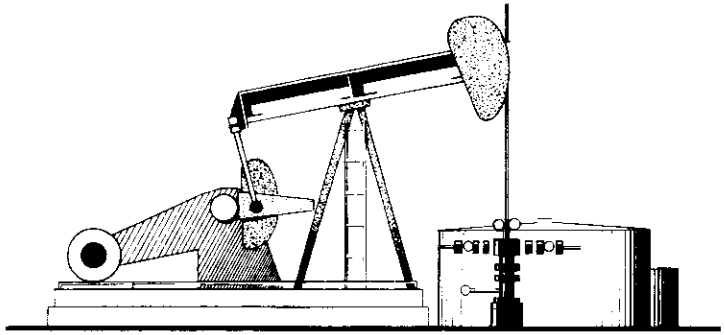
DALY UNIT No. 1



UNITIZATION AND WATERFLOOD PROPOSAL

JANUARY 1971

PROPOSED DALY UNIT NO. 1

UNITIZATION AND WATERFLOOD PROPOSAL

INTRODUCTION

The Daly Field was discovered in December, 1951 by drilling of the well known as Calstan Daly 15-18-10-27. Further development drilling continued on through the 1950's. Part of the Daly Field in the north east section has been under waterflood since the early 1950's and has shown varying degrees of success.

In December, 1969, Rundle Petroleums Ltd. initiated a pilot waterflood on the NW¼ of Section 4, Township 10, Range 28 WPM. A former salt water disposal well which was drilled in the center of the quarter section was recompleted as a Mississippian water injection well. Produced salt water from this lease and other nearby leases was injected into the Mississippian producing zone through this well, and the results to date have been most encouraging. The oil production from the four surrounding wells has increased from 54 barrels of oil per day to 140 barrels of oil per day in 12 months. The production at time of writing is continuing to show a steady increase.

It is anticipated that the production from this and nearby leases can be increased similarly by expansion of this one well pilot flood to several other injection wells. This will mean increased income to Royalty owners and working interest owners of these leases. Royalty owners do not contribute money towards the installations of the waterflood.

WATERFLOODING

Waterflooding is a process whereby water is forced into the rock containing oil in order to flush the oil from the rock into the producing well bore. Water injection is accomplished by either drilling new wells or converting

existing selective producers and injecting water through these wells into the reservoir rock. (See Figure 1).

This technique has been successfully applied in the North Virden Scallion Field as well as the Virden-Roselea field in Manitoba. Many other fields in Western Canada are now under waterflood.

Studies indicate that the portion of the Daly Field encompassed by Daly Unit No. 1, will produce about 1,500,000 barrels of oil in the future, if it is operated under the present primary producing methods. If the area is waterflooded, it is anticipated that this same area will yield an additional 5 million barrels of oil. The area to date has produced some 3,500,000 barrels of oil. With waterflooding, the ultimate recovery for the area is estimated to be 10,000,000 barrels of oil. In order to accomplish this goal and to institute the most efficient waterflood for the proposed Daly Unit No. 1 it is necessary to unitize that part of the field.

UNITIZATION

Unitization is a method whereby all interests in an oil field are merged and the reservoir is developed and operated as a single property. Working Interest and Royalty Owners no longer receive a portion of the production from a specific well or group of wells but share in the Unit's total production. They share in the Unit Production on the basis of a participation formula agreed upon by a majority of Working Interest Owners. (See Figure 1).

Manitoba is rather unique in that with few exceptions, production rates have been unrestricted. Most wells are produced to capacity. Because of this fact the production history not only gives the present and past value of each well but also indicates the future worth of each well to a

Unit. Each well's decline rate, current rate, and water cut represent the present and future worth of that well.

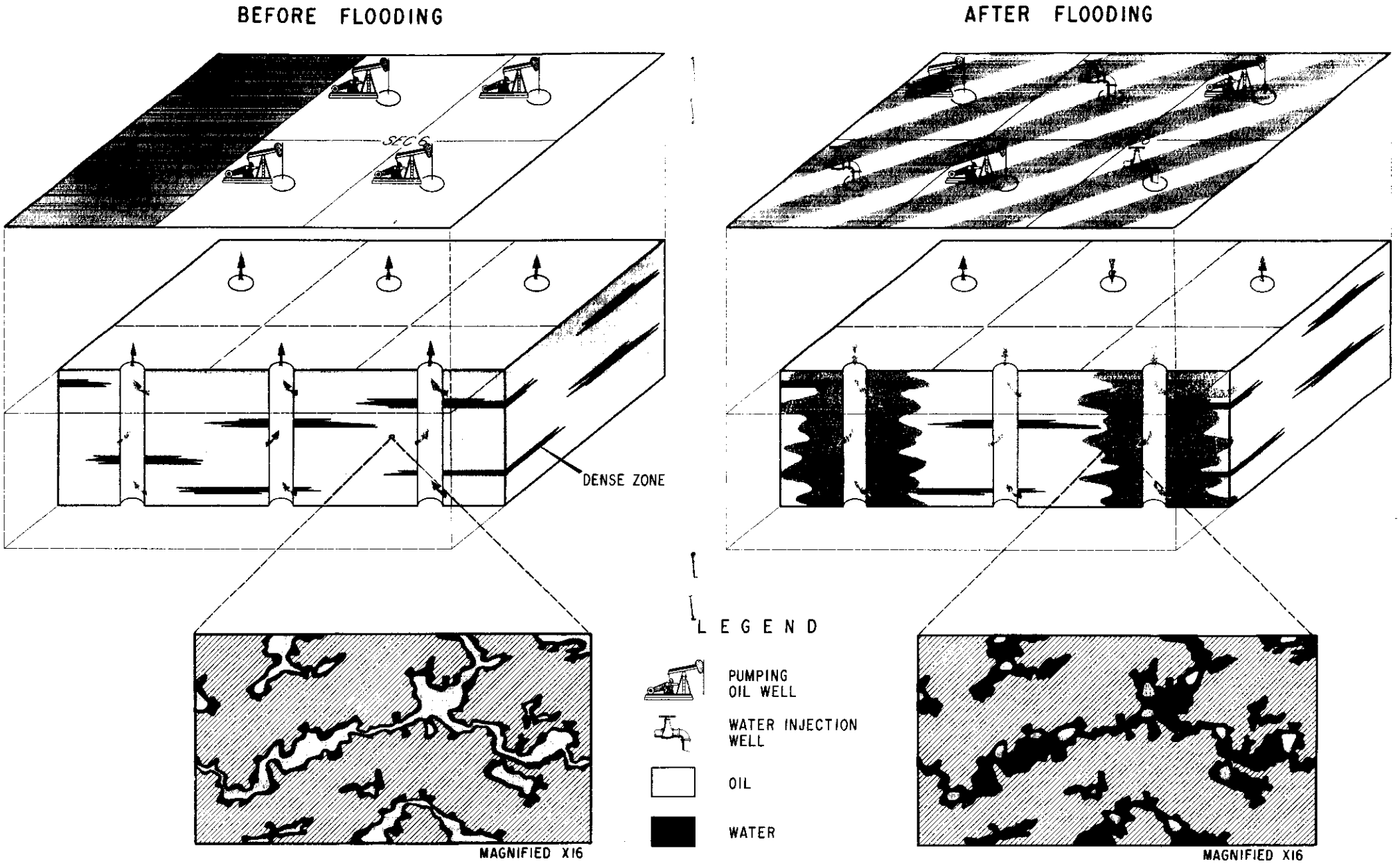
The Working Interest Owners agreed that the combination of current production rate and cumulative average producing rate penalized for water production was the fairest means of participating within this Unit. The current producing rate represents the current worth of each well or tract and the penalized cumulative average producing rate represents the future worth of each well or tract. The current producing factor was given 40% weighting and the cumulative production a 60% weighting for the final participation tract factor. A participation formula incorporating a current production factor and a penalized cumulative average producing rate factor has been used in North Virden Scallion Unit No. 1, the three Virden Roselea Units, and Routledge Unit No. 1.

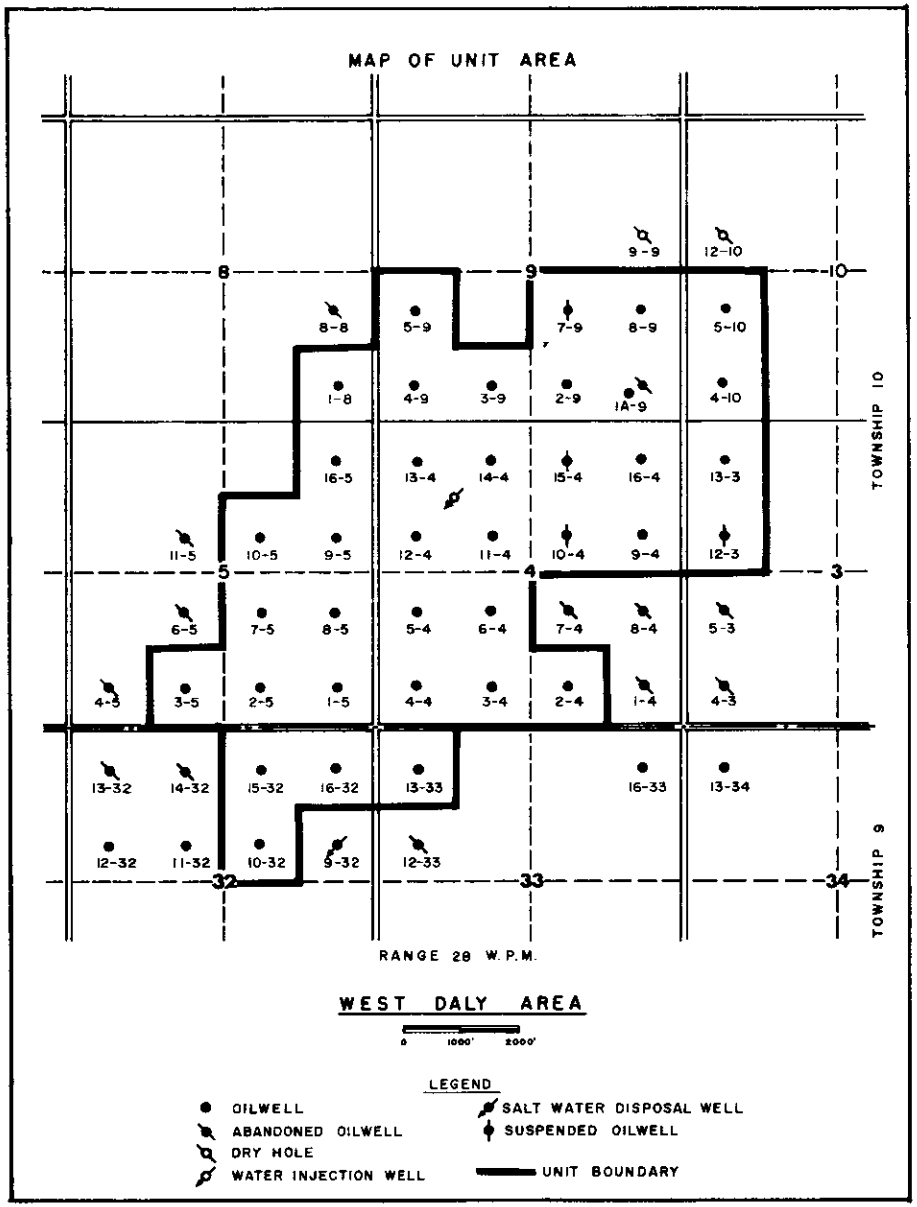
Pay thickness and oil-in-place factors which are commonly used to determine participation were not used because of a lack of core analyses, poor quality logs, and the complexity of geology at most wells.

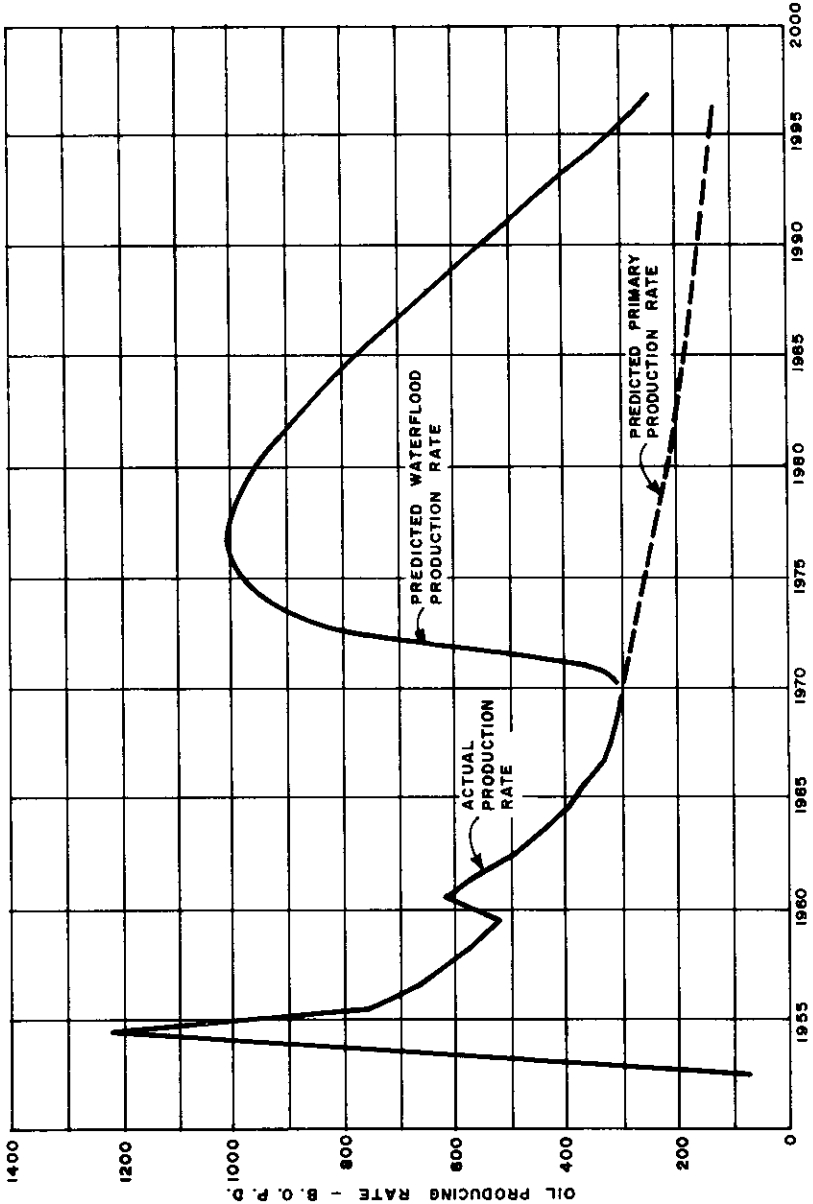
It must be pointed out that each Working Interest and Royalty Owner will share to the extent of his participating interest until complete abandonment of the Unit, whether his well or wells are producing, injecting, suspended, or abandoned.

A plan for unitization and water flooding of Daly Unit No. 1 was approved in principle by the Oil and Natural Gas Conservation Board of Manitoba, Department of Mines & Natural Resources, following a public hearing held in Virden, Manitoba, on December 15, 1970.

SCHEMATIC SECTION OF TYPICAL LIMESTONE RESERVOIR







DALY UNIT NO. 1

PREDICTED WATERFLOOD PERFORMANCE

RUNDLE PETROLEUMS LTD.

300 ROYALITE BUILDING
CALGARY 2, ALBERTA
Telephone 263-7171

October 22, 1970

The Oil & Gas Conservation Board
Dept. of Mines & Natural Resources
Legislative Building
Province of Manitoba
Winnipeg 1, Manitoba

Dear Sirs;

Rundle Petroleums Ltd., under and pursuant to The Mines Act, Revised Statutes of Manitoba 1970, and amendments thereto, hereby, on behalf of itself and other Working Interest Owners in the Daly Field, requests the Board to hold a hearing to consider and approve the following:

1. "PLAN FOR UNIT OPERATION GOVERNING THE UNITIZED MANAGEMENT OPERATION AND FURTHER DEVELOPMENT OF THE DALY UNIT NO. 1" pursuant to Section 62 of the Mines Act.

2. "PROPOSAL FOR PRESSURE MAINTENANCE BY WATERFLOODING" pursuant to Section 62 of the Mines Act.

3. "APPLICATION FOR A UNIT MAXIMUM PERMISSIBLE RATE OF PRODUCTION" pursuant to Section 62 of the Mines Act.

Enclosed please find ten copies of each of the following:

1. "PLAN FOR UNIT OPERATION GOVERNING THE UNITIZED MANAGEMENT OPERATION AND FURTHER DEVELOPMENT OF THE DALY UNIT NO. 1."

2. "PROPOSAL FOR PRESSURE MAINTENANCE BY WATERFLOODING."

3. "APPLICATION FOR A UNIT MAXIMUM PERMISSIBLE RATE OF PRODUCTION."

We have included several maps and curves used by the Engineering Committee in its' study of the area.

cont...

In addition we are enclosing a list of the Royalty Owners and Working Interest Owners for the proposed area of Daly Unit #1.

Yours very truly,

R. F. Atkinson
Chairman
Proposed Daly Unit No. 1
Operating Committee

RFA:ft
Encls.

RUNDLE PETROLEUMS LTD.
400 ROYALITE BUILDING
CALGARY 2, ALBERTA
Telephone 263-7171

PROPOSAL FOR PRESSURE MAINTENANCE BY WATERFLOODING

The applicants propose to unitize a portion of the west side of the Daly Field. The proposed area consists of 37 oil-wells. The primary purpose for unitizing the area is to facilitate waterflooding in that area.

No detailed waterflood study has been done on the area, mainly because of the following:

1. Reservoir core data is scant and not complete.

2. The results of the Rundle Cruickshank pilot flood is available.

PILOT FLOOD

Rundle Petroleums Ltd. started water injection into the Mississippian on December 13, 1969 on a 20 acre spacing located in the center of NW¼ 4-10-28 WPM. The well had previously been used as a Devonian salt water disposal well and was recompleted as a Mississippian water injection well. The estimated bottom hole pressure in the area was approximately 450 psi compared to an original bottom hole pressure of 1000 psi.

Injectivity proved to be excellent upon recompletion and the well had a capacity in excess of 1000 BWPD at surface pressures up to 1300 psi.

The water injection rates reached a high of 24,000 bbls. per month in September 1970 with a total water injection to that time of some 166,000 barrels. This was all the produced water available to the pilot during this time.

Oil production showed a marked increase after 3½ months. During 1969 the four producers averaged 56.7 BOPD for 11 months. In September, 1970 these same four wells averaged just under 100 BOPD and a steady climb has been noted since.

In view of the excellent injection rates and the accompanied oil response, it was felt that the flood should be expanded.

OPERATOR RECOMMENDATIONS

The operators of the adjoining tracts met and agreed to expand the flood as soon as possible. The Engineering Committee

cont...

studied the area and proposed various combinations of tract factors.

The Engineering Committee estimates that the ultimate primary recoverable reserves for the area would be 5,000,000 barrels. This was based on rate-time decline curves analysis. The estimated cumulative oil production to 1-1-71 is 3,500,000 barrels. This leaves another 1.5 million to be recovered. It is estimated that waterflooding will double the estimated primary figure, hence another 5 million barrels is expected on this basis. This leaves an estimated remaining primary and secondary reserves as of 1-1-71 at 6.5 million barrels.

Several approaches to tract factors were studied but only two parameters appeared feasible to use as a measure of the waterflood potential of a tract. In view of the scarce reservoir data and inconsistency of logs, a test period, (in this case 1969) was used to give a measure of the wells current producing capabilities. Flood response achieved in 1970, as a result of the Pilot Flood initiated December 13, 1969 in the NW¼ 4-10-28 WPM, makes a more recent period unacceptable as current production criteria. The other factor considered was the cumulative oil production over its' present life. In order to bring the wells to a common denominator this was converted to a cumulative average monthly production which compensates for wells having a shorter history. In order to bring this into a more equitable realm this average monthly production was penalized for water production based on the 1969 water cut. In other words if a well had procuded a large amount of oil but in 1969 had produced with a high water cut, it would be penalized accordingly. This method would relate to the residual oil remaining in the well and would enable one to place a numerical weighting factor to it. Several combinations of the two parameters were studied but the most equitable appeared to be 60% based on penalized average monthly production and 40% on the current (or 1969 oil production). This was adopted by the operators.

FLOOD PATTERN

Two basic patterns have been studied for waterflooding. No decision has been made at this time but it is currently under further study. These are:

1. 20 acre inverted 5 spot which could be converted to a line drive or standard 5 spot.

2. 40 acre 5 spot which could be changed to a line drive if need be.

The differential of costs is not great but it is felt that further study should be done on this phase before adoption of any specific pattern. It is not anticipated that any construction could be done until May or June, 1970.

For the same reason the battery consolidation has not been finalized.

RUNDLE PETROLEUMS LTD.
400 ~~800~~ ROYALITE BUILDING
CALGARY 2, ALBERTA
Telephone 263-7171

APPLICATION FOR A UNIT MAXIMUM RATE OF PRODUCTION

The applicants propose that the operation of the Daly Unit #1 should not be restricted by the allowables presently in effect in the Daly Field. It is the applicants contention that no reservoir damage will be done by producing the wells at capacity.

It is important that the oil bank built up in front of a flood front be produced in the first line of offsetting wells if at all possible. This is good engineering and economic practice.

The applicants contend that no nearby non-unit wells will be harmed by this practice since the increased oil production will be a result of water injection within the unit boundaries.

The applicants respectfully request that, on and after the first day that the Daly Unit #1 becomes effective, the Unit be excluded from any provisions governing the limitations of production of oil.

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Telephone 263-7171

PROPOSED DALY UNIT NO. 1

Engineering Committee - October 8, 1970

1. Unit Boundaries

It was decided that the proposed unit boundaries be extended to the north east to include a further 12 wells from the original proposal submitted by Rundle at the September 11/70 meeting. This would extend the boundaries to the edge of a line of suspended or abandoned wells in Section 3-10-28 WPM. The only producer left to the east would be 6-10-10-28.

The extension of the boundaries would aid in the selection of a water-flood pattern since it would add to the flexibility of locating injection wells and not having them located at the edge of the unit boundaries which could cause oil to be swept off the unit.

It will be noted that some of these wells have shown good to medium producing characteristics in the past.

2. The estimated recoverable oil reserves are based on rate-cumulative decline curves. Since the history is long on these wells, this method is felt to be most reliable as only limited core information is available. By using what core information was available and applying recovery factors used in the Chevron Daly waterflood, the figures compare most favourably.

In extrapolation of the decline curves it has been assumed that the economic limit would be 4BOPD/well for primary and 7 BOPD/well for waterflood.

It was assumed that the waterflood recovery would double the primary reserves and that the peak production would be 1000 BOPD for the proposed unit.

3. In the area of tract factor participation several approaches were studied. It is recommended that a similar method to that used in other Manitoba units be adopted. It is the belief of this committee that the only equitable method of equating the value of a well to a waterflood project is to arrive at some numerical value based on the past performance of the well. It is also important to devise a method whereby all information is available to everyone concerned in order to check the calculations. Since Manitoba has published oil production figures from inception, this is the most desireable data to use.

As in other Manitoba units the two factors which have been used to determine tract factors are -

1. A current test period to measure the wells' recent value or capacity.

2. Cumulative production based on an average monthly production and penalized by a water penalty factor from the test period.
As an example the penalized cumulative production value of a well which has produced 120,000 barrels of oil over a period of 15 years (or 180 months) and having a 60% water production during the test period would be - $120{,}000 \div 180 \times (1 - .60) = 266.7$ barrels/month.

Page 2

In the case where a well did not produce in the test period, the last 12 months of production (or portion thereof) was used to determine the water penalty.

Four combinations are shown of these two factors on the attached data sheets.

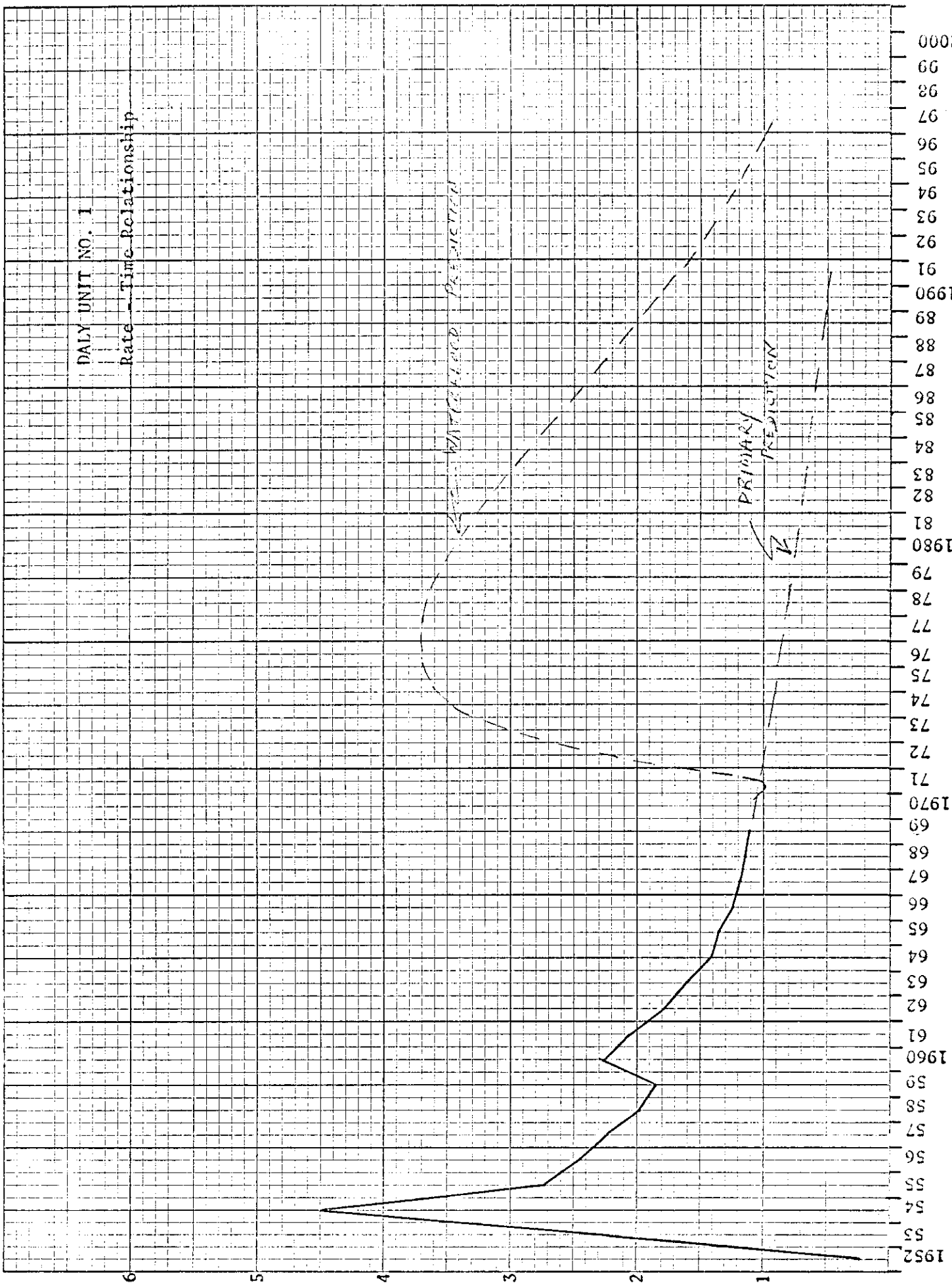
As a guide to choosing a combination the committee discounted the primary production at 10% and the secondary at 20%. It was found that comparing these two that the primary discounted barrels was 42% while the secondary was 58% of a total of the two figures. This can be used as a guide to arriving at the weighting to be used in the final analysis.

The committee used the 1969 figures for the test period since these figures were not influenced by the effects of the pilot waterflood.

4. The enclosed plats show the two patterns studied together with anticipated costs. No figures for battery consolidation have been included but will not vary from one pattern to another. Further study should be done on this aspect.

5. R.F. Atkinson recently met with some members of the Oil & Gas Conservation Board in Winnipeg. A tentative date of December 15, 1970 has been set for a hearing. If we can get our application in by the end of October, it is hoped that this hearing can include the proposed Daly Unit #1 at that time.

R. F. Atkinson.



DALY FIELD

PERCENTAGES

	Cumulative Oil Production to 31/12/69	Monthly Avge. Oil Production to 31/12/69	Monthly Avge. Penalized By 1969 Water Prod.	Oil Production 1969
Basco	1.02239	1.17188	1.09467	.86807
Chevron	25.56927	26.02932	32.64495	31.86345
Rundle	46.40651	45.62076	40.87035	44.00838
Recovery	1.51238	1.55106	2.57741	.64328
R. B. Exploration	11.33249	11.47174	3.65770	7.32570
Scurry	14.15696	14.15524	19.15492	15.29112
	100.00000%	100.00000%	100.00000%	100.00000%

Amended October 13, 1970

DALY FIELD

TRACT FACTOR COMBINATIONS

	Basco	Chevron	Rundle	Recovery	R.B.	Scurry
1. (a) 1969 - 50%	.43404	15.93172	22.00419	.32164	3.66285	7.64556
(b) Cumulative averaged on monthly basis penalized by 1969 water penalty - 50%	.54775	16.30145	20.44785	1.28950	1.83000	9.58345
	.98179	32.23317	42.45204	1.61114	5.49285	17.22901
2. (a) 1969 - 60%	.52084	19.11807	26.40503	.38597	4.39542	9.17467
(b) Cumulative averaged on monthly basis penalized by 1969 water penalty - 40%	.43820	13.04116	16.35828	1.03160	1.46400	7.66676
	.95904	32.15923	42.76331	1.41757	5.85942	16.84143
3. (a) 1969 - 40%	.34723	12.74538	17.60335	.25731	2.93028	6.11645
(b) Cumulative averaged on monthly basis penalized by 1969 water penalty - 60%	.65730	19.56174	24.53742	1.54740	2.19600	11.50014
	1.00453	32.30712	42.14077	1.80471	5.12628	17.61659
4. (a) 1969 - 30%	.26042	9.55904	13.20251	.19298	2.19771	4.58734
(b) Cumulative averaged on monthly basis penalized by 1969 water penalty - 70%	.76685	22.82203	28.62699	1.80530	2.56200	13.41683
	1.02727	32.38107	41.82950	1.99828	4.75971	18.00417

DALY FIELD

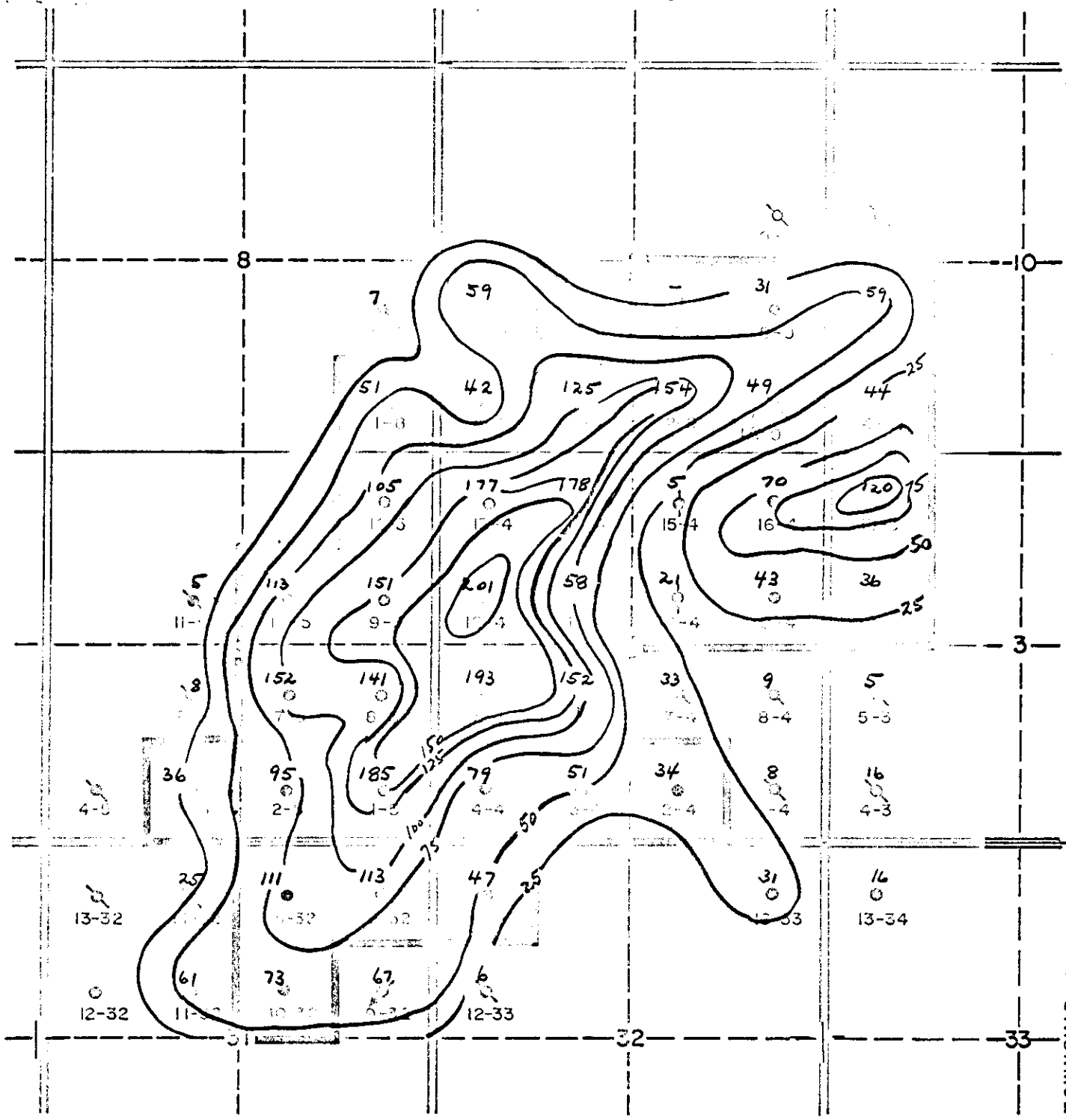
	Cumulative Oil Production to 31/12/69	Monthly Avge. Oil Production to 31/12/69	Water penalty Factor on 1969 Prod.	Monthly Avge. Penalized on 1969 Water Prod. Basis	Oil Prod. 1969
Basco Daly 2-4	34,302	201.77647	.56214	113.42663	977
Company Total	34,302	201.77647		113.42663	977
Chev. Daly 12-3	35,542	224.94937*	.10411	23.41948	-
Chev. Daly 13-3	119,977	605.94444	.99829	604.90828	7,598
Chev. Daly Prov. 9A-4	42,870	266.27329	1.00000	266.27329	2,450
Chev. Daly 10-4	21,369	133.55625*	.37591	50.20513	-
Chev. Daly Prov. 15-4	4,756	26,71910*	.05301	1.41638	-
Chev. Daly Prov. 16-4	69,785	396,50568	1.00000	396.50568	2,896
Chev. Daly 1A-9	48,913	238.60000	.58688	140.02957	3,614
Chev. Daly 2-9	153,894	750.70244	.85676	643.17182	4,785
Chev. Daly 3-9	125,484	603.28846	.73461	443.18174	4,653
Chev. Daly 4-9	42,279	215.70918	.18995	40.97396	964
Chev. Daly 5-9	59,186	287.31068	.55389	159.13851	3,628
Chev. Daly 7-9	46	.30873*	.09446	.02916	-
Chev. Daly 8-9	30,732	156.79592*	.52064	81.63423	-
Chev. Daly 4-10	43,669	221.67005	.85272	189.02249	2,119
Chev. Daly 5-10	59,374	353.41667	.96958	342.66574	3,155
Company Total	857,876	4,481.75026		3,382.57546	35,862
Rundle Cr. Daly 11-4	58,251	282.77185	.05620	15.89178	1,208
Rundle Cr. 12-4	201,359	1,027.34184	.83650	859.37145	8,585
Rundle Cr. Daly 13-4	177,172	868.49020	.79628	691.56138	5,609
Rundle Cr. Daly 14-4	178,156	840.35849	.64818	544.70357	5,376
Rundle M&H Daly 1-5	185,012	953.67010	.33706	321.44404	8,493
Rundle M&H Daly 2-5	94,547	489.88083	.02317	11.35054	2,389
Rundle M&H Daly 7-5	151,869	782.82990	.64230	502.81165	4,737
Rundle M&H Daly 8-5	141,212	720.46939	.32203	232.01276	2,368
Rundle M&H Daly 9-5	150,720	772.92308	.73695	569.60566	4,631
Rundle M&H Daly 10-5	113,286	583.94845	.43340	253.08326	3,322
Rundle M&H Daly 16-5	105,403	532.33838	.43775	233.03113	2,813
Company Total	1,556,987	7,855.02251		4,234.86722	49,531
Recovery Daly 1-8	50,742	267.06316	1.00000	267.06316	724
Company Total	50,742	267.06316		267.06316	724
R.B. Exp. Th. Daly 10-32	73,224	381.37500	.01814	6.91814	474
R.B. Exp. Th. Daly 15-32	111,460	577.51295	.01857	10.72442	1,393
R.B. Exp. Th. Daly 16-32	113,117	586.09845	.05504	32.25886	2,180
R.B. Exp. Th. Daly 13-33	46,567	242.53646	.77700	188.45083	2,446
R.B. Exp. Grieve Daly 3-5	35,849	187.69110	.74936	140.64820	1,752
Company Total	380,217	1,975.21396		379.00045	8,245
Scurry Cr. Daly 3-4	50,564	274.80435	.73744	202.65172	1,497
Scurry Cr. Daly 4-4	79,020	405.23077	.67582	273.86306	3,569
Scurry Cr. Daly 5-4	193,206	980.74112	.84266	826.43131	6,684
Scurry Cr. Daly 6-5	152,191	776.48469	.87810	681.83121	5,460
Company Total	474,981	2,437.26093		1,984.77730	17,210
GRAND TOTAL	3,355,105	17,218.08729		10.361.71022	112,549

* No 1969 production - penalty based on last 12 months of production

Amended October 13, 1970

PART XXIII

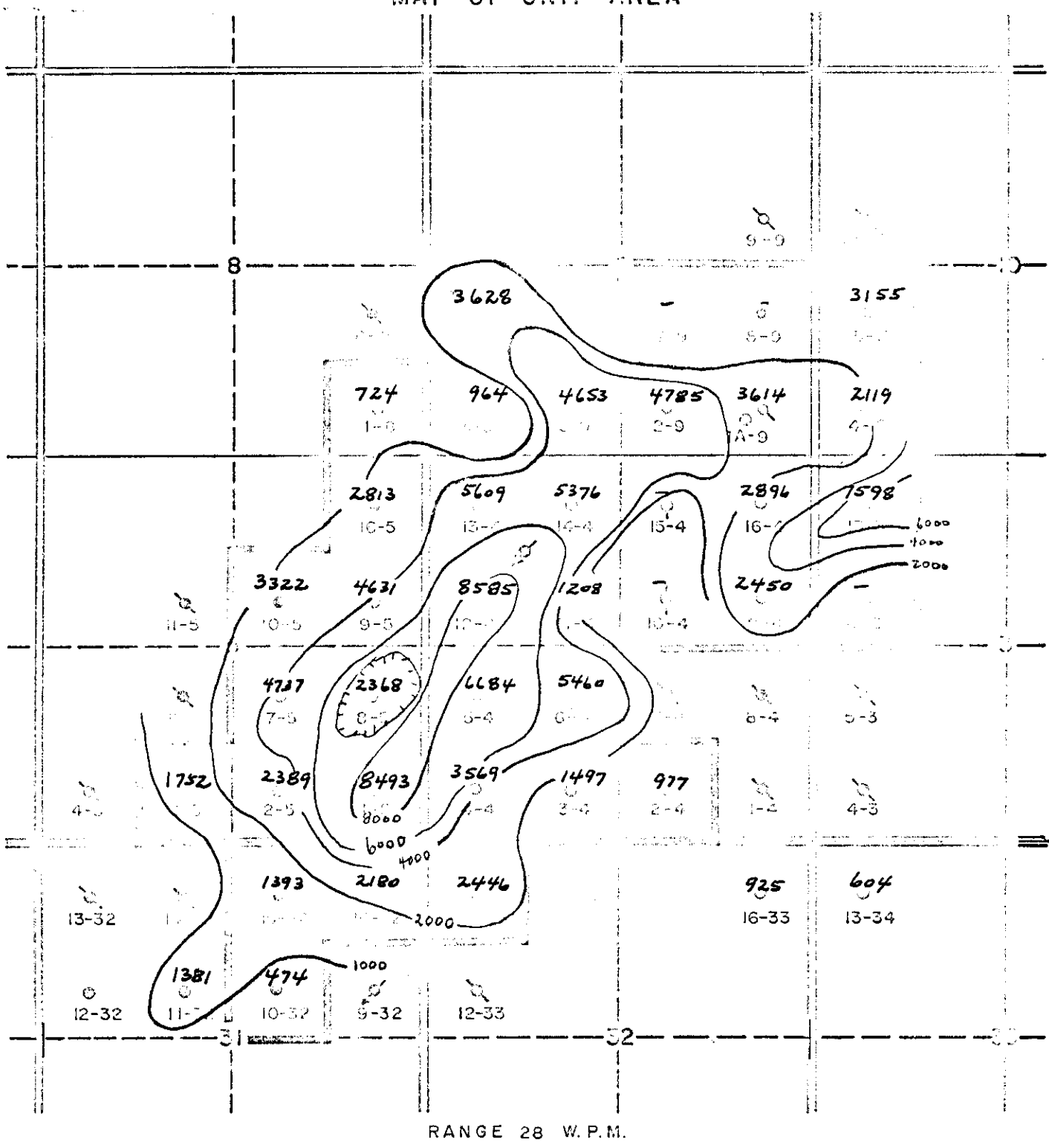
MAP OF UNIT AREA



WEST DALY AREA

PART XXIII

MAP OF UNIT AREA



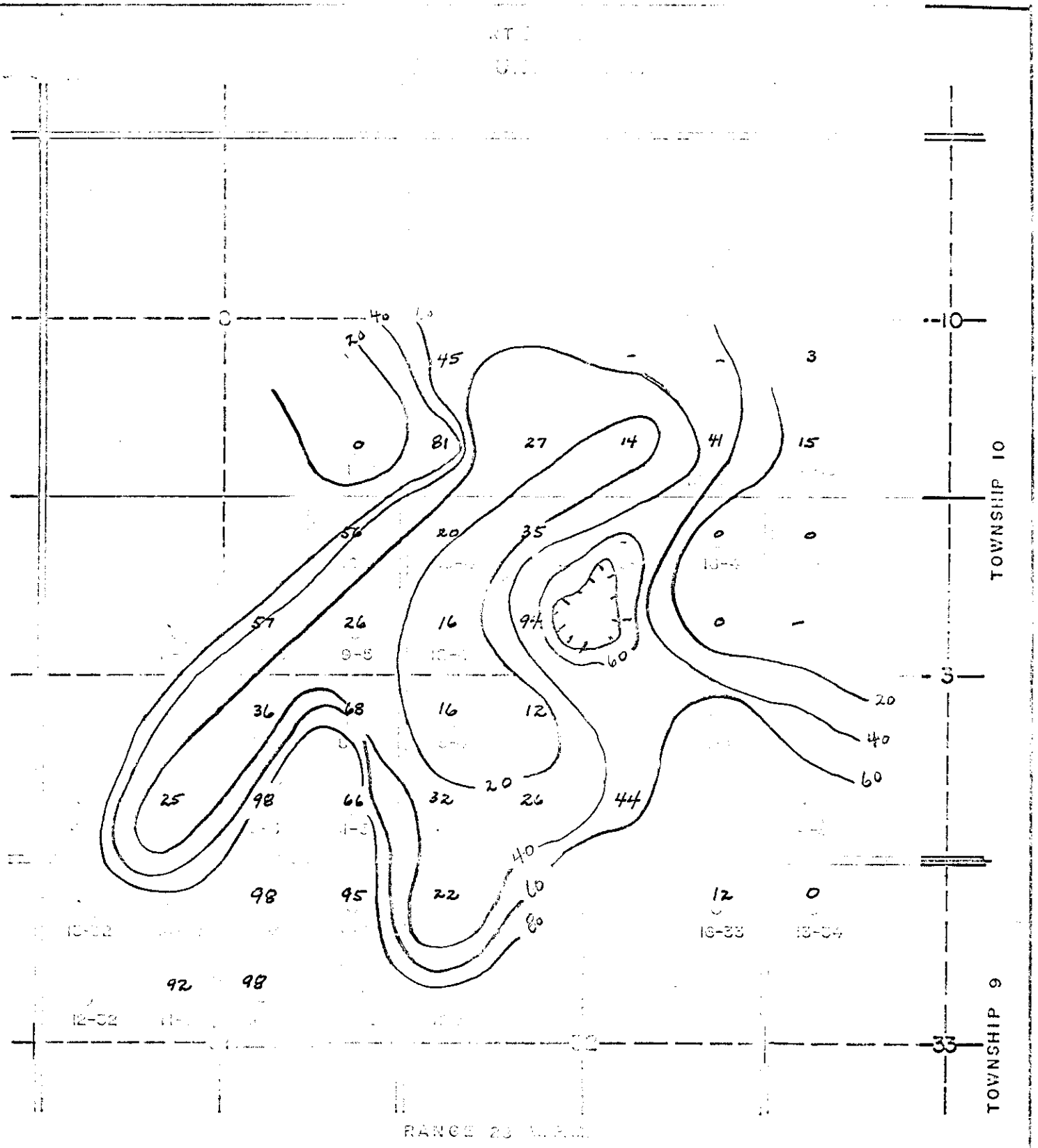
RANGE 28 W.P.M.

WEST DALY AREA

0 1000' 2000' 1969 Oil Production in bbls.

LEGEND

- OILWELL
- ABANDONED OILWELL
- DRY HOLE
- WATER INJECTION WELL
- SALT WATER DISPOSAL WELL
- SUSPENDED OILWELL
- UNIT BOUNDARY



Percent Water Cut For 1969

OILWELL

DRY HOLE

WATER INJECTION WELL

UNIT BOUNDARY

WATERFLOOD PATTERN STUDY

CASE NO 1

40 acre 5 spot pattern - 7 additional injection wells

3" line required - 4000'
2" line required - 8400'

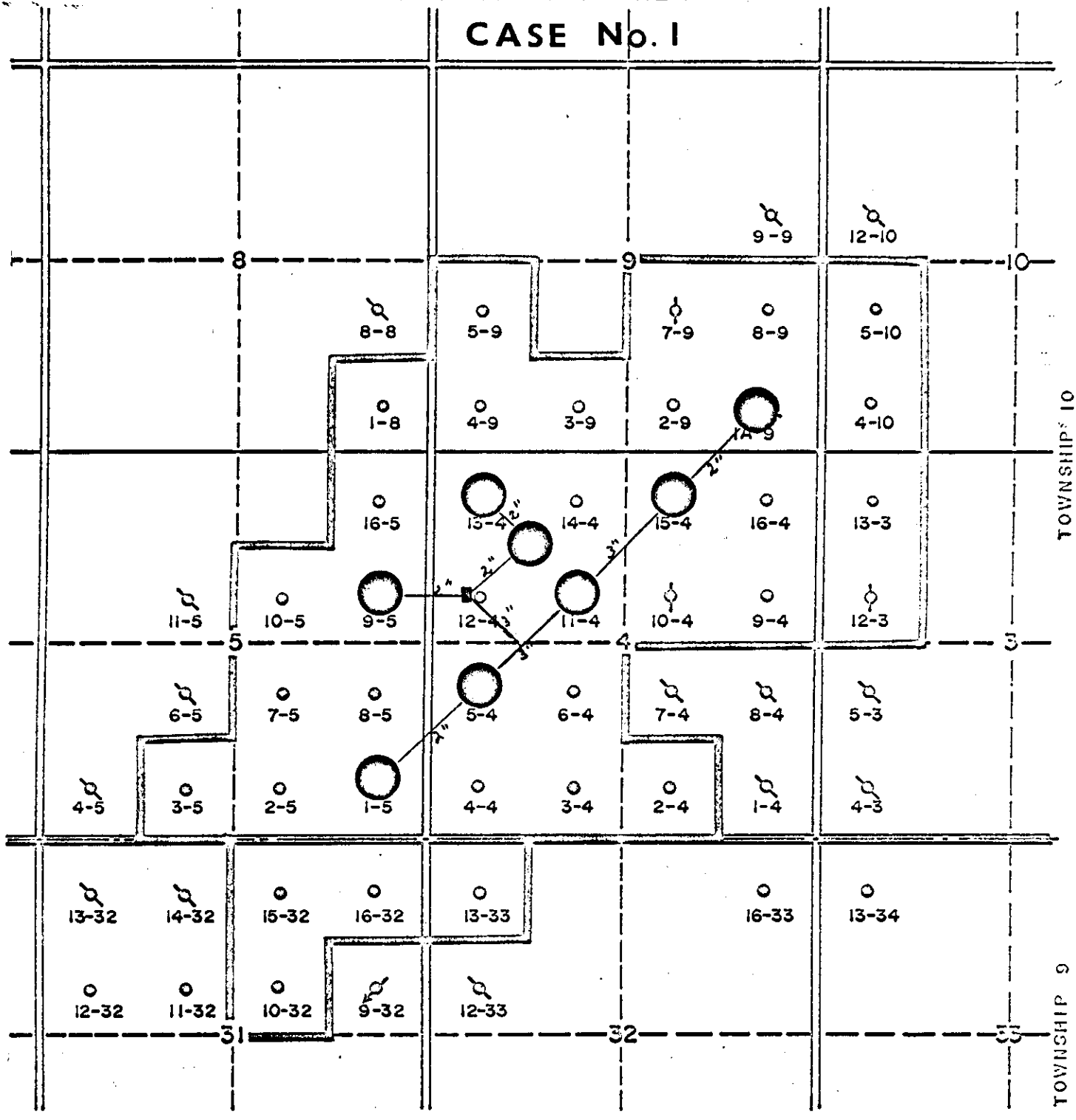
COST ESTIMATES

1. Inection lines	(3")	4000 x 2.70	=	$10,800
	(2")	8400 x 2.10	=	17,650
				$28,450
2. Well Conversions		8000 x 7	=	56,000
3. Plant Expansion		4000 x 3	=	12,000
4. Engineering & Overhead				3,550
TOTAL				$110,000

PART XXIII

MAP OF UNIT AREA

CASE No. 1



RANGE 28 W.P.M.

WEST DALY AREA

0 1000' 2000'

LEGEND

- OILWELL
- ABANDONED OILWELL
- DRY HOLE
- WATER INJECTION WELL
- SALT WATER DISPOSAL WELL
- SUSPENDED OILWELL
- UNIT BOUNDARY

WATERFLOOD PATTERN STUDY

CASE NO 2

20 acre inverted 5 spot - 4 additional new injection wells

3" line required	-	3800'	x	2.70	= $ 10,280
2" line required	-	4740'	x	2.10	= 10,500
					20,780

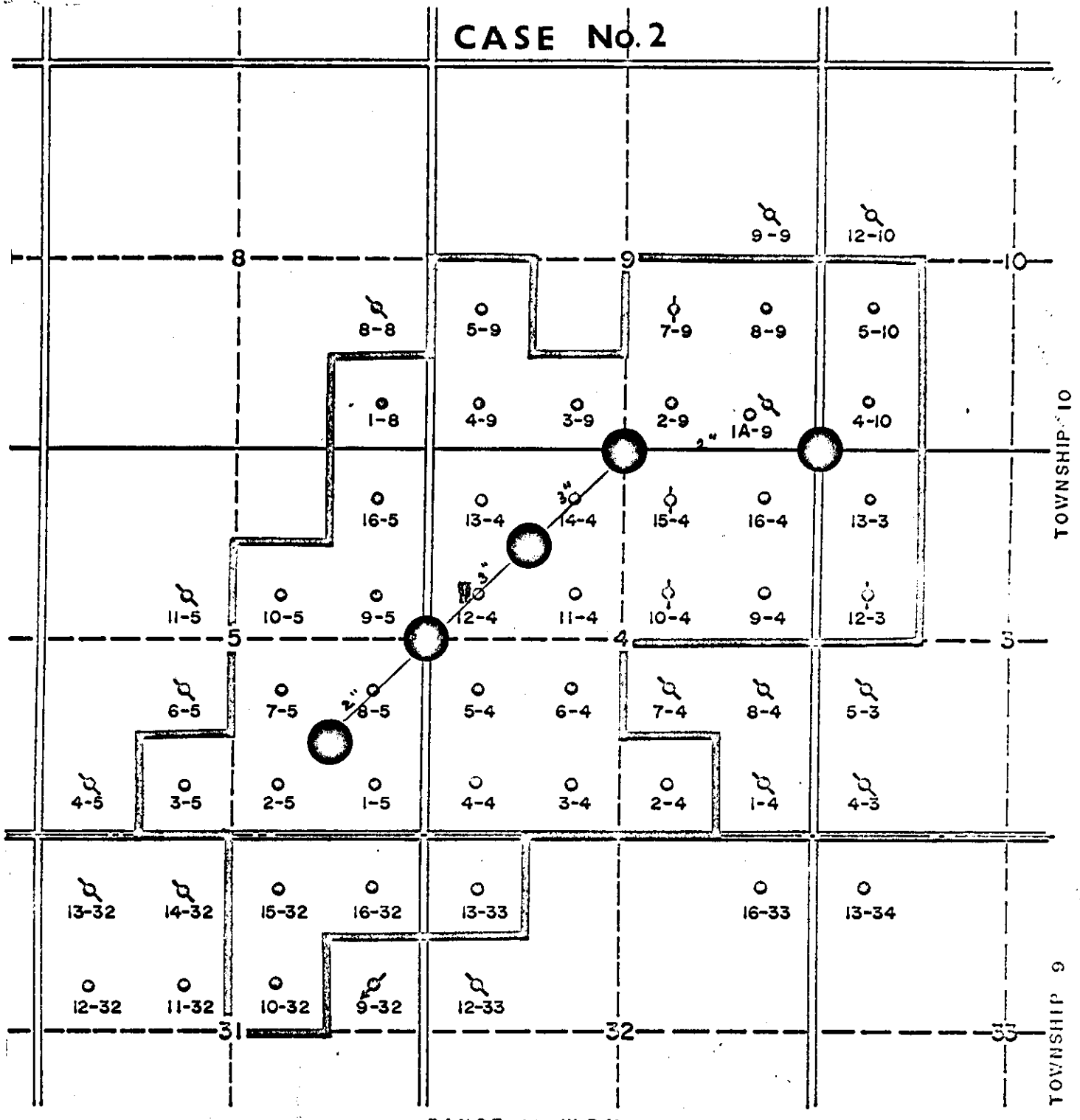
COST ESTIMATES

1. Injection lines	20,780
2. New Wells 4 x 25,000	100,000
3. Plant Expansion 3000 x 3	9,000
4. Engineering & Overhead	4,000
TOTAL	$133,780

PART XXIII

MAP OF UNIT AREA

CASE No. 2



RANGE 28 W.P.M.

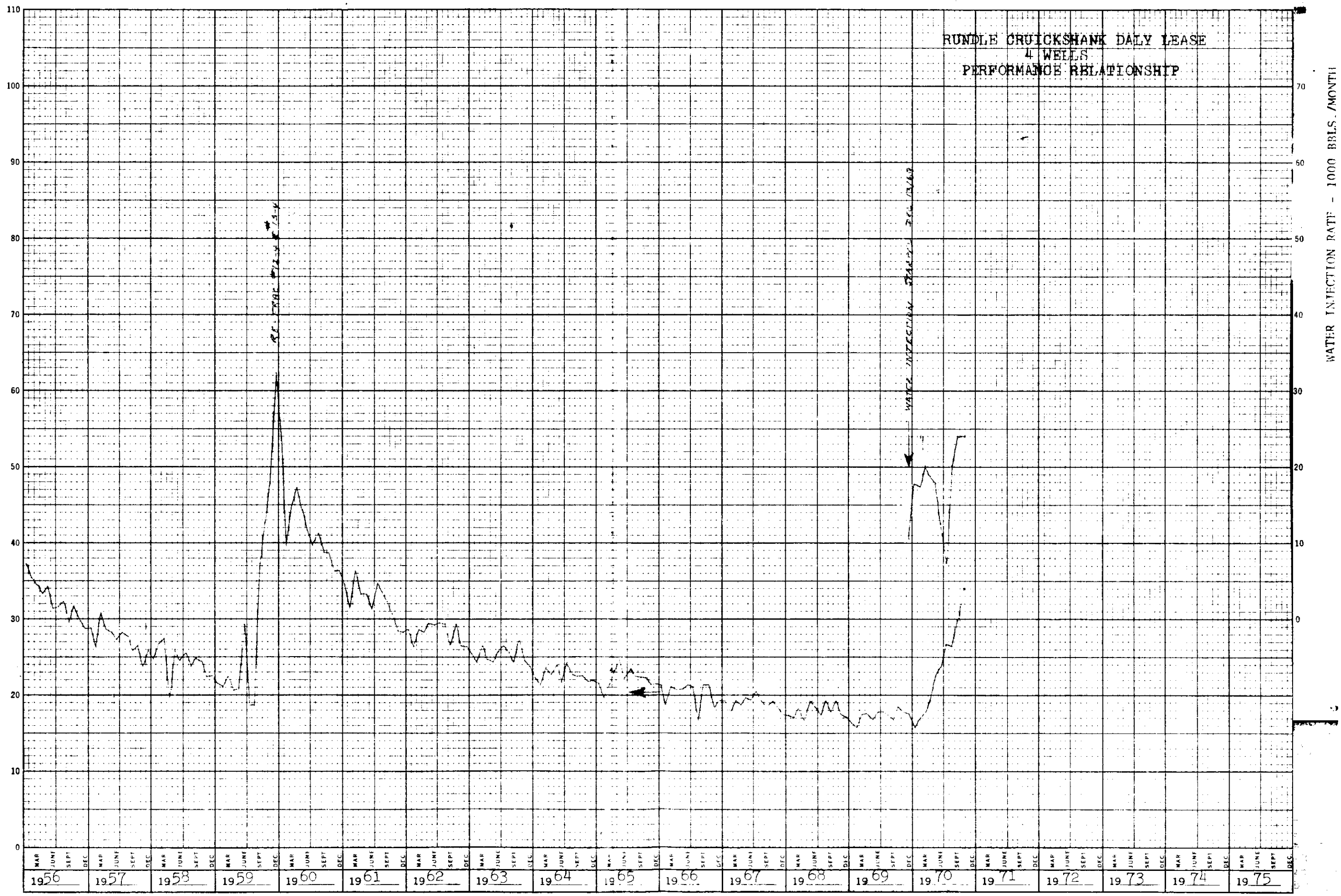
WEST DALY AREA

0 1000' 2000'

LEGEND

- OILWELL
- ABANDONED OILWELL
- DRY HOLE
- WATER INJECTION WELL
- SALT WATER DISPOSAL WELL
- SUSPENDED OILWELL
- UNIT BOUNDARY

RUNDLE CRUICKSHANK DALY LEASE
4 WELLS
PERFORMANCE RELATIONSHIP



RUNDLE PETROLEUMS LTD.
300 ROYALITE BUILDING
CALGARY, ALBERTA

November 25, 1969

Oil & Natural Gas Conservation Board
Dept. of Mines & Natural Resources
Mines Branch
Petroleum Engineering Division
911 Norquay Building
401 York Avenue
Winnipeg 1, Manitoba

Gentlemen;

DALY UNIT #1

Re: Pilot Waterflood - West Daly

Rundle Petroleums Ltd. as operator and joint owner of 11 oilwells located in the western portion of the Daly Field has made application to convert the salt water disposal well from Devonian to Mississippian injection. Since this would result in maintaining or increasing the reservoir pressure in this area it is suggested that it be called a pilot waterflood.

No formal waterflood study has been done on the area to date for the following reasons:

1. Core Analysis is spotty.
2. All wells have been hydraulically fractured.
3. The nearby Daly waterflood has considerable history.
4. Injectivity rate with the Mississippian is hypothetical at this time.

What is Sketch.

PROPOSAL

It is proposed that the packer above the Devonian be temporarily sealed and the Mississippian be perforated and treated for water injection. If at some future date it is necessary to use the Devonian

Cont...

as a source of water, this could be easily accomplished, by using a temporary plug. If the surface pressure became high (in excess of 1200 psi) a packer will be set above the Mississippian injecting zone, but until that point is reached it would be preferable to inject without a packer since further treatment may be necessary.

WATERFLOOD POTENTIAL

In attempting to evaluate the waterflood potential of this area, the Chevron Daly waterflood performance was studied to some degree. The area around the injector located in LSD 4-12-10-28 has produced over 1½ million barrels to date from the surrounding 4 producers. (See attached decline curve). It is assumed that only 1/4 of this oil was swept out around the #4-12 injection well. If the decline continues its present rate it is expected that the four (4) producers in the pattern will ultimately produce some 2.2 million barrels. On this basis it could be assumed that the 80 acres around #4-12 will produce 550,000 barrels or 6800 bbls. per acre. Since the water cuts for these four wells have not changed significantly, it is felt that the decline exhibited by the curve is not accurate and is a direct result of under injection. If this is the case, this pattern could concievably produce much more ultimately.

It is felt that the area in NW¼-4-10-28 is similar in producing capacity to the waterflood area discussed above, based on initial producing rates within the first year of producing history.

The wells on NW¼-4-10-28 have produced over 610,000 barrels to date which is 3800 barrels per acre. The wells presently produce 60 barrels of oil and 90 barrels of water per day. Most of this water (70-

Cont...

75 bbls.) comes from #11-4. The present bottom hole pressure is estimated to be about 450 psi based on static fluid levels after a seven(7) day shut in. It is the writers opinion that little can be done to stimulate this production until the bottom hole pressure is raised.

WATER INJECTION

If the well located in the center of NW¼-4-10-28 can be treated properly it is proposed to inject about 500 barrels of water per day into the Mississippian. This is our present cumulative production from the NW of 4 and E½ of 5 producing wells. If this much water can be injected it would represent an over-injection of 400% +. On the 20 acre pattern it would not take long to show an increase in production.

REQUEST FOR UNRESTRICTED PRODUCTION

As mentioned above, if the injective capacity of the well is high enough, this pattern could be repressured quite rapidly and if a bank of oil can be built up ahead of the flood front, the productive capacity of the producers could concievably exceed the present allowables. If production was restricted at the producing wells, it would necessitate slowing down the injection rate and historically in water floods, to regain the oil bank profile takes some time. It is hereby requested that if this approval is granted for water injection that the four producing wells on NW¼-4-10-28 be relieved of any allowable restrictions in order to provide an efficient water flood and to prevent oil being swept off the flood pattern.

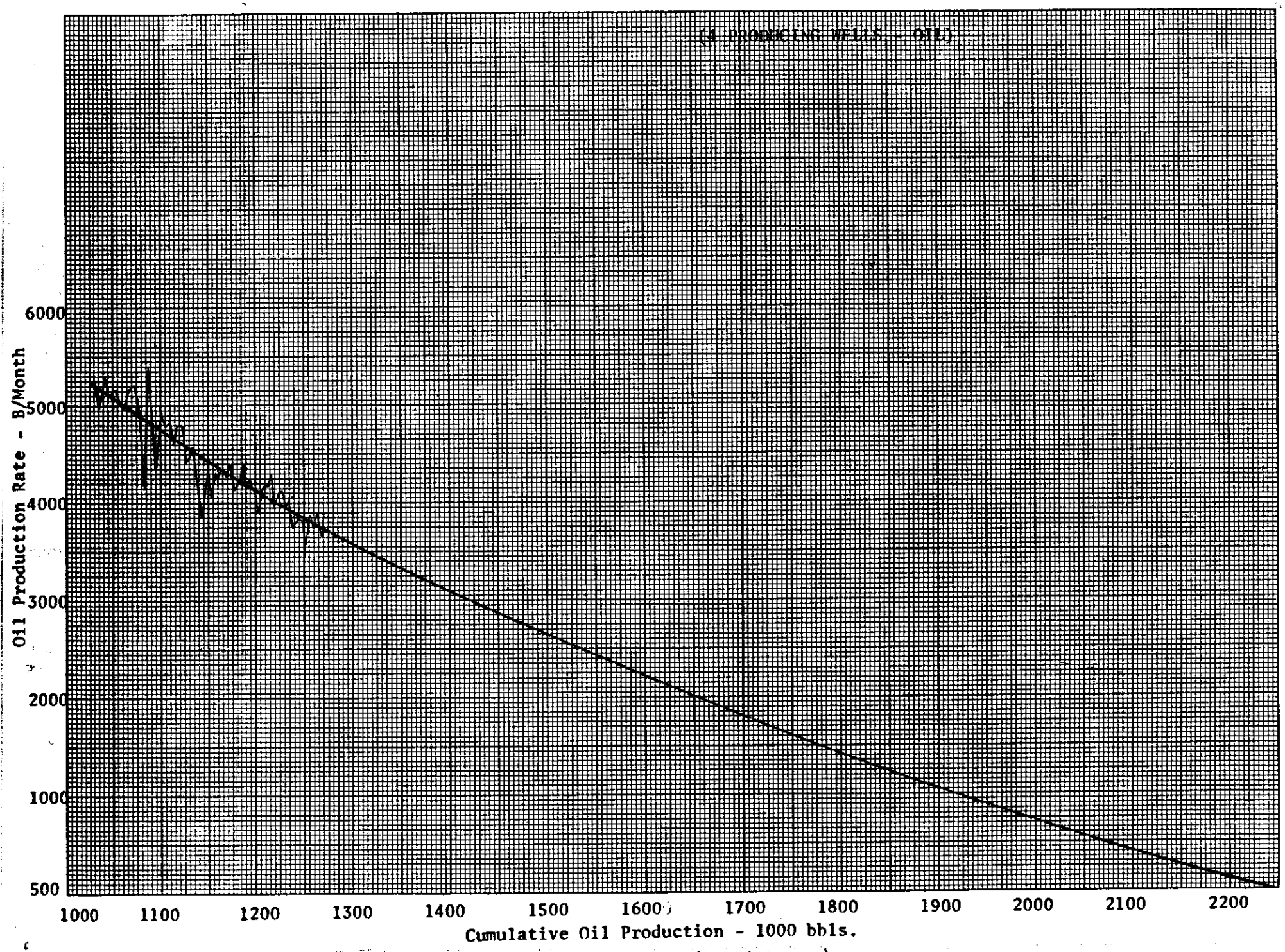
Respectfully submitted,

RUNDLE PETROLEUMS LTD.

R. F. Atkinson, P.Eng.
President

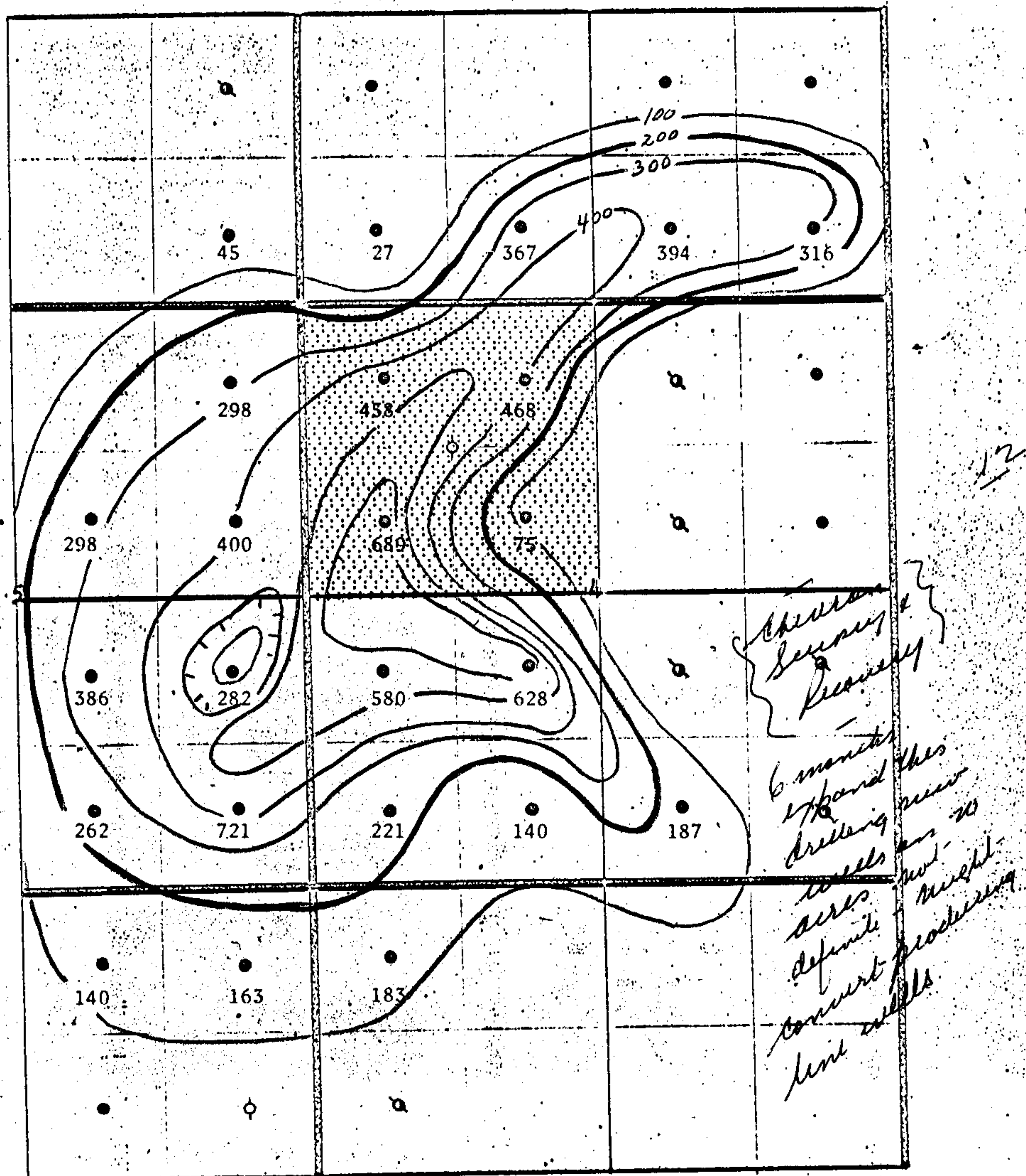
RFA:ft
Enclosure

CHEVRON WATERFLOOD
DALY FIELD
S SPOT AROUND LSD 4-12-10-28



PROSPECT WEST DALY PILOT WATERFLOOD

N.W. SEC. 4 TWP. 10 RGE. 28 MER. 1st. PROV. Manitoba



LEGEND

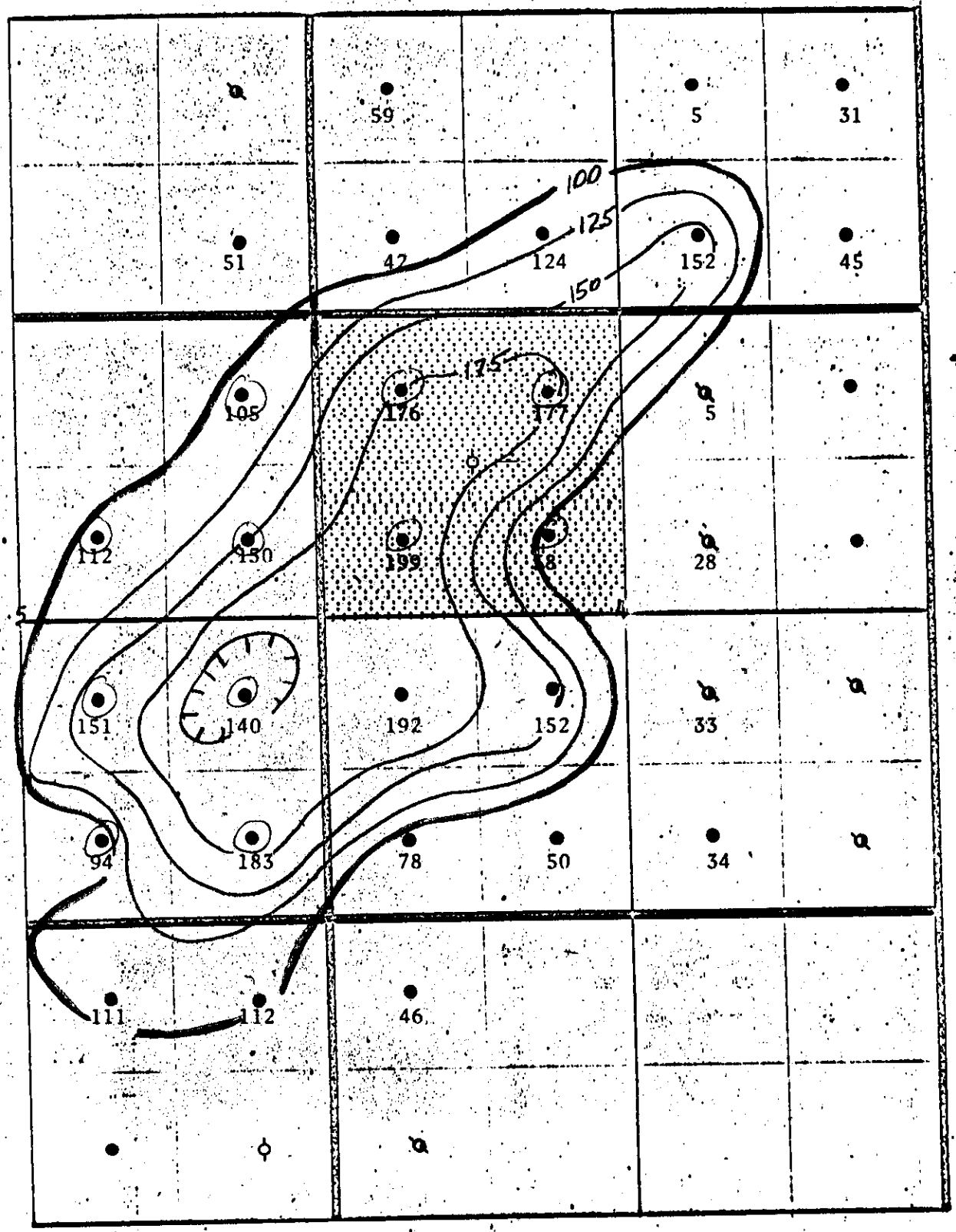
SEPT/69 OIL PRODUCTION - BBLS.

Monthly

- ● OILWELL
- ABANDONED
- S.W. DISPOSAL

PROSPECT WEST DALY PILOT WATERFLOOD

N.W. SEC. 4 TWP. 10 RGE. 28 MER. 1st. PROV. Manitoba



LEGEND

- ● OILWELL
- ⍁ ABANDONED
- ⍜ S.W. DISPOSAL

CUM. OIL PROD. TO 1-10-69
IN THOUSANDS OF BBLS.

MANITOBA REGULATION 94/71
Being
THE OIL AND NATURAL GAS CONSERVATION BOARD
UNITIZATION ORDER NO. 11

Pertaining to the Unitized Management Operation and Further Development of Daly Unit No. 1.

Made and passed pursuant to "The Mines Act", Cap. M160, R. S. M., 1970, and amendments thereto, by The Oil and Natural Gas Conservation Board, of Manitoba.

(Filed June 24/71)

1. Effective at the hour of seven o'clock in the forenoon, Central Daylight Time, on the first day of July, 1971, that a certain part of the Daly Field, to be known as the Unit Area, shall be operated as a unit in accordance with the Plan for Unit Operation Governing the Unitized Management Operation and Further Development of Daly Unit No. 1, dated October 20, 1970, and amended January 6, 1971, and shall be known as the Daly Unit No. 1.

2. Excerpts from the Plan, namely: Parts XXII, XXIII, and XXIV here attached, are for publication in The Manitoba Gazette for the information of the public.

Oil and Natural Gas Unitization Order No. 11, made and passed this 17th day of June, A. D., 1971, at the City of Winnipeg, in the Province of Manitoba, by The Oil and Natural Gas Conservation Board.

Approved:

Sidney Green,
Minister of Mines, Resources
and Environmental Management.

W. Winston Mair,
Chairman,
The Oil and Natural Gas
Conservation Board.

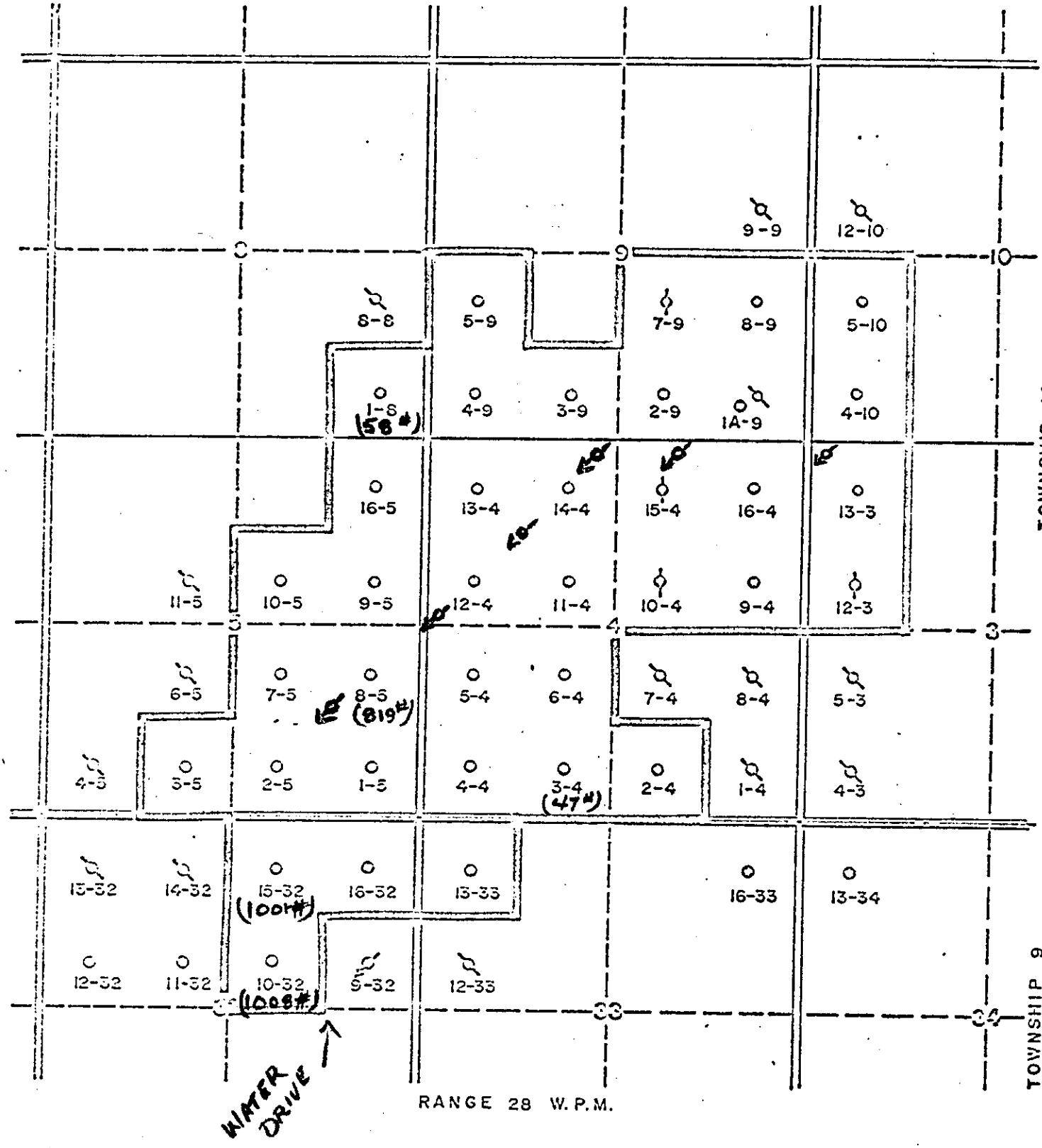
J. S. Roper,
Deputy Chairman,
The Oil and Natural Gas
Conservation Board.

M. J. Gobert,
Member,
The Oil and Natural Gas
Conservation Board.

Printed by R. S. Evans - Queen's Printer for the Province of Manitoba.

PART XXIII

MAP OF UNIT AREA



WEST DALY AREA

0 1000' 2000'

40=WIW

(47#)=Pressure at datum.

LEGEND

- OILWELL
- ABANDONED OILWELL
- DRY HOLE
- WATER INJECTION WELL
- SALT WATER DISPOSAL WELL
- SUSPENDED OILWELL
- UNIT BOUNDARY

FSG. JAN 10/73.

PART XXII

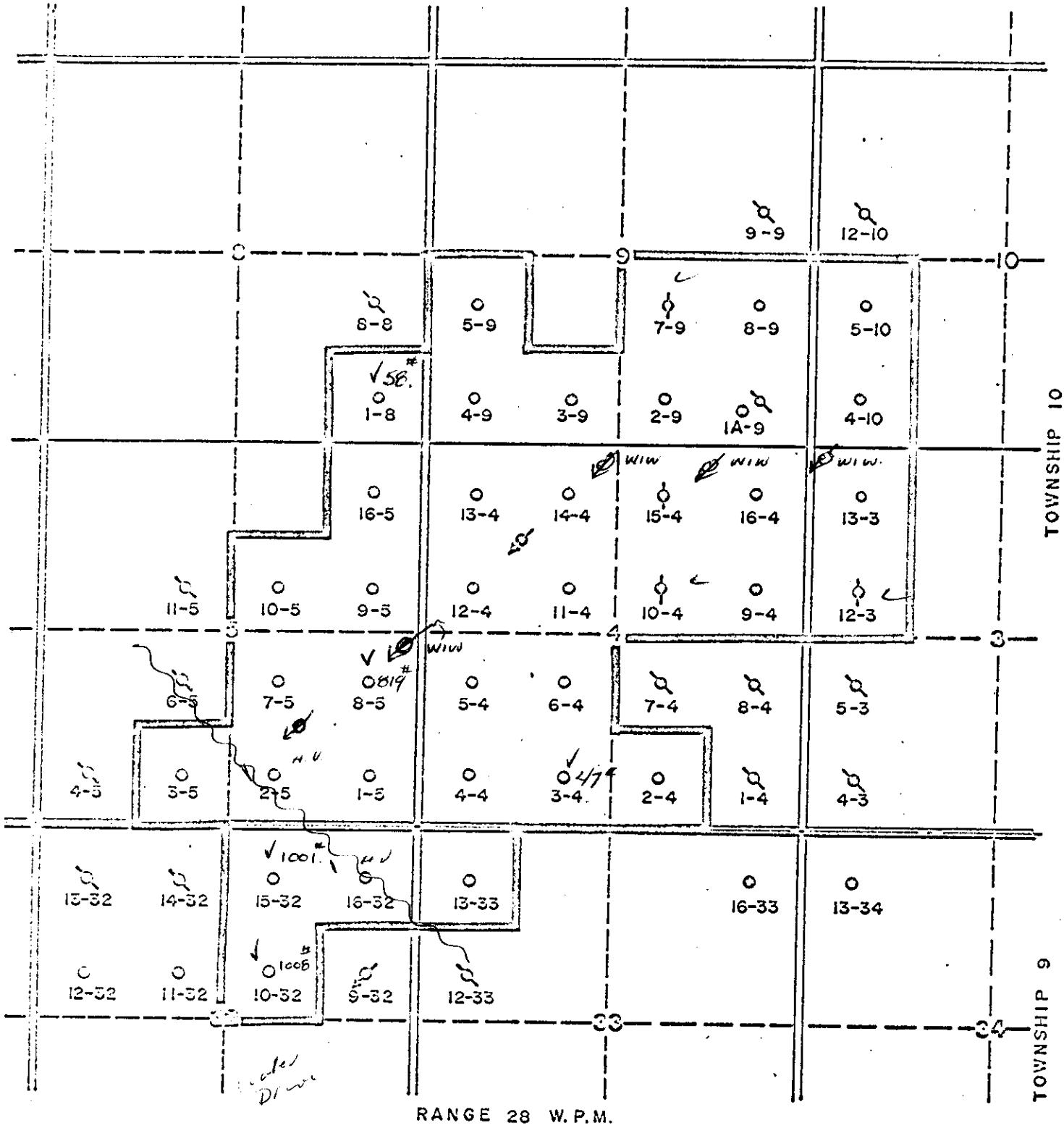
THE LANDS IN THE PROVINCE OF MANITOBA WHICH COMPRISE THE DALY UNIT NO. 1 ARE AS FOLLOWS:

TRACT NUMBER	LEGAL DESCRIPTION
	TOWNSHIP 10 RANGE 28
2-4	LSD. 2, SECTION 4
12-3	LSD. 12, SECTION 3
13-3	LSD. 13, SECTION 3
9-4	LSD. 9, SECTION 4
10-4	LSD. 10, SECTION 4
15-4	LSD. 15, SECTION 4
16-4	LSD. 16, SECTION 4
1-9	LSD. 1, SECTION 9
2-9	LSD. 2, SECTION 9
3-9	LSD. 3, SECTION 9
4-9	LSD. 4, SECTION 9
5-9	LSD. 5, SECTION 9
7-9	LSD. 7, SECTION 9
8-9	LSD. 8, SECTION 9
4-10	LSD. 4, SECTION 10
5-10	LSD. 5, SECTION 10
1-8	LSD. 1, SECTION 8
	TOWNSHIP 9 RANGE 28
10-32	LSD. 10, SECTION 32
15-32	LSD. 15, SECTION 32
16-32	LSD. 16, SECTION 32
13-33	LSD. 13, SECTION 33

TRACT NUMBER	LEGAL DESCRIPTION
	TOWNSHIP 10 RANGE 28
3-5	LSD. 3, SECTION 5
11-4	LSD. 11, SECTION 4
12-4	LSD. 12, SECTION 4
13-4	LSD. 13, SECTION 4
14-4	LSD. 14, SECTION 4
1-5	LSD. 1, SECTION 5
2-5	LSD. 2, SECTION 5
7-5	LSD. 7, SECTION 5
8-5	LSD. 8, SECTION 5
9-5	LSD. 9, SECTION 5
10-5	LSD. 10, SECTION 5
16-5	LSD. 16, SECTION 5
3-4	LSD. 3, SECTION 4
4-4	LSD. 4, SECTION 4
5-4	LSD. 5, SECTION 4
6-4	LSD. 6, SECTION 4

PART XXIII

MAP OF UNIT AREA



WEST DALY AREA

0 1000' 2000'

LEGEND

- OILWELL
- ABANDONED OILWELL
- DRY HOLE
- WATER INJECTION WELL
- SALT WATER DISPOSAL WELL
- SUSPENDED OILWELL
- UNIT BOUNDARY

PART XXIV

TRACT NUMBER	TRACT PARTICIPATION	TRACT NUMBER	TRACT PARITICPATION
2-4	1.00403	3-5	1.43709
12-3	.13561	11-4	.52135
13-3	6.20309	12-4	8.02734
9-4	2.41260	13-4	5.99796
10-4	.29071	14-4	5.06476
15-4	.00820	1-5	4.87978
16-4	3.32522	2-5	.91478
1-9	2.09526	7-5	4.59511
2-9	5.42490	8-5	2.18513
3-9	4.21993	9-5	4.94419
4-9	.57987	10-5	2.64613
5-9	2.21090	16-5	2.34913
7-9	.00017	3-4	1.70549
8-9	.47271	4-4	2.85424
4-10	1.84763	5-4	7.16099
5-10	3.10550	6-4	5.88864
1-8	1.80375		
10-32	.20853		
15-32	.55718		
16-32	.96156		
13-33	1.96054		

(1)

CHEVRON STANDARD LIMITED

400 FIFTH AVENUE S.W., CALGARY 1, ALBERTA

January 27, 1970

Oil and Natural Gas Conservation Board
Department of Mines and Natural Resources
Province of Manitoba
901 Norquay Building
401 York Avenue
Winnipeg 1, Manitoba

Attention: Mr. W. W. Mair, Chairman

Gentlemen:

Under The Mines Act, being Chapter 166 of The Revised Statutes of Manitoba, 1954, and amendments thereto, Chevron Standard Limited hereby applies to the Board for an order allowing the applicant to increase injection pressure above the estimated formation fracture pressure in a certain portion of the Daly Field.

In support of this application we enclose ten copies of "Proposal For Daly High Pressure Waterflood."

An early consideration of our request would be greatly appreciated.

Respectfully submitted,

for J. G. TROWELL, P.ENG
Division Superintendent
Producing Department
Calgary Division

SNB/cs
Encls.

PROPOSAL FOR DALY HIGH PRESSURE WATERFLOOD

The applicant proposes that the portion of the Daly field presently under waterflood be subjected to injection pressures greater than the currently imposed 1,080 psi surface limitation. It is desirable to increase the injection pressure since sufficient quantities of water cannot be injected with current pressure restrictions.

Initially, a pilot scheme using the 14-1-10-28 injection well would be conducted to confirm the feasibility of the project. The injection pressure at the pilot injection well would be increased gradually until a suitable volume of water was being injected. It is possible that pressures in excess of 1,500 psi will be necessary. Upon the completion of a successful test, it is the applicant's intention to expand the scheme to include the entire project.

The Daly waterflood area is shown on Figure 1. From net pay isopachs, it is estimated that the original oil-in-place was 26,000,000 barrels (see Figure 2). The indicated recovery from the present scheme is 4,500,000 barrels for a recovery factor of 17%. Cumulative production to June 30, 1969 was 3,550,000 barrels.

It is estimated that, by increasing the amount of water injected, the ultimate recovery could be increased by 1,500,000 barrels to 6,000,000 barrels to realize a recovery factor of 23%. The applicant submits that there is no indication that exceeding formation fracture pressure will be detrimental to the performance of the waterflood.

Appendix I contains a summary of the performance of the present waterflood.

Appendix II contains details of the applicant's proposed scheme, and reference to other high pressure schemes in existence.

APPENDIX I

REVIEW OF THE PERFORMANCE OF THE EXISTING SCHEME

INTRODUCTION

The Daly waterflood commenced operations in July 1953 as an 80 acre, 5 spot pilot flood. Early increases in production experienced at the central producer, 15-1, and the offset producer, 3-12, led to an expansion of the waterflood in December 1954. Subsequent expansions to the project in 1955, 1956, 1959 and 1961 have increased the area to cover 1960 acres.

GEOLOGY

The Daly field lies on the northeast flank of the Williston basin, about 10 miles west of the town of Virden. The reservoir beds are limestones of the Lodgepole Formation of Mississippian age. Regional dip of these beds is about 30 feet per mile to the southwest in this area, and they are unconformably overlain by the Jurassic Watrous series of Red Beds and anhydrites which form a good seal. Anhydritization from the very evaporitic Watrous seas commonly penetrated the limestones to a depth of 60 or more feet, destroying the reservoir by infilling.

Although there is a structural trough along the east side of the Daly field, with a reversal in the order of 40', the trap is in part stratigraphic, with permeability disappearing along strike. The reservoir beds have been divided into three zones as follows:

1. The First Crinoidal - This unit, immediately underlying the anhydritized zone, is a limestone, crinoidal, in part siliceous, with earthy chert nodules and some brown and maroon shaly interbeds. It is commonly finely crystalline and has irregular poor to good intergranular and fine vuggy porosity. It

is 20' - 30' thick.

2. The Main Crinoidal - This is a limestone with coarse crinoidal bands, and some shaly interbeds. Porosity ranges from poor to good. It is 8' - 15' thick and overlies a shaly unit 10' - 15' thick, which is sometimes known as the Cruickshank shale.

3. The Cruickshank Crinoidal - Another limestone with coarse crinoidal bands and some shaly interbeds. Porosity is patchy and ranges from very poor to good. The zone is 6' - 12' thick.

At the bottom of the Cruickshank Crinoidal is a thick argillaceous limestone and calcareous shale unit called the Shaly Zone. This zone is approximately 200' thick.

Permeability in the field is generally poor and oil saturation is not uniform. Fluid recoveries on drillstem tests were usually small.

HISTORY

The first well drilled in the waterflood area was Chevron Daly 7-12-10-28. It encountered 52' of Mississippian section between the First Crinoidal and the top of the Shaly zone, of which 30' is effective pay.

The most common completion technique in Daly consisted of cementing the casing at the top of the First Crinoidal and sand fracturing the open hole interval. A volume of 10,000 lbs. of sand fed at a rate of 5 - 10 BPM at 1500 - 2500 psi on surface was the most common method of completion. Some other early methods of stimulation included shooting with nitroglycerin, acid fracs and hydra fracs.

Acid treatments of varying size and type met with limited success in attempts to increase production rates. Similar limited success has also been experienced in attempts to improve declining injection rates by acid stimulating injection wells.

Construction of waterflood facilities began in May 1953. In July of that year, water was injected into four wells, 10-14, 14-1, 16-1 and 2-12, of the initial 80 acre 5 spot. In the fall of 1954, 8-11, 6-12 and 12-12 were converted to water injection wells. In 1955, a major waterflood expansion took place with the drilling out of Section 11 specifically to add to the waterflood operations. Six wells were drilled for water injection, and two producing wells were converted. Several wells were drilled as central producers to complete the 5 spot pattern. Further expansions of the project in 1956, 1959 and 1961 have increased the area to the present 1960 acres.

Waterflood success has been achieved mainly in the areas of the original pilot scheme and the first expansion. Flood response in the region of the second expansion has not been as good as expected, particularly in the Section 11 area.

Wells in this latter area were fractured with large volumes of sand at high feed rates. Injection tests indicated that some fractures may have broken into the Shaly zone. Cement squeezes of the thief zone were attempted in these wells with some initial success; however, most of the wells that had once achieved a water shut off are operating at low efficiencies today.

Injection pressures in Daly stabilized at 1,080 psi after only two to three months of injection. A rapid decline in injection rates was noted. Total water injected into the pilot area declined from 2,000 BWPD to 730 BWPD in a period of 13 months. Presently, only 5 of the 22 injection wells are capable of effective injection

at rates of over 100 BWPD at the 1,080 psi wellhead pressure.

ORIGINAL OIL-IN-PLACE

An attempt was made to establish the amount of oil originally in place in the waterflood area. The total pay isopach is presented as Figure 2.

Many wells in the south and northwest portions of the waterflood area penetrated the entire pay interval and have core analysis data. The net pay isopach drawn through these areas is deemed fairly accurate; however, a northeast to southwest belt through the middle of the waterflood area has virtually no core analysis data. To compound the difficulty in contouring the area, none of the wells penetrated the entire pay interval and few, if any, reliable porosity logs exist. The values assigned to wells in this area are estimates made from logs to which an extrapolated value for unpenetrated pay has been added.

Table I presents a list of reservoir parameters used to calculate the original oil-in-place. These parameters were obtained from interpretation of logs, core analysis, oil base core data, and other miscellaneous sources. Employing this data, the calculated original oil-in-place was established to be 26,000,000 barrels.

ULTIMATE RECOVERABLE OIL

A decrease in the amount of water injected into the producing horizon has resulted in a corresponding decline in production rate. Production in the waterflood area, which averaged 630 BOPD in 1961, has declined to an average of 410 BOPD in 1968. The corresponding decrease in water injected into the "effective" injection wells is 585 BWPD. A substantial production drop has been experienced in the southwest quarter of Section 12, which is the area exhibiting the best performance

to date. The two wells which were each once capable of producing in excess of 100 barrels of oil per day, now have a combined production rate of only 75 barrels per day. Injection into 4 of the 6 offsetting wells is approximately 50 BWPD per well.

Although water is produced in several wells, it is questionable that breakthrough, as such, has occurred in any part of the field. The decline curves for all wells were examined to establish the ultimate recoverable oil. It does not appear that high water production will be an influential factor when the economic limit of 120 BOPD for the existing project is reached in 1979. Indicated ultimate recovery from the waterflood area is 4,500,000 barrels, or 17% of the original oil-in-place. Of this total, 2,115,000 barrels are made up of primary oil and 2,385,000 barrels of secondary oil.

Waterflood studies conducted for the North Virden Scallion and Virden Roselea fields indicate an ultimate recovery of between 28% and 35% of the original oil-in-place. Although the permeability in Daly is lower than the other Virden area fields, the 5 spot waterflood which is in effect in Daly should yield a higher recovery factor than the 17% forecast.

APPENDIX II

DALY HIGH PRESSURE WATERFLOOD

INTRODUCTION

A critical factor influencing the choice of waterflood pattern is allowing for an adequate number of injection wells to best sweep all areas of the field. Low injectivity dictates a dense injection pattern.

In Daly, a 5 spot waterflood pattern was selected because of low permeability in the reservoir. This allows for maximum practical injection because of the close network of injection wells. It now has become evident that, even with this 5 spot pattern, insufficient quantities of water are being injected because of the present injection pressure restrictions. It will, therefore, be necessary to increase the injection pressure to above the formation fracture pressure in order to achieve adequate injectivity.

A. Pilot Waterflood

Location

A good method of confirming the feasibility of a new project is to conduct a small-scale field test. It is proposed that such a pilot test be conducted at 14-1-10-28 to confirm the feasibility of high pressure flooding in this area.

The following were considerations in the selection of 14-1 as the pilot injection well:

1. 14-1 is located in an area where waterflood response has been experienced. An improvement in production in an area of response will indicate the feasibility of the project in areas of good production, as well as not

discounting the possibility of improvement in poor areas. Conversely, a high pressure flood test conducted in an area of poor response may show no improvement in production which, however, would yield little indication of the feasibility in the better response areas.

2. A spinner survey conducted at 14-1 in September 1956 indicated a uniform distribution of injected water over the entire pay interval at 1,400 psi surface injection pressure.

Objective

The main objective of the pilot test is to determine what production increases occur at higher injection rates and to establish the pressure at which desired quantities of water can be injected. The production in the three offsetting wells will be monitored closely. After reviewing various injection well histories in other projects, where fracture pressure appears to have been exceeded, it may be concluded that a tenfold increase in injectivity is not unlikely. At Daly, a minimum two to threefold increase in injectivity index is the objective.

Procedure

A separate injection facility will be located at 14-1 in order that there would be no disruption in the operation of the present waterflood. It may be possible to use the present injection line for water source; however, it may be necessary to install a water supply line from the 15-1 plant site.

The pilot test will start at pressures that are 100 - 200 psi above the present 1,080 psi injection pressure. The pressure will be increased in

gradual increments until the desired quantity of water can be injected. Although it is anticipated that a twofold increase in the injectivity index may be reached at 1,500 psi, it would be undesirable to impose pressure limitations at the pilot stage.

B. Full-Scale High Pressure Waterflood

Proposal

Currently an average of 1,300 BWPD is being injected into the waterflood area. Three wells, as listed on Table II, are considered ineffective and, therefore, excluded from this total. The amount of secondary oil produced from the area is approximately 300 BOPD. A barrel of injected water has the net effect of contributing 0.23 barrels of oil.

It is desirable to substantially increase the amount of water injected in order to appreciably increase production. If the injectivity index was doubled, the amount of water injected could be increased to 3,260 BWPD. It is anticipated that this volume would be adequate for a satisfactory production increase. A production forecast is presented as Figure 3.

The present injection plant, located at 15-1-10-28, will be used for the high pressure waterflood. It will be necessary to modify the plant in order to house additional equipment, and to cope with higher pressures. Modification of some wellhead equipment may also be necessary. No difficulties are anticipated in the operation of the injection lines. An adequate water supply for the project is currently available, since water production in west Daly is substantially greater than the increased volume required for a high pressure waterflood. A water supply line from west Daly already provides water

to the present project.

Ultimate Recoverable Oil

Because of the decline in injection rates, it has become apparent that the ultimate recovery at Daly will not be in the 28% - 35% range predicted for various other Chevron operated Manitoba waterfloods. As discussed in Appendix I, the ultimate recovery of the present Daly waterflood will be 17% of the original oil-in-place. The main contributing factor to this poor recovery is the injection of inadequate volumes of water due to existing surface pressure limitations.

It is estimated that, by increasing the injection rates, the ultimate recovery can be increased substantially. With other Manitoba floods serving as a guide, it is anticipated that the recovery at Daly can be increased to 23% of the original oil-in-place which represents an additional 1,500,000 barrels of recoverable oil.

C. Review of Otner High Pressure Waterfloods

Deer Mountain

The Deer Mountain Unit in Alberta produces from the Swan Hills Formation platform unit of the Beaverhill Lake group at an average depth of 7,600 feet. A pilot waterflood was commenced in October 1965. Enlargements to the original scheme have increased the area to include the present 10 injection wells and 28 producing wells, in a 9 spot waterflood pattern (see Figure 4). All wells were drilled on 160 acre spacing.

To illustrate the effect of increased injection pressure on injection rate,

two injection wells in Deer Mountain Unit No. 1 have been selected. The injection pressure at 4-7-69-8 W5 was increased from 3,000 psi in September 1966 to 3,800 psi in October 1966. The corresponding rise in injectivity index was from 0.06 to 0.22 BWPD/psi, while the injection rate increased from 270 BWPD to 1,000 BWPD. The injection pressure at 4-6-69-8 was increased from 3,000 psi in January 1967 to 3,550 psi in March 1967. This increased the injectivity index fivefold. The injection rate was increased from 70 BWPD to 420 BWPD (see Figures 5 and 6)

An increase in production due to waterflood response has been recorded in most wells. Only two wells, 12-5-69-8 W5 and 12-7-69-8 W5, may have experienced water breakthrough to date (see Figures 7 and 8). Both wells began producing water in April 1967; however, water production ceased within five months. Water production resumed at 12-7 in September 1968. By April 1969 the water cut at this well had increased to 14%. In excess of a twofold increase in production rate has been experienced at the well, beginning about the time that the injection pressure at an offsetting well was increased.

Other High Pressure Floods

The House Mountain waterflood has been designed to operate at 5,000 psi injection pressure. However, because of decreased allowables, a sufficient quantity of water is presently being injected at a pressure below formation fracture pressure.

A pilot high pressure waterflood was conducted at Ebor by Bralorne Petroleums Ltd. during the summer of 1966. The short four-month duration of this pilot scheme was insufficient to conclusively establish the feasibility of the project.

LIST OF TABLES AND FIGURES

TABLE I

SUMMARY OF RESERVOIR PARAMETERS

DALY WATERFLOOD AREA

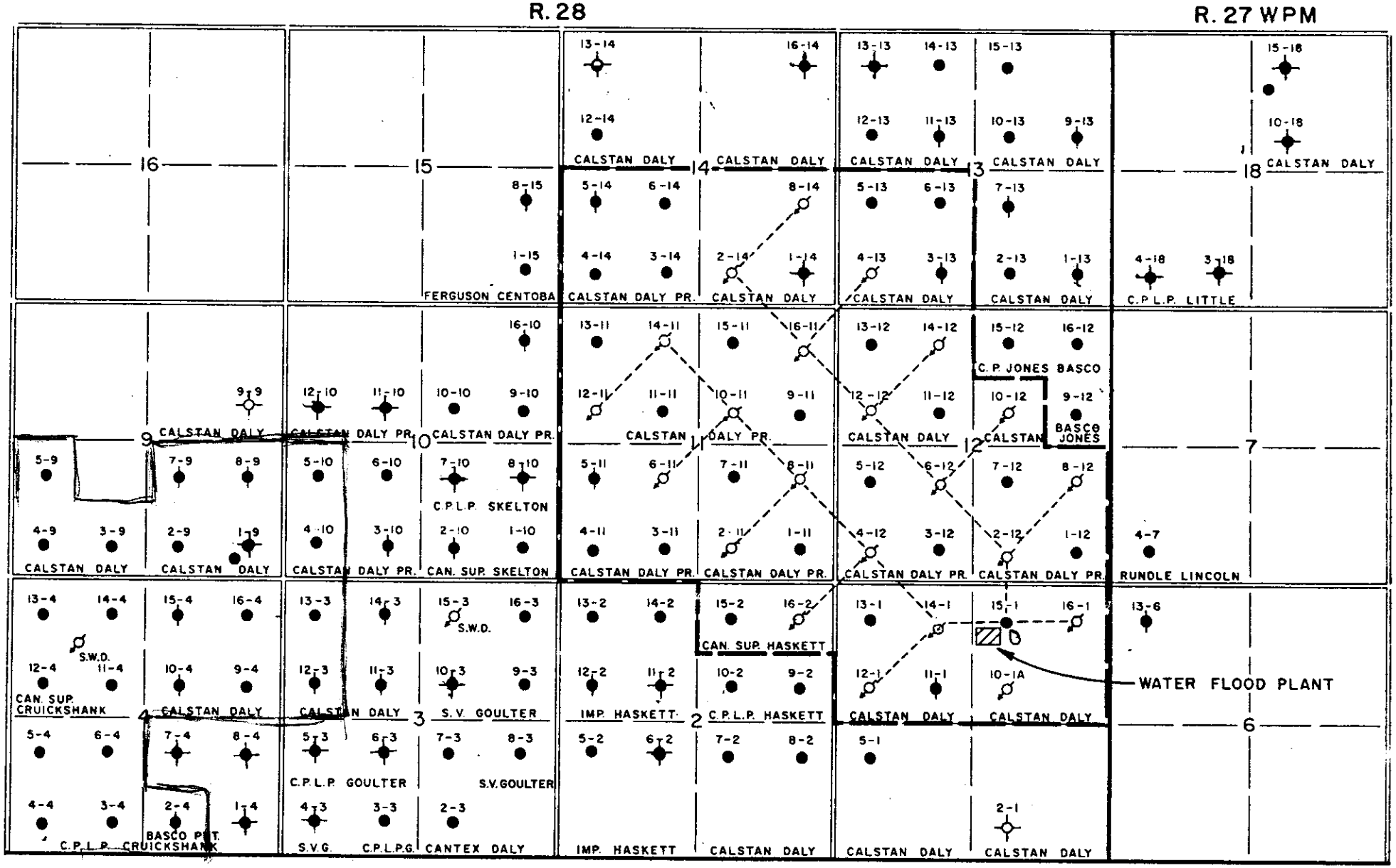
Surface Area	1,960
Average Pay Thickness (Ft.)	28.5'
Reservoir Rock Volume	56,000 Acre-ft.
Average Porosity	10.7%
Average Water Saturation	39.5
Average Initial Oil Saturation	60.5
Formation Volume Factor (Res. Bbls./S.T.B.)	1.08
Original Oil-in-Place (Bbls./Acre-ft.)	465
Original Oil-in-Place (Barrels)	26,000,000
Estimated Recovery Under Present Waterflood	4,500,000
Recovery Factor	17%

TABLE II

DALY INJECTION - BELOW AND ABOVE FRACTURE PRESSURE

Well	Injection Rate June 1969 BWPD	Injectivity Index @ 1,080 psi BWPD/psi	Injectivity Index @ 1,500 psi BWPD/psi	Injection Rate w/Frac. Press. Exceeded
Effective				
12-1-10-28	75	.069	.138	207
14-1-10-28	54	.050	.100	150
16-2-10-28	106	.098	.196	294
2-11-10-28	84	.078	.156	234
8-11-10-28	58	.054	.108	162
14-11-10-28	39	.036	.072	108
2-12-10-28	118	.109	.218	327
4-12-10-28	64	.059	.118	177
6-12-10-28	50	.046	.092	138
8-12-10-28	44	.041	.082	123
10-12-10-28	181	.168	.336	400*
12-12-10-28	51	.047	.094	140
14-12-10-28	252	.234	.268	400*
4-13-10-28	151	.140	.280	400*
Subtotal	1,328			3,260
Ineffective				
16-1-10-28	236			300*
10-11-10-28	249			300*
12-11-10-28	219			300*
Total	2,032			4,160

*Maximum Rate



LEGEND

INJECTION WELL

FIGURE 1

DALY WATER FLOOD AREA

SCALE : 1" = 1/2 Mile

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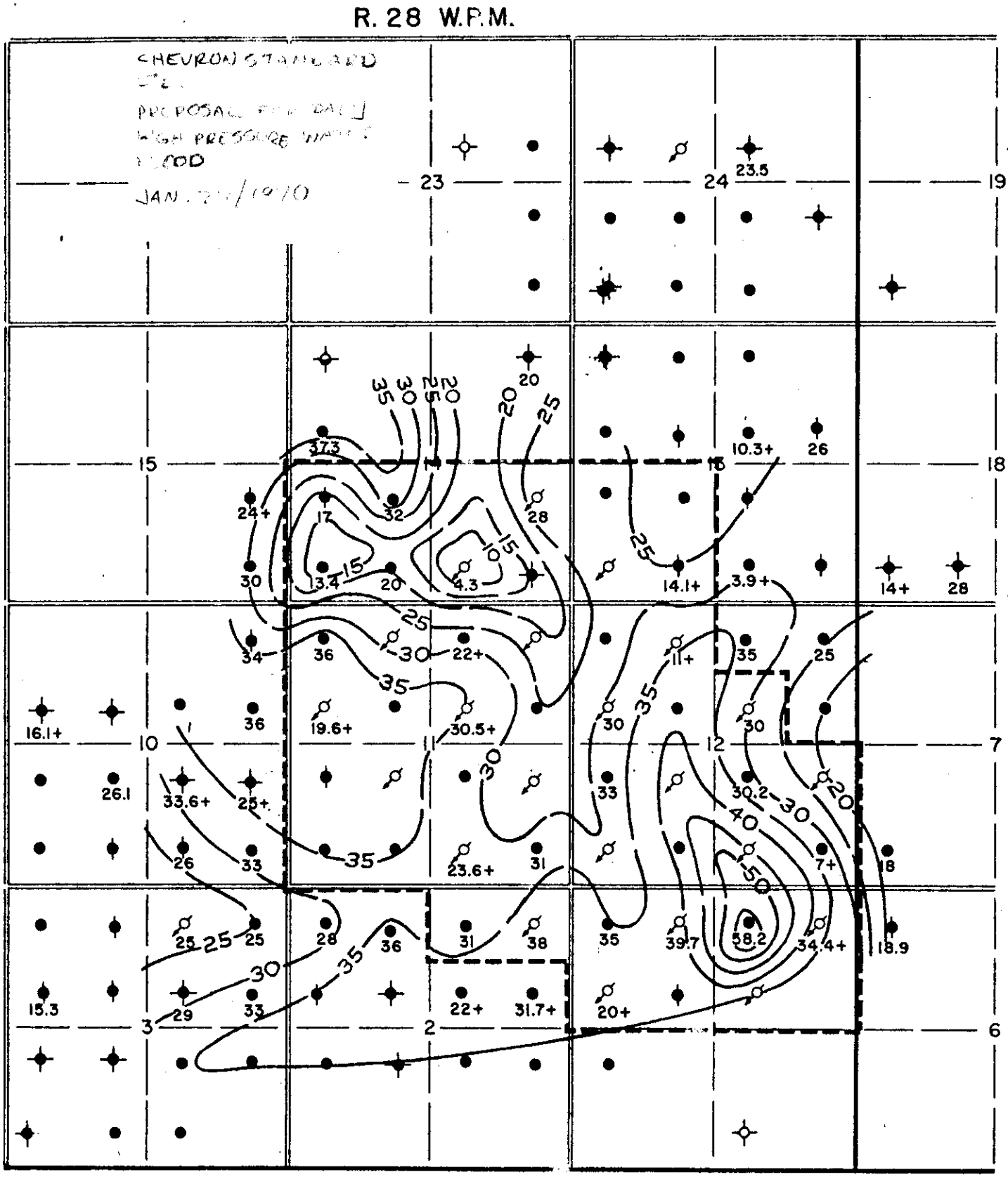


FIGURE 2

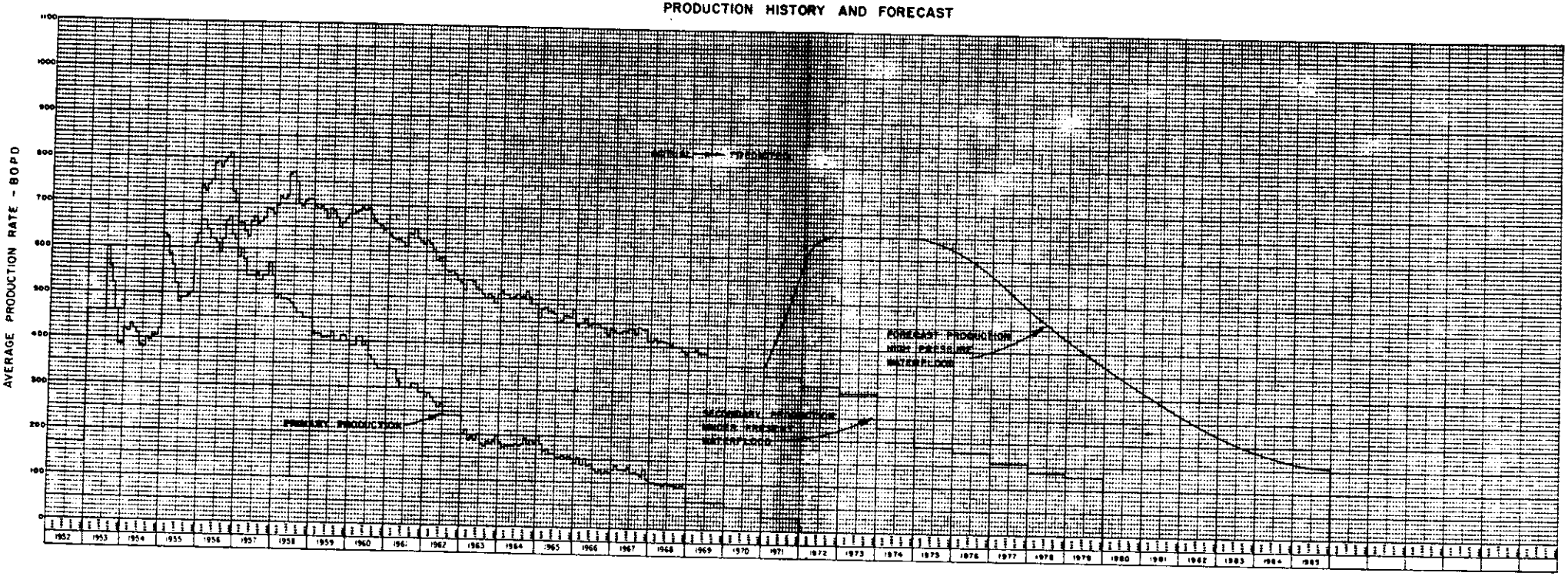
DALY WATERFLOOD AREA

ISOPACH OF NET PAY

FIGURE 3

DALY WATER FLOOD

PRODUCTION HISTORY AND FORECAST



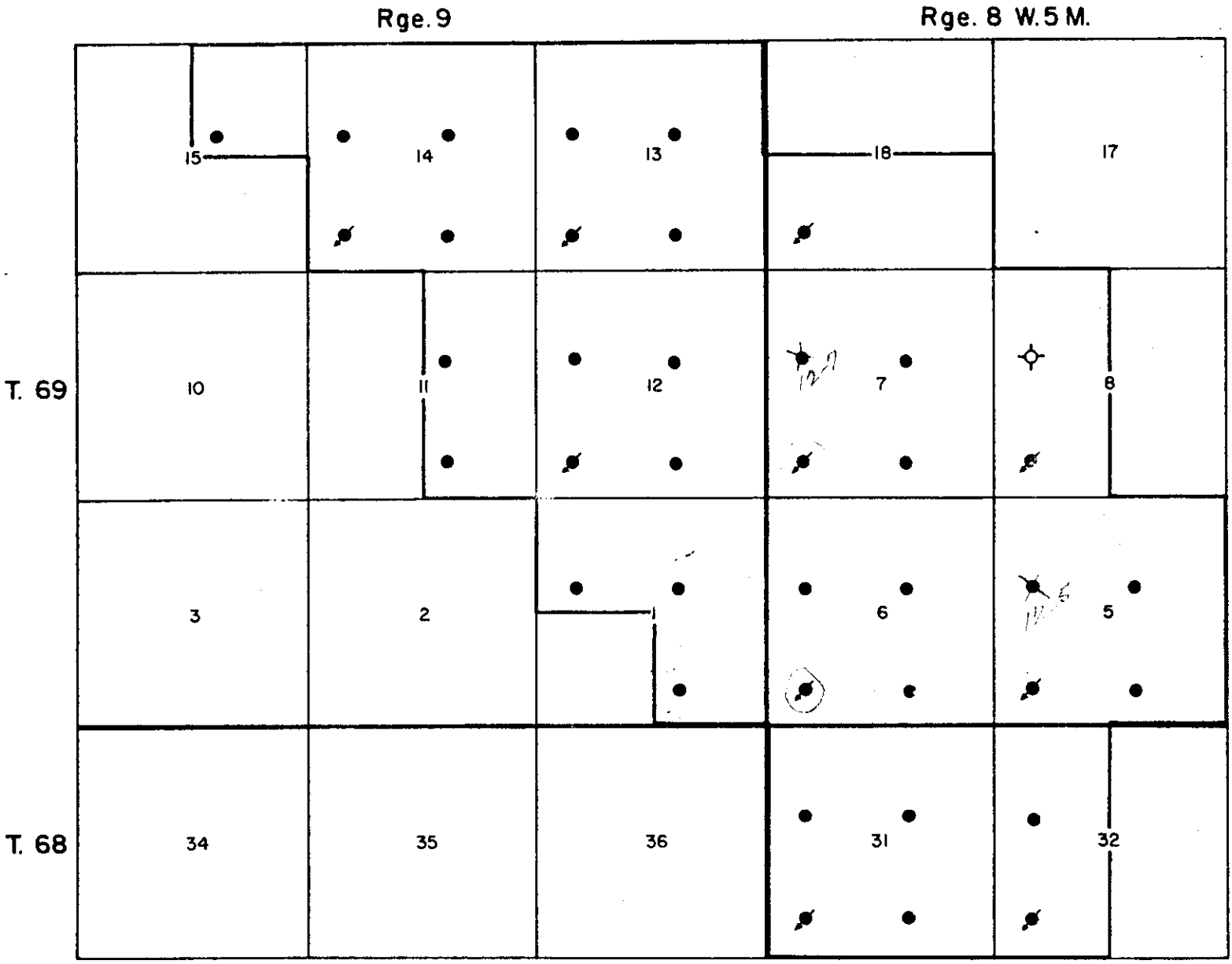
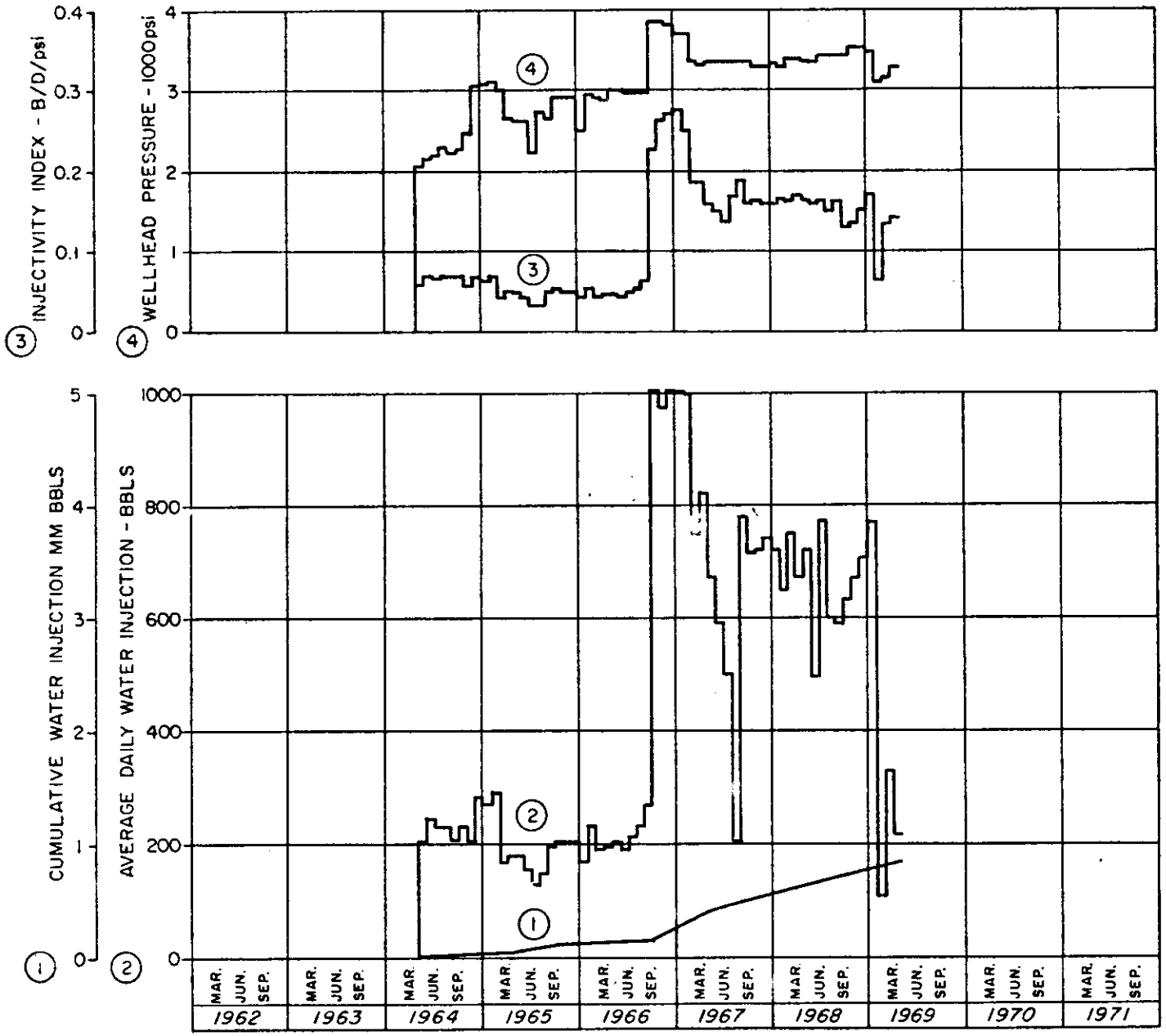


FIGURE 4

DEER MOUNTAIN UNIT

SCALE: 1½ in. = 1 mi.

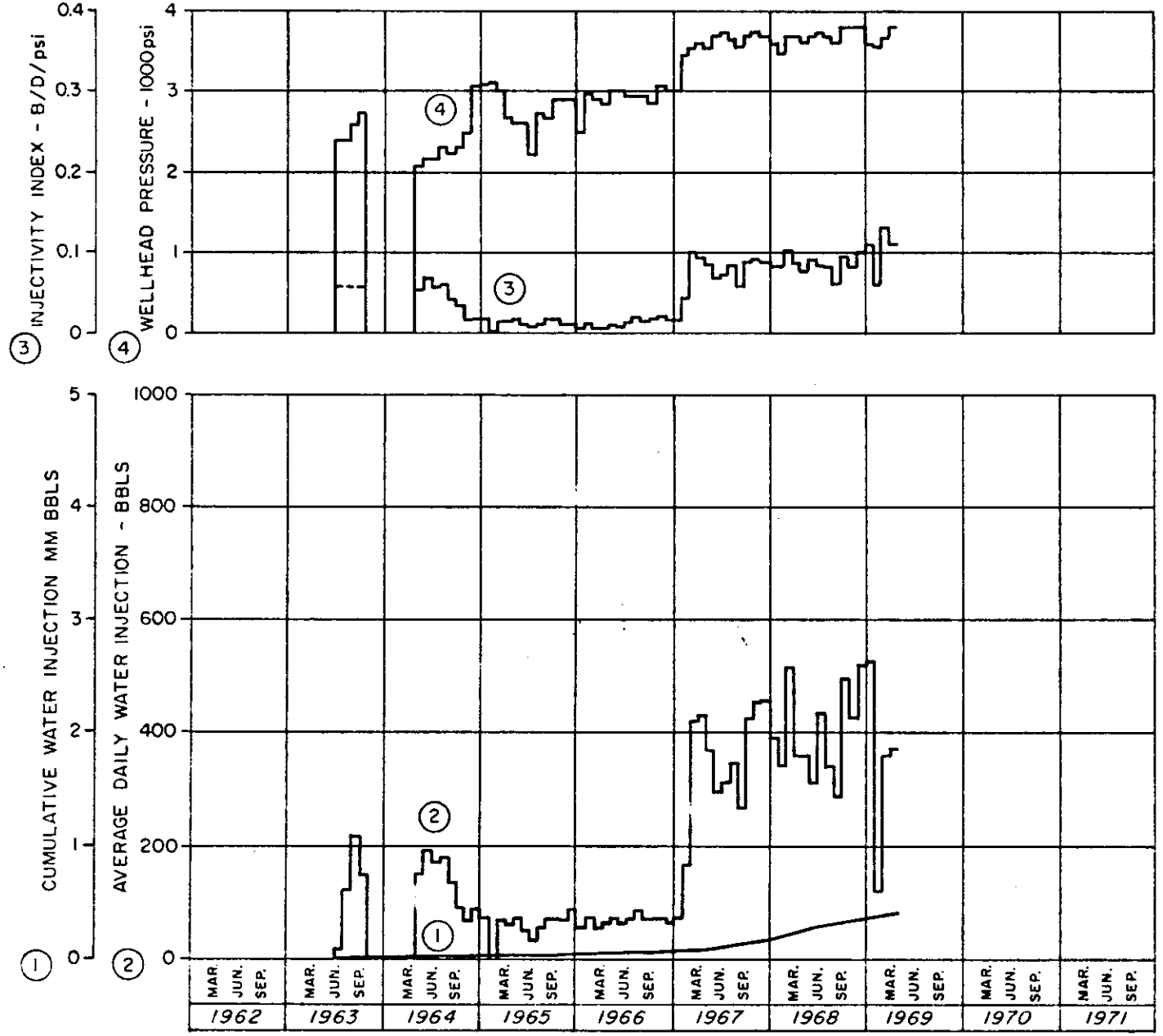


DEER MOUNTAIN UNIT No.1

INDIVIDUAL WELL INJECTION PERFORMANCE

4-7-69-8-W5M

FIGURE 5

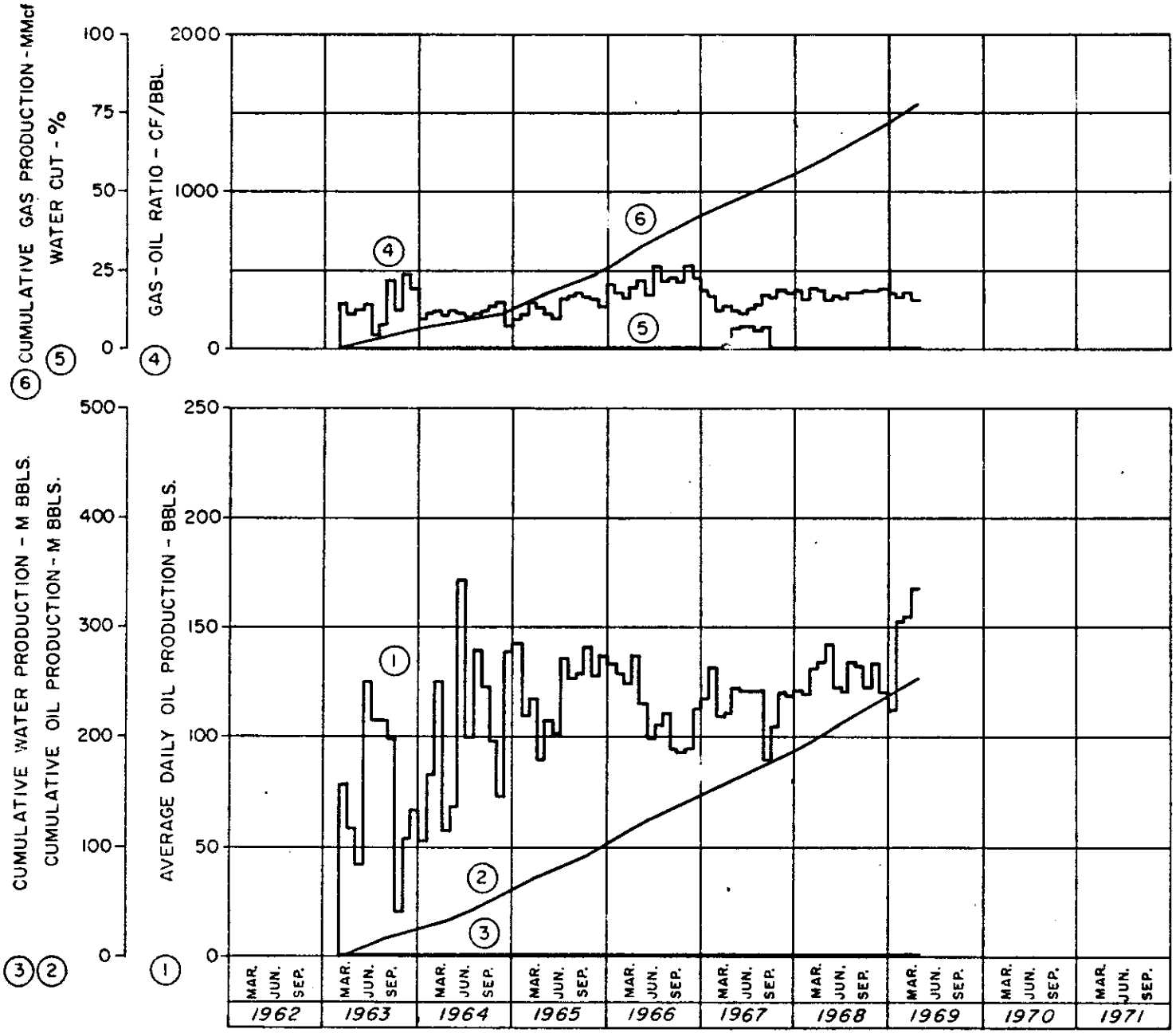


DEER MOUNTAIN UNIT No. I

INDIVIDUAL WELL INJECTION PERFORMANCE

4-6-69-8-W5M

FIGURE 6

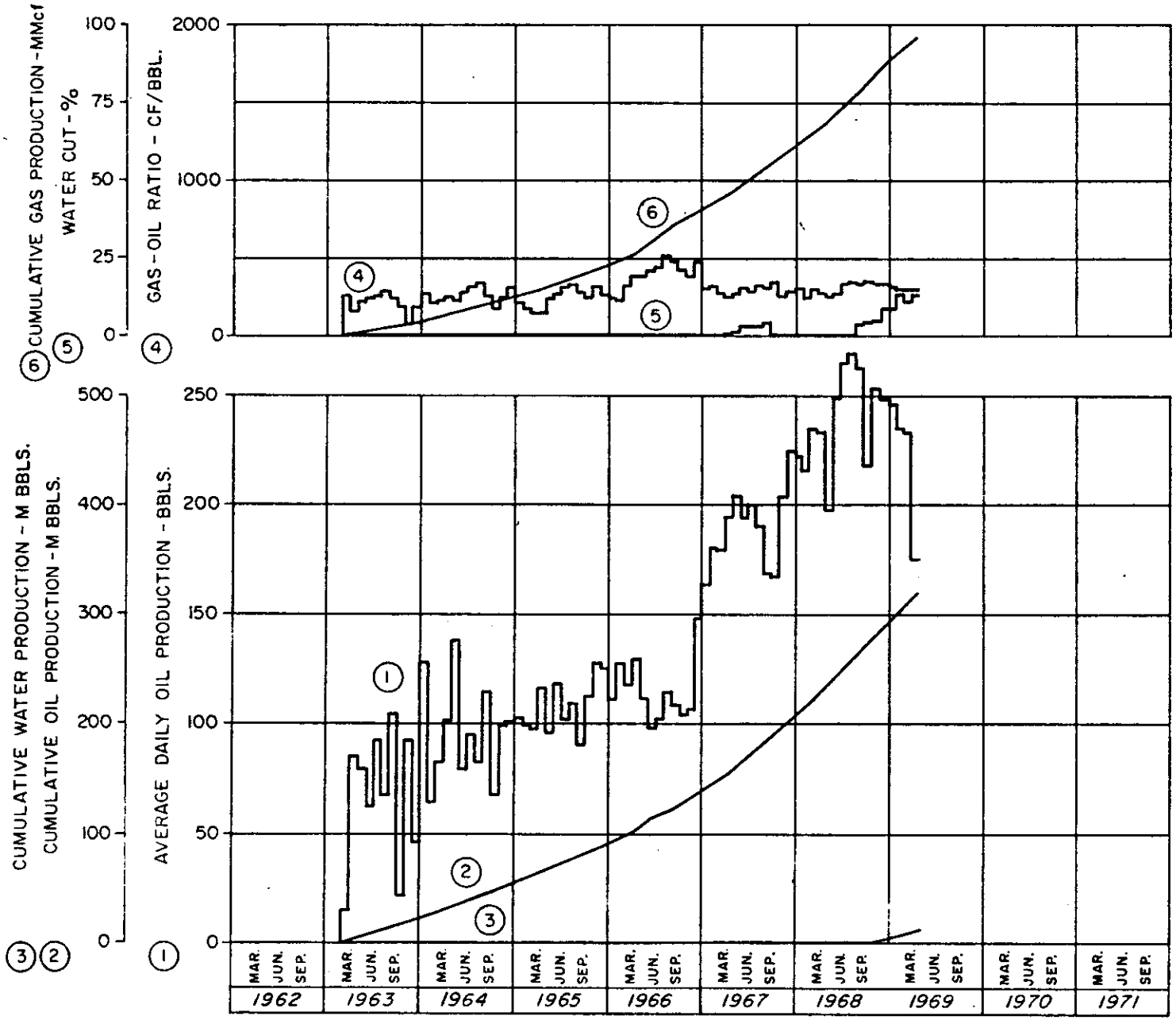


DEER MOUNTAIN UNIT No.1

INDIVIDUAL WELL PRODUCTION PERFORMANCE

12 - 5 - 69 - 8 - W5M

FIGURE 7



DEER MOUNTAIN UNIT No.1

INDIVIDUAL WELL PRODUCTION PERFORMANCE

12 - 7 - 69 - 8 - W5M

FIGURE 8