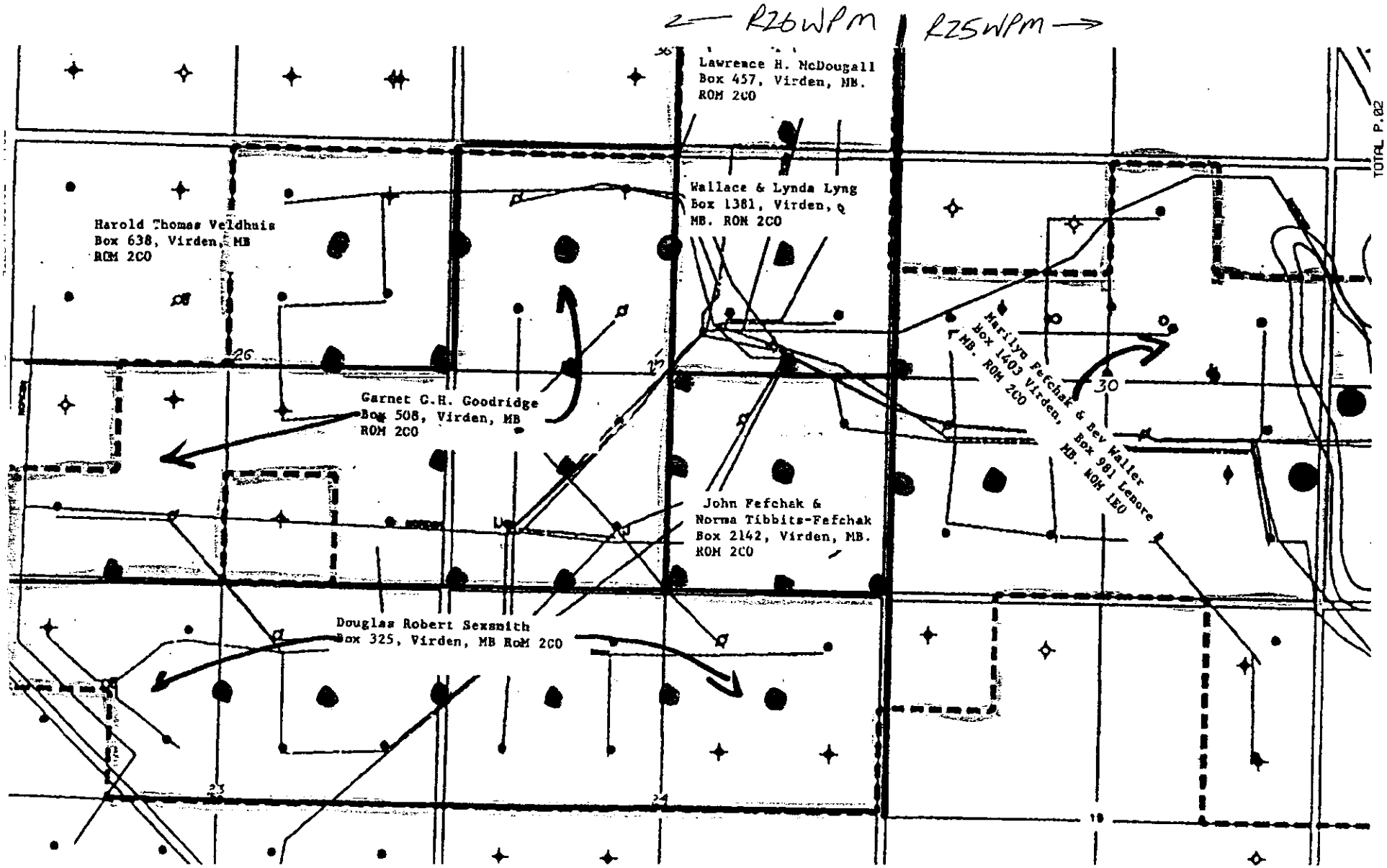
Registered Owner: D.R. Sexsmith Address: Box 325, Virden, Man. R0M 2C0

Occupant: N/A Address:

Witness

D.R. Sexsmith
(Person Granting Permit)

1 copy to Landowner
1 copy to Contractor
1 copy to District Office


R26WPM
R25WPM
Lawrence H. McDougall
Box 457, Virden, MB.
ROM 2CO
Wallace & Lynda Lyng
Box 1381, Virden, MB. ROM 2CO
Harold Thomas Veldhuis
Box 638, Virden, MB
ROM 2CO
Marilyn Fefchak & Bev Walker
Box 1403 Virden, MB. ROM 2CO
Box 981 Lenore MB. ROM 1E0
Garnet C.H. Goodridge
Box 508, Virden, MB
ROM 2CO
John Fefchak &
Norma Tibbits-Fefchak
Box 2142, Virden, MB.
ROM 2CO
Douglas Robert Sexsmith
Box 325, Virden, MB ROM 2CO
26
25
30
T.10.

Nov 3 19 93

Chevron Canada Resources Limited
500 - 5th Avenue S.W.
Calgary, Alberta
T2P 0L7

Landowner Contact Report

I, the undersigned, hereby grant you permission to do survey work and the removal of trees where necessary on the following lands (owned, leased, purchased) by me and described as follows:

S½-36-10-26 WPM

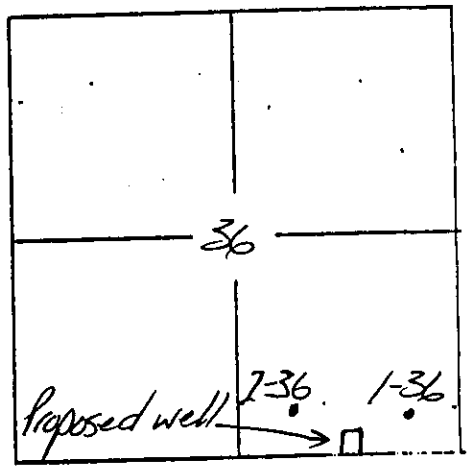
This permission is granted in consideration of your promise as follows:

All work under this permit will be conducted at the risk and expense of Chevron Canada Resources Limited

Also I, the undersigned, hereby acknowledge that I am in agreement with the proposed route as shown on the sketch.

Special Requirements:

Location to be further defined in 1994.



Nature of land likely to be crossed:

Cultivated

Registered Owner: LAWRENCE McDOUGALL Address: Box 457 Virden, MB R0M 2C0

Occupant: N/A Address:

Witness

L.H. McDougall
(Person Granting Permit)

1 copy to Landowner
1 copy to Contractor
1 copy to District Office

Nov 3 19 93

Chevron Canada Resources Limited
500 - 5th Avenue S.W.
Calgary, Alberta
T2P 0L7

Landowner Contact Report

I, the undersigned, hereby grant you permission to do survey work and the removal of trees where necessary on the following lands (owned), leased, purchased) by me and described as follows:

W½-25-5 S½-26-10-26 WPM

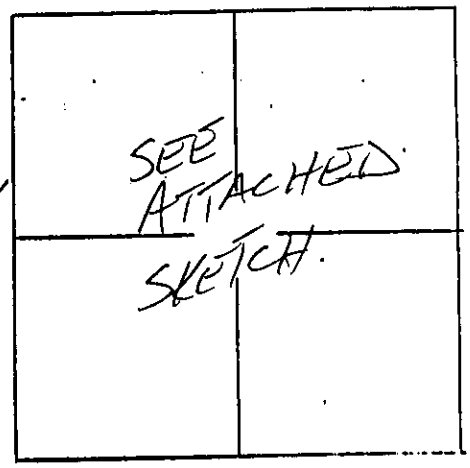
This permission is granted in consideration of your promise as follows:

All work under this permit will be conducted at the risk and expense of Chevron Canada Resources Limited

Also I, the undersigned, hereby acknowledge that I am in agreement with the proposed route as shown on the sketch.

Special Requirements:

Locations to be further defined and agreed to in '94.



Nature of land likely to be crossed:

Pasture, bush, hay, crop.

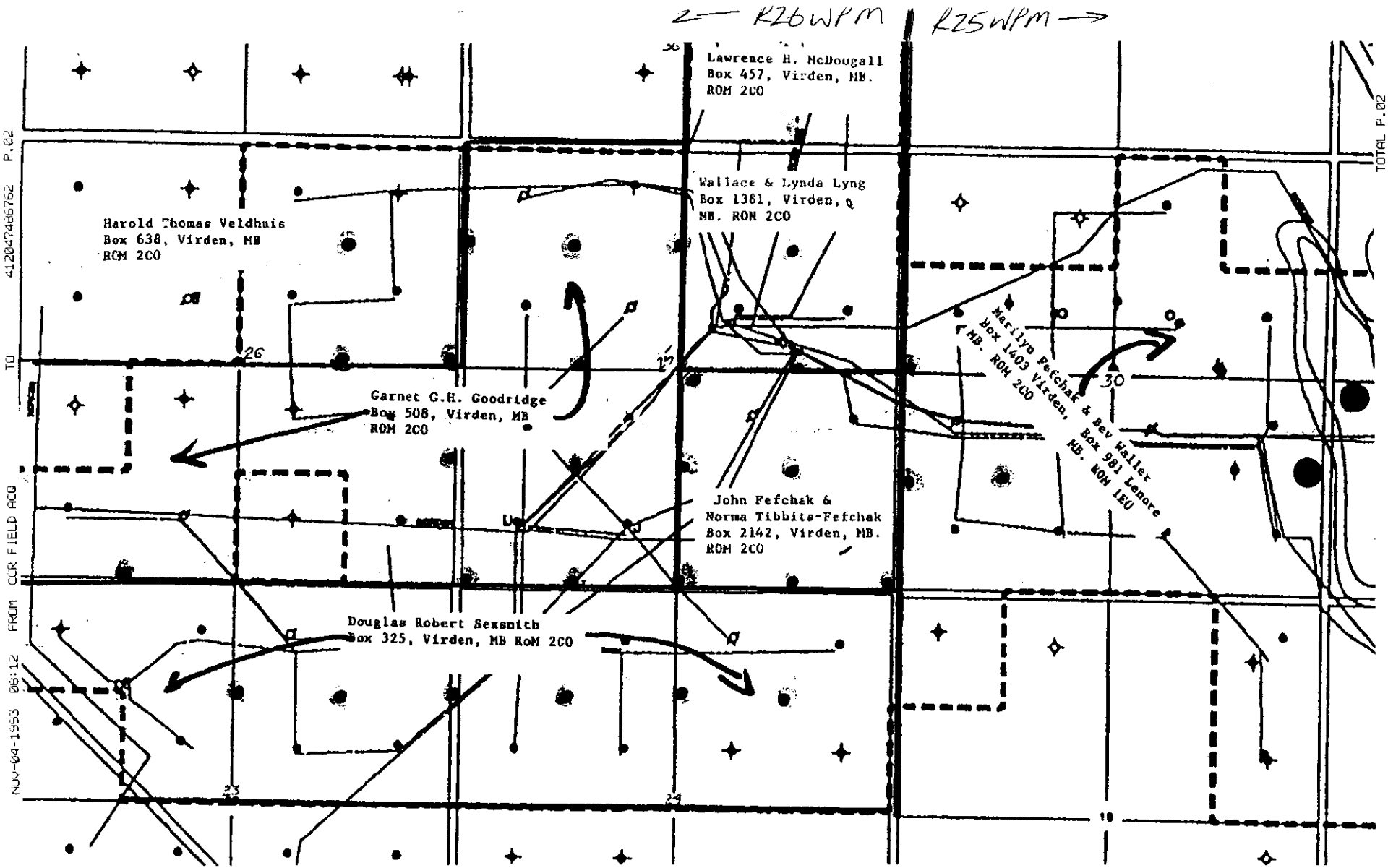
Registered Owner: GARNET GOODRIDGE Address: Box 506, Virden, MB R0M 2C0

Occupant: N/A. Address:

Witness

(Person Granting Permit)

1 copy to Landowner
1 copy to Contractor
1 copy to District Office


R26WPM
R25WPM
Lawrence H. McDougall
Box 457, Virden, MB.
ROM 2C0
Wallace & Lynda Lyng
Box 1381, Virden, MB. ROM 2C0
Harold Thomas Veldhuis
Box 638, Virden, MB
ROM 2C0
Marilyn Fefchak & Bev Waller
Box 1403 Virden, MB. ROM 2C0
Box 981 Lenore MB. ROM 1E0
Garnet G.H. Goodridge
Box 508, Virden, MB
ROM 2C0
John Fefchak &
Norma Tibbits-Fefchak
Box 2142, Virden, MB.
ROM 2C0
Douglas Robert Sexsmith
Box 325, Virden, MB RoM 2C0
T.10.
NOV-04-1993 08:12 FROM CCR FIELD ACG
4126047465762 P.02
TOTAL P.02

Nov 3 19 93

Chevron Canada Resources Limited
500 - 5th Avenue S.W.
Calgary, Alberta
T2P 0L7

Landowner Contact Report

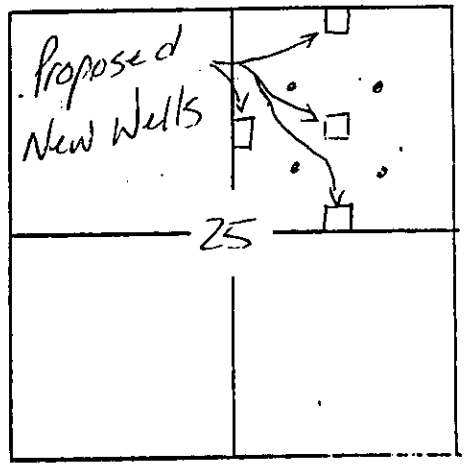
I, the undersigned, hereby grant you permission to do survey work and the removal of trees where necessary on the following lands (owned, leased, purchased) by me and described as follows:

NE¼-25-10-26WPM

This permission is granted in consideration of your promise as follows:

All work under this permit will be conducted at the risk and expense of Chevron Canada Resources Limited

Also I, the undersigned, hereby acknowledge that I am in agreement with the proposed route as shown on the sketch.



Special Requirements:

Locations to be more defined in 1994.

Nature of land likely to be crossed:

Hay / pasture.

Registered Owner: Wallace & Lynn Lyng Address: Box 1321, Virden, MB. R0M 2C0

Occupant: N/A Address: _____

Witness

Barry Lyng, Lynda Lyng
(Person Granting Permit)

1 copy to Landowner
1 copy to Contractor
1 copy to District Office

October 4, 1993

Mr. Leo Langlois
P.O. Box 819
Virden, Manitoba
R0M 2C0

Virden Roselea Unit No. 1
2-28-10-25
SE 1/4 28-10-25 WPM
Our File: 24834

Dear Mr. Langlois:

Chevron Canada Resources Limited is in the process of applying for reduced spacing in the Virden Roselea Unit No. 1. As part of this infill and conversion project, Chevron will be converting some existing producing wells to water injection wells.

This letter is to inform you, the landowner, that upon approval of the proposed project, the following well is to be converted:

2-28-10-25

If you have any questions, or require more information, please call Mr. Randy Dahlman in Virden at 748-6342 or myself in Calgary at 403-234-5618.

Yours very truly,

I. C. (IAN) ROSS
Land Representative

ICR/dew

bpc: M. Roy
J. Major

October 4, 1993

Keith & Marlene Pearn
P.O. Box 70
Virden, Manitoba
R0M 2C0

Virden Roselea Unit No. 1
3-28-10-25
SW 1/4 28-10-25 WPM
Our Files: 24741

Dear Mr. & Mrs. Pearn:

Further to our letter of October 1, we have re-evaluated our well conversion proposal and wish to advise you that the 2-28 well will be converted to an injector, not 3-28 as earlier proposed.

We apologize for any inconvenience this may have cost.

If you have any questions, or require more information, please call Mr. Randy Dahlman in Virden at 748-6342 or myself in Calgary at 403-234-5618.

Yours very truly,

I. C. (IAN) ROSS
Land Representative

ICR/dew

bpc: M. Roy
J. Major

October 1, 1993

Keith & Marlene Pearn
P.O. Box 70
Virden, Manitoba
R0M 2C0

Virden Roselea Unit No. 1
3-28-10-25 & 1-29-10-25
SW 1/4 28 & SE 1/4 29-10-25 WPM
Our Files: 24741 & 13868

Dear Mr. & Mrs. Pearn:

Chevron Canada Resources Limited is in the process of applying for reduced spacing in the Virden Roselea Unit No. 1. As part of this infill and conversion project, Chevron will be converting some existing producing wells to water injection wells.

This letter is to inform you, the landowner, that upon approval of the proposed project, the following wells are to be converted:

3-28-10-25 WPM
1-29-10-25 WPM

If you have any questions, or require more information, please call Mr. Randy Dahlman in Virden at 748-6342 or myself in Calgary at 403-234-5618.

Yours very truly,

I. C. (IAN) ROSS
Land Representative

ICR/dew

bpc: M. Roy
J. Major

NOTICE SEND TO (✓)
OWNERS ADJACENT
TO THE UNIT

APPENDIX 16

Section 15 10-25 W1

NW¼		John Ashworth Roy Read Rural Municipality of Woodworth, Manitoba
W½	U½I	Marvel Estella Read Box 212 Virden, Manitoba R0M 2C0
W½	U½I	John Ashworth Roy Read Virden, Manitoba R0M 2C0

Section 16 10-25 W1

NW¼	U¼I	Walter Cameron Pearn, Farmer Rural Municipality of Woodworth, Manitoba
	U¼I	The Toronto General Trusts Corporation 283 Portage Avenue Winnipeg, Manitoba
	U½I	Keith Erle Pearn Box 70 Virden, Manitoba R0M 2C0 and Carole Marie Sangster R.R. #3 Brandon, Manitoba R7A 5Y3 AS JOINT TENANTS
NE¼		Crown

Section 17 10-25 W1

NW¼	U½I	The North Canadian Trust Company 209 Bank of Nova Scotia Building Winnipeg, Manitoba
	U¼I	Marie Paulette Langlois Box 1981 Virden, Manitoba R0M 2C0

	U¼I	Leo Joseph Langlois R.M. of Woodworth, Manitoba
NE¼	U½I	The Toronto General Trusts Corporation 283 Portage Avenue Winnipeg, Manitoba
NE¼	U½I	Keith Erle Pearn Box 70 Virden, Manitoba R0M 2C0 and Carole Marie Sangster R.R. #3 Brandon, Manitoba R7A 5Y3 AS JOINT TENANTS

Section 18 10-25 W1

NE¼		Edwin John Penny Post Office of Virden, Manitoba

Section 19 10-25 W1

SE¼	U¾I	Jim Latham, Horticulturist ✓ GENERAL DELIVERY Virden, Manitoba
	U¼I	David Fefchak and Marilyn Jean Fefchak Both of P.O. of Virden, Manitoba AS JOINT TENANTS AND NOT AS TENANTS IN COMMON
NE¼	U⅛I	Marilyn Jean Fefchak Box 1403 Virden, Manitoba R0M 2C0
NE¼	U⅛I	Beverly Gay Waller Box 981 Lenore, Manitoba R0M 1E0
NE¼	U¼I	The Toronto General Trusts Corporation ✓ RETURNED 283 Portage Avenue R3B 2B5 Winnipeg, Manitoba
SW¼	U¼I	Marilyn Jean Fefchak Box 1403 Virden, Manitoba R0M 2C0
SW¼	U¼I	Beverly Gay Waller Box 981 Lenore, Manitoba R0M 1E0

SW¼	U½I	David Fefchak and Marilyn Jean Fefchak Both of Virden, Manitoba AS JOINT TENANTS
	U¼I	David Fefchak and Marilyn Jean Fefchak Both of Virden, Manitoba AS JOINT TENANTS
	U¼I	John Alexander Forrest and Judith Irene Forrest Both of Virden, Manitoba GEN. DELIVERY RETURNED AS JOINT TENANTS AND NOT AS TENANTS IN COMMON
NW¼	U½I	Marilyn Jean Fefchak Box 1403 Virden, Manitoba R0M 2C0
NE¼	U¼I	Marilyn Jean Fefchak Box 1403 Virden, Manitoba R0M 2C0
NW¼	U½I	Beverly Gay Waller Box 981 Lenore, Manitoba R0M 1E0
NE¼	U¼I	Beverly Gay Waller Box 981 Lenore, Manitoba R0M 1E0

Section 20 10-25 W1

SW¼	U½I	The North Canadian Trust Company C/O Thorvaldson, Eggertson & Co. Winnipeg, Manitoba
SE¼	U¾I	The North Canadian Trust Company C/O Thorvaldson, Eggertson & Co. Winnipeg, Manitoba
SW¼	U½I	The North Canadian Trust Company 209 Bank of Nova Scotia Building Winnipeg, Manitoba
SE¼	U¼I	The North Canadian Trust Company 209 Bank of Nova Scotia Building Winnipeg, Manitoba

Section 21 10-25 W1

SW¼	U¼I	Keith Erle Pearn Box 70 Virden, Manitoba R0M 2C0 and Carole Marie Sangster R.R. #3 Brandon, Manitoba R7A 5Y3 AS JOINT TENANTS
	U¼I	The Toronto General Trusts Corporation 283 Portage Avenue Winnipeg, Manitoba
LSD's 1, 2, & 8	U½I	The Toronto General Trusts Corporation 283 Portage Avenue Winnipeg, Manitoba
LSD 7	U½I	The Toronto General Trusts Corporation 283 Portage Avenue Winnipeg, Manitoba
LSD's 1, 2, & 8	U½I	John Ashworth Roy Read Virden, Manitoba GEN. DELIVERY R0M 2C0
LSD 7	U½I	John Ashworth Roy Read Virden, Manitoba R0M 2C0
NE¼	U¼I	Walter Cameron Pearn R. M. of Woodworth, Manitoba
	U½I	The Toronto General Trusts Corporation 283 Portage Avenue Winnipeg, Manitoba
	U¼I	The Toronto General Trusts Corporation 283 Portage Avenue Winnipeg, Manitoba
NW¼		Walter Cameron Pearn Woodworth, Manitoba
SW¼	U½	Walter Cameron Pearn Woodworth, Manitoba

Section 22 10-25 W1

NE¼	U¼I	The Toronto General Trusts Corporation 283 Portage Avenue Winnipeg, Manitoba
	U¾I	Donald Thomas Brisson P.O. of Virden, Manitoba R.M. of Woodworth, Manitoba
SE¼		Donald Thomas Brisson P.O. of Virden, Manitoba R.M. of Woodworth, Manitoba
W½		Crown

Section 27 10-25 W1

W½		Elizabeth Lobel 42 Belmoral Place Winnipeg, Manitoba

Section 28 10-25 W1

NW¼		The Rural Municipality of Woodworth Kenton, Manitoba GEN. DELIVERY R0M 0Z0
SE¼		Donald Bain Norval 4 Snowcrest Avenue Willowdale, Ontario M2K 2K6
NE¼		Crown

Section 29 10-25 W1

N½		Crown

* Section 30 10-25 W1

NE¼	U¼I	GEN. DELIVERY Richard Henry Stevens, Fannystelle, Manitoba R0G 0P0 Alexander Garfield Sissons, R.M. of Portage La Prairie, Manitoba GEN. DELIVERY R1N 3A7
NE¼	U¼I	Frank Osborne Meighen, Barrister-At-Law c/o 119 - 9th Street Brandon, Manitoba
E½	U½I	The Toronto General Trusts Corporation 283 Portage Avenue Winnipeg, Manitoba

W½	U¼I	The Toronto General Trusts Corporation 283 Portage Avenue Winnipeg, Manitoba
W½	U¼I	The Toronto General Trusts Corporation 283 Portage Avenue Winnipeg, Manitoba
W½	U¼I	The Toronto General Trusts Corporation 283 Portage Avenue Winnipeg, Manitoba
NW¼	U¼I	John Wesley Clarke 343 Conway Street Winnipeg, Manitoba R3J 2N5 Saul Katz Winnipeg, Manitoba 156 Arrowwood Dr. S. R2V 2P1

Section 31 10-25 W1

NE¼	U½I	Marilyn Jean Fefchak Box 1403 Virden, Manitoba R0M 2C0
	U½I	Beverly Gay Waller Box 981 Lenore, Manitoba R0M 1E0
	U½I	Kate Gorzala Virden, Manitoba R0M 2C0
SE¼	U½I	Beverly Gay Waller Box 981 Lenore, Manitoba R0M 1E0
	U½I	Marilyn Jean Fefchak Box 1403 Virden, Manitoba R0M 2C0
SW¼		PanCanadian Petroleum Limited Att'n: Land Dept'T

Section 32 10-25 W1

S½		Crown

Section 33 10-25 W1

SW¼		The Rural Municipality of Woodworth Kenton, Manitoba R0M 0Z0

Section 13 10-26 W1

NW¼	U¼I	The Toronto General Trusts Corporation Portage and Smith Winnipeg, Manitoba
	U¼I	John Cameron Manser Box 1172 Virden, Manitoba R0M 2C0
	U½I	The Toronto General Trusts Corporation 283 Portage Avenue Winnipeg, Manitoba
NE¼	U¼I	Ruth Evelyn Welch, Rivers, Manitoba Ralph McLeod Welch, Roland, Manitoba
	U¼I	Ralph McLeod Welch Roland, Manitoba
	U¼I	Shirley May Welch Box 1191 Virden, Manitoba R0M 2C0
	U¼I	Linda Five of Canada, Ltd. 941 Somerset Building Winnipeg, Manitoba

Section 14 10-26 W1

E½		The Toronto General Trusts Corporation 283 Portage Avenue Winnipeg, Manitoba
W½	U½	The Toronto General Trusts Corporation 505 - 3 Street S.W. Box 2523, Station "M" Calgary, Alberta T2P 3Y8

W½	U¼I	The Toronto General Trusts Corporation 505 - 3 Street S.W. Box 2523, Station "M" Calgary, Alberta T2P 3Y8
W½	U¼I	The Toronto General Trusts Corporation c/o A.B. Rutherford Virden, Manitoba R0M 2C0
NW¼	U½I	Russell Keselowsky and Kathrine Anna Keselowsky Both of Winnipeg, Manitoba AS JOINT TENANTS AND NOT AS TENANTS IN COMMON
NW¼	U½I	Kathleen Janet Hughes, 8107 - 145th Street Edmonton, Alberta and Alice Margaret Cotton, 8614 Sunset Avenue Fair Oak S, California, U.S.A. as to each an undivided ½ interest

Section 15 10-26 W1

NE¼	Henrietta Mary Boyd Virden, Manitoba R0M 2C0
NE¼	Ferdinand Breh Post Office of Routledge, Manitoba
NE¼	Alice Jane McDonald, Jean Cassandra Whitaker of Virden, Manitoba
NE¼	Edward Girth Whitaker and Jean Cassandra Whitaker Both of Virden, Manitoba
NE¼	George Benjamin Goulding Virden, Manitoba
NE¼	Leslie Milne Virden, Manitoba
NE¼	Lucien Robinson Virden, Manitoba
NE¼	The Director, The Veterans' Land Act 636 Dominion Park Building Winnipeg, Manitoba
NE¼	George N. Walker, Clara Elsie Walker Both of Virden, Manitoba

Section 22 10-26 W1

Crown

Section 23 10-26 W1

S½	U¼I	The Toronto General Trusts Corporation Portage & Smith Winnipeg, Manitoba
S½	U¼I	The Toronto General Trusts Corporation Portage & Smith Winnipeg, Manitoba
S½	U¼I	The Toronto General Trusts Corporation Portage & Smith Winnipeg, Manitoba
S½	U¼I	The Toronto General Trusts Corporation Portage & Smith Winnipeg, Manitoba
S½		Douglas Robert Sexsmith Virden, Manitoba Andrew Lawrence Rausch Regina, Saskatchewan
S½		Lea Marie Theresa Colbeck Box 1686 Virden, Manitoba R0M 2C0
S½	U½I	Douglas Robert Sexsmith Box 325 Virden, Manitoba R0M 2C0
SE¼	U½I	Charles Fenton Schock Calgary, Alberta
SE¼	U¼I	Kathleen Janet Hughes, 8107 - 145th Street Edmonton, Alberta T5R 0S8 Alice Margaret Cotton, 8614 Sunset Avenue Fair Oak S, California, U.S.A. As to each an undivided ½ interest
SE¼		Florence Elaine Davies, 488 Lakeshore Drive Penticton, British Columbia V2A 1B9 Margaret Edith Crystal, #23, 8280 - #2 Road, Richmond British Columbia V7C 4P3 As to an undivided ½ interest each
SE¼	U¾I	Florence Elaine Davies, 488 Lakeshore Drive Penticton, British Columbia Margaret Edith Crystal, #23, 8280 - #2 Road, Richmond British Columbia As to an undivided ½ interest each

SE¼		Douglas Robert Sexsmith, Mabel Ellen Sexsmith Both of Box 325 Virden, Manitoba R0M 2C0 AS JOINT TENANTS
SW¼	U½I	Terrence Morrison McLean, Ethel Myrna McLean Both of Box 851 Virden, Manitoba R0M 2C0 AS JOINT TENANTS
SW¼	U½I	Frank A. Bender Apt. 608, 1601 - 18 Street N.W. Washington, D.C., U.S.A. 20009
SW¼		Douglas Robert Sexsmith, Mabel Ellen Sexsmith Both of Box 325 Virden, Manitoba R0M 2C0 AS JOINT TENANTS
N¼	U¼I	The Toronto General Trusts Corporation
N½	U¼I	Earl Neil Schwartz Kenmore, North Dakota, U.S.A
N½	U½I	William John Leonard Hepburn P.O. of Port Hammond, British Columbia

Section 24 10-26 W1

SE¼	U¼I	Alice Ruthine Salsbury Laurel, Montana, U.S.A.
SW¼	U¼I	Alice Ruthine Salsbury Laurel, Montana, U.S.A
SE¼	U¼I	The Toronto General Trusts Corporation Portage and Smith Street Winnipeg, Manitoba
SW¼	U¼I	Carole Ann Baron 297 Borebank Street Winnipeg, Manitoba R3N 1E5 Margaret Ardeth MacVicar Apt. #3, 11415 - 8 Street S.W. T2W 2N4 Calgary, Alberta As to each an undivided ⅛ interest
SE¼	U¼I	The Toronto General Trusts Corporation Portage Avenue Smith Street Winnipeg, Manitoba
SW¼	U¼I	The Toronto General Trusts Corporation Portage Avenue Smith Street Winnipeg, Manitoba

SE¼	U¼I	Frank Osborne Meighen Barrister-At-Law c/o 110 - 11 Street Brandon, Manitoba
SW¼	U¼I	Frank Osborne Meighen Barrister-At-Law c/o 110 - 11 Street Brandon, Manitoba

Section 26 10-26 W1

S½	U½I	Canadian Bible Society Auxiliary of the British and Foreign Bible Society Manitoba District 308 Kennedy Street Winnipeg, Manitoba 419 Graham Ave. R3C 0T3
S½	U¼I	The Toronto General Trusts Corporation Winnipeg, Manitoba
S½	U¼I	Garnet Martin Howard Goodridge Thompson, Manitoba - NOT LISTED IN PHONE BOOK
SW¼	U¼I	The Toronto General Trusts Corporation 283 Portage Avenue Winnipeg, Manitoba
NW¼	U⅛I	Georgina Ellen Mawhinney 113 - 230 Fairlane Avenue Winnipeg, Manitoba R2Y 2H1
NW¼	U⅛I	Sarah Verona McKinley Manitou, Manitoba GENERAL DELIVERY
NW¼	U¼I	Jean Pompana 37 Westview Village Winterburn, Alberta
NW¼	U¼I	The Canada Permanent Trust Company Regina, Saskatchewan

Section 27 10-26 W1

NE¼	U¼I	The Toronto General Trusts Corporation 283 Portage Avenue Winnipeg, Manitoba
NE¼	U¼I	The Canada Permanent Trust Company Regina, Saskatchewan
LSD's 9, 10 & 15	U¼I	Gordon Howard Grose, R.M. of Wallace, Manitoba, P.O. of Virden, Manitoba and Edith Lillian Chapple, Elkhorn, Manitoba Undivided ½ interest each

LSD 16	U¼I	Ernest Grose Welwyn, Saskatchewan
SE ¼	U¼I	Gordon Howard Grose, R.M. of Wallace, Manitoba P.O. of Virden, Manitoba Edith Lillian Chappel, Elkhorn, Manitoba Each and undivided ½ interest
SE¼	U¼I	Gordon Howard Grose, R.M. of Wallace, Manitoba P.O. of Virden, Manitoba Edith Lillian Chappel, Elkhorn, Manitoba Each and undivided ½ interest
SE¼	U½I	The Canada Permanent Trust Company Regina, Saskatchewan
SW¼		The Rural Municipality of Wallace Virden, Manitoba
SW¼	U¼I	Gordon Howard Grose, R.M. of Wallace, Manitoba P.O. of Virden, Manitoba Edith Lillian Chappel, Elkhorn, Manitoba Each and undivided ½ interest
SW¼	U¼I	The Canada Permanent Trust Company Regina, Saskatchewan
SW¼	U¼I	Joanne Flower Maxwell 136 Girton Boulevard Winnipeg, Manitoba R3P 0A5
	U¼I	Gordon Howard Grose R.M. of Wallace, Manitoba Virden, Manitoba R0M 2C0

Section 35 10-26 W1

NE¼		Lawrence Henry McDougall Virden, Manitoba
SE¼	U¼I	Elof Gunnar Pearson, Arthur Henning Pearson Both of Sherwood, North Dakota, U.S.A. As joint tenants and not as tenants in common
SE¼	U¼I	John Wesley Clarke Winnipeg, Manitoba P.O. of Virden, Manitoba R0M 2C0
SE¼	U¼I	The Canada Trust Company 505 - 3 Street S.W. Calgary, Alberta T2P 3E6 Attention: Oil Royalties
SE¼	U⅛I	Leon John Hauk Virden, Manitoba

SE¼	U⅛I	Muriel Hauk Virden, Manitoba
SW¼		Crown

Section 36 10-26 W1

SE¼	U½I	The Toronto Trust Corporation Portage & Smith Winnipeg, Manitoba
LSD's 11 & 12	U½I	The Toronto Trust Corporation Portage & Smith Winnipeg, Manitoba
LSD 13	U½I	The Toronto Trust Corporation Portage & Smith Winnipeg, Manitoba
LSD 14	U½I	The Toronto Trust Corporation Portage & Smith Winnipeg, Manitoba
NW¼	U½I	Jennie Maria Nash P.O. Box 82 Reston, Manitoba
SE¼	U½I	Jennie Maria Nash P.O. Box 82 Reston, Manitoba
SW¼	U¼I	Jennie Maria Nash P.O. Box 82 Reston, Manitoba
SE¼	U¼I	The Toronto General Trusts Corporation 283 Portage Avenue Winnipeg, Manitoba
SE¼	U¾I	Lawrence Henry McDougall R.M. of Wallace, Manitoba
LSD's 3, 4, & 5	U¼I	Richard Allan Frazer Box 622 Swan River, Manitoba R0L 1Z0
LSD 6	U¼I	Richard Allan Frazer Box 622 Swan River, Manitoba R0L 1Z0
NE¼		Crown

Manitoba

The Oil and Natural Gas Conservation Board

555 — 330 Graham Avenue
Winnipeg MB R3C 4E3
CANADA

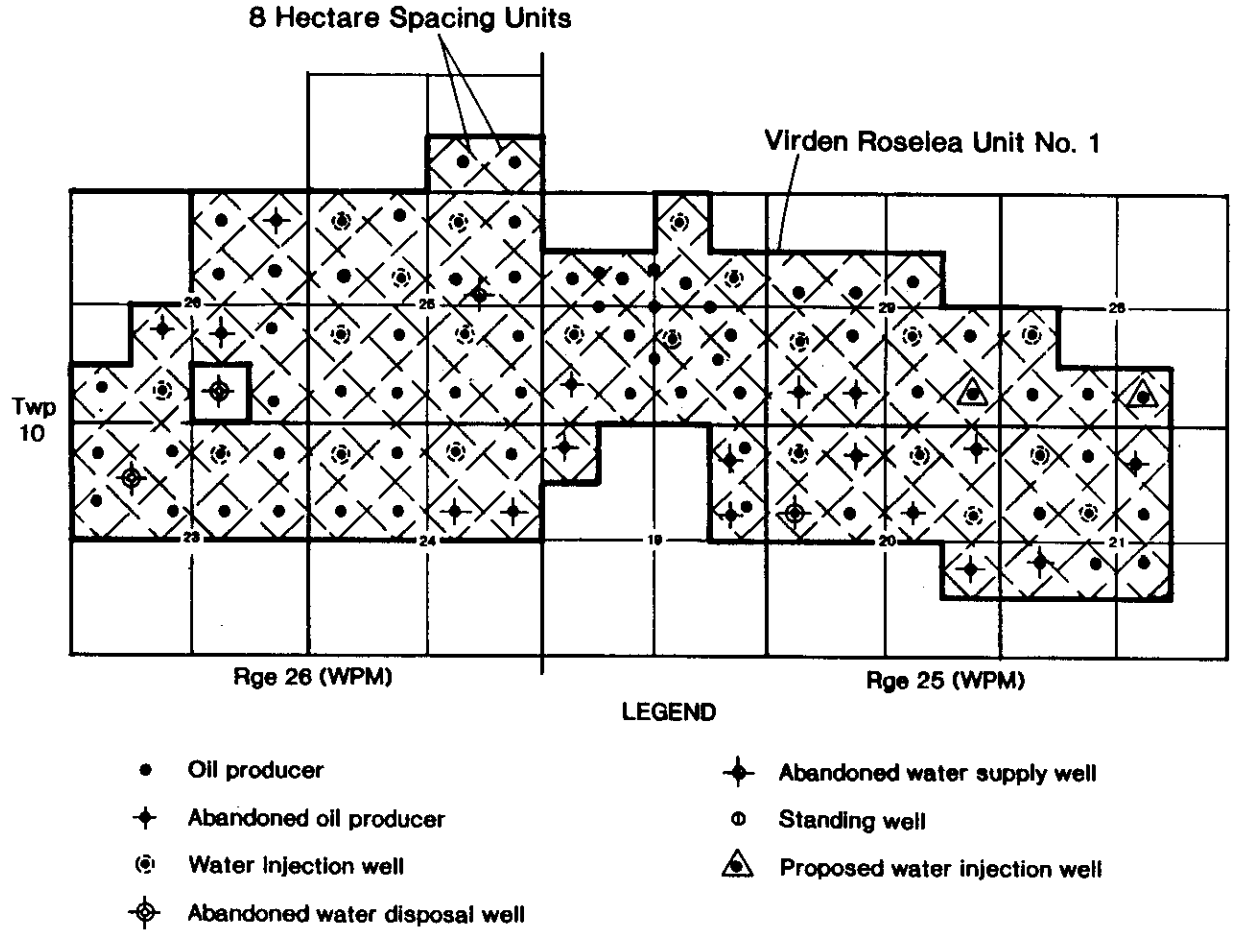
(204) 945-1111
FAX: (204) 945-0586

NOTICE

UNDER THE MINES ACT

Chevron Canada Resources, the Unit Operator of Virden Roselea Unit No. 1 ("the unit area") has made application:

1. Under Section 20 of the Petroleum Drilling and Production Regulation for approval of special drilling spacing units in the unit area. It is proposed that drilling spacing units would be reduced from 16 hectares (40 acres) to eight hectares (20 acres) in the unit area outlined below. In the application, Chevron indicated the company plans as a first phase to drill a potential 14 wells on eight hectare spacing in 1994.



2. Under Section 64 of the Petroleum Drilling and Production Regulation for approval to convert the following wells to water injection.

Chevron East Virden 2-28-10-25 (WPM)
Chevron East Virden Prov. 1-29-10-25 (WPM)

If no intervention in writing is received by the Board at 555-330 Graham Avenue, Winnipeg, Manitoba, R3C 4E3 on or before January 28, 1994, the Board may approve the application.

Copies of the application may be obtained from:

Chevron Canada Resources
Box 100
Virden MB R0M 2C0
(204) 748-1334

The application may be viewed at the offices of the Petroleum Branch:

555-330 Graham Avenue
Winnipeg, Manitoba
(204) 945-6577

227 King Street West
Virden, Manitoba
(204) 748-1557

Dated at Winnipeg, this 23 day of December, 1993.

David Tomasson
Chairman

, Bob and
e accom-
e Bianco
Sask., to
il Bianco.
tors with
ook were
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members
and Box-
nd Barb
f Portage
and Kyle
ortage la
Carlyle,
Jody and

d Jamie
. Ontario
holidays
ian. Ber-
amantha
awn Hea-
of Mooso-
s dinner

of Bran-
y guests
l. Boxing
Vance,
n McColl
d Shelly
harlotte,
McColl,
don and

days in hospital and was able to return home Christmas morning.

Charlie and Louise Milne enjoyed the Christmas holidays visiting in Alberta with Mrs. Laverne Drydon of Drayton Valley and Muriel Paterson of Bashaw. They spent several days with Alex, Val and Cameron Milne at Stettler, and enjoyed Christmas supper with Mark and Heather Dennis, also of Stettler. Charlie and Louise were overnight guests with Murray and Edna Milne in Saskatoon on December 27, returning home December 28.

Christmas brunch visitors with Les, Donna, Laranda, Casandra and Samantha Odell were Allan and Caroline Greig, Darcy and Alana Henuset of Virden, and Don, Ev and Sheryl Odell. Les, Donna and girls enjoyed Christmas supper with the Greigs in Virden.

Brian Heaman spent Christmas with Alvin and Joyce Heaman of Virden and his sister Norma Heaman of Winnipeg.

Scott and Trudy Pool and family of Red Deer, Alberta were overnight visitors with Trevor, Joanne, Tyler and Tanner Pateman on December 20. On Boxing Day, the Patemans travelled to Parry, Sask., to spend a few days with Harold and Eleanor Olsen, and also visited with Tolton of Carberry, and Boyd Tolton of Toronto.

Jim and Margaret Anne Heaman, Henry and Anne Heaman, and Glen and Barb Heaman attended the funeral for their uncle, Don McNish, in Brandon on Monday, December 27.

Supper guests with Stan, Marian, Jody and Curt Braybrook on Boxing Day were Brian and Josie Hayward and family.

George, Chris, Andrew, Evan and Ainsley Brereton spent Christmas with Len, Kim, Jacob and Calla Ebelher of Medicine Hat, Alta.

Sympathy goes to the Bartlett and Heaman families on the recent death of their uncle, Don McNish, in Brandon.

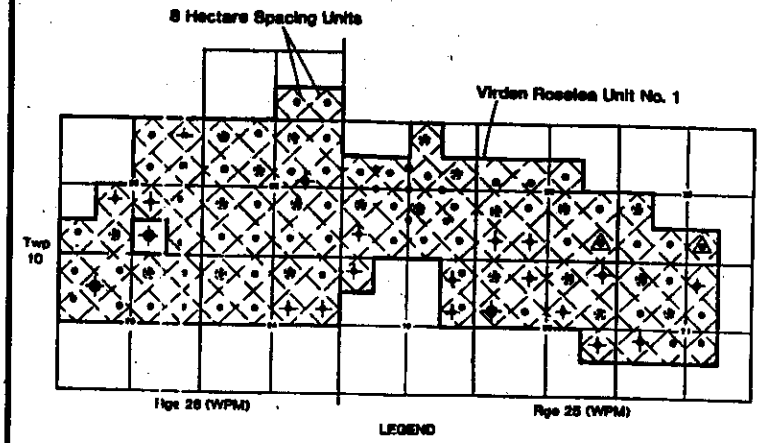
Christmas dinner guests with Greg, Cathy, Megan, Mitchell and Veronica Tough were Daryl, Cheryl, Jacy and Kayla Fisher, Lorne Hazlewood of Pilot Mound, and Bill Tough of Virden. On December 30, the Toughs visited with Sheldon and

NOTICE

Under the Mines Act

Chevron Canada Resources, the Unit Operator of Virden Roselea Unit No. 1 ("the unit area") has made application:

1. Under Section 20 of the Petroleum Drilling and Production Regulation for approval of special drilling spacing units in the unit area. It is proposed that drilling spacing units would be reduced from 16 hectares (40 acres) to eight hectares (20 acres) in the unit area outlined below. In the application, Chevron indicated the company plans as a first phase to drill a potential 14 wells on eight hectare spacing for 1994.



2. Under Section 64 of the Petroleum Drilling and Production Regulation for approval to convert the following wells to water injection.

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Chevron East Virden Prov. 1-29-10-25 (WPM)

If no intervention in writing is received by the Board at 555 - 330 Graham Avenue, Winnipeg, Manitoba, R3C 4E3 on or before January 28, 1994, the Board may approve the application.

Copies of the application may be obtained from:
Chevron Canada Resources
Box 100
Virden, Man. R0M 2C0 (204) 748-1334

The application may be viewed at the offices of the Petroleum Branch:
555 - 330 Graham Avenue
Winnipeg, Manitoba
(204) 945-6577

227 King Street West
Virden, Manitoba
(204) 748-1557

Dated at Winnipeg, this 23rd day of December, 1993.

David Tomasson
Chairman

mas, and
guests with
Nolan on Cl
Visitors o
Mr. and Mr
Miss Susan
and Mr. and
Virden. Mr.
joined them
Day, Mr. ar
and Susan w
Mr. and Mrs
don.
Mr. and M
Christmas E
Mr. and M
Chad. On Chr
supper guest
Hall and far
Christmas
and Mrs. Ke
and Mrs. Ed
Mrs. Jennie
and Kevin a
and boys. Th
Howard and
Christmas
Mr. and Mrs.
Gordon Nyk
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Anderson of
Gee of Langr
and Jo-Ann N
of Crandall.
Mr. and Mr
Marlin were
guests with M
and family o
Boxing Day
Mrs. David K
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Christmas
and Mrs. Oliv
vor were Nic
Yeo of Gladst
Joe Donaghy
ing Day gues
Sharon Fratt
Virden. Mr. a
tinger and T
social in Pipe
cole Fratting
cember 26.
Christmas
and Mrs. Kev
ly were Diana
Tina Walker
all of Boissev
Bill Walker o
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chison, Russel
McAuley, all
Kerik of Wey
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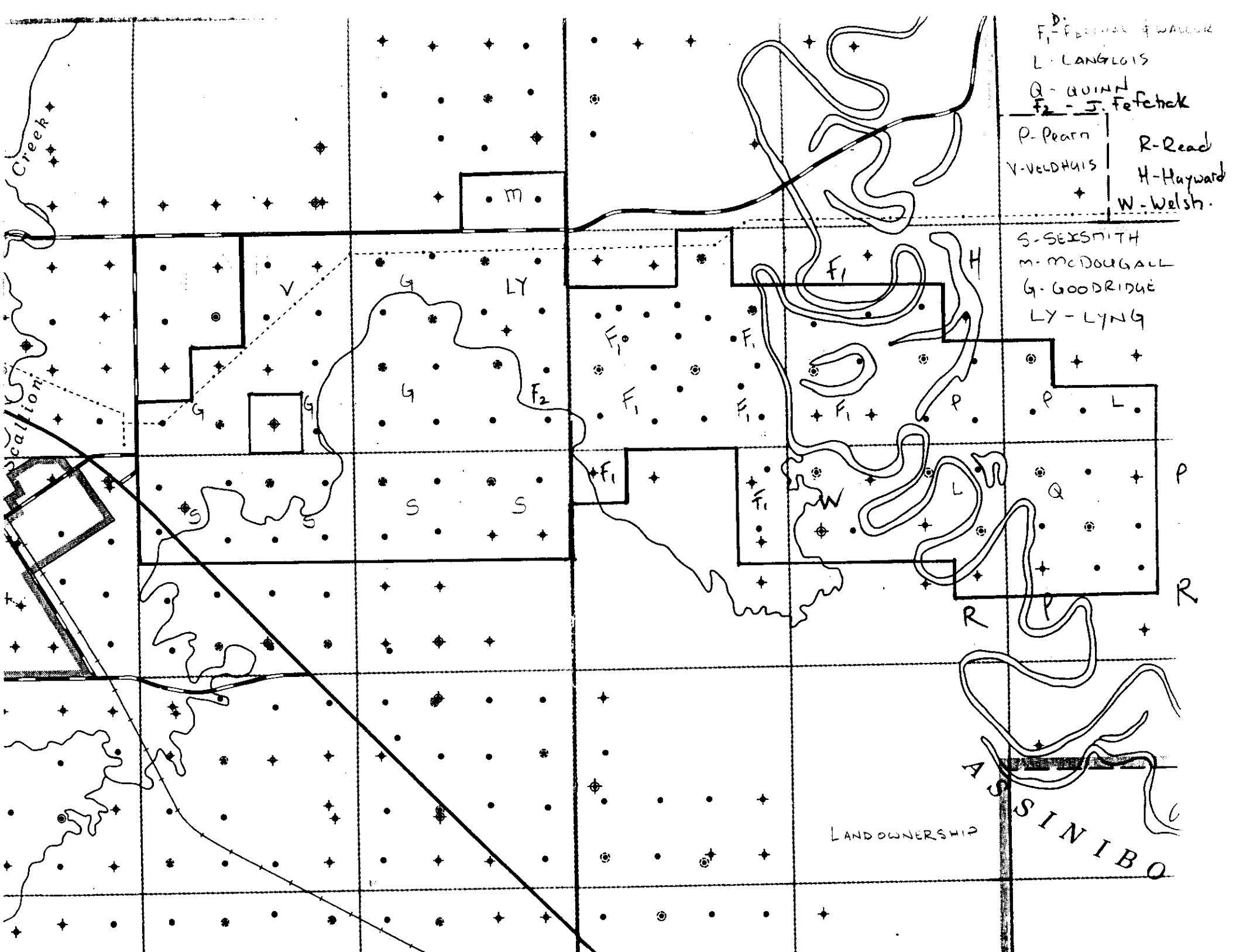
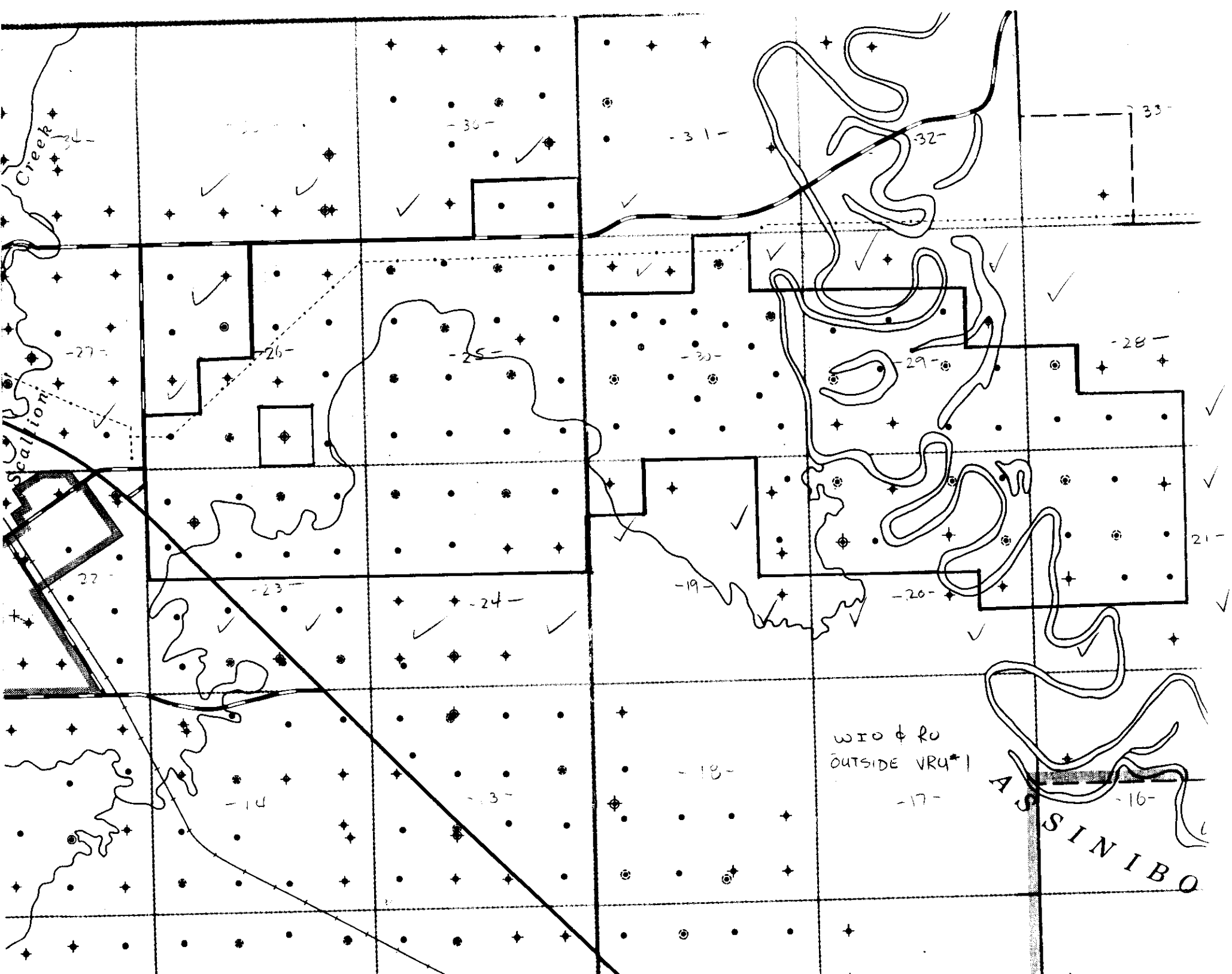
Alison Kerik
Christmas
with Mr. and
Christopher
Mrs. Eva Har
Milne, Mr. Ja
da, Ryan and
Nan Clarke a
nard.
Christmas F


F1 - D. Fetchuk & Walker
L - Langlois
Q - Quinn
F2 - J. Fetchuk
P - Pearn
V - Veldhuis
R - Read
H - Hayward
W - Welsh.
S - Sexsmith
m - McDougall
G - Goodridge
LY - Lyng
Creek
LANDOWNERSHIP
ASSINIBO


Creek
-36-
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W10 & R0
OUTSIDE VRY#1
ASSINIBO

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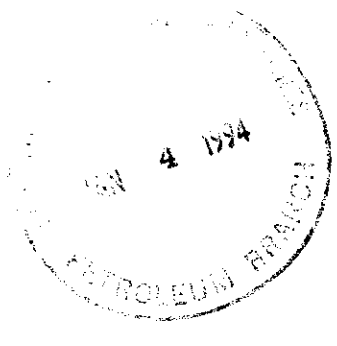
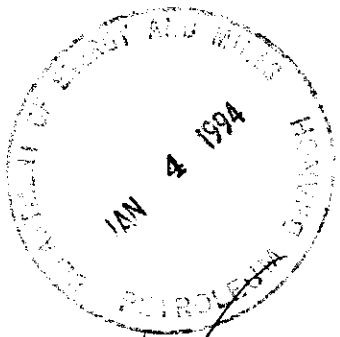


The Toronto General Trusts Corp.
283 Portage Avenue
Winnipeg MB R3B 2B5



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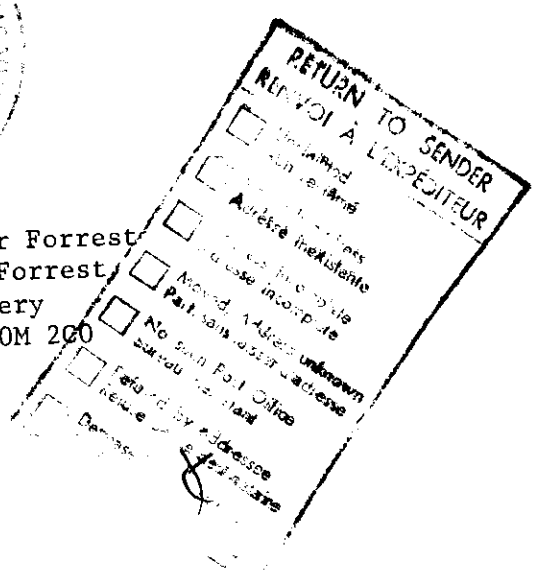


John Alexander Forrest
Judith Irene Forrest
General Delivery
Virden MB ROM 2C0

2. Under Section 64 of the Petroleum Drilling and Production Regulation for approval to convert the following wells to water injection.

Chevron East Virden 2-28-10-25 (WPM)
Chevron East Virden Prov. 1-29-10-25 (WPM)

If no intervention in writing is received by the Board at 555-330 Graham Avenue, Winnipeg, Manitoba, R3C 4E3 on or before January 28, 1994, the Board may approve the application.

Copies of the application may be obtained from:

Chevron Canada Resources
Box 100
Virden MB R0M 2C0
(204) 748-1334

The application may be viewed at the offices of the Petroleum Branch:

555-330 Graham Avenue
Winnipeg, Manitoba
(204) 945-6577

227 King Street West
Virden, Manitoba
(204) 748-1557

Dated at Winnipeg, this 23 day of December, 1993.

David Tomasson
Chairman

VALLEY FLOOR - HAY LAND

VRU #1

INFILL WELL SITING

TWP 10, RGE 25
SEC 19 - WESTERN SLOPE OF ASSINIBOINE RVR VALLEY, GOPHER CR. FLOWS INTO RVR
SEC. 20 - ASSINIBOINE RVR - VALLEY FLOOR & RIVER

SEC 21 - ASSINIBOINE RVR - NORTHEASTERN SLOPE OF RVR VALLEY
- VALLEY FLOOR
- POOR PASTURE LAND (TOP OF VALLEY)

SEC 28 - EASTERN SLOPE OF ASSINIBOINE RVR VALLEY
- POOR PASTURE LAND (TOP OF VALLEY)

SEC 29 - VALLEY FLOOR & RIVER

SEC 30 - EASTERN SLOPE OF ASSINIBOINE RVR VALLEY
- POOR, ROCKY PASTURE ON TOP OF VALLEY

TWP 10, RGE 26

N12 SEC 23 - NE EDGE OF THE TOWN OF VIRDEN (SURFACE IMPROVEMENT NW/4)
- HWY 1
- GOPHER CR.
- HAY/CROP LAND, SOME PASTURE

N12 SEC 24 HAY/CROP LAND

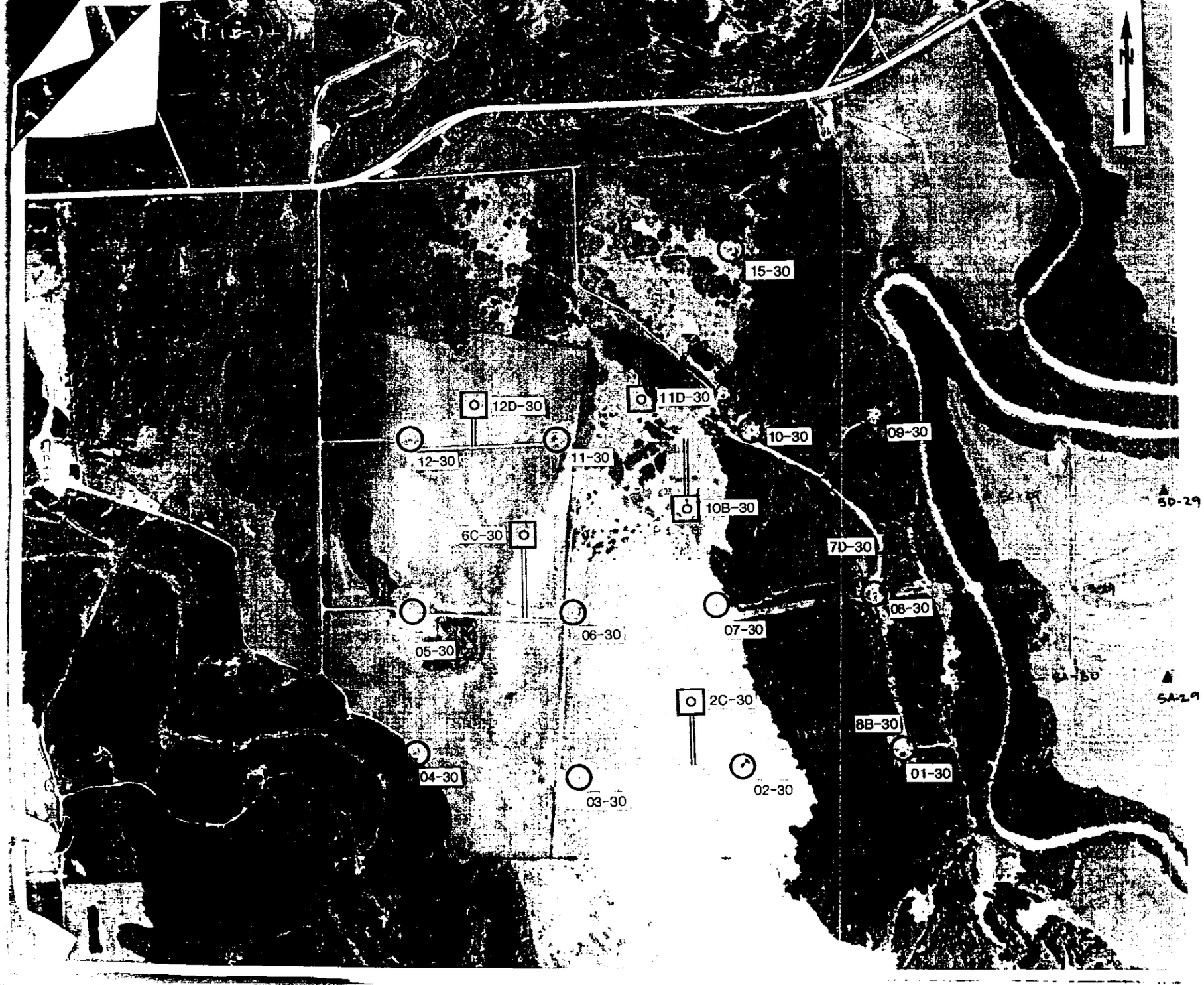
SEC 25 GOPHER CR & banks are quite steep (GULLY)
- HAY/CROP LAND

SEC 26 - SE/4 GOPHER CR. ROTHAINDER HAY LAND

LSD 1&2 SEC 36 HAY LAND @ TOP OF GULLY

FIGURE 4

AERIAL PHOTOGR
OF
REDUCED SPACING
PROJECT AREA



KEY:

- EXISTING WELLS
- PROPOSED WELLS
- PROPOSED LEASE TRAILS

SCALE

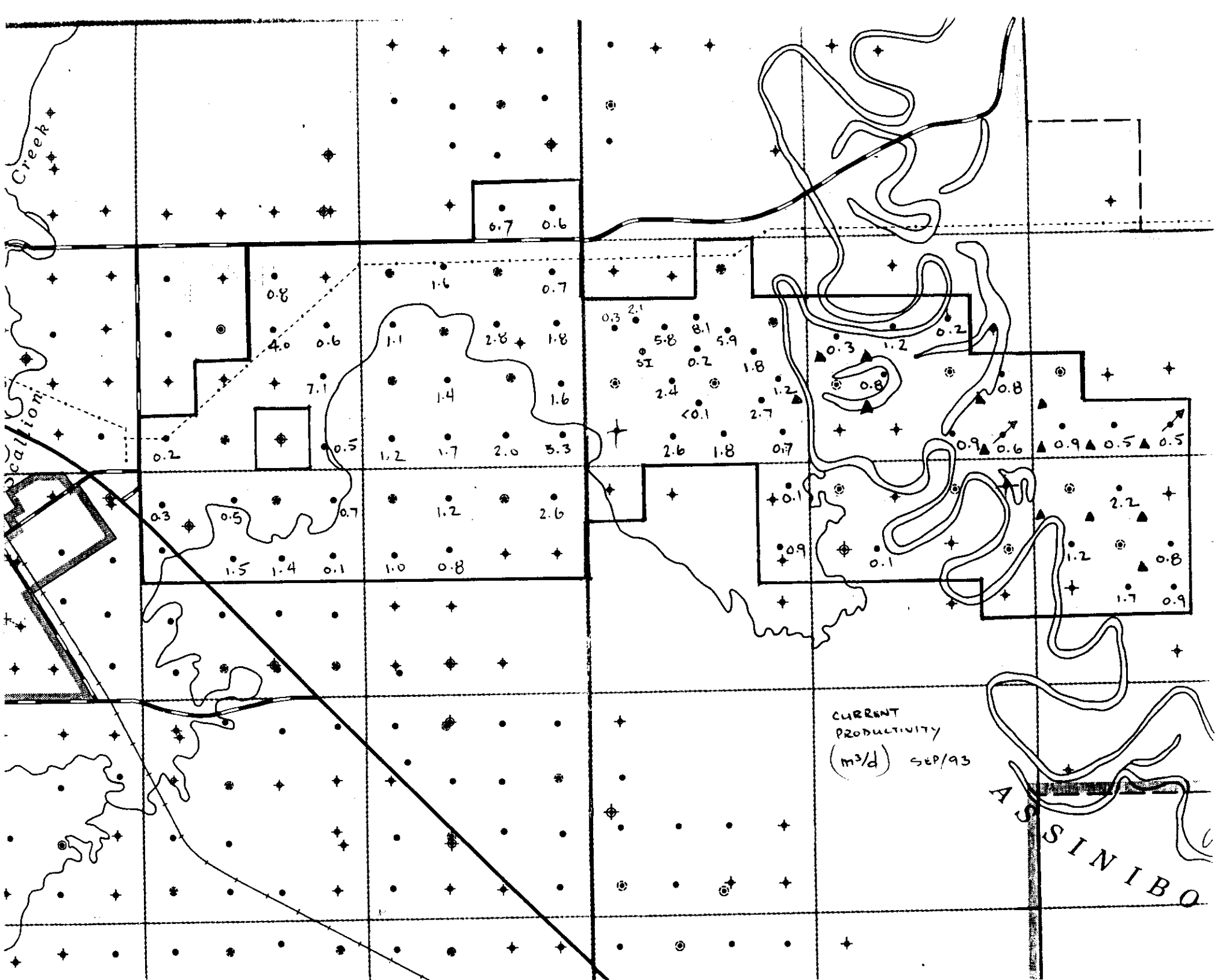
0 100 200 300 400 500

METRES

100 m

100 m

DRILLING LEASE SIZE
(TO SCALE)


Creek
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0.8
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4.0 0.6
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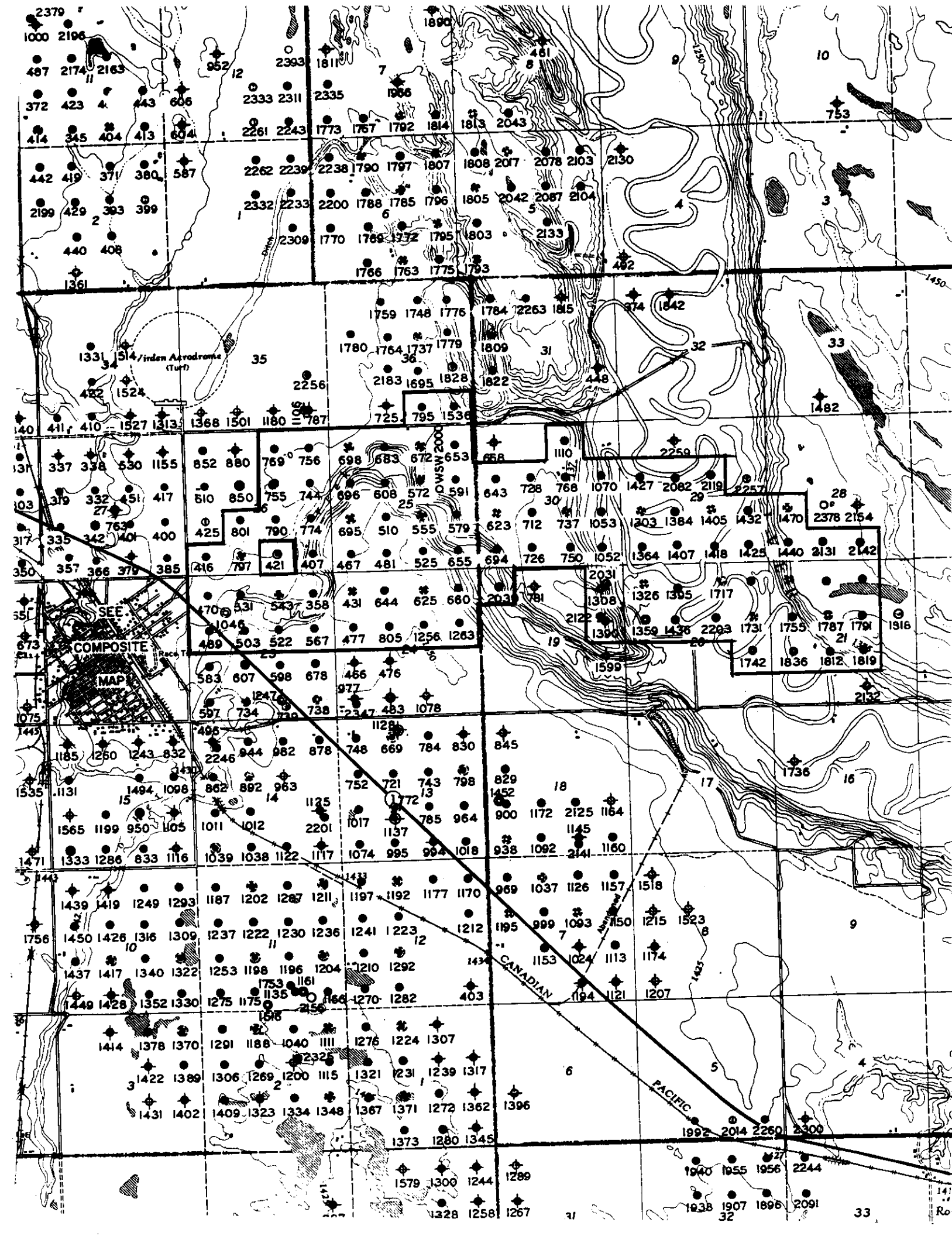
CURRENT
PRODUCTIVITY
(m³/d) SEP/93
ASSINIBO


Innisfail Aerodrome (Turf)
SEE COMPOSITE MAP
CANADIAN PACIFIC

Manitoba

The Oil and Natural Gas
Conservation Board

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

(204) 945-3130

Order No. PM 65

An Order Pertaining to Pressure Maintenance by Water Flooding
Virden Lodgepole B Pool

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, Chevron Canada Resources is the unit operator of Virden Roselea Unit No. 1, Virden Roselea Unit No. 2 and Virden Roselea Unit No. 3 ("the unit areas").

AND WHEREAS, the Board received an application dated January 18, 1991 from Chevron Canada Resources for approval to convert two additional wells in Virden Roselea Unit No. 1 to water injection.

AND WHEREAS, upon publication of notice of the application the Board received no objections to or interventions in the application.

AND WHEREAS, upon due consideration of the said application, the Board has found it is reasonable and desirable to convert the said wells to water injection in the Virden Lodgepole B Pool ("the pool").

NOW THEREFORE, the Board orders that:

1. Board Order No. PM 55 is hereby rescinded.

2. The unit operator shall conduct pressure maintenance operations by the injection of water into the pool underlying the unit areas.

3. 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:

Chevron South Virden CPR WIW 10-7-10-25 (WPM)
Chevron South Virden CPR WIW 12-7-10-25 (WPM)
Chevron South Virden CPR WIW 14-7-10-25 (WPM)
Chevron Virden Prov. WIW A2-18-10-25 (WPM)
Sun I. Welch Virden WIW 4-18-10-25 (WPM)
Chevron Virden WIW 9-20-10-25 (WPM)
Sun M. Welch Virden WIW 13-20-10-25 (WPM)
Chevron Virden WIW 15-20-10-25 (WPM)
Chevron Virden WIW 11-21-10-25 (WPM)
Chevron Virden WIW 13-21-10-25 (WPM)
Chevron East Virden Prov. WIW 5-28-10-25 (WPM)
Chevron East Virden Prov. WIW 5-29-10-25 (WPM)
Chevron Virden Prov. WIW 7-29-10-25 (WPM)
Placer Virden WIW 5-30-10-25 (WPM)
Placer Virden WIW 7-30-10-25 (WPM)
Virden Roselea Unit No. 1 WIW 9-30-10-25 (WPM)
Virden Roselea Unit No. 1 WIW 15-30-10-25 (WPM)
Continental Virden WIW 12-31-10-25 (WPM)
Chevron South Virden CPR WIW 6-1-10-26 (WPM)
Chevron South Virden CPR WIW 14-1-10-26 (WPM)
Chevron South Virden Prov. WIW 8-2-10-26 (WPM)
Chevron South Virden WIW 14-2-10-26 (WPM)
Mineraloid Virden WIW 16-2-10-26 (WPM)
Chevron South Virden WIW 16-3-10-26 (WPM)
Gulf Duncan Virden WIW 6-10-10-26 (WPM)
Chevron South Virden Prov. WIW 8-10-10-26 (WPM)
Chevron South Virden Prov. WIW 6-11-10-26 (WPM)
Chevron South Virden Prov. WIW 8-11-10-26 (WPM)
Chevron South Virden Prov. WIW 12-11-10-26 (WPM)
Chevron South Virden Prov. WIW 14-11-10-26 (WPM)
Chevron South Virden Prov. WIW 16-11-10-26 (WPM)
Chevron South Virden WIW 6-12-10-26 (WPM)
Chevron South Virden WIW 14-12-10-26 (WPM)
Placer Virden WIW 6-13-10-26 (WPM)
Gulf Union Welch Virden WIW 9-13-10-26 (WPM)
Mineraloid Virden WIW 14-13-10-26 (WPM)
Rundle Williams Virden WIW 4-14-10-26 (WPM)
Rundle Williams Virden WIW 11-14-10-26 (WPM)
Murphy Virden WIW 1-23-10-26 (WPM)
Esso Virden WIW 3-23-10-26 (WPM)
Teck Hepburn Virden WIW 15-23-10-26 (WPM)
Chevron Virden WIW 13-24-10-26 (WPM)
Chevron Virden WIW 15-24-10-26 (WPM)

Chevron Virden WIW 5-25-10-26 (WPM)
Chevron Virden CPR WIW 7-25-10-26 (WPM)
Chevron Virden WIW 11-25-10-26 (WPM)
Chevron Virden WIW 13-25-10-26 (WPM)
Chevron Virden CPR WIW 15-25-10-26 (WPM)
Chevron Virden WIW 3-26-10-26 (WPM)
Chevron Virden Prov. WIW 10-36-10-26 (WPM)
Chevron Virden WIW 4-5-11-25 (WPM)
Chevron Virden WIW 10-5-11-25 (WPM)
Chevron Virden Prov. WIW 12-5-11-25 (WPM)
Chevron Virden Prov. WIW 14-5-11-25 (WPM)
Chevron Virden Prov. WIW 2-6-11-25 (WPM)
Chevron Virden Prov. WIW 8-6-11-25 (WPM)
Chevron Virden Prov. WIW 10-6-11-25 (WPM)
Chevron Virden Prov. WIW 12-6-11-25 (WPM)
Chevron Virden Prov. WIW 14-6-11-25 (WPM)
Chevron Virden Prov. WIW 16-6-11-25 (WPM)
Murphy Virden WIW 2-7-11-25 (WPM)
Murphy Virden WIW 4-7-11-25 (WPM)
Chevron Virden WIW 4-8-11-25 (WPM)

and such other wells in the unit areas as the Board may approve.

1(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 subsection (1), endeavour to maintain continuous injection.

1(3) Notwithstanding the provisions of subsection (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 areas will not be adversely affected.

1(4) The completion of the wells referred to in subsection (1) will be as prescribed by the Director of Petroleum.

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) At least once every three years commencing in 1981, unless otherwise directed by the Board, the unit operator shall conduct a survey to determine the static reservoir pressure in the unit areas.

3(2) Notwithstanding the provisions of subsection (1), the unit operator shall, at yearly intervals until such time as the Board approves otherwise, conduct a survey to determine the static reservoir pressure in Section 30, Township 10, Range 25 (WPM).

3(3) The unit operator shall submit to the Petroleum Branch, the details of the surveys described in subsections (1) and (2), 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 Petroleum before the program is carried out.

3(4) The unit operator shall submit to the Petroleum Branch, within 30 days of the completion date of the surveys described in subsections (1) and (2), a report which shall include:

(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 areas based on the data obtained; and

(c) a discussion of the survey results and pressure distribution within the pool.

3(5) 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 subsection 1(1) shall not exceed 8 000 kPa or such other maximum pressure as the Board may prescribe and 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 areas.

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 subsection 1(1).

6(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, which 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; and

(c) 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, including a discussion of the performance of the reduced spacing project area outlined in Board Order No. SU 8.

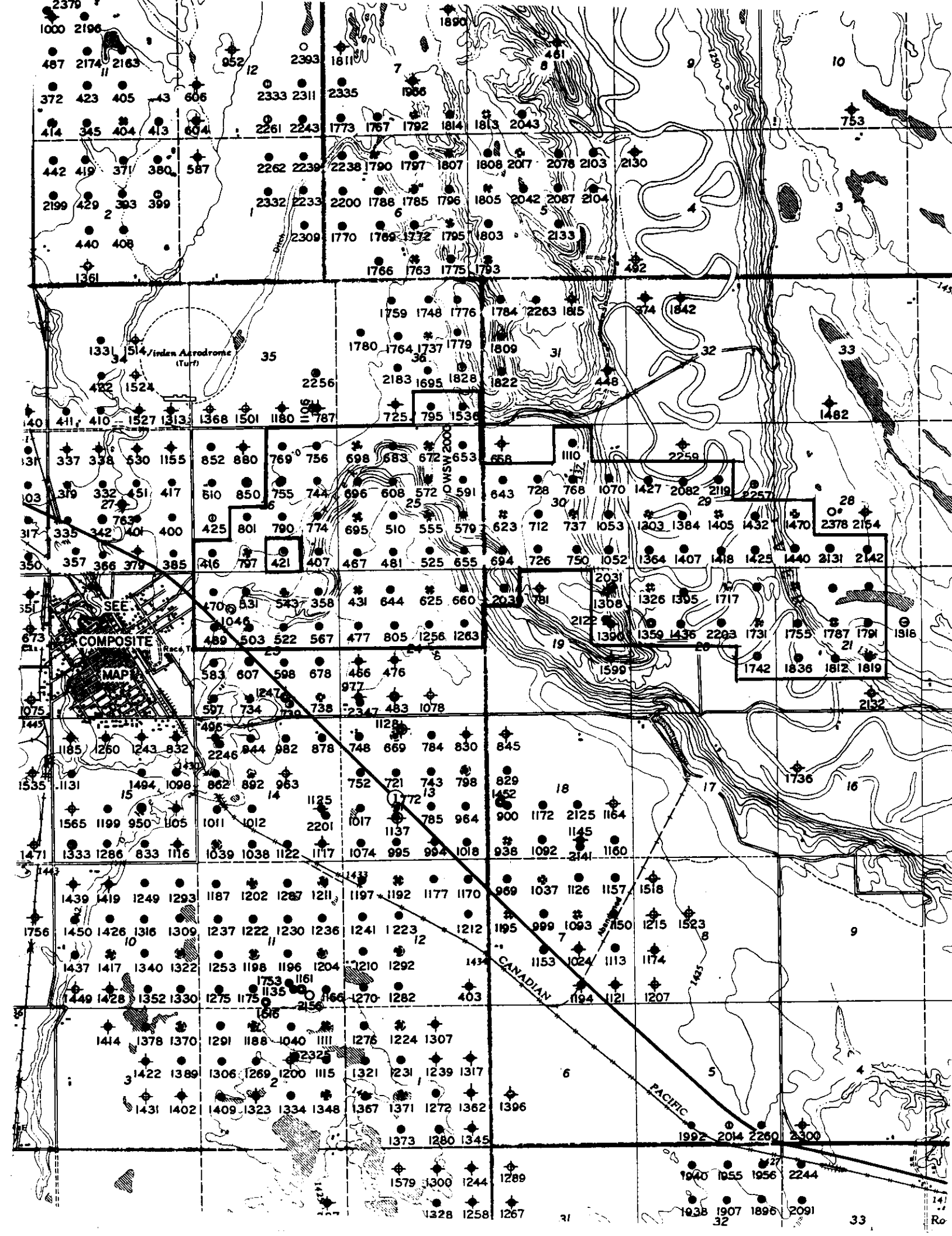
Wm. McDonald
Member

H. Clare Moster
Deputy Chairman

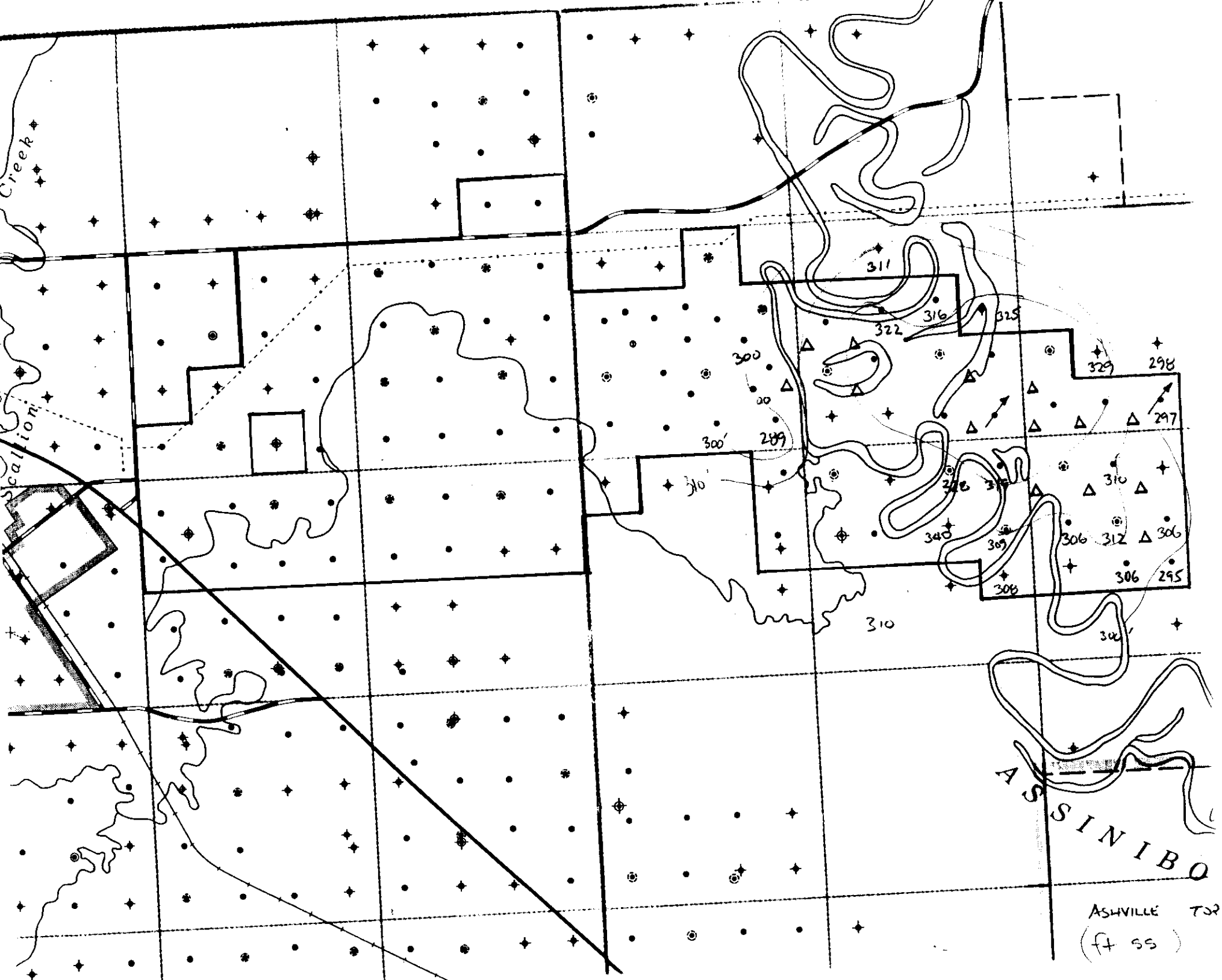
OIL AND NATURAL GAS CONSERVATION BOARD ORDER NO. PM 65 APPROVED THIS 14 DAY OF MAY A.D. 1991 AT THE CITY OF WINNIPEG.

APPROVED:

Harold Neufeld
Minister of Energy and Mines


SEE COMPOSITE MAP
Indian Aerodrome (Turf)
CANADIAN PACIFIC

WELL	KB	FORMATION TOPS ASHVILLE	SWAN RIVER
TWP 10-25	(ft)	(ft)	(ft)
8-20	1226	920 (308 ss)	1046 (182 ss)
9-20	1228	919 (309 ss)	-
10-20	1226	885 (340' ss)	-
15-20	1229	901 (328' ss)	1100 (129' ss)
16-20	1229	910 (319' ss)	1103 (126' ss)
5-21	1230	-	-
6-21	1246	937 (306' ss)	-
7-21	1382	1087 (295' ss)	1212 (170' ss)
9-21	1390	1090 (300' ss)	-
10-21	1399	1093 (306' ss)	1232 (167' ss)
11-21	1377	1065 (312' ss)	1210 (167' ss)
12-21	1231	925 (306' ss)	1055 (176' ss)
		-	-
14-21	1388	1072 (316' ss)	1218 (170' ss)
15-21	1387	1077 (310' ss)	1217 (170' ss)
2-28	1399	1102 (297' ss)	-
		-	
		-	-
6-28	1401	1072 (329' ss)	-
7-28	1406'	1108 (298' ss)	-
1-29	1229	-	-
9-29	1230	905 (325' ss)	-
16-29	1231	915 (316' ss)	-
11-29	1232	910 (322' ss)	
14-29	1231	920 (311' ss)	
1-30	1265	976 (289' ss)	1090 (175' ss)
8-30	1285	985 (300' ss)	1101 (184' ss)
9-30	1262	962 (300' ss)	1084 (178' ss)


Creek
311
316
322
325
329
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289
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340
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312
306
306
295
308
310
ASSINIBO
ASHVILLE TWP
(ft SS)

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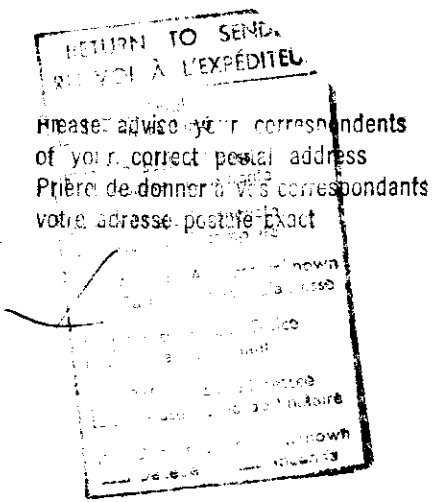
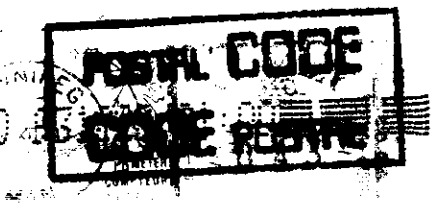


Jean Pompana
37 Westview Village
Winterburn AB ~~T0E 2N0~~

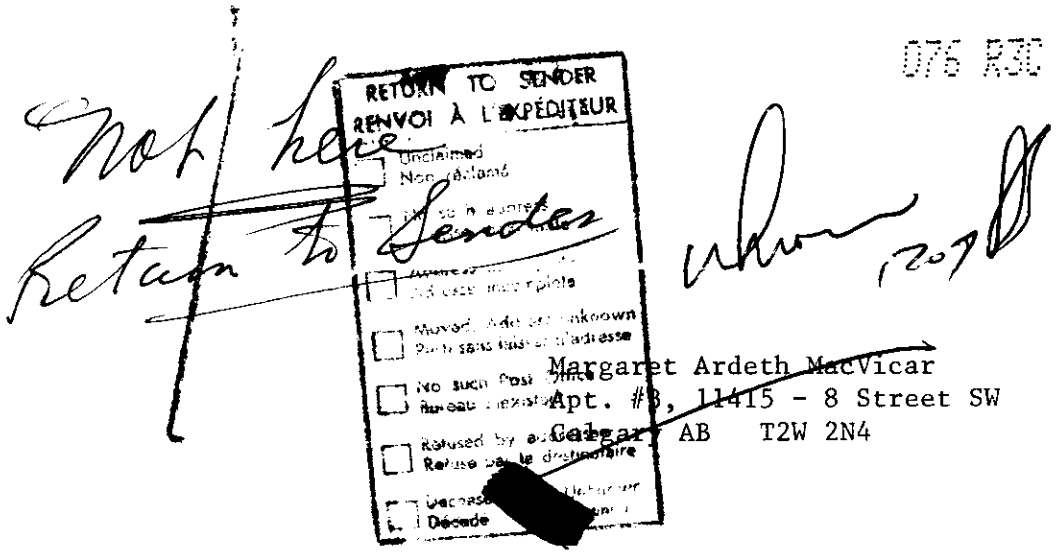


RETURN TO SENDER
RENVOI À L'EXPÉDITEUR

Florence Elaine Davies
488 Lakeshore Drive W
Penticton BC V2A 1B9

Deceased
Décédé

V2A 1B9



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Not here
Return to Sender
unknown
1207

Margaret Ardeth MacVicar
Apt. #3, 11415 - 8 Street SW
Calgary AB T2W 2N4