

# **TUNDRA OIL AND GAS LTD.**



**NORTH TILSTON FIELD**

**REDUCED SPACING  
UNIT APPLICATION**

**August, 1993**

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August 16, 1993

Manitoba Energy and Mines  
Petroleum Branch  
555 - 330 Graham Avenue  
Winnipeg, Manitoba  
R3C4E3

Attention: Mr. C. Moster  
Deputy Chairman

Dear Mr. Moster,

**RE: REQUEST FOR REDUCED DRILLING SPACING UNIT APPROVAL  
NORTH TILSTON FIELD - MISSION CANYON 1C POOL**

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#### **INTRODUCTION**

Tundra Oil and Gas Ltd., as Operator and on behalf of the working interest owners of the referenced pool, pursuant to Section 20(3) of the Manitoba Petroleum Drilling and Production Regulations, hereby requests approval for reduced drilling spacing units of 20 acres (8.1 hectares) in the North Tilston Field - Mission Canyon 1C Pool. The current approved well spacing is for 40 acres (16.19 hectares).

The reduced drilling spacing unit program offers the possibility to improve oil recovery from the North Tilston Mission Canyon 1C Pool, while at the same time respecting existing land owner and environmental considerations.

#### **CONCLUSIONS**

1. Oil recovery from the North Tilston Mission Canyon 1C Pool is impacted by water influx either through natural fractures and/or water coning.

2. Infill drilling, as an enhanced recovery program, offers an opportunity to significantly improve oil recovery from the Mission Canyon 1C Pool.

3. Current ultimate recovery is estimated at 4.8% of the original oil-in-place(OOIP). Infill drilling on 20 acre spacing will increase ultimate oil recovery from this pool by an additional 5.2% of the OOIP. Total ultimate recovery with the existing and proposed infill wells is estimated at 10% of the OOIP.

4. Incremental oil reserves of up to 50,000 m3 (315,000 STB) are estimated by drilling six infill wells. Initially two infill wells will be drilled to test the commercial

viability of the program.

5. Successful commercial application of reduced drilling spacing units in the North Tilston Mission Canyon 1C Pool will offer an opportunity to implement tested technology to maximize oil recovery from other Mission Canyon Pools in the Province of Manitoba.

## **DISCUSSION**

The following sections outline the supporting documentation pertaining to Tundra's application for reduced drilling spacing units in the North Tilston Field.

### **1. GEOLOGY**

The productive zone in the North Tilston Field is the Mission Canyon MC-1 member of the lower Mississippian Mission Canyon complex. The hydrocarbon trapping mechanism within the field is primarily due to the presence of several closed paleotopographic highs developed on the Mississippian erosional surface. A dense impermeable secondary dolomite acts as a caprock within the field with the overlying Lower Amaranth Red Beds providing a secondary caprock. Oil accumulation occurs in the underlying porous MC-1 member limestones.

The following geological data for the Mission Canyon MC-1 member is included with our application for reduced drilling spacing units:

- \* Attachment No.1: Net Pay Isopach, MC-1 Member
- \* Attachment No.2: Structure Contour Map, Top Mississippian
- \* Attachment No.3: Structural Cross-section including formations above and below the Mission Canyon MC-1 formation.

### **2. RESERVOIR DRIVE MECHANISM**

The predominant depletion mechanism in the Mission Canyon MC-1 zone is attributable to strong aquifer drive. This is supported by a recent pressure buildup at well 5-9-6-29 W1M which indicated original reservoir pressure of 8900 kPa after being on production since November, 1983. Appendix A contains an analysis of the pressure buildup test completed at well 5-9-6-29 W1M during May, 1993. Well 5-9-6-29 W1M also has the majority of fluid withdrawals from the Mission Canyon MC-1 zone. The strong aquifer drive has contributed to water, coning and high water-cuts in the producing wells. A review of the available core data suggests that water breakthrough may further be enhanced due to natural fractures in the Mission Canyon MC-1 zone.

### 3. LAND

The lands that reduced drilling spacing unit approval is requested for are outlined in Attachment No.4 (mineral owners). Attachment No.4A outlines the working interest owners in the reduced drilling spacing unit application area. Attachment No.5 outlines the reduced spacing application area, and the 20 acre drilling spacing unit configuration that Tundra envisions is applicable for the North Tilston Mission Canyon MC-1 lands. Infill drilling on 20 acre spacing will also require pooling of section 8-6-29 W1M, section 9-6-29 W1M, and section 5-6-29 W1M lands.

### 4. RESERVES

The volumetric reserve estimate of the original oil-in-place for the Mission Canyon MC-1 lands outlined in Attachment No.4 is 943.6 E3M3 (5.9 MM STB). Table No.1 outlines the volumetric original oil-in-place reserve estimates for each 40 acre drilling spacing unit. Tundra's reserve estimates for the North Tilston Mission Canyon MC-1 zone have been appraised by Coles Gilbert in February, 1993 and found to be in general agreement with the reserve auditors estimates. A material balance estimate of the original oil-in-place was not attempted, since there was insufficient pressure data to support a reliable estimate.

A relative permeability study on core 5-9-6-29 W1M was initiated in July, 1993 to address the question of initial reservoir fluid saturations. The relative permeability study will provide a better estimate of initial irreducible formation water saturation than is currently available from log analysis. This approach will improve the reliability of the reserve estimate for the North Tilston Mission Canyon 1C Pool. The relative permeability study will also provide information pertaining to efficiency of oil displacement, and ultimate recovery from this reservoir. The results from the study will be available in late September, 1993.

### 5. PRODUCTION HISTORY

Production commenced from the North Tilston Mission Canyon MC-1 zone in August, 1983 from well 12-9-6-29 W1M. There are currently 5 producing wells from the Mission Canyon MC-1 zone. The average field oil production during the month of March, 1993 was 7.2 m3/day at a water-cut of 88%. Cumulative oil production from the North Tilston Mission Canyon MC-1 zone to 93.03.31 was 31566.2 m3. Attachment No.6 illustrates the total North Tilston production history. Appendix B outlines the production statistics for the total North Tilston Field Mission Canyon MC-1 zone. Individual well production plots and production statistics are outlined in Appendix C and Appendix D, respectively.

## 6. RECOVERY ESTIMATES

Current oil recovery to 92.12.31 was 3.3% of the original oil-in-place. Tundra estimates that with the existing wells on 40 acre spacing the ultimate recovery from the North Tilston Mission Canyon MC-1 zone will be about 4.8% of the original oil-in-place or 45,000 m3 (283,000 STB). The ultimate recovery for the North Tilston Mission Canyon MC-1 zone was determined by decline analysis. Table No.2 outlines the remaining reserves for each of the producing wells. Table No.3 outlines the recovery factor for each well on the existing 40 acre spacing. From Table No.3 it is apparent that only wells 1-8-6-29 and 5-9-6-29 will recover in excess of 5% of the original oil-in-place in the 40 acre drilling spacing unit. Appendix E illustrates the oil rate vs cumulative production plot for the total North Tilston Mission Canyon MC-1 zone that was used to estimate ultimate pool recovery. Appendix F outlines the decline analysis profile for each of the individual wells that was used to determine the ultimate recovery from a 40 acre drilling spacing unit.

## 7. DRAINAGE AREAS

The drainage areas of each individual well on 40 acre spacing were determined by an iterative process. A series of recovery factors ranging from 5 - 40% were selected to determine the oil-in-place that was being drained by an individual well on 40 acre spacing. Appendix G outlines this process for each producing well in the pool. By analogy, a recovery factor was then selected that would be representative of a pressure maintenance recovery scheme in Western Canada. A recovery factor of 30% of the original oil-in-place was selected as the maximum recovery achievable by an individual well on 40 acre spacing in the North Tilston Mission Canyon MC-1 zone. Attachment No.7 outlines the maximum drainage area of each individual well on 40 acre spacing based on this methodology. As Attachment No.7 illustrates, the majority of the existing wells in the pool will ultimately drain less than 10 acres of the 40 acre drilling spacing unit. Only well 5-9-6-29 W1M is expected to exceed 10 acres of drainage, however, the ultimate drainage of 5-9 is estimated to be less than 20 acres. The drainage prediction for well 5-9 is considered to be optimistic, since frequent chemical treatments are required to maintain productivity at the 5-9 location. These chemical treatments will not be economic if productivity gains are not realized in the future.

## 8. INFILL DRILLING LOCATIONS

Attachment No.7 also outlines the proposed infill locations that would be drilled in the future with approval of the reduced drilling spacing application. Although Tundra has currently identified 6 infill drilling locations in the North Tilston Mission Canyon MC-1 pool, we would only drill

one or two infill locations initially to test the commercial feasibility of this enhanced recovery program. The 6 initial infill locations have been selected in the best parts of the reservoir to test the feasibility of improving oil recovery through infill drilling. The six infill locations are as follows: i) 15c-5-6-29 W1M, ii) 15d-5-6-29 W1M, iii) 8a-8-6-29 W1M, iv) 8b-8-6-29 W1M, v) 5c-9-6-29 W1M, and vi) 12a-9-6-29 W1M.

#### **9. INFILL INCREMENTAL RESERVES AND RECOVERY**

Incremental oil reserves with infill drilling have been estimated by determining ultimate recovery expected on 40 acre spacing. On this basis, each of the 6 infill locations potentially may recover an incremental 8000 - 9000 m<sup>3</sup> (50 - 57 M STB) on 20 acre spacing. Total incremental oil reserves from the 6 infill locations are estimated at 50,000 m<sup>3</sup> (315,000 STB). This estimate is speculative at this time and actual infill drilling will confirm the actual incremental oil recovery potential. Table No.4 outlines the incremental oil recovery estimated from each infill location on 20 acre spacing. Drilling of the 6 infill locations would increase ultimate oil recovery from the Mission Canyon MC-1 pool from 4.8% of the original oil-in-place to 10.0% of the original oil-in-place.

#### **10. INFILL WELLS PRODUCTION FORECAST**

The incremental production rate for each infill well was determined by reviewing the initial rates of the existing wells on 40 acre spacing. The average initial oil rate of the existing wells during the first year of production was 5 m<sup>3</sup>/day. As a result, each infill well was assigned an initial oil rate of 5 m<sup>3</sup>/day during the first year of production. The initial rate was exponentially declined at 22% / year thereafter, based on the field historical decline rate. Table No.5 outlines the incremental oil production forecast by drilling 6 infill wells.

#### **11. HORIZONTAL DRILLING POTENTIAL**

Tundra has also evaluated the merits of applying horizontal well drilling technology in the North Tilston Mission Canyon MC-1 pool to improve oil recovery. In our opinion, infill drilling has several advantages at this time which makes this approach more attractive than horizontal drilling for the following reasons:

1. There is lower risk in obtaining a commercial well with infill drilling. This is attributable to being better able to predict the down-hole location of the vertical well over a horizontal section which may encounter the aquifer or run out of producible reservoir pay.

2. Infill drilling technology is recognized in Western

Canada as a proven method to improve oil recovery where water coning from either bottom water or influx through natural fractures has precluded recovery. Horizontal drilling technology, however, has not proven conclusive incremental oil recovery in these types of scenarios.

3. Our estimates indicate there is higher incremental oil recovery with infill drilling than with horizontal drilling. The 6 infill locations are projected to recover 315 M STB of incremental oil whereas 1 horizontal well spanning 2 LSD's is projected to recover about 120 M STB of additional oil. Since the pool only covers about 640 acres of land, further horizontal drilling locations beyond the initial application are limited. In Tundra's opinion, even if we proceeded with horizontal drilling at this time, further infill drilling would be required to improve oil recovery.

4. There are also minimal fiscal incentives to drill a horizontal well in the North Tilston Field, since the land position is primarily freehold. The only incentive applicable is the mineral tax holiday on the first 10,000 m3 of oil production. This incentive does not provide better economics than drilling conventional infill wells due to the higher capital investment for drilling a horizontal well.

5. Infill drilling will also provide better reservoir data, since conventional logging suites can be run in a vertical well. Open-hole logging in horizontal sections is expensive and interpretation of reservoir conditions is more difficult.

6. Finally, it is more feasible to control drawdowns in conventional infill wells than with a horizontal well, since the capital investment is significantly higher in a horizontal section requiring higher rates to generate attractive economics. This may lead to premature watering out of the horizontal well.

Tundra's opinion is that infill drilling will be a reliable indicator whether horizontal drilling technology (applied in the future) will be commercially successful in a Mission Canyon MC-1 pool, since both techniques involve exploiting more reservoir area. As a result, infill drilling is considered by Tundra to be less risky at this time.

## **12. WELL SITING INFORMATION**

Appendix H provides an aerial photograph of the reduced drilling spacing unit application area in the North Tilston Field. An overlay is included which outlines the existing wells, battery facilities, flow lines, lease roads, and proposed infill locations.



### **13. ENVIRONMENTAL IMPACT ASSESSMENT**

Appendix I outlines the environmental impact assessment that has been prepared for the North Tilston Field. The environmental impact assessment indicates that there will be no land owner or environmental concerns raised by the infill drilling program proposed for the North Tilston Field.

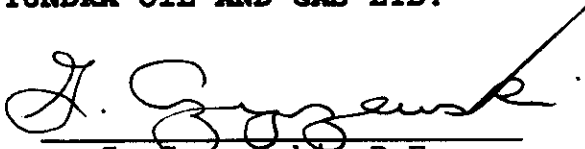
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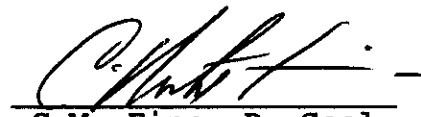
Tundra's assessment of the production performance of the North Tilston Mission Canyon MC-1 pool indicates that the low recovery factor may be attributable to localized water coning from a strong water drive, and influx through natural fractures. As a result, infill drilling offers an alternative to increase oil recovery by an additional 5% of the original oil-in-place or 315 M STB. Tundra would like to proceed with the infill program prior to the end of the 3rd quarter of 1993, and any further assistance that your office requires in expediting the approval of the reduced drilling spacing unit application, we would be pleased to provide.

Should you have any questions or require further information, please contact either George Czyzewski at 934-5853, or Mike Finn at 934-5294.

**Respectfully Submitted,**

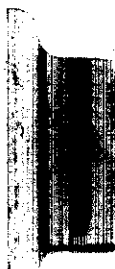
**TUNDRA OIL AND GAS LTD.**

  
\_\_\_\_\_  
G. Czyzewski, P.Eng.  
Senior Reservoir Engineer

  
\_\_\_\_\_  
C.M. Finn, P. Geol.  
Chief Geologist

cc. R. Puchniak

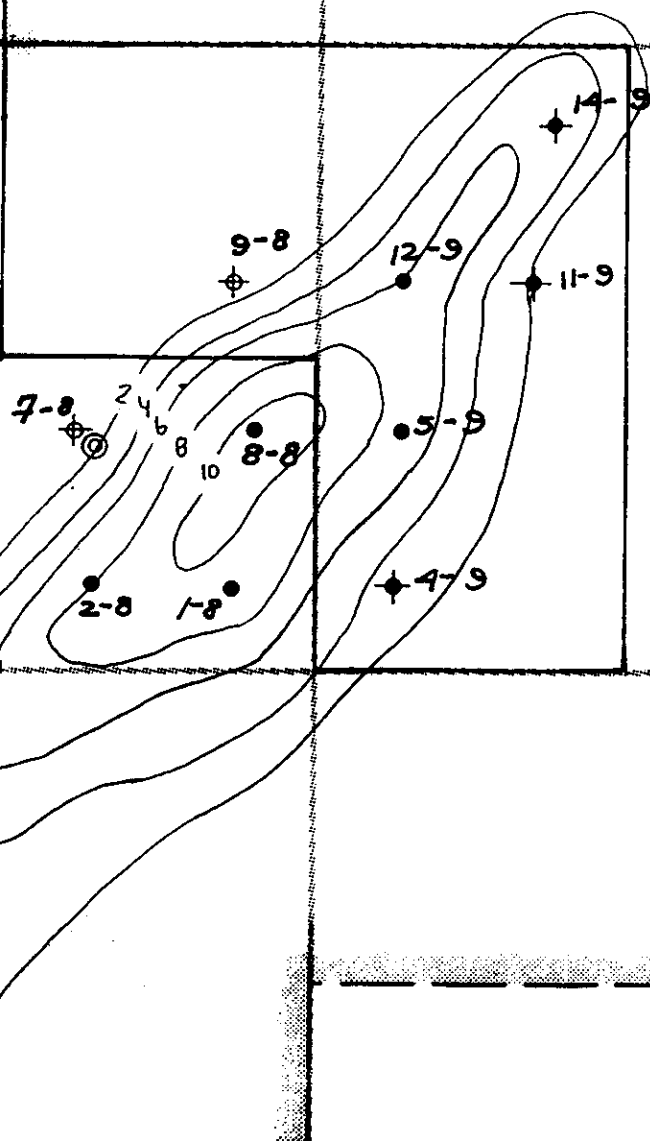
# ATTACHMENTS



# ATTACHMENT NO.1

## TILSTON FIELD

Section 8-6-29



**Tundra** oil and gas ltd.

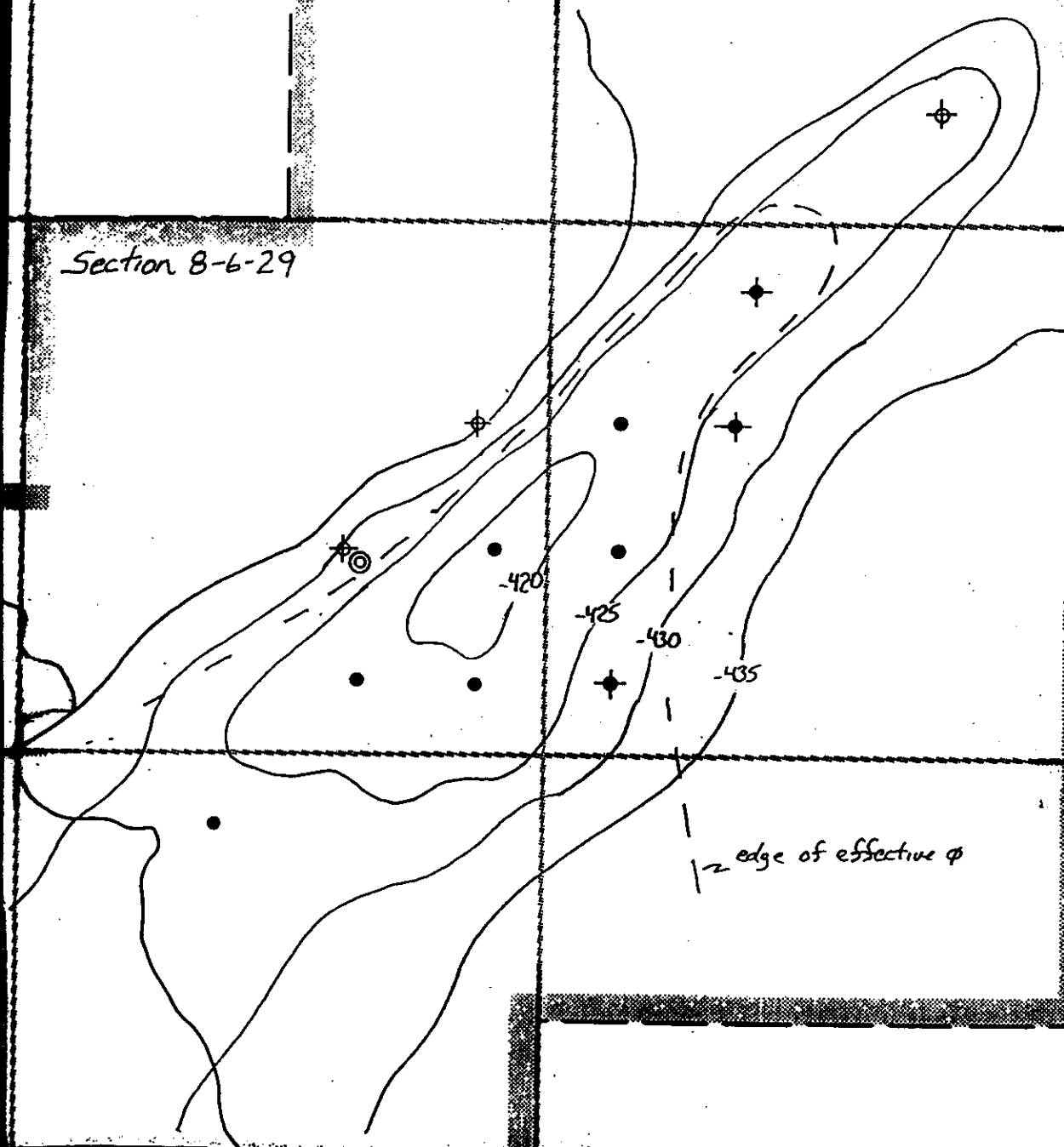
North Tilston : Net Pay Isopach (m)

Contour Interval: 2m | Date: 03/93 | By: DB

ATTACHMENT NO. 2

TILSTON FIELD

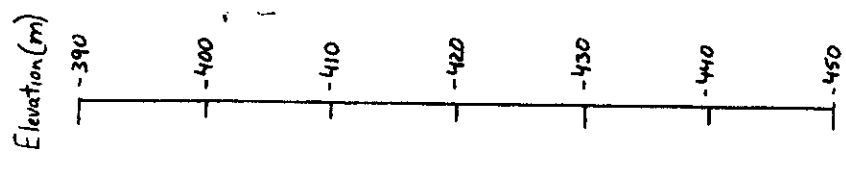
Section 8-6-29



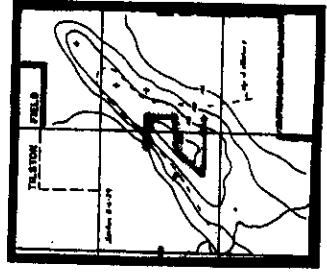
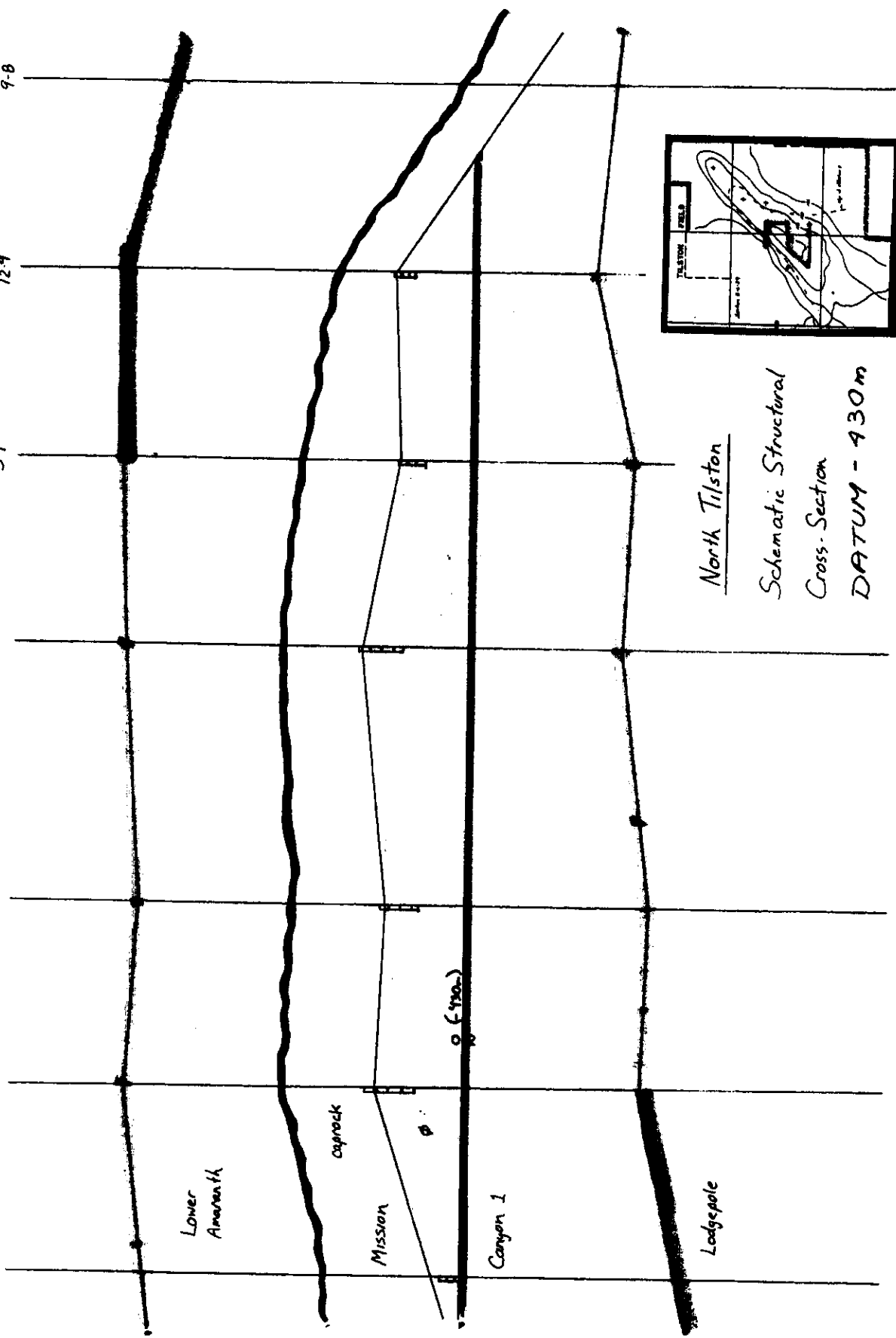
**Tundra** oil and gas ltd.

North Tilston : Structure Contour Map  
Top of MC1 Porosity

Contour Interval: 5m | Date: 03/93 | By: DB

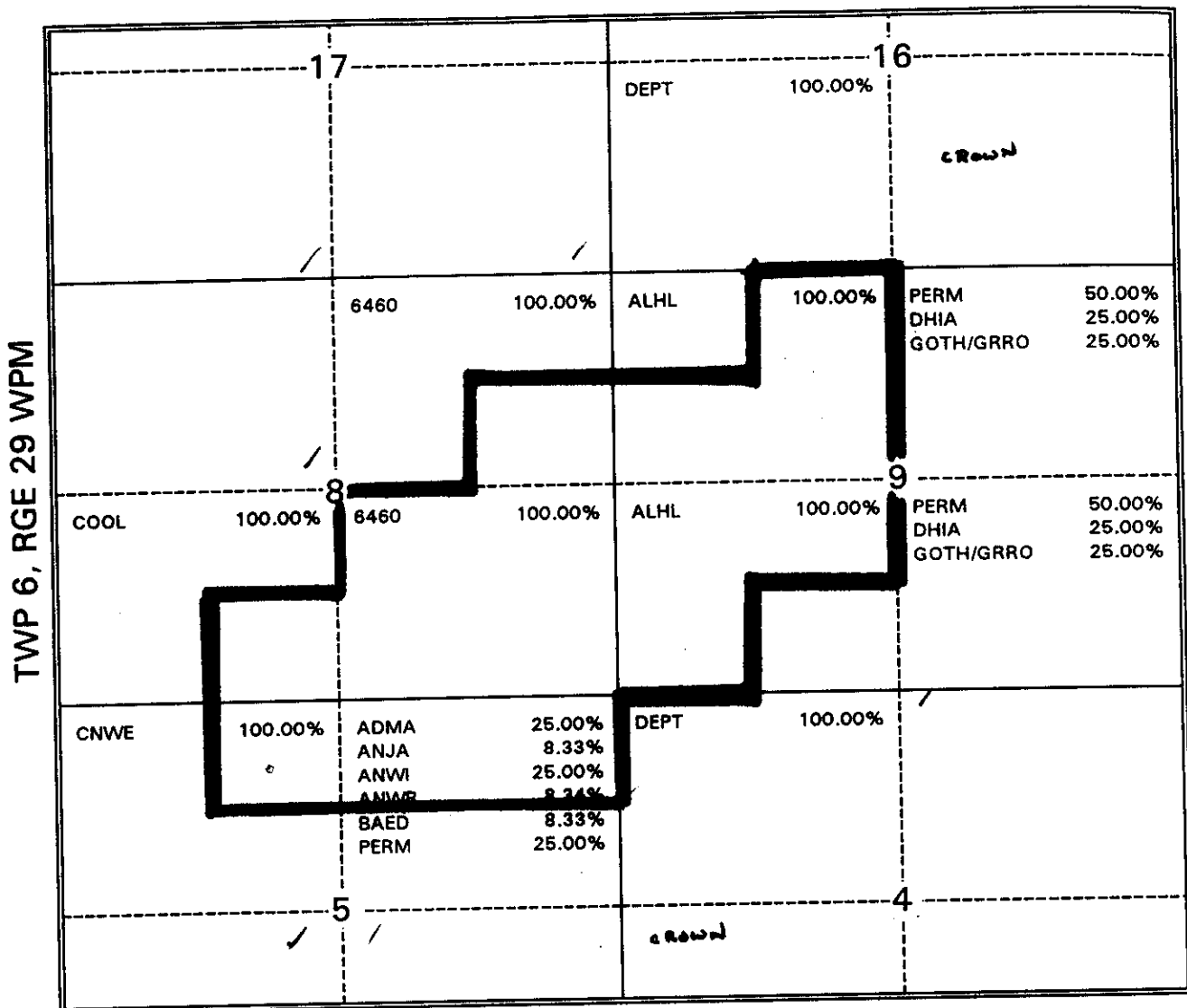


4-9 1-8 2-8 8-8 5-9 12-9 9-8



North Tilston  
Schematic Structural  
Cross-Section  
DATUM - 430m

**Attachment No. 4**  
**Lands Included in Reduced Drilling Spacing Unit Application**



6460 64601 Manitoba Ltd.  
c/o Les Grieves  
2908 Rosser Avenue  
Brandon, Manitoba  
R7B 0G7

ALHL Allnutt Holdings Ltd.  
1650 Ninth Street  
Brandon, Manitoba  
R7A 4E3

DHIA Don Harley Insurance Agencies  
412 - 742 Rosser Avenue  
Brandon, Manitoba

ADMA Margaret Jane Adams  
P.O. Box 165  
Reston, Manitoba  
ROM 1X0

ANJA James Leslie Anderson  
P.O. Box 8  
Tilston, Manitoba  
ROM 2B0

GOTH Thomas Arthur Gould  
General Delivery  
Melita, Manitoba  
ROM 1L0

ANWI William Andrew Anderson  
P.O. Box 8  
Tilston, Manitoba  
ROM 2B0

ANWR William Wray Anderson  
P.O. Box 37  
Tilston, Manitoba  
ROM 2B0

GRRO Robert Lorne Grierson  
General Delivery  
Tilston, Manitoba  
ROM 2B0

BAED Edith May Bartle  
P.O. Box 444  
Reston, Manitoba  
ROM 1X0

PERM Canada Trust c/o Montreal Trust  
411 Eighth Avenue S.W.  
Calgary, Alberta  
T2P 1E7

DEPT Department of Energy & Mines  
555 - 330 Graham Avenue  
Winnipeg, Manitoba  
R3C 4E3

COOL Corveair Oils Ltd.  
P.O. Box 3827, Station "D"  
Edmonton, Alberta  
T5L 4J8

CNWE Canada Northwest Energy Limited  
2700, 300 Fifth Avenue S.W.  
Calgary, Alberta  
T2P 3C4

**— REDUCED DRILLING SPACING AREA**

**Attachment No. 4A**  
**Working Interest Owners in Reduced Drilling Spacing Unit Application**

**Brandon Professional Investments Ltd.**  
**P.O. Box 1270**  
**Brandon, Manitoba**  
**R7A 6K4**

**Tundra Oil and Gas Ltd.**  
**1111 One Lombard Place**  
**Winnipeg, Manitoba**  
**R3B 0X4**

8-6-29

20 ACRE DRILLING  
SPACING UNIT  
CONFIGURATION

SECTION 9-6-29

— 20 ACRE REDUCED SPACING  
APPLICATION AREA

SECTION 5-6-29

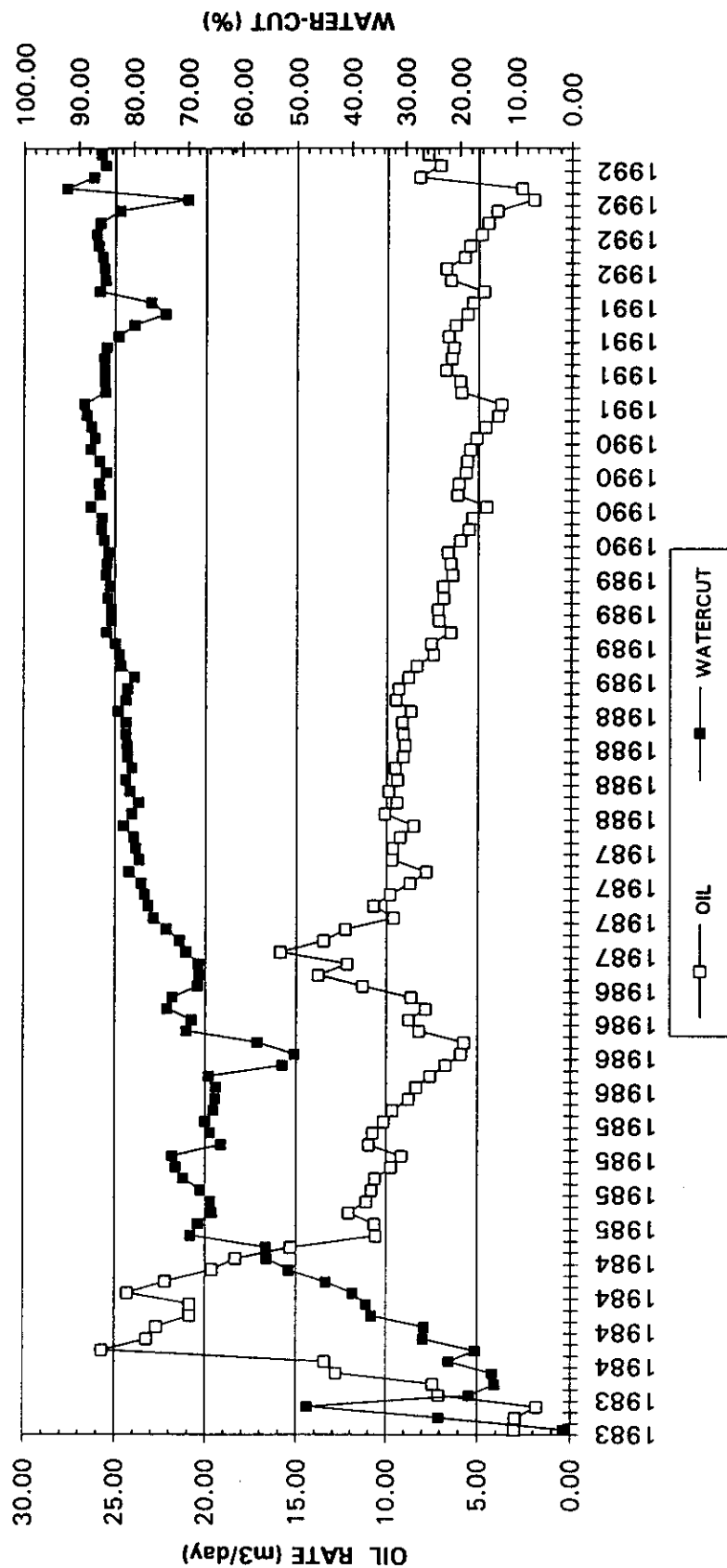
**Tundra** oil and gas ltd.

North Tilston : Net Pay Isopach (m)



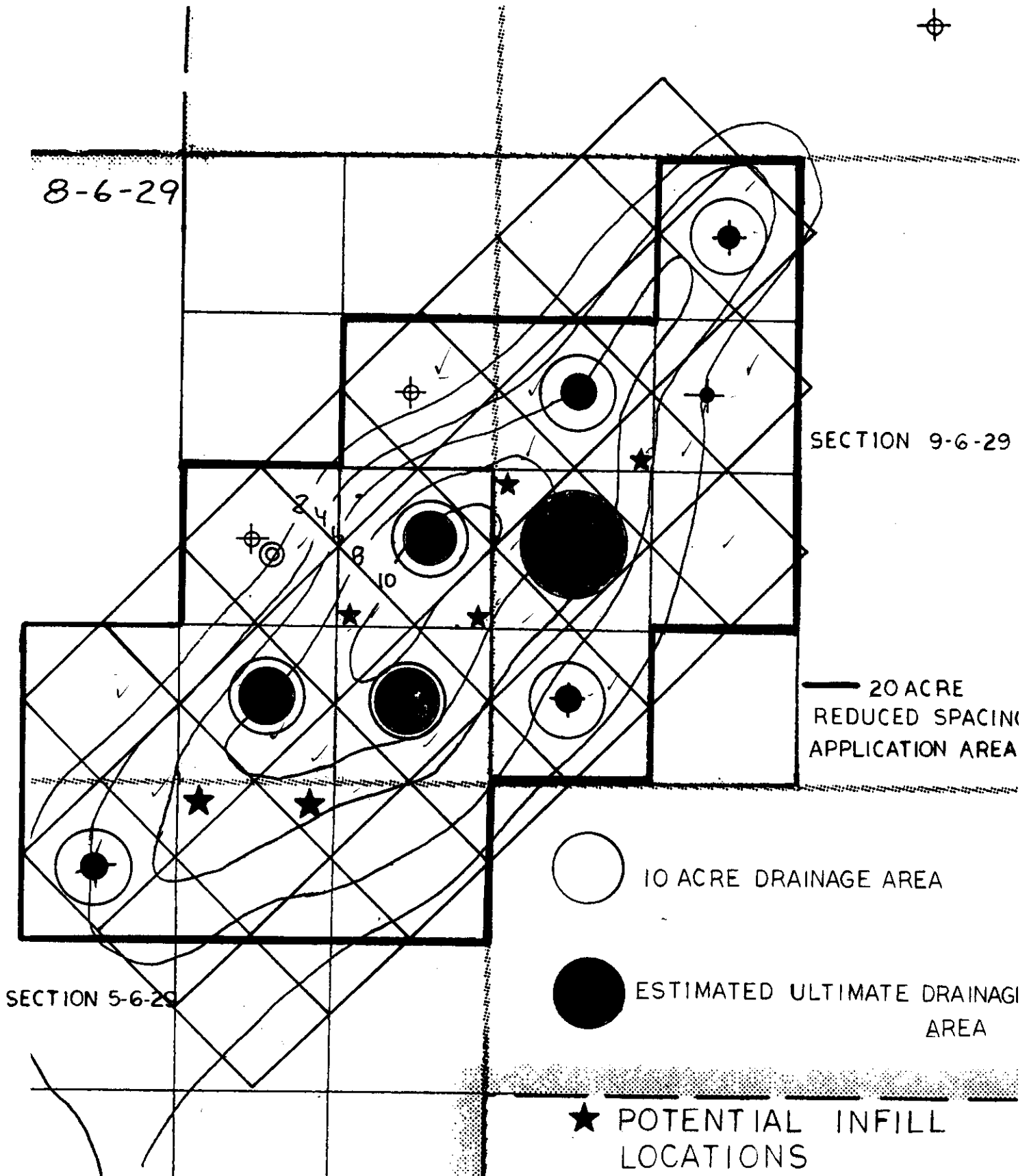
# ATTACHMENT NO.6

## NORTH TILSTON PRODUCTION HISTORY



ATTACHMENT NO.7  
NORTH TILSTON

20 ACRE INFILL DRILLING PROGRAM



# TABLES



TABLE NO. I

|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

				-	
	NORTH TILSTON FIELD				
	RESERVE AND PRODUCTION SUMMARY				
WELL	CUMULATIVE PRODUCTION	ULTIMATE RECOVERY	REMAINING RESERVES		
	(m3)	(m3)	(m3)		
14-5-6-29	940.5	940.5	0		
1-8-6-29	6046.5	9000	2953.5		
2-8-6-29	5252.1	6800	1547.9		
8-8-6-29	6302.1	7900	1597.9		
4-9-6-29	746.5	746.5	0		
5-9-6-29	8753.7	16090.5	7336.8		
11-9-6-29	121.1	121.1	0		
12-9-6-29	2149.9	2800	650.1		
14-9-6-29	285.7	285.7	0		
5-15-6-29	315.7	315.7	0		
TOTAL	30913.8	45000	14086.2		



TABLE NO.4

		NORTH TILSTON FIELD		
		INFILL DRILLING LOCATIONS		
		INCREMENTAL OIL RESERVES		
SECTION	LOCATION	OIL (m3)	OIL (STB)	
NE 1/4 5-8-29				
	15C-5	8,000	50,320	
	15D-5	8,000	50,320	
SW 1/4 8-8-29				
	8A-8	8,000	50,320	
	8B-8	8,000	50,320	
SW 1/4 9-6-29				
	5C-9	9,000	56,810	
NW 1/4 9-6-29				
	12A-9	9,000	56,810	
TOTAL		50,000	314,500	

TABLE NO.5

		NORTH TILSTON FIELD						
		PRODUCTION FORECAST FOR INFILL DRILLING						
				20 ACRE SPACING				
				6 INFILL WELLS				
YEAR	OIL RATE (m3/day)	OIL RATE (STB/day)	ANNUAL PROD. (m3)	ANNUAL PROD. (STB)	CUM. PROD. (m3)	CUM. PROD. (STB)		
1993	30.00	188.70	10,950.00	68,875.50	10,950.00	68,875.50		
1994	23.36	146.94	8,526.52	53,631.82	19,476.52	122,507.32		
1995	18.19	114.42	6,639.41	41,761.91	26,115.93	164,269.23		
1996	14.16	89.09	5,169.96	32,519.07	31,285.90	196,788.29		
1997	11.03	69.38	4,025.74	25,321.88	35,311.63	222,110.17		
1998	8.59	54.02	3,134.75	19,717.58	38,446.38	241,827.75		
1999	6.69	42.06	2,440.96	15,353.64	40,887.34	257,181.39		
2000	5.21	32.75	1,900.72	11,955.54	42,788.07	269,136.93		
2001	4.05	25.51	1,480.05	9,309.51	44,268.12	278,446.44		
2002	3.16	19.86	1,152.48	7,249.11	45,420.60	285,695.56		
2003	2.46	15.46	897.41	5,644.72	46,318.01	291,340.28		
2004	1.91	12.04	698.79	4,395.42	47,016.80	295,735.70		
2005	1.49	9.38	544.14	3,422.62	47,560.94	299,158.31		
2006	1.16	7.30	423.71	2,665.11	47,984.65	301,823.42		
2007	0.90	5.69	329.93	2,075.27	48,314.58	303,898.69		
2008	0.70	4.43	256.91	1,615.96	48,571.49	305,514.65		
2009	0.55	3.45	200.05	1,258.31	48,771.54	306,772.97		
2010	0.43	2.68	155.77	979.82	48,927.31	307,752.79		



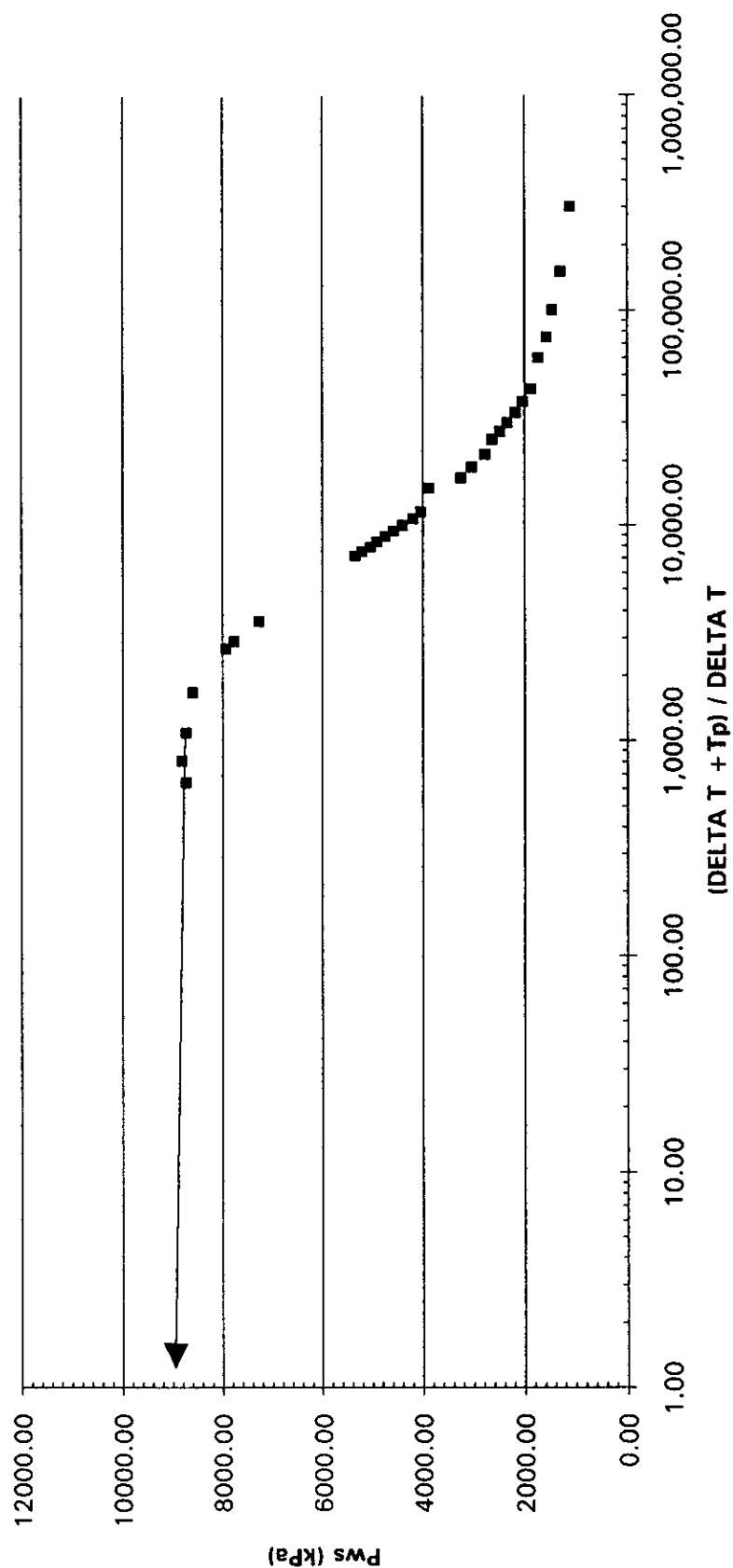
# APPENDICI

**APPENDIX A**

**PRESSURE BUILDUP TEST 5-9-6-29 W1M**

Tp = (18753.7 + 161.6 / 2.94) * 24		NORTH TILSTON											
		5-9-6-29											
Tp = 75340.56 hours		PRESSURE BUILDUP											
		HORNER PLOT DATA											
DATE	TIME	DELTA TIME (hours)	(DELTA T + Tp)	JOINTS TO FLUID	FLUID LEVEL (m)	FLUID PRESSURE (kPa)	CASING PRESSURE (psig)	CASING PRESSURE (kPa)	ADJ. CASING PRESSURE (psig)	TOTAL PRESSURE (psig)	TOTAL PRESSURE (kPa)		
5-May	11:00 AM	0	-	97	922.47	124.05	40	275.80	293.68	60.58	417.73		
5-May	11:15 AM	0.25	301.363.24	95.25	905.93	282.48	112	772.24	821.38	160.10	1,103.86		
5-May	11:30 AM	0.5	150.682.12	93.5	889.19	440.92	116	799.82	849.75	187.19	1,290.67		
5-May	11:45 AM	0.75	100.455.08	92	874.92	576.72	120	827.40	878.20	211.01	1,454.92		
5-May	12:00	1	75.341.56	91	865.41	667.26	122	841.19	892.25	226.18	1,559.51		
5-May	12:15 PM	1.25	60.273.45	89.25	848.77	826.69	124	854.98	905.85	251.13	1,731.55		
5-May	12:45 PM	1.75	43.052.75	88	836.88	938.86	128	882.56	934.32	271.67	1,873.18		
5-May	13:00	2	37.671.28	86.5	822.82	1,074.67	132	910.14	962.58	295.47	2,037.25		
5-May	1:15 PM	2.25	33.485.69	85.25	810.73	1,187.83	136	937.72	990.96	315.99	2,178.78		
5-May	1:30 PM	2.5	30.137.22	83.75	796.46	1,323.64	140	985.30	1,047.37	339.77	2,342.74		
5-May	1:45 PM	2.75	27.397.57	82.5	784.58	1,436.81	144	982.88	1,047.37	339.77	2,342.74		
5-May	2:00 PM	3	25.114.52	81	770.31	1,572.61	146	1,006.67	1,060.89	381.84	2,633.50		
5-May	2:30 PM	3.5	21.526.87	79.5	758.05	1,708.41	148	1,020.45	1,074.38	403.59	2,782.79		
5-May	3:00 PM	4	18.836.14	77	732.27	1,934.76	152	1,048.04	1,101.63	440.37	3,036.38		
5-May	3:30 PM	4.5	16.743.35	75	713.25	2,115.82	156	1,075.62	1,129.15	470.63	3,244.97		
5-May	4:00 PM	5	15.069.11	69	666.19	2,659.03	168	1,158.36	1,211.30	561.32	3,870.33		
5-May	5:30 PM	6.5	11.591.86	67.5	641.93	2,794.83	172	1,185.94	1,238.93	596.03	4,033.77		
5-May	6:00 PM	7	10.763.94	66	627.66	2,930.64	176	1,206.63	1,259.32	607.68	4,189.95		
5-May	6:30 PM	7.5	10.046.41	64	608.64	3,111.71	180	1,241.10	1,293.62	638.92	4,405.33		
5-May	7:00 PM	8	9.418.57	62.5	594.38	3,247.51	185	1,275.58	1,328.26	663.64	4,575.77		
5-May	7:30 PM	8.5	8.864.60	61	580.11	3,383.31	190	1,310.05	1,362.84	688.35	4,748.15		
5-May	8:00 PM	9	8.372.17	59.5	565.85	3,519.12	194	1,337.63	1,390.18	712.01	4,909.29		
5-May	8:30 PM	9.5	7.931.59	58.25	553.96	3,632.28	196	1,351.42	1,403.37	730.33	5,035.66		
5-May	9:00 PM	10	7.535.06	56.5	537.32	3,790.72	200	1,378.00	1,430.39	757.23	5,221.11		
5-May	9:30 PM	10.5	7.176.29	55.5	527.81	3,881.26	205	1,413.48	1,465.20	775.41	5,346.46		
6-May	8:00 AM	21	3.588.65	40	380.40	5,294.55	280	1,930.60	1,981.27	1053.78	7,266.82		
6-May	1:00 PM	26	2.898.71	36	342.36	5,646.69	300	2,068.50	2,117.29	1126.03	7,763.98		
6-May	3:00 PM	28	2.691.73	35	322.85	5,737.23	310	2,137.45	2,186.45	1149.19	7,923.68		
7-May	8:00 AM	45	1.675.23	30.25	287.68	6,167.27	345	2,378.78	2,425.84	1246.28	8,593.11		
8-May	8:00 AM	69	1.092.89	30.25	287.68	6,167.27	365	2,516.68	2,566.46	1266.68	8,733.73		
9-May	8:00 AM	93	811.11	30.25	287.68	6,167.27	375	2,565.63	2,636.78	1276.87	8,804.05		
10-May	8:00 AM	117	644.94	30.25	287.68	6,167.27	365	2,516.68	2,566.46	1266.68	8,733.73		

# NORTH TILSTON 5-9-6-29 HORNER PLOT



**APPENDIX B**

**PRODUCTION STATISTICS FOR TOTAL NORTH TILSTON FIELD**

YEAR	MONTH	CUM. OIL (m3)	NORTH TILSTON FIELD PRODUCTION HISTORY				MONTH OIL (m3)	MONTH WATER (m3)	CUM. WATER (m3)
			OIL RATE (m3/day)	WATER-CUT (%)					
1983	JAN.	0	0.00	0.00		0	0	0	0
1983	FEB.	0	0.00	0.00		0	0	0	0
1983	MARCH	0	0.00	0.00		0	0	0	0
1983	APRIL	0	0.00	0.00		0	0	0	0
1983	MAY	0	0.00	0.00		0	0	0	0
1983	JUNE	0	0.00	0.00		0	0	0	0
1983	JULY	0	0.00	0.00		0	0	0	0
1983	AUGUST	93.2	3.01	1.17		93.2	1.1	1.1	1.1
1983	SEPT.	182	2.96	23.51		88.8	27.3	28.4	28.4
1983	OCT.	237.8	1.80	48.00		55.8	51.5	79.9	79.9
1983	NOV.	449.8	7.07	18.02		212	46.6	126.5	126.5
1983	DEC.	678.4	7.37	13.57		228.6	35.9	162.4	162.4
1984	JAN.	1074.6	12.78	13.94		396.2	64.2	226.6	226.6
1984	FEB.	1450.5	13.43	21.75		375.9	104.5	331.1	331.1
1984	MARCH	2246.6	25.68	16.99		796.1	162.9	494	494
1984	APRIL	2943	23.21	26.42		696.4	250.1	744.1	744.1
1984	MAY	3646.3	22.69	26.19		703.3	249.6	993.7	993.7
1984	JUNE	4271.5	20.84	36.03		625.2	352.1	1345.8	1345.8
1984	JULY	4918	20.85	36.99		646.5	379.6	1725.4	1725.4
1984	AUGUST	5670.8	24.28	39.49		752.8	491.3	2216.7	2216.7
1984	SEPT.	6337	22.21	44.63		666.2	536.9	2753.6	2753.6
1984	OCT.	6945.3	19.62	51.35		608.3	642.1	3395.7	3395.7
1984	NOV.	7495.1	18.33	55.41		549.8	683.2	4078.9	4078.9
1984	DEC.	7970	15.32	55.52		474.9	592.8	4671.7	4671.7
1985	JAN.	8298	10.58	69.33		328	741.6	5413.3	5413.3
1985	FEB.	8595.6	10.63	67.98		297.6	631.7	6045	6045
1985	MARCH	8969.9	12.07	65.37		374.3	706.4	6751.4	6751.4
1985	APRIL	9302.3	11.08	65.67		332.4	635.9	7387.3	7387.3
1985	MAY	9636.8	10.79	67.49		334.5	694.4	8081.7	8081.7
1985	JUNE	9954.8	10.60	70.62		318	764.4	8846.1	8846.1
1985	JULY	10255.7	9.71	72.02		300.9	774.7	9620.8	9620.8
1985	AUGUST	10538	9.11	72.74		282.3	753.1	10373.9	10373.9
1985	SEPT.	10867.1	10.97	63.82		329.1	580.4	10954.3	10954.3
1985	OCT.	11200	10.74	65.87		332.9	642.5	11596.8	11596.8
1985	NOV.	11503.1	10.10	66.69		303.1	606.9	12203.7	12203.7
1985	DEC.	11802.2	9.65	65.12		299.1	558.4	12762.1	12762.1
1986	JAN.	12073.1	8.74	64.87		270.9	500.2	13262.3	13262.3
1986	FEB.	12305.9	8.31	64.75		232.8	427.6	13689.9	13689.9

				NORTH TILSTON FIELD PRODUCTION HISTORY							
YEAR	MONTH	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	MONTH OIL (m3)	MONTH WATER (m3)	CUM. WATER (m3)				
1986	MARCH	12539.5	7.54	66.01	233.6	453.6	14143.5				
1986	APRIL	12740.5	6.70	52.47	201	221.9	14365.4				
1986	MAY	12922.2	5.86	50.31	181.7	184	14549.4				
1986	JUNE	13093.4	5.71	57.14	171.2	228.2	14777.6				
1986	JULY	13345.9	8.15	70.07	252.5	591.1	15368.7				
1986	AUGUST	13616.4	8.73	69.10	270.5	605	15973.7				
1986	SEPT.	13850.3	7.80	73.69	233.9	655.2	16628.9				
1986	OCT.	14116.7	8.59	72.70	266.4	709.6	17338.5				
1986	NOV.	14455.9	11.31	68.09	339.2	723.8	18062.3				
1986	DEC	14882.9	13.77	67.82	427	900	18962.3				
1987	JAN.	15260	12.16	67.93	377.1	798.6	19760.9				
1987	FEB.	15705	15.89	70.22	445	1049.2	20810.1				
1987	MARCH	16123.9	13.51	71.47	418.9	1049.2	21859.3				
1987	APRIL	16491.9	12.27	73.91	368	1042.6	22901.9				
1987	MAY	16788.3	9.56	76.23	296.4	950.7	23852.6				
1987	JUNE	17109.5	10.71	77.26	321.2	1091.1	24943.7				
1987	JULY	17411.9	9.75	77.80	302.4	1059.7	26003.4				
1987	AUGUST	17680.8	8.67	78.45	268.9	978.8	26982.2				
1987	SEPT.	17914.1	7.78	80.69	233.3	975.1	27957.3				
1987	OCT.	18213.4	9.65	78.86	299.3	1116.5	29073.8				
1987	NOV.	18502.9	9.65	79.41	289.5	1116.6	30190.4				
1987	DEC	18788.8	9.22	79.91	285.9	1137.4	31327.8				
1988	JAN.	19051.2	8.46	81.67	262.4	1169	32496.8				
1988	FEB.	19333.4	10.08	80.19	282.2	1142	33638.8				
1988	MARCH	19625.4	9.42	78.92	292	1093	34731.8				
1988	APRIL	19921.5	9.87	80.51	296.1	1223.1	35954.9				
1988	MAY	20212.6	9.39	81.29	291.1	1264.9	37219.8				
1988	JUNE	20497.4	9.49	80.20	284.8	1153.3	38373.1				
1988	JULY	20778.1	9.05	80.94	280.7	1192	39565.1				
1988	AUGUST	21055.5	8.95	81.10	277.4	1190.2	40755.3				
1988	SEPT.	21327.4	9.06	81.23	271.9	1176.5	41931.8				
1988	OCT.	21610.4	9.13	81.28	283	1229.1	43160.9				
1988	NOV.	21870	8.65	82.68	259.6	1239.2	44400.1				
1988	DEC	22164.2	9.49	81.30	294.2	1279.3	45679.4				
1989	JAN.	22453	9.32	80.99	288.8	1230.3	46909.7				
1989	FEB.	22698.6	8.77	79.74	245.6	966.6	47876.3				
1989	MARCH	22956.4	8.32	82.19	257.8	1189.7	49066				
1989	APRIL	23177.6	7.37	82.51	221.2	1043.5	50109.5				
1989	MAY	23410.7	7.52	83.21	233.1	1154.9	51264.4				

		NORTH TILSTON FIELD PRODUCTION HISTORY							
YEAR	MONTH	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	MONTH OIL (m3)	MONTH WATER (m3)	CUM. WATER (m3)		
1989	JUNE	23604.2	6.45	84.77	193.5	1077.2	52341.6		
1989	JULY	23823.6	7.08	83.99	219.4	1150.8	53492.4		
1989	AUGUST	24045.7	7.16	83.90	222.1	1157.6	54650		
1989	SEPT.	24250.5	6.83	84.65	204.8	1129	55779		
1989	OCT.	24463.8	6.88	84.14	213.3	1131.3	56910.3		
1989	NOV.	24654.4	6.35	84.89	190.6	1071.1	57981.4		
1989	DEC	24854.4	6.45	84.72	200	1108.6	59090		
1990	JAN.	25059.2	6.61	84.44	204.8	1111.8	60201.8		
1990	FEB.	25225.3	5.93	85.30	166.1	963.9	61165.7		
1990	MARCH	25394.9	5.47	85.82	169.6	1026.3	62192		
1990	APRIL	25553.5	5.29	85.71	158.6	950.9	63142.9		
1990	MAY	25694.4	4.55	87.71	140.9	1005.5	64148.4		
1990	JUNE	25877	6.09	86.01	182.6	1122.7	65271.1		
1990	JULY	26064.3	6.04	86.23	187.3	1172.7	66443.8		
1990	AUGUST	26239.7	5.66	84.92	175.4	987.6	67431.4		
1990	SEPT.	26406.7	5.57	86.08	167	1032.7	68464.1		
1990	OCT.	26575.1	5.43	87.75	168.4	1206	69670.1		
1990	NOV.	26727.6	5.08	87.01	152.5	1021.5	70891.6		
1990	DEC	26870.7	4.62	87.62	143.1	1013.1	71704.7		
1991	JAN.	26992.3	3.92	88.53	121.6	938.4	72643.1		
1991	FEB.	27097.8	3.77	88.87	105.5	842.6	73485.7		
1991	MARCH	27280.6	5.90	85.02	182.8	1037.4	74523.1		
1991	APRIL	27459.5	5.96	85.15	178.9	1026	75549.1		
1991	MAY	27668.7	6.75	85.18	209.2	1202.2	76751.3		
1991	JUNE	27860.7	6.40	85.26	192	1110.8	77862.1		
1991	JULY	28056.6	6.32	84.82	195.9	1095	78957.1		
1991	AUGUST	28261.6	6.61	82.69	205	979.1	79936.2		
1991	SEPT.	28448	6.21	79.77	186.4	735.2	80671.4		
1991	OCT.	28620.5	5.56	74.12	172.5	494.1	81165.5		
1991	NOV.	28778.9	5.28	76.76	158.4	523.3	81688.8		
1991	DEC	28924.8	4.71	86.13	145.9	905.7	82594.5		
1992	JAN.	29125.6	6.48	85.00	200.8	1138.1	83732.6		
1992	FEB.	29314.1	6.73	85.20	188.5	1085.2	84817.8		
1992	MARCH	29492.2	5.75	85.58	178.1	1057.4	85875.2		
1992	APRIL	29655.9	5.46	86.31	163.7	1031.8	86907		
1992	MAY	29806.2	4.85	86.61	150.3	972.1	87879.1		
1992	JUNE	29940.5	4.48	85.96	134.3	822.4	88701.5		
1992	JULY	30064.3	3.99	82.49	123.8	583.4	89284.9		
1992	AUGUST	30127.2	2.03	69.99	62.9	146.7	89431.6		

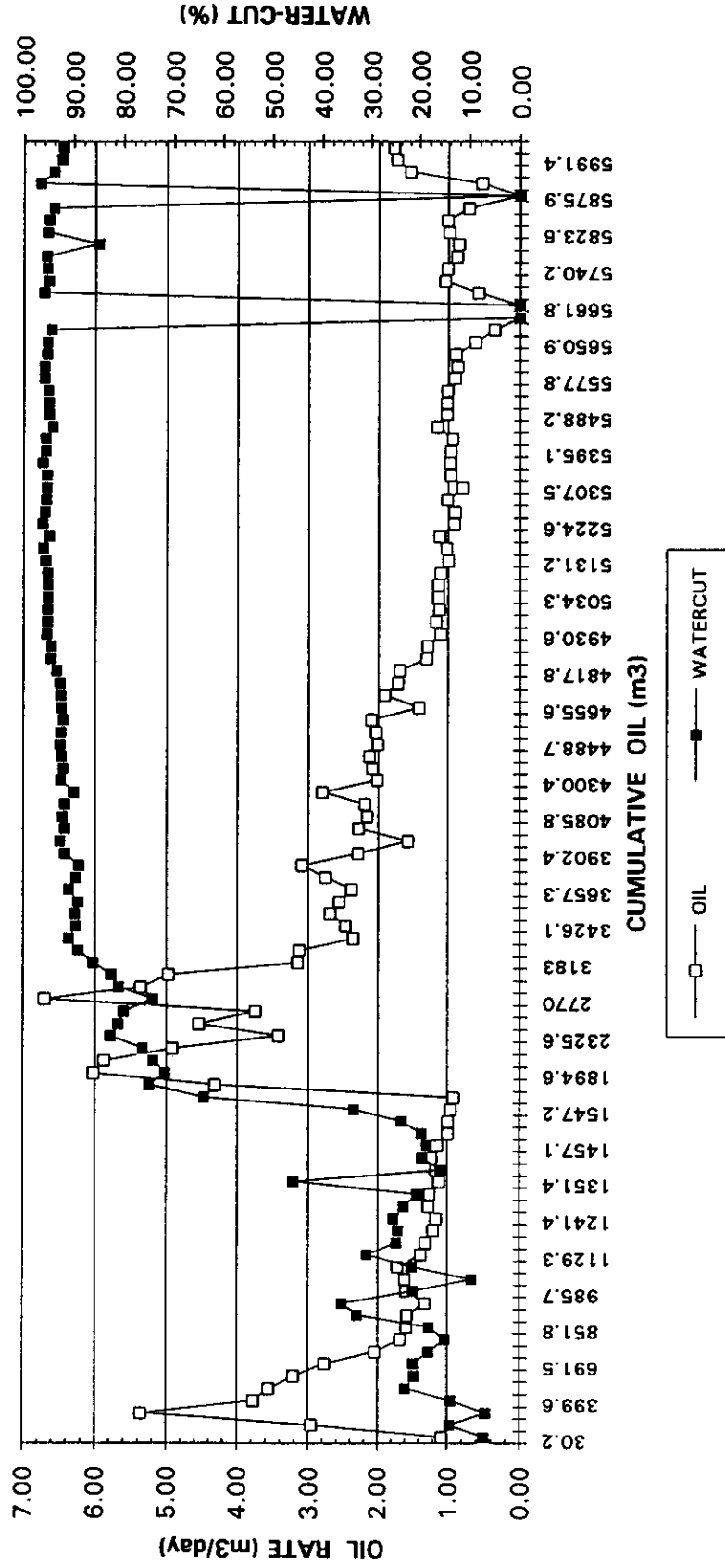


		NORTH TILSTON FIELD PRODUCTION HISTORY					
YEAR	MONTH	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	MONTH OIL (m3)	MONTH WATER (m3)	CUM. WATER (m3)
1992	SEPT.	30207.4	2.67	92.09	80.2	933.8	90365.4
1992	OCT.	30461.5	8.20	87.23	254.1	1735	92100.4
1992	NOV.	30673.5	7.07	85.07	212	1208.4	93308.8
1992	DEC	30913.8	7.75	87.42	240.3	1669.2	94978

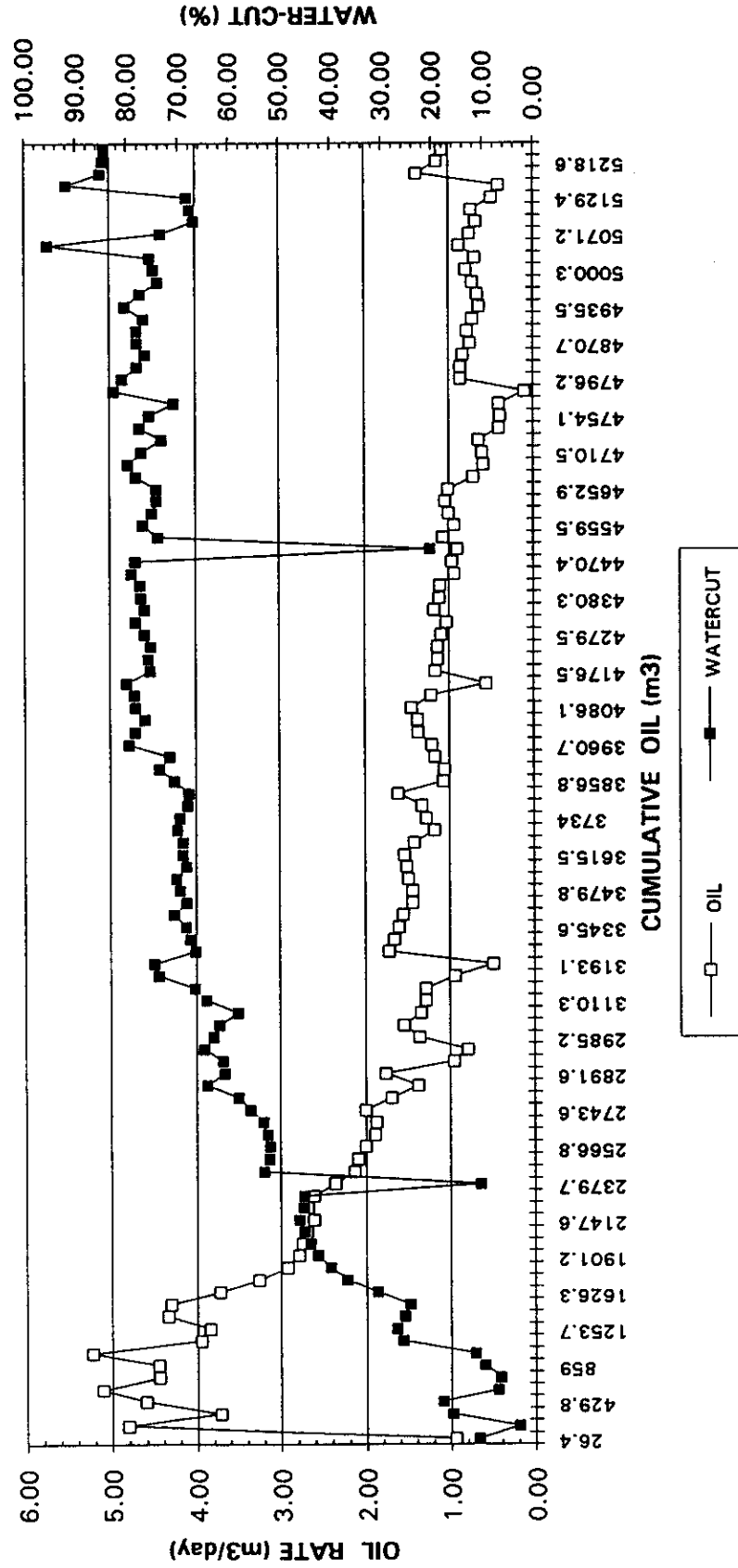
**APPENDIX C**

**INDIVIDUAL WELL PRODUCTION PLOTS**

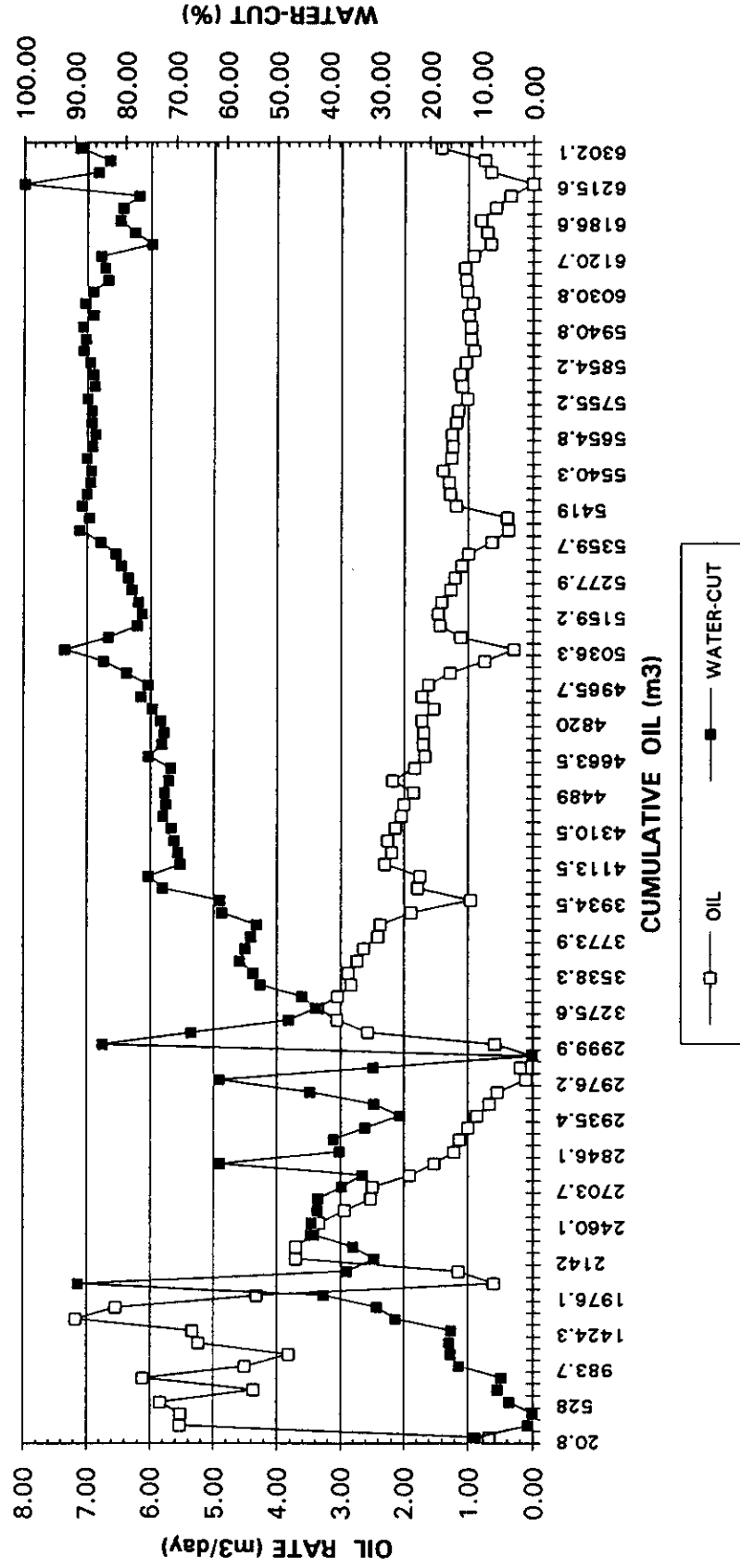
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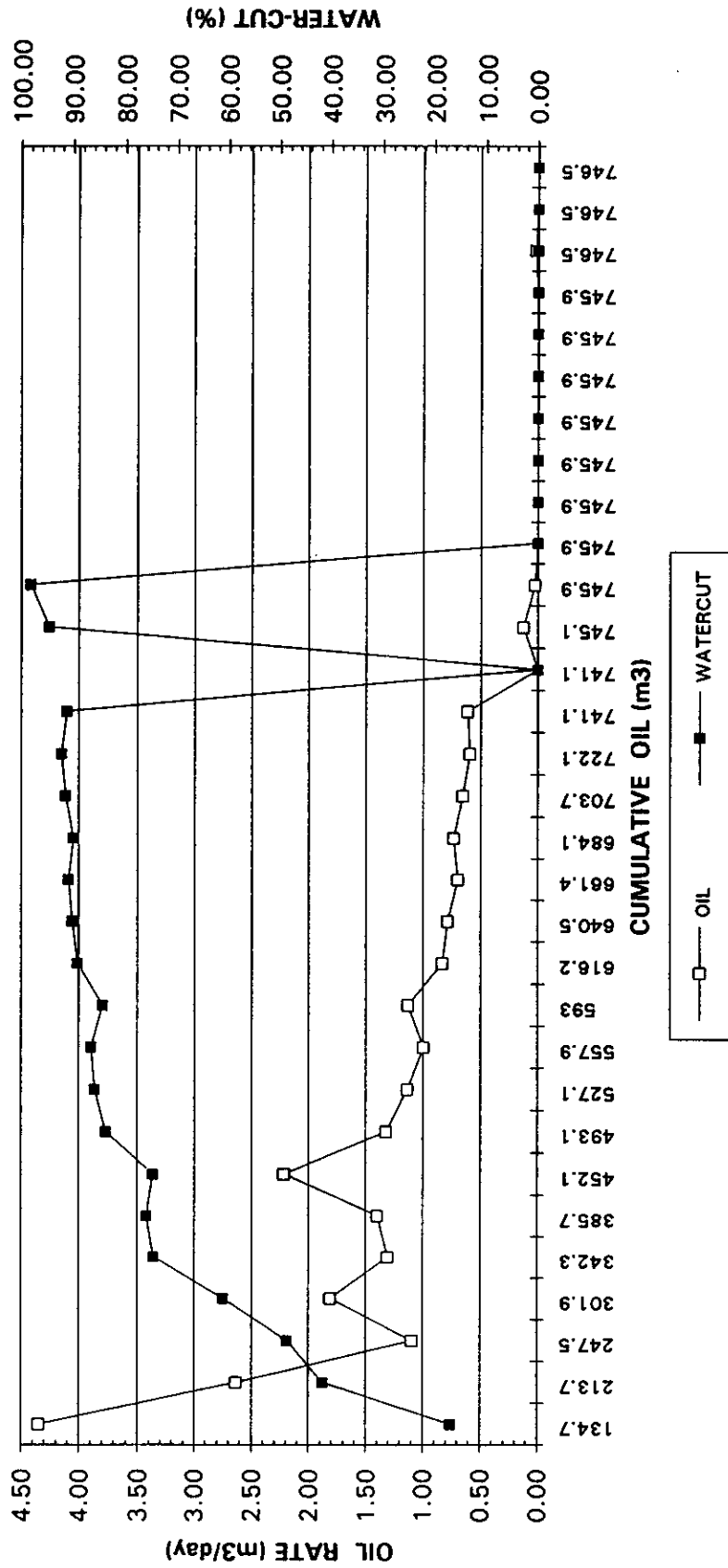
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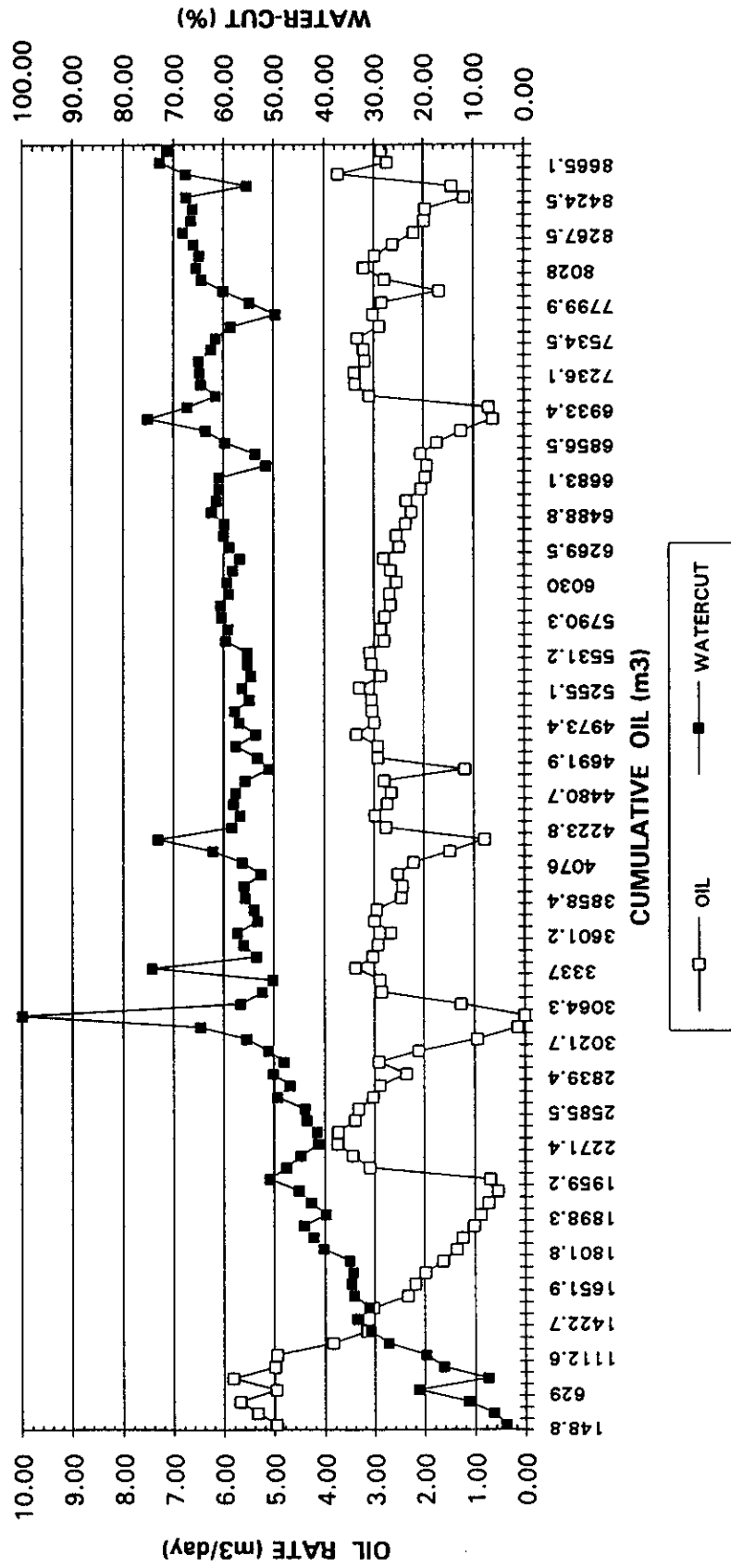
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# NORTH TILSTON 4-9-6-29



# NORTH TILSTON 5-9-6-29



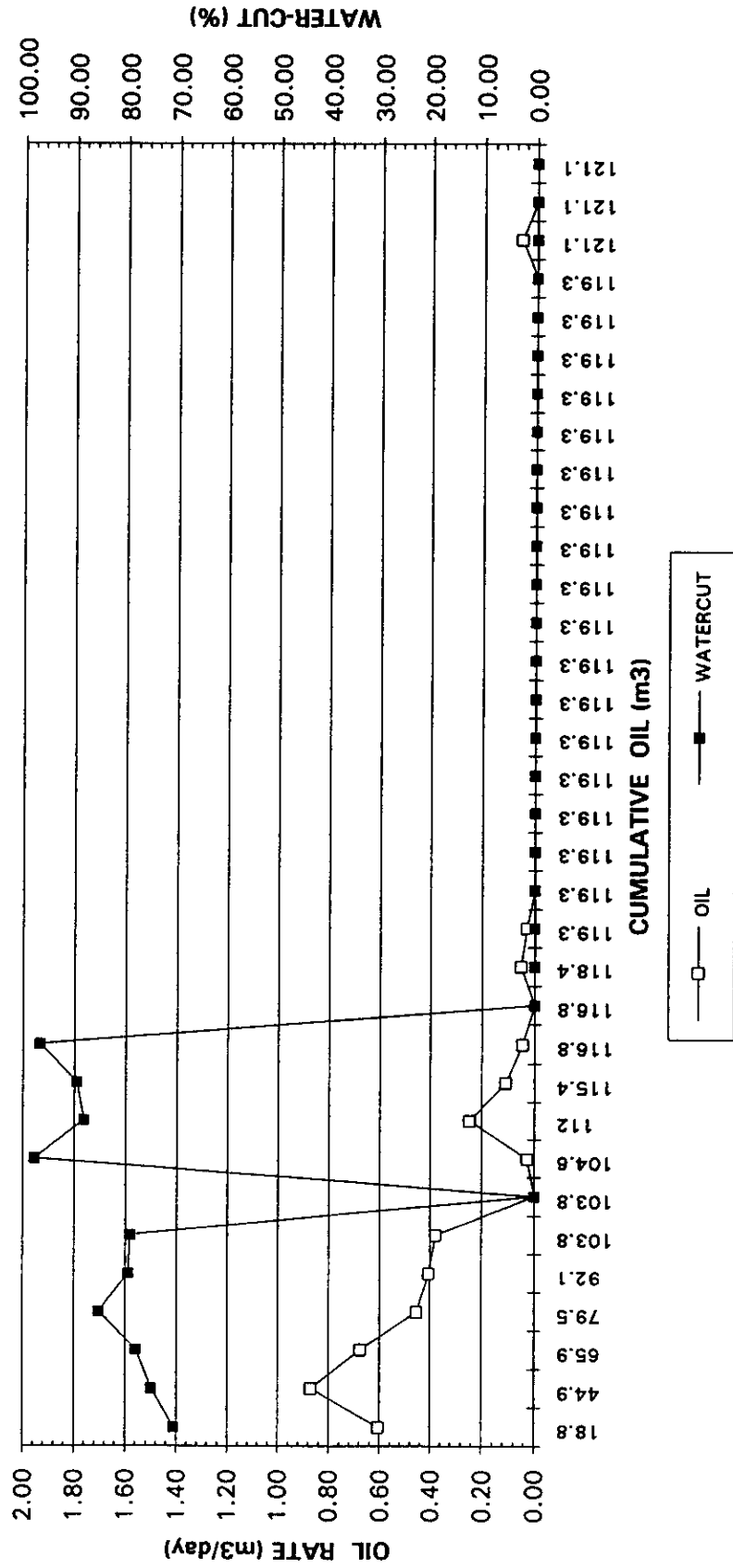
**Oil Rate (m3/day)**

**Water-Cut (%)**

**Cumulative Oil (m3)**

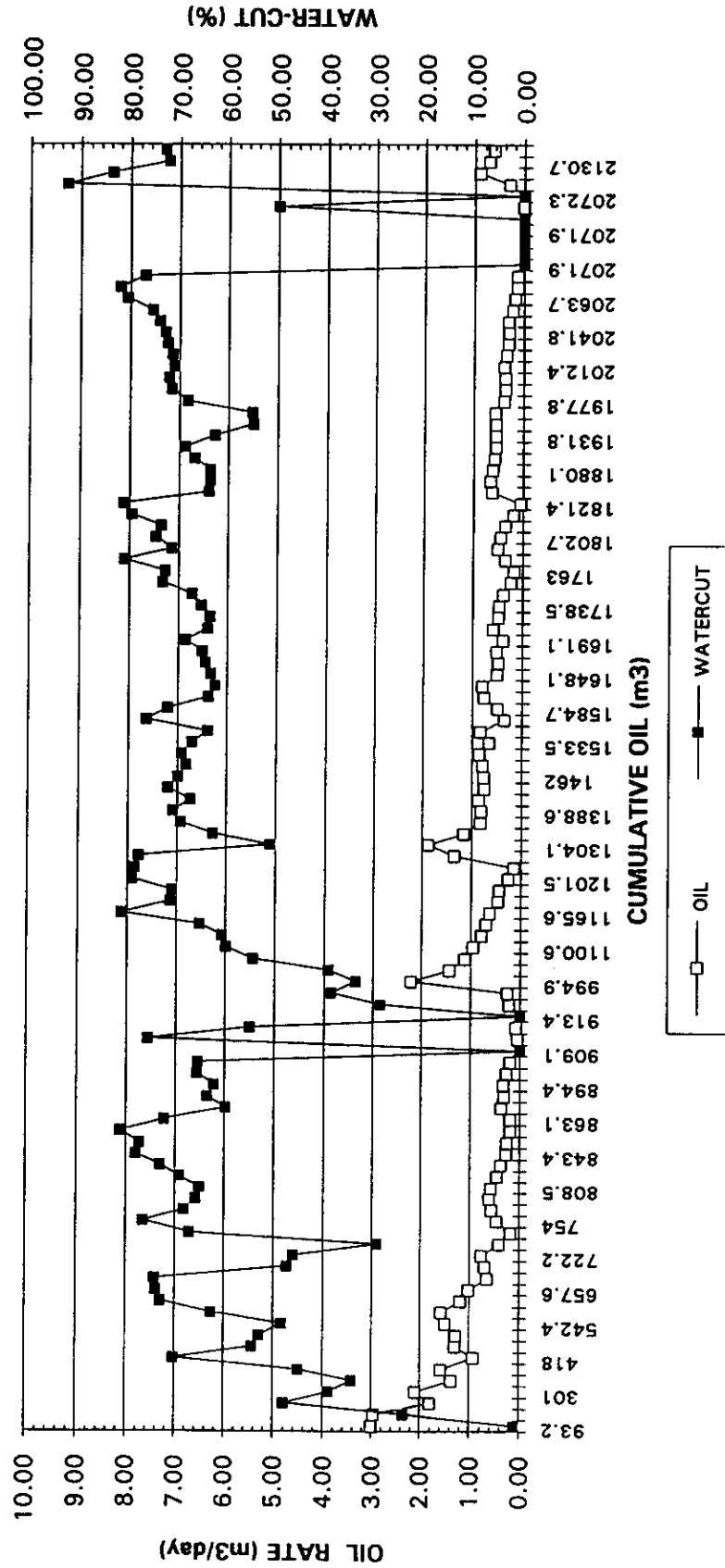
Legend: □ OIL ■ WATERCUT

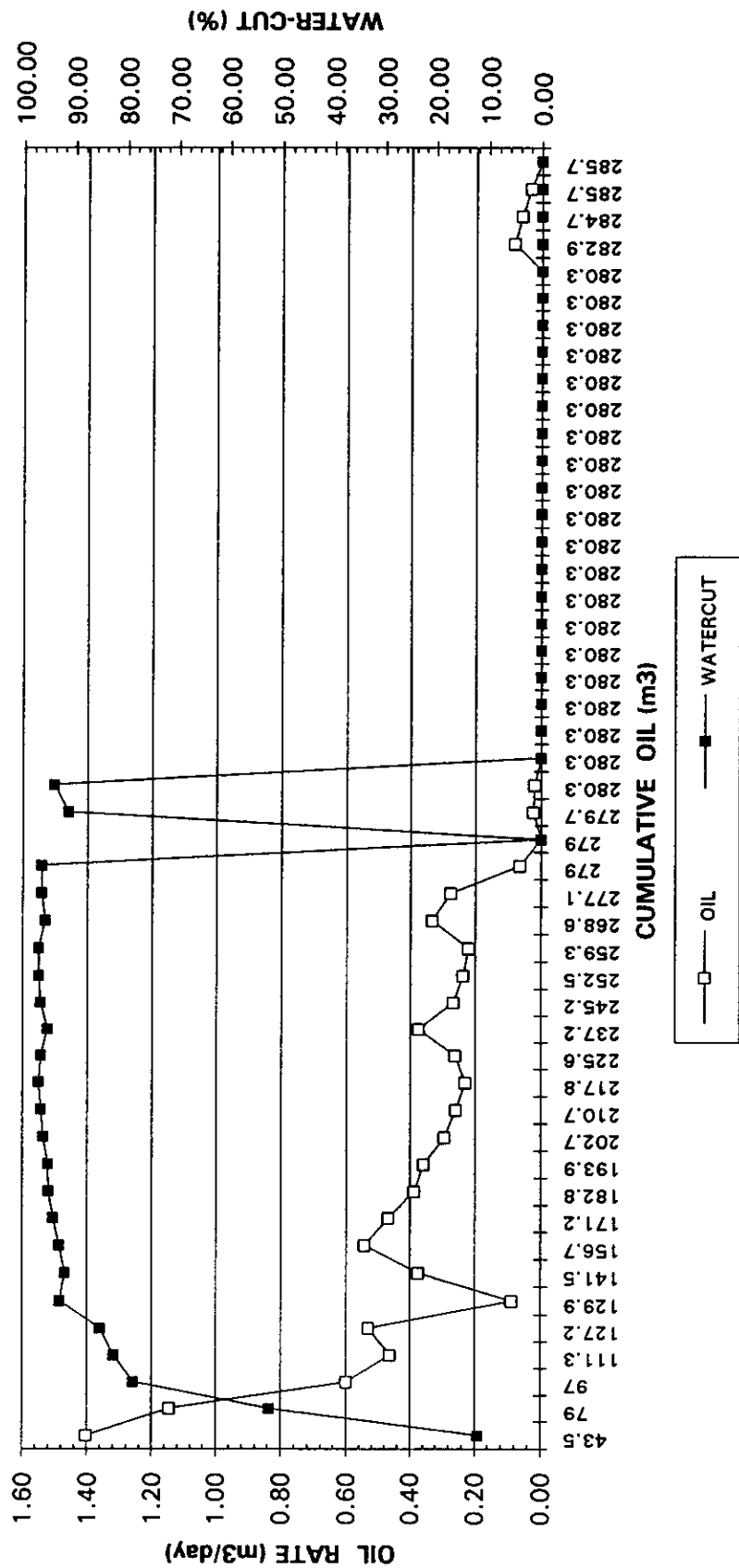
Cumulative Oil (m3)	Oil Rate (m3/day)	Water-Cut (%)
18.8	1.85	18.8
44.9	0.65	44.9
65.9	0.75	55.0
79.5	0.85	65.0
92.1	0.95	75.0
103.8	1.05	85.0
104.8	1.15	90.0
112	1.25	95.0
115.4	1.35	98.0
116.8	1.45	99.0
118.4	1.55	99.5
119.3	1.65	99.8
121.1	1.85	100.0



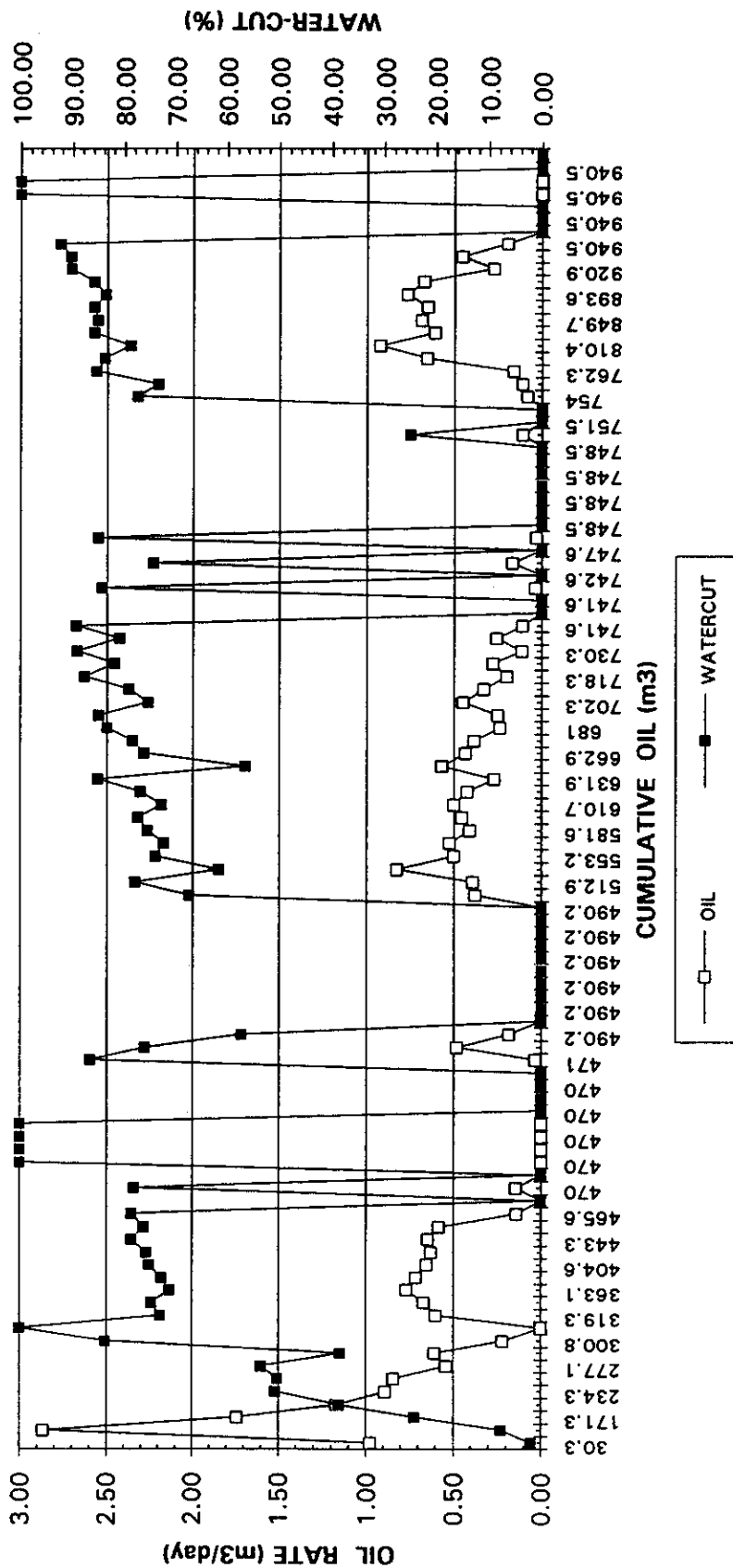


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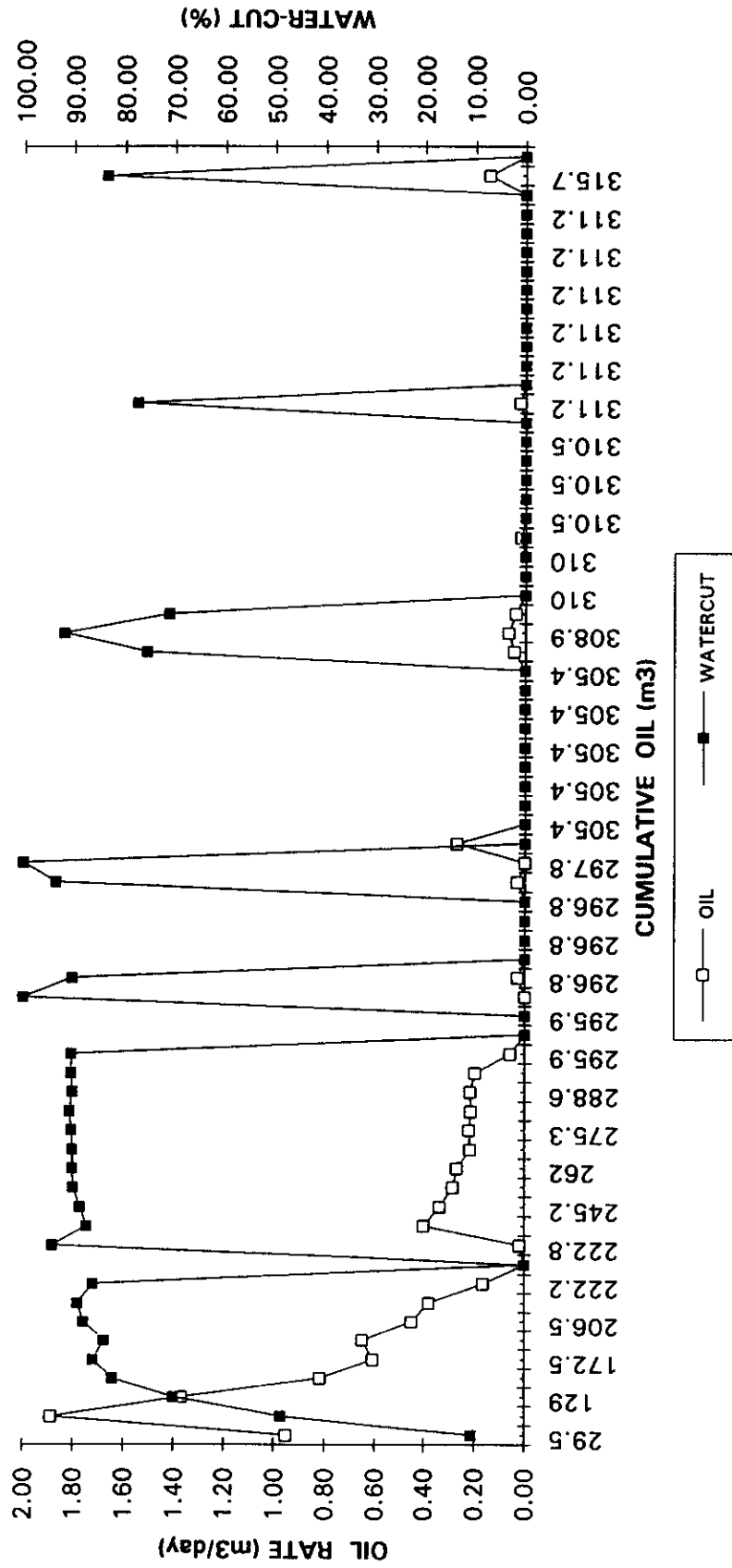


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# NORTH TILSTON 14-5-6-29



# NORTH TILSTON 5-15-6-29



**APPENDIX D**

**INDIVIDUAL WELL PRODUCTION STATISTICS**

NORTH TILSTON FIELD									
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
1983	JAN.	31	0	0	0.00	0.00	0	0	
	FEB.	28	0	0	0.00	0.00	0	0	
	MARCH	31	0	0	0.00	0.00	0	0	
	APRIL	30	0	0	0.00	0.00	0	0	
	MAY	31	0	0	0.00	0.00	0	0	
	JUNE	30	0	0	0.00	0.00	0	0	
	JULY	31	0	0	0.00	0.00	0	0	
	AUGUST	31	0	0	0.00	0.00	0	0	
	SEPT.	30	0	0	0.00	0.00	0	0	
	OCT.	31	0	0	0.00	0.00	0	0	
	NOV.	30	0	0	0.00	0.00	0	0	
	DEC.	31	0	0	0.00	0.00	0	0	
1984	JAN.	31	0	0	0.00	0.00	0	0	
	FEB.	28	30.2	30.2	1.08	7.08	2.3	2.3	
	MARCH	31	91.9	122.1	2.96	13.79	14.7	17	
	APRIL	30	160.7	282.8	5.36	6.79	11.7	28.7	
	MAY	31	116.8	399.6	3.77	13.61	18.4	47.1	
	JUNE	30	108.5	508.1	3.55	22.83	31.5	78.6	
	JULY	31	99.4	605.5	3.21	21.05	26.5	105.1	
	AUGUST	31	86	691.5	2.77	21.10	23	128.1	
	SEPT.	30	61.2	752.7	2.04	18.07	13.5	141.6	
	OCT.	31	51.7	804.4	1.67	14.83	9	150.6	
	NOV.	30	47.4	851.8	1.58	17.99	10.4	161	
	DEC.	31	48.6	900.4	1.57	32.78	23.7	184.7	
1985	JAN.	31	40.8	941.2	1.32	35.95	22.9	207.6	
	FEB.	28	44.5	985.7	1.59	21.24	12	219.6	
	MARCH	31	49.7	1035.4	1.60	9.47	5.2	224.8	
	APRIL	30	51.3	1086.7	1.71	21.44	14	238.8	
	MAY	31	42.6	1129.3	1.37	30.73	18.9	257.7	
	JUNE	30	39.1	1168.4	1.30	24.66	12.8	270.5	
	JULY	31	37.1	1205.5	1.20	24.29	11.9	282.4	
	AUGUST	31	35.9	1241.4	1.16	25.21	12.1	294.5	
	SEPT.	30	37.9	1279.3	1.26	23.12	11.4	305.9	
	OCT.	31	38.6	1317.9	1.25	20.41	9.9	315.8	
	NOV.	30	33.5	1351.4	1.12	45.79	28.3	344.1	
	DEC.	31	35.8	1387.2	1.15	15.57	6.6	350.7	
1986	JAN.	31	38	1425.2	1.23	19.32	9.1	359.8	
	FEB.	28	31.9	1457.1	1.14	18.41	7.2	367	



NORTH TILSTON FIELD									
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
				1-8-8-29					
	JUNE	30	39	4858.8	1.30	94.54	675.7	24304.7	
	JULY	31	39.8	4898.6	1.28	94.42	673.2	24977.9	
	AUGUST	31	34	4930.6	1.10	95.33	693.7	25671.6	
	SEPT.	30	35.1	4965.7	1.17	95.21	698	26369.6	
	OCT.	31	34.5	5000.2	1.11	95.23	688.3	27057.9	
	NOV.	30	34.1	5034.3	1.14	95.11	683.4	27721.3	
	DEC	31	35	5069.3	1.13	95.14	685	28406.3	
1990	JAN.	31	34.1	5103.4	1.10	95.24	682.5	29088.8	
	FEB.	28	27.8	5131.2	0.99	95.56	598.6	29687.4	
	MARCH	31	31.6	5162.8	1.02	96.01	759.5	30446.9	
	APRIL	30	33.6	5196.4	1.12	94.90	625.5	31072.4	
	MAY	31	28.2	5224.6	0.91	96.14	701.6	31774	
	JUNE	30	27.1	5251.7	0.90	95.74	609.7	32383.7	
	JULY	31	31.2	5282.9	1.01	95.53	667.4	33051.1	
	AUGUST	31	24.6	5307.5	0.79	95.37	506.6	33557.7	
	SEPT.	30	28.8	5336.3	0.96	95.33	588.1	34145.8	
	OCT.	31	30.1	5366.4	0.97	96.14	749.9	34895.7	
	NOV.	30	28.7	5395.1	0.96	95.57	618.8	35514.5	
	DEC	31	28.9	5424	0.93	95.85	635.8	36150.3	
1991	JAN.	31	35.7	5459.7	1.15	94.20	579.7	36730	
	FEB.	28	28.5	5488.2	1.02	94.95	535.4	37265.4	
	MARCH	31	31.5	5519.7	1.02	95.07	607.6	37873	
	APRIL	30	30.2	5549.9	1.01	95.19	597.2	38470.2	
	MAY	31	27.9	5577.8	0.90	95.81	638.2	39108.4	
	JUNE	30	26	5603.8	0.87	95.85	599.9	39708.3	
	JULY	31	27.8	5631.6	0.90	95.41	578.5	40286.8	
	AUGUST	31	19.3	5650.9	0.62	95.29	390.7	40677.5	
	SEPT.	30	10.9	5661.8	0.36	94.40	183.6	40861.1	
	OCT.	31	0	5661.8	0.00	0.00	0	40861.1	
	NOV.	30	0	5661.8	0.00	0.00	0	40861.1	
	DEC	31	17.9	5679.7	0.58	95.91	419.7	41280.8	
1992	JAN.	31	32.3	5712	1.04	95.06	622.1	41902.9	
	FEB.	28	28.2	5740.2	1.01	95.36	579.6	42482.5	
	MARCH	31	27.3	5767.5	0.88	95.53	583.9	43066.4	
	APRIL	30	25.5	5793	0.85	95.03	144.8	43211.2	
	MAY	31	30.6	5823.6	0.99	95.21	608.7	43819.9	
	JUNE	30	30.2	5853.8	1.01	94.88	560	44379.9	
	JULY	31	22.1	5875.9	0.71	93.94	342.7	44722.6	
	AUGUST	31	0	5875.9	0.00	0.00	0	44722.6	



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NORTH TILSTON FIELD									
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
1983	JAN.	31	0	0	0.00	0.00	0	0	
	FEB.	28	0	0	0.00	0.00	0	0	
	MARCH	31	0	0	0.00	0.00	0	0	
	APRIL	30	0	0	0.00	0.00	0	0	
	MAY	31	0	0	0.00	0.00	0	0	
	JUNE	30	0	0	0.00	0.00	0	0	
	JULY	31	0	0	0.00	0.00	0	0	
	AUGUST	31	0	0	0.00	0.00	0	0	
	SEPT.	30	0	0	0.00	0.00	0	0	
	OCT.	31	0	0	0.00	0.00	0	0	
	NOV.	30	0	0	0.00	0.00	0	0	
	DEC.	31	0	0	0.00	0.00	0	0	
1984	JAN.	31	0	0	0.00	0.00	0	0	
	FEB.	28	26.4	26.4	0.94	11.11	3.3	3.3	
	MARCH	31	149.2	175.6	4.81	3.31	5.1	8.4	
	APRIL	30	111.5	287.1	3.72	16.35	21.8	30.2	
	MAY	31	142.7	429.8	4.60	18.18	31.7	61.9	
	JUNE	30	153.2	583	5.11	7.38	12.2	74.1	
	JULY	31	137.9	720.9	4.45	6.89	10.2	84.3	
	AUGUST	31	138.1	859	4.45	9.97	15.3	99.6	
	SEPT.	30	156.8	1015.8	5.23	11.86	21.1	120.7	
	OCT.	31	122.5	1138.3	3.95	26.12	43.3	164	
	NOV.	30	115.4	1253.7	3.85	27.28	43.3	207.3	
	DEC.	31	134.8	1388.5	4.35	25.73	46.7	254	
1985	JAN.	31	133.6	1522.1	4.31	24.65	43.7	297.7	
	FEB.	28	104.2	1626.3	3.72	31.18	47.2	344.9	
	MARCH	31	101.1	1727.4	3.26	37.13	59.7	404.6	
	APRIL	30	87.5	1814.9	2.92	40.35	59.2	463.8	
	MAY	31	86.3	1901.2	2.78	42.73	64.4	528.2	
	JUNE	30	82.2	1983.4	2.74	44.23	65.2	593.4	
	JULY	31	83.4	2066.8	2.69	45.38	69.3	662.7	
	AUGUST	31	80.8	2147.6	2.61	46.35	69.8	732.5	
	SEPT.	30	80.4	2228	2.68	45.45	67	799.5	
	OCT.	31	80.8	2308.8	2.61	45.33	67	866.5	
	NOV.	30	70.9	2379.7	2.36	10.59	8.4	874.9	
	DEC.	31	66.2	2445.9	2.14	53.28	75.5	950.4	
1986	JAN.	31	64.9	2510.8	2.09	52.24	71	1021.4	
	FEB.	28	56	2566.8	2.00	52.01	60.7	1082.1	

		NORTH TILSTON FIELD									
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)			
	MARCH	31	58.6	2625.4	1.89	52.55	64.9	1147			
	APRIL	30	56.2	2681.6	1.87	53.36	64.3	1211.3			
	MAY	31	62	2743.6	2.00	55.97	78.8	1290.1			
	JUNE	30	50.8	2794.4	1.69	58.26	70.9	1361			
	JULY	31	42.5	2836.9	1.37	64.55	77.4	1438.4			
	AUGUST	31	54.7	2891.6	1.76	60.98	85.5	1523.9			
	SEPT.	30	28.5	2920.1	0.95	61.33	45.2	1569.1			
	OCT.	31	24.4	2944.5	0.79	65.09	45.5	1614.6			
	NOV.	30	40.7	2985.2	1.36	63.30	70.2	1684.8			
	DEC	31	47.9	3033.1	1.55	62.07	78.4	1763.2			
1987	JAN.	31	41.4	3074.5	1.34	58.31	57.9	1821.1			
	FEB.	28	35.8	3110.3	1.28	64.62	65.4	1886.5			
	MARCH	31	39.7	3150	1.28	66.86	80.1	1966.6			
	APRIL	30	28.1	3178.1	0.94	74.05	80.2	2046.8			
	MAY	31	15	3193.1	0.48	74.92	44.8	2091.6			
	JUNE	30	51.5	3244.6	1.72	66.82	103.7	2195.3			
	JULY	31	51.4	3296	1.66	67.79	108.2	2303.5			
	AUGUST	31	49.6	3345.6	1.60	68.71	108.9	2412.4			
	SEPT.	30	46.5	3392.1	1.55	71.05	114.1	2526.5			
	OCT.	31	44.5	3436.6	1.44	68.53	96.9	2623.4			
	NOV.	30	43.2	3479.8	1.44	69.90	100.3	2723.7			
	DEC	31	46	3525.8	1.48	70.57	110.3	2834			
1988	JAN.	31	46.7	3572.5	1.51	68.55	101.8	2935.8			
	FEB.	28	43	3615.5	1.54	69.29	97	3032.8			
	MARCH	31	43.8	3659.3	1.41	69.31	98.9	3131.7			
	APRIL	30	35.3	3694.6	1.18	70.26	83.4	3215.1			
	MAY	31	39.4	3734	1.27	69.79	91	3306.1			
	JUNE	30	39.8	3773.8	1.33	68.26	85.6	3391.7			
	JULY	31	49.9	3823.7	1.61	68.07	106.4	3498.1			
	AUGUST	31	33.1	3856.8	1.07	70.91	80.7	3578.8			
	SEPT.	30	31.6	3888.4	1.05	73.86	89.3	3668.1			
	OCT.	31	36.3	3924.7	1.17	71.77	92.3	3760.4			
	NOV.	30	36	3960.7	1.20	79.76	141.9	3902.3			
	DEC	31	42.4	4003.1	1.37	78.55	155.3	4057.6			
1989	JAN.	31	42.5	4045.6	1.37	76.70	139.9	4197.5			
	FEB.	28	40.5	4086.1	1.45	78.43	147.3	4344.8			
	MARCH	31	37.6	4123.7	1.21	78.62	138.3	4483.1			
	APRIL	30	16.8	4140.5	0.56	80.02	67.3	4550.4			
	MAY	31	36	4176.5	1.16	75.56	111.3	4661.7			

NORTH TILSTON FIELD									
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
				2-8-6-29					
	JUNE	30	33.9	4210.4	1.13	75.97	107.2	4768.9	
	JULY	31	35.2	4245.6	1.14	75.49	108.4	4877.3	
	AUGUST	31	33.9	4279.5	1.09	76.80	111	4988.3	
	SEPT.	30	30.9	4310.4	1.03	78.47	112.6	5100.9	
	OCT.	31	36.5	4346.9	1.18	76.65	119.8	5220.7	
	NOV.	30	33.4	4380.3	1.11	77.42	114.5	5335.2	
	DEC	31	34.2	4414.5	1.10	77.54	118.1	5453.3	
1990	JAN.	31	29	4443.5	0.94	79.09	109.7	5563	
	FEB.	28	26.9	4470.4	0.96	78.48	98.1	5661.1	
	MARCH	31	28	4498.4	0.90	20.45	7.2	5668.3	
	APRIL	30	32	4530.4	1.07	74.05	91.3	5759.6	
	MAY	31	29.1	4559.5	0.94	77.03	97.6	5857.2	
	JUNE	30	29.9	4589.4	1.00	75.21	90.7	5947.9	
	JULY	31	32.4	4621.8	1.05	74.31	93.7	6041.6	
	AUGUST	31	31.1	4652.9	1.00	74.36	90.2	6131.8	
	SEPT.	30	21.3	4674.2	0.71	78.35	77.1	6208.9	
	OCT.	31	18.2	4692.4	0.59	79.92	72	6280.9	
	NOV.	30	18.1	4710.5	0.60	77.26	61.5	6342.4	
	DEC	31	20	4730.5	0.65	73.40	55.2	6397.6	
1991	JAN.	31	12.7	4743.2	0.41	77.80	44	6441.6	
	FEB.	28	10.9	4754.1	0.39	75.78	34.1	6475.7	
	MARCH	31	12.5	4766.6	0.40	70.93	30.5	6506.2	
	APRIL	30	3.1	4769.7	0.10	82.49	14.6	6520.8	
	MAY	31	26.5	4796.2	0.85	80.94	112.5	6633.3	
	JUNE	30	25.7	4821.9	0.86	78.13	91.8	6725.1	
	JULY	31	25.7	4847.6	0.83	76.49	83.6	6808.7	
	AUGUST	31	23.1	4870.7	0.75	78.08	82.3	6891	
	SEPT.	30	23.3	4894	0.78	78.06	82.9	6973.9	
	OCT.	31	22.3	4916.3	0.72	76.75	73.6	7047.5	
	NOV.	30	19.2	4935.5	0.64	80.43	78.9	7126.4	
	DEC	31	20.4	4955.9	0.66	77.46	70.1	7196.5	
1992	JAN.	31	22.2	4978.1	0.72	74.04	63.3	7259.8	
	FEB.	28	22.2	5000.3	0.79	74.92	66.3	7326.1	
	MARCH	31	21.3	5021.6	0.69	75.66	66.2	7392.3	
	APRIL	30	26.2	5047.8	0.87	95.45	549.5	7941.8	
	MAY	31	23.4	5071.2	0.75	73.44	64.7	8008.5	
	JUNE	30	20.3	5091.5	0.68	66.88	41	8047.5	
	JULY	31	22.7	5114.2	0.73	67.76	47.7	8095.2	
	AUGUST	31	15.2	5129.4	0.49	68.27	32.7	8127.9	

		NORTH TILSTON FIELD							
						2-8-6-29			
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
	SEPT.	30	12.2	5141.6	0.41	91.79	136.4	8264.3	
	OCT.	31	42.8	5184.4	1.38	85.13	245	8509.3	
	NOV.	30	34.2	5218.6	1.14	84.62	188.1	8697.4	
	DEC	31	33.5	5252.1	1.08	84.33	180.3	8877.7	

			TILSTON NORTH FIELD							
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	8-8-6-29 (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
1983										
	JAN.	31	0	0	0	0.00	0.00	0	0	
	FEB.	28	0	0	0	0.00	0.00	0	0	
	MARCH	31	0	0	0	0.00	0.00	0	0	
	APRIL	30	0	0	0	0.00	0.00	0	0	
	MAY	31	0	0	0	0.00	0.00	0	0	
	JUNE	30	0	0	0	0.00	0.00	0	0	
	JULY	31	0	0	0	0.00	0.00	0	0	
	AUGUST	31	0	0	0	0.00	0.00	0	0	
	SEPT.	30	0	0	0	0.00	0.00	0	0	
	OCT.	31	0	0	0	0.00	0.00	0	0	
	NOV.	30	0	0	0	0.00	0.00	0	0	
1984	DEC	31	20.8	20.8		0.67	11.11	2.6	2.6	
	JAN.	31	171.5	192.3		5.53	1.04	1.8	4.4	
	FEB.	28	154.6	346.9		5.52	0.00	0	4.4	
	MARCH	31	181.1	528		5.84	4.63	8.8	13.2	
	APRIL	30	131	659		4.37	6.89	9.7	22.9	
	MAY	31	189.5	848.5		6.11	6.14	12.4	35.3	
	JUNE	30	135.2	983.7		4.51	14.21	22.4	57.7	
	JULY	31	118.3	1102		3.82	15.80	22.2	79.9	
	AUGUST	31	162.4	1264.4		5.24	16.12	31.2	111.1	
	SEPT.	30	159.9	1424.3		5.33	15.75	29.9	141	
	OCT.	31	222.1	1646.4		7.16	26.65	80.7	221.7	
	NOV.	30	196	1842.4		6.53	30.27	85.1	306.8	
1985	DEC	31	133.7	1976.1		4.31	40.92	92.6	399.4	
	JAN.	31	18.9	1995		0.61	89.12	154.8	554.2	
	FEB.	28	32	2027		1.14	36.13	18.1	572.3	
	MARCH	31	115	2142		3.71	30.93	51.5	623.8	
	APRIL	30	111.1	2253.1		3.70	34.95	59.7	683.5	
	MAY	31	107	2360.1		3.45	42.78	80	763.5	
	JUNE	30	100	2460.1		3.33	43.21	76.1	839.6	
	JULY	31	90.9	2551		2.93	42.10	66.1	905.7	
	AUGUST	31	78.1	2629.1		2.52	41.89	56.3	962	
	SEPT.	30	74.6	2703.7		2.49	37.21	44.2	1006.2	
	OCT.	31	59.2	2762.9		1.91	33.18	29.4	1035.6	
	NOV.	30	45.6	2808.5		1.52	61.29	72.2	1107.8	
1986	DEC	31	37.6	2846.1		1.21	37.75	22.8	1130.6	
	JAN.	31	34.8	2880.9		1.12	38.84	22.1	1152.7	
	FEB.	28	27.7	2908.6		0.99	32.60	13.4	1166.1	

TILSTON NORTH FIELD									
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
1987	MARCH	31	26.8	2935.4	0.86	25.76	9.3	1175.4	
	APRIL	30	20.3	2955.7	0.68	30.95	9.1	1184.5	
	MAY	31	17.1	2972.8	0.55	49.58	13.2	1197.7	
	JUNE	30	3.4	2976.2	0.11	61.36	5.4	1203.1	
	JULY	31	6	2982.2	0.19	31.03	2.7	1205.8	
	AUGUST	31	0	2982.2	0.00	0.00	0	1205.8	
	SEPT.	30	17.7	2999.9	0.59	84.25	94.7	1300.5	
	OCT.	31	79.6	3079.5	2.57	66.93	161.1	1461.6	
	NOV.	30	91.7	3171.2	3.06	47.75	83.8	1545.4	
	DEC	31	104.4	3275.6	3.37	42.42	76.9	1622.3	
	JAN.	31	94.4	3370	3.05	45.15	77.7	1700	
	FEB.	28	79.3	3449.3	2.83	53.27	90.4	1790.4	
1988	MARCH	31	89	3538.3	2.87	54.68	107.4	1897.8	
	APRIL	30	82.1	3620.4	2.74	57.33	110.3	2008.1	
	MAY	31	81.5	3701.9	2.63	56.28	104.9	2113	
	JUNE	30	72	3773.9	2.40	55.11	88.4	2201.4	
	JULY	31	73.3	3847.2	2.36	54.02	86.1	2287.5	
	AUGUST	31	58.5	3905.7	1.89	60.92	91.2	2378.7	
	SEPT.	30	28.8	3934.5	0.96	61.19	45.4	2424.1	
	OCT.	31	55.4	3989.9	1.79	72.59	146.7	2570.8	
	NOV.	30	52.3	4042.2	1.74	75.31	159.5	2730.3	
	DEC	31	71.3	4113.5	2.30	69.16	159.9	2890.2	
	JAN.	31	67.8	4181.3	2.19	69.58	155.1	3045.3	
	FEB.	28	63.1	4244.4	2.25	70.28	149.2	3194.5	
1989	MARCH	31	66.1	4310.5	2.13	70.84	160.6	3355.1	
	APRIL	30	61	4371.5	2.03	72.50	160.8	3515.9	
	MAY	31	62.1	4433.6	2.00	72.00	159.7	3675.6	
	JUNE	30	55.4	4489	1.85	72.17	143.7	3819.3	
	JULY	31	67.6	4556.6	2.18	71.37	168.5	3987.8	
	AUGUST	31	56.8	4613.4	1.83	70.98	138.9	4126.7	
	SEPT.	30	50.1	4663.5	1.67	75.31	152.8	4279.5	
	OCT.	31	52.7	4716.2	1.70	72.78	140.9	4420.4	
	NOV.	30	50.6	4766.8	1.69	72.32	132.2	4552.6	
	DEC	31	53.2	4820	1.72	73.06	144.3	4696.9	
	JAN.	31	47.4	4867.4	1.53	74.67	139.7	4836.6	
	FEB.	28	48.1	4915.5	1.72	76.93	160.4	4997	
	MARCH	31	50.2	4965.7	1.62	75.49	154.6	5151.6	
	APRIL	30	38.4	5004.1	1.28	79.70	150.8	5302.4	
	MAY	31	23.2	5027.3	0.75	84.14	123.1	5425.5	

		TILSTON NORTH FIELD								
YEAR	MONTH	DAYS	MONTH OIL (m3)	8-8-6-29 CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)		
1990	JUNE	30	9	5036.3	0.30	91.83	101.2	5526.7		
	JULY	31	34.5	5070.8	1.11	83.24	171.3	5698		
	AUGUST	31	44.6	5115.4	1.44	77.60	154.5	5852.5		
	SEPT.	30	43.8	5159.2	1.46	76.63	143.6	5996.1		
	OCT.	31	43.6	5202.8	1.41	77.42	149.5	6145.6		
	NOV.	30	37.9	5240.7	1.26	78.64	139.5	6285.1		
	DEC	31	37.2	5277.9	1.20	79.40	143.4	6428.5		
	JAN.	31	34.1	5312	1.10	80.71	142.7	6571.2		
	FEB.	28	27.9	5339.9	1.00	81.89	124.5	6696.7		
	MARCH	31	19.8	5359.7	0.64	84.75	110	6805.7		
	APRIL	30	11.4	5371.1	0.38	88.92	91.5	6897.2		
	MAY	31	12.4	5383.5	0.40	87.03	83.2	6980.4		
1991	JUNE	30	35.5	5419	1.18	88.44	271.5	7251.9		
	JULY	31	39.6	5458.6	1.28	87.48	276.6	7528.5		
	AUGUST	31	40	5498.6	1.29	86.79	262.8	7791.3		
	SEPT.	30	41.7	5540.3	1.39	86.67	271.1	8062.4		
	OCT.	31	38.9	5579.2	1.25	87.49	272	8334.4		
	NOV.	30	37	5616.2	1.23	86.45	236	8570.4		
	DEC	31	38.6	5654.8	1.25	85.86	234.3	8804.7		
	JAN.	31	36.6	5691.4	1.18	86.56	235.7	9040.4		
	FEB.	28	32.4	5723.8	1.16	86.52	207.9	9248.3		
	MARCH	31	31.4	5755.2	1.01	87.34	216.7	9465		
	APRIL	30	33	5788.2	1.10	85.89	200.8	9665.8		
	MAY	31	35	5823.2	1.13	86.23	219.2	9885		
1992	JUNE	30	31	5854.2	1.03	86.94	206.4	10091.4		
	JULY	31	28.3	5882.5	0.91	88.22	212	10303.4		
	AUGUST	31	29.6	5912.1	0.95	87.68	210.6	10514		
	SEPT.	30	28.7	5940.8	0.96	88.29	216.3	10730.3		
	OCT.	31	30.7	5971.5	0.99	86.25	192.5	10922.8		
	NOV.	30	27.8	5999.3	0.93	87.82	200.4	11123.2		
	DEC	31	31.5	6030.8	1.02	86.27	197.9	11321.1		
	JAN.	31	32	6062.8	1.03	83.36	160.3	11481.4		
	FEB.	28	29.5	6092.3	1.05	84.00	154.9	11636.3		
	MARCH	31	28.4	6120.7	0.92	84.75	157.8	11794.1		
	APRIL	30	19.7	6140.4	0.88	74.78	58.4	11852.5		
	MAY	31	22.1	6162.5	0.71	78.21	79.3	11931.8		
	JUNE	30	24.1	6186.6	0.80	80.96	102.5	12034.3		
	JULY	31	18	6204.6	0.58	80.37	73.7	12108		
	AUGUST	31	11	6215.6	0.35	77.41	37.7	12145.7		



				TILSTON NORTH FIELD					
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
	SEPT.	30	0	6215.6	0.00	100.00	65.9	12211.6	
	OCT.	31	20.2	6235.8	0.65	85.21	116.4	12328	
	NOV.	30	22.4	6258.2	0.75	83.13	110.4	12438.4	
	DEC	31	43.9	6302.1	1.42	88.86	350	12788.4	

NORTH TILSTON FIELD									
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
1983				4-9-8-29					
	JAN.	31	0	0	0.00	0.00	0	0	
	FEB.	28	0	0	0.00	0.00	0	0	
	MARCH	31	0	0	0.00	0.00	0	0	
	APRIL	30	0	0	0.00	0.00	0	0	
	MAY	31	0	0	0.00	0.00	0	0	
	JUNE	30	0	0	0.00	0.00	0	0	
	JULY	31	0	0	0.00	0.00	0	0	
	AUGUST	31	0	0	0.00	0.00	0	0	
	SEPT.	30	0	0	0.00	0.00	0	0	
	OCT.	31	0	0	0.00	0.00	0	0	
	NOV.	30	0	0	0.00	0.00	0	0	
1984	DEC	31	0	0	0.00	0.00	0	0	
	JAN.	31	0	0	0.00	0.00	0	0	
	FEB.	28	0	0	0.00	0.00	0	0	
	MARCH	31	134.7	134.7	4.35	16.85	27.3	27.3	
	APRIL	30	79	213.7	2.63	41.78	56.7	84	
	MAY	31	33.8	247.5	1.09	48.63	32	116	
	JUNE	30	54.4	301.9	1.81	61.03	85.2	201.2	
	JULY	31	40.4	342.3	1.30	74.72	119.4	320.6	
	AUGUST	31	43.4	385.7	1.40	78.13	138.4	459	
	SEPT.	30	66.4	452.1	2.21	74.74	196.5	655.5	
	OCT.	31	41	493.1	1.32	83.76	211.5	867	
	NOV.	30	34	527.1	1.13	85.79	205.2	1072.2	
1985	DEC	31	30.8	557.9	0.99	86.54	198.1	1270.3	
	JAN.	31	35.1	593	1.13	84.39	189.8	1460.1	
	FEB.	28	23.2	616.2	0.83	89.13	190.2	1650.3	
	MARCH	31	24.3	640.5	0.78	90.23	224.3	1874.6	
	APRIL	30	20.9	661.4	0.70	90.89	208.5	2083.1	
	MAY	31	22.7	684.1	0.73	90.00	204.4	2287.5	
	JUNE	30	19.6	703.7	0.65	91.46	210	2497.5	
	JULY	31	18.4	722.1	0.59	92.23	218.3	2715.8	
	AUGUST	31	19	741.1	0.61	91.24	197.8	2913.6	
	SEPT.	30	0	741.1	0.00	0.00	0	2913.6	
	OCT.	31	4	745.1	0.13	94.69	71.3	2984.9	
	NOV.	30	0.8	745.9	0.03	98.26	45.3	3030.2	
	DEC	31	0	745.9	0.00	0.00	0	3030.2	
1986	JAN.	31	0	745.9	0.00	0.00	0	3030.2	
	FEB.	28	0	745.9	0.00	0.00	0	3030.2	

		NORTH TILSTON FIELD						
				4-9-8-29				
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)
1987	MARCH	31	0	745.9	0.00	0.00	0	3030.2
	APRIL	30	0	745.9	0.00	0.00	0	3030.2
	MAY	31	0	745.9	0.00	0.00	0	3030.2
	JUNE	30	0	745.9	0.00	0.00	0	3030.2
	JULY	31	0.6	746.5	0.02	0.00	18	3048.2
	AUGUST	31	0	746.5	0.00	0.00	0	3048.2
	SEPT.	30	0	746.5	0.00	0.00	0	3048.2
	OCT.	31	0	746.5	0.00	0.00	0	3048.2
	NOV.	30	0	746.5	0.00	0.00	0	3048.2
	DEC	31	0	746.5	0.00	0.00	0	3048.2
	JAN.	31	0	746.5	0.00	0.00	0	3048.2
	FEB.	28	0	746.5	0.00	0.00	0	3048.2
1988	MARCH	31	0	746.5	0.00	0.00	0	3048.2
	APRIL	30	0	746.5	0.00	0.00	0	3048.2
	MAY	31	0	746.5	0.00	0.00	0	3048.2
	JUNE	30	0	746.5	0.00	0.00	0	3048.2
	JULY	31	0	746.5	0.00	0.00	0	3048.2
	AUGUST	31	0	746.5	0.00	0.00	0	3048.2
	SEPT.	30	0	746.5	0.00	0.00	0	3048.2
	OCT.	31	0	746.5	0.00	0.00	0	3048.2
	NOV.	30	0	746.5	0.00	0.00	0	3048.2
	DEC	31	0	746.5	0.00	0.00	0	3048.2
	JAN.	31	0	746.5	0.00	0.00	0	3048.2
	FEB.	28	0	746.5	0.00	0.00	0	3048.2
1989	MARCH	31	0	746.5	0.00	0.00	0	3048.2
	APRIL	30	0	746.5	0.00	0.00	0	3048.2
	MAY	31	0	746.5	0.00	0.00	0	3048.2
	JUNE	30	0	746.5	0.00	0.00	0	3048.2
	JULY	31	0	746.5	0.00	0.00	0	3048.2
	AUGUST	31	0	746.5	0.00	0.00	0	3048.2
	SEPT.	30	0	746.5	0.00	0.00	0	3048.2
	OCT.	31	0	746.5	0.00	0.00	0	3048.2
	NOV.	30	0	746.5	0.00	0.00	0	3048.2
	DEC	31	0	746.5	0.00	0.00	0	3048.2
	JAN.	31	0	746.5	0.00	0.00	0	3048.2
	FEB.	28	0	746.5	0.00	0.00	0	3048.2
	MARCH	31	0	746.5	0.00	0.00	0	3048.2
	APRIL	30	0	746.5	0.00	0.00	0	3048.2
	MAY	31	0	746.5	0.00	0.00	0	3048.2
	JUNE	30	0	746.5	0.00	0.00	0	3048.2
	JULY	31	0	746.5	0.00	0.00	0	3048.2

NORTH TILSTON FIELD									
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
				4-9-6-29					
	JUNE	30	0	746.5	0.00	0.00	0	3048.2	
	JULY	31	0	746.5	0.00	0.00	0	3048.2	
	AUGUST	31	0	746.5	0.00	0.00	0	3048.2	
	SEPT.	30	0	746.5	0.00	0.00	0	3048.2	
	OCT.	31	0	746.5	0.00	0.00	0	3048.2	
	NOV.	30	0	746.5	0.00	0.00	0	3048.2	
	DEC	31	0	746.5	0.00	0.00	0	3048.2	
1990	JAN.	31	0	746.5	0.00	0.00	0	3048.2	
	FEB.	28	0	746.5	0.00	0.00	0	3048.2	
	MARCH	31	0	746.5	0.00	0.00	0	3048.2	
	APRIL	30	0	746.5	0.00	0.00	0	3048.2	
	MAY	31	0	746.5	0.00	0.00	0	3048.2	
	JUNE	30	0	746.5	0.00	0.00	0	3048.2	
	JULY	31	0	746.5	0.00	0.00	0	3048.2	
	AUGUST	31	0	746.5	0.00	0.00	0	3048.2	
	SEPT.	30	0	746.5	0.00	0.00	0	3048.2	
	OCT.	31	0	746.5	0.00	0.00	0	3048.2	
	NOV.	30	0	746.5	0.00	0.00	0	3048.2	
	DEC	31	0	746.5	0.00	0.00	0	3048.2	
1991	JAN.	31	0	746.5	0.00	0.00	0	3048.2	
	FEB.	28	0	746.5	0.00	0.00	0	3048.2	
	MARCH	31	0	746.5	0.00	0.00	0	3048.2	
	APRIL	30	0	746.5	0.00	0.00	0	3048.2	
	MAY	31	0	746.5	0.00	0.00	0	3048.2	
	JUNE	30	0	746.5	0.00	0.00	0	3048.2	
	JULY	31	0	746.5	0.00	0.00	0	3048.2	
	AUGUST	31	0	746.5	0.00	0.00	0	3048.2	
	SEPT.	30	0	746.5	0.00	0.00	0	3048.2	
	OCT.	31	0	746.5	0.00	0.00	0	3048.2	
	NOV.	30	0	746.5	0.00	0.00	0	3048.2	
	DEC	31	0	746.5	0.00	0.00	0	3048.2	
1992	JAN.	31	0	746.5	0.00	0.00	0	3048.2	
	FEB.	28	0	746.5	0.00	0.00	0	3048.2	
	MARCH	31	0	746.5	0.00	0.00	0	3048.2	
	APRIL	30	0	746.5	0.00	0.00	0	3048.2	
	MAY	31	0	746.5	0.00	0.00	0	3048.2	
	JUNE	30	0	746.5	0.00	0.00	0	3048.2	
	JULY	31	0	746.5	0.00	0.00	0	3048.2	
	AUGUST	31	0	746.5	0.00	0.00	0	3048.2	

			NORTH TILSTON FIELD						

NORTH TILSTON FIELD									
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
1983	JAN.	31	0	0	0.00	0.00	0	0	
	FEB.	28	0	0	0.00	0.00	0	0	
	MARCH	31	0	0	0.00	0.00	0	0	
	APRIL	30	0	0	0.00	0.00	0	0	
	MAY	31	0	0	0.00	0.00	0	0	
	JUNE	30	0	0	0.00	0.00	0	0	
	JULY	31	0	0	0.00	0.00	0	0	
	AUGUST	31	0	0	0.00	0.00	0	0	
	SEPT.	30	0	0	0.00	0.00	0	0	
	OCT.	31	0	0	0.00	0.00	0	0	
	NOV.	30	148.8	148.8	4.96	3.94	6.1	6.1	
	DEC	31	165.6	314.4	5.34	6.44	11.4	17.5	
1984	JAN.	31	175.9	490.3	5.67	11.34	22.5	40	
	FEB.	28	138.7	629	4.95	21.24	37.4	77.4	
	MARCH	31	180.5	809.5	5.82	7.53	14.7	92.1	
	APRIL	30	149.6	959.1	4.99	16.24	29	121.1	
	MAY	31	153.5	1112.6	4.95	19.76	37.8	158.9	
	JUNE	30	115.1	1227.7	3.84	27.29	43.2	202.1	
	JULY	31	98	1325.7	3.16	30.74	43.5	245.6	
	AUGUST	31	97	1422.7	3.13	33.61	49.1	294.7	
	SEPT.	30	91.1	1513.8	3.04	31.14	41.2	335.9	
	OCT.	31	72.5	1586.3	2.34	34.15	37.6	373.5	
	NOV.	30	65.6	1651.9	2.19	34.73	34.9	408.4	
	DEC	31	61.6	1713.5	1.99	34.40	32.3	440.7	
1985	JAN.	31	50.4	1763.9	1.63	35.14	27.3	468	
	FEB.	28	37.9	1801.8	1.35	40.31	25.6	493.6	
	MARCH	31	38.4	1840.2	1.24	42.34	28.2	521.8	
	APRIL	30	30.4	1870.6	1.01	44.22	24.1	545.9	
	MAY	31	27.7	1898.3	0.89	39.78	18.3	564.2	
	JUNE	30	22.2	1920.5	0.74	42.78	16.6	580.8	
	JULY	31	16.9	1937.4	0.55	45.13	13.9	594.7	
	AUGUST	31	21.8	1959.2	0.70	50.90	22.6	617.3	
	SEPT.	30	93.1	2052.3	3.10	47.61	84.6	701.9	
	OCT.	31	106.6	2158.9	3.44	44.71	86.2	788.1	
	NOV.	30	112.5	2271.4	3.75	41.31	79.2	867.3	
	DEC	31	115.8	2387.2	3.74	41.60	82.5	949.8	
1986	JAN.	31	105.2	2492.4	3.39	43.62	81.4	1031.2	
	FEB.	28	93.1	2585.5	3.33	43.98	73.1	1104.3	

		NORTH TILSTON FIELD								
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)		
1987	MARCH	31	94	2679.5	3.03	49.35	91.6	1195.9		
	APRIL	30	86.7	2766.2	2.89	46.91	76.6	1272.5		
	MAY	31	73.2	2839.4	2.36	50.24	73.9	1346.4		
	JUNE	30	87.5	2926.9	2.92	48.10	81.1	1427.5		
	JULY	31	65.5	2992.4	2.11	51.16	68.6	1496.1		
	AUGUST	31	29.3	3021.7	0.95	55.54	36.6	1532.7		
	SEPT.	30	4.6	3026.3	0.15	64.62	8.4	1541.1		
	OCT.	31	0	3026.3	0.00	100.00	6.5	1547.6		
	NOV.	30	38	3084.3	1.27	56.62	49.6	1597.2		
	DEC	31	88.6	3152.9	2.86	52.26	97	1694.2		
	JAN.	31	89.5	3242.4	2.89	50.19	90.2	1784.4		
	FEB.	28	94.6	3337	3.38	74.27	273	2057.4		
1988	MARCH	31	93.9	3430.9	3.03	53.47	107.9	2165.3		
	APRIL	30	87.7	3518.6	2.92	56.02	111.7	2277		
	MAY	31	82.6	3601.2	2.66	57.20	110.4	2387.4		
	JUNE	30	89.9	3691.1	3.00	53.23	102.3	2489.7		
	JULY	31	91.2	3782.3	2.94	53.96	106.9	2596.6		
	AUGUST	31	76.1	3858.4	2.45	55.68	95.6	2692.2		
	SEPT.	30	72.9	3931.3	2.43	55.95	92.6	2784.8		
	OCT.	31	78.4	4009.7	2.53	52.54	86.8	2871.6		
	NOV.	30	66.3	4076	2.21	56.27	85.3	2966.9		
	DEC	31	45.9	4121.9	1.48	62.19	75.5	3032.4		
	JAN.	31	24.5	4146.4	0.79	73.14	66.7	3099.1		
	FEB.	28	77.4	4223.8	2.76	58.41	108.7	3207.8		
1989	MARCH	31	92.4	4316.2	2.98	56.78	121.4	3329.2		
	APRIL	30	82.2	4398.4	2.74	58.06	113.8	3443		
	MAY	31	82.3	4480.7	2.65	57.56	111.6	3554.6		
	JUNE	30	83.8	4564.5	2.79	55.78	105.7	3660.3		
	JULY	31	36.8	4601.3	1.19	50.93	38.2	3698.5		
	AUGUST	31	90.6	4691.9	2.92	53.25	103.2	3801.7		
	SEPT.	30	87.6	4779.5	2.92	57.60	119	3920.7		
	OCT.	31	104.1	4883.6	3.36	53.61	120.3	4041		
	NOV.	30	89.8	4973.4	2.99	56.93	118.7	4159.7		
	DEC	31	94.4	5067.8	3.05	57.84	129.5	4289.2		
	JAN.	31	94.8	5162.6	3.06	54.88	115.3	4404.5		
	FEB.	28	92.5	5255.1	3.30	56.29	119.1	4523.6		
	MARCH	31	88.8	5343.9	2.86	54.55	106.6	4630.2		
	APRIL	30	91.7	5435.6	3.06	55.27	113.3	4743.5		
	MAY	31	95.6	5531.2	3.08	55.24	118	4861.5		

NORTH TILSTON FIELD									
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
1990	JUNE	30	84	5615.2	2.80	59.63	124.1	4985.6	
	JULY	31	88.8	5704	2.86	59.12	128.4	5114	
	AUGUST	31	86.3	5790.3	2.78	60.45	131.9	5245.9	
	SEPT.	30	79.9	5870.2	2.66	60.66	123.2	5369.1	
	OCT.	31	83.4	5953.6	2.69	58.96	119.8	5488.9	
	NOV.	30	76.4	6030	2.55	59.36	111.6	5600.5	
	DEC	31	82.6	6112.6	2.66	58.20	115	5715.5	
	JAN.	31	87.1	6199.7	2.81	56.73	114.2	5829.7	
	FEB.	28	69.8	6269.5	2.49	58.87	99.9	5929.6	
	MARCH	31	79	6348.5	2.55	59.98	118.4	6048	
	APRIL	30	70.9	6419.4	2.36	59.90	105.9	6153.9	
	MAY	31	69.4	6488.8	2.24	62.43	115.3	6269.2	
1991	JUNE	30	70.3	6559.1	2.34	61.48	112.2	6381.4	
	JULY	31	63.3	6622.4	2.04	60.85	98.4	6479.8	
	AUGUST	31	60.7	6683.1	1.96	60.94	94.7	6574.5	
	SEPT.	30	57.8	6740.9	1.93	51.43	61.2	6636.7	
	OCT.	31	63.8	6804.7	2.06	53.57	73.6	6709.3	
	NOV.	30	51.8	6856.5	1.73	59.69	76.7	6786	
	DEC	31	38.4	6894.9	1.24	63.53	66.9	6862.9	
	JAN.	31	19	6913.9	0.61	75.13	57.4	6910.3	
	FEB.	28	19.5	6933.4	0.70	67.28	40.1	6950.4	
	MARCH	31	96	7029.4	3.10	61.58	153.9	7104.3	
	APRIL	30	101.6	7131	3.39	64.54	184.9	7289.2	
	MAY	31	105.1	7236.1	3.39	64.83	193.7	7482.9	
1992	JUNE	30	95.5	7331.6	3.18	64.99	177.3	7660.2	
	JULY	31	99.4	7431	3.21	62.59	166.3	7826.5	
	AUGUST	31	103.5	7534.5	3.34	61.64	166.3	7992.8	
	SEPT.	30	86.5	7621	2.88	58.57	122.3	8115.1	
	OCT.	31	93.6	7714.6	3.02	49.65	92.3	8207.4	
	NOV.	30	85.3	7799.9	2.84	54.75	103.2	8310.6	
	DEC	31	51.9	7851.8	1.67	60.02	77.9	8388.5	
	JAN.	31	86.4	7938.2	2.79	64.44	156.6	8545.1	
	FEB.	28	89.8	8028	3.21	65.46	170.2	8715.3	
	MARCH	31	92.6	8120.6	2.99	64.91	171.3	8886.6	
	APRIL	30	78.7	8199.3	2.62	66.03	153	9039.6	
	MAY	31	68.2	8267.5	2.20	68.23	146.5	9186.1	
	JUNE	30	59.7	8327.2	1.99	66.57	118.9	9305	
	JULY	31	60.6	8387.8	1.95	66.24	118.9	9423.9	
	AUGUST	31	36.7	8424.5	1.18	67.52	76.3	9500.2	



		NORTH TILSTON FIELD							
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
				5-9-6-29					
	SEPT.	30	43	8487.5	1.43	55.39	53.4	9553.6	
	OCT.	31	115.4	8582.9	3.72	67.58	240.6	9794.2	
	NOV.	30	82.2	8665.1	2.74	72.79	219.9	10014.1	
	DEC	31	88.6	8753.7	2.86	71.34	220.5	10234.6	

NORTH TILSTON FIELD									
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
1983				11-9-6-29					
	JAN.	31	0	0	0.00	0.00	0	0	
	FEB.	28	0	0	0.00	0.00	0	0	
	MARCH	31	0	0	0.00	0.00	0	0	
	APRIL	30	0	0	0.00	0.00	0	0	
	MAY	31	0	0	0.00	0.00	0	0	
	JUNE	30	0	0	0.00	0.00	0	0	
	JULY	31	0	0	0.00	0.00	0	0	
	AUGUST	31	0	0	0.00	0.00	0	0	
	SEPT.	30	0	0	0.00	0.00	0	0	
	OCT.	31	0	0	0.00	0.00	0	0	
	NOV.	30	0	0	0.00	0.00	0	0	
1984	DEC	31	0	0	0.00	0.00	0	0	
	JAN.	31	0	0	0.00	0.00	0	0	
	FEB.	28	0	0	0.00	0.00	0	0	
	MARCH	31	18.8	18.8	0.61	70.53	45	45	
	APRIL	30	26.1	44.9	0.87	74.93	78	123	
	MAY	31	21	65.9	0.68	77.94	74.2	197.2	
	JUNE	30	13.6	79.5	0.45	85.19	78.2	275.4	
	JULY	31	12.6	92.1	0.41	79.45	48.7	324.1	
	AUGUST	31	11.7	103.8	0.38	79.03	44.1	368.2	
	SEPT.	30	0	103.8	0.00	0.00	0	368.2	
	OCT.	31	0.8	104.6	0.03	97.77	35.1	403.3	
	NOV.	30	7.4	112	0.25	88.14	55	458.3	
1985	DEC	31	3.4	115.4	0.11	89.57	29.2	487.5	
	JAN.	31	1.4	116.8	0.05	96.68	40.8	528.3	
	FEB.	28	0	116.8	0.00	0.00	0	528.3	
	MARCH	31	1.6	118.4	0.05	0.00	0	528.3	
	APRIL	30	0.9	119.3	0.03	0.00	0	528.3	
	MAY	31	0	119.3	0.00	0.00	0	528.3	
	JUNE	30	0	119.3	0.00	0.00	0	528.3	
	JULY	31	0	119.3	0.00	0.00	0	528.3	
	AUGUST	31	0	119.3	0.00	0.00	0	528.3	
	SEPT.	30	0	119.3	0.00	0.00	0	528.3	
	OCT.	31	0	119.3	0.00	0.00	0	528.3	
	NOV.	30	0	119.3	0.00	0.00	0	528.3	
1986	DEC	31	0	119.3	0.00	0.00	0	528.3	
	JAN.	31	0	119.3	0.00	0.00	0	528.3	
	FEB.	28	0	119.3	0.00	0.00	0	528.3	

NORTH TILSTON FIELD									
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
				11-9-6-29					
	MARCH	31	0	119.3	0.00	0.00	0	528.3	
	APRIL	30	0	119.3	0.00	0.00	0	528.3	
	MAY	31	0	119.3	0.00	0.00	0	528.3	
	JUNE	30	0	119.3	0.00	0.00	0	528.3	
	JULY	31	0	119.3	0.00	0.00	0	528.3	
	AUGUST	31	0	119.3	0.00	0.00	0	528.3	
	SEPT.	30	0	119.3	0.00	0.00	0	528.3	
	OCT.	31	1.8	121.1	0.06	0.00	4.5	532.8	
	NOV.	30	0	121.1	0.00	0.00	0	532.8	
	DEC	31	0	121.1	0.00	0.00	0	532.8	
1987	JAN.	31	0	121.1	0.00	0.00	0	532.8	
	FEB.	28	0	121.1	0.00	0.00	0	532.8	
	MARCH	31	0	121.1	0.00	0.00	0	532.8	
	APRIL	30	0	121.1	0.00	0.00	0	532.8	
	MAY	31	0	121.1	0.00	0.00	0	532.8	
	JUNE	30	0	121.1	0.00	0.00	0	532.8	
	JULY	31	0	121.1	0.00	0.00	0	532.8	
	AUGUST	31	0	121.1	0.00	0.00	0	532.8	
	SEPT.	30	0	121.1	0.00	0.00	0	532.8	
	OCT.	31	0	121.1	0.00	0.00	0	532.8	
	NOV.	30	0	121.1	0.00	0.00	0	532.8	
	DEC	31	0	121.1	0.00	0.00	0	532.8	
1988	JAN.	31	0	121.1	0.00	0.00	0	532.8	
	FEB.	28	0	121.1	0.00	0.00	0	532.8	
	MARCH	31	0	121.1	0.00	0.00	0	532.8	
	APRIL	30	0	121.1	0.00	0.00	0	532.8	
	MAY	31	0	121.1	0.00	0.00	0	532.8	
	JUNE	30	0	121.1	0.00	0.00	0	532.8	
	JULY	31	0	121.1	0.00	0.00	0	532.8	
	AUGUST	31	0	121.1	0.00	0.00	0	532.8	
	SEPT.	30	0	121.1	0.00	0.00	0	532.8	
	OCT.	31	0	121.1	0.00	0.00	0	532.8	
	NOV.	30	0	121.1	0.00	0.00	0	532.8	
	DEC	31	0	121.1	0.00	0.00	0	532.8	
1989	JAN.	31	0	121.1	0.00	0.00	0	532.8	
	FEB.	28	0	121.1	0.00	0.00	0	532.8	
	MARCH	31	0	121.1	0.00	0.00	0	532.8	
	APRIL	30	0	121.1	0.00	0.00	0	532.8	
	MAY	31	0	121.1	0.00	0.00	0	532.8	

NORTH TILSTON FIELD									
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
1990	JUNE	30	0	121.1	0.00	0.00	0	532.8	
	JULY	31	0	121.1	0.00	0.00	0	532.8	
	AUGUST	31	0	121.1	0.00	0.00	0	532.8	
	SEPT.	30	0	121.1	0.00	0.00	0	532.8	
	OCT.	31	0	121.1	0.00	0.00	0	532.8	
	NOV.	30	0	121.1	0.00	0.00	0	532.8	
	DEC	31	0	121.1	0.00	0.00	0	532.8	
	JAN.	31	0	121.1	0.00	0.00	0	532.8	
	FEB.	28	0	121.1	0.00	0.00	0	532.8	
	MARCH	31	0	121.1	0.00	0.00	0	532.8	
	APRIL	30	0	121.1	0.00	0.00	0	532.8	
	MAY	31	0	121.1	0.00	0.00	0	532.8	
1991	JUNE	30	0	121.1	0.00	0.00	0	532.8	
	JULY	31	0	121.1	0.00	0.00	0	532.8	
	AUGUST	31	0	121.1	0.00	0.00	0	532.8	
	SEPT.	30	0	121.1	0.00	0.00	0	532.8	
	OCT.	31	0	121.1	0.00	0.00	0	532.8	
	NOV.	30	0	121.1	0.00	0.00	0	532.8	
	DEC	31	0	121.1	0.00	0.00	0	532.8	
	JAN.	31	0	121.1	0.00	0.00	0	532.8	
	FEB.	28	0	121.1	0.00	0.00	0	532.8	
	MARCH	31	0	121.1	0.00	0.00	0	532.8	
	APRIL	30	0	121.1	0.00	0.00	0	532.8	
	MAY	31	0	121.1	0.00	0.00	0	532.8	
1992	JUNE	30	0	121.1	0.00	0.00	0	532.8	
	JULY	31	0	121.1	0.00	0.00	0	532.8	
	AUGUST	31	0	121.1	0.00	0.00	0	532.8	
	SEPT.	30	0	121.1	0.00	0.00	0	532.8	
	OCT.	31	0	121.1	0.00	0.00	0	532.8	
	NOV.	30	0	121.1	0.00	0.00	0	532.8	
	DEC	31	0	121.1	0.00	0.00	0	532.8	
	JAN.	31	0	121.1	0.00	0.00	0	532.8	
	FEB.	28	0	121.1	0.00	0.00	0	532.8	
	MARCH	31	0	121.1	0.00	0.00	0	532.8	
	APRIL	30	0	121.1	0.00	0.00	0	532.8	
	MAY	31	0	121.1	0.00	0.00	0	532.8	
	JUNE	30	0	121.1	0.00	0.00	0	532.8	
	JULY	31	0	121.1	0.00	0.00	0	532.8	
	AUGUST	31	0	121.1	0.00	0.00	0	532.8	

NORTH TILSTON FIELD									
							11-9-6-29		
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
	SEPT.	30	0	121.1	0.00	0.00	0	532.8	
	OCT.	31	0	121.1	0.00	0.00	0	532.8	
	NOV.	30	0	121.1	0.00	0.00	0	532.8	
	DEC	31	0	121.1	0.00	0.00	0	532.8	

NORTH TILSTON FIELD									
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
1983	JAN.	31	0	0	0.00	0.00	0	0	
	FEB.	28	0	0	0.00	0.00	0	0	
	MARCH	31	0	0	0.00	0.00	0	0	
	APRIL	30	0	0	0.00	0.00	0	0	
	MAY	31	0	0	0.00	0.00	0	0	
	JUNE	30	0	0	0.00	0.00	0	0	
	JULY	31	0	0	0.00	0.00	0	0	
	AUGUST	31	93.2	93.2	3.01	1.17	1.1	1.1	
	SEPT.	30	88.8	182	2.96	23.51	27.3	28.4	
	OCT.	31	55.8	237.8	1.80	48.00	51.5	79.9	
	NOV.	30	63.2	301	2.11	39.05	40.5	120.4	
	DEC	31	42.2	343.2	1.36	34.17	21.9	142.3	
1984	JAN.	31	48.8	392	1.57	44.98	39.9	182.2	
	FEB.	28	26	418	0.93	70.29	61.5	243.7	
	MARCH	31	39.9	457.9	1.29	54.24	47.3	291	
	APRIL	30	38.5	496.4	1.28	52.88	43.2	334.2	
	MAY	31	46	542.4	1.48	48.37	43.1	377.3	
	JUNE	30	47.2	589.6	1.57	62.72	79.4	456.7	
	JULY	31	36.6	626.2	1.18	73.03	99.1	555.8	
	AUGUST	31	31.4	657.6	1.01	73.90	88.9	644.7	
	SEPT.	30	19.6	677.2	0.65	74.18	56.3	701	
	OCT.	31	21.8	699	0.70	47.34	19.6	720.6	
	NOV.	30	23.2	722.2	0.77	46.05	19.8	740.4	
	DEC	31	13.1	735.3	0.42	29.19	5.4	745.8	
1985	JAN.	31	5.6	740.9	0.18	67.06	11.4	757.2	
	FEB.	28	13.1	754	0.47	76.52	42.7	799.9	
	MARCH	31	17.8	771.8	0.57	68.33	38.4	838.3	
	APRIL	30	18.7	790.5	0.62	65.81	36	874.3	
	MAY	31	18	808.5	0.58	65.18	33.7	908	
	JUNE	30	14.1	822.6	0.47	69.21	31.7	939.7	
	JULY	31	12	834.6	0.39	73.09	32.6	972.3	
	AUGUST	31	8.8	843.4	0.28	78.05	31.3	1003.6	
	SEPT.	30	7.8	851.2	0.26	77.33	26.6	1030.2	
	OCT.	31	6	857.2	0.19	81.25	26	1056.2	
	NOV.	30	5.9	863.1	0.20	72.30	15.4	1071.6	
	DEC	31	11.8	874.9	0.38	59.86	17.6	1089.2	
1986	JAN.	31	10.2	885.1	0.33	63.57	17.8	1107	
	FEB.	28	9.3	894.4	0.33	62.20	15.3	1122.3	

		NORTH TILSTON FIELD								
						12-9-6-29	-			
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)		
	MARCH	31	8.6	903	0.28	65.74	16.5	1138.8		
	APRIL	30	6.1	909.1	0.20	65.54	11.6	1150.4		
	MAY	31	0	909.1	0.00	0.00	0	1150.4		
	JUNE	30	1.6	910.7	0.05	75.76	5	1155.4		
	JULY	31	2.7	913.4	0.09	55.00	3.3	1158.7		
	AUGUST	31	0	913.4	0.00	0.00	0	1158.7		
	SEPT.	30	7	920.4	0.23	28.57	2.8	1161.5		
	OCT.	31	8.1	928.5	0.26	38.64	5.1	1166.6		
	NOV.	30	66.4	994.9	2.21	33.60	33.6	1200.2		
	DEC	31	44.2	1039.1	1.43	39.29	28.6	1228.8		
	1987	JAN.	31	34.8	1073.9	1.12	54.45	41.6	1270.4	
		FEB.	28	26.7	1100.6	0.95	59.97	40	1310.4	
	MARCH	31	24.6	1125.2	0.79	60.83	38.2	1348.6		
	APRIL	30	20.9	1146.1	0.70	65.40	39.5	1388.1		
	MAY	31	19.5	1165.6	0.63	81.21	84.3	1472.4		
	JUNE	30	14	1179.6	0.47	71.37	34.9	1507.3		
	JULY	31	13.7	1193.3	0.44	71.04	33.6	1540.9		
	AUGUST	31	8.2	1201.5	0.26	79.13	31.1	1572		
	SEPT.	30	4.5	1206	0.15	78.67	16.6	1588.6		
	OCT.	31	41.8	1247.8	1.35	77.82	146.7	1735.3		
	NOV.	30	56.3	1304.1	1.88	51.13	58.9	1794.2		
	DEC	31	35.9	1340	1.16	62.84	60.7	1854.9		
	1988	JAN.	31	25.7	1365.7	0.83	69.37	58.2	1913.1	
		FEB.	28	22.9	1388.6	0.82	70.90	55.8	1968.9	
	MARCH	31	26.7	1415.3	0.86	67.40	55.2	2024.1		
	APRIL	30	22.7	1438	0.76	71.94	58.2	2082.3		
	MAY	31	24	1462	0.77	69.96	55.9	2138.2		
	JUNE	30	24	1486	0.80	68.30	51.7	2189.9		
	JULY	31	26.9	1512.9	0.87	69.29	60.7	2250.6		
	AUGUST	31	20.6	1533.5	0.66	67.09	42	2292.6		
	SEPT.	30	25.1	1558.6	0.84	63.94	44.5	2337.1		
	OCT.	31	11	1569.6	0.35	76.45	35.7	2372.8		
	NOV.	30	15.1	1584.7	0.50	72.09	39	2411.8		
	DEC	31	23.8	1608.5	0.77	63.83	42	2453.8		
	1989	JAN.	31	25.1	1633.6	0.81	62.48	41.8	2495.6	
		FEB.	28	14.5	1648.1	0.52	63.38	25.1	2520.7	
	MARCH	31	15.1	1663.2	0.49	64.39	27.3	2548		
	APRIL	30	15.6	1678.8	0.52	65.10	29.1	2577.1		
	MAY	31	12.3	1691.1	0.40	68.54	26.8	2603.9		

YEAR	MONTH	DAYS	NORTH TILSTON FIELD				CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)
			MONTH OIL (m3)	12-9-6-29							
1990	JUNE	30	17.7			1708.8	0.59	64.02	31.5	2635.4	
	JULY	31	15			1723.8	0.48	63.59	26.2	2661.6	
	AUGUST	31	14.7			1738.5	0.47	65.33	27.7	2689.3	
	SEPT.	30	11.7			1750.2	0.39	67.23	24	2713.3	
	OCT.	31	7.3			1757.5	0.24	73.26	20	2733.3	
	NOV.	30	5.5			1763	0.18	72.77	14.7	2748	
	DEC	31	11			1774	0.35	81.07	47.1	2795.1	
	JAN.	31	16			1790	0.52	71.43	40	2835.1	
	FEB.	28	12.7			1802.7	0.45	74.65	37.4	2872.5	
	MARCH	31	11.2			1813.9	0.36	73.58	31.2	2903.7	
	APRIL	30	5.7			1819.6	0.19	79.57	22.2	2925.9	
	MAY	31	1.8			1821.4	0.06	81.25	7.8	2933.7	
1991	JUNE	30	18.9			1840.3	0.63	63.93	33.5	2967.2	
	JULY	31	20.8			1861.1	0.67	63.76	36.6	3003.8	
	AUGUST	31	19			1880.1	0.61	63.67	33.3	3037.1	
	SEPT.	30	17.4			1897.5	0.58	66.92	35.2	3072.3	
	OCT.	31	17.4			1914.9	0.56	68.87	38.5	3110.8	
	NOV.	30	16.9			1931.8	0.56	62.78	28.5	3139.3	
	DEC	31	17.2			1949	0.55	54.86	20.9	3160.2	
	JAN.	31	17.6			1966.6	0.57	55.10	21.6	3181.8	
	FEB.	28	11.2			1977.8	0.40	68.27	24.1	3205.9	
	MARCH	31	11.4			1989.2	0.37	71.57	28.7	3234.6	
	APRIL	30	11			2000.2	0.37	72.15	28.5	3263.1	
	MAY	31	12.2			2012.4	0.39	71.09	30	3293.1	
1992	JUNE	30	10.5			2022.9	0.35	71.47	26.3	3319.4	
	JULY	31	9.7			2032.6	0.31	72.36	25.4	3344.8	
	AUGUST	31	9.2			2041.8	0.30	72.86	24.7	3369.5	
	SEPT.	30	9.2			2051	0.31	74.08	26.3	3395.8	
	OCT.	31	7.1			2058.1	0.23	75.52	21.9	3417.7	
	NOV.	30	5.6			2063.7	0.19	80.62	23.3	3441	
	DEC	31	4.1			2067.8	0.13	82.02	18.7	3459.7	
	JAN.	31	4.1			2071.9	0.13	76.97	13.7	3473.4	
	FEB.	28	0			2071.9	0.00	0.00	0	3473.4	
	MARCH	31	0			2071.9	0.00	0.00	0	3473.4	
	APRIL	30	0			2071.9	0.00	0.00	0	3473.4	
	MAY	31	0			2071.9	0.00	0.00	0	3473.4	
1993	JUNE	30	0			2071.9	0.00	0.00	0	3473.4	
	JULY	31	0.4			2072.3	0.01	50.00	0.4	3473.8	
	AUGUST	31	0			2072.3	0.00	0.00	0	3473.8	
	SEPT.	30	0			2072.3	0.00	0.00	0	3473.8	



		NORTH TILSTON FIELD						
				12-9-6-29		-		
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)
	SEPT.	30	9.1	2081.4	0.30	92.79	117.1	3590.9
	OCT.	31	28	2109.4	0.90	83.70	143.8	3734.7
	NOV.	30	21.3	2130.7	0.71	72.34	55.7	3790.4
	DEC	31	19.2	2149.9	0.62	73.03	52	3842.4

NORTH TILSTON FIELD									
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
1983	JAN.	31	0	0	0	0.00	0	0	
	FEB.	28	0	0	0	0.00	0	0	
	MARCH	31	0	0	0	0.00	0	0	
	APRIL	30	0	0	0	0.00	0	0	
	MAY	31	0	0	0	0.00	0	0	
	JUNE	30	0	0	0	0.00	0	0	
	JULY	31	0	0	0	0.00	0	0	
	AUGUST	31	0	0	0	0.00	0	0	
	SEPT.	30	0	0	0	0.00	0	0	
	OCT.	31	0	0	0	0.00	0	0	
	NOV.	30	0	0	0	0.00	0	0	
	DEC	31	0	0	0	0.00	0	0	
1984	JAN.	31	0	0	0	0.00	0	0	
	FEB.	28	0	0	0	0.00	0	0	
	MARCH	31	0	0	0	0.00	0	0	
	APRIL	30	0	0	0	0.00	0	0	
	MAY	31	0	0	0	0.00	0	0	
	JUNE	30	0	0	0	0.00	0	0	
	JULY	31	0	0	0	0.00	0	0	
	AUGUST	31	0	0	0	0.00	0	0	
	SEPT.	30	0	0	0	0.00	0	0	
	OCT.	31	0	0	0	0.00	0	0	
	NOV.	30	0	0	0	0.00	0	0	
	DEC	31	0	0	0	0.00	0	0	
1985	JAN.	31	11.6	141.5	0.37	91.85	130.7	433.9	
	FEB.	28	15.2	156.7	0.54	92.92	199.4	633.3	
	MARCH	31	14.5	171.2	0.47	94.15	233.4	866.7	
	APRIL	30	11.6	182.8	0.39	95.01	220.8	1087.5	
	MAY	31	11.1	193.9	0.36	95.10	215.5	1303	
	JUNE	30	8.8	202.7	0.29	95.99	210.7	1513.7	
	JULY	31	8	210.7	0.26	96.54	222.9	1736.6	
	AUGUST	31	7.1	217.8	0.23	96.94	225.2	1981.8	
	SEPT.	30	7.8	225.6	0.26	96.50	214.9	2176.7	
	OCT.	31	11.6	237.2	0.37	95.22	231	2407.7	
	NOV.	30	8	245.2	0.27	96.58	225.9	2633.6	
	DEC	31	7.3	252.5	0.24	96.95	231.7	2865.3	
	JAN.	31	6.8	259.3	0.22	97.02	221.7	3087	
1986	FEB.	28	9.3	268.6	0.33	95.69	206.3	3293.3	

NORTH TILSTON FIELD									
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
				14-9-6-29					
	MARCH	31	8.5	277.1	0.27	96.46	231.3	3524.6	
	APRIL	30	1.9	279	0.06	96.42	51.1	3575.7	
	MAY	31	0	279	0.00	0.00	0	3575.7	
	JUNE	30	0.7	279.7	0.02	91.25	7.3	3583	
	JULY	31	0.6	280.3	0.02	93.94	9.3	3592.3	
	AUGUST	31	0	280.3	0.00	0.00	0	3592.3	
	SEPT.	30	0	280.3	0.00	0.00	0	3592.3	
	OCT.	31	0	280.3	0.00	0.00	0	3592.3	
	NOV.	30	0	280.3	0.00	0.00	0	3592.3	
	DEC	31	0	280.3	0.00	0.00	0	3592.3	
1987	JAN.	31	0	280.3	0.00	0.00	0	3592.3	
	FEB.	28	0	280.3	0.00	0.00	0	3592.3	
	MARCH	31	0	280.3	0.00	0.00	0	3592.3	
	APRIL	30	0	280.3	0.00	0.00	0	3592.3	
	MAY	31	0	280.3	0.00	0.00	0	3592.3	
	JUNE	30	0	280.3	0.00	0.00	0	3592.3	
	JULY	31	0	280.3	0.00	0.00	0	3592.3	
	AUGUST	31	0	280.3	0.00	0.00	0	3592.3	
	SEPT.	30	0	280.3	0.00	0.00	0	3592.3	
	OCT.	31	0	280.3	0.00	0.00	0	3592.3	
	NOV.	30	0	280.3	0.00	0.00	0	3592.3	
	DEC	31	0	280.3	0.00	0.00	0	3592.3	
1988	JAN.	31	0	280.3	0.00	0.00	0	3592.3	
	FEB.	28	0	280.3	0.00	0.00	0	3592.3	
	MARCH	31	2.6	282.9	0.08	0.00	9.7	3602	
	APRIL	30	1.8	284.7	0.06	0.00	11.8	3613.8	
	MAY	31	1	285.7	0.03	0.00	11.6	3625.4	
	JUNE	30	0	285.7	0.00	0.00	3.1	3628.5	
	JULY	31	0	285.7	0.00	0.00	0	3628.5	
	AUGUST	31	0	285.7	0.00	0.00	0	3628.5	
	SEPT.	30	0	285.7	0.00	0.00	9.8	3638.3	
	OCT.	31	0	285.7	0.00	0.00	0	3638.3	
	NOV.	30	0	285.7	0.00	0.00	0	3638.3	
	DEC	31	0	285.7	0.00	0.00	0	3638.3	
1989	JAN.	31	0	285.7	0.00	0.00	0	3638.3	
	FEB.	28	0	285.7	0.00	0.00	0	3638.3	
	MARCH	31	0	285.7	0.00	0.00	0	3638.3	
	APRIL	30	0	285.7	0.00	0.00	0	3638.3	
	MAY	31	0	285.7	0.00	0.00	0	3638.3	

			NORTH TILSTON FIELD						
					14-9-6-29				
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
	JUNE	30	0	285.7	0.00	0.00	0	3638.3	
	JULY	31	0	285.7	0.00	0.00	0	3638.3	
	AUGUST	31	0	285.7	0.00	0.00	0	3638.3	
	SEPT.	30	0	285.7	0.00	0.00	0	3638.3	
	OCT.	31	0	285.7	0.00	0.00	0	3638.3	
	NOV.	30	0	285.7	0.00	0.00	0	3638.3	
	DEC	31	0	285.7	0.00	0.00	0	3638.3	
	JAN.	31	0	285.7	0.00	0.00	0	3638.3	
	FEB.	28	0	285.7	0.00	0.00	0	3638.3	
	MARCH	31	0	285.7	0.00	0.00	0	3638.3	
	APRIL	30	0	285.7	0.00	0.00	0	3638.3	
	MAY	31	0	285.7	0.00	0.00	0	3638.3	
	JUNE	30	0	285.7	0.00	0.00	0	3638.3	
	JULY	31	0	285.7	0.00	0.00	0	3638.3	
	AUGUST	31	0	285.7	0.00	0.00	0	3638.3	
	SEPT.	30	0	285.7	0.00	0.00	0	3638.3	
	OCT.	31	0	285.7	0.00	0.00	0	3638.3	
	NOV.	30	0	285.7	0.00	0.00	0	3638.3	
	DEC	31	0	285.7	0.00	0.00	0	3638.3	
	JAN.	31	0	285.7	0.00	0.00	0	3638.3	
	FEB.	28	0	285.7	0.00	0.00	0	3638.3	
	MARCH	31	0	285.7	0.00	0.00	0	3638.3	
	APRIL	30	0	285.7	0.00	0.00	0	3638.3	
	MAY	31	0	285.7	0.00	0.00	0	3638.3	
	JUNE	30	0	285.7	0.00	0.00	0	3638.3	
	JULY	31	0	285.7	0.00	0.00	0	3638.3	
	AUGUST	31	0	285.7	0.00	0.00	0	3638.3	
	SEPT.	30	0	285.7	0.00	0.00	0	3638.3	
	OCT.	31	0	285.7	0.00	0.00	0	3638.3	
	NOV.	30	0	285.7	0.00	0.00	0	3638.3	
	DEC	31	0	285.7	0.00	0.00	0	3638.3	
	JAN.	31	0	285.7	0.00	0.00	0	3638.3	
	FEB.	28	0	285.7	0.00	0.00	0	3638.3	
	MARCH	31	0	285.7	0.00	0.00	0	3638.3	
	APRIL	30	0	285.7	0.00	0.00	0	3638.3	
	MAY	31	0	285.7	0.00	0.00	0	3638.3	
	JUNE	30	0	285.7	0.00	0.00	0	3638.3	
	JULY	31	0	285.7	0.00	0.00	0	3638.3	
	AUGUST	31	0	285.7	0.00	0.00	0	3638.3	
	SEPT.	30	0	285.7	0.00	0.00	0	3638.3	
	OCT.	31	0	285.7	0.00	0.00	0	3638.3	
	NOV.	30	0	285.7	0.00	0.00	0	3638.3	
	DEC	31	0	285.7	0.00	0.00	0	3638.3	
	JAN.	31	0	285.7	0.00	0.00	0	3638.3	
	FEB.	28	0	285.7	0.00	0.00	0	3638.3	
	MARCH	31	0	285.7	0.00	0.00	0	3638.3	
	APRIL	30	0	285.7	0.00	0.00	0	3638.3	
	MAY	31	0	285.7	0.00	0.00	0	3638.3	
	JUNE	30	0	285.7	0.00	0.00	0	3638.3	
	JULY	31	0	285.7	0.00	0.00	0	3638.3	
	AUGUST	31	0	285.7	0.00	0.00	0	3638.3	
	SEPT.	30	0	285.7	0.00	0.00	0	3638.3	
	OCT.	31	0	285.7	0.00	0.00	0	3638.3	
	NOV.	30	0	285.7	0.00	0.00	0	3638.3	
	DEC	31	0	285.7	0.00	0.00	0	3638.3	
	JAN.	31	0	285.7	0.00	0.00	0	3638.3	
	FEB.	28	0	285.7	0.00	0.00	0	3638.3	
	MARCH	31	0	285.7	0.00	0.00	0	3638.3	
	APRIL	30	0	285.7	0.00	0.00	0	3638.3	
	MAY	31	0	285.7	0.00	0.00	0	3638.3	

NORTH TILSTON FIELD									
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
				14-9-6-29	-				
	SEPT.	30	0	285.7	0.00	0.00	0	3638.3	
	OCT.	31	0	285.7	0.00	0.00	0	3638.3	
	NOV.	30	0	285.7	0.00	0.00	0	3638.3	
	DEC	31	0	285.7	0.00	0.00	0	3638.3	

NORTH TILSTON FIELD									
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
1983				14-5-6-29					
	JAN.	31	0	0	0.00	0.00	0	0	
	FEB.	28	0	0	0.00	0.00	0	0	
	MARCH	31	0	0	0.00	0.00	0	0	
	APRIL	30	0	0	0.00	0.00	0	0	
	MAY	31	0	0	0.00	0.00	0	0	
	JUNE	30	0	0	0.00	0.00	0	0	
	JULY	31	0	0	0.00	0.00	0	0	
	AUGUST	31	0	0	0.00	0.00	0	0	
	SEPT.	30	0	0	0.00	0.00	0	0	
	OCT.	31	0	0	0.00	0.00	0	0	
	NOV.	30	0	0	0.00	0.00	0	0	
1984	DEC.	31	0	0	0.00	0.00	0	0	
	JAN.	31	0	0	0.00	0.00	0	0	
	FEB.	28	0	0	0.00	0.00	0	0	
	MARCH	31	0	0	0.00	0.00	0	0	
	APRIL	30	0	0	0.00	0.00	0	0	
	MAY	31	0	0	0.00	0.00	0	0	
	JUNE	30	0	0	0.00	0.00	0	0	
	JULY	31	0	0	0.00	0.00	0	0	
	AUGUST	31	0	0	0.00	0.00	0	0	
	SEPT.	30	0	0	0.00	0.00	0	0	
	OCT.	31	0	0	0.00	0.00	0	0	
	NOV.	30	0	0	0.00	0.00	0	0	
1985	DEC.	31	0	0	0.00	0.00	0	0	
	JAN.	31	16.7	277.1	0.54	53.35	19.1	120	
	FEB.	28	16.9	294	0.60	38.32	10.5	130.5	
	MARCH	31	6.8	300.8	0.22	83.50	34.4	164.9	
	APRIL	30	0	300.8	0.00	100.00	13.6	178.5	
	MAY	31	18.5	319.3	0.60	72.83	49.6	228.1	
	JUNE	30	20	339.3	0.67	74.59	58.7	286.8	
	JULY	31	23.8	363.1	0.77	71.08	58.5	345.3	
	AUGUST	31	22	385.1	0.71	72.67	58.5	403.8	
	SEPT.	30	19.5	404.6	0.65	75.06	58.7	462.5	
	OCT.	31	19.4	424	0.63	75.63	60.2	522.7	
	NOV.	30	19.3	443.3	0.64	78.48	70.4	593.1	
1986	DEC.	31	18	461.3	0.58	76.03	57.1	650.2	
	JAN.	31	4.3	465.6	0.14	78.50	15.7	665.9	
	FEB.	28	0	465.6	0.00	0.00	0	665.9	



NORTH TILSTON FIELD									
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
				14-5-6-29					
	JUNE	30	9.9	712.2	0.33	79.11	37.5	1429.5	
	JULY	31	6.1	718.3	0.20	87.65	43.3	1472.8	
	AUGUST	31	8.6	726.9	0.28	81.86	38.8	1511.6	
	SEPT.	30	3.4	730.3	0.11	89.03	27.6	1539.2	
	OCT.	31	8	738.3	0.26	80.91	33.9	1573.1	
	NOV.	30	3.3	741.6	0.11	89.25	27.4	1600.5	
	DEC	31	0	741.6	0.00	0.00	0	1600.5	
1990	JAN.	31	0	741.6	0.00	0.00	0	1600.5	
	FEB.	28	1	742.6	0.04	84.38	5.4	1605.9	
	MARCH	31	0	742.6	0.00	0.00	0	1605.9	
	APRIL	30	5	747.6	0.17	74.36	14.5	1620.4	
	MAY	31	0	747.6	0.00	0.00	0	1620.4	
	JUNE	30	0.9	748.5	0.03	85.00	5.1	1625.5	
	JULY	31	0	748.5	0.00	0.00	0	1625.5	
	AUGUST	31	0	748.5	0.00	0.00	0	1625.5	
	SEPT.	30	0	748.5	0.00	0.00	0	1625.5	
	OCT.	31	0	748.5	0.00	0.00	0	1625.5	
	NOV.	30	0	748.5	0.00	0.00	0	1625.5	
	DEC	31	0	748.5	0.00	0.00	0	1625.5	
1991	JAN.	31	0	748.5	0.00	0.00	0	1625.5	
	FEB.	28	3	751.5	0.11	25.00	1	1626.5	
	MARCH	31	0	751.5	0.00	0.00	0	1626.5	
	APRIL	30	0	751.5	0.00	0.00	0	1626.5	
	MAY	31	2.5	754	0.08	77.48	8.6	1635.1	
	JUNE	30	3.3	757.3	0.11	73.39	9.1	1644.2	
	JULY	31	5	762.3	0.16	85.38	29.2	1673.4	
	AUGUST	31	20.3	782.6	0.65	83.73	104.5	1777.9	
	SEPT.	30	27.8	810.4	0.93	78.88	103.8	1881.7	
	OCT.	31	18.8	829.2	0.61	85.82	113.8	1995.5	
	NOV.	30	20.5	849.7	0.68	85.14	117.5	2113	
	DEC	31	20.1	869.8	0.65	85.80	121.4	2234.4	
1992	JAN.	31	23.8	893.6	0.77	83.69	122.1	2356.5	
	FEB.	28	18.8	912.4	0.67	85.86	114.2	2470.7	
	MARCH	31	8.5	920.9	0.27	90.20	78.2	2548.9	
	APRIL	30	13.6	934.5	0.45	90.26	126.1	2675	
	MAY	31	6	940.5	0.19	92.40	72.9	2747.9	
	JUNE	30	0	940.5	0.00	0.00	0	2747.9	
	JULY	31	0	940.5	0.00	0.00	0	2747.9	
	AUGUST	31	0	940.5	0.00	0.00	0	2747.9	



			NORTH TILSTON FIELD							
							14-5-6-29			
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)		
	SEPT.	30	0	940.5	0.00	100.00	100.8	2848.7		
	OCT.	31	0	940.5	0.00	100.00	249	3097.7		
	NOV.	30	0	940.5	0.00	0.00	0	3097.7		
	DEC	31	0	940.5	0.00	0.00	0	3097.7		

NORTH TILSTON FIELD									
5-15-6-29									
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
1983	JAN.	31	0	0	0.00	0.00	0	0	
	FEB.	28	0	0	0.00	0.00	0	0	
	MARCH	31	0	0	0.00	0.00	0	0	
	APRIL	30	0	0	0.00	0.00	0	0	
	MAY	31	0	0	0.00	0.00	0	0	
	JUNE	30	0	0	0.00	0.00	0	0	
	JULY	31	0	0	0.00	0.00	0	0	
	AUGUST	31	0	0	0.00	0.00	0	0	
	SEPT.	30	0	0	0.00	0.00	0	0	
	OCT.	31	0	0	0.00	0.00	0	0	
	NOV.	30	0	0	0.00	0.00	0	0	
	DEC	31	0	0	0.00	0.00	0	0	
1984	JAN.	31	0	0	0.00	0.00	0	0	
	FEB.	28	0	0	0.00	0.00	0	0	
	MARCH	31	0	0	0.00	0.00	0	0	
	APRIL	30	0	0	0.00	0.00	0	0	
	MAY	31	0	0	0.00	0.00	0	0	
	JUNE	30	0	0	0.00	0.00	0	0	
	JULY	31	0	0	0.00	0.00	0	0	
	AUGUST	31	0	0	0.00	0.00	0	0	
	SEPT.	30	0	0	0.00	0.00	0	0	
	OCT.	31	0	0	0.00	0.00	0	0	
	NOV.	30	0	0	0.00	0.00	0	0	
	DEC	31	0	0	0.00	0.00	0	0	
1985	JAN.	31	29.5	29.5	0.95	10.61	3.5	3.5	
	FEB.	28	58.5	88	1.89	48.59	55.3	58.8	
	MARCH	31	41	129	1.37	70.01	95.7	154.5	
	APRIL	30	25.3	154.3	0.82	82.06	115.7	270.2	
	MAY	31	18.2	172.5	0.61	85.98	111.6	381.8	
	JUNE	30	20.1	192.6	0.65	83.72	103.4	485.2	
	JULY	31	13.9	206.5	0.45	87.91	101.1	586.3	
	AUGUST	31	10.6	217.1	0.38	89.03	86	672.3	
	SEPT.	30	5.1	222.2	0.16	85.99	31.3	703.6	
	OCT.	31	0	222.2	0.00	0.00	0	703.6	
	NOV.	30	0.6	222.8	0.02	94.12	9.6	713.2	
	DEC	31	12	234.8	0.40	87.32	82.6	795.8	
1986	JAN.	31	10.4	245.2	0.34	88.65	81.2	877	
	FEB.	28	8.8	254	0.28	90.03	79.5	956.5	
	MARCH	31	8	262	0.27	90.12	73	1029.5	
	APRIL	30	6.7	268.7	0.22	90.18	61.5	1091	
	MAY	31	6.6	275.3	0.22	90.35	61.8	1152.8	
	JUNE	30	6.6	281.9	0.21	90.73	64.6	1217.4	
	JULY	31	6.7	288.6	0.22	90.16	61.4	1278.8	
	AUGUST	31	5.5	294.1	0.20	90.37	51.6	1330.4	
	SEPT.	30							
	OCT.	31							
	NOV.	30							
	DEC	31							



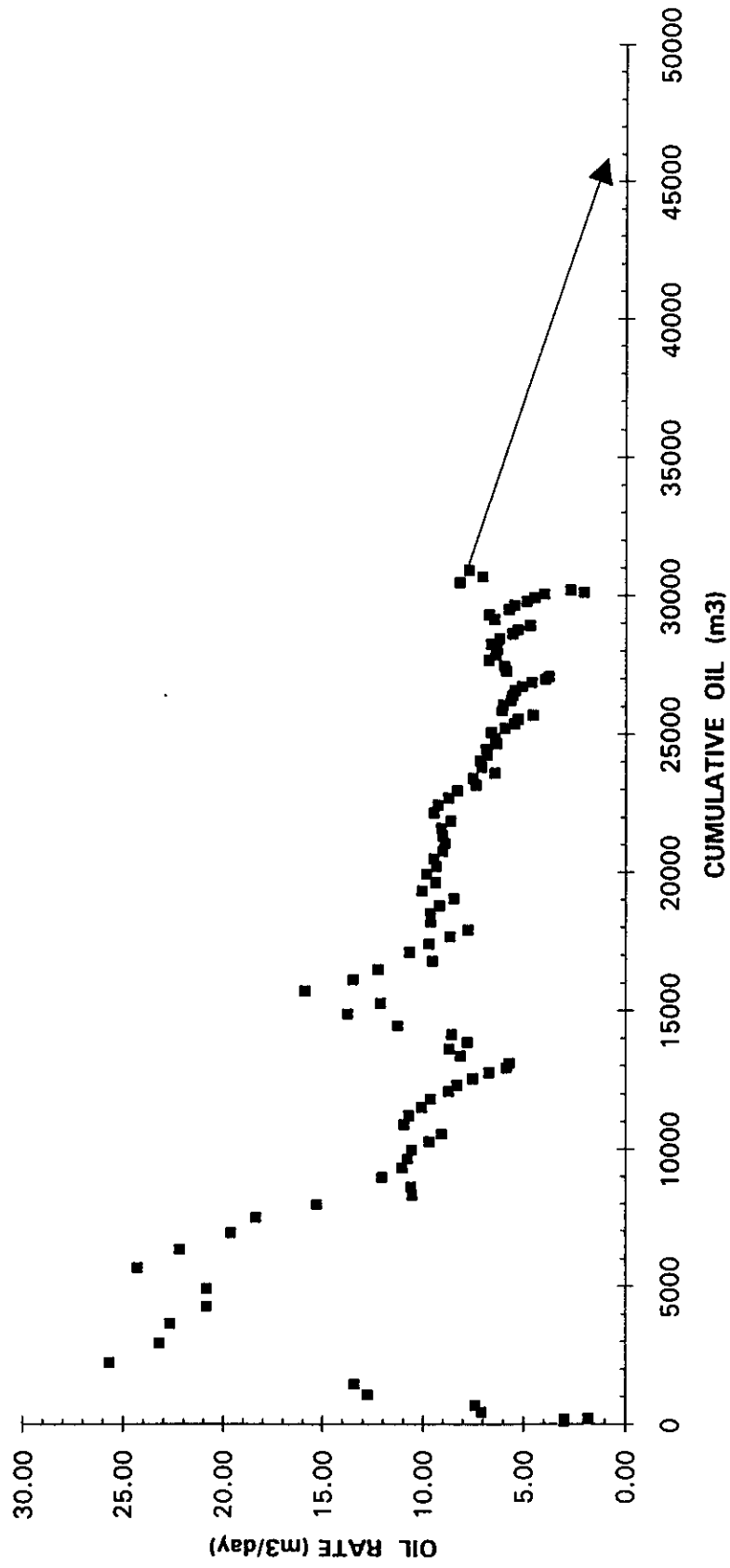
			NORTH TILSTON FIELD							
					5-15-6-29					
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)		
1990	JUNE	30	0	311.2	0.00	0.00	0	1471.5		
	JULY	31	0	311.2	0.00	0.00	0	1471.5		
	AUGUST	31	0	311.2	0.00	0.00	0	1471.5		
	SEPT.	30	0	311.2	0.00	0.00	0	1471.5		
	OCT.	31	0	311.2	0.00	0.00	0	1471.5		
	NOV.	30	0	311.2	0.00	0.00	0	1471.5		
	DEC	31	0	311.2	0.00	0.00	0	1471.5		
	JAN.	31	4.5	315.7	0.15	83.46	22.7	1494.2		
	FEB.	28	0	315.7	0.00	0.00	0	1494.2		
	MARCH	31	0	315.7	0.00	0.00	0	1494.2		
	APRIL	30	0	315.7	0.00	0.00	0	1494.2		
	MAY	31	0	315.7	0.00	0.00	0	1494.2		
1991	JUNE	30	0	315.7	0.00	0.00	0	1494.2		
	JULY	31	0	315.7	0.00	0.00	0	1494.2		
	AUGUST	31	0	315.7	0.00	0.00	0	1494.2		
	SEPT.	30	0	315.7	0.00	0.00	0	1494.2		
	OCT.	31	0	315.7	0.00	0.00	0	1494.2		
	NOV.	30	0	315.7	0.00	0.00	0	1494.2		
	DEC	31	0	315.7	0.00	0.00	0	1494.2		
	JAN.	31	0	315.7	0.00	0.00	0	1494.2		
	FEB.	28	0	315.7	0.00	0.00	0	1494.2		
	MARCH	31	0	315.7	0.00	0.00	0	1494.2		
	APRIL	30	0	315.7	0.00	0.00	0	1494.2		
	MAY	31	0	315.7	0.00	0.00	0	1494.2		
1992	JUNE	30	0	315.7	0.00	0.00	0	1494.2		
	JULY	31	0	315.7	0.00	0.00	0	1494.2		
	AUGUST	31	0	315.7	0.00	0.00	0	1494.2		
	SEPT.	30	0	315.7	0.00	0.00	0	1494.2		
	OCT.	31	0	315.7	0.00	0.00	0	1494.2		
	NOV.	30	0	315.7	0.00	0.00	0	1494.2		
	DEC	31	0	315.7	0.00	0.00	0	1494.2		
	JAN.	31	0	315.7	0.00	0.00	0	1494.2		
	FEB.	28	0	315.7	0.00	0.00	0	1494.2		
	MARCH	31	0	315.7	0.00	0.00	0	1494.2		
	APRIL	30	0	315.7	0.00	0.00	0	1494.2		
	MAY	31	0	315.7	0.00	0.00	0	1494.2		

		NORTH TILSTON FIELD							
					5-15-8-29				
YEAR	MONTH	DAYS	MONTH OIL (m3)	CUM. OIL (m3)	OIL RATE (m3/day)	WATER-CUT (%)	WATER (m3)	CUM. WATER (m3)	
	SEPT.	30	0	315.7	0.00	0.00	0	1494.2	
	OCT.	31	0	315.7	0.00	0.00	0	1494.2	
	NOV.	30	0	315.7	0.00	0.00	0	1494.2	
	DEC	31	0	315.7	0.00	0.00	0	1494.2	

**APPENDIX E**

**DECLINE ANALYSIS FOR TOTAL NORTH TILSTON FIELD**

# NORTH TILSTON PRODUCTION HISTORY

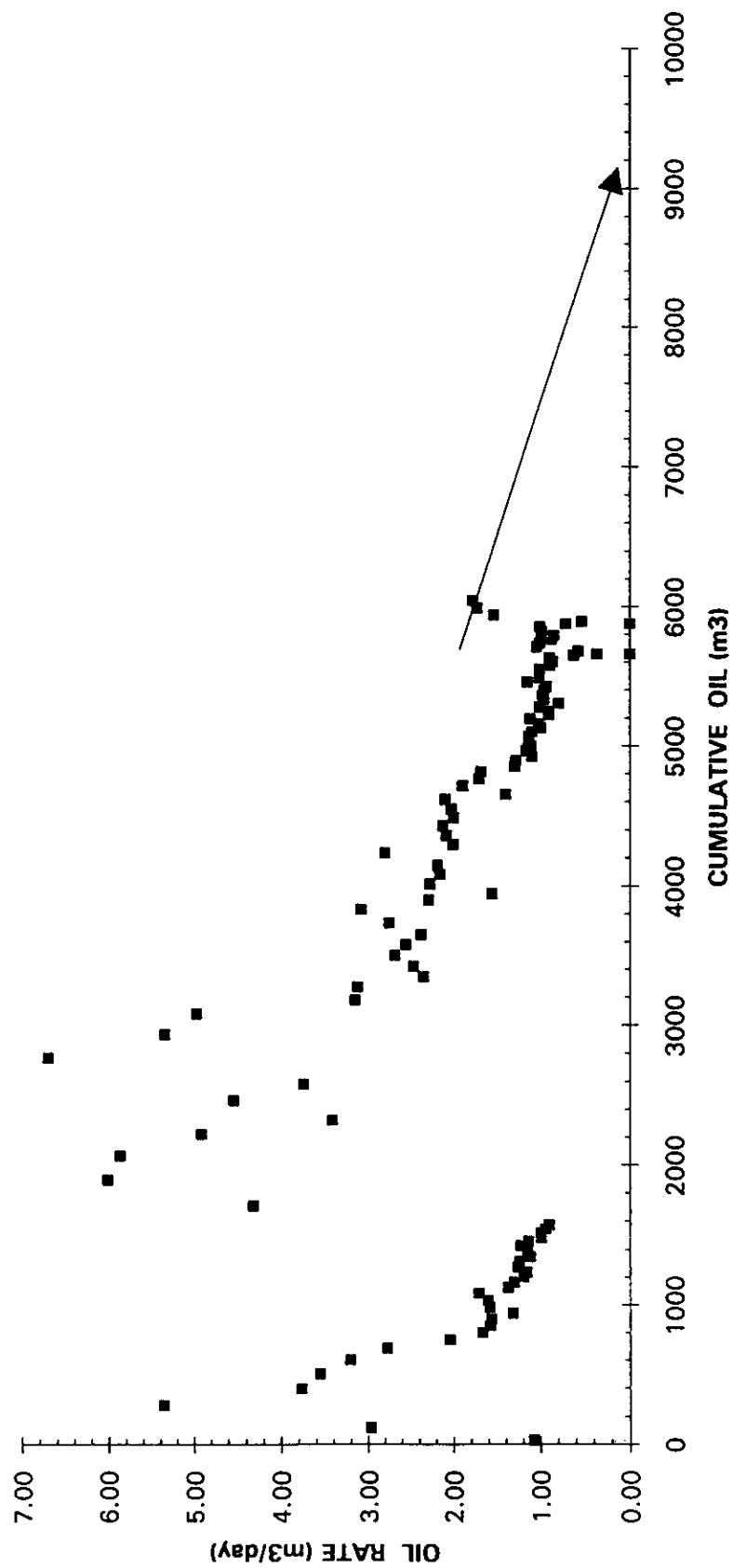


**APPENDIX F**

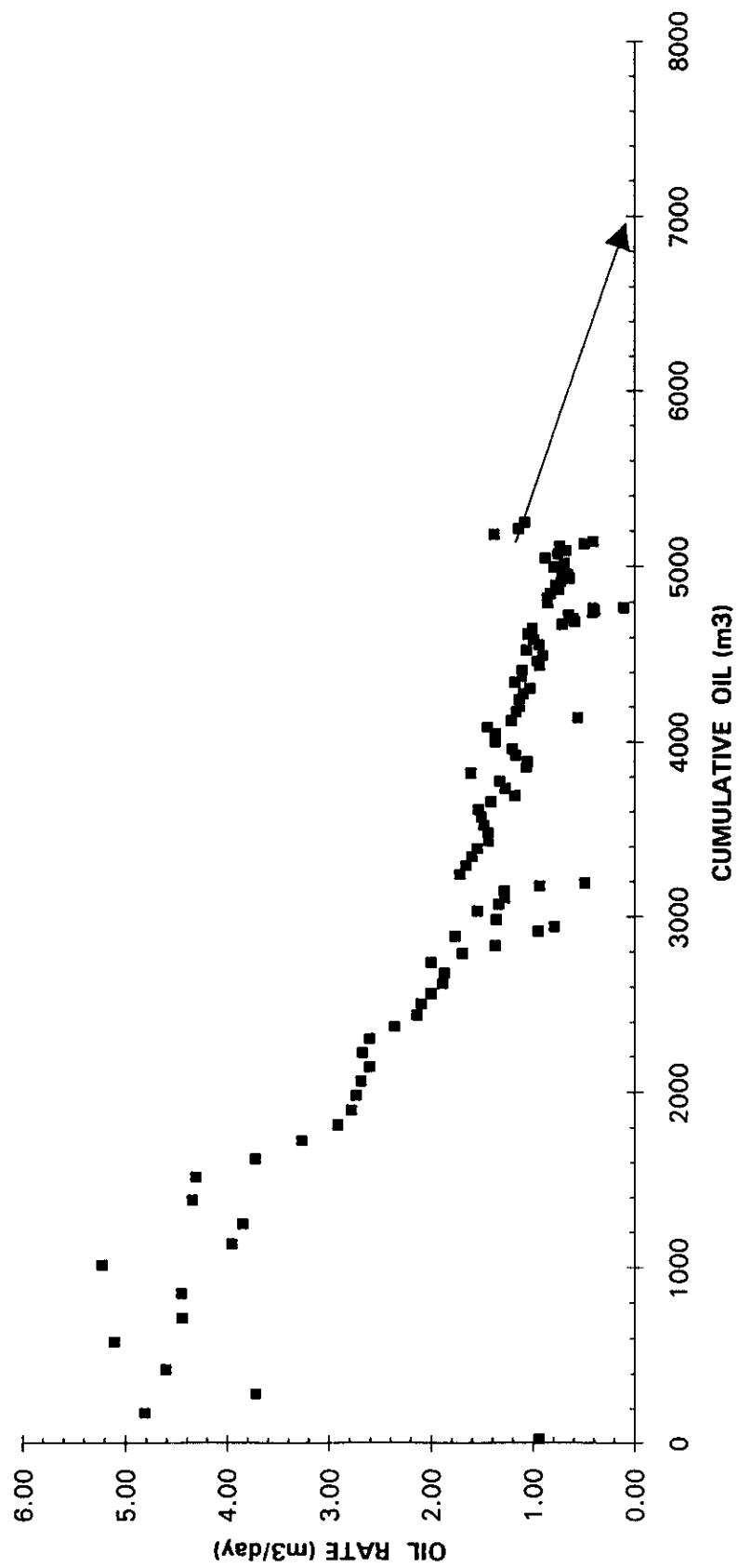
**DECLINE ANALYSIS FOR INDIVIDUAL WELLS**



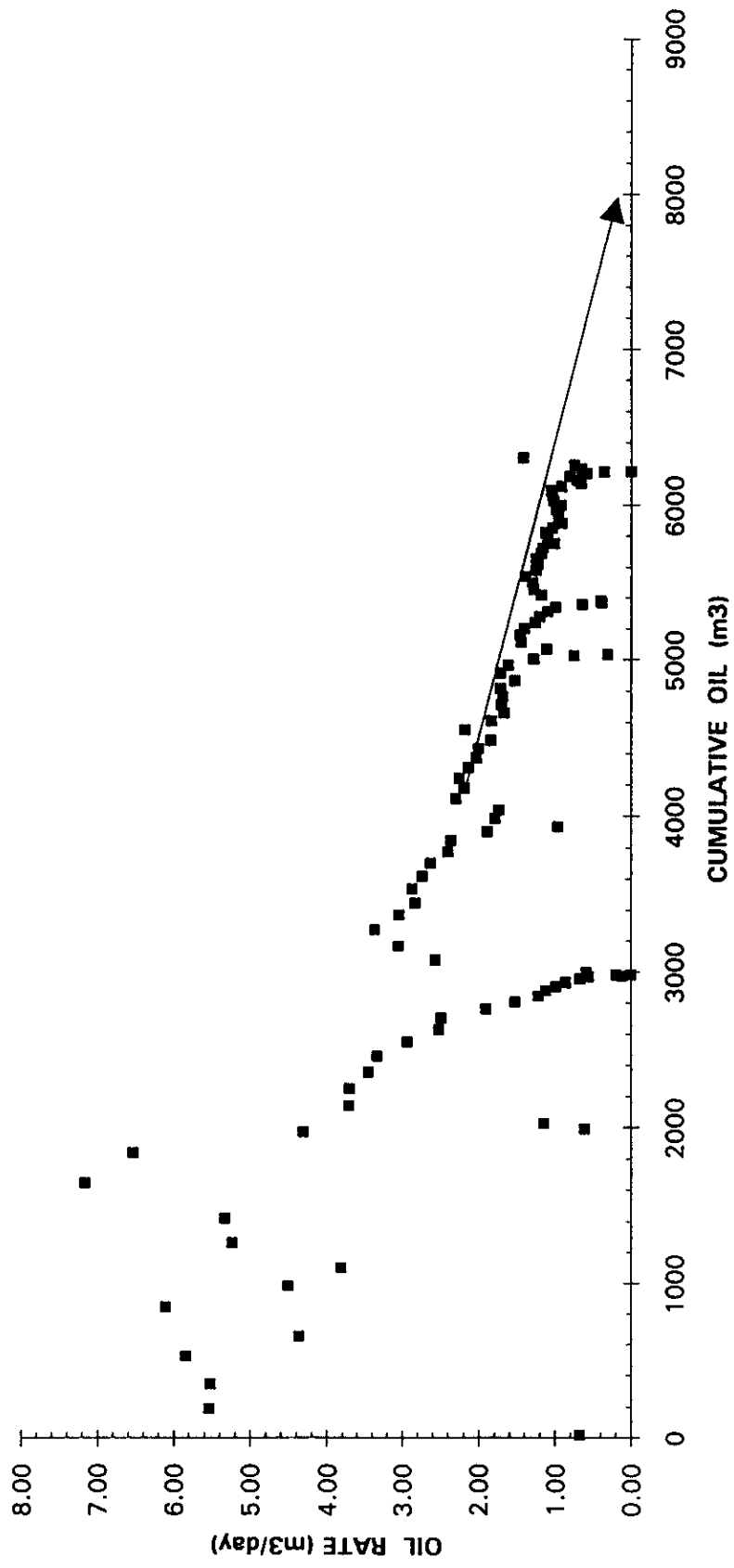
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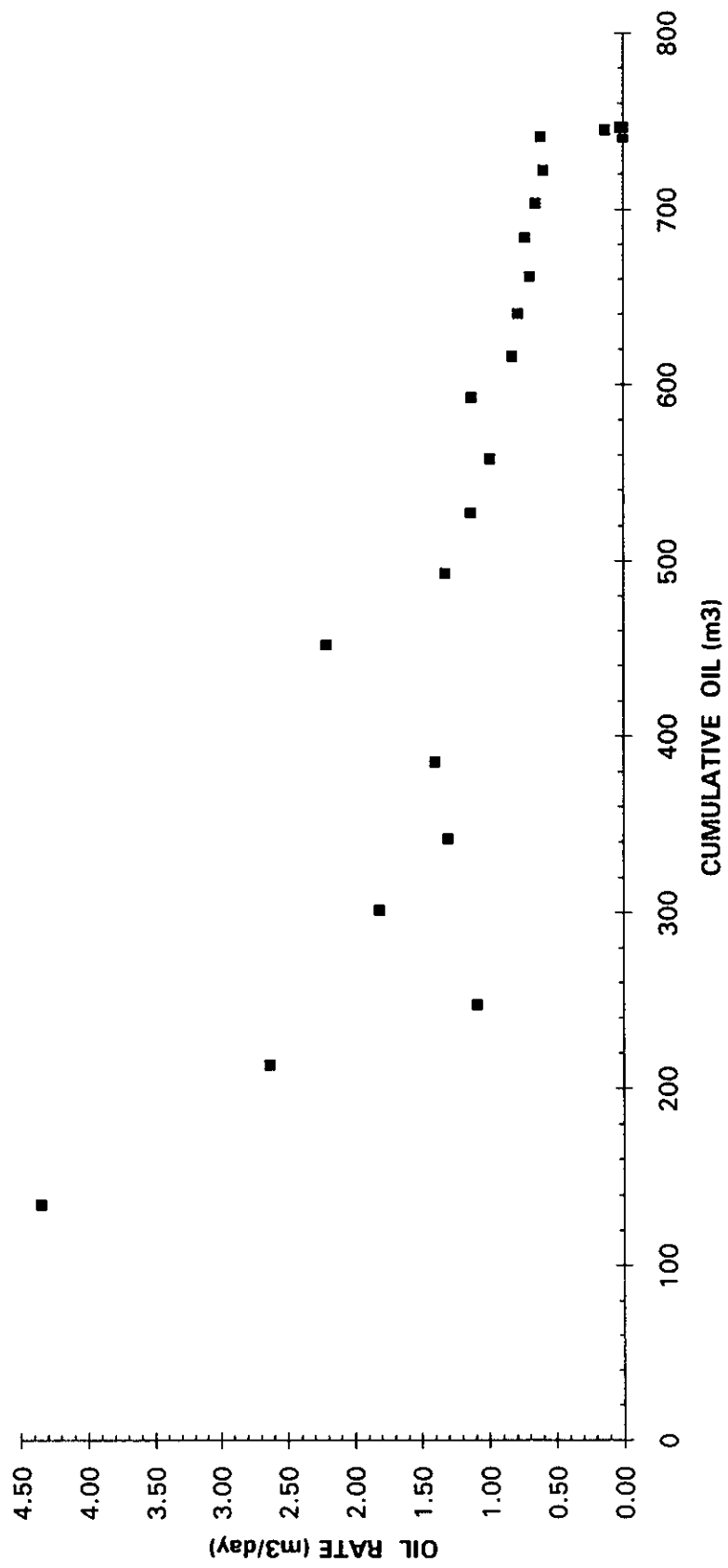
NORTH TILSTON 2-8-6-29



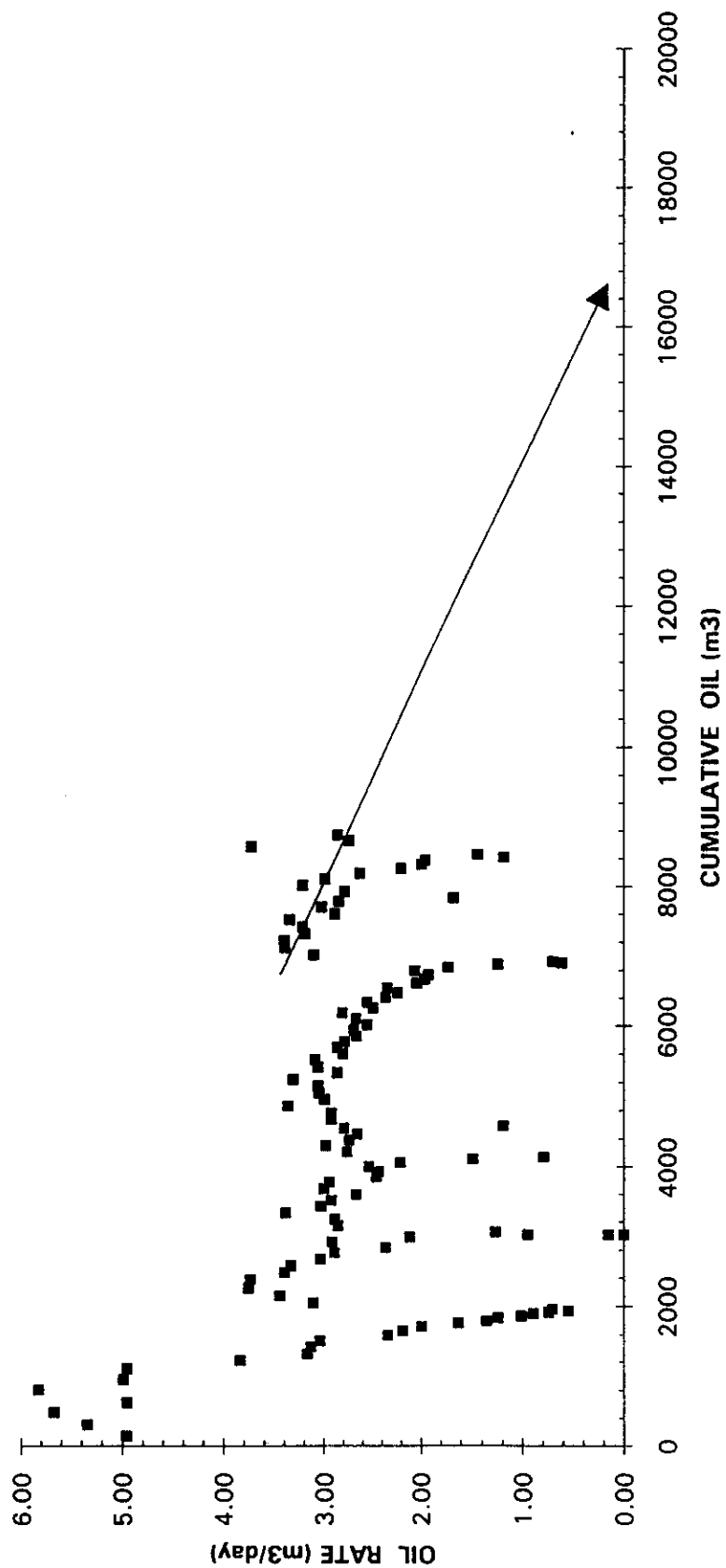
NORTH TILSTON 8-8-6-29



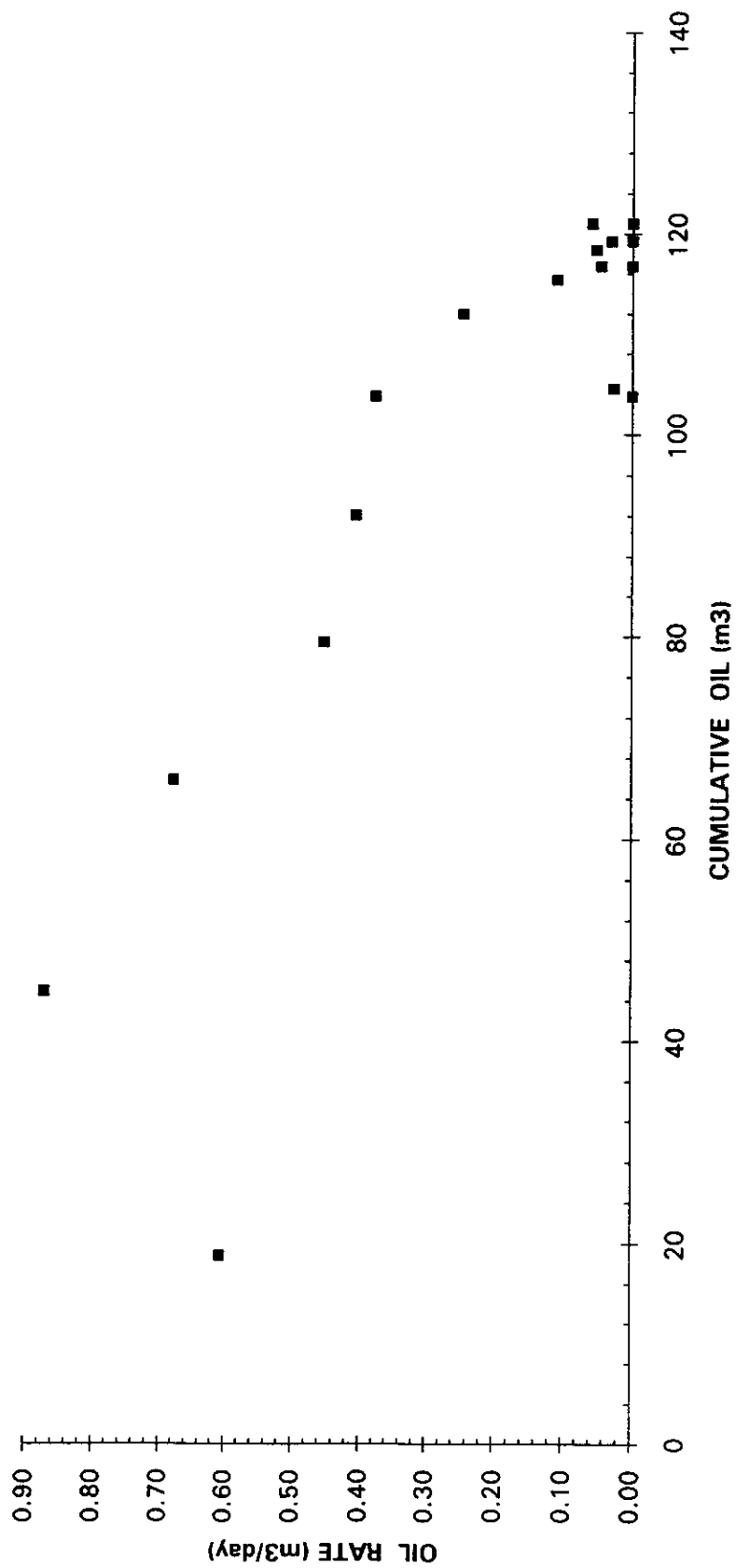
NORTH TILSTON 4-9-6-29



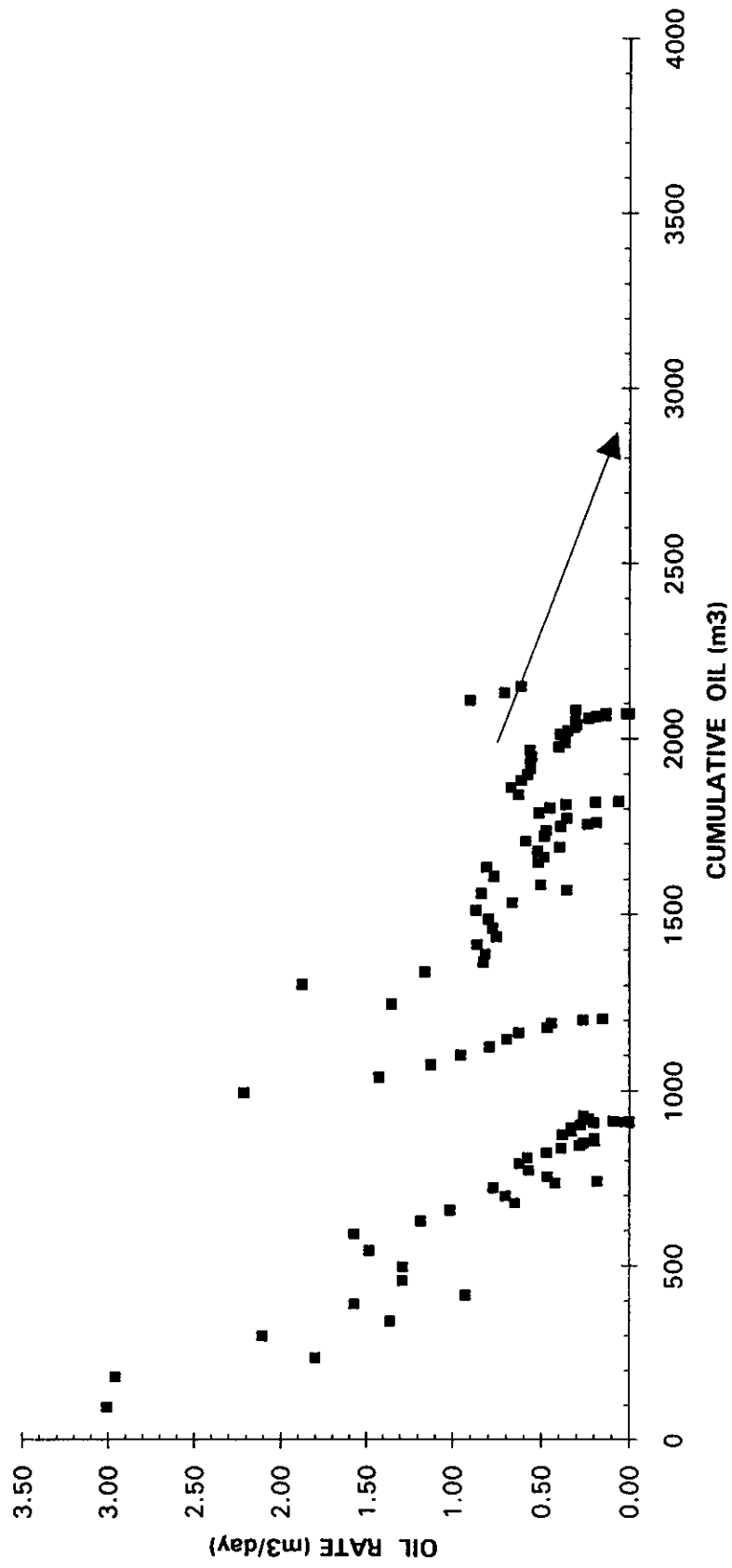
NORTH TILSTON 5-9-6-29



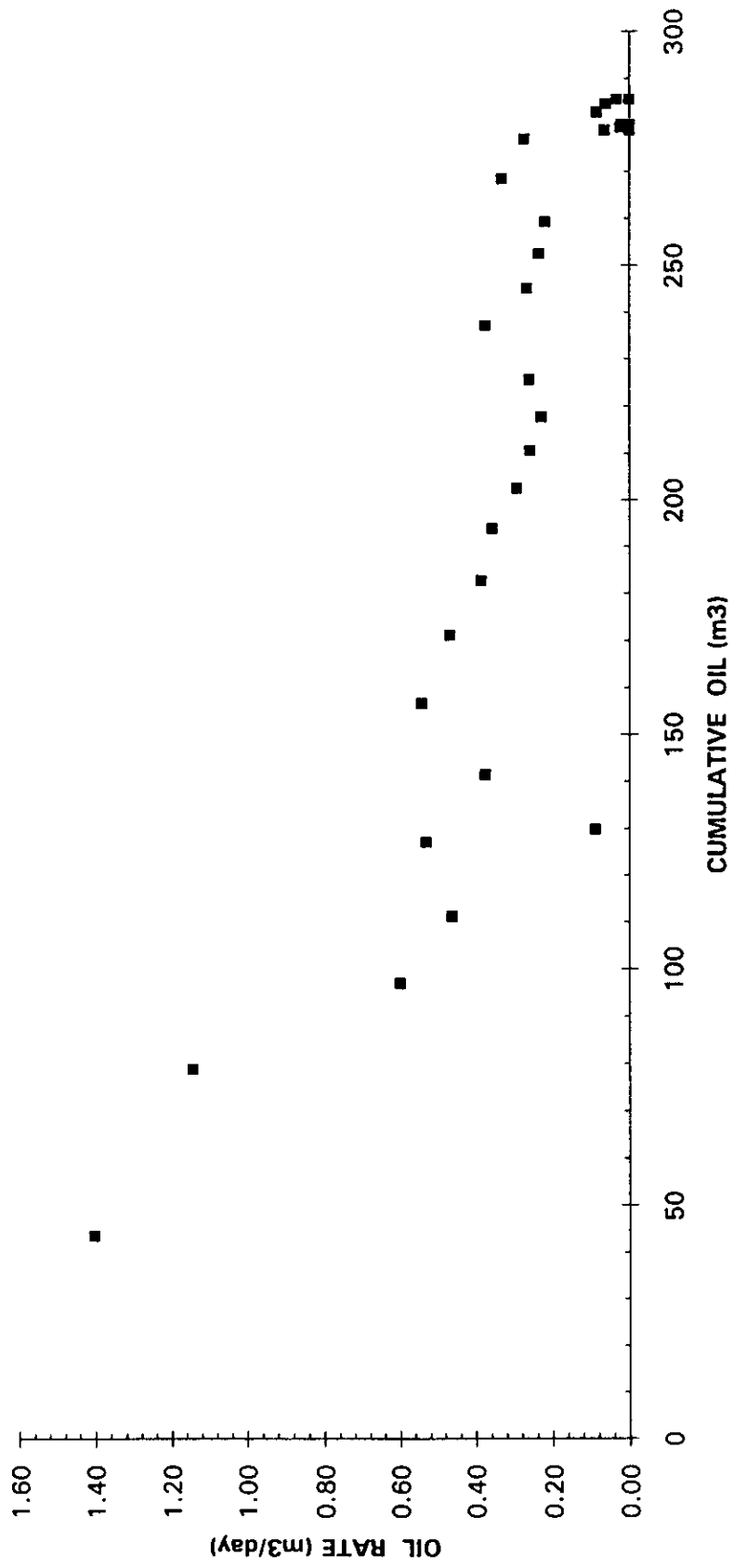
NORTH TILSTON 11-9-6-29



NORTH TILSTON 12-9-6-29

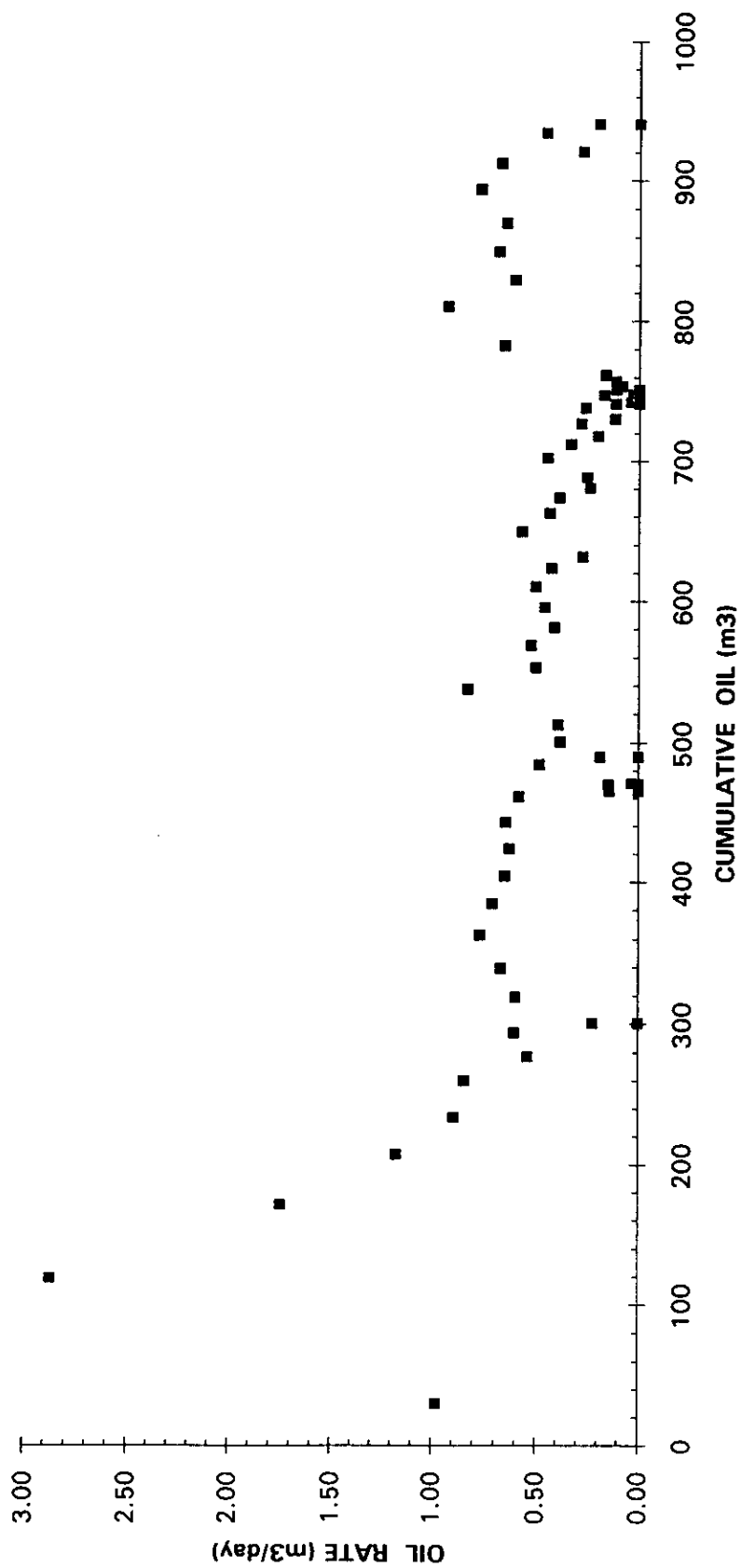


NORTH TILSTON 14-9-6-29

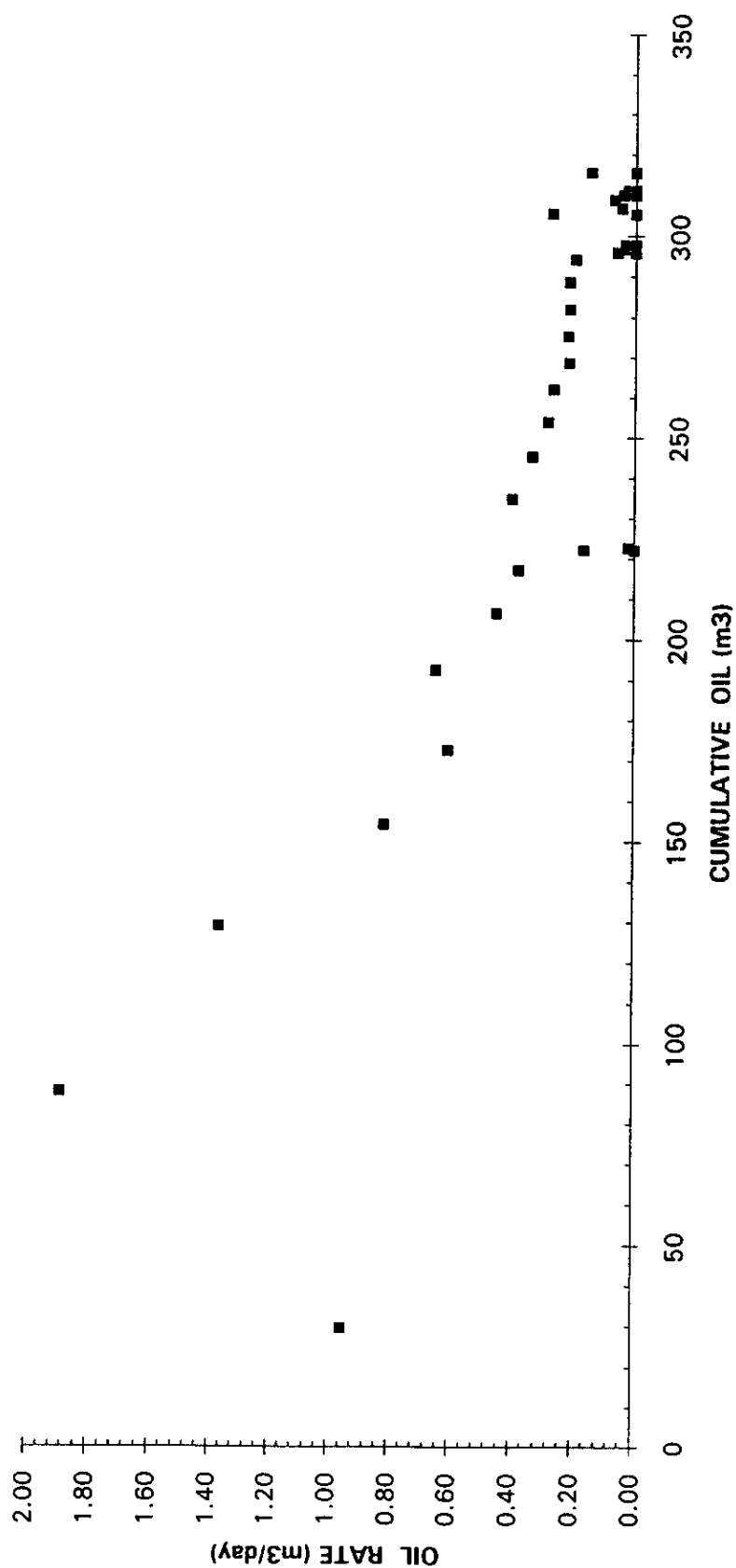




TILSTON NORTH 14-5-6-29



NORTH TILSTON 5-15-6-29



**APPENDIX G**

**ESTIMATION OF DRAINAGE AREAS ON 40 ACRE SPACING**



[illegible]

[illegible]

[illegible]

[illegible]



[illegible]

[illegible]



## **APPENDIX H**

### **AERIAL WELL SITING PHOTOGRAPH**

## **APPENDIX H**

### **WELL SITE INFORMATION**

The attached colour infra-red aerial photograph of the North Tilston Mission Canyon 1C Pool area was taken in July of 1993 and represents the most up-to-date aerial photography available. The existing facilities are clearly visible on the photograph and the accompanying overlay provides annotation of existing well sites and facilities as well as proposed infill locations. The following is a brief description of each proposed location:

#### **15C-5 and 15D-5-6-29 WPM**

Located on the extreme northern edge of a wheat field, the locations will be accessed along a presently undeveloped road allowance. The locations have been selected to minimize natural habitat disruption and avoid marshy lower elevations. It is proposed that flowlines will be run to existing flowline trenches at the 1-8 and 2-8 locations.

#### **8A-8-6-29 WPM**

Located immediately adjacent to a developed road allowance, the location will be accessed via a ditch crossing. The location will be sited to minimize habitat disruption and loss of arable land. Flowline routing will be direct to the 8-8 battery.

#### **8B-8-6-29 WPM**

The location will be accessed by a field crossing from the existing 2-8 lease road. Access will be along high ground to minimize disruption. The location is sited to reduced habitat disruption and minimize loss of arable land. Flowline routing will utilize the existing right-of-way as much as possible.

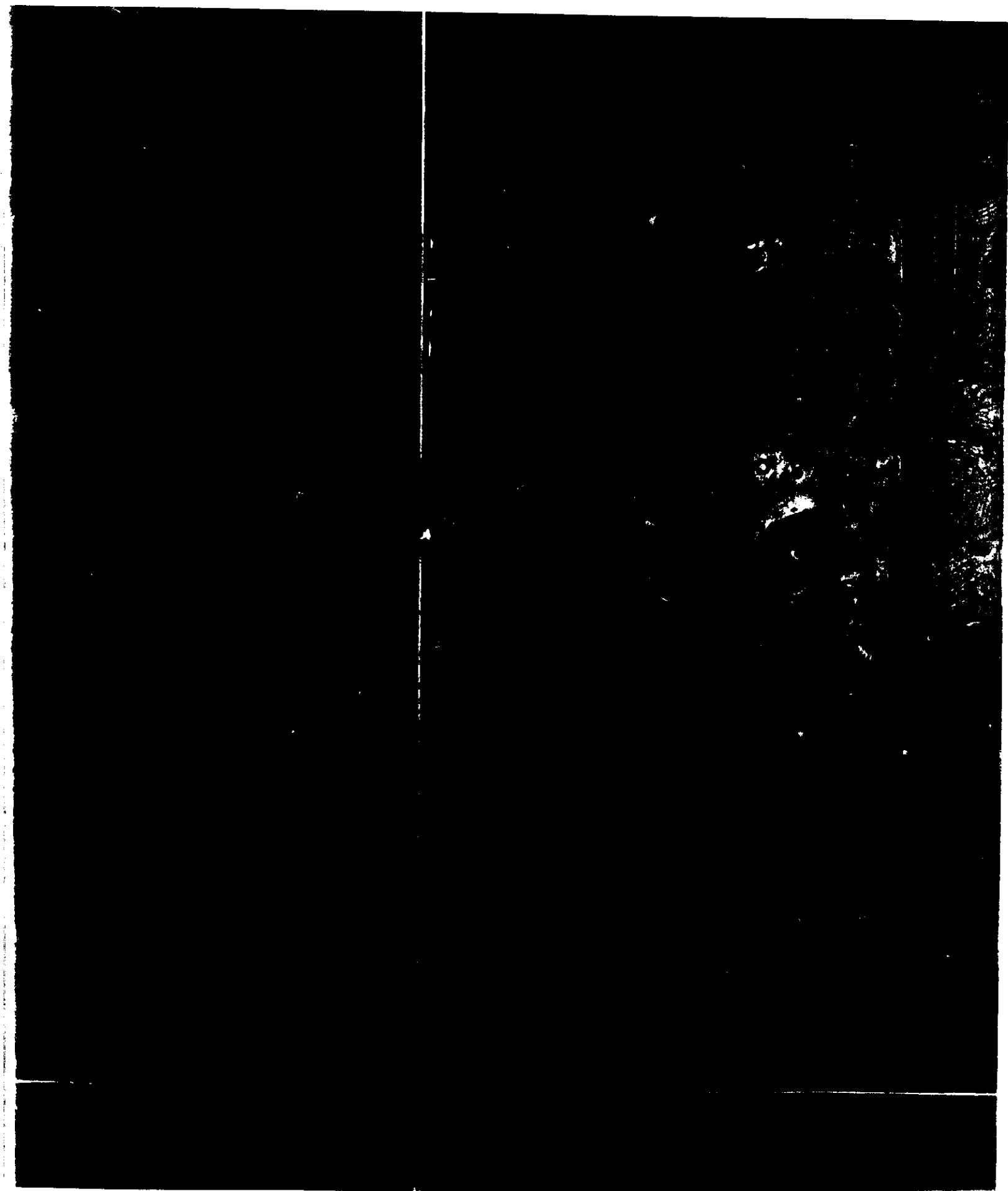
#### **5C-9-6-29 WPM**

The location will be accessed by a lease road constructed along the existing fenceline. The location is immediately adjacent to a developed road allowance and has been sited on high ground to optimize access and minimize loss of arable land. Proposed flowline routing is adjacent to the existing road allowance to minimize disruption.

#### **12A-9-6-29 WPM**

The location will be accessed by the above lease road. The location is currently not cropped and, as such, will result in minimum loss of arable land. The location is also sited to minimize habitat disruption. Proposed flowline routing is direct to the existing 5-9 well head.

Finalization of all surface locations and right-of-ways are subject to land owner concurrence.



# **APPENDIX I**

## **NORTH TILSTON ENVIRONMENTAL IMPACT ASSESSMENT**

# **APPENDIX I**

## **ENVIRONMENTAL IMPACT ASSESSMENT**

The purpose of this assessment is to evaluate impacts which may result on the surrounding environment from the proposed Tundra Oil and Gas Ltd. reduced spacing project in the North Tilston Mission Canyon 1C Pool.

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 are modelled upon those employed by Chevron in the North Virden Scallion Unit No. 1 and Virden Roselea Unit No. 1 with specific modifications designed for the North Tilston Mission Canyon 1C Pool reduced spacing project:

### **1. DISPOSAL OF DRILLING FLUIDS ON DRILL SITES**

Tundra 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 North Tilston Mission Canyon 1C Pool, 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 Tundra 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, Tundra will institute procedures wherever necessary, in consultation with the landowner, to strip and stockpile the topsoil before the flowline is installed. These procedures to prevent soil mixing



and topsoil compaction will ensure topsoil is conserved so that the productive capability of the soil is maintained. Tundra 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 Tundra to institute programs which will minimize the probability of spills occurring. Tundra, wherever practical, will construct flowlines of non-corrodible fibreglass pipe.

Another possible cause of spills is through flowline failure due to over pressure. Wax build-up is the main cause of pressure build-up in the flowline. 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 Tundra's standard practise, 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. Tundra, wherever possible, will bury flowlines in the reduced spacing project to a depth of 1.5 metres to stabilize the position of the flowline and to help prevent flowline breakage from frost heaving.

Although unlikely, a spill may occur even though the above preventative measures have been implemented. Should a spill occur, it is/will be Tundra's standard practise 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.

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 Tundra 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, Tundra 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 no longer possible, Tundra 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 North Tilston Mission Canyon 1C Pool reduced spacing project area will be cultivated lands. The intent of this assessment is to highlight Tundra's efforts to minimize the impact of the project on surface operations in the area.

### Discussion

#### A. Project Location

The location of the proposed North Tilston Mission Canyon 1C Pool reduced spacing project area was chosen primarily on the basis of favourable geologic and reservoir characteristics.

#### B. Well Spacing

A map showing the orientation and size of drilling spacing units within the proposed reduced spacing area is shown in Attachment 5. 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.

#### C. Well Locations

The existing wells in Sections 8 and 9 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 corner of the legal Subdivisions as possible (see the aerial photograph in Appendix H). The final locations may be moved slightly from the ideal pattern locations to:

- a. Minimize surface impact;
- b. Minimize lease construction;
- c. Avoid pipelines, road allowances and other facilities in the area.

Most of these infill locations are on cultivated lands. Movement of the locations off of cultivated lands would result in higher lease construction costs and significant habitat disruption. The locations will be as close to ideal corner locations as possible, given the constraints noted above.

D. Minimization of Surface Impacts

1. Location Access

With the well locations fixed by the constraints discussed previously, Tundra 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 where possible.
- c. Constructing new lease access roads along existing fence lines to minimize disruption to existing cultivation practises.

2. Pad Drilling

Tundra 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 8-8-6-29 WPM may be upgraded. Tundra'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 would not be expanded.

E. Land Owner Consent

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

Conclusion

Tundra believes that agricultural and petroleum operations can co-exist on the same lands. Such coexistence will maximize development of Manitoba's resources above and below the surface. Tundra will make every reasonable effort to minimize the impact of the proposed North Tilston Mission Canyon 1C Pool reduced spacing project on surface operations and will not proceed without the full consent of the affected landowners.

# **SURFACE FACILITIES FOR NORTH TILSTON MISSION CANYON 1C POOL**

## **INTRODUCTION**

The North Tilston Mission Canyon 1C Pool currently contains five producing wells and one water disposal well.

A network of flowlines and field headers tie these wells into a battery and water disposal pumping plant at 8-8-6-29 W1M (refer to Appendix H).

In Fall of 1993, the first two of a possible six infill wells will be drilled. The only surface facilities modification required to handle new fluids is the tie-in of infill wells at existing field headers.

Appendix H is an aerial photograph showing the locations of existing leases and roads, and the proposed leases and roads for the infill project.

## **FACILITIES DESIGN**

### **Gathering System**

### **Infill Well Tie-Ins**

Tie-ins are to the closest existing field headers. Routes are shown in Appendix H.

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

### **8-8 Battery**

### **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. Five existing wells and up to six new infill wells will be tested at the 8-8 battery.

### **8-8 Water Plant**

No new equipment will be required.



November 10, 1993

Mr. G. Czyzewski, P. Eng.  
Sr. Reservoir Engineer  
Tundra Oil and Gas Ltd.  
1111 One Lombard Place  
Winnipeg MB R3B 0X4

Dear Mr. Czyzewski:

Re: Tilston MC-1 C Pool  
Reduced Spacing Application

Tundra Oil and Gas Ltd.'s request that the Board withhold final disposition of the subject application pending results from the drilling of a horizontal well, Tundra Osprey Tilston HZNTL 2-8-6-29 (WPM) in the area of application, is approved.

Tundra is requested to notify the lessors, lessees and landowners in the area of application of the suspension of the application.

If Tundra wishes to reactivate the application, before June 1, 1994, the technical information provided with the application is to be updated including a discussion of the horizontal well performance and a revised depletion strategy to maximize economic recovery from the pool. After June 1, 1994, notice of the application will have to be republished and redistributed.

If you have any questions please contact L. R. Dubreuil, Director of Petroleum or John N. Fox, Chief Petroleum Engineer at 945-6573 and 945-6574, respectively.

Yours respectfully,

H. Clare Moster  
Deputy Chairman



Date November 9, 1993

## Memorandum

To The Oil and Natural Gas  
Conservation Board  
- David Tomasson, Chairman  
- Clare Moster, Deputy Chairman

From John N. Fox  
Chief Petroleum Engineer

Subject **Tilston MC-1 C Pool**  
**Reduced Spacing Application**

Telephone

Tundra Oil and Gas Ltd. has requested the Board withhold final disposition of the application pending results from the drilling of a horizontal well, Tundra Osprey Tilston HZNTL 2-8-6-29 (WPM), in the area of application.

### RECOMMENDATIONS

It is recommended that the Board grant Tundra's request to withhold final disposition of the application. Attached is the proposed Board letter indicating the application will be held until June 1, 1994 to allow time to evaluate results of horizontal drilling in the Tilston MC-1 C Pool.

### DISCUSSION

The Branch concurs with Tundra's estimate that recovery from the Tilston MC-1 C Pool will be less than 5% OOIP on 16 ha spacing. Tundra in its application presented a cursory comparison of incremental recovery from the pool by reduced 8 ha infill drilling versus horizontal drilling. Tundra listed six technical and economic reasons that favour infill drilling over horizontal drilling as a means of recovering incremental reserves from the pool; (1) horizontal well placement difficulties; (2) horizontal wells are not a proven application in water coning or channelling situations; (3) lower incremental recovery is expected from horizontal wells; (4) there are minimal horizontal drilling incentives on freehold land; (5) horizontal wells will yield poorer reservoir data; and (6) horizontal wells have a greater potential for premature watering out. Tundra appears to have changed its mind and licensed a horizontal well at 2-8-6-29 (Fig. 1) that extends through the area of application.

Tundra has requested the Board withhold final disposition of the reduced spacing application pending a review of the performance of the 2-8 horizontal well. The Branch believes a combination of horizontal wells and vertical wells on 8 ha spacing may maximize recovery from the pool. The 2-8 horizontal well is located to minimize interference with the existing 16 ha and proposed 8 ha locations (Fig. 1).

The Branch has no environmental or land use concerns with the application. Notice of Tundra's application was published in the Virden Empire Advance (93-09-29) and the Melita New Era (93-09-28) and sent to lessors, lessees and surface owners in and adjacent to the area of application. No objections to the application were received. Rural Development, Environment and Agriculture provided comments on the application (attached) and none of the Departments had any significant concerns.

Under the circumstances, there appears to be no reason to proceed with final disposition of the application at this time. Therefore it is recommended that the Board withhold final disposition of the application pending the results of the 2-8 horizontal well. If Tundra requests the Board reactivate the application before June 1, 1994, all that should be required is an update of the technical information provided with the application including a discussion of the horizontal well performance and a revised depletion strategy to maximize economic recovery from the pool.

If the application is not reactivated by June 1, 1994, in addition to filing updated information, notice of the application should be republished and redistributed to interested parties. The proposed Board letter to Tundra granting the company's request, lists the above conditions and requests the company notify the lessors, lessees and surface owners within the area of application of suspension of the application.



John N. Fox

Approved by:   
L.R. Dubreuil, Director

JNF/hw



The Oil and Natural Gas  
Conservation Board

555 — 330 Graham Avenue  
Winnipeg MB R3C 4E3  
CANADA

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

November 10, 1993

Mr. G. Czyzewski, P. Eng.  
Sr. Reservoir Engineer  
Tundra Oil and Gas Ltd.  
1111 One Lombard Place  
Winnipeg MB R3B 0X4

Dear Mr. Czyzewski:

Re: Tilston MC-1 C Pool  
Reduced Spacing Application

Tundra Oil and Gas Ltd.'s request that the Board withhold final disposition of the subject application pending results from the drilling of a horizontal well, Tundra Osprey Tilston HZNTL 2-8-6-29 (WPM) in the area of application, is approved.

Tundra is requested to notify the lessors, lessees and landowners in the area of application of the suspension of the application.

If Tundra wishes to reactivate the application, before June 1, 1994, the technical information provided with the application is to be updated including a discussion of the horizontal well performance and a revised depletion strategy to maximize economic recovery from the pool. After June 1, 1994, notice of the application will have to be republished and redistributed.

If you have any questions please contact L. R. Dubreuil, Director of Petroleum or John N. Fox, Chief Petroleum Engineer at 945-6573 and 945-6574, respectively.

Yours respectfully,

H. Clare Moster  
Deputy Chairman



**Manitoba**

Date October 7, 1993

**Memorandum**

To : John N. Fox  
Chief Petroleum Engineer  
Petroleum Branch  
555 - 330 Graham Ave.

From : Bruno Gossen  
Senior Policy Planner  
Corporate Planning &  
Business Development  
607-800 Portage Ave

Subject : TILSTON OIL FIELD  
APPLICATION FOR REDUCED SPACING

Telephone

This is in response to your September 10th memo on the above topic addressed to Serge Scrafield, Provincial Planning. Serge is no longer with us, having moved to Environment. Also, the branch name has also changed as you will note above.

We have reviewed your submission with our regional Deloraine office which is responsible for the Rural Municipality of Albert in which the application is located. No concerns were identified.

Thank you for the opportunity to review this matter.

  
Bruno Gossen

# Manitoba



## Memorandum

Date : October 13, 1993

To : John N. Fox  
Chief Petroleum Engineer  
Petroleum Branch  
555-330 Graham Avenue

From : Floyd Phillips, Chief  
Terrestrial Quality  
Management

Subject : **Tilston Reduced Spacing Proposal**

Telephone : 945-7003

Sorry I'm late getting this to you.

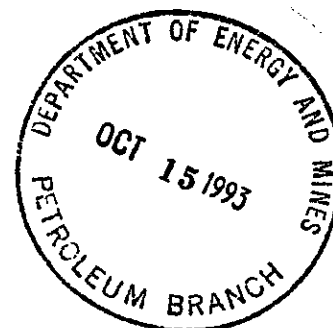
I do not have any specific concerns with the proposal or the proposed locations of the infill wells, except that it will result in the loss of some agricultural land. This impact could be reduced by locating some or all of the wells at the edge of bushes. Given the amount of bush in the area, the latter would not be a serious loss of natural habitat.

Since the terrain is rolling and there are numerous sloughs, measures should be used to prevent contamination of those wetland areas, during both the development and operational phases. Perimeter dikes might be used to prevent spills from contaminating adjacent areas. It may be that this or other means are used to control off-site movement of contaminants. If not, I suggest that it be considered.

Other measures such as stripping the topsoil and respreading it after the site is developed and the flow lines are installed, meets with our approval.

Thank you.

*L. Floyd Phillips*



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# Manitoba



## Memorandum

Date: October 13, 1993

To: John Fox  
Chief Petroleum Engineer  
555-330 Graham Avenue  
Winnipeg, Manitoba

From: Ken McGill, Chief  
Land Utilization  
Box 1149  
Carman, Manitoba  
ROG OJO

Telephone:

Subject: Reduced Spacing Application - Tilston Oil Fields

I have reviewed the above proposal and have made particular note of the following comments contained in Appendix XI - Environmental Impact Assessment.

1. Section 3. "Procedures to prevent soil mixing, soil compaction and ensure productive capacity of the soil is maintained" should definitely be followed.
2. Section 4. Reclamation procedures should a flowline or injection line fail appear adequate assuming "annual compensation" (if required) is equitable.
3. Section 5. Tundra should "ensure compensation is equitable" rather than just "provide assistance to the land owner" should oil or salt water spill affect a water supply.
4. Section 7.E. Tundra should ensure landowners are adequately compensated for the impact of the installations.

Based on the above considerations and assuming the two statements "landowners support the in fill drilling program" (Section 7.E. and (Tundra) "will not proceed without the full consent of the affected landowners" are correct, I have no additional concerns with the above proposals.

Please feel free to call me if you have any questions or concerns with these comments.

  
Ken McGill, Chief  
Land Utilization Section

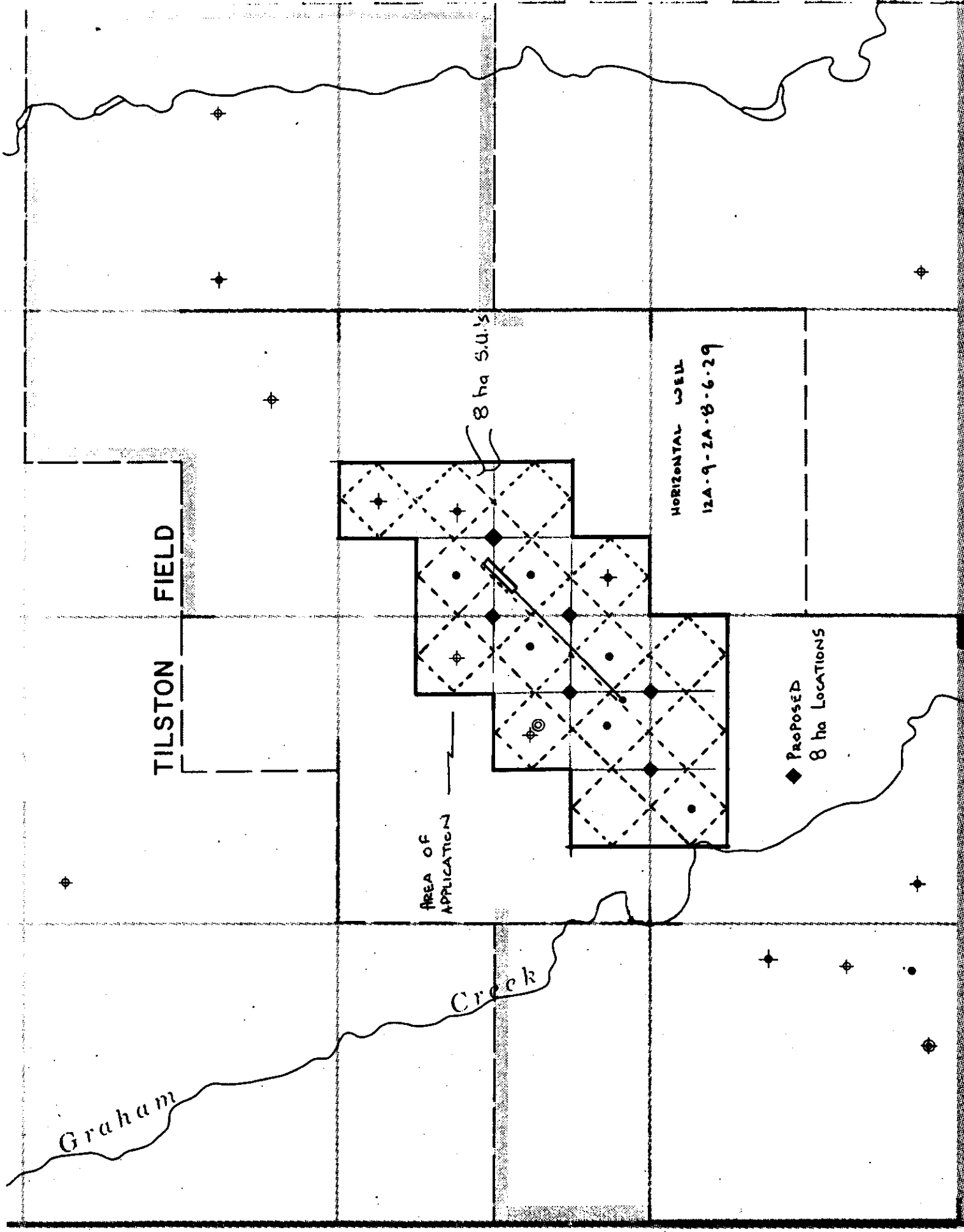


Figure 1

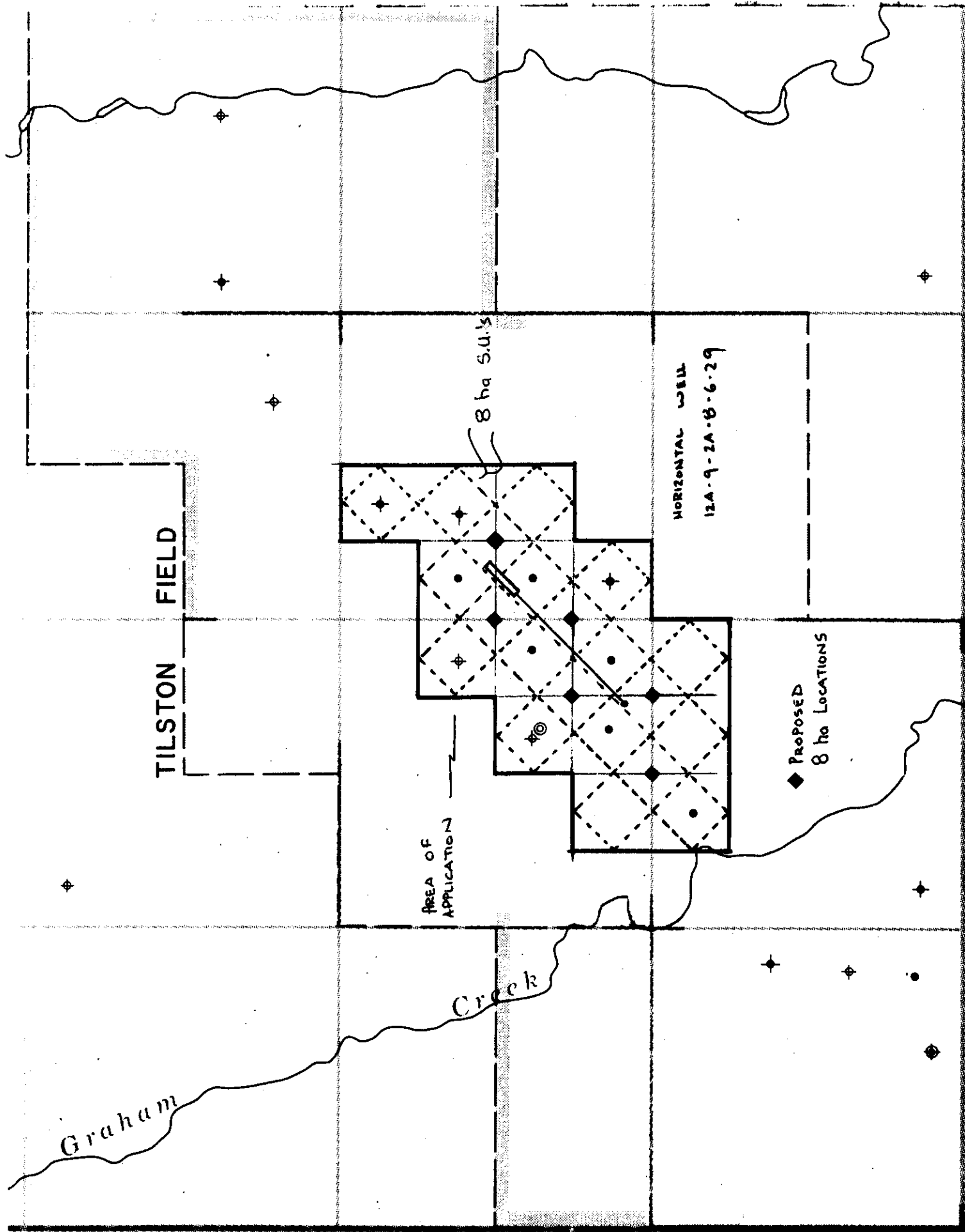


FIGURE 1



## Memorandum

Date October 15, 1993

To H. Clare Moster  
Deputy Chairman  
Oil and Natural Gas  
Conservation Board

From John N. Fox  
Chief Petroleum Engineer  
Petroleum Branch

Telephone

Subject **Tilston 8 ha Reduced Spacing Application**

Tundra was requested prior to publishing notice of the application to supply the names and addresses of landowners in the area of application. The Branch has just received this information. It is recommended that notice of the application be sent to the landowners with a revised date for objections of November 1, 1993. If Tundra wishes to accelerate this deadline they have the option of approaching the landowners directly for their approval.

John N. Fox

JNF/hw

First Fold

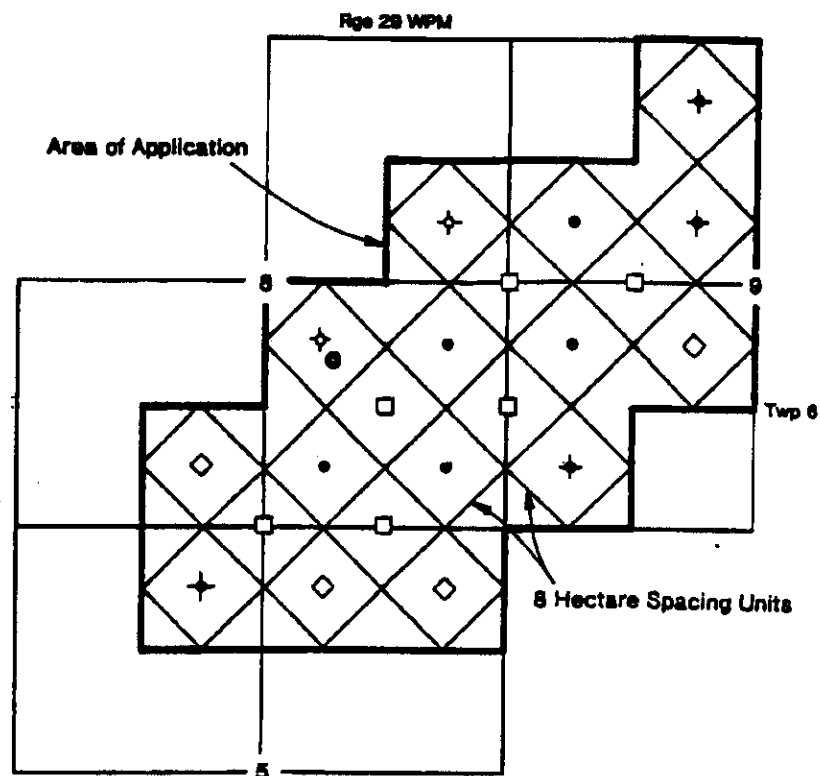


## NOTICE

### UNDER THE MINES ACT

### TILSTON OIL FIELD

Tundra Oil and Gas Ltd. has made application under Section 20 of The Petroleum Drilling and Production Regulation for approval of special drilling spacing units in a portion of the Tilston Field. It is proposed that drilling spacing units would be reduced from 16 hectares (40 acres) to 8 hectares (20 acres) in a portion of the N/2 of Section 5, the S/2 and NE/4 of Section 8 and the W/2 of Section 9 in Township 6, Range 29 (WPM) (the "area of application") outlined below.



#### Legend

- |                                   |                            |
|-----------------------------------|----------------------------|
| ● Existing producer               | ⊗ Salt water disposal well |
| □ Proposed new 8 hectare producer | ✦ Abandoned producer       |
| ◇ Potential future well location  | ✦ Dry and Abandoned        |

If no valid objection or intervention in writing is received by The Oil and Natural Gas Conservation Board at 555-330 Graham Avenue, Winnipeg, Manitoba, R3C 4E3 before November 1, 1993, the Board may approve the application.

Copies of the applications can be obtained from:

Tundra Oil and Gas Ltd.  
1111 - One Lombard Place  
Winnipeg MB R3B 0X4

(204) 934-5850

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

555-330 Graham Avenue  
Winnipeg MB R3C 4E3

(204) 945-6577

106 Railway Avenue  
Waskada MB ROM 2C0

(204) 673-2472

Dated at Winnipeg, this 15<sup>th</sup> day of October, 1993.



H. Clare Moster  
Deputy Chairman





Date **October 13, 1993**

## Memorandum

To **L.R. Dubreuil**  
**Director**  
**Petroleum Branch**  
**Energy and Mines**

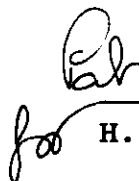
From **H. Clare Moster**  
**Director**  
**Energy Management Branch**  
**Energy and Mines**  
**1111**

Telephone

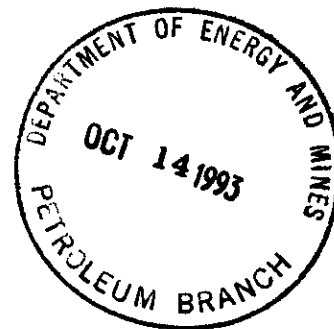
Subject **BOARD NOTICE**

Attached is a reply from Phyllis E. Isfeld (Grierson).

First | Fold

  
H. Clare Moster

Attachment



HCM:p  
MemDT124 Doc

Melita Man  
Oct 5, 1983

Box 101  
Melita, Md.  
Rom 120

To Whom It May Concern -

In regards to the letter I  
have just received re: (The Mexico  
Act Tuleton Oil Field). Robert  
Lorne Grierson passed away March  
24, 1986. Since that time I have  
remarried, Thomas Fredrick Hugh  
Isfeld. We were married in Nashville  
Tennessee on March 23, 1990. I  
still retain a portion of those  
mineral rights. I have no  
objection to the suggested change  
in drilling spacing units. Should  
you have reason for further  
communication, my address  
is Mrs. Phyllis Enelgn Isfeld

Box 101  
Melita, Md  
Rom 120  
Telephone 522-3664.

The Oil & Natural Gas Conservation  
Board  
555 - 330 Graham Avenue  
Washington, Md.



MANITOBA RURAL DEVELOPMENT  
CORPORATE PLANNING AND BUSINESS DEVELOPMENT  
607 - 800 PORTAGE AVENUE  
WINNIPEG, MANITOBA  
R3G 0N4

FAX NUMBER (204) 945-3769

FACSIMILE TRANSMITTAL COVER SHEET

DATE: Oct. 7/93

NUMBER OF PAGES: 2 (INCLUDING THIS COVER SHEET)

TO: John N. Fox  
Chief Petroleum Engineer  
Petroleum Branch

FROM:

Mr. Bruno Gossen  
Senior Policy Planner  
Corporate Planning and Business Development  
Manitoba Rural Development  
607 - 800 Portage Avenue  
Winnipeg MB R3G 0N4

Phone Number: (204) 945-2594

Operator's Name and Phone Number  
(If different from above): \_\_\_\_\_

This message is intended only for the use of the individual or entity to which it is addressed, and may contain information that is privileged, confidential and exempt from disclosure under applicable law.

If the reader of this message is not the intended recipient, or the employee or agent responsible for delivering the message to the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify us immediately by telephone. Thank you.

REMARKS:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## **MANITOBA AGRICULTURE**

**Agricultural Development and Marketing**

Soils and Crops Branch  
Land Utilization & Soil Survey  
Box 1149  
Carman, Manitoba  
R0G 0J0

Phone: (204) 745-2324  
Fax: (204) 745-2299

### **FAX TRANSMITTAL SHEET**

Date: October 14, 1993

TO: John Fox  
Chief Petroleum Engineer  
555-330 Graham Avenue  
Winnipeg, MB

FROM: Ken McGill, Chief  
Land Utilization & Soil Survey  
Soils & Crops Branch  
Box 1149, Carman, MB

Fax No. 945-6574<sup>0586</sup>

Number of Pages (not including this one): 1

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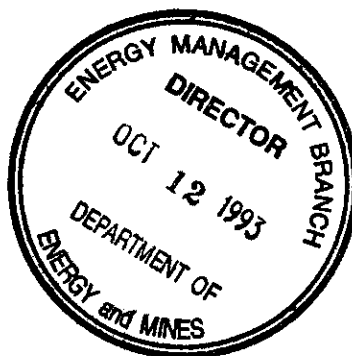
### **MESSAGE**

# CORVAIR OILS LTD.

P.O. BOX 3827, EDMONTON, ALBERTA T5L 4J8

Telephone and Fax:  
(403) 453-2311  
(Direct Calgary Line) 264-6304

October 6, 1993



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

**ATTENTION: H. Clare Moster, Deputy Chairman**

Dear Sir:

**RE: Tilston Oil Field**  
**Application for Special Drilling Spacing Units - Tundra Oil and Gas Ltd.**

Corvair Oils Ltd. is the mineral owner and the working interest owner of the SW/4 of Section 8-6-29 WPM. Legal subdivision 3 of Section 8 is within the area of application for special drilling spacing units in the Tilston oil field as submitted by Tundra Oil and Gas Ltd.

Corvair Oils Ltd. has reviewed the application and **has no objection** to the granting of special drilling spacing units and reduced spacing on legal subdivision 3 of Section 8-6-29 WPM.

If there are any questions, please contact the undersigned.

Yours truly,

**CORVAIR OILS LTD.**

A handwritten signature in cursive script that reads "Roger Delbaere".

**Roger Delbaere**  
**Vice-President, Engineering**

**RAD/des**

**cc: Tundra Oil and Gas Ltd.**  
**Attention: George Czyzewski**

Continued from Page 1

people away.  
ave to have it certified  
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t be aware of that,  
it up, take it out there,  
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tion and that they must  
and take it back to  
Councillor Cockbill.  
be in a position to go

Wallack predicted that  
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the environment is go-  
we should be accepting  
r we can get any money  
not," he said.  
r informed the Council  
e for littering ranges  
00 to \$1,500.00.  
a lengthy discussion,  
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air conditioners at the  
sal site without charge  
bears a certification  
liances without a stick-  
cepted with the pay-  
00 fee to cover the cost  
the refrigerant and ad-  
the billing program.

ued from Page 1

abandoned lines are re-  
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-present condition;  
e, be it resolved that  
panies be required to  
adoned lines to a condi-  
e a farmer on purchase  
nd for agricultural pur-  
nimum expense."

support will be sent to  
employment Skills Cen-  
use in its bid to ad-  
GED Program in Man-

il discussed the speed  
Anderson Street. The  
s PR 257 (White Owl  
reen Ivens Street and  
was decided to post the  
0 kilometres per hour

ued from Page 1

ucking returned Friday  
the remaining paint  
railed car into another  
The derailed car had  
tal of 10,000 gallons of  
base.  
as most cooperative in  
the clean-up, said Mrs.

In other business, Council:  
—Received the August RCMP re-  
port from Sergeant W. A. MacLen-  
nan.

—Agreed that it had no objections  
to the Virden-Wallace Planning Dis-  
trict Development Plan Amendment  
By-law No. 20 which provides for  
the redesignation of Parcels 3, 4 and  
5 of Plan 1440 from Agricultural Re-  
stricted Area to Commercial High-  
way Area.

—Approved an application from  
Stewart Chrysler Plymouth Ltd. to  
erect a 12-foot by five-foot illumi-  
nated sign on a nine-foot pedestal on  
its property in Virden.

—Decided to levy fees for the dis-  
posal of dead animals at the Virden-  
Wallace Waste Disposal Site in ac-  
cordance with the Environment Act  
and Regulations (\$20.00 for the first  
or single animal; \$5.00 for each ad-  
ditional animal in the same load).

—Agreed to have seeded to grass  
the flower beds in Victoria Park  
which are situated under trees and  
are therefore unable to grow flow-  
ers because of the reduced sunlight.

—Agreed to provide support in  
principle to the concept of a Central  
North American Trade Corridor  
linking Canada, the USA and Mex-  
ico via Highway 83.

—Declined to purchase a set of  
217 historical photos from the Vir-  
den Historical Society for display in  
the town office because the Soci-  
ety's set is already accessible for  
public viewing.

—Agreed to protest to the Minis-  
ter of Rural Development, MLA  
James Downey, and Ducks Unlim-  
ited the removal of decentralized  
staff from Virden without notice  
and to request their replacement  
with new provincial positions.

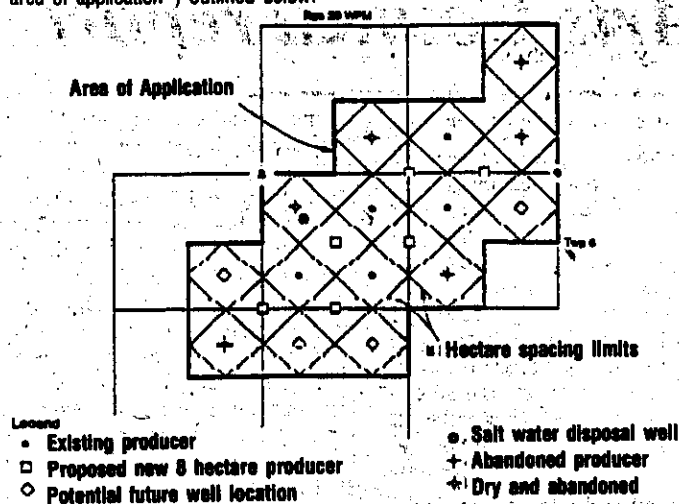
—Sat as a variation board to con-  
sider an application for a variation  
order from Vern Gardner of 401  
Third Avenue South to permit the

reduction of front yard require-  
ments from 25 feet to 12 feet to al-  
low for the construction of a sun-  
porch (the home already has a front

yard of 20 feet due to its construc-  
tion prior to the implementation of  
the zoning regulations); the appli-  
cation was denied by the Council.

## NOTICE Under the Mines Act Tilston Oil Field

Tundra Oil and Gas Ltd. has made application under Section 20 of The Petroleum Drilling and Production Regulation for approval of special drilling spacing units in a portion of the Tilston Field. It is proposed that drilling spacing units would be reduced from 16 hectares (40 acres) to 8 hectares (20 acres) in a portion of the N/2 of Section 5, the S/2 and NE/4 of Section 8 and the W/2 of Section 9 in Township 6, Range 29 (WPM) (the "area of application") outlined below.



If no valid objection or intervention in writing is received by The Oil and Natural Gas Conservation Board at 555-330 Graham Avenue, Winnipeg, Manitoba R3C 4E3 before Oc-  
tober 20, 1993, the Board may approve the application.

Copies of the applications can be obtained from:

Tundra Oil and Gas Ltd.  
1111 One Lombard Place  
Winnipeg, Manitoba R3B 0X4  
(204) 945-6577

The application may be viewed at the offices of the Petroleum Branch:  
555-330 Graham Avenue  
Winnipeg, Manitoba R3C 4E3  
(204) 945-6577

Dated at Winnipeg this 21st day of September, 1993.  
H. Clare Mosier  
Deputy Chairman



## BILL MURRAY MOTORS LTD.

"Where You Come First"

Highway No. 1, Virden  
Phone 748-3811 or Cellular 748-7611

St. Clair St. W., Birtle  
Phone 842-3301



# COME DOWN AND SEE OUR GREAT USED SELECTION TODAY!

**CARS**  
1991 CHEV CAPRICE  
Classic V6 auto  
loaded 1 year  
\$15,995  
1991 PONTIAC GRAN PRIX

1991 GMC SUBURBAN  
350 auto  
tilt, cruise  
\$18,995  
1991 CHEV SCOTTSDALE  
¾-ton, 4 X 4, air  
tilt, cruise, 350 auto  
\$17,995

The F.W.K. was given by Ruth Wallace. Ruth read to us an article from the Institute news "New and African Safety". This is a learning package consisting of comic books, a video, a wall poster and teaching guide. It is for 4-H members and various other youth groups. Fran Dickinson reported that she has a kit and will see that it is made available.

The June minutes were read and adopted as read, seconded by Vera Brown. Carried. The Treasurer's report was given by Melba Stewart.

Alister was received regarding the Fall Seminar to be held in the Deloraine United Church on October 14.

Dorothy Howden reported sending five birthday cards and one anniversary card.

Fran Dickinson reported for the History Committee. Ideas are needed for a title for the History Book. Dorothy Howden reported that it was a very quiet summer at the museum. Ruth thanked everyone who helped out at the museum.

Vera Brown volunteered to take over the Cancer books from Grace Tawin.

Cats were collected for the Women's Shelter. It was decided to do this in May next year rather than September.

Melba Stewart passed out the Heritage books. The price remains at \$6.00.

World Food Day will be celebrated in October. A motion

the new book which they are putting together.

The Manitoba WT's past presidents are holding an essay competition to be titled "Family Life in The Year 2007". Paulette Stewart and Mary Annin.

## SSAR - Pierson

Recently the government has passed legislation, "The Health Care Directives Act", which provides legal recognition for the use of Health Care Directives. Such directives allow an individual to express his/her own wishes regarding care and treatment decisions in situations where this person is unable to communicate on his/her behalf.

The Legislation also allows for the appointment of a proxy who will act on behalf of the individual writing the directive. On September 29, Sheldon Landberg, a lawyer from Deloraine, will be in the Friendship Centre at 250 to give a presentation, information and answer questions concerning this legislation. Seniors, family and friends of any age are welcome to attend.

Seniors are asked to help butter beans for the Carried of Carbons Friday morning, October 1st in the Congregate Meals room at the risk. There is cooking a meat buffet that day so why not plan to stay and enjoy.

Seniors needing assistance

with fall work, don't hesitate to call. There are strong-backed youth willing to be asked.

Congregate Meals Menu: Wednesday, Sept. 29 - Meatballs, and Mushroom Sauce, Raspberries and Ice Cream.

Friday, Oct. 1 - Roast Beef and Yorkshire Pudding, Rice Pudding.

Butter buns at 10:30 a.m. Monday, Oct. 4 - Barbecue Short ribs, Strawberry Shortcake

Wednesday, Oct. 6 - Thanks giving dinner - Roast Turkey and Peas.

## A Wedding to Remember

Create the Perfect Wedding with exclusive wedding stationery including:

- Napkins
- Invitations
- Bridal Books
- Accessories
- Announcements
- Members' Gifts

See us at:

**NEW ERA**  
Phone 823-9491

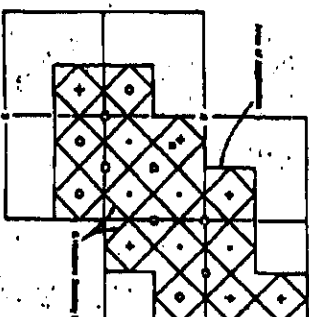
Public Sale GAC Ltd. Town The 6 (also photo), Kelly White, Peter Canada (see Leppard, Jeff Bagg Connection.

## NOTICE

### Under the Mines Act TALSTON OIL FIELD

Talston Oil and Gas Ltd. has made application under Section 20 of The Petroleum Drilling and Production Regulation for approval of special drilling spacing wells in a portion of the Talston Field.

It is proposed that drilling spacing wells would be reduced from 16 hectares (40 acres) to 8 hectares (20 acres) in a portion of the W2 of Section 5, the S2 2 and NE24 of Section 8 and the W22 of Section 9 in Township 4, Range 20 (NPR4) (the "area of application") outlined below.



- Legend
- Existing production
  - Proposed new 8 hectares production
  - ◇ Proposed new well location
  - Salt water disposal well
  - Abandoned production
  - Dry and Abandoned

No well location or intervention activity is recommended by The Oil and Natural Gas Conservation Board at 825-320 Graham Avenue, Winnipeg, Manitoba, R3C 4E8 before October 20, 1993. The Board may approve the application. Copies of the application may be obtained from:

Talston Oil and Gas Ltd.  
1111 One Lanceland Place  
Winnipeg, MB R2S 0K4  
(204) 594-4330

The application may be viewed at the offices of the Petroleum Branch:  
825 - 320 Graham Avenue  
Winnipeg, MB R3C 4E8  
(204) 945-4377  
Dates at Winnipeg 2nd day of September, 1993

H. Guss Minister  
Deputy Chairman

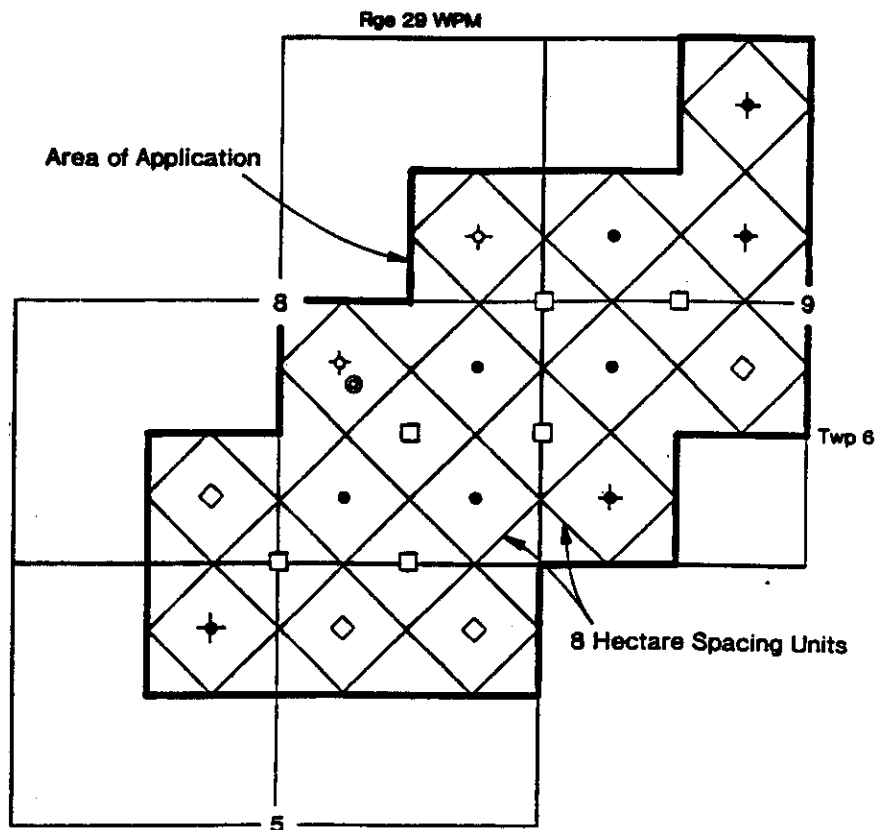


## NOTICE

### UNDER THE MINES ACT

### TILSTON OIL FIELD

Tundra Oil and Gas Ltd. has made application under Section 20 of The Petroleum Drilling and Production Regulation for approval of special drilling spacing units in a portion of the Tilston Field. It is proposed that drilling spacing units would be reduced from 16 hectares (40 acres) to 8 hectares (20 acres) in a portion of the N/2 of Section 5, the S/2 and NE/4 of Section 8 and the W/2 of Section 9 in Township 6, Range 29 (WPM) (the "area of application") outlined below.



#### Legend

- |                                   |                            |
|-----------------------------------|----------------------------|
| • Existing producer               | ● Salt water disposal well |
| □ Proposed new 8 hectare producer | ✦ Abandoned producer       |
| ◇ Potential future well location  | ✧ Dry and Abandoned        |



If no valid objection or intervention in writing is received by The Oil and Natural Gas Conservation Board at 555-330 Graham Avenue, Winnipeg, Manitoba, R3C 4E3 before October 20, 1993, the Board may approve the application.

Copies of the applications can be obtained from:

Tundra Oil and Gas Ltd.  
1111 - One Lombard Place  
Winnipeg MB R3B 0X4

(204) 934-5850

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

555-330 Graham Avenue  
Winnipeg MB R3C 4E3

(204) 945-6577

106 Railway Avenue  
Waskada MB ROM 2E0

(204) 673-2472

Dated at Winnipeg, this 21<sup>st</sup> day of September, 1993.

A handwritten signature in black ink, appearing to read 'H. Clare Moster', with a stylized flourish at the end.

H. Clare Moster  
Deputy Chairman

SURFACE OWNERS AND ADDRESSES

SXTN 70X.

Can Imperial Bank of Canm.  
P.O. Box 50  
Redvers, Saskatchewan  
S0C 2H0

Leslie S. Greves  
2908 Rosser Avenue  
Brandon, Manitoba  
R7B 0G7

John & Viola Jackson  
P.O. Box 85  
Sinclair, Manitoba  
R0M 2A0

William F. Campbell  
P.O. Box 77  
Tilston, Manitoba  
R0M 2B0

William W. Anderson  
P.O. Box 37  
Tilston, Manitoba  
R0M 2B0

Leslie S. Greves  
2908 Rosser Avenue  
Brandon, Manitoba  
R7B 0G7

William F. Campbell  
P.O. Box 77  
Tilston, Manitoba  
R0M 2B0

William A. Anderson  
P.O. Box 8  
Tilston, Manitoba  
R0M 2B0

James & Wendy Anderson  
P.O. Box 8  
Tilston, Manitoba  
R0M 2B0

William & Donna Anderson  
P.O. Box 37  
Tilston, Manitoba  
R0M 2B0

TWP 6 RGE 29 WPM

September 10, 1993

Serge Scrafield, A/Director  
Provincial Planning Branch  
Rural Development  
4th Floor - 800 Portage Avenue

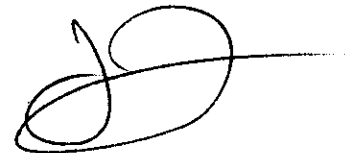
John N. Fox  
Chief Petroleum Engineer  
Petroleum Branch  
555 - 330 Graham Avenue

**Tilston Oil Field  
Application for Reduced Spacing**

Tundra Oil and Gas Ltd. has made application to reduce well spacing from 16 ha to 8 ha in portions of Sections 5, 8 & 9 in Township 6, Range 29 WPM in the Tilston Filed.

The project, which requires the approval of the Oil and Natural Gas Conservation Board, involves the drilling of 6 infill wells as shown on the attached notice. The area of application is primarily agricultural land. The terrain is gently rolling with as many as 20-50 bluffs and sloughs per section.

I ask that you review the application and provide me with your comments before October 8, 1993, to permit the company time to drill the wells before winter. If you have any questions please contact me at 945-6574.

A handwritten signature in black ink, consisting of a stylized 'J' and 'F' followed by a horizontal line.

John N. Fox

JNF/hw

cc: Floyd Phillips, Chief  
Terrestrial Quality Management  
Department of Environment

J.R.D. Partridge, Chief  
Land Utilization and Soil Surveys Section  
Department of Agriculture



Date September 9, 1993

## Memorandum

To The Oil and Natural Gas  
Conservation Board  
- David Tomasson, Chairman  
- H. Clare Moster, Deputy Chairman

From John N. Fox  
Chief Petroleum Engineer  
Petroleum Branch

Subject **Tilston MC-1 C Pool**  
**Reduced Spacing Application**

Telephone

Tundra Oil and Gas Ltd. has made application to reduce spacing from 16 to 8 ha in the Tilston MC-1 C Pool.

### Recommendations

It is recommended that notice of the application be published in the Virden Empire Advance and the Melita New Era and sent to surface, royalty and working interest owners within and adjacent to the area of application. A copy of the proposed Board notice is attached. As with previous reduced spacing applications, a copy of the application has been sent to the Departments of Rural Development, Agriculture and Environment for comment.

### Discussion

The Tilston MC-1 C Pool was discovered in 1983. The pool is located on a small paleotopographic high trending NE-SW (Fig.1). The oil leg, which reaches a maximum net pay thickness of 10 m at 8-8-6-29 is underlain by a large aquifer. The estimated pool O/W contact is -430 m subsea.

There are 5 producing wells and 5 abandoned producers in the pool. Production in June 1993 was 6.6 m<sup>3</sup>/d at a water-cut of 87%. Cumulative production to June 30, 1993 is 32 158 m<sup>3</sup>, 3.4% OOIP. Figure 2 is a plot of the pool production history. The pool has a strong water drive and water coning may be accelerated by the presence of vertical fractures. Tundra has predicted ultimate recovery on 16 ha spacing of 45 000 m<sup>3</sup> or 4.8% OOIP which appears reasonable. Tundra feels, with the exception of the 5-9-6-29 well, that wells in the pool are draining less than 4 ha.

The company has identified six 8 ha infill drilling locations in the best portion of the reservoir (Fig.3). The infill locations, listed in Table 1, are expected to recover 8000 to 9000 m<sup>3</sup> each, more than doubling the pool recovery to 10% OOIP. Initially Tundra plans to drill the 8A-8 and 8B-8 locations to test the commercial viability of the project. Table 2 compares primary recovery on 8 and 16 ha spacing.

The area of application covers 240 ha of agricultural land. Wheat and canola are being grown this year. The terrain is gently rolling with as many as 20-50 bluffs and sloughs per section. The infill wells proposed by Tundra have been located to minimize disruption of agricultural activities and to minimize environmental impacts. The 6 infill wells and access roads will occupy a maximum of 8.3 ha within the area of application. This area will be reduced after the wells have been drilled and completed. A copy of the application has been sent to the Departments of Rural Development, Agriculture and Environment for comment on land use and environmental impacts.

Tundra has reviewed the feasibility of drilling horizontal wells instead of vertical infill wells. There have been mixed results from horizontal wells drilled in strong water drive reservoirs in SE Saskatchewan. Some wells have experienced high productivity and will recover significant incremental reserves and others have coned water immediately and may not recover any more oil than offsetting vertical wells. There are technical and economic risks associated with horizontal drilling in the Tilston MC-1 C Pool; the potential for high water influx and correspondingly low oil production and the high capital costs of horizontal drilling (D&C costs; vertical well \$200M vs horizontal well \$500M). The Branch believes, unless there are significant land use or environmental impacts, the choice of whether to drill vertical or horizontal wells is the company's.

Tundra has been asked to supply the names of surface owners within and adjacent to the area of application. Once this information is received notice of the application should be published in the Virden Empire Advance and the Melita New Era and sent to surface, royalty and working interest owners within and adjacent to the area of application. A copy of the proposed Board notice is attached.

John N. Fox

Approved: \_\_\_\_\_  
L.R. Dubreuil, Director

**Table 1**

**Infill Drilling Locations**

15C-5-6-29 WPM

15D-5-6-29 WPM

8A-8-6-29 WPM

8B-8-6-29 WPM

5C-9-6-29 WPM

12A-9-6-29 WPM

**TABLE 2**  
**Tilston MC-1 C Pool**  
**RECOVERY ESTIMATES**

	16 ha Spacing	8 ha Spacing
Original Oil-in-Place (10 <sup>3</sup> m <sup>3</sup> )	943.6	943.6
No. of Producing Wells	5	11
Primary Recoverable Reserves (10 <sup>3</sup> m <sup>3</sup> )	45	95
Primary Recovery Factor (%)	4.8	10



## Memorandum

Date September 10, 1993

To Serge Scrafield, A/Director  
Provincial Planning Branch  
Rural Development  
4th Floor - 800 Portage Avenue

From John N. Fox  
Chief Petroleum Engineer  
Petroleum Branch  
555 - 330 Graham Avenue

Telephone

Subject **Tilston Oil Field**  
**Application for Reduced Spacing**

Tundra Oil and Gas Ltd. has made application to reduce well spacing from 16 ha to 8 ha in portions of Sections 5, 8 & 9 in Township 6, Range 29 WPM in the Tilston Filed.

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I ask that you review the application and provide me with your comments before October 8, 1993, to permit the company time to drill the wells before winter. If you have any questions please contact me at 945-6574.

John N. Fox

JNF/hw

cc: Floyd Phillips, Chief  
Terrestrial Quality Management  
Department of Environment

J.R.D. Partridge, Chief  
Land Utilization and Soil Surveys Section  
Department of Agriculture

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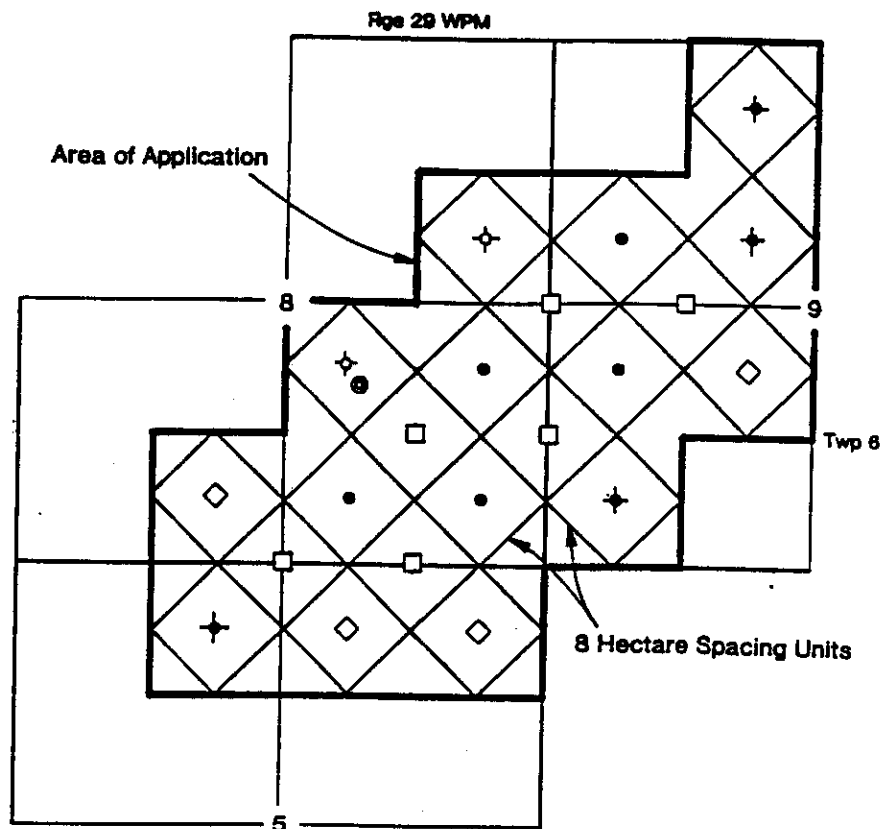


## NOTICE

### UNDER THE MINES ACT

### TILSTON OIL FIELD

Tundra Oil and Gas Ltd. has made application under Section 20 of The Petroleum Drilling and Production Regulation for approval of special drilling spacing units in a portion of the Tilston Field. It is proposed that drilling spacing units would be reduced from 16 hectares (40 acres) to 8 hectares (20 acres) in a portion of the N/2 of Section 5, the S/2 and NE/4 of Section 8 and the W/2 of Section 9 in Township 6, Range 29 (WPM) (the "area of application") outlined below.



#### Legend

- |                                   |                            |
|-----------------------------------|----------------------------|
| • Existing producer               | ● Salt water disposal well |
| □ Proposed new 8 hectare producer | + Abandoned producer       |
| ◇ Potential future well location  | ◇ Dry and Abandoned        |

If no valid objection or intervention in writing is received by The Oil and Natural Gas Conservation Board at 555-330 Graham Avenue, Winnipeg, Manitoba, R3C 4E3 before October ~~12~~, 1993, the Board may approve the application.

20

Copies of the applications can be obtained from:

Tundra Oil and Gas Ltd.  
1111 - One Lombard Place  
Winnipeg MB R3B 0X4

(204) 934-5850

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

555-330 Graham Avenue  
Winnipeg MB R3C 4E3

(204) 945-6577

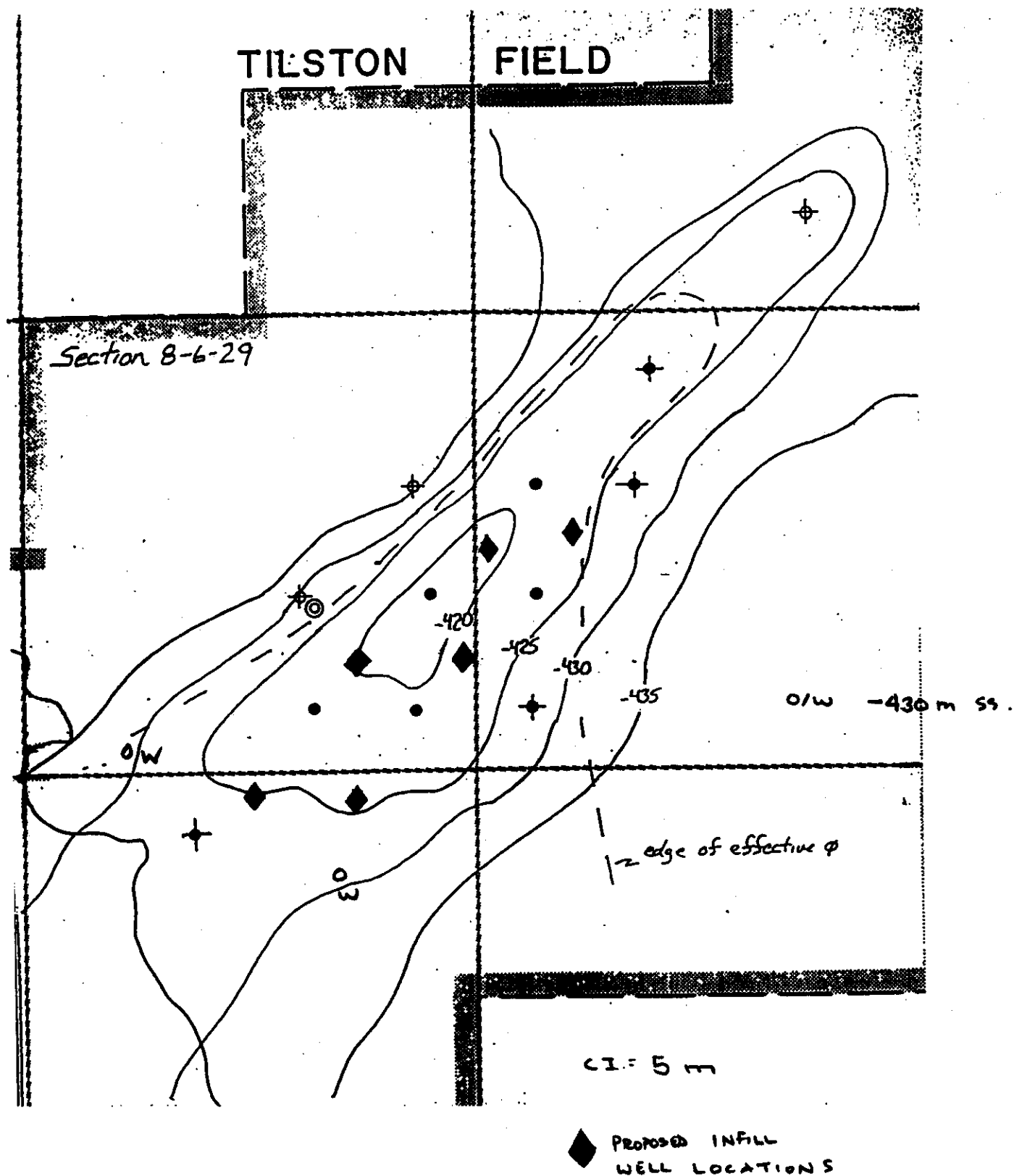
106 Railway Avenue  
Waskada MB ROM 2E0

(204) 673-2472

Dated at Winnipeg, this                      day of                      , 1993.

H. Clare Moster  
Deputy Chairman

FIGURE 1  
STRUCTURE CONTOUR MAP  
TOP OF MC-1 POROSITY



**MemFB**  
**89-03-12**

**MONTHLY OIL - M3/M**

**FROM**

10

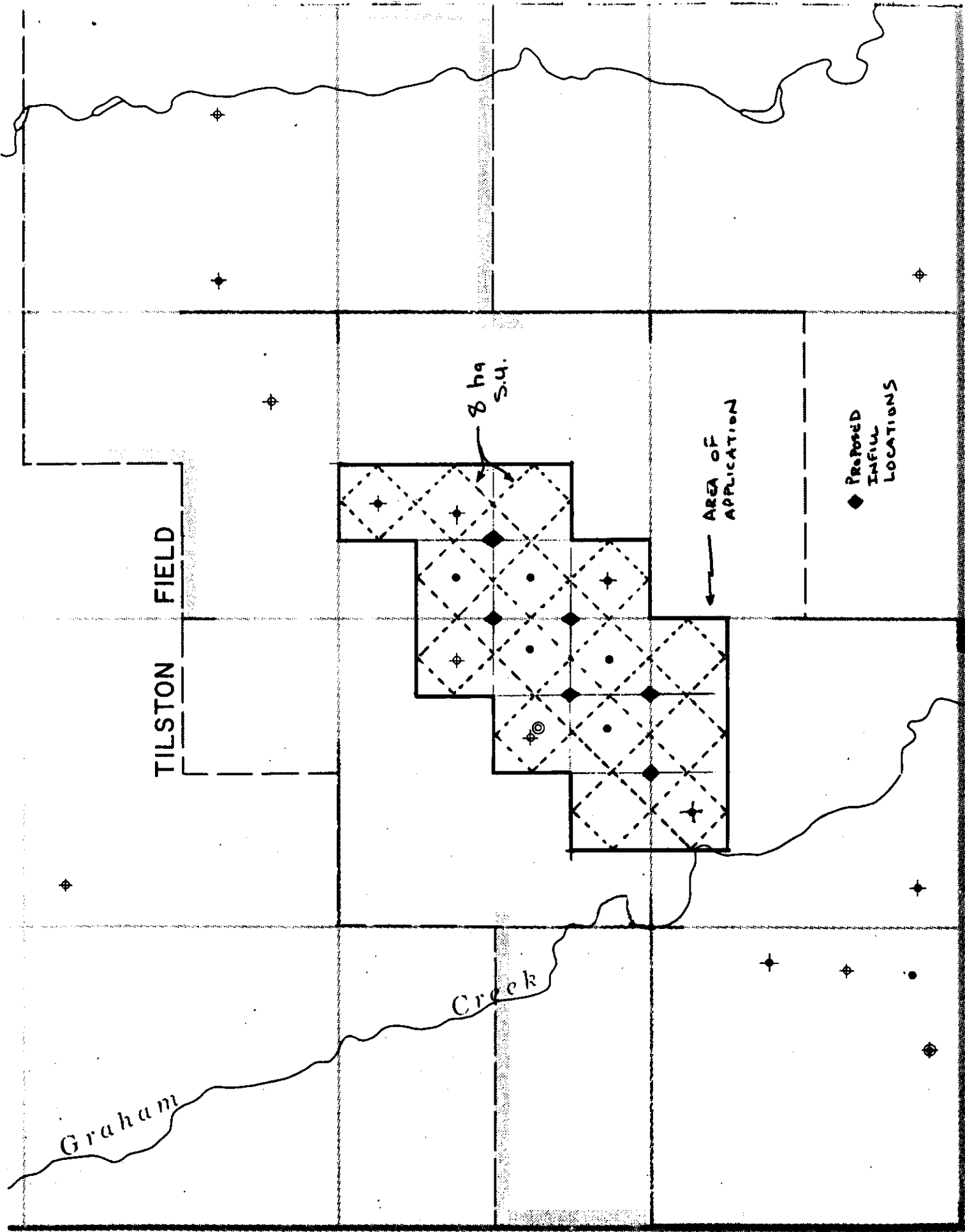
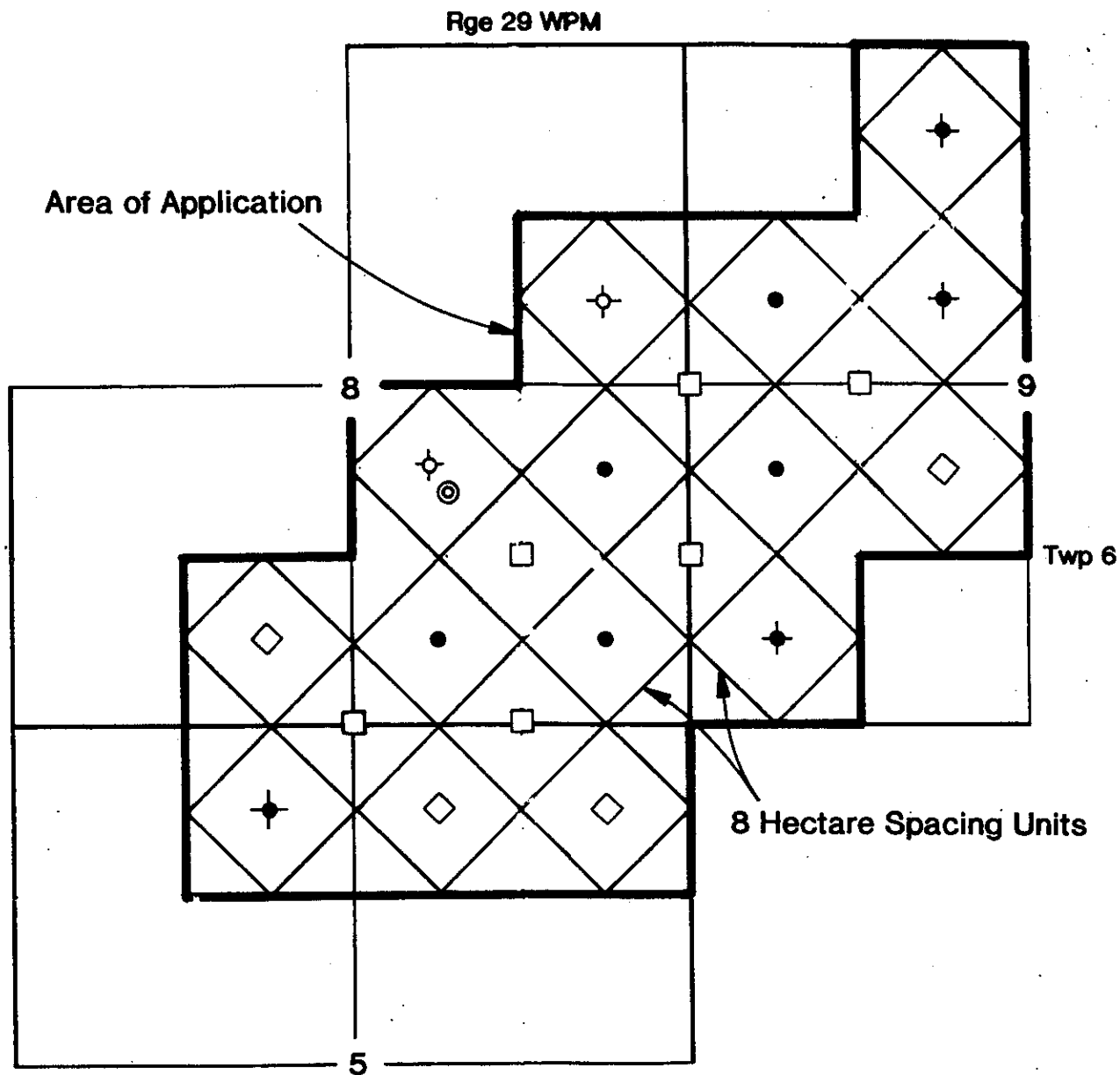


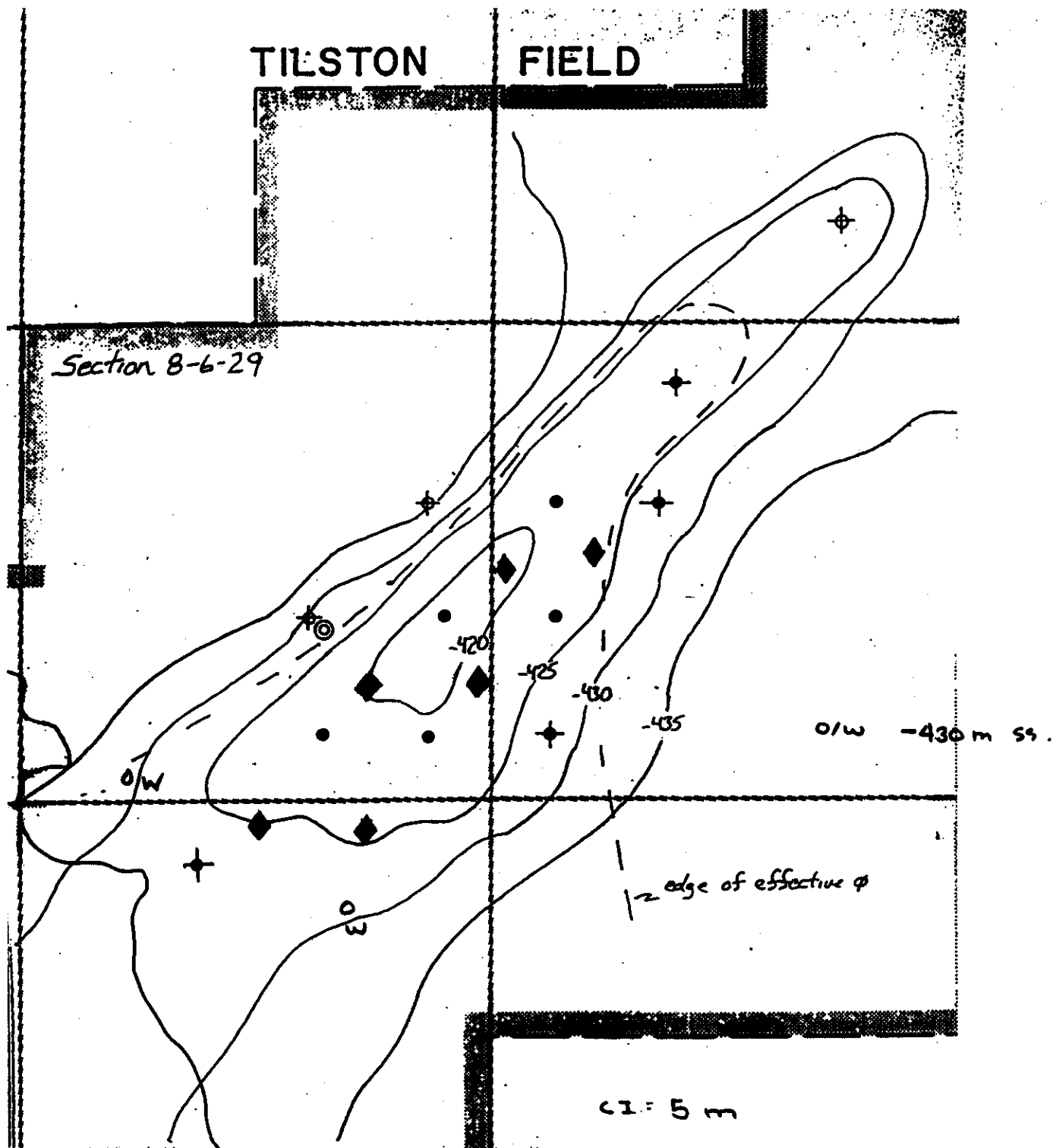
FIGURE 3



### Legend

- |                                   |                            |
|-----------------------------------|----------------------------|
| ● Existing producer               | ⊙ Salt water disposal well |
| □ Proposed new 8 hectare producer | ✦ Abandoned producer       |
| ◇ Potential future well location  | ⊕ Dry and Abandoned        |

FIGURE 1  
STRUCTURE CONTOUR MAP  
TOP OF MC-1 POROSITY



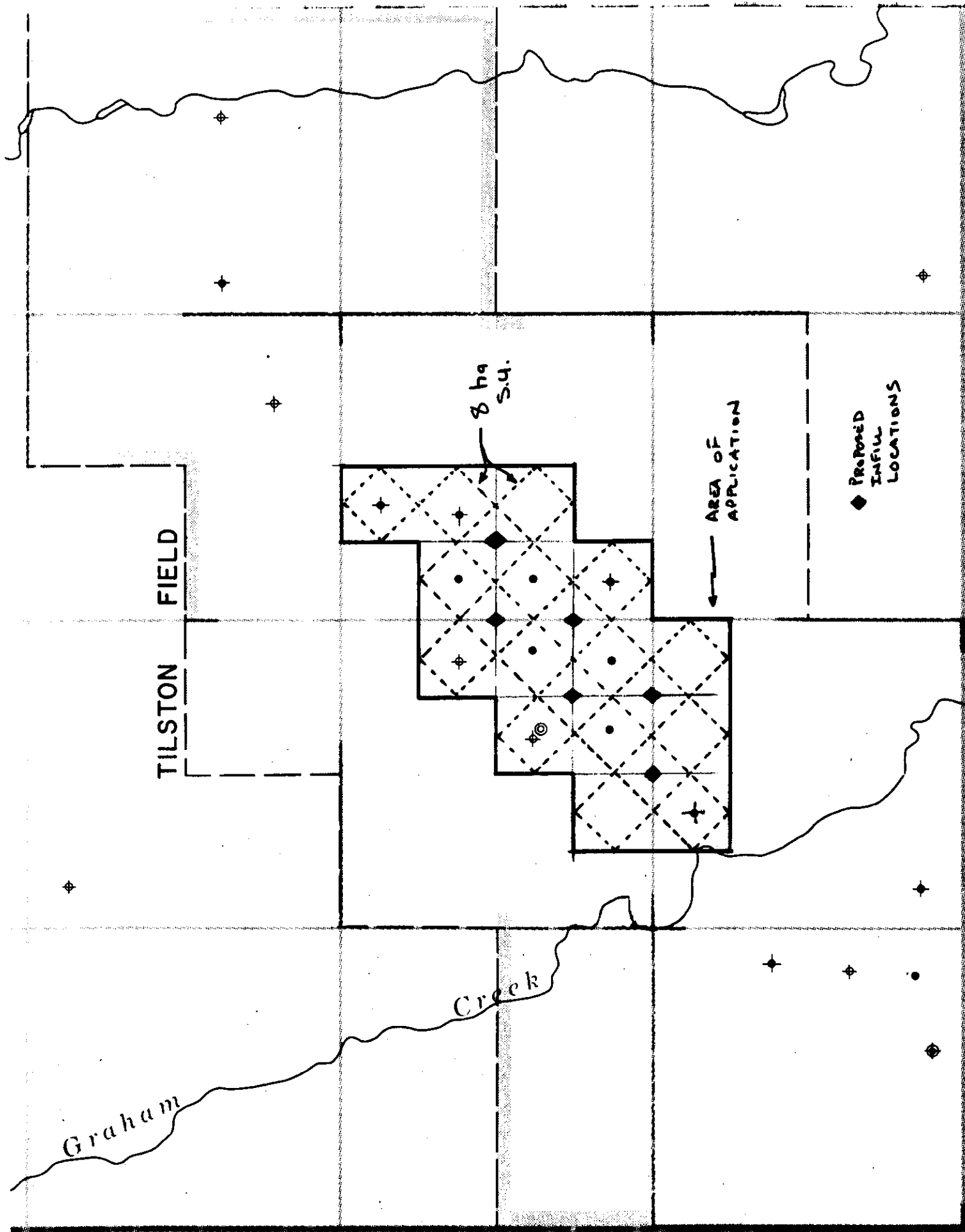
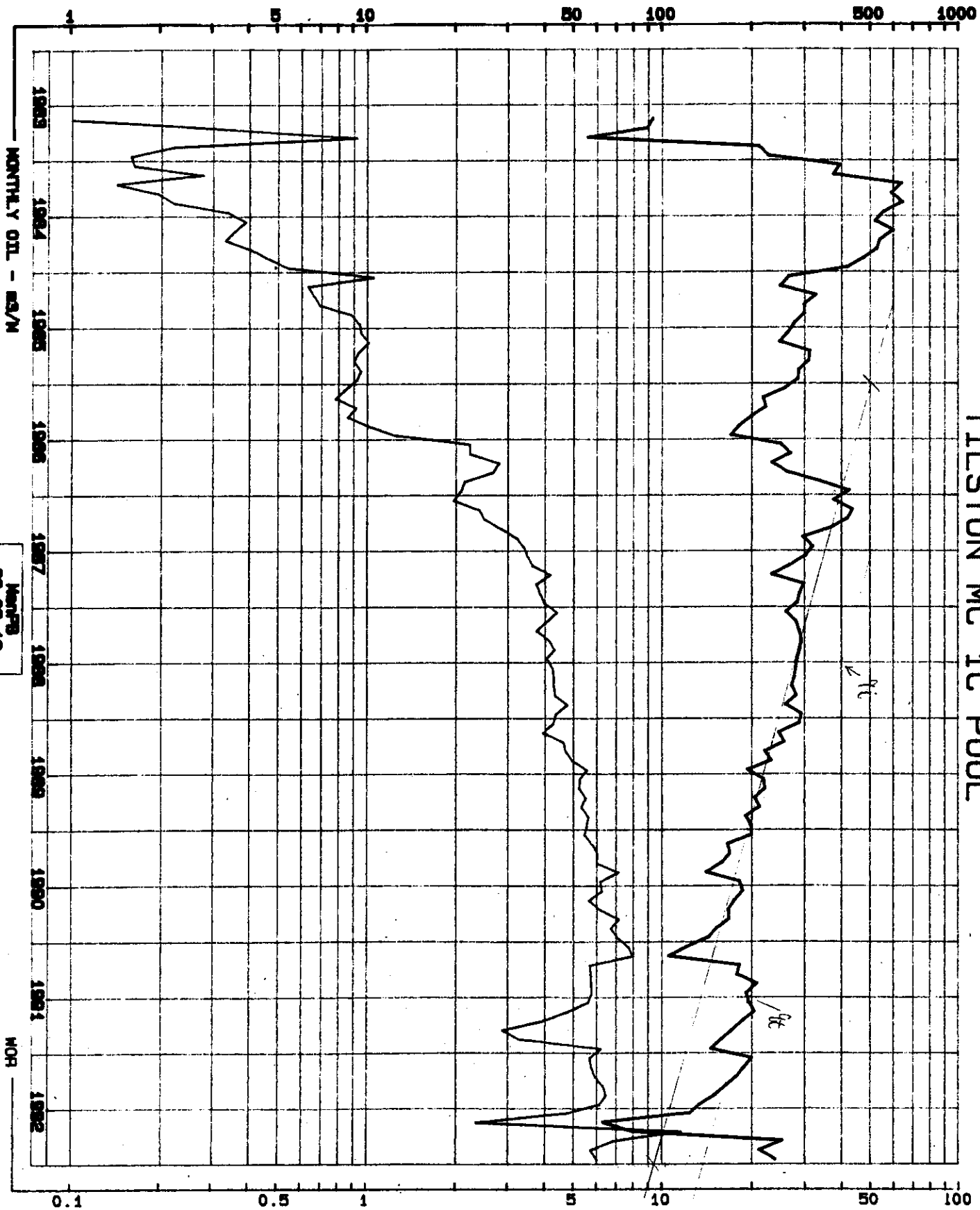


Figure 3



# TILSTON MC 1C POOL



Map 8  
98-08-18  
12 11 15

TUNDRA - P.B. MTG - MAY 31/93 → TILSTON MCIC POOL  
REDUCED SPACING

- conservative parameters included in appl<sup>n</sup> - weighted average

- SW calculated as low a 25%

- SW concerns

- infill well able to determine casing vs. Uctn drive

- 8B-8 1<sup>st</sup> WELL → ACCURATE LOG RESOLUTION of  
8A-8 2<sup>nd</sup> WELL O/W CONTACT, IF O/W CONTACT  
HAS RISEN, PROJECT WILL NOT BE  
PROCEEDED WITH

- Cased hole logging to EVALUATE O/W → Schlumberger  
GST  
↳ NO

- OH logging suite

- PARKMAN COMPARISON

LRO - ASSUME 2500 m<sup>3</sup> Holiday volume ASSIGNED, (HOLIDAY BANKING PROVISIONS)  
IP 5 m<sup>3</sup>/d, 22%/yr decline rate - WELL  
PAYS AN AVERAGE OF < 5% FREEHOLD PRODUCTION TAX

- offsetting mineral values for noise
- which two wells (project abandoned: if initial wells have poor results)

NEWSCOPE'S 8 Le Spacing APPLN

TILSTON NEI A Pool

- surface area: cropped # of small sloughs  
20-50 sloughs / 1st section (rolling cultivated land)
- well siting (discussion with landowners)  
+ facilities access roads, power lines, fire lines
- 1988-09 prediction recovery/well - 9535 -
- drainage < 10 ac (4 ha)
- proposed maintain inter-well distance 150 - & 100 -  
for competitive lease boundaries

proposed location

1C-8 , 1D-8

8B-8 , 5B-9 , 5C-9 12A-9

economic producible limit top of  $\phi$  -428

NEWSCOPE RESTRICTOR PARAMETERS

→ thinner net pay

$d_{ee} = 15\% / yr$   $IP = 30 b/d$   $A_R = 66666 bbls/well$

NEED FOR UNITIZATION PROTECTION OF CORRELATIVE RIGHTS

- NAMES AND ADDRESSES OF SURF. OWNERS , RO , WZO + 1 km  
PLANS FOR COMMUNICATION

NC 10 Pool

OOIP

2878

NSTB

Reip

269.2

NSTB

9.4% OOIP

INFLU PRIMUM  $\Delta$  recovery = 5.6% OOIP (ult. rec = 16%  
OOIP)

LED OOIP =  $1.06 \times 10^6 \text{ m}^3$

- Melita New Eng

WIO, Re, SURF OWNER WITHIN POOL

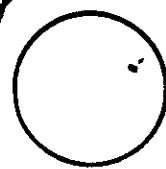
ATTACHMENT NO.8  
20 ACRE INFILL DRILLING LOCATIONS



8-6-29

SECTION 9-6-29

SECTION 5-6-29



10 ACRE DRAINAGE AREA



ESTIMATED ULTIMATE DRAINAGE AREA



POTENTIAL INFILL LOCATIONS



**Tundra** oil and gas ltd.

unitization is not required by pooling of sec that  
cross section boundaries will be required

- pooling vs. unitization - no concern - provisions  
in lease (will this be a problem) -  
plan pool on an areal basis? - pooling  
agreement

- PROJECT SCHEDULE - no well control  
- 40 AC DEVELOPMENT LOCATION 15-5 or 16-5 - NO  
- 20 AC INFILL DRILLING INDICATE  
2 WELLS INITIALLY WHEN, WHICH WELLS  
6 INFILL WELLS IN TOTAL

- ✓ - NO CONCERN A RECOVERY / PRODUCTION FORECAST  
- HOW COMFORTABLE IS TUNDRAS WITH RESERVOIR PARAMETERS  
H. Ø. SW, Boi

HORIZONTAL WELL RISKS - AGREE

- 6x  
# 8017 vert. well
  - greater economic risk due higher costs of  
concern IP \$500,000
  - placement of well @ top of structure
  - limited areal extent of pool - questionable
  - better data from infill well (typical logging suite) - questionable
  - what directions considered for horizontal
    - predicted to recover double vertical infill well  
what is predicted IP?

ATTACHMENT 2 - what is edge of effective Ø (NEWSCOPE - 428)  
where is O/O contact (NEWSCOPE - 430)  
- 430

- proposed 8 ha (20 ac) spacing v. it's quite extensive

ATTACHMENT NO. 6

- steady increase we, accompanied by decrease oil productivity 1981-91  
after 1991 more variability - why

WHAT CAUSES FLUCTUATIONS IN PRODUCTIVITY

- why has 5-9 performed so well, productivity, recovery better than other wells calcium sulphate scale problem in field
- what degree of risk has Tundra attached to the reservoir parameters used  
 $\phi = 17$  &  $SW = 40\%$  constant

note: 10% reduction in  $\phi$  (15%), 20% increase in  $SW$  (50%), 25% reduction in net pay, reduces OOIIP by 50%, conversely, increases recovery by 50% and drainage area by 50% (NEWSCOPE LESS OOIIP)

IS TUNDRA ABLE TO PUMP THE WELLS OFF - YES

## COMMENTS.

- H. Cline Minter - Deputy Chairman
- TUNORA'S NOTIFICATION PLANS - WIO, RO & SURFACE OWNERS  
REQ'D REQUIREMENTS WITHIN 1 KM → PROPOSE NOTIFY  
NWA-4, N/2-5, 8, 9, WIO & RO - YES  
S/2-15, S/4-16
- WELL SITING AND IMPACT REDUCTION  
OTHER INFILL PROJECT CONDITION { other agencies for  
comment  
Environment, Rural Dev.  
Agriculture
  - non-built up roads
  - tanks only permitted on temporary basis until well flowlined
  - minimize active well within of lease area.
  - landowners approval of surface location
  - accurate measurement of production
  - annual progress report with results
  - weigh disturbance to agricultural operations & disturbance to wooded & water-covered areas.
  - where feasible req'd power lines buried
- plan showing well siting, access roads, flowline routes, <sup>other</sup> facilities
- aerial photo, survey showing topographic detail
- land use (rolling)  
- agriculture (cropped) 20-50  
small sloughs / 1/4 section



1-8 what happens Aug/86

8-8 " " Oct/86

4-9 SF Aug/85  $\approx 20 \text{ m}^3/\text{m}^2$  90+% WC  
check status

5-9 what causes fluctuations in productivity

11-9 was the well ever pumped off?

ESTIMATION OF DRAINAGE AREA 1-8

NET DAY	6	(0.75)
<del>Ø</del>	.15	(0.9)
SW	0.5	(0.8)
Bui	1.07	(.98)

$$10000 \times 16.19 \times 6 \times .15 \times 0.5 \times \frac{1}{1.07} = 68089 \text{ m}^3 \text{ GOIP}$$

$$\text{RoIP} = \frac{7000}{68089} = 13.2 \% \text{ GOIP} \quad \text{vs. doubled recovery vs. Turchie's prediction}$$

DRAINAGE AREA  $\approx 7.1$  ha assuming 30% recovery

- what reservoir parameters have a high degree of variability (unpredictability)

i.e. if SW = 50% not 40% area drained in 20% greater  $\phi = 17$  (constant)?

- why has S-9 performed so well, ult. rec. 14.6% oil
- Turbine predicts 20 ac drainage, analogy for remainder of pool

## 6 INFILL LOCATIONS

	Pooling Req'd	Production cum Rec	
2A-8	✓	8000	} average of offset 40 ac well.
2B-8	✓	8000	
8A-8	✓	8000	
8B-8		8000	
5C-9	✓	9000	
12A-9		9000	

- still room for horizontal wells either NE-SW  $\perp$  to axis of pool or NW-SE across structure

- how does S-15 fit into the pool?

- prod. forecast shows 6 wells drilled in 1993

- pump the wells off?

Approximately 6 # of wells - odd

- cumulative water, cumulative WOR  
current WOR - plots

- check recovery vs OIP
- review abd locations 4-9, 11-9, 14-9
- o/w contact (fig 2) -430 - ?  
edge of effective  $\phi$  -425 - - what does this mean
- are there any 40 ac development locations -  
15-5, 16-5, 13-9 (NO)  $\rightarrow$  fig 2 good control with  
best location exception of South 6048
- horizontal locations. NE-SW on trend
- who owns the 14-5-6-29 well
- Attachment 6 - (32) 8 ha DSU
  - 6 producing wells
  - 3 ABDIP
  - 2 D&A (1 SWD)
  - 21 undrilled 8 ha DSU's
- unprospective<sup>DSU</sup> NW & SE flanks of pool
- narrow 8 ha DSU to (2) rows parallel to the existing producers
- Attachment no. 6 steady increase in WC  
1987-91 then a dramatic variation?, similar  
variation in oil production rate - explanation

TUSTON NGL Pool - Reduced SO<sub>2</sub> N

- H.C. monitor - ongoing campaign

- NGL Pool strong with drive - with casing LGL work  
- enhanced by natural fractures observed in core (discovered Aug/83 12-9-6-29)

- build-up  $\approx$  5-9-6-29 - 8900 kPa May/93  $\approx$  5 days

near original reservoir pressure - 1983 - 11

5-9 highest high reservoir withdrawal

- Geology: located on paleotopographic high

- non-unit regime pooling Sec 8 & 9-6-29 (WPR)

- Tundra has initiated a rel. k study provide better estimate of SW:

OOIP - 943.6  $10^3$  m<sup>3</sup>

< volumetric SW = 40%  
(not planimetered, sum of LSD OOIPs)

- 5 producers, current productivity  
7.2 m<sup>3</sup>/d, 88% uc (MAR/93)

- cumulative prod 93-03-31 31566.2 m<sup>3</sup> ( $\approx$  2 OOIP)

- ult. recovery to ac spacing 4.8% OOIP - 45000 m<sup>3</sup>  
decline curve analysis

- predicted drainage  $\rightarrow$  assume a recovery factor of  
30% OOIP possible under a waterflood  $\rightarrow$  most  
draining less than 10 ac. (5-9 drain  $<$  20 ac)

- 1-2 wells initially (evaluate economic feasibility)  
currently identified 6 locations in the best  
portion of the reservoir

6 infill well (1st phase)  $\Delta$  reserves = 500 00 m<sup>3</sup>  
 ↳ best portion of reservoir  
 2 wells to test commercial viability



- infill recovery 8000 - 9000 m<sup>3</sup>/well  
 (5.1 - 5.7 % OOIP), production - forecast  
 IP 5 m<sup>3</sup>/d decline rate = 22 %/yr
- 20 ac spacing will more than double pool recovery to 10 % OOIP,  $\Delta$  rec = 5.2 % OOIP


## INFILL VS HORIZONTAL

- horizontal
  - greater economic risk
  - threshold (reduced incentives)
  - higher cost
  - low productivity (IP = 5 m<sup>3</sup>/d)
  - concern potential for high water influx (premature watering out)
  - limit need extent of pool to position horizontal wells
- risk horizontal well placement
  - aquifer or not
  - pay zone
- compare with some results in other w.d. reservoir, where hor. wells have proved to be immediately profitable
- predict a horizontal well (800 m) will recover 19069
- log infill wells better data (?)
  - won't rule out hor. well in future
- incentive program → should qualify for holiday volume = Crown holiday volume for horizontal drilling

# LAND USE

6 Vertical L-fill wells

	WELL SITE * (ha)	ACCESS ROAD ** (ha)
15C-5	1	1.2
15D-5	1	— (Access Road <sup>INCLUDED</sup> 15C-5)
8A-8	1	0.1
8B-8	1	0.4
5E-9	1	 (Access Road <sup>INCLUDED</sup>  12A-9)
12A-9	1	0.6
	<hr/>	<hr/>
TOTAL	6 ha.	2.3 ha.

\* wellsite  $100\text{ m} \times 100\text{ m}$   = 1 ha

\*\* access road = 15m wide x m length

## TILSTON FIELD

OIL WATER	Cum. Prod. Dec. 31/92 m <sup>3</sup>	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	AUG. Daily m <sup>3</sup>	1993 Y.T.D. m <sup>3</sup>	Cum. Total m <sup>3</sup>
<b>MISSION CANYON 1 A POOL 02 44A</b>																
<b>BRIAN DOUGLAS CAMPBELL</b>																
01-06-06-29	6 097.7 27 000.1	4.5 —	3.0 —	6.0 —	5.5 —	5.5 —	3.1 —	6.5 —	7.2 —					7.20 —	41.3 —	6 139.0 27 000.1
<b>TUNDRA OIL AND GAS LTD.</b>																
13-30-05-29	3 143.2 23 330.8	27.4 258.8	23.2 240.4	27.5 296.2	25.9 277.4	26.6 293.3	23.3 241.7	21.2 289.4	19.4 309.8					0.65 2 207.0	194.5 25 537.8	3 337.7 25 537.8
14-30-05-29	2 394.6 11 460.6	3.6 —	5.7 —	6.8 —	5.1 —	5.2 —	6.7 0.1	4.6 —	4.7 —					0.15 0.1	42.4 11 460.7	2 437.0 11 460.7
15-30-05-29	4 409.6 18 903.2	20.5 207.1	17.4 192.2	20.6 236.9	19.4 221.8	20.0 234.6	17.5 193.3	17.4 247.0	14.3 263.7					0.48 1 796.6	147.1 20 699.8	4 556.7 20 699.8
02-31-05-29	5 235.6 7 539.0	— —	— —	— —	— —	— —	— —	— —	0.8 —					0.80 —	0.8 7 539.0	5 236.4 7 539.0
03-31-05-29	5 930.2 21 877.3	22.0 322.5	20.0 321.3	22.9 381.8	21.6 357.5	21.4 365.9	20.2 323.0	20.1 361.3	24.0 383.5					0.80 2 816.8	172.2 24 694.1	6 102.4 24 694.1
04-31-05-29 <sup>1</sup>	944.4 11 190.6	— —	— —	— —	— —	— —	— —	— —	— —					— —	— 11 190.6	944.4 11 190.6
06-31-05-29	4 181.1 34 585.1	22.8 537.8	20.0 517.9	22.9 615.4	21.6 576.3	21.5 589.7	20.1 520.8	25.6 596.7	34.1 627.9					1.14 4 582.5	188.6 39 167.6	4 369.7 39 167.6
12-32-05-29 Prev.	7 790.3 34 348.3	5.6 —	5.4 —	7.1 —	6.6 0.1	5.4 —	6.7 —	5.5 —	5.5 —					0.18 —	47.8 34 348.4	7 838.1 34 348.4
	34 029.0 163 234.9		91.7 1 271.8		100.2 1 433.1		94.5 1 278.9		102.8 1 584.9							34 822.4 174 638.0
TOTAL OIL		101.9		107.8		100.1		94.4						793.4		
TOTAL WATER		1 326.2		1 530.3		1 483.5		1 494.4						11 403.1		
NON-UNIT PREVIOUS PRODUCERS	61 351.6 438 518.8															61 351.6 438 518.8
MISSION CANYON 1 A POOL:	101 478.3 628 753.8		94.7 1 271.8		105.7 1 433.1		97.6 1 278.9		110.0 1 584.9							102 313.0 640 156.9
TOTAL OIL		106.4		113.8		105.6		100.9						834.7		
TOTAL WATER		1 326.2		1 530.3		1 483.5		1 494.4						11 403.1		

MISSION CANYON 1 C POOL  
02 44C

<b>TUNDRA OIL AND GAS LTD.</b>																
01-08-06-29	6 046.5 47 200.5	51.8 625.5	45.0 584.7	51.5 692.1	46.6 613.5	51.2 634.4	48.8 619.8	51.7 735.4	45.9 674.9					1.58 5 180.3	392.5 52 380.8	6 439.0 52 380.8
02-08-06-29	5 252.1 8 877.7	32.8 181.4	28.6 170.2	30.5 187.9	29.6 178.1	31.2 163.4	26.4 93.6	27.0 107.4	25.7 105.3					0.83 1 187.3	231.8 10 065.0	5 483.9 10 065.0

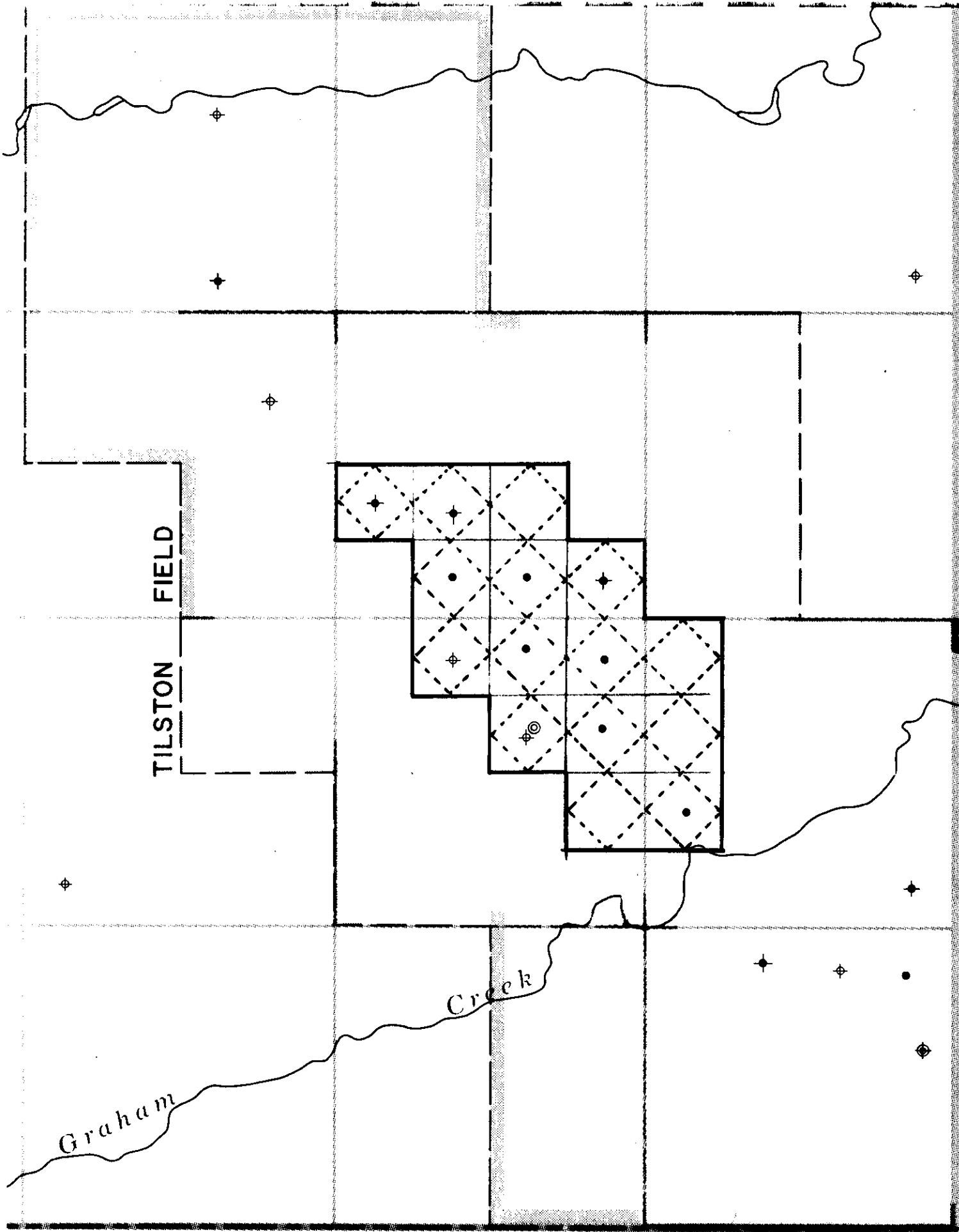
1 - 1 ABANDONED PRODUCER - August 26, 1993

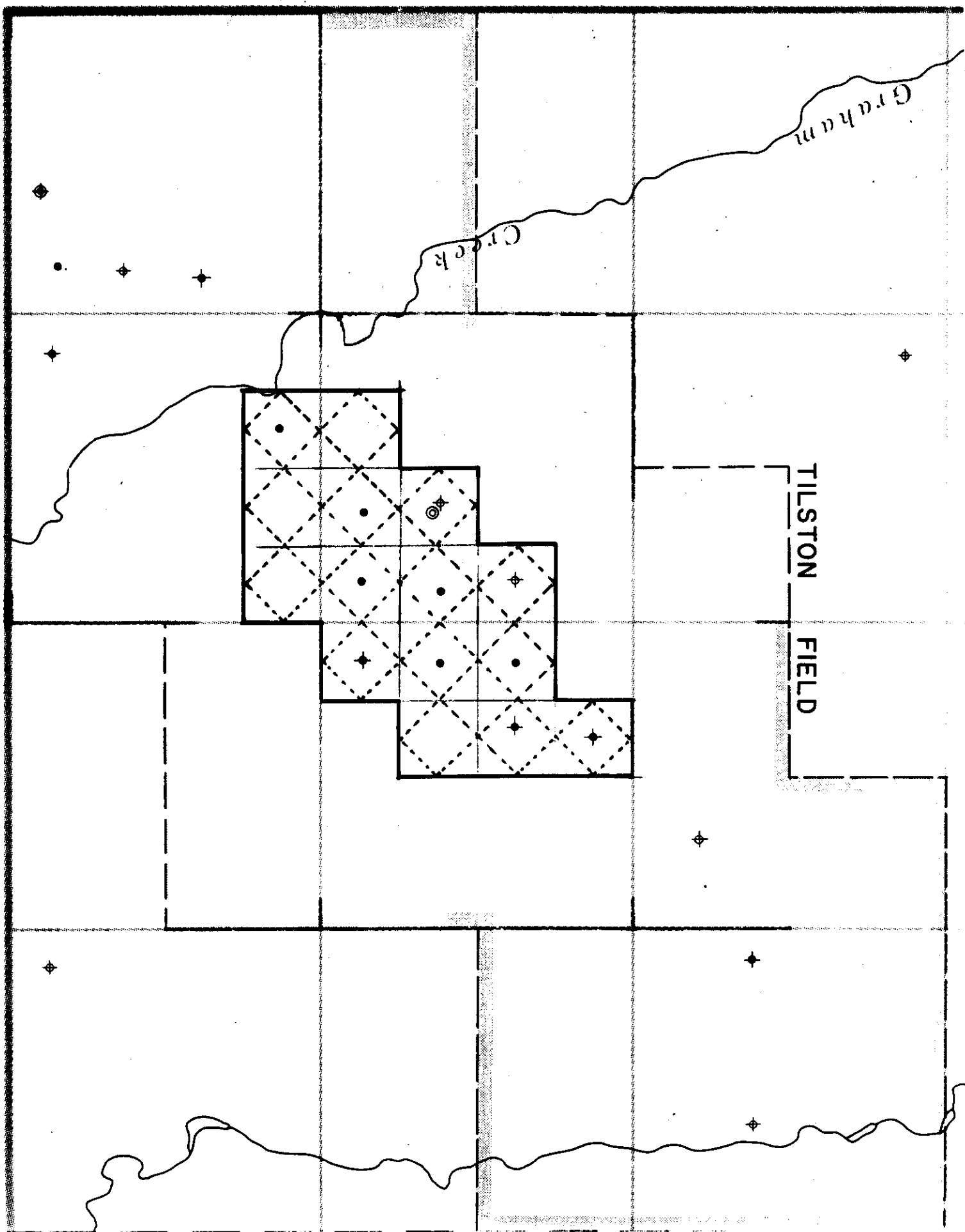
**MISSION CANYON 1 C POOL  
02 44C**

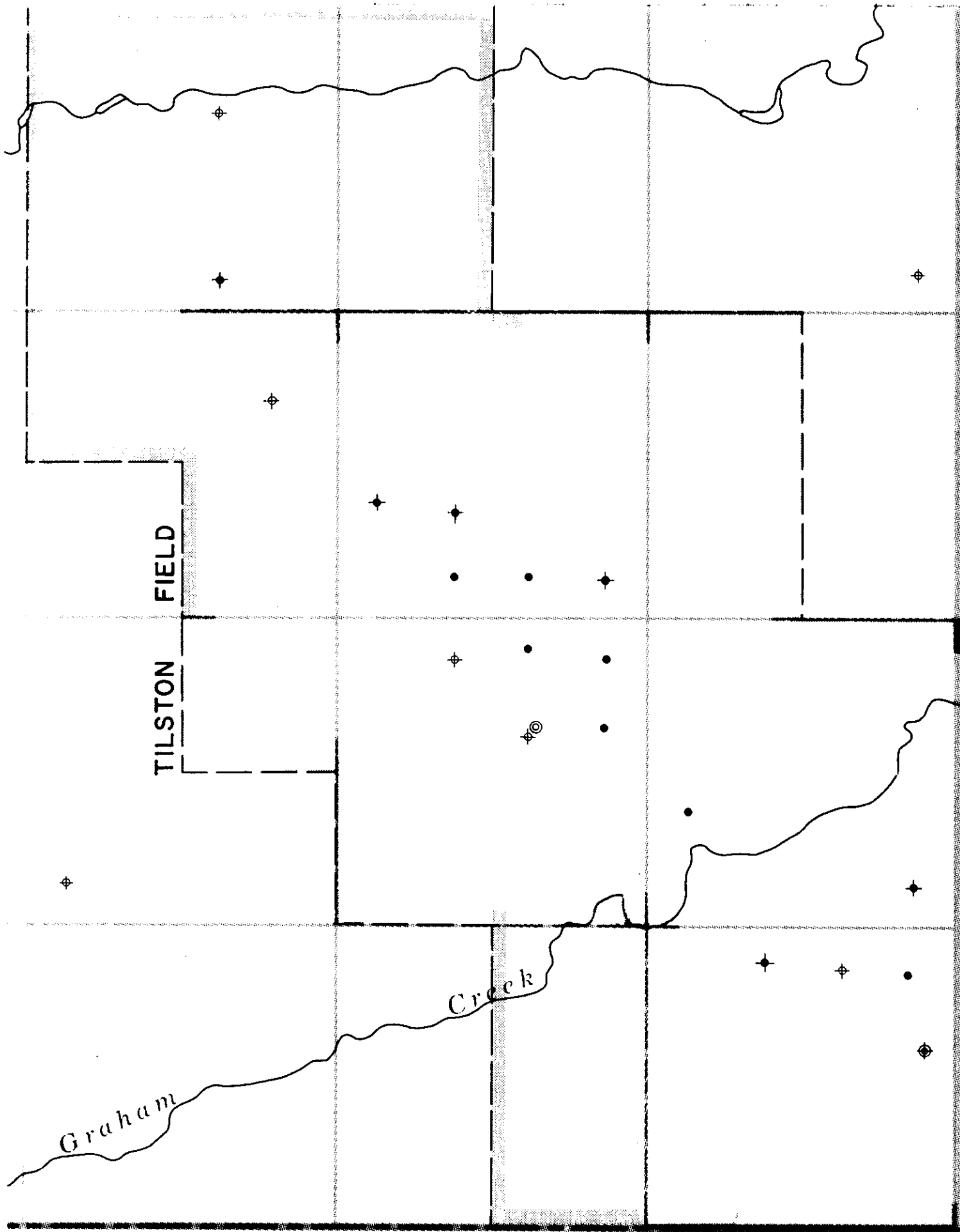
**TILSTON FIELD**

OIL WATER	Cum. Prod. Dec. 31/92 m <sup>3</sup>	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	AUG. Daily m <sup>3</sup>	1993 Y.T.D. m <sup>3</sup>	Cum. Total m <sup>3</sup>
<b>TUNDRA OIL AND GAS LTD. (Cont.)</b>																
08-08-06-29	6 302.1	42.2	36.7	39.0	37.8	41.6	39.6	40.5	34.8					1.24	312.2	6 614.3
	12 788.4	355.4	333.3	367.7	348.8	335.9	321.3	368.1	326.2						2 756.7	15 545.1
05-09-06-29	8 753.7	86.4	75.2	80.2	77.9	44.3	70.6	72.2	68.4					2.21	575.2	9 328.9
	10 234.6	221.6	207.9	229.4	217.6	128.6	209.5	240.0	235.4						1 690.0	11 924.6
12-09-06-29	2 149.9	18.7	16.4	17.4	16.8	16.6	13.2	13.5	12.8					0.41	125.4	2 275.3
	3 842.4	52.1	48.9	53.9	51.2	46.0	35.1	40.2	39.5						366.9	4 209.3
	28 504.3		201.9		208.7		198.6		187.6							30 141.4
	82 943.6		1 345.0		1 409.2		1 279.3		1 381.3							94 124.8
TOTAL OIL		231.9		218.6		184.9		204.9							1 637.1	
TOTAL WATER		1 436.0		1 531.0		1 308.3		1 491.1							11 181.2	
<b>NON-UNIT PREVIOUS PRODUCERS</b>																
	2 409.5															2 409.5
	12 034.4															12 034.4
MISSION CANYON 1 C	30 913.8		201.9		208.7		198.6		187.6							32 550.9
POOL:	94 978.0		1 345.0		1 409.2		1 279.3		1 381.3							106 159.2
TOTAL OIL		231.9		218.6		184.9		204.9							1 637.1	
TOTAL WATER		1 436.0		1 531.0		1 308.3		1 491.1							11 181.2	
<b>TILSTON FIELD</b>																
MISSION CANYON 1 A	101 478.3		94.7		105.7		97.6		110.0							102 313.0
POOL:	628 753.8		1 271.8		1 433.1		1 278.9		1 584.9							640 156.9
TOTAL OIL		106.4		113.8		105.6		100.9							834.7	
TOTAL WATER		1 326.2		1 530.3		1 483.5		1 494.4							11 403.1	
MISSION CANYON 1 C	30 913.8		201.9		208.7		198.6		187.6							32 550.9
POOL:	94 978.0		1 345.0		1 409.2		1 279.3		1 381.3							106 159.2
TOTAL OIL		231.9		218.6		184.9		204.9							1 637.1	
TOTAL WATER		1 436.0		1 531.0		1 308.3		1 491.1							11 181.2	
TILSTON	132 392.1		296.6		314.4		296.2		297.6							134 863.9
FIELD:	723 731.8		2 616.8		2 842.3		2 558.2		2 966.2							746 316.1
TOTAL OIL		338.3		332.4		290.5		305.8							2 471.8	
TOTAL WATER		2 762.2		3 061.3		2 791.8		2 985.5							22 584.3	









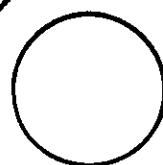
ATTACHMENT NO.8  
20 ACRE INFILL DRILLING LOCATIONS



8-6-29

SECTION 9-6-29

SECTION 5-6-29



10 ACRE DRAINAGE AREA



ESTIMATED ULTIMATE DRAINAGE  
AREA

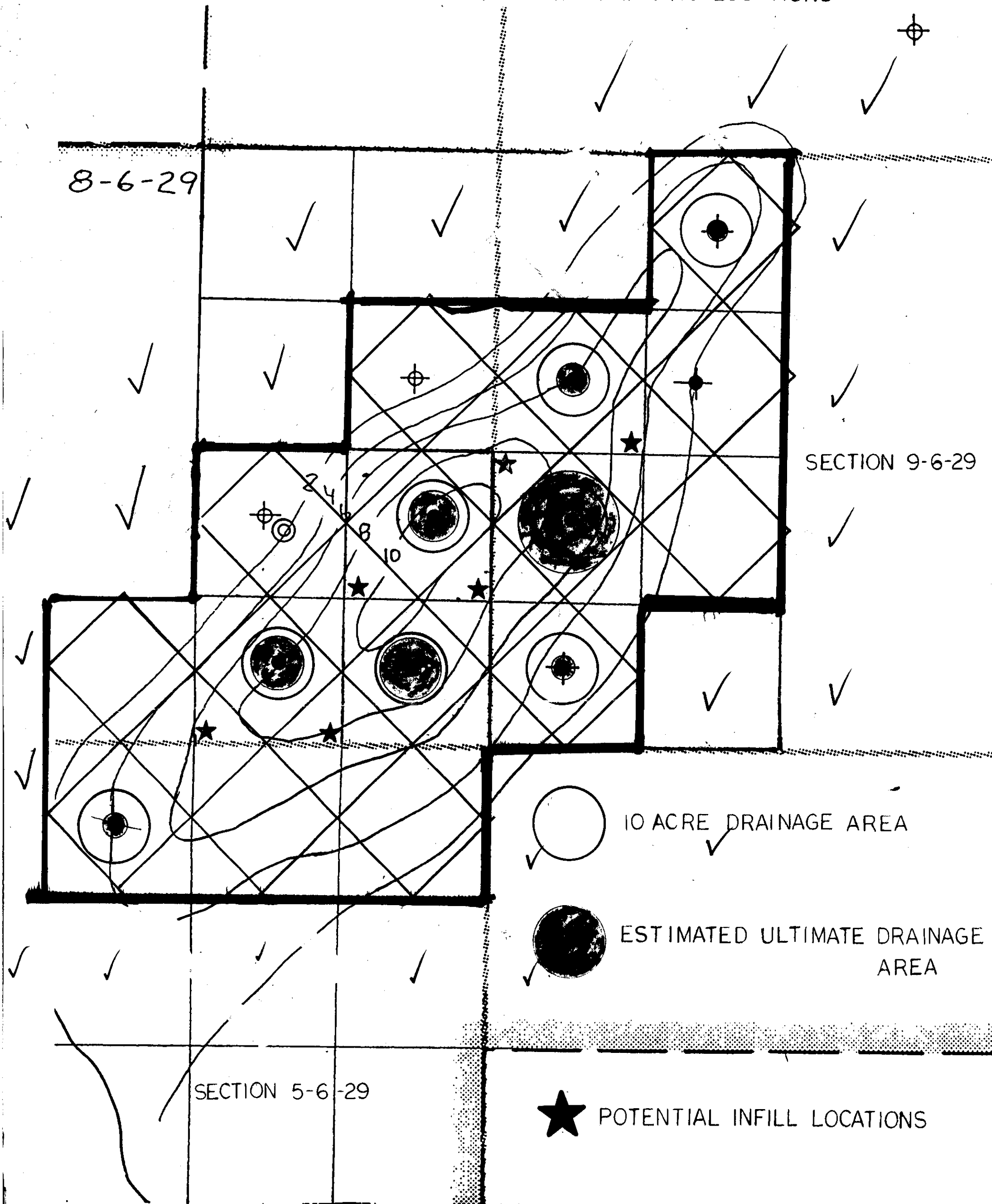


POTENTIAL INFILL LOCATIONS



**Tundra** oil and gas ltd.

20 ACRE INFILL DRILLING LOCATIONS



NOTIFICATION  
SURF. OWNERS WITHIN PROJECT AREA  
RO & WIA



**Tundra** oil and gas ltd.



August 16, 1993

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

Attention: **Mr. C. Moster**  
**Deputy Chairman**

Dear Mr. Moster:

**RE: North Tilston Mission Canyon 1C Pool**  
**Reduced Drilling Spacing Unit Application**

---

Please find attached Tundra's reduced drilling spacing unit application that we are requesting approval for in the referenced field. Tundra personnel met with representatives of the Petroleum Branch on May 31, 1993 to review the scope of the program, and to identify any additional requirements to facilitate processing of the reduced drilling spacing unit application. The Petroleum Branch requested that Tundra include an aerial well siting photograph of the reduced drilling spacing unit area, and an environmental impact assessment of the program on the affected lands. Both items have been addressed and are included in the application.

Tundra would prefer to commence drilling operations by late September, 1993, and any further assistance that Tundra can provide to expedite approval of the application will be made available from our office.

Should you have any questions, please contact me at 934-5853.

Sincerely,

TUNDRA OIL AND GAS LTD.

A handwritten signature in dark ink, appearing to read "G. Czyzewski", with a long, sweeping horizontal stroke extending to the right.

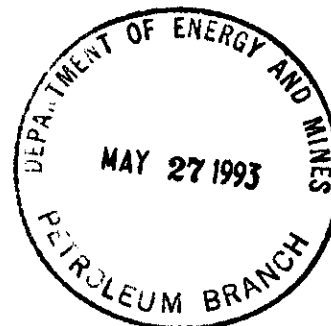
George Czyzewski, P. Eng.  
Senior Reservoir Engineer

GC/bp

cc Mr. J. Fox, P. Eng., Chief Petroleum Engineer  
Mr. L. R. Dubreuil, Director  
Mr. R. Puchniak

May 27, 1993

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



Attention: **Mr. J. Fox, P. Eng.**  
**Chief Petroleum Engineer**

Dear John:

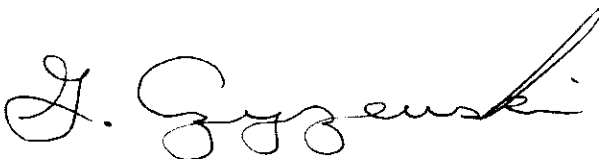
**RE: North Tilston Mission Canyon IC Pool**  
**Draft Reduced Drilling Spacing Unit Application**

Please find attached Tundra's proposed reduced drilling spacing unit application that we are seeking approval for in the referenced field. Tundra would appreciate feedback from the Petroleum Branch pertaining to our draft reduced drilling spacing unit application, prior to submission of the formal request for approval by the Crown. Tundra representatives would like to meet with the Petroleum Branch personnel on May 31, 1993 at 10:45 a.m. (Petroleum Branch Offices) to discuss our proposal with your staff. Pending your initial review and feedback, Tundra will follow-up with the formal request for approval of the reduced drilling spacing unit application in the North Tilston Mission Canyon MC-1 pool.

Should you have any questions before our meeting on May 31, 1993, please call me at 934-5853.

Yours truly,

TUNDRA OIL AND GAS LTD.



George Czyzewski, P. Eng.  
Senior Reservoir Engineer

GC/bp

Enclosure

# **Tundra**

**oil and gas ltd.**

May 27, 1993

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

**Attention: Mr. C. Moster, Assistant Deputy Minister**

Dear Mr. Moster:

**RE: Request for Reduced Drilling Spacing Unit Approval  
North Tilston Field - Mission Canyon 1C Pool**

---

Tundra Oil and Gas Ltd., as Operator on behalf of the working interest owners of the referenced pool, pursuant to Section 20(3) of the Manitoba Petroleum Drilling and Production Regulations, hereby requests approval for reduced drilling spacing units of 20 acres (8.1 hectares) in the North Tilston Field - Mission Canyon 1C Pool. The current approved well spacing is for 40 acres (16.19 hectares).

The following sections outline the supporting documentation pertaining to Tundra's application for reduced drilling spacing units in the North Tilston Field.

## **GEOLOGY**

The productive zone in the North Tilston Field is the Mission Canyon MC-1 member of the lower Mississippian Mission Canyon complex. The hydrocarbon trapping mechanism within the field is primarily due to the presence of several closed paleotopographic highs developed on the Mississippian erosional surface. A dense impermeable secondary dolomite acts as a caprock within the field with the overlying Lower Amaranth Red Beds providing a secondary caprock. Oil accumulation occurs in the underlying porous MC-1 member limestones.

The following geological data for the Mission Canyon MC-1 member is included with our application for reduced drilling spacing units:

- Attachment No. 1: Net Pay Isopach, MC-1 Member
- Attachment No. 2: Structure Contour Map, Top Mississippian
- Attachment No. 3: Structural Cross-section including formations above and below the Mission Canyon MC-1 formation.

## **RESERVOIR DRIVE MECHANISM**

The predominant depletion mechanism in the Mission Canyon MC-1 zone is attributable to strong aquifer drive. This is supported by a recent pressure build-up at well 5-9-6-29 W1M



which indicated original reservoir pressure of 8,900 kPa after being on production since November, 1983. Appendix A contains an analysis of the pressure build-up test completed at well 5-9-6-29 W1M during May, 1993. Well 5-9-6-29 W1M also has the majority of fluid withdrawals from the Mission Canyon MC-1 zone. The strong aquifer drive has contributed to water coning and high water-cuts in the producing wells. A review of the available core data suggests that water breakthrough may further be enhanced due to natural fractures in the Mission Canyon MC-1 zone.

## **LAND**

The lands that reduced drilling spacing unit approval is requested for are outlined in Attachment No. 4. Attachment No. 5 outlines the 20 acre drilling spacing unit configuration that Tundra envisions is applicable for the North Tilston Mission Canyon MC-1 lands. Infill drilling on 20 acre spacing will also require pooling of section 8-6-29 W1M and section 9-6-29 W1M lands.

## **RESERVES**

The volumetric reserve estimate of the original oil-in-place for the Mission Canyon MC-1 lands outlined in Attachment No. 4 is 943.6 E3M3 (5.9 MM STB). Table No. 1 outlines the volumetric original oil-in-place reserve estimates for each 40 acre drilling spacing unit. Tundra's reserve estimates for the North Tilston Mission Canyon MC-1 zone have been appraised by Coles Gilbert in February, 1993 and found to be in general agreement with the reserve auditors estimates. A material balance estimate of the original oil-in-place was not attempted, since there was insufficient pressure data to support a reliable estimate.

## **PRODUCTION HISTORY**

Production commenced from the North Tilston Mission Canyon MC-1 zone in August, 1983 from well 12-9-6-29 W1M. There are currently 5 producing wells from the Mission Canyon MC-1 zone. The total field oil production rate at year end 1992 was 7.8 m<sup>3</sup>/day at a water-cut of 87%. Cumulative oil production from the North Tilston Mission Canyon MC-1 zone to the end of 1992 was 30,913.8 m<sup>3</sup>. Attachment No. 6 illustrates the total North Tilston production history. Appendix B outlines the production statistics for the total North Tilston Field Mission Canyon MC-1 zone. Individual well production plots and production statistics are outlined in Appendix C and Appendix D, respectively.

## **RECOVERY ESTIMATES**

Current oil recovery to 92.12.31 was 3.3% of the original oil-in-place. Tundra estimates that with the existing wells on 40 acre spacing the ultimate recovery from the North Tilston Mission Canyon MC-1 zone will be about 4.8% of the original oil-in-place or 45,000 m<sup>3</sup> (283,000 STB). The ultimate recovery for the North Tilston Mission Canyon MC-1 zone was determined by decline analysis. Table No. 2 outlines the remaining reserves for each of the producing wells. Table No. 3 outlines the recovery factor for each well on the existing 40 acre spacing. From Table No. 3 it is apparent that only wells 1-8-6-29 and 5-9-6-29 will

recover in excess of 5% of the original oil-in-place in the 40 acre drilling spacing unit. Appendix E illustrates the oil vs cumulative production plot for the total North Tilston Mission Canyon MC-1 zone that was used to estimate ultimate pool recovery. Appendix F outlines the decline analysis profile for each of the individual wells that was used to determine the ultimate recovery from a 40 acre drilling spacing unit.

### **DRAINAGE AREAS**

The drainage areas of each individual well on 40 acre spacing were determined by an iterative process. A series of recovery factors ranging from 5 - 40% were selected to determine the oil-in-place that was being drained by an individual well on 40 acre spacing. Appendix G outlines this process for each producing well in the pool. By analogy, a recovery factor was then selected that would be representative of a pressure maintenance recovery scheme in Western Canada. A recovery factor of 30% of the original oil-in-place was selected as the maximum recovery achievable by an individual well on 40 acre spacing in the North Tilston Mission Canyon MC-1 zone. Attachment No. 7 outlines the maximum drainage area of each individual well on 40 acre spacing based on this methodology. As Attachment No. 7 illustrates, the majority of the existing wells in the pool will ultimately drain less than 10 acres of the 40 acre drilling spacing unit. Only well 5-9-6-29 W1M is expected to exceed 10 acres of drainage, however, the ultimate drainage of 5-9 is estimated to be less than 20 acres. The drainage prediction for well 5-9 is considered to be optimistic, since frequent chemical treatments are required to maintain productivity at the 5-9 location. These chemical treatments will not be economic if productivity gains are not realized in the future.

### **INFILL DRILLING LOCATIONS**

Attachment No. 8 outlines the proposed infill locations that would be drilled in the future with approval of the reduced drilling spacing application. Although Tundra has currently identified 6 infill drilling locations in the North Tilston Mission Canyon MC-1 pool, we would only drill one or two infill locations initially to test the commercial feasibility of this enhanced recovery program. The six initial infill locations have been selected in the best parts of the reservoir to test the feasibility of improving oil recovery through infill drilling.

### **INFILL INCREMENTAL RESERVES AND RECOVERY**

Incremental oil reserves with infill drilling have been estimated by determining ultimate recovery expected on 40 acre spacing. On this basis, each of the six infill locations potentially may recover an incremental 8,000 - 9,000 m<sup>3</sup> (50 - 57 M STB) on 20 acre spacing. Total incremental oil reserves from the six infill locations are estimated at 50,000 m<sup>3</sup> (315,000 STB). This estimate is speculative at this time, since the Mission Canyon MC-1 zone in the North Tilston field has an extensive transition zone. This may result in significantly higher current formation water saturations (SW = 40% used in initial reserve estimates) and lower oil-in-place estimates. As a result, actual infill drilling will confirm the incremental oil recovery potential. Table No. 4 outlines the incremental oil recovery estimate from each infill location on 20 acre spacing. Drilling of the six infill locations may increase ultimate oil recovery from the Mission Canyon MC-1 pool from 4.8% of the original oil-in-place to 10.0% of the original oil-in-place.

## **INFILL WELLS PRODUCTION FORECAST**

The incremental production rate for each infill well was determined by reviewing the initial rates of the existing wells on 40 acre spacing. The average initial oil rate of the existing wells during the first year of production was 5 m<sup>3</sup>/day. As a result, each infill well was assigned an initial rate of 5 m<sup>3</sup>/day during the first year of production. The initial rate was exponentially declined at 22% per year thereafter, based on the field historical decline rate. Table No. 5 outlines the incremental oil production forecast by drilling six infill wells.

## **HORIZONTAL DRILLING POTENTIAL**

Tundra has also evaluated the merits of applying horizontal well drilling technology in the North Tilston Mission Canyon MC-1 pool to improve oil recovery. In our opinion, infill drilling has several advantages which makes this approach more attractive than horizontal drilling for the following reasons:

1. There is lower risk in obtaining a commercial well with infill drilling. This is attributable to being better able to predict the down-hole location of the vertical well over a horizontal section which may encounter the aquifer or run out of producible reservoir pay.
2. Infill drilling technology is recognized in Western Canada as a proven method to improve oil recovery where water coning from either bottom water or influx through natural fractures has precluded recovery. Horizontal drilling technology, however, has not proven conclusive incremental recovery in these types of scenarios.
3. Our estimates indicate there is higher incremental oil recovery with infill drilling than with horizontal drilling. The six infill locations are projected to recover 315 M STB of incremental oil whereas one horizontal well spanning two LSD's is projected to recover about 120 M STB of additional oil. Since the pool only covers less than 640 acres of land, further horizontal drilling locations beyond the initial application are limited. In Tundra's opinion, even if we proceeded with horizontal drilling at this time, further infill drilling would be required to improve oil recovery.
4. There are also minimal fiscal incentives to drill a horizontal well in the North Tilston Field, since the land position is primarily freehold. The only incentive applicable is the mineral tax holiday on the first 10,000 m<sup>3</sup> of oil production. This incentive does not provide better economics than drilling conventional infill wells due to the higher capital investment for drilling a horizontal well.
5. Infill drilling will also provide better reservoir data, since conventional logging suites can be run in a vertical well. Open-hole logging in horizontal sections is expensive and interpretation of reservoir conditions is more difficult.
6. Finally, it is more feasible to control drawdowns in conventional infill wells than with a horizontal well, since the capital investment is significantly higher in a horizontal section requiring higher rates to generate attractive economics. This may lead to premature watering out of the horizontal well.

Tundra's opinion is that infill drilling will be a reliable indicator whether horizontal drilling technology will be commercially successful in a Mission Canyon MC-1 pool, since both techniques involve exploiting more reservoir area. As a result, infill drilling is considered by Tundra to be less risky at this time.

### **INCENTIVE PROGRAM**

Tundra views the application for reduced drilling spacing units on 20 acres as an experimental depletion program at this time. Since infill drilling may offer significant incremental oil recovery potential in the North Tilston Mission Canyon MC-1 pool, Tundra's position is that this optimization program should qualify for a mineral tax holiday equivalent to a royalty production holiday for horizontal drilling on Crown Lands. We perceive the infill drilling program as similar in scope to horizontal drilling (incremental oil recovery with high risk), and as a result, a similar Crown incentive program should be extended to at least the first two infill locations. Infill drilling at this time is not a wide scale depletion program in Manitoba, and until this optimization approach is proven as a means of improving oil recovery, we believe an extension of a government incentive program to infill drilling would increase activity. Tundra envisions that other fields in our portfolio (South Tilston and Deloraine) would also benefit from this type of reservoir depletion program. A Crown incentive program for infill drilling in the Mission Canyon MC-1 pool will provide further motivation for operating companies to continue exploration for the Mission Canyon MC-1 reservoir in Manitoba.

### **SUMMARY**

Tundra's assessment of the production performance of the North Tilston Mission Canyon MC-1 pool indicates that the low recovery factor is attributable to localized water coning from a strong water drive. As a result, infill drilling may offer an attractive approach to increase oil recovery by an additional 5% of the original oil-in-place or 315 M STB. Tundra would like to proceed with the infill program early in the third quarter of 1993, and any further assistance that your office requires in expediting the approval of the reduced drilling spacing unit application, we would be pleased to provide.

Should you have any questions or require further information, please contact either George Czyzewski at 934-5853, or Mike Finn at 934-5294.

Respectfully Submitted,

TUNDRA OIL AND GAS LTD.

---

G. Czyzewski, P. Eng.  
Senior Reservoir Engineer

---

C. M. Finn, P. Geol.  
Chief Geologist

bp

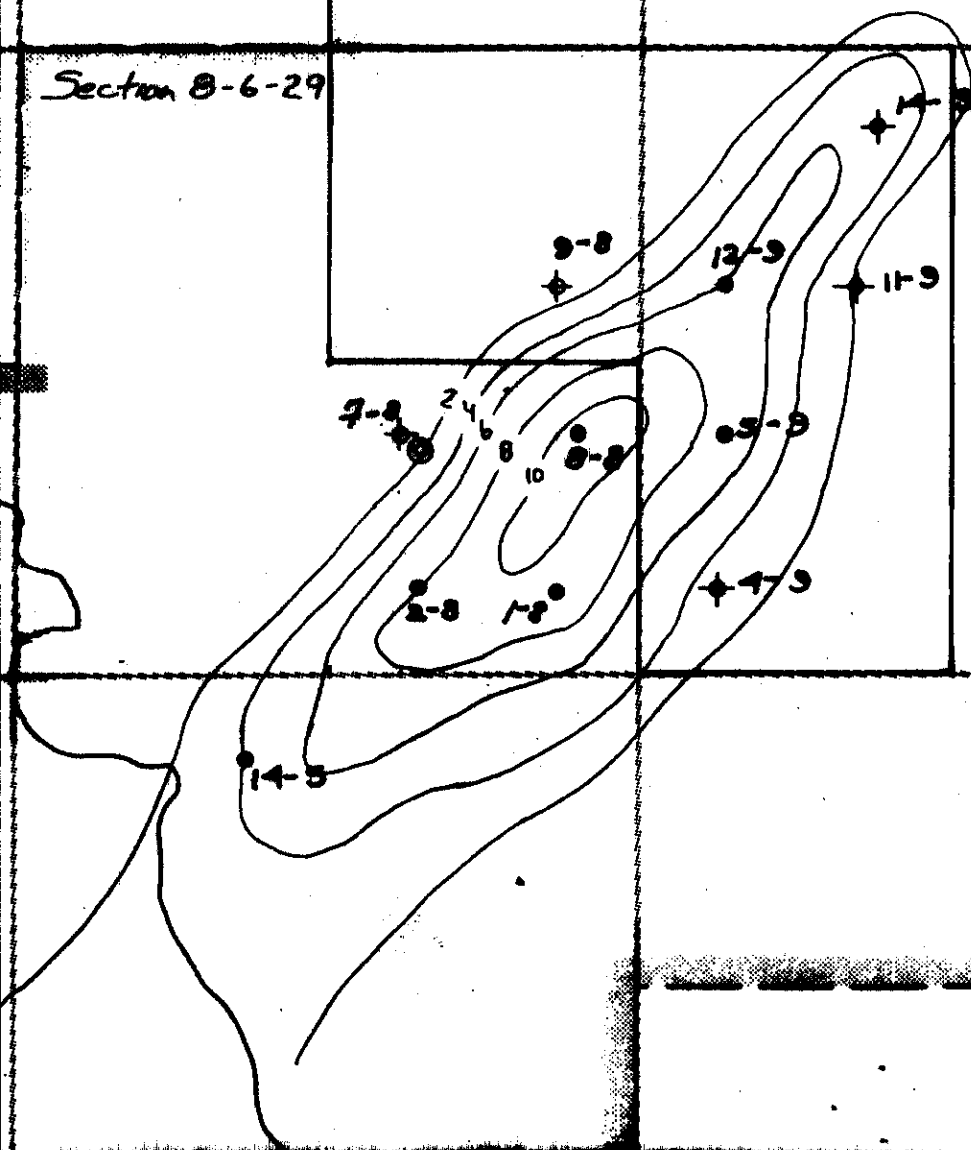
cc R. G. Puchniak

# ATTACHMENT NO.1

TILSTON

FIELD

Section 8-6-29



oil and gas ltd.

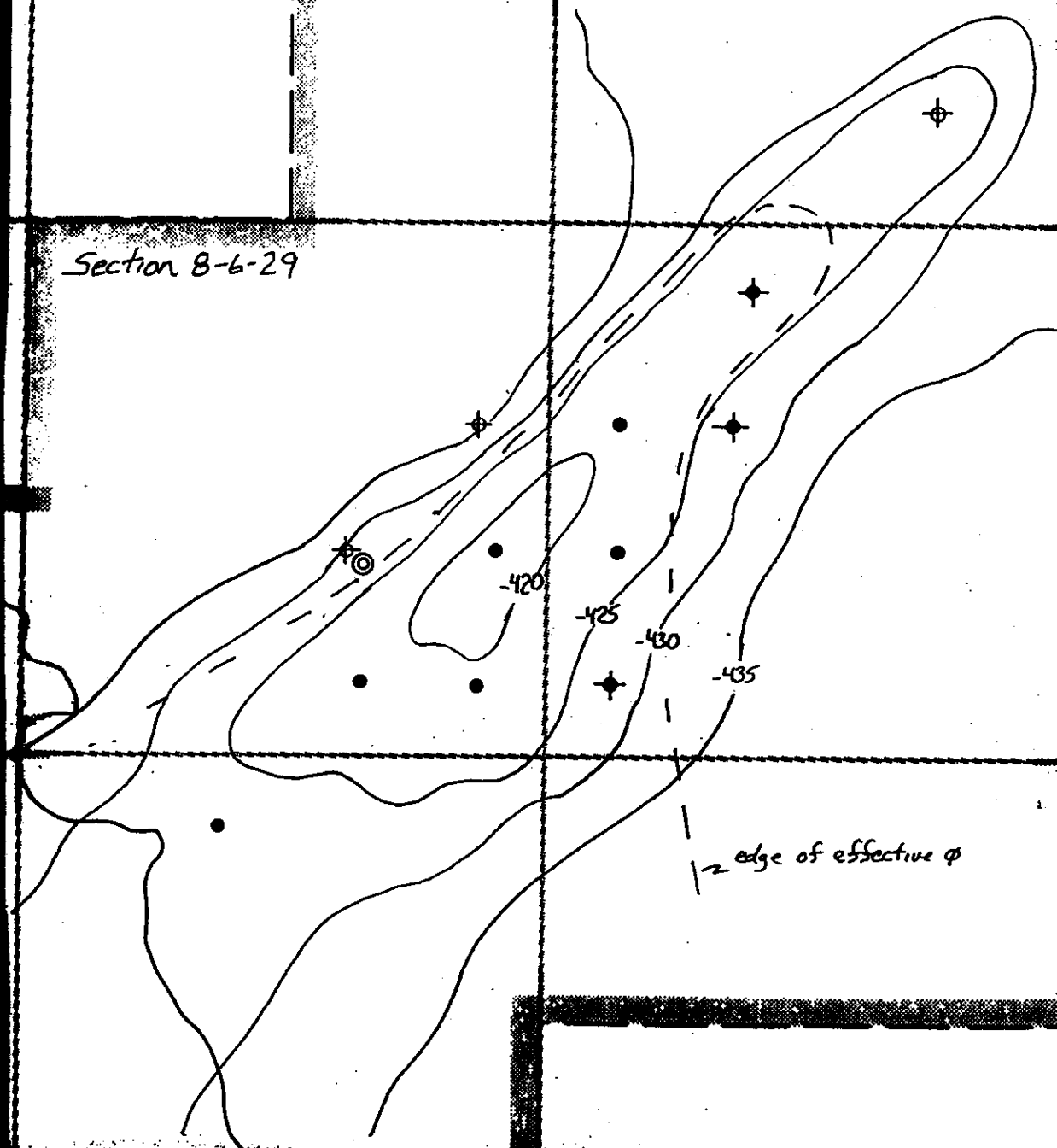
North Tilston: Net Pay Isopach (m)

Contour Interval: 2m Date: 03/93 By: DB

ATTACHMENT NO.2

TILSTON FIELD

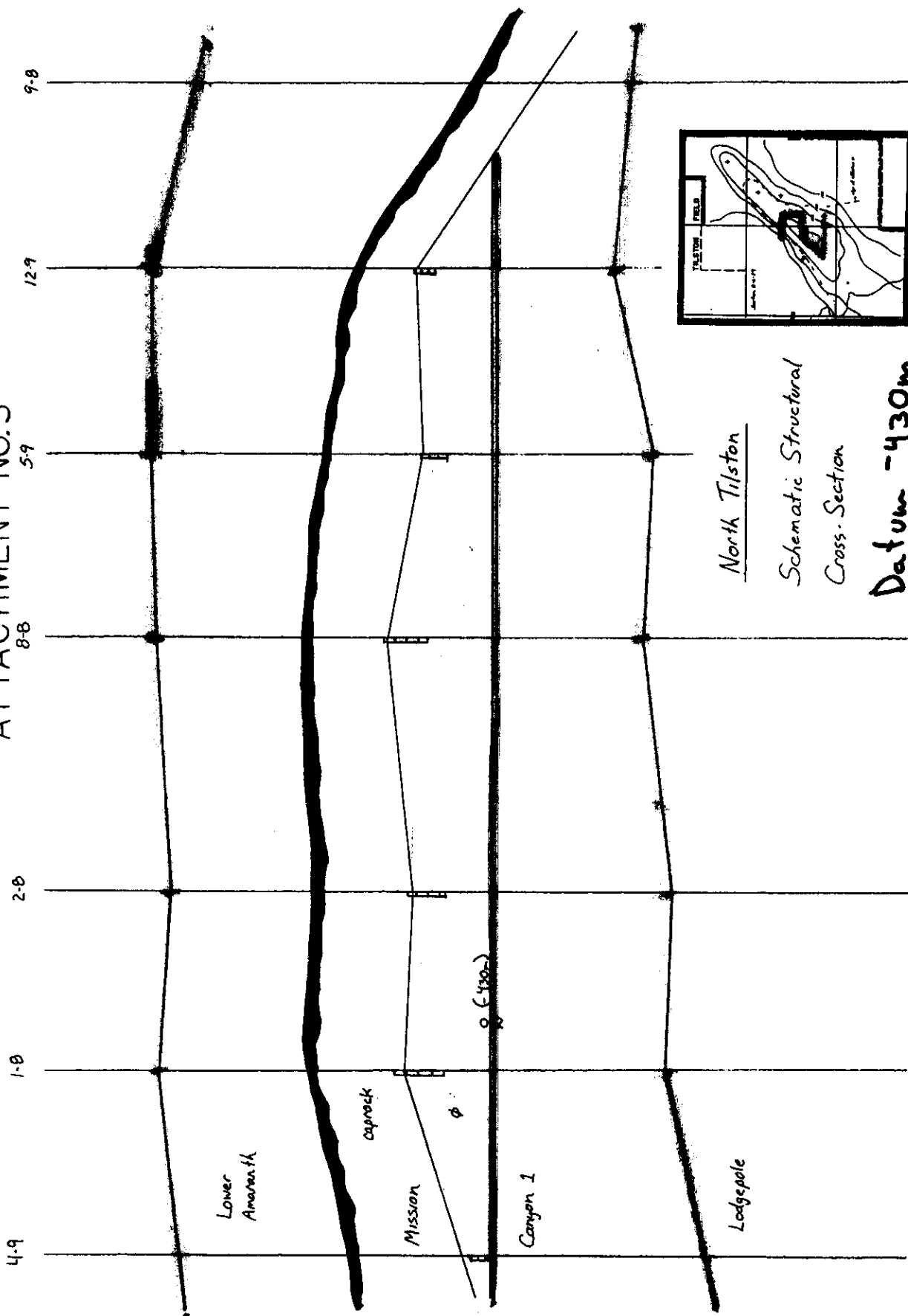
Section 8-6-29



**Tundra** oil and gas ltd.

North Tilston : Structure Contour Map  
Top of MC1 Porosity

Contour Interval: 5m | Date: 03/93 | By: DB



Attachment No.4

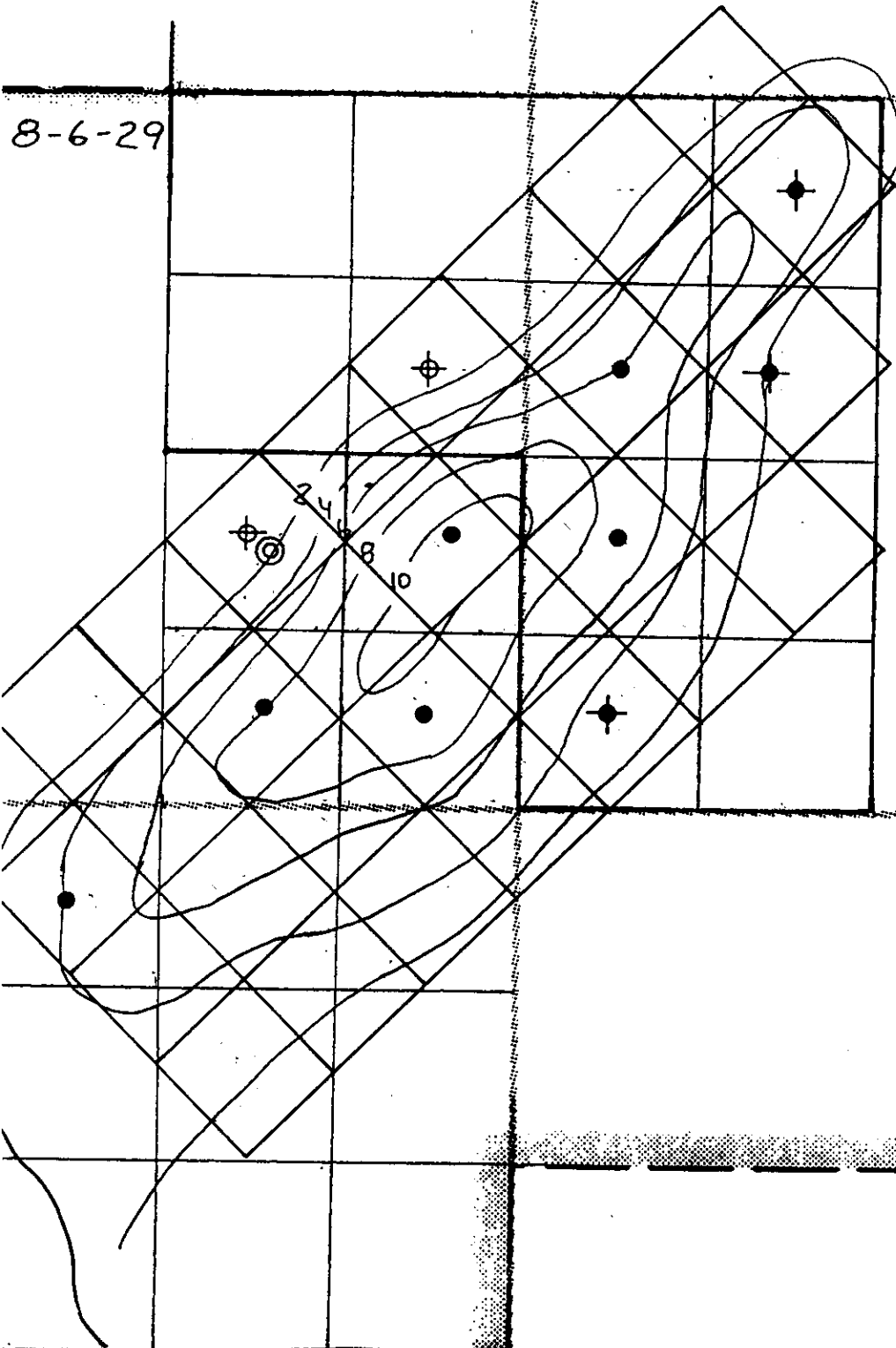
Lands Included In Reduced Drilling Spacing Unit Application

<u>Lands</u>	<u>Working Interest Owners</u>	<u>Royalty Owners</u>
NW1/4 NE1/4-5-6-29 W1M	Tundra in the process of of acquiring acreage	
SE1/4 8-6-29 W1M	Tundra BPI	90.00% 10.00% Les Grieves (64601 Manitoba)
NE1/4 8-6-29 W1M	Tundra BPI	90.00% 10.00% Les Grieves (64601 Manitoba)
SW1/4 9-6-29 W1M	Tundra BPI	95.00% 5.00% Allnutt Holdings
NW1/4 9-6-29 W1M	Tundra BPI	95.00% 5.00% Allnutt Holdings
SW1/4 8-6-29 W1M	Tundra in the process of acquiring acreage	



8-6-29

20 ACRE DRILLING  
SPACING UNIT  
CONFIGURATION

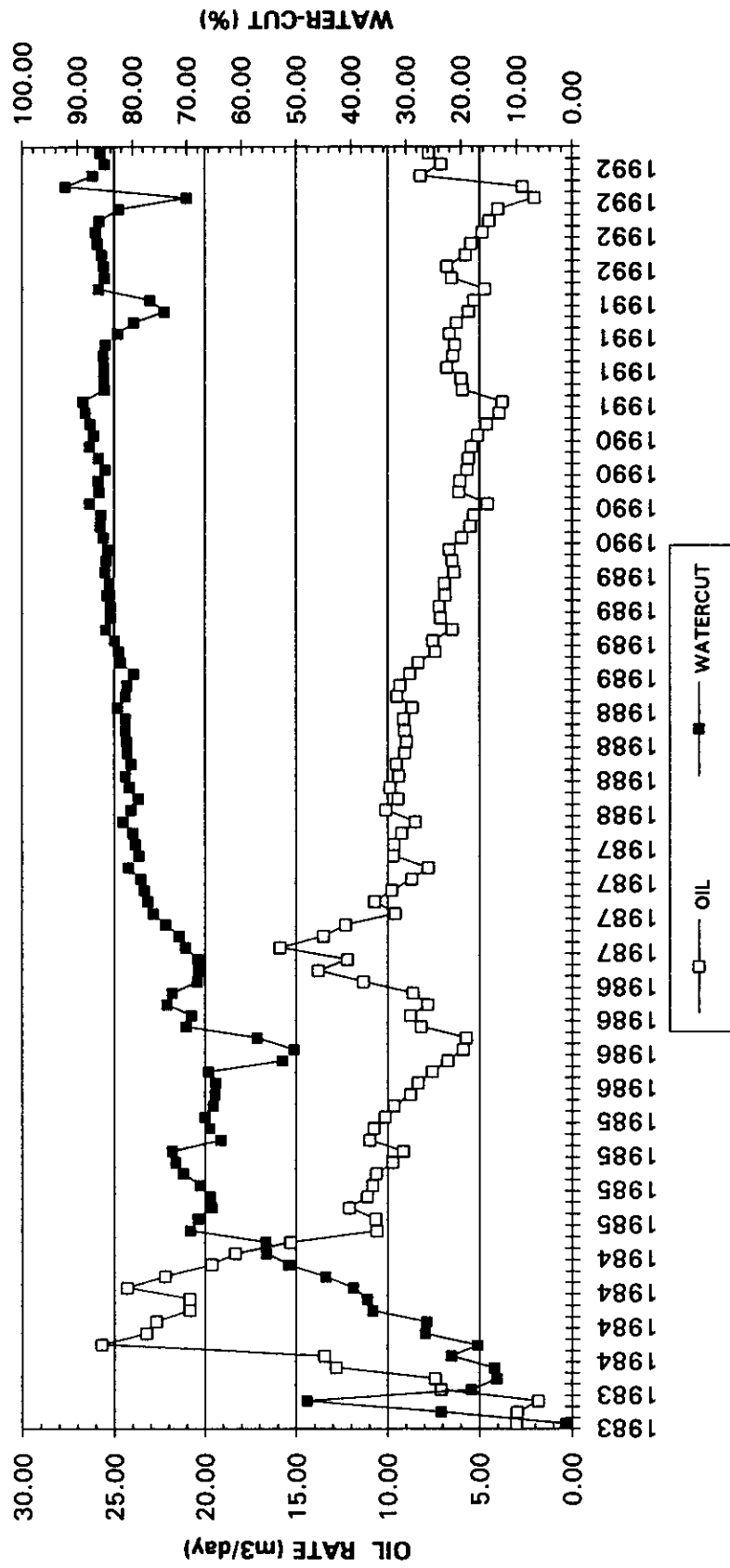


**Tundra** oil and gas ltd.

North Tilston : Net Pay Isopach (m)

# ATTACHMENT NO.6

## NORTH TILSTON PRODUCTION HISTORY



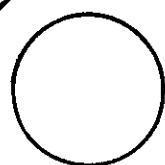
ATTACHMENT NO.7  
DRAINAGE AREAS ON 40 ACRE SPACING



8-6-29

9-6-29

5-6-29



10 ACRE DRAINAGE AREA



MAXIMUM DRAINAGE AREA

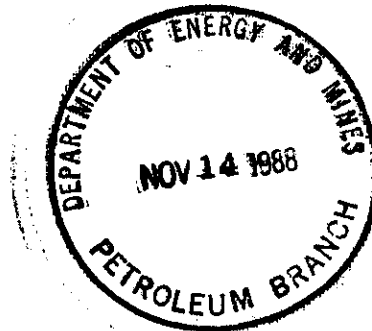


**Tundra** oil and gas ltd.

**NEWSCOPE**  
**Resources Limited**

1988 11 09

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



Attention: Mr. L. R. Dubreuil

Dear Mr. Dubreuil,

Re: Tilston MCl C Pool  
Reduced Spacing

Further to our application, dated September 12, 1988, to reduce spacing in the subject pool, Newscope Resources Limited hereby requests the application be suspended pending higher oil prices. The project is uneconomic at the current price level, however, should oil prices increase and stabilize we would pursue the proposed reduced spacing application.

Yours very truly

NEWSCOPE RESOURCES LIMITED

A handwritten signature in dark ink, appearing to read "S. Bruce McKay".

S. Bruce McKay  
Production Manager

SBM/lsl

cc: Manitoba Energy & Mines File  
Tilston - Government Applications



Energy and Mines

Petroleum

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

(204) 945-6577

October 31, 1988

Newscope Resources Limited  
1090, 700 - 9th Avenue S.W.  
CALGARY, Alberta T2P 3V4

Attention: S. Bruce McKay  
Production Manager

Re: Tilston MC1 C Pool  
Reduced Spacing

Upon receipt of the subject application (dated September 12, 1988) we discussed (by telephone) several aspects of your reduced spacing proposal. It was concluded that in lieu of a formal deficiency letter a meeting between Newscope and the Petroleum Branch would facilitate processing of the application. As of today's date we have not been contacted to set up the proposed meeting.

I would again suggest we meet to discuss various aspects of the application. Such a meeting would provide us with a better understanding of your plans and would allow consideration of possible alternatives or modifications to your proposal.

Please contact me at your earliest convenience to set up a meeting.

Yours sincerely

A handwritten signature in dark ink, appearing to read "L.R. Dubreuil". The signature is written in a cursive style with some ink bleed-through from the reverse side of the page.

L.R. Dubreuil  
Chief Petroleum Engineer  
Petroleum Branch

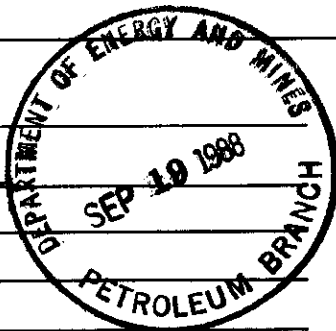
LRD:dah

cc: H. Clare Moster



Date: 88/09/15

To: BOB DUBREUIL



## Action / Route Slip

From: IAN MCGREGOR

Telephone:

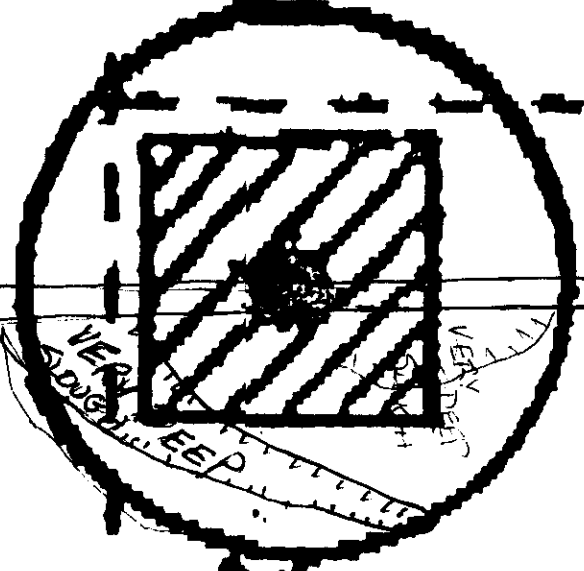
- |   |  |  |   |  |
|---|--|--|---|--|
| <input type="checkbox"/> Take Action    | <input checked="" type="checkbox"/> Per Your Request | <input type="checkbox"/> Circulate, Initial and Return     | <input type="checkbox"/> For Approval and Signature | <input type="checkbox"/> Make _____ Copies |
| <input type="checkbox"/> May We Discuss | <input type="checkbox"/> For Your Information        | <input type="checkbox"/> Return With Comments or Revisions | <input type="checkbox"/> Draft Reply for Signature  | <input type="checkbox"/> Please File       |

Comments: - Here is a very rough map indicating significant slough areas. These sloughs are not framed and in a wet year should be filled with water. I have around topographic maps of these sections and will plot sloughs more accurately. There are probably 20-50 small sloughs per 1/4 in this area. The fields are all broken for crops. It appears the wetlands have been plowed with no eye to providing the sloughs and still allowing as much area to be farmed as possible.

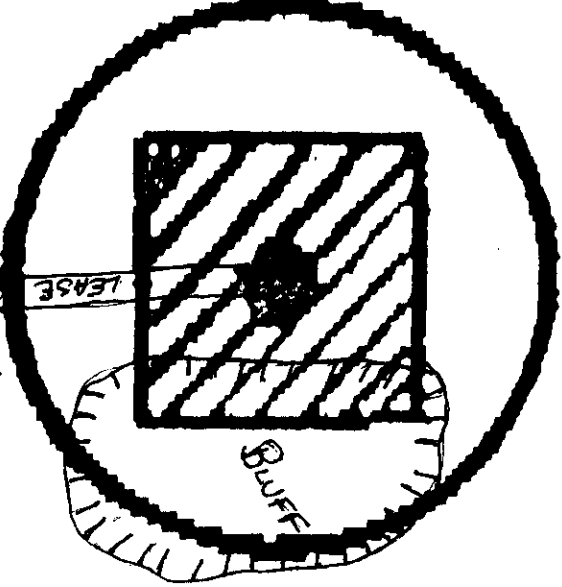
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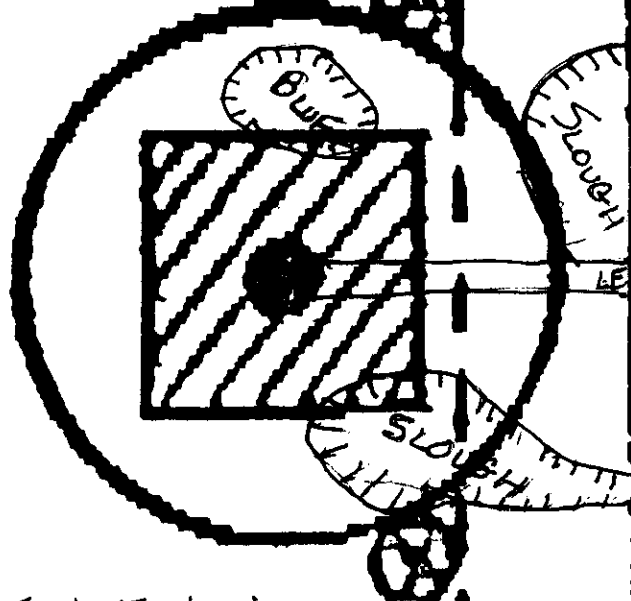
8-1



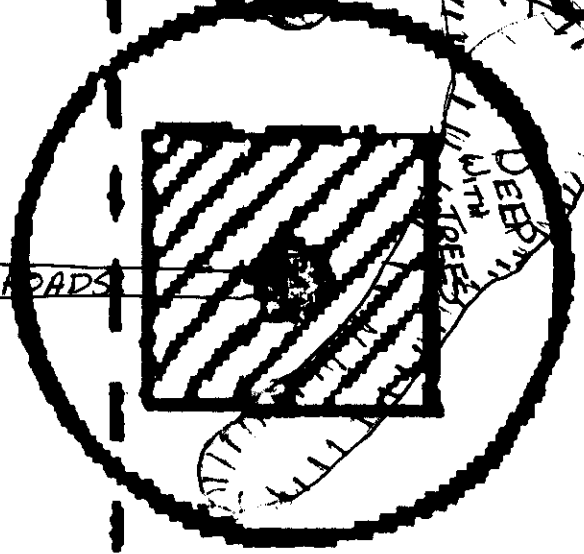
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6-5



8-3



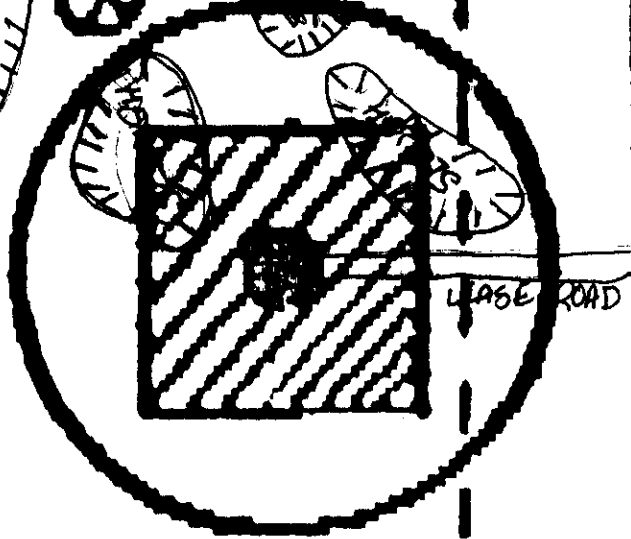
8-4



8-6



6-6

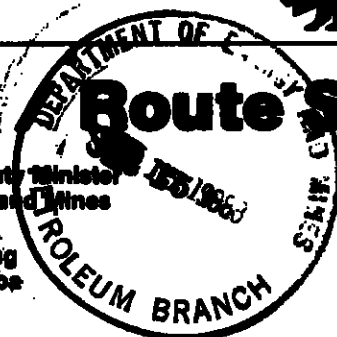


Date: September 14, 1988

To: Clare Moster  
Petroleum

## Action Route Slip

From: Office of the Deputy Minister  
Manitoba Energy and Mines  
Room 309  
Legislative Building  
Winnipeg, Manitoba  
R3C 0V8



- |   |   |  |   |  |
|---|---|--|---|--|
| <input type="checkbox"/> Take Action    | <input type="checkbox"/> Per Your Request     | <input type="checkbox"/> Circulate, Initial and Return     | <input type="checkbox"/> For Approval and Signature                       | <input type="checkbox"/> Make _____ Copies |
| <input type="checkbox"/> May We Discuss | <input type="checkbox"/> For Your Information | <input type="checkbox"/> Return With Comments or Revisions | <input checked="" type="checkbox"/> Draft Reply for Signature<br>Chairman | <input type="checkbox"/> Please File       |

Comments:

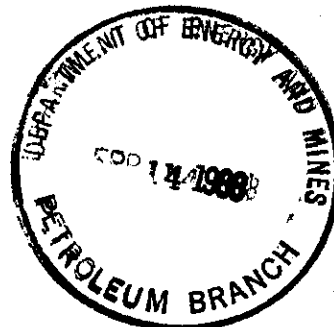
Thanks

Rose





September 12, 1988



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

ATTENTION: Mr. C. S. Kang, Chairman

Dear Mr. Kang

RE: Request for Reduced Drilling Spacing Unit Approval  
Tilston Field - Mission Canyon 1C Pool

As requested in your letter of July 20, 1988 the following information is hereby submitted in support of the subject application.

1. A map showing the locations of the proposed wells on reduced spacing is attached (Figure #1). Although six locations are indicated, Newscope proposes to drill and evaluate one before drilling any others.

From our engineering reports, the average recoverable oil is approximately 60,000 BBLS/well. This translates into a drainage area of less than 10 acres using volumetrics and average reservoir parameters. This drainage area is illustrated on Figure #1.

As indicated in our initial application of July 11, 1988, Newscope proposes 150 m inter-well spacing units for the Tilston MC-1 pool. The 150 m inter-well buffer is shown in Figure #1. As this area is substantially larger than the calculated well drainage area, Newscope feels infill drilling is required in order to maximize pool recovery. It is our contention that the proposed 150 m inter-well spacing would allow for infill drilling while not affecting the drainage radius of existing wells.

2. Structural and isopach maps of the subject pool are attached (Attachment #1 & #2).
3. A list of all royalty and working interest owners (by location) for all lands within one kilometer of the application area and in the application area itself is shown in Attachments #3 and #4. Newscope Resources Limited is making this application on behalf of itself, Contact Ventures and 60494 Manitoba Ltd.
4. A production forecast for the application area with and without the planned reduced spacing is shown in Attachment #5.

5. As stated in point 1. above, the calculated well drainage area is smaller than the proposed 150 m inter well spacing area. Therefore, we submit that the correlative rights of the royalty and working interest owners will not be affected. To further protect correlative rights, Newscope proposes a 100 m buffer zone be established on the east and south sides of section 8 and on the west and south sides of section 9 - which is the current regulated 40 acre spacing unit buffer amount of 100 m from the edge of the spacing unit. (Refer to Figure #1).

The existing wells, in the area of application, have working interests as follows:

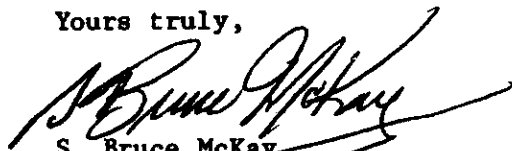
	<u>Sec 8-6-29</u>	<u>Sec 9-6-29</u>
Newscope	68.34	95
Contact	21.66	-
60494	10.00	5

All working interest owners have been contacted and are agreeable to the proposed spacing units. To date, the royalty interest owners have not been contacted.

6. No formal communication has been carried out with the surface landowners. Newscope will discuss the impact of the proposed wells with the landowners in the near future. From our past experience in the area, we do not anticipate any problems. The topography of the area is rolling cultivated farm land.

Should further information be required, please contact the undersigned.

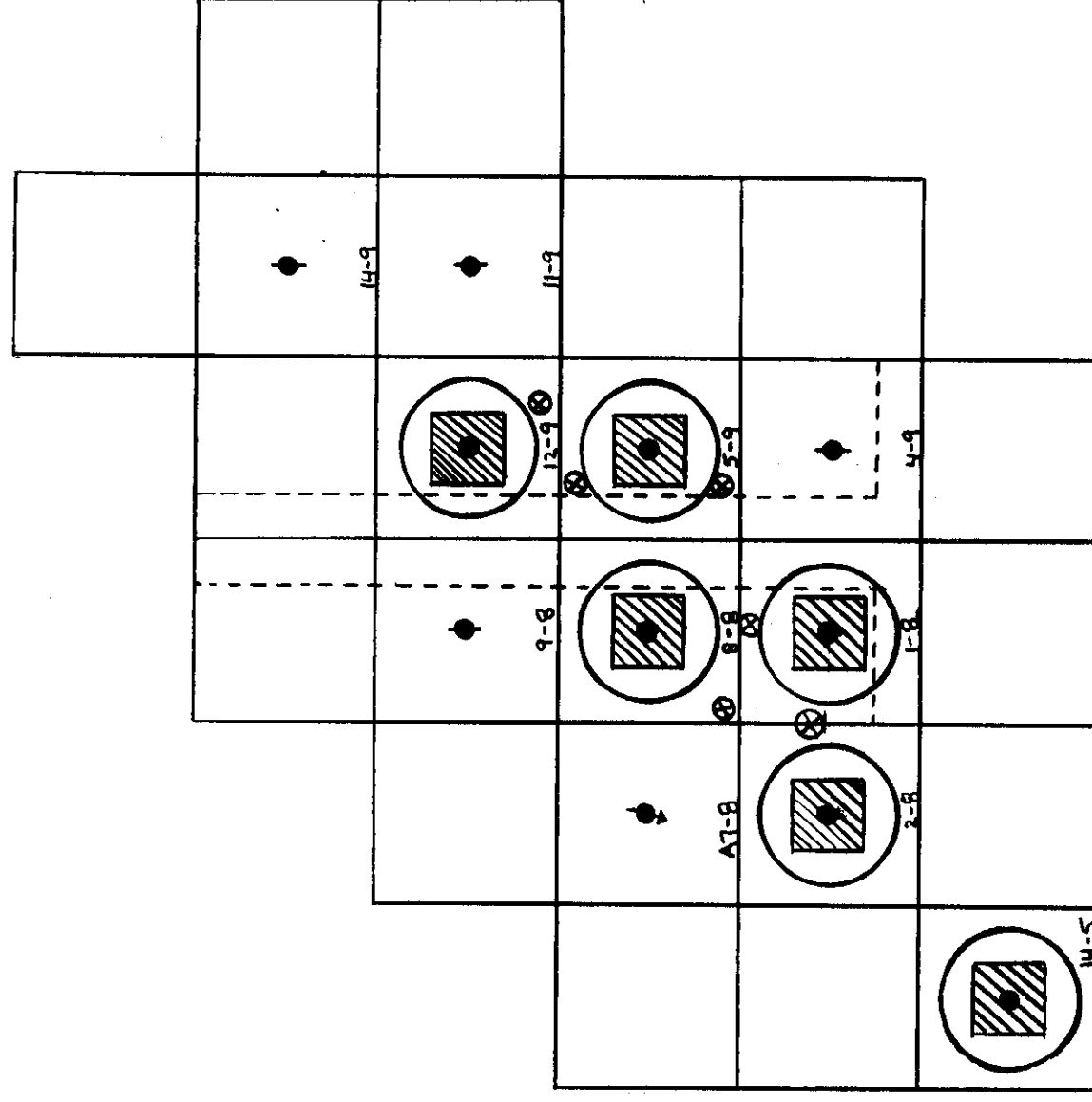
Yours truly,

  
S. Bruce McKay  
Production Manager

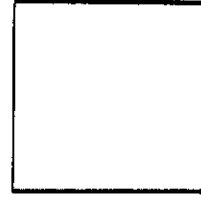
SBM/lak  
Enclosures

cc: Tilston - Gov't Application File  
Virden  
D. W. Shepherd  
C. Moster - Energy & Mines

Figure 1



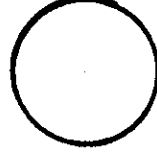
legend



40 acre spacing



well drainage area

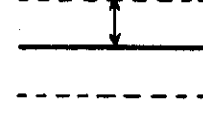


150m inter-well buffer

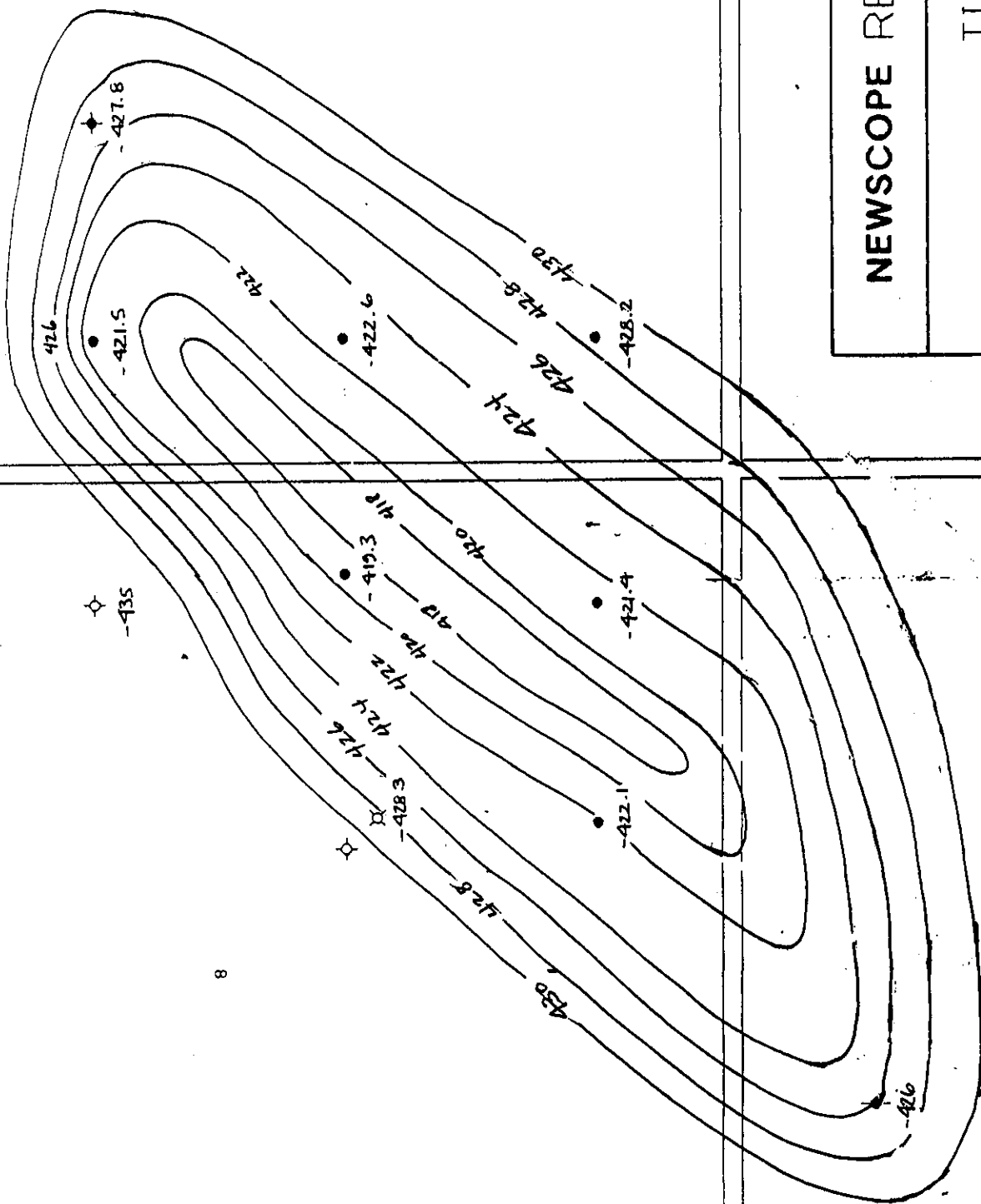
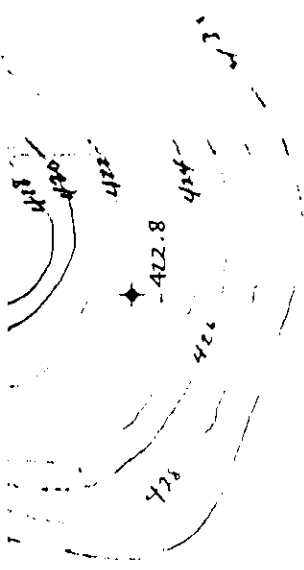
existing wells



proposed wells



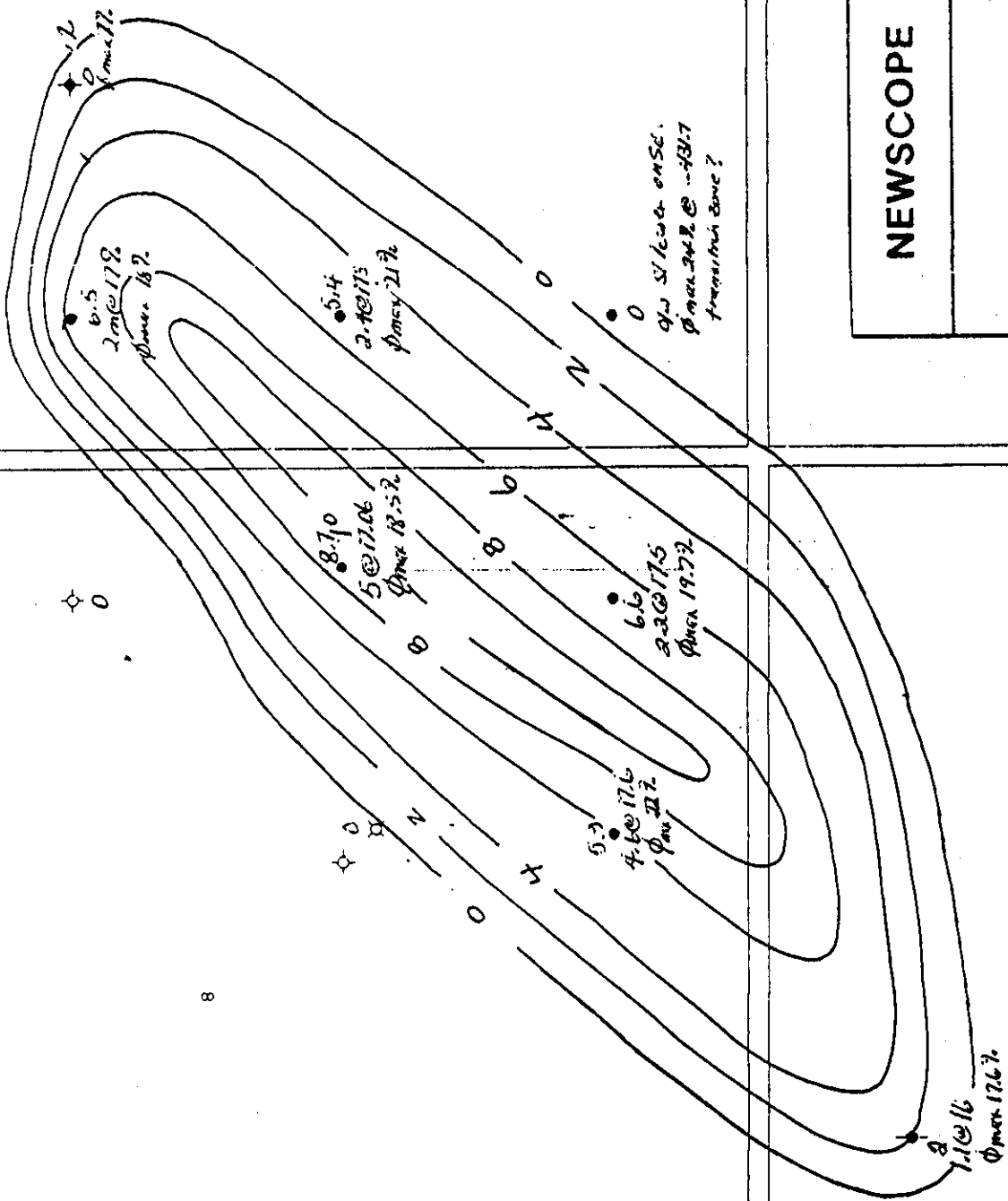
100m buffer



NEWSCOPE RESOURCES LTD		
TILSTON		
STRUCTURE OF TOP OF TILSTON (MC-1) POROSITY (metres) MANITOBA		
DATE: JUN 30, 1988	SCALE: 1:10,000	MCW/07/88

29W1

T 6



0  
Q.W. S' 1/2 sec. on Sec. 1  
Q.W. S' 1/2 sec. on Sec. 1  
Q.W. S' 1/2 sec. on Sec. 1  
Q.W. S' 1/2 sec. on Sec. 1

NEWSCOPE RESOURCES LTD		
TILSTON		
GROSS PAY ABOVE -- 428m		
MANITOBA		
DATE: JUN 30, 1988	SCALE: 1:10,000	MCW/09/88

29W1

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**ATTACHMENT #3****ROYALTY AND WORKING INTEREST OWNERS**

<u>AREA OF APPLICATION</u>	<u>WORKING INTEREST</u>	<u>ROYALTY</u>
SE 1/4 8-6-29 (except A7-8-6-29)	Newscope Resources 68.34 Contact Ventures 21.66 60494 Manitoba 10.00	Les Grieves (64601 Manitoba)
NE 1/4 8-6-29	Newscope Resources 60.00 Contact Ventures 30.00 60494 Manitoba 10.00	Les Grieves (64601 Manitoba)
SW 1/4 9-6-29	Newscope Resources 95.00 60494 Manitoba 5.00	Allnutt Holdings
NW 1/4 9-6-29	Newscope Resources 95.00 60494 Manitoba 5.00	Allnutt Holdings

**ATTACHMENT #4****ROYALTY AND WORKING INTEREST OWNERS**

<u>SURROUNDING AREA</u>	<u>WORKING INTEREST</u>	<u>ROYALTY</u>
NE 1/4 4-6-29	Newscope Resources 60494 Manitoba	Frank Lee Anderson/Bartle Anderson/Adams
NW 1/4 4-6-29	Pioneer/Brosco	Crown
NE 1/4 5-6-29	Antler River Resources	Canada Trust Anderson/Bartle Anderson/Adams
NW 1/4 5-6-29	Newscope Resources Contact Ventures 60494 Manitoba	Canada Northwest Energy Dart Petroleum
SW 1/4 8-6-29	Newscope Resources 60.00 Contact Ventures 30.00 60494 Manitoba 10.00	Dome
NW 1/4 8-6-29	Dome	Dome
E 1/2 9-6-29	Pioneer/Brosco	Don Harley Insurance Kathleen Isabell Shoemaker Canada Trust T. Gould & R. Grierson
SE 1/4 16-6-29	Newscope Resources	Crown
SW 14 16-6-29	Newscope Resources	Crown
S 1/2 17-6-29	-	Mary Margaret Campell Donald Hubert Harley Ernestine Prefontaine Jules Prefontaine Lucille Turenne Pauline Ross Corinne Harley Bernard Prefontaine

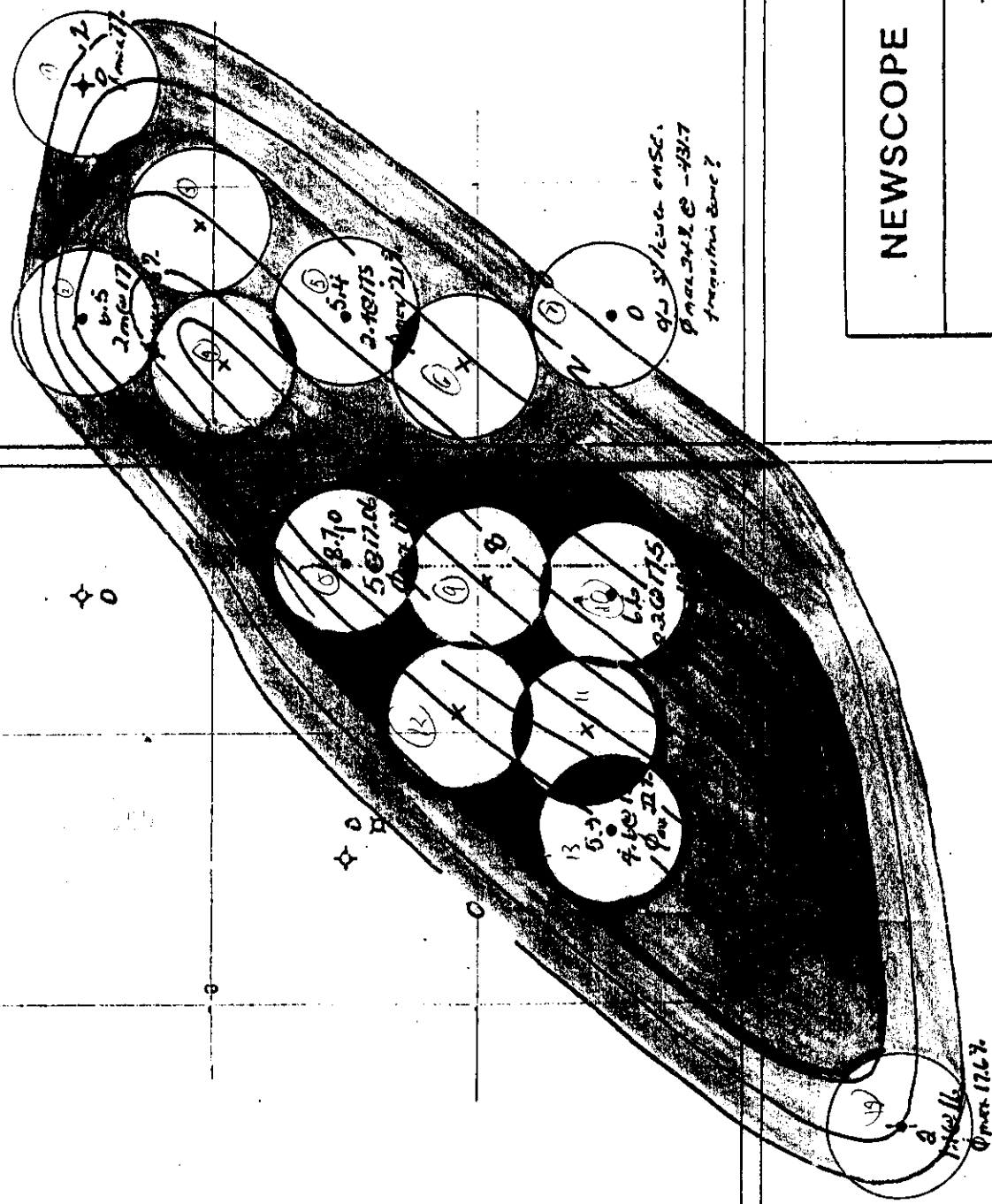
**PRODUCTION FORECAST  
TILSTON MC-1C POOL**

WITHOUT REDUCED SPACING (EXISTING WELLS)			WITH REDUCED SPACING (EXISTING + 3 NEW INFILL)	
<u>YEAR</u>	<u>BPD</u>	<u>CUM (MSTR)</u>	<u>BPD</u>	<u>CUM (STB)</u>
1987	65.0	105.3	65.0	105.3
1988	55.0	125.4	55.0	125.4
1989	46.9	142.5	136.9	175.3
1990	39.8	157.0	116.3	217.7
1991	33.5	169.2	98.5	253.6
1992	28.2	179.5	83.5	284.1
1993	23.6	188.1	70.6	309.8
1994	17.3	194.4	57.3	330.7
1995	11.9	198.7	45.9	347.4
1996	9.6	202.2	38.6	361.5
1997	3.0	203.3	27.5	371.5
1998	-	-	20.8	379.1
1999	-	-	17.6	385.5
2000	-	-	15.0	391.0
2001	-	-	12.8	395.6
2002	-	-	10.9	399.5
2003	-	-	9.2	403.0

**ASSUMPTIONS:**

1. Decline rate = 15%/year
2. Economic limit = 3 BOPD
3. Oil price as per Coles Nikiforuk Pennel Engineering Evaluation
4. Three infill wells drilled. On production January 1989





T 6

$$\text{DRAINAGE AREA} = 10 \text{ ac}$$

$$= 10 \times 43560 = 435,600 \text{ ft}^2$$

$$A = \pi r^2$$

$$r = \sqrt{\frac{A}{\pi}} = \sqrt{\frac{435,600}{\pi}} = 372 \text{ FT}$$

Newscopes proposed 6 in fill wells

- UNDRAINED AREA
- AREA DRAINED BY 2 WELLS

NEWSCOPE RESOURCES LTD			
TILSTON			
GROSS PAY ABOVE - 428m			
MANITOBA			
DATE: JUN 30, 1988	SCALE: 1:10,000	MGN/09/88	

29W1  
11

$\phi$  . 17  
 $S_w$  . 35  
 $h$  . 5 FT  
 $1/\beta_{oi}$  = .95

$$N = 7758 \ h \ \phi \ (1 - S_w) \ A \ 1/\beta_{oi}$$

$$7758 \times 5 \times .17 \times .65 \times \overset{10}{\cancel{.65}} \times .95$$

$$40,719 \ 666 \ \frac{6.6}{5}$$

$$53911$$

- ① Calculations describing estimate of drainage area.
- ② Method of determining forecasted  
       prod 8.7  
       5.4  
       6.5
- ③ Unitization a possible to provide better areal coverage.

TOTAL AREA IN REO - 1 233 522 m<sup>2</sup>

CIRCLE #1	-	22	539.44	(.2)
2	-	36	882.72	(6.5)
3	-	37	394.98	(5)
4	-	37	394.98	(8)
5	-	37	394.98	(5.4)
6	-	37	394.98	(6.3)
7	-	16	392.32	(0)
8	-	37	394.98	(8.7)
9	-	37	394.98	(6.8)
10	-	37	394.98	(6.6)
11	-	37	394.98	(7.8)
12	-	37	394.98	(4.8)
13	-	37	394.98	(5.9)
14	-	31	247.86	(2)

481 012.14 m<sup>2</sup>

AREA IN REO UNSWEPT - 1 233 522

481 012

39%

752 510 m<sup>2</sup>

Au Pan/well -  $74 \div 14 = 5.3 \text{ m}$

$$161 \text{ } 874 \text{ m}^2 \text{ ) } 1/4 \text{ SECTION } \div 158 = 1024.52$$

$$\text{TOTAL AREA - RED} = 1204 \times 1024.52 = 1233522 \text{ m}^2$$

CIRCLE # 1	5259 $\Rightarrow$ 5281 $\Rightarrow$ 5303	=	22 $\times$ 1024.52	=	22 539.44 (9.2)
2	5191 $\Rightarrow$ 5226 $\Rightarrow$ 5263	=	36 $\times$ "	=	36 882.72 (6.52)
3	5374 $\Rightarrow$ 5411 $\Rightarrow$ 5447	=	36.5 $\times$ "	=	37 394.98 (6.2)
4		=	36.5 $\times$ "	=	37 394.98 (11)
5	<del>5589</del> $\Rightarrow$ 5623 $\Rightarrow$ <del>5657</del>	=	34 $\times$ "	=	34 833.68 (5.4)
6		=	36.5 $\times$ "	=	37 394.98 (4.2)
7	5926 $\Rightarrow$ 5941 $\Rightarrow$ 5957	=	16 $\times$ "	=	16 392.32 (0)
8		=	36.5 $\times$ "	=	37 394.98 (8.72)
9	6707 $\Rightarrow$ 6742 $\Rightarrow$ 6775	=	35 $\times$ "	=	35 858.20 (9.8)
10		=	36.5 $\times$ "	=	37 394.98 (6.6)
11	6809 $\Rightarrow$ 6837 $\Rightarrow$ 6869	=	27.5 $\times$ "	=	28 174.30 (9.7)
12		=	36.5 $\times$ "	=	37 394.98 (6.2)
13		=	36.5 $\times$ "	=	37 394.98 (5.9)
14	<del>7880</del> $\Rightarrow$ 7911 $\Rightarrow$ 7941	=	30.5 $\times$ "	=	31 247.86 (2)
					<hr/>
					467 693.38 m <sup>2</sup>

$$\text{AREA IN RED UNDEWPT} \quad 1233522 - 467693.38 = 37.9\%$$

$$765829 \text{ m}^2 \text{ (red)}$$

$$\text{AV. PAY / WELL} = 82.4 \div 14 = 59.64$$

Coming Cool

$$\frac{.5}{.65}$$

76.9%

$$1.67 \times 10^6 \text{ m}^3$$

Swept RV

$$= \cancel{+ 285 \times 10^6 \text{ m}^3}$$

PV 284 000 m<sup>3</sup> Swept PV

SOR  
15%  
25%

3 FT  
70%  
56%

5 FT

60% HPV = 185,000 m<sup>3</sup>

Swept HPV

48% Recovered = 142,000 m<sup>3</sup>

Recovery 134,900 m<sup>3</sup>

1.92 000

70%

$\Delta$  Rec 50%

20%

First Fold

# Memorandum



Manitoba

Telephone

Subject

From

To

Date

# TILSTON MC-1 -C Pool

Cum Prod THROUGH 88 07 20 773 m<sup>3</sup>

Decline analysis using pool total production curve from mid 87 to mid 88

$$\begin{aligned} q_i &= 380 \text{ m}^3/\text{mon} (8601) & q_i &= 12.5 \text{ m}^3/\text{d} \\ q_c &= 250 \text{ m}^3/\text{mon} (8812) & q_c &= 8.22 \text{ m}^3/\text{d} \\ t &= 3 \text{ yrs} \end{aligned}$$

Ave. decline rate  $A_i = 13.03 \% / \text{year.}$

with  $q_i = 280 \text{ m}^3/\text{mon} (8807) = 9.21 \text{ m}^3/\text{d}$  and

<u>ULT REC</u>						
$q_c =$	2	$t =$	10.9 yr	$N_p =$	18 850 m <sup>3</sup>	39623
	2.5		9.3		17 543	<b>38316</b>
	3		8.0		16.236	37009
	4		6.0		13 621	34 394
	1.5		13.0		20158	40 931

Recovery per well - all wells (11) - 3483 m<sup>3</sup>.  
- 21 910 bbl.

5 wells 7663 m<sup>3</sup> = 48202 bbl

Manitoba



## Memorandum

Date

To

From

Subject

Telephone

ORIGINAL OIP for 5 wells

=

$$.17 \times .65 \times .95 \times 40000 \times 6$$

$$25,194 \times 158470 \times 4$$

$$633.880$$

$$\frac{60000}{158470} = 37.8\%$$

Questions for N.S.

① - 60,000 BBLs / well -

then 10 acre spacing

how do you get from 1 to the other

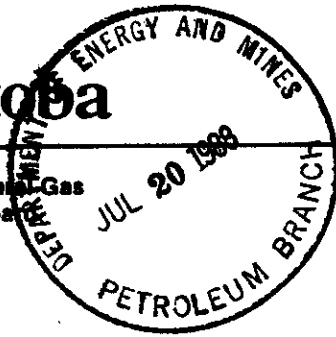
② how do you derive your predicted prod curve

③ Names / addresses of surface owners

④ Unit.

# Manitoba

The Oil and Natural Gas  
Conservation Board



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

(204) 945-3130

JUL 20 1988

Newscope Resources Limited  
1600, 700 - 9th Avenue S.W.  
CALGARY, Alberta T2P 3V4

Attention: S.B. McKay  
Production Manager

Re: Request for Reduced Drilling Spacing Unit Approval  
Tilston Field - Mission Canyon 1C Pool

Dear Sir:

Receipt of your letter of application dated July 11, 1988 is acknowledged.

To enable us to better understand and evaluate your application we shall require the following additional information pursuant to Section 115 of the Petroleum Drilling and Production Regulation:

1. A map or plan showing the proposed reduced spacing units and the (surface and pool completion) locations of all proposed wells in the application area.
2. A structural and isopach map of the total Pool.
3. A list of all royalty and working interest owners (by location) for all lands within one kilometre of the application area and in the application area itself. Please advise as to the working interest owners on whose behalf this application is being made.
4. A production forecast, including assumptions used, for the application area with and without the planned reduced spacing.
5. The effect on the correlative rights of royalty and working interest owners in the application area and within one half kilometre of the application area. This should include what measures if any (i.e. - unitization) that have been considered or are planned to protect correlative rights and what communication has occurred to date with the owners.



6. What communication has been carried out with surface landowners and occupants, if applicable, regarding the proposed location and impact of surface facilities (i.e. wellsites, lease roads, flowlines and power lines). A discussion of the topography of the area and current land use.

On receipt of this information, processing of your application will be continued.

Yours sincerely  
ORIGINAL SIGNED BY  
CHARLES S. KANG

Charles S. Kang  
Chairman

cc: H.C. Moster

bc: Wm. McDonald  
Bruce Ball

HCM:dah

DATE: July 14, 1988

**MANIT<sup>B</sup>BA**

FROM: Office of the Deputy Minister  
Department of Energy and Mines  
309 Legislative Building  
Winnipeg, Manitoba R3C 0V8

COMMENTS:

Thank you.

TO: Clare Master

Rose

Telephone:

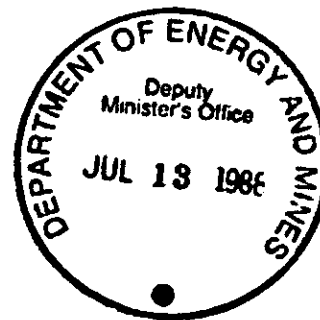
- |   |   |
|---|---|
| <input type="radio"/> Take action                             | <input type="radio"/> Circulate   |
| <input type="radio"/> Per your request                        | <input type="radio"/> See me re attached                                |
| <input type="radio"/> Call me on this matter                  | <input type="radio"/> For your information                              |
| <input type="radio"/> Investigate and report                  | <input type="radio"/> Supply data for my reply                          |
| <input type="radio"/> For your revision or approval           | <input type="radio"/> Reply direct with copy to me                      |
| <input type="radio"/> Return with comments or recommendations | <input checked="" type="radio"/> Draft reply for signature of: Chairman |



1988 07 11

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

Attention: Mr. C. S. Kang, Chairman



Dear Mr. Kang,

Re: Request for Reduced Drilling Spacing Unit Approval  
Tilston Field - Mission Canyon 1C Pool

Pursuant to Section 20(3) of the Petroleum Drilling and Production Regulations, Newscope Resources Limited, as operator and on behalf of the working interest owners of the subject pool, hereby requests approval for reduced drilling spacing units in the Tilston Field - Mission Canyon 1C Pool. The current approved well spacing is 40 acres.

The area of application is shown in Figure 1. As the royalty interest owners in Section 08-06-29 and Section 09-06-29 are different, Newscope proposes a 100m buffer zone as shown with 150m inter-well spacing. Therefore, the infill wells will not have any effect on the correlative rights of the royalty and working interest owners. Production from the Tilston Field is obtained from the Mission Canyon 1 (MC-1) Member of the lower Mississippian Mission Canyon formation. Entrapment within the field is primarily due to the presence of several closed paleotopographic highs developed on the Mississippian erosional surface. A dense impermeable secondary dolomite acts as a caprock within the field with the overlying lower Amaranth Red Beds providing a secondary caprock. Oil accumulation occurs in the underlying porous MC-1 member limestones.

The main depletion mechanism in the Mission Canyon zone is the strong aquifer drive. As a result, water coning and high producing water oil ratios are prevalent. Natural fractures within the reservoir further enhance the problem of early water breakthrough thus reducing ultimate pool recovery. A list of the wells in the MC-1C pool along with their current producing rates and watercuts are shown in Table 1.


The original oil-in-place (OOIP) values for the Tilston MC-1 wells are shown in Table 2 and were obtained from the Coles Nikiforuk Pennell engineering evaluation of Newscope properties effective January 1, 1988. The OOIP value for the proved producing plus probable MC-1C properties is 2878 MSTB and based on 40 acre spacing the estimated recoverable oil is 269.2 MSTB or only 9.4% of the OOIP. Cumulative production to 88/01/01 is 105.3 MSTB or 39% of the initial recoverable oil.

Since the active water drive of the Tilston MC-1C aquifer causes localized coning effects thereby reducing recoverable oil to 9.4% of the OOIP, Newscope submits that in order to maximize pool recovery, it is necessary to drill additional infill wells in the Tilston MC-1C pool. With reduced spacing, it is Newscope's contention that pool recovery can be increased to approximately 16% of OOIP. As it is Newscope's desire to coordinate the drilling of the wells with an exploration program in the area and to have them tied in before fall, anything that can be done to expedite approval of this application would be appreciated.

Any questions regarding this application should be directed to Bruce McKay at 266-1101.

Yours very truly

NEWSCOPE RESOURCES LIMITED



S. B. McKay  
Production Manager

SBM/lsl  
Encl.

cc: H. C. Moster  
Director, Petroleum Branch

TABLE 1

TILSTON: MC-1 POOL  
AVERAGE PRODUCTION

<u>LOCATION</u>	<u>STATUS</u>	<u>BOPD</u>	<u>BWPD</u>	<u>WATER-CUT (%)</u>
14-5-6-29 WPM	Producing	3	9	75
1-8-6-29 WPM	Producing	15	160	91
2-8-6-29 WPM	Producing	8	20	71
8-8-6-29 WPM	Producing	13	33	72
4-9-6-29 WPM	Shut-In	2	45	96
5-9-6-29 WPM	Producing	17	23	43
12-9-6-29 WPM	Producing	5	12	71
14-9-6-29 WPM	Shut-In	2	45	96

TABLE 2

TABLE TIL-2  
TILSTON  
RESERVE SUMMARY

WELL (WIM)	POOL	IRO (MSTB)	CUM. PROD. 88/01/01 (MSTB)	RRD (MSTB)	DAILY OIL (BPD)	DECLINE RATE (%)	OOIP (MSTB)	RECOVERY FACTOR (%)	NET PAY (FEET)
Proved Developed Producing Reserves									
13-30-05-29	MC-1A	20.0	11.2	8.8	7	8.2	489	4.3	18.4
15-30-05-29	MC-1A	24.0	15.2	8.8	12	25	285	8.4	19.8
16-30-05-30	MC-1A	35.0	22.1	12.5	10	13	237	8.1	19.7
01-08-06-29	MC-1C	35.0	22.5	11.5	18	25	563	14.8	18.7
02-08-06-29	MC-1C	36.0	23.3	13.8	18	33	539	6.2	18.7
08-08-06-29	MC-1C	36.0	23.9	10.1	14	33	779	4.6	27.2
05-09-06-29	MC-1C	60.0	25.9	34.1	30	26	522	11.5	19.7
TOTAL		281.0	178.8	102.2	118		3984	7.1	

Proved Plus Probable Reserves									
13-30-05-29	MC-1A	20.0	11.5	8.5	7	8.2	489	4.3	18.4
15-30-05-29	MC-1A	30.9	15.2	15.7	12	15	285	10.8	19.8
16-30-05-30	MC-1A	39.1	22.1	17.3	10	13	237	8.1	19.7
01-08-06-29	MC-1C	37.0	23.6	4.3	18	18	539	18.0	18.7
02-08-06-29	MC-1C	57.2	23.5	33.7	18	15	539	10.2	19.7
08-08-06-29	MC-1C	55.9	25.9	33.7	14	15	779	10.4	27.2
05-09-06-29	MC-1C	88.5	25.9	60.6	30	15	475	16.5	19.4
Section 8 (3 Wells)	MC-1C	19.0	7.8	11.2	8	15		14.0	
TOTAL		582.5	186.6	395.9	214		4439	13.1	

No Remaining Reserves									
03-30-05-29	MC-1A	0.2	0.2	0.0	-	Suspended 84/12			
14-30-05-29	MC-1A	13.1	13.1	0.0	4	Uneconomic			
08-06-05-30	MC-1A	13.1	13.1	0.0	4	Uneconomic			
14-05-06-29	MC-1C	4.7	4.7	0.0	-	Suspended 87/03			
04-09-06-29	MC-1C	0.6	0.6	0.0	-	Suspended 86/07			
11-09-06-29	MC-1C	1.8	1.8	0.0	-	Suspended 86/10			
14-09-06-29	MC-1C	1.9	1.9	0.0	1	Suspended 86/07			
05-15-06-29	MC-1C	1.9	1.9	0.0	1	Uneconomic			

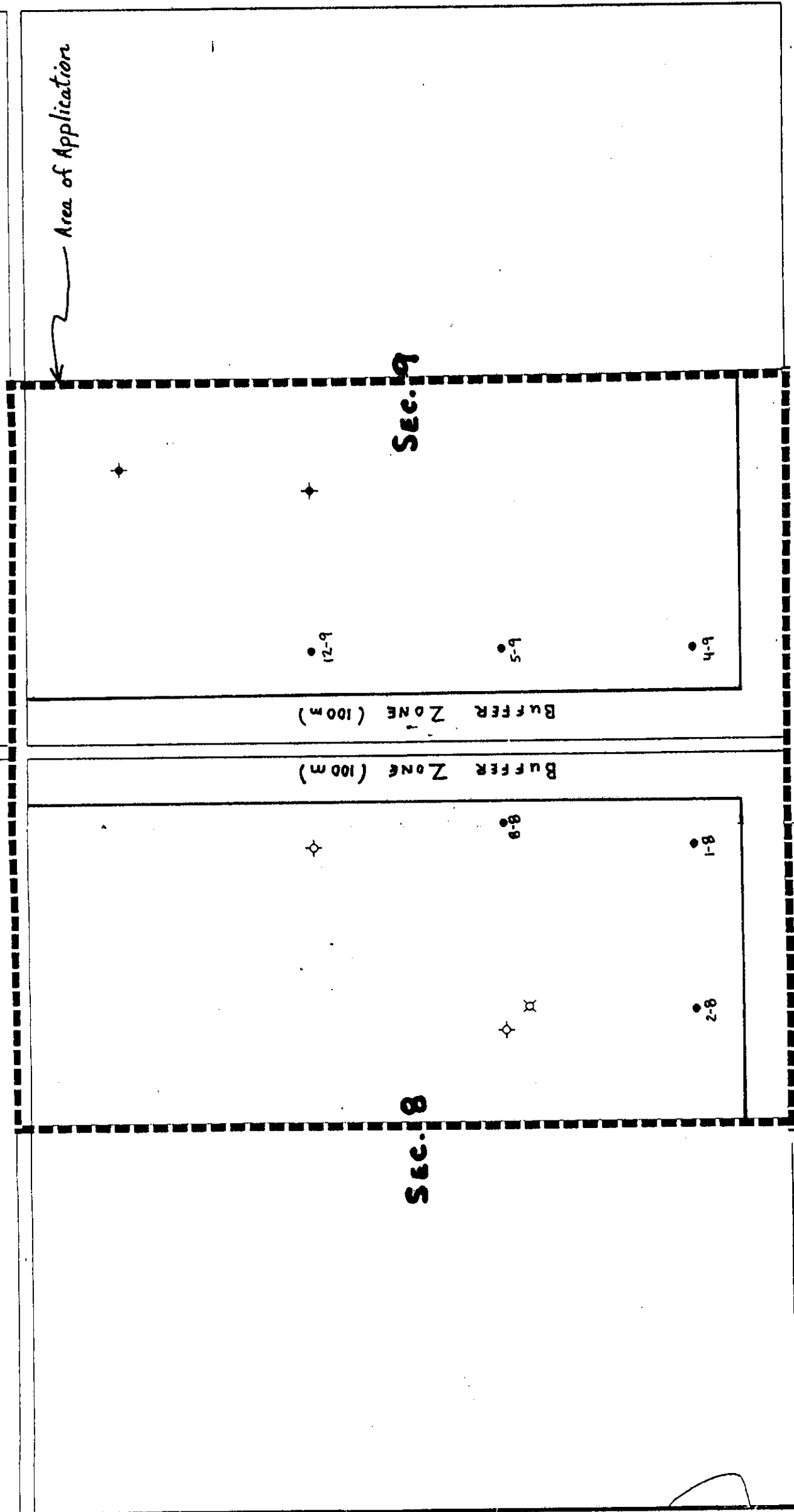
Legend:

IRO Initial Recoverable Oil  
 RRO Remaining Recoverable Oil  
 OOIP Original Oil-In-Place  
 CUM. PROD. Cumulative Production

TABLE 2

FIGURE 1

APPLICATION FOR REDUCED SPACING  
TILSTON - MISSION CANYON 1C POOL



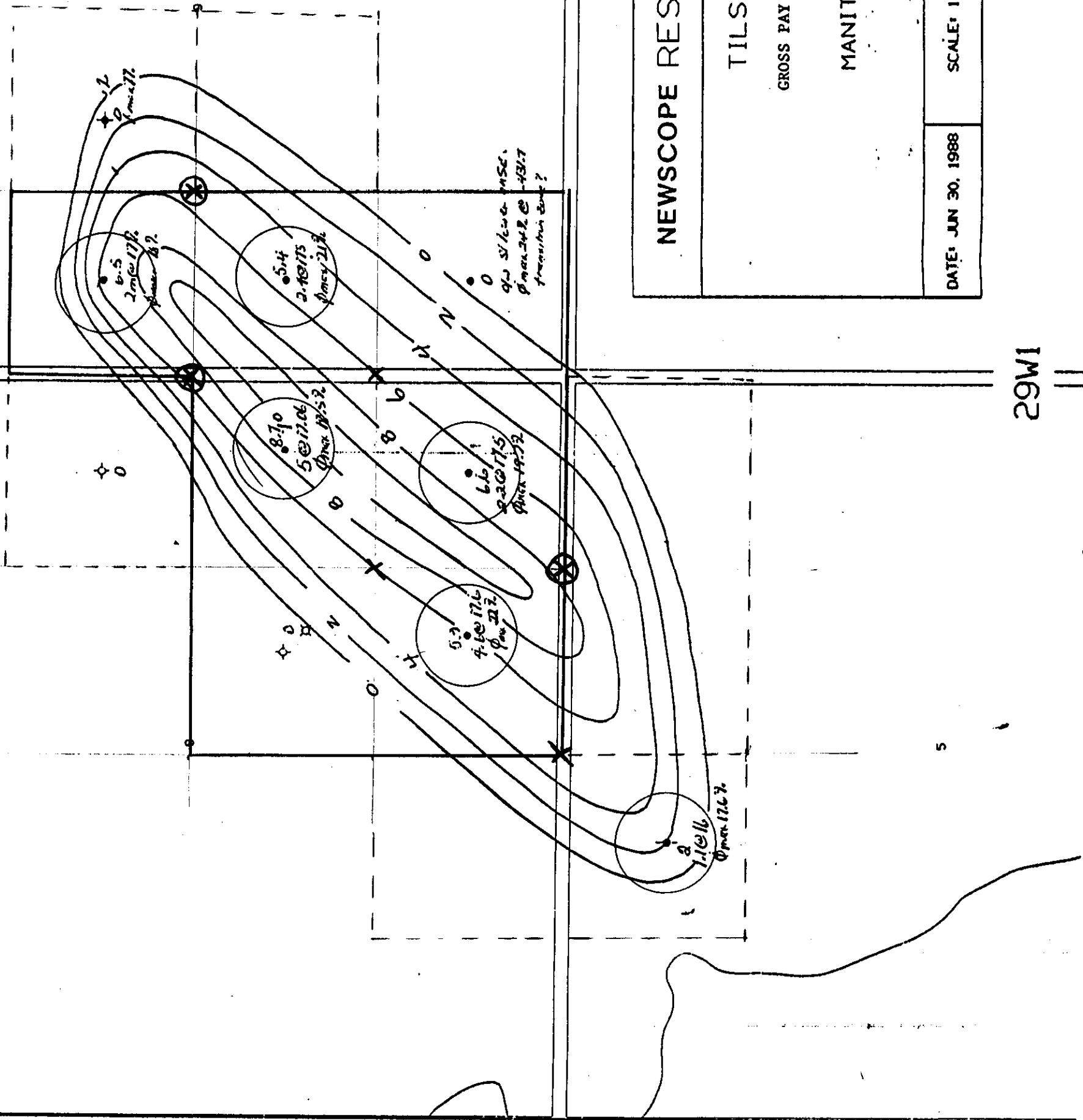
T 6

DRAINAGE AREA = 10 ac

$$= 10 \times 43560 = 435,600 \text{ ft}^2$$

$$A = \pi r^2$$

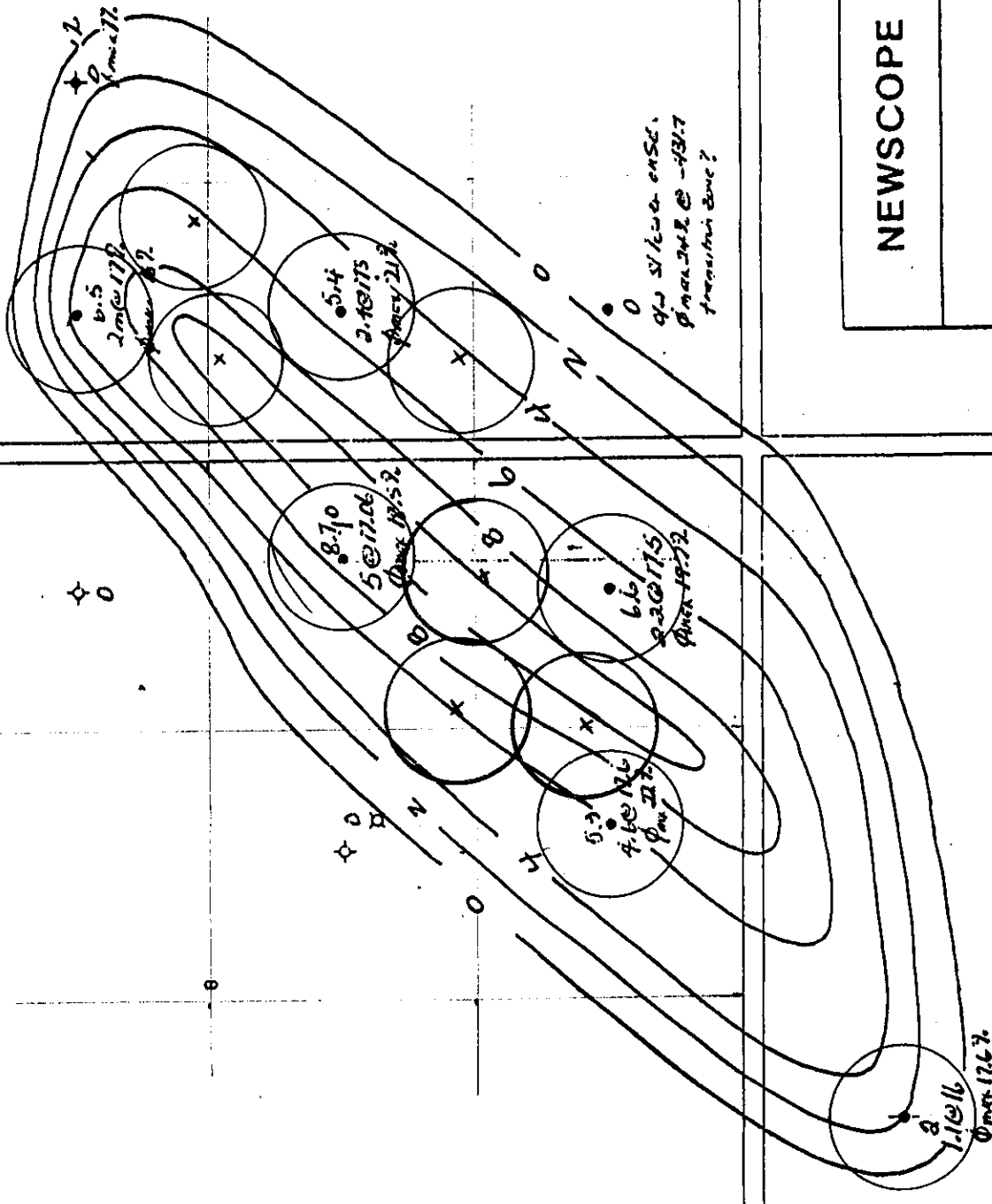
$$r = \sqrt{\frac{A}{\pi}} = \sqrt{\frac{435,600}{\pi}} = 372 \text{ FT}$$



NEWSCOPE RESOURCES LTD			
TILSTON			
GROSS PAY ABOVE - 428m			
MANITOBA			
DATE: JUN 30, 1988	SCALE: 1:10,000	MGW/09/88	

29W1





$$A = \pi r^2$$

$$r = \sqrt{\frac{A}{\pi}} = \sqrt{\frac{435,600}{\pi}} = 372 \text{ FT}$$

Newscores proposed 6 in fill wells

NEWSCOPE RESOURCES LTD		
TILSTON		
GROSS PAY ABOVE - 428m		
MANITOBA		
DATE: JUN 30, 1988	SCALE: 1:10,000	MGW/09/88

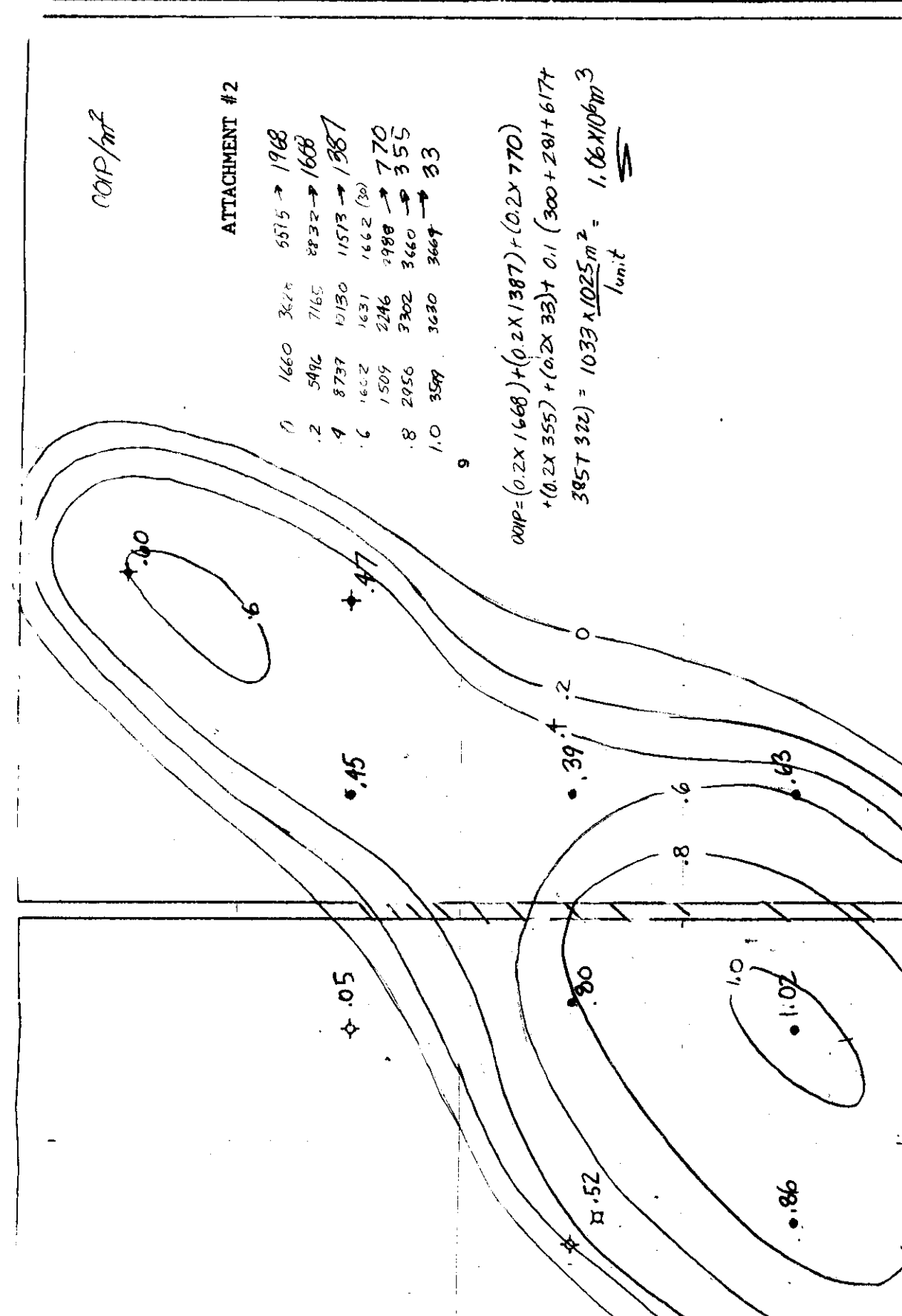
29W1  
11

$\phi_{01} = 0.95$   
 $(1-5w) \phi_D \times t \times \frac{1}{8} \times A_{01}$   
 $\phi_D$   $\phi_E$   $S_w (R_{01} = 0.05d)$   $\phi_{01} / \phi_{02}$

29	1	18	46(?)	28	
29	1	15	30	38	
29	1	21	21	33	
29	1	9	31	63	
29	2	14	13	63	
29	2	16.5	6	78	
29	1	13	9	81	
29	2	15	5	88	
29	2.5	17	30	34	
29	3	12	16	66	
29	1	16	13	55	
29	2	10	7	100X	
29	2.5	15	10	67X	
29	2	15	50	94X	
29	1	16	?	30	
29	2	10	20	50	
29	1.2	17	11	56	
29	1.5	14	11	68	
29	1.5	18	7	66	
29	1	17	50	26	
29	1	10.5	?	125	
29	1.3	21	40	24	
29	1.3	8	21	86X	
29	2	15	17	51X	
29	3	13	8	86X	
29	1	19	50	23	
29	1	24	21	29	
29	2.5	15	20	47	
29	2.5	19	11	50	
29	2.5	14	7	85X	
29	2	11	15	74	
29	1.5	3	TIME	X	
29	1.5	10	12	91X	
29	.6	7.5	11	100X	
29	2	12	10	X	
29	5	18	40	28	
29	2	14	50	32	
29	1	19	9	X	
29	1.5	16.5	7	72X	

T 6

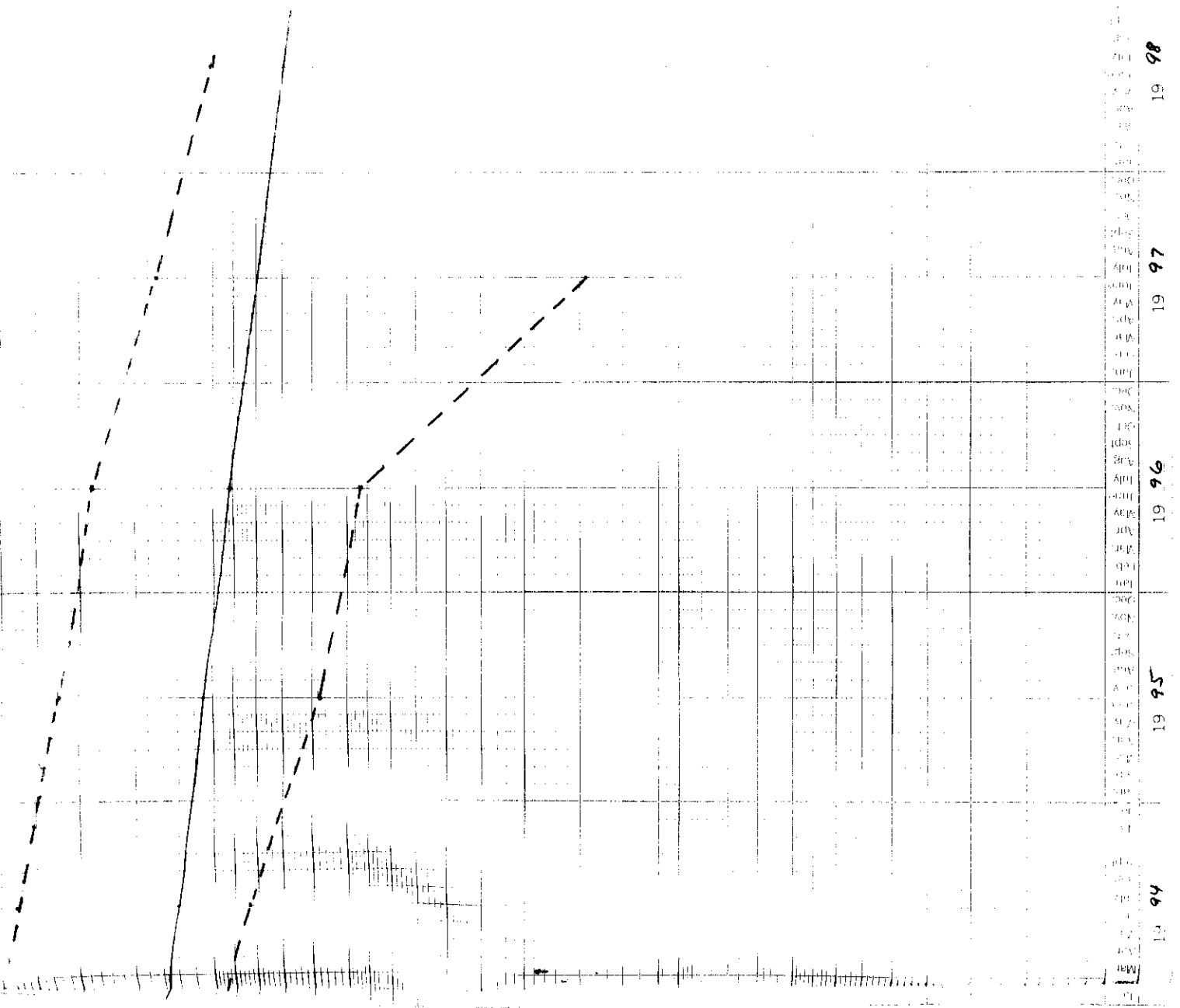
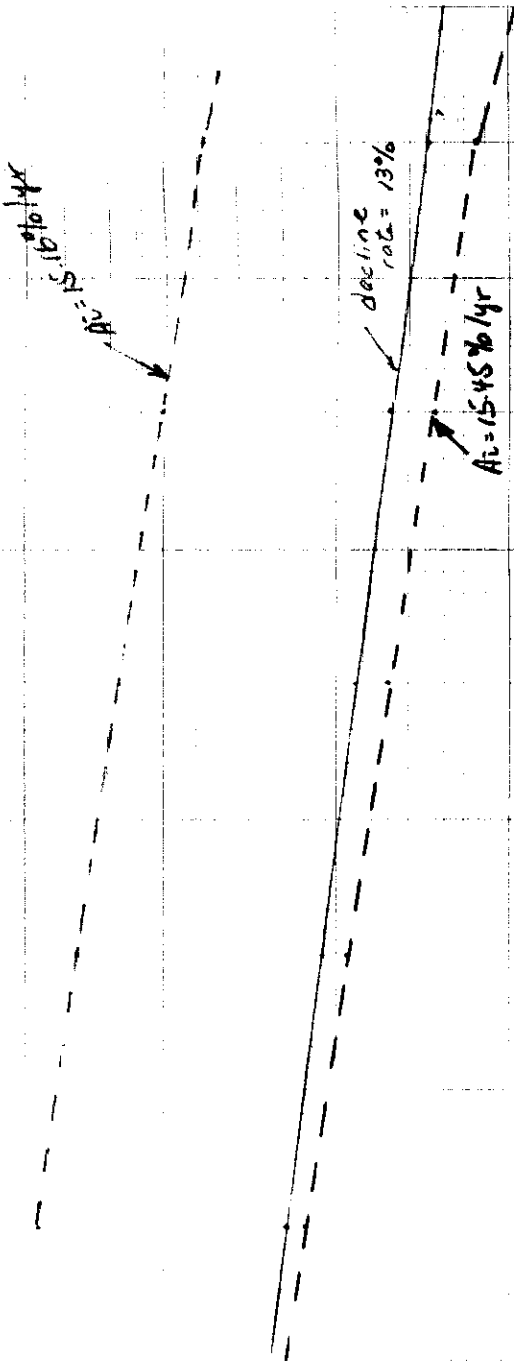
AT-8-6-29	2.5	16.5	20	43	
2-8-6-29	2	10	14	85X	
	2	16	18	47	
	2	18	9	59	
	1.3	14.5	50	23	
	1.7	15	55	28	
	1	22	30	26	
	1.5	13.5	30	43	
	2.5	18.5	11	49	
	2	13	8	86X	
	1.5	8	14	100X	
	1.5	12	15	68	
	2	16	40	31	
	1	20	34	27	
	1.3	18	40	33	
	.6	17	30	34	
	1	23	34	24	
	3	13	15	63	
	1.5	18	12	51	
	1	12	12	76X	
	1	18	11	53X	
	1.5	16	60	26	
	.5	10.5	60	39	
	1	15	23	44	
	1	12	23	55	
	3	18	7	65	
	2	13	6	100X	



NEWSCOPE RESOURCES LTD	
TILSTON	
GROSS PAY ABOVE - 428m	
MANITOBA	
DATE: JUN 30, 1988	SCALE: 1:10,000
MGW/09/88	

29W1





19 88 19 97 19 96 19 95 19 94 19 93 19 92 19 91 19 90 19 89

Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec

PAGE 1

\*\*\* STORE \*\*\*  
NORTH1  
WELL LISTManPB  
88-09-16  
09:09:38

WELL NAME	ON PRODCTN	FIRST	LAST	CUM.DIL	CUM.WAT
	DATE	MONTH	MONTH	m3	m3
(0)14-05-006-29 WIM(0)	1984-07-24	1984-07	1988-07	581.6	988.1
(0)09-06-006-29 WIM(0)	1984-09-25	1984-09	1985-08	21.0	223.2
(0)01-08-006-29 WIM(0)	1984-02-25	1984-02	1988-07	4238.2	16463.4
(0)02-08-006-29 WIM(0)	1984-02-27	1984-02	1988-07	3818.6	3488.0
(0)08-08-006-29 WIM(0)	1983-12-31	1983-12	1988-07	4556.6	3987.8
(0)04-09-006-29 WIM(0)	1984-03-06	1984-03	1986-07	746.5	3048.2
(0)05-09-006-29 WIM(0)	1983-11-10	1983-11	1988-07	4601.3	3698.5
(0)11-09-006-29 WIM(0)	1984-03-20	1984-03	1986-10	100.1	532.8
(0)12-09-006-29 WIM(0)	1983-08-10	1983-08	1988-07	1512.9	2250.6
(0)14-09-006-29 WIM(0)	1984-07-18	1984-07	1988-06	285.7	3628.5
(0)05-15-006-29 WIM(0)	1984-07-12	1984-07	1988-06	310.5	1469.1

20773

Newscope Resources Limited as the operator of wells in the Tilston MC-1 C Pool has applied for <sup>approval</sup> reduced spacing in the Pool.

### Recommendations:

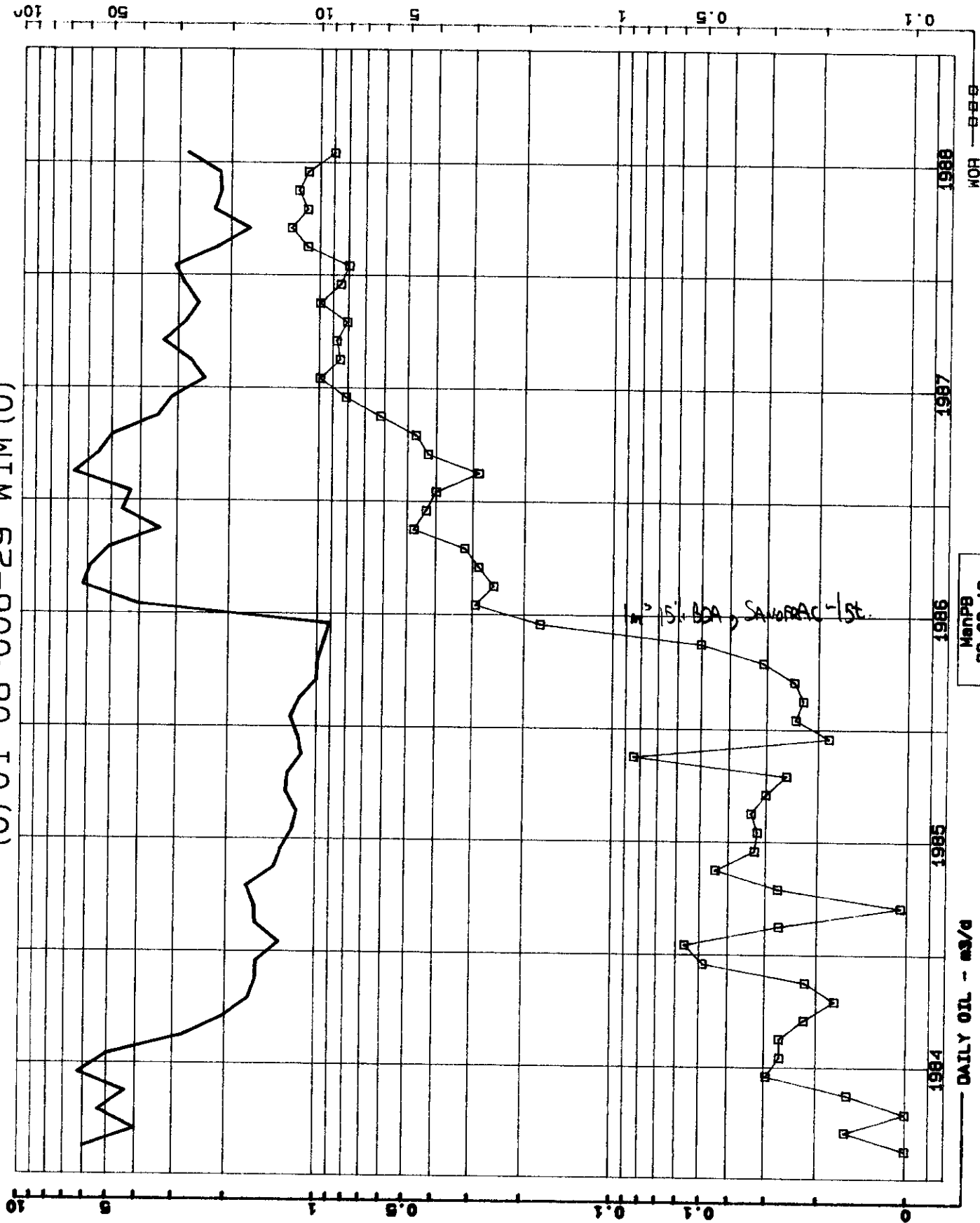
It is recommended that the attached Letter requesting more information and presenting possible alternate development plans be sent to Newscope.

It is also recommended that notice of the application be published in the Manitoba Gazette, and the Melita New Era. Copies of the notice should also be sent to working interest <sup>and surface</sup> owners within ~~and adjacent to~~ the planned reduced spacing area ~~At~~ (see ~~Table No~~ as well as ~~surface~~ to working interest owners. A proposed notice is attached.

### Discussion.

The Tilston MC1 - C Pool was discovered in Aug 1983 ~~and developed to it~~ and developed over the next year to include a total of 11 wells <sup>(see Fig No. 2)</sup>. The pool is a structural high in the Mississippian MC-1 and is underlain by a very active aquifer. <sup>Fig No. 2 shows the production history of the pool</sup> During the early stages of production, down dip

(0) 01-08-006-29 W1M (0)

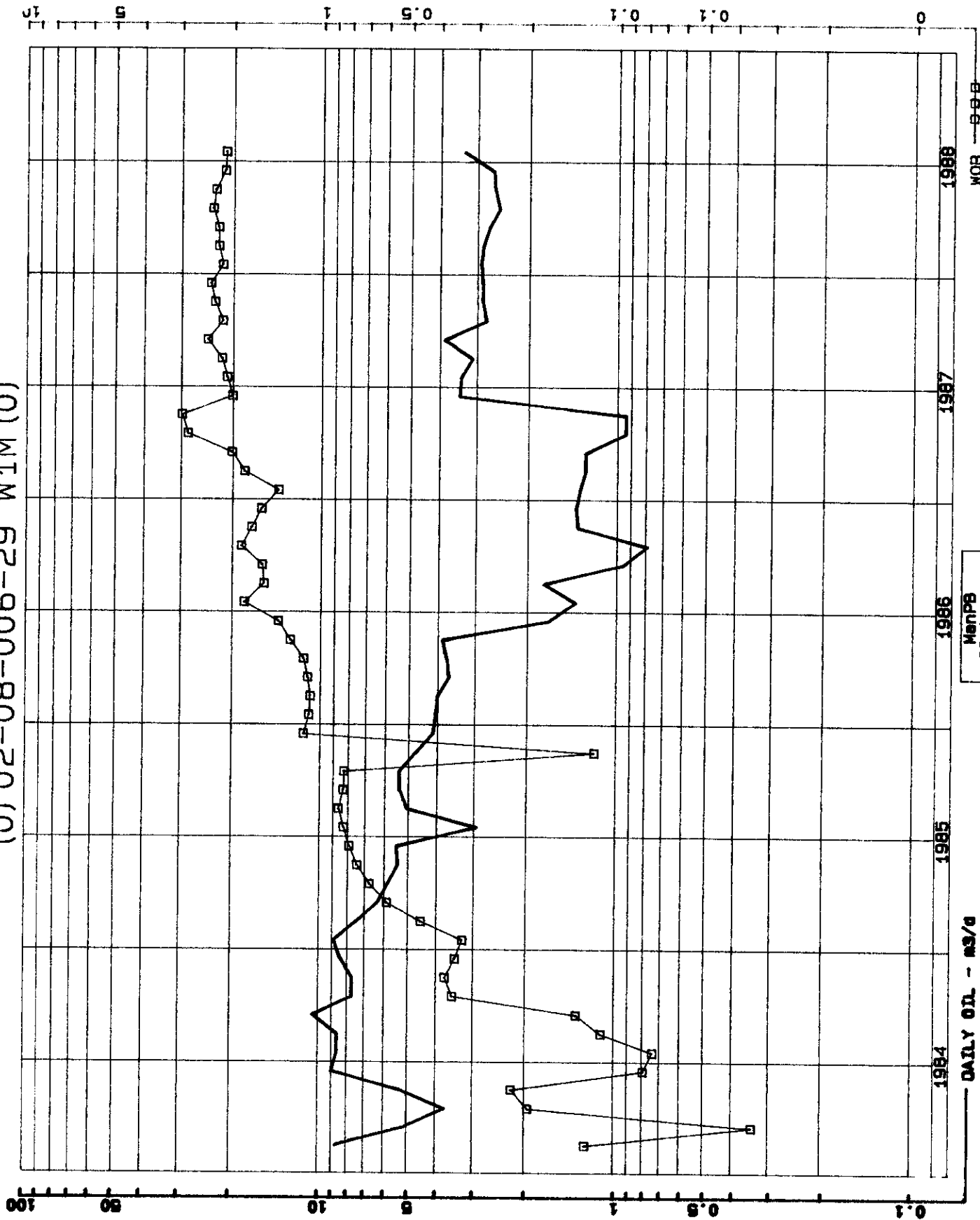


ManPB  
88-09-19  
08:30:08

DAILY OIL - m3/d

WOR ---B-B-B

(0) 02-08-006-29 W1M (0)



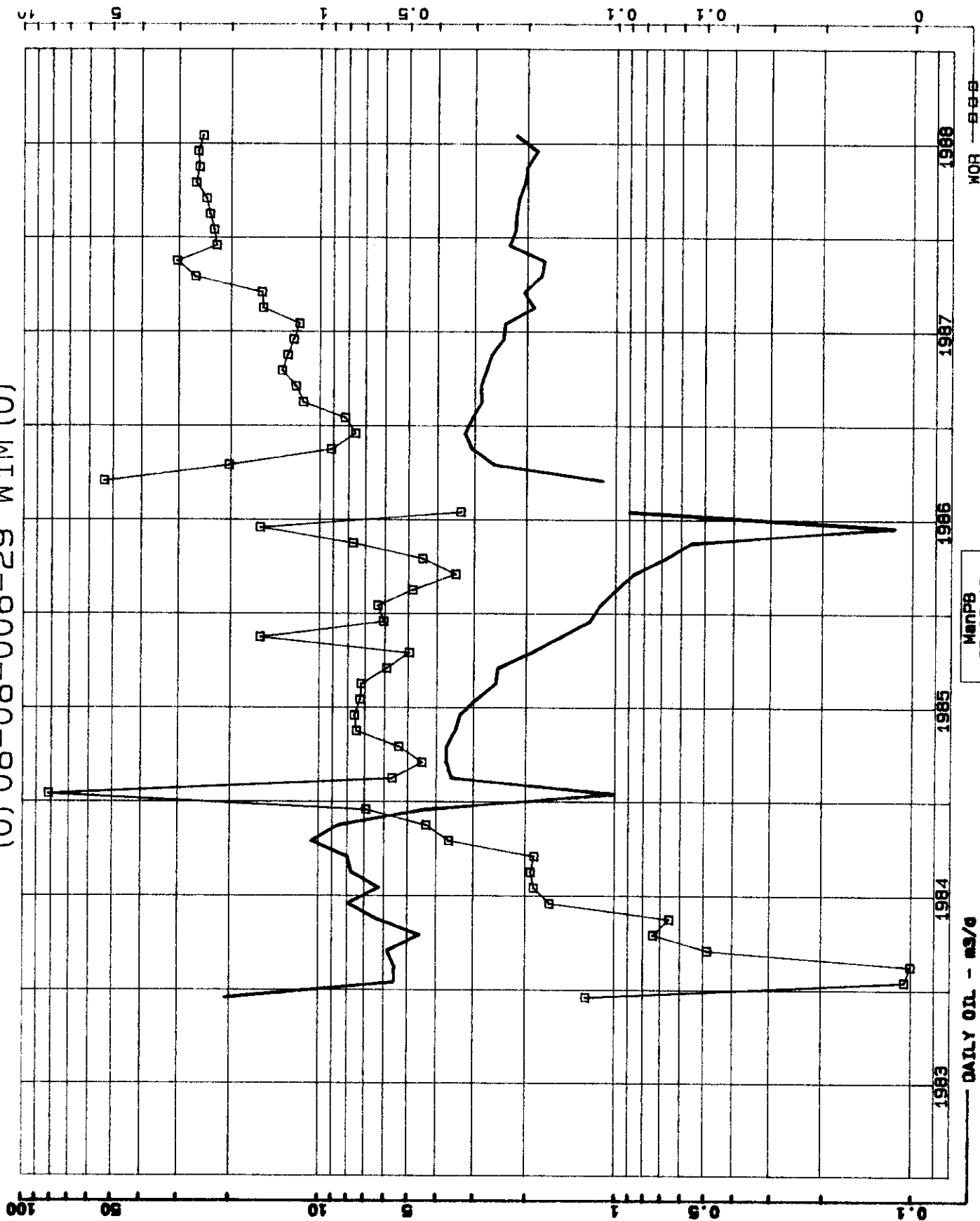
ManPB  
88-09-19  
08:33:05

DAILY OIL - m3/d

WOR - %



(0) 08-08-006-29 W1M (0)

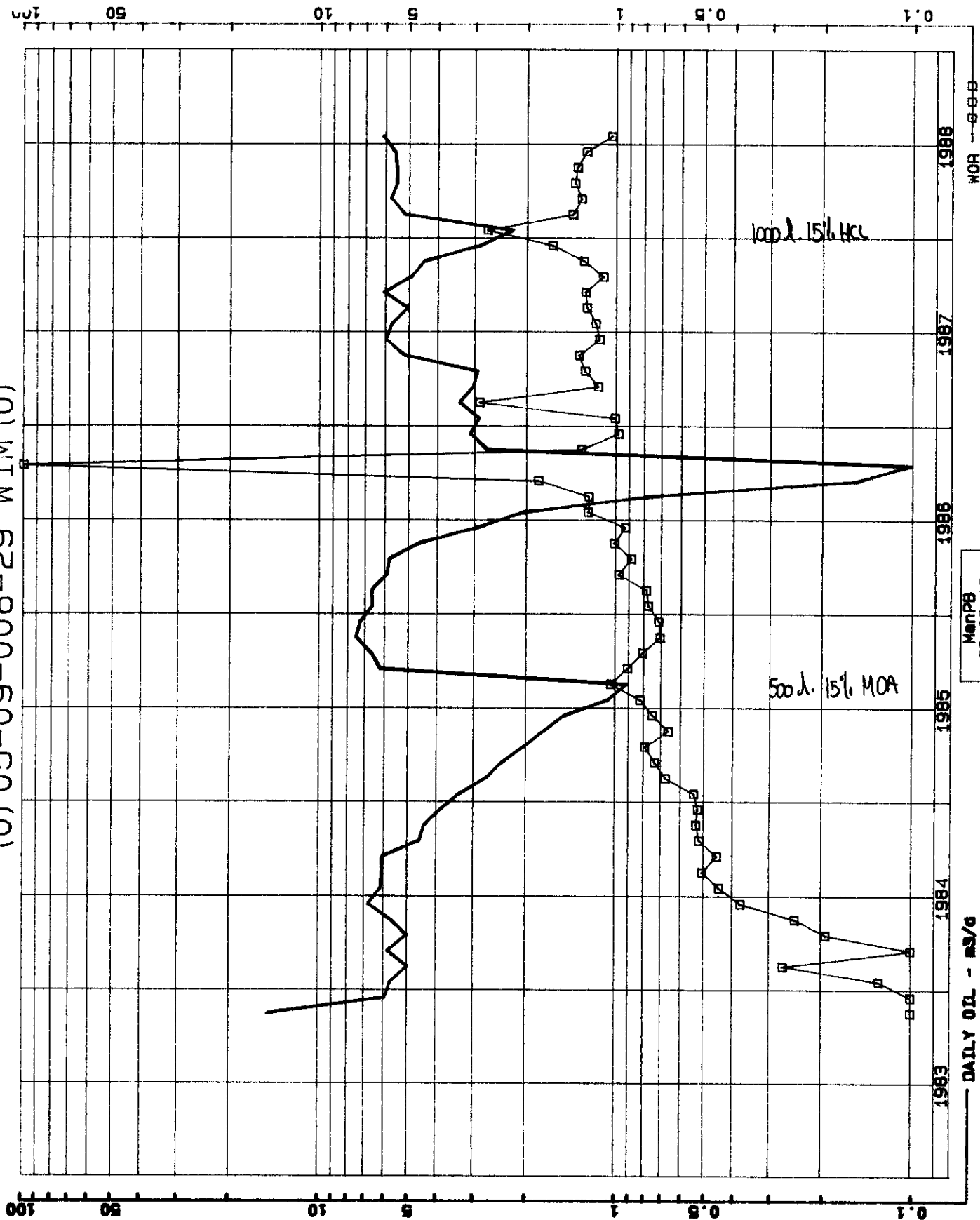


ManPB  
88-09-19  
08:36:04

DAILY OIL - m3/d

WOR - BBS

(0) 05-09-006-29 W1M (0)

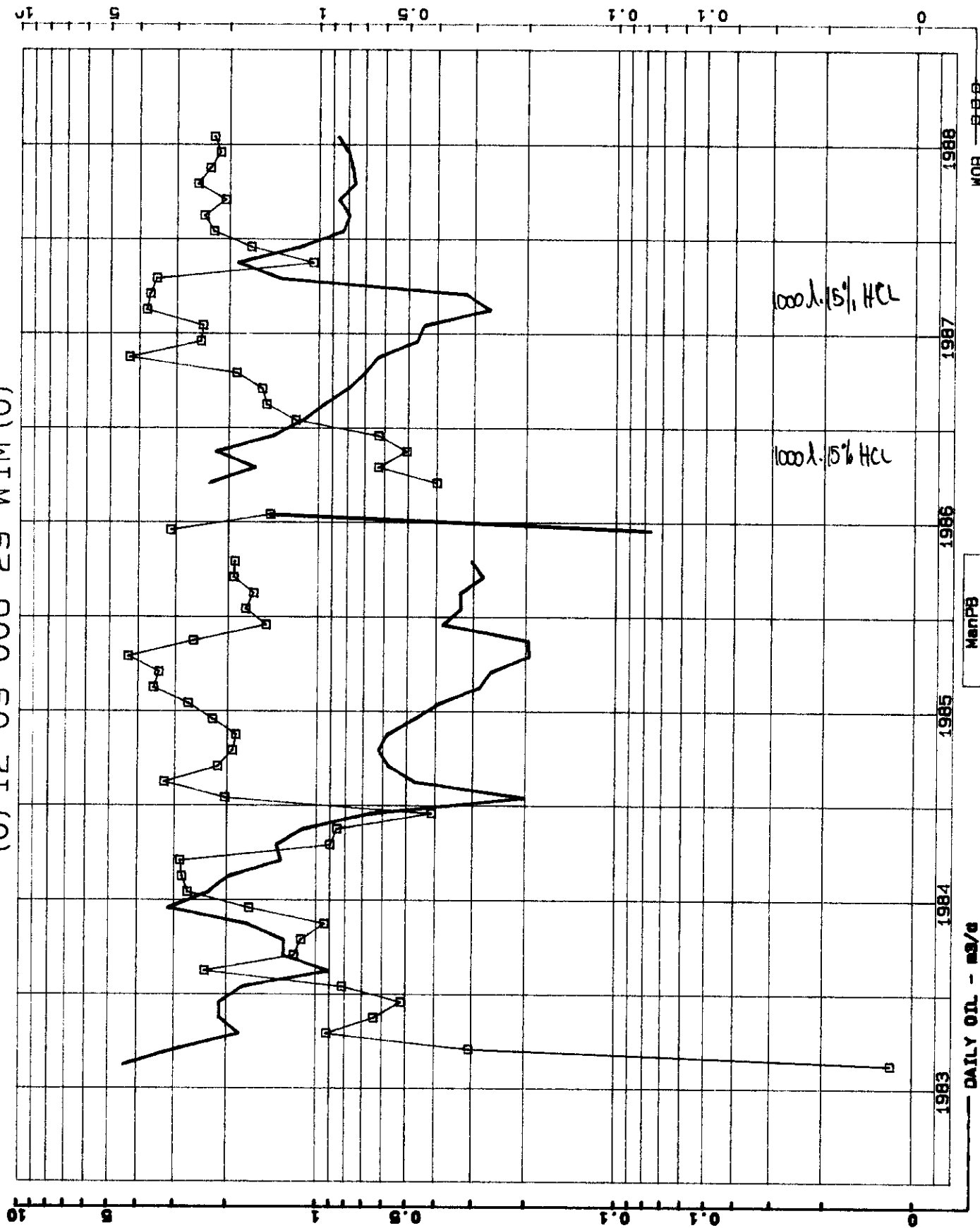


ManPB  
88-09-19  
08:39:01

DAILY OIL - m3/d

WOB - 88-8

(0) 12-09-006-29 W1M (0)



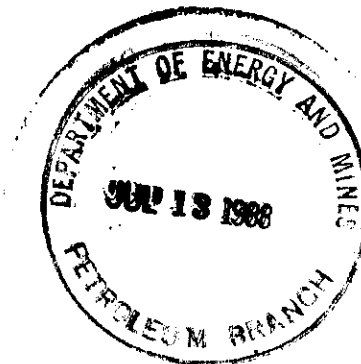
DAILY OIL - mg/g

ManPB  
88-09-19  
08:41:48

WOR - 88-8



1988 07 11



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

Attention: Mr. C. S. Kang, Chairman

Dear Mr. Kang,

Re: Request for Reduced Drilling Spacing Unit Approval  
Tilston Field - Mission Canyon 1C Pool

Pursuant to Section 20(3) of the Petroleum Drilling and Production Regulations, Newscope Resources Limited, as operator and on behalf of the working interest owners of the subject pool, hereby requests approval for reduced drilling spacing units in the Tilston Field - Mission Canyon 1C Pool. The current approved well spacing is 40 acres.

The area of application is shown in Figure 1. As the royalty interest owners in Section 08-06-29 and Section 09-06-29 are different, Newscope proposes a 100m buffer zone as shown with 150m inter-well spacing. Therefore, the infill wells will not have any effect on the correlative rights of the royalty and working interest owners. Production from the Tilston Field is obtained from the Mission Canyon 1 (MC-1) Member of the lower Mississippian Mission Canyon formation. Entrapment within the field is primarily due to the presence of several closed paleotopographic highs developed on the Mississippian erosional surface. A dense impermeable secondary dolomite acts as a caprock within the field with the overlying lower Amaranth Red Beds providing a secondary caprock. Oil accumulation occurs in the underlying porous MC-1 member limestones.

The main depletion mechanism in the Mission Canyon zone is the strong aquifer drive. As a result, water coning and high producing water oil ratios are prevalent. Natural fractures within the reservoir further enhance the problem of early water breakthrough thus reducing ultimate pool recovery. A list of the wells in the MC-1C pool along with their current producing rates and watercuts are shown in Table 1.

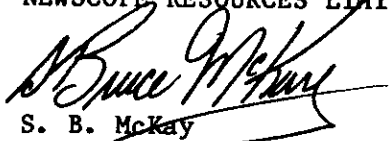
The original oil-in-place (OOIP) values for the Tilston MC-1 wells are shown in Table 2 and were obtained from the Coles Nikiforuk Pennell engineering evaluation of Newscope properties effective January 1, 1988. The OOIP value for the proved producing plus probable MC-1C properties is 2878 MSTB and based on 40 acre spacing the estimated recoverable oil is 269.2 MSTB or only 9.4% of the OOIP. Cumulative production to 88/01/01 is 105.3 MSTB or 39% of the initial recoverable oil.

Since the active water drive of the Tilston MC-1C aquifer causes localized coning effects thereby reducing recoverable oil to 9.4% of the OOIP, Newscope submits that in order to maximize pool recovery, it is necessary to drill additional infill wells in the Tilston MC-1C pool. With reduced spacing, it is Newscope's contention that pool recovery can be increased to approximately 16% of OOIP. As it is Newscope's desire to coordinate the drilling of the wells with an exploration program in the area and to have them tied in before fall, anything that can be done to expedite approval of this application would be appreciated.

Any questions regarding this application should be directed to Bruce McKay at 266-1101.

Yours very truly

NEWSCOPE RESOURCES LIMITED

  
S. B. McKay  
Production Manager

SBM/lsl  
Encl.

cc: H. C. Moster  
Director, Petroleum Branch

TABLE 1

TILSTON: MC-1 POOL  
AVERAGE PRODUCTION

<u>LOCATION</u>	<u>STATUS</u>	<u>BOPD</u>	<u>BWPD</u>	<u>WATER-CUT (%)</u>
14-5-6-29 WPM	Producing	3	9	75
1-8-6-29 WPM	Producing	15	160	91
2-8-6-29 WPM	Producing	8	20	71
8-8-6-29 WPM	Producing	13	33	72
4-9-6-29 WPM	Shut-In	2	45	96
5-9-6-29 WPM	Producing	17	23	43
12-9-6-29 WPM	Producing	5	12	71
14-9-6-29 WPM	Shut-In	2	45	96

TABLE 2

TABLE IIL-2  
TILSTON  
RESERVE SUMMARY

WELL (WIM)	POOL	IRO (MSTB)	CUM. PROD. 088/01/01 (MSTB)	RRO (MSTB)	DAILY OIL (BPD)	DECLINE RATE (%)	OOIP (MSTB)	RECOVERY FACTOR (%)	NET PAY (FEET)
Proved Developed Producing Reserves									
15-05-05-29	MC-1A	20.0	15.2	8.8	7	0	199	1.3	19.1
15-30-05-29	MC-1A	24.0	15.2	8.8	12	25	285	0.1	19.8
16-25-05-30	MC-1A	35.0	22.1	12.9	10	13	270	6.1	19.7
01-36-05-30	MC-1A	35.0	22.1	12.9	10	25	237	14.8	18.2
01-08-06-29	MC-1C	35.0	22.2	11.5	19	38	563	6.2	18.7
02-08-06-29	MC-1C	35.0	22.2	13.8	14	33	539	6.7	18.7
08-08-06-29	MC-1C	35.0	25.9	10.1	14	33	779	1.8	27.2
08-08-06-29	MC-1C	35.0	25.9	10.1	30	35	509	1.5	19.1
TOTAL		281.0	178.8	102.2	116		3964	7.1	
Proved Plus Probable Reserves									
15-05-05-29	MC-1A	20.0	15.2	8.8	7	0	199	1.3	19.1
15-30-05-29	MC-1A	24.0	15.2	8.8	12	25	285	0.1	19.8
16-25-05-30	MC-1A	35.0	22.1	12.9	10	13	270	6.1	19.7
01-36-05-30	MC-1A	35.0	22.1	12.9	10	25	237	14.8	18.2
01-08-06-29	MC-1C	57.2	23.5	33.7	18	15	563	10.2	18.7
02-08-06-29	MC-1C	55.9	23.5	33.7	18	15	539	10.4	18.7
05-08-06-29	MC-1C	88.5	25.9	60.6	30	15	779	16.8	27.2
12-08-06-29	MC-1C	19.0	7.8	11.2	8	15	475	14.0	16.4
Section 8 (3 Wells)	MC-1C	186.0	0.0	186.0	90	15	-	-	-
TOTAL		582.5	186.6	395.9	214		4439	13.1	

No Remaining Reserves									
08-05-05-29	MC-1A	0.2	0.2	0.0	0	Suspended 94/12			
14-30-05-30	MC-1A	13.3	13.3	0.0	4	Unconformity			
08-38-05-30	MC-1A	13.1	13.1	0.0	4	Unconformity			
14-05-06-29	MC-1C	3.1	3.1	0.0	-	Suspended 87/03			
04-09-06-29	MC-1C	4.7	4.7	0.0	-	Suspended 86/07			
11-09-06-29	MC-1C	0.6	0.6	0.0	-	Suspended 86/10			
14-08-06-29	MC-1C	1.8	1.8	0.0	-	Suspended 86/07			
08-10-06-29	MC-1C	1.0	1.0	0.0	-	Unconformity			

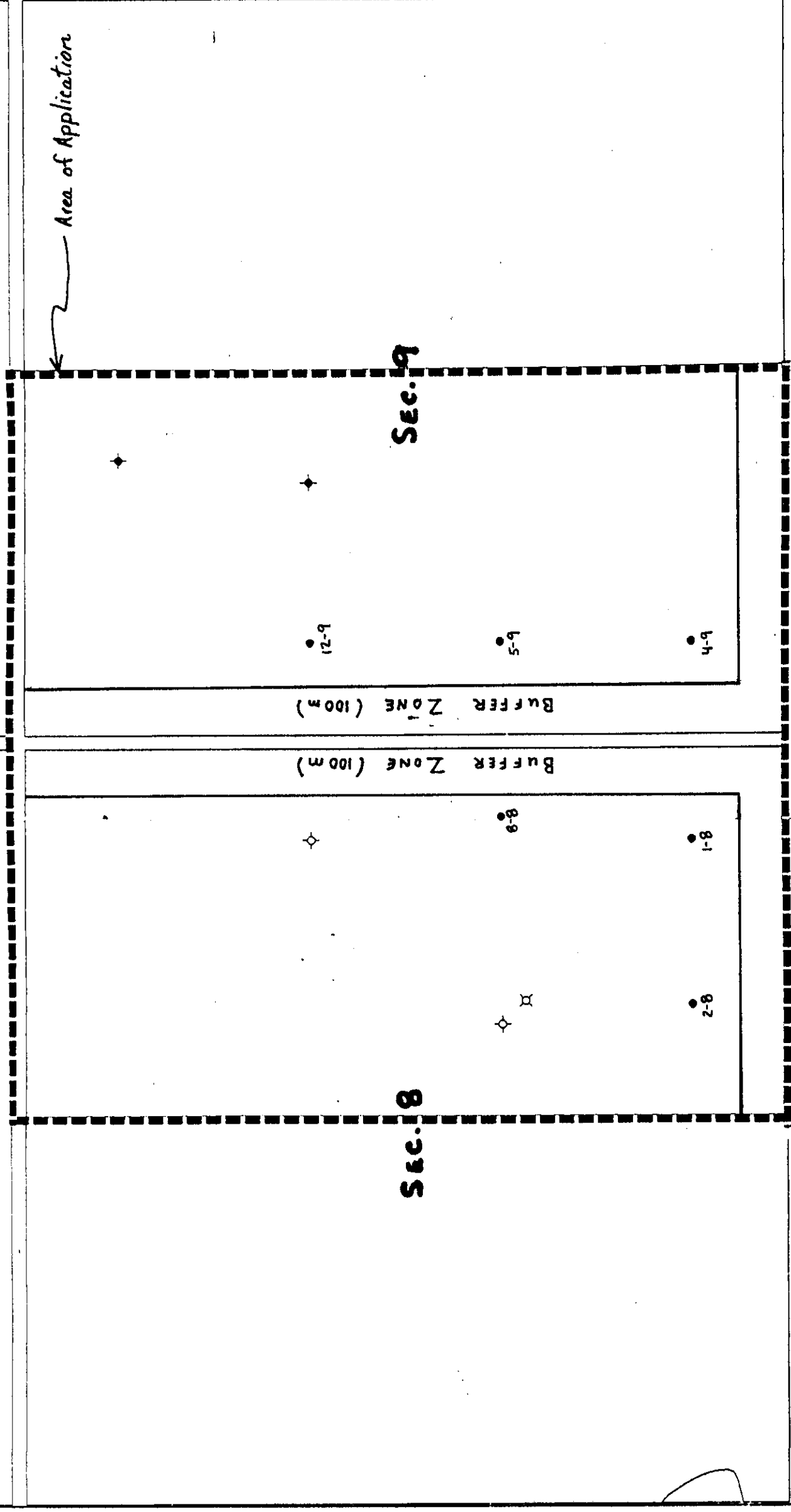
Legend:

IRO Initial Recoverable Oil  
 RRO Remaining Recoverable Oil  
 OOIP Original Oil-In-Place  
 CUM. PROD. Cumulative Production

TABLE 2

FIGURE 1

APPLICATION FOR REDUCED SPACING  
TILSTON - MISSION CANYON 1C POOL



R 29WPM



$$.65 \times .17 \times .95 \times 40,000 \times 2 = 8398 \text{ m}^3$$

$$\underline{52,823} \text{ BBLs in}$$

10 acres

$$\phi = 19$$

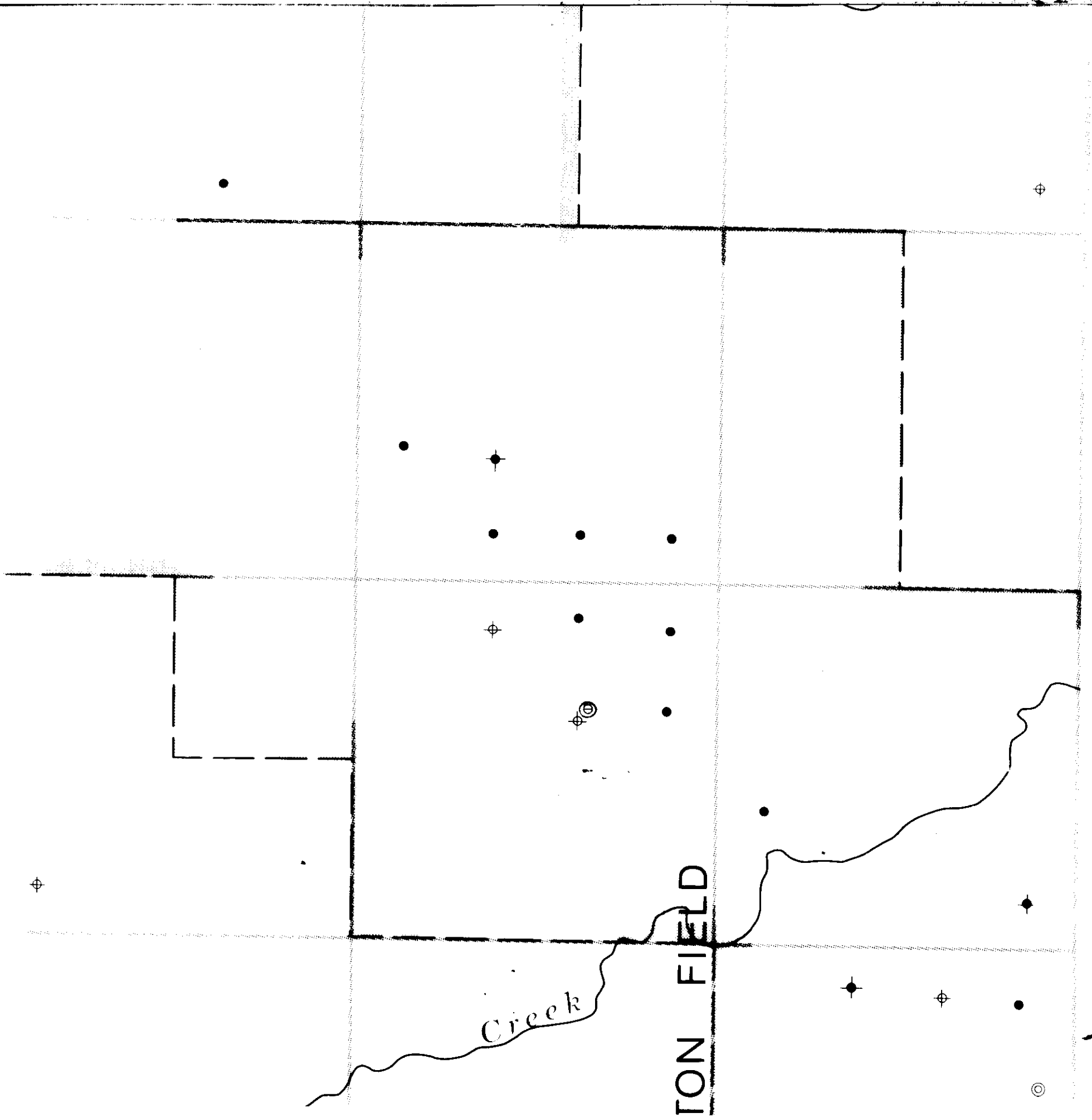
$$.8 \times .2 \times .95 \times 40000 \times 3 = 18240$$

$$114729$$

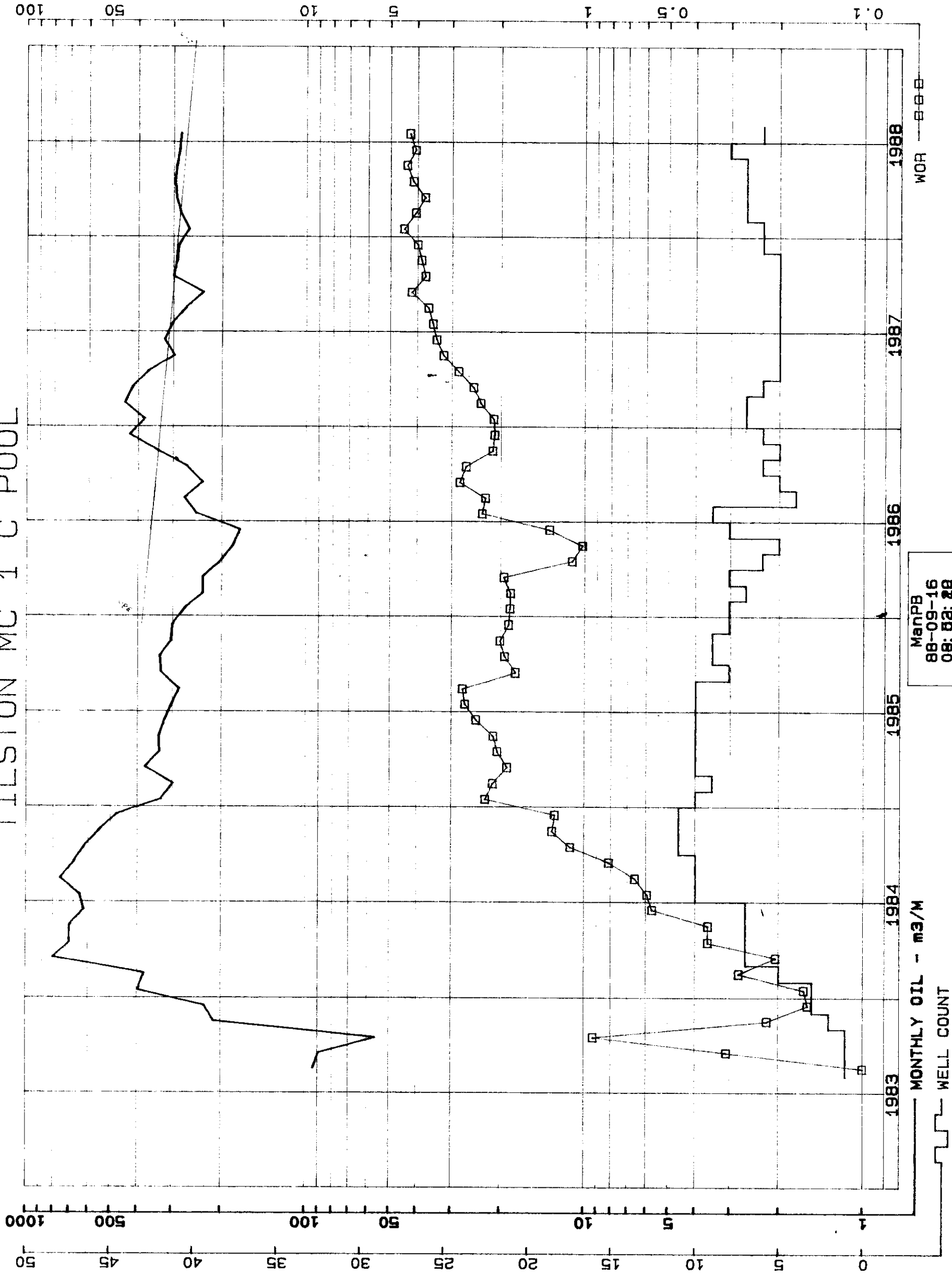
$$52\%$$

13%

1-8 - 5<sup>t</sup> frac in June 86



# TILSTON MC 1 C POOL



ManPB  
88-09-16  
08:52:28

$q_{ic} = 380 \text{ m}^3/\text{mon} \sim 12.50 \text{ m}^3/\text{d}$   
 $q_c = 250 \text{ m}^3/\text{mon} = 8.22 \text{ m}^3/\text{d}$   
 $t = 3 \text{ years}$

$A_i = 13.03\% / \text{yr}$

$q_{ic} = 265 \text{ m}^3/\text{mon} = 8.72 \text{ m}^3/\text{d}$   
 $f_{qc} = 2.5 \text{ m}^3/\text{d}$

$t = 8.9 \text{ yrs}$   $N_p = 16255$

$f_{qc} = 2.0 \text{ m}^3/\text{d}$

$t = 10.5 \text{ yr}$   $N_p = 17569$

$f_{qc} = 3.0 \text{ m}^3/\text{d}$

$t = 7.6 \text{ yr}$   $N_p = 14955$

We suggest  
that come to  
this

Bruce McKen  
Newscope

- ① 60,000 BBL / well translates to 10 acres  
drained -

Details of your calculations.

- ② ~~21~~ Names / addresses of surface owners

- ③ What is basis and what are calculations  
done to come up with predicted production.

- Note that if coming a problem, per well  
rate should be restricted. Perhaps total  
pool rate would remain the same or  
increase only marginally.

- ④ Alternative location of infill wells - Possibility  
of unitization

- ⑤ What are spacing units being applied for

- ⑥ 2-16-6-29 is letter requesting waiver  
of off target penalty?

What are coords. of proposed loc.