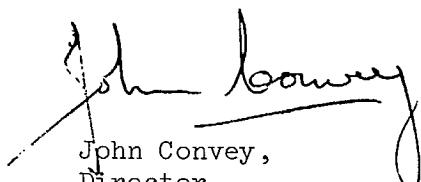


FOR E W O R D

Numerous samples of crude oil collected in various regions of Canada have been analysed, over a period of several decades, at the Fuels Research Centre, Mines Branch, Department of Energy, Mines and Resources, in Ottawa, as part of the resource evaluation program. For general documentation, as well as for specialized studies, it has been considered desirable to publish nearly 400 of these analyses of typical oil samples, together with some reservoir data.

The present publication is part of a series which will cover separately the Maritime Provinces (New Brunswick, Newfoundland and Nova Scotia), Quebec, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia and Northwest Territories. All these analyses were performed according to the United States Bureau of Mines Routine Method of Distillation. In the more recent analyses, refractive index and dispersion were determined at 20°C, using an Abbé-type refractometer equipped with compensating prisms. The refractive index thus determined is for the Sodium D line of light, and the dispersion ($N_F - N_C$) 10^4 is calculated from the position of the compensating prisms.

Most of the reservoir data are estimates obtained in the mid 1960's and grateful acknowledgement is hereby given for the excellent cooperation received from the various provincial authorities (Departments of Mines and others concerned with oil resources development and conservation) and from the numerous oil companies which contributed to this project. In order to improve further editions of this publication, it would be greatly appreciated if any errors, additional data, or supplementary bibliographical references were reported to the authors.



John Convey,
Director,
Mines Branch.

Ottawa, June 16, 1969.

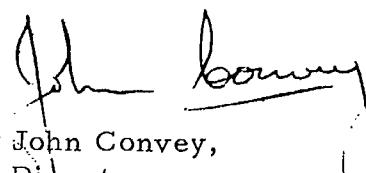
AVANT-PROPOS

Au cours d'une période de plusieurs décennies, de nombreux échantillons de pétrole brut recueillis dans diverses régions du Canada ont été analysés au Centre de recherches sur les combustibles, Direction des mines, ministère de l'Énergie, des Mines et des Ressources, à Ottawa, dans le cadre du programme de l'évaluation des ressources. Pour la documentation générale, aussi bien que pour des études spécialisées, il a semblé désirable de publier presque 400 de ces analyses d'échantillons de pétrole typiques, ainsi que quelques caractéristiques des gisements.

La présente publication fait partie d'une série de rapports qui traitera séparément les Provinces Maritimes (Nouveau-Brunswick, Terre-Neuve et Nouvelle-Écosse), le Québec, l'Ontario, le Manitoba, la Saskatchewan, l'Alberta, et la Colombie-Britannique et les Territoires du Nord-Ouest. Toutes ces analyses ont été faites d'après la méthode "Routine" de distillation du Bureau des Mines des États-Unis d'Amérique. Dans les analyses plus récentes, l'indice de réfraction et la dispersion ont été déterminés à 20°C à l'aide d'un réfractomètre de type Abbé équipé de prismes compensateurs. L'indice de réfraction ainsi obtenu correspond à la raie de lumière D du sodium, et la dispersion $(N_F N_G)^{10^4}$ est calculée d'après les positions des prismes compensateurs.

La plupart des caractéristiques de gisement sont des estimations obtenues vers 1965, et l'on doit rendre hommage à l'excellente collaboration reçue des diverses autorités provinciales (Ministères des mines, et autres intéressés au développement et à la conservation des ressources pétrolières) ainsi que des nombreuses sociétés de pétrole qui contribuèrent à ce projet.

Pour l'amélioration de rééditions de cette publication, il serait très apprécié que toute erreur, caractéristique ou référence bibliographique supplémentaire soit indiquée aux auteurs.



John Convey,
Directeur,
Direction des mines.

Mines Branch Information Circular IC 231

ANALYSES AND CHARACTERISTICS
OF OIL SAMPLES FROM SASKATCHEWAN

by

R. P. Charbonnier¹, R. G. Draper¹,
W. H. Harper² and A. Yates¹

ABSTRACT

The 83 oil analyses gathered in this publication have been performed in the Fuels Research Laboratories of the Mines Branch in Ottawa, according to the U.S.B.M. Routine Method of Distillation. Some reservoir characteristics are also included.

¹Senior Scientific Officer, and ² Technical Officer, Fuels Research Centre, Mines Branch, Department of Energy, Mines and Resources, Ottawa, Canada.

Direction des mines

Circulaire d'information IC 231

ANALYSES ET CARACTÉRISTIQUES D'ÉCHANTILLONS
DE PÉTROLE DE LA SASKATCHEWAN

par

R. P. Charbonnier¹, R. G. Draper¹,
W. H. Harper² et A. Yates¹

RÉSUMÉ

Les 83 analyses de pétrole rassemblées dans cette publication ont été faites aux laboratoires de recherches sur les combustibles de la Direction des mines, à Ottawa, suivant la méthode U. S. B. M. de distillation. On a aussi inclus quelques caractéristiques des gisements.

¹ Officier scientifique principal, ² agent technique, Centre de recherches sur les combustibles, Direction des mines, ministère de l'Énergie, des Mines et des Ressources, Ottawa, Canada.

CONTENTS

	<u>Page</u>
Foreword	i
Avant-Propos	ii
Abstract	iii
Résumé	iv
SASKATCHEWAN OIL SAMPLES	

Field

Aberfeldy	2
Alameda	5
Alida	6
Benson	7
Bone Creek	8
Cantuar	12
Carnduff	20
Coleville-Smiley	21
Dollard	35
Elmore	40
Forget	42
Fosterton	43
Frobisher	44
Gainsborough	45
Glen Ewan	46
Gull Lake	47

- cont'd

CONTENTS (Continued)

<u>Field</u>	<u>Page</u>
Hastings	49
Instow	51
Kingsford	55
Lampman	56
Leon Lake	57
Lloydminster	58
Line Rock	67
Lost Horse Hill	71
Maidstone	72
Marsden	73
McLaren	75
Midale	77
Nottingham	81
Oungre	83
Parkman	84
Pinto	85
Queensville	88
Rapdan	89
Rocanville	93
Smiley-Dewar	94
South Eureka	97
Steelman	99
Success	112
Vera	114

- concluded

CONTENTS (Concluded)

<u>Field</u>	<u>Page</u>
Wapella	115
Waseca	118
West Carnduff	119
West Kingsford	123
Weyburn	124
Whiteside	130
Wildcat	133
Wilmar	134
Workman	135
Miscellaneous:	

<u>Producing Zone</u>	<u>Well Name</u>	
Cantuar Sand - - -	liows Beverley X 11-19	136
Frobisher - - -	Tidewater Forget Crown #1	137
do - - -	White Rose, Canadian Superior 3-31	138
Upper Shaunavon - -	BA Eastend Grundler 16-29	139
do - -	BA E+A1 Robinson 15-3	140
do - -	Oliphant Tidewater Rapdan Cr. 4-19	141
do - -	Pure Garden Head 4-14	142
Viking - - - - -	Geepee Fitzpatrick No. 6-32-30-19-W3	143
do - - - - -	Highwood Vanalta Eagle Lake #11-11	144
do - - - - -	Highwood Vanalta Gleneath #10-11	145

SASKATCHEWAN
O I L S A M P L E S

OIL FIELD DATA

Field and Pool: Aberfeldy Field, Sparky Sand Pool

Location: Twp(s) 49 and 50, Rge(s) 26 and 27, W 3 M

DISCOVERY DETAILS

Method: Oil Well

Well: Name: Husky Aberfeldy D 3 - 1 - 50 - 27 W 3 M

Completed: 1809 ft. K.B. (+218)

Perforated: 1752-1762 ft. K.B.

Treatment: None

Initial Potential: 40 bbls of oil per day

GEOLOGY

Producing Zone(s): Sparky Sand

Other Shows: 9 feet of G.P.

Trap Type: Stratigraphic trap

Lithology: Unconsolidated Sand

Maximum Reservoir Thickness: 25 feet

Deepest Formation Penetrated: G.P.

DEVELOPMENT DATA

Total Wells: Completed Oil: 88; Gas: 1

Producing Oil: 80; Suspended Oil: 8

Injection or Disposal: Water, 4; Gas, None

Well Spacing: 40 Acres; Pattern: Peripheral

Logging Practice: Electric Induction and Gamma Ray Logs

Completion Practice: Perforation through casing

RESERVOIR DATA

Type of Drive: Solution Gas, water drive, and part gas cap expansion

Estimated Oil in Place: 200,000,000 S.T.bbls (1438 bbls/acre-foot)

Estimated Recoverable Oil: 10,000,000 S.T.bbls (72 bbls/acre-foot)

Oil Zone Thickness: Maximum: 25 feet; Average: 10 feet

Gas Zone Thickness: Maximum: 8 feet

Porosity, 25%; Permeability, 1,000 md

Area: 13,900 Acres

Oil Characteristics: Gravity: 17 °API; Sulphur: Nil

Pour Point: 0°F.; Initial Solution GOR: 50

Pressure Maintenance or Secondary Recovery: Yes

Market Outlet: Pipeline and local refining

SECONDARY RECOVERY

RESERVOIR DATA

- 1) Field: Aberfeldy
- 2) Pool: Sparky Sand Pool
- 3) Province: Saskatchewan
- 4) Location: Twp(s) 49 and 50, Rge(s) 26 and 27, W 3 M
- 5) Operator: Husky Oil Canada Ltd
- 6) Project: Aberfeldy Unit
- 7) Reservoir: Sparky Sand, Mannville Formation, Lower Cretaceous
- 8) Discovery Date: July 1957
- 9) Date Injection Began: May 1964
- 10) Main Structural Feature: Stratigraphic Trap, Lenticular, Average Flank Dip 0° 5'
- 11) Gas Cap: Originally: Yes; At Present: Yes
- 12) Time required for Initial Results: 6 Months
- 13) Initial Results on Production, BHP, GOR, etc:
- 14) Main Drive in Primary Production: Solution Gas; Gas Cap; Water Drive
- 15) Productive Area (Acres) of Reservoir: 13,900 Acres; Of Project: 13,900 Acres; Affected by Injection: 500 Acres
- 16) Average Depth to Top of Pay: 1,720 ft.
- 17) Average Effective Thickness: 10.3 ft.
- 18) Average Porosity: 25%
- 19) Average Horizontal Permeability and Range in Brackets; (millidarcys): 1,000 (100-3,000)
- 20) Connate Water (% of Pore Space): 15
- 21) Viscosity at Initial Reservoir Conditions (centipoises): 800
- 22) API gravity: 17.0 degrees
- 23) Solution Gas/Oil Ratio at Saturation Pressure: 55 cu.ft./bbl.
- 24) Bubble Point Pressure: 500 psi
- 25) Original Pressure: 500 psi
- 26) Reservoir Pressure at Start of Injection: 400 psi (est.)
- 27) Latest Reservoir Pressure: 400 psi (est.) (September 1965)
- 28) Injection Fluid: Salt Water
- 29) Injection Fluid Source: Dina Sand
- 30) System: Open
- 31) Fluid Treatment before Injection: None
- 32) Injection Pattern: Peripheral
- 33) Structural Position Injection Wells: Oil Zone

- 34) Distance Injection Wells to Producers: 1,400-2,000 feet
- 35) Number of Injection Wells at Start: Three
- 36) Number of Injection Wells at Present: Four (May 1965)
- 37) Average Daily Injection Rate per Injection Well at Start: 290 bbls
- 38) Average Daily Injection Rate per Injection Well at Present: 500 bbls (July 1965)
- 39) Average Injection Pressure at Start: 500 psi
- 40) Average Injection Pressure at Present: 1,000 psi (July 1965)
- 41) Number of Producing Wells in Project Area at Start: 47 Wells
- 42) Number of Producing Wells in Project Area at Present: 75 (June 30, 1965)
- 43) Average Production Rate in Project Area at Start (bbls/day):
- 44) Average Production Rate in Project Area at Present: Area is still under active development and production rate is increasing, as numbers of producers are increasing. However, there is a sign of response in the offset wells due to injection.
- 45) Original Oil in Place in Project Area: 200,000,000 bbls
- 46) Original Oil Saturation (% of pore space): 85
- 47) Primary Recovery from Project Area when Injection Started: 492,535 bbls
- 48) Oil Saturation at Start of Project (% of pore space): 83
- 49) Oil Production from Project Area from Start of Injection to now (bbls): 581,998 (April 1965)
- 50) Total Volume of Injected Fluids at Present (bbls): 162,105 (April 1965)
- 51) Estimated Primary Ultimate Recovery from Project Area: 5.0%
- 52) Estimated Increase in Ultimate Recovery from Project Area: 5.0%
- 53) Well Spacing: 40 Acres
- 54) Oil Volume Factor (initial reservoir barrels per Stock-Tank barrel): 1.16
- 55) Remarks: There is an evidence of success in the offset wells due to water injection. It seems that the scheme is economically attractive, but there is no factual information at this early stage of the project life to support this statement.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 233-58

FIELD: Alameda

POOL:

ZONE: Midale

Well Name: Imperial Oxbow 3-14
 Location: Lsd. 3, Sec. 14, Twp. 3, Rge. 2, W2
 Interval tested, depth, feet: 4325
 Producing Zone: Midale
 Geological Age: Mississippian

Province: Saskatchewan
 Sample From: Sask. Dept. of Mineral Resources
 Date Sampled: June 20, 1958
 Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.828
 Sulphur, percent by weight: 0.65
 Saybolt Universal Viscosity:
 at 100°F., sec. 36

A.P.I. gravity at 60°F.: 39.4
 Pour point, °F.: 30
 Colour: Brownish Black
 Carbon residue, percent by weight: 1.2
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 753 mm. Hg.
 First drop, 33°C. (91°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion ₄ (N _F -N _C) 10 ⁴
1.	122	1.9	0.652	85.5						
2.	167	4.9	0.676	77.8	10					
3.	212	10.2	0.718	65.6	20	50.8				
4.	257	17.5	0.748	57.7	26	47.0				
5.	302	25.2	0.767	53.0	27	46.0				
6.	347	31.0	0.783	49.2	28	48.1				
7.	392	36.2	0.796	46.3	28	53.2				
8.	437	41.1	0.809	43.4	28	59.0				
9.	482	46.1	0.823	40.4	30	62.2				
10.	527	52.7	0.841	36.7	33	65.8				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	55.8	0.855	34.0	36	68.2	39	20		
12.	437	61.1	0.863	32.5	37	71.4	44	35		
13.	482	66.6	0.874	30.4	38	75.9	54	60		
14.	527	71.5	0.885	28.4	40	81.0	74	80		
15.	572	77.5	0.896	26.4	42	86.0	131	95		
Resi-duum		96.5	0.957	16.4						

Carbon residue of residuum: 5.4% Carbon residue of crude: 1.2%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	10.2	0.693	72.3	
Total gasoline and naphtha	36.2	0.749	57.4	
Kerosine distillate	9.9	0.816	41.9	
Gas oil	15.5	0.852	34.6	
Nonviscous lubricating distillate	9.9	0.870-0.890	31.1-27.5	Below 50
Medium lubricating distillate	6.0	0.890-0.902	27.5-25.4	50-100
Viscous lubricating distillate	-	-	-	100-200
Residuum	19.0	0.957	16.4	Above 200
Distillation loss	3.5			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 180-58

FIELD: Alida

POOL:

ZONE: Frobisher

Well Name: McCarty & Coleman; Lemieux 8-31
Location: Lsd. 8, Sec. 31, Twp. 5, Reg. 33, WPM
Interval tested, depth, feet: 3725-3738
Producing Zone: Frobisher
Geological Age: Mississippian

Province: Saskatchewan
Sample From: Sask. Dept. of Mineral Resources
Date Sampled: June 19, 1958
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.830 A.P.I. gravity at 60°F.: 39.0
Sulphur, percent by weight: 0.84
Saybolt Universal Viscosity:
at 100°F., sec. 37

Pour point, °F.: minus 20
Colour: Greenish Black
Carbon residue, percent by weight: 1.7
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 758 mm. Hg.
First drop, 34°C. (93°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion _{(N_F-N_C) 10⁴}
1.	122	1.3	0.647	87.2						
2.	167	5.3	0.676	77.8	10					
3.	212	10.7	0.710	67.8	17	55.2				
4.	257	18.2	0.743	58.9	23	52.7				
5.	302	25.2	0.767	53.0	27	50.0				
6.	347	30.9	0.782	49.5	27	52.5				
7.	392	36.0	0.797	46.0	28	54.9				
8.	437	40.8	0.809	43.4	28	58.5				
9.	482	46.6	0.823	40.4	30	62.8				
10.	527	53.3	0.841	36.8	33	66.4				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	56.3	0.861	32.8	39	68.3	40	10		
12.	437	61.6	0.868	31.5	38	71.0	45	30		
13.	482	67.3	0.880	29.3	41	75.2	58	55		
14.	527	72.0	0.891	27.3	43	79.1	81	75		
15.	572	78.0	0.901	25.6	45	83.0	137	90		
Resi-duum		97.4	0.958	16.2						

Carbon residue of residuum: 7.4%

Carbon residue of crude: 1.7%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	10.7	0.690	73.6	
Total gasoline and naphtha	36.0	0.746	58.2	
Kerosine distillate	10.6	0.817	41.7	
Gas oil	14.5	0.853	34.4	
Nonviscous lubricating distillate	10.4	0.873-0.894	30.6-26.8	Below 50
Medium lubricating distillate	6.0	0.894-0.908	26.8-24.3	50-100
Viscous lubricating distillate	-	-	-	100-200
Residuum	19.4	0.958	16.2	Above 200
Distillation loss	2.6			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 236-58

FIELD: Benson

POOL:

ZONE: Frobisher

Well Name: Imperial Viewfield No. 1-21
Location: Lsd., Sec. 21, Twp. 6, Rge. 9, W 2
Interval tested, depth, feet: 4523-4548
Producing Zone: Frobisher
Geological Age: Mississippian

Province: Saskatchewan
Sample From: Sask. Dept. of
Mineral Resources
Date Sampled: June 26, 1958
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.878
Sulphur, percent by weight: 1.88
Saybolt Universal Viscosity:
at 70°F., sec. 105
at 100°F., sec. 58

A.P.I. gravity at 60°F.: 29.7
Pour point, °F.: 40
Colour: Black
Carbon residue, percent by weight: 4.7
(Conradson)

DISTILLATION
(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 760 mm. Hg.
First drop, 32°C. (89°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion Index (N_F-N_C) 10^4
1.	122	1.4	0.665	81.3	-	-				
2.	167	4.2	0.681	76.3	13	-				
3.	212	7.3	0.728	62.9	25	44.8				
4.	257	11.2	0.753	56.4	28	43.4				
5.	302	16.1	0.769	52.5	28	44.0				
6.	347	20.0	0.782	49.4	27	47.0				
7.	392	23.7	0.798	45.8	29	51.1				
8.	437	28.2	0.810	43.2	29	55.4				
9.	482	32.4	0.826	39.8	31	58.1				
10.	527	38.4	0.844	36.2	35	61.0				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	41.8	0.865	32.1	41	62.4	38	20		
12.	437	47.0	0.877	29.8	43	65.1	44	40		
13.	482	52.1	0.889	27.7	45	68.2	55	65		
14.	527	56.9	0.902	25.4	48	71.0	77	80		
Resi-duum	572	62.9	0.912	23.7	50	74.9	139	95		

Carbon residue of residuum: 12.6% Carbon residue of crude: 4.7%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	7.3	0.698	71.2	
Total gasoline and naphtha	23.7	0.747	57.9	
Kerosine distillate	4.5	0.810	43.2	
Gas oil	19.0	0.853	34.4	
Nonviscous lubricating distillate	9.3	0.884-0.906	28.6-24.7	
Medium lubricating distillate	6.4	0.906-0.918	24.7-22.6	
Viscous lubricating distillate	-	-	-	
Residuum	32.7	1.010	8.6	
Distillation loss	4.4			

OIL FIELD DATA

Field and Pool: Bone Creek Field - Upper Shaunavon Pool

Location: Twp(s) 10 and 11, Rge 19, West 3 M

DISCOVERY DETAILS

Method: Seismic Interpretation

Well: Name: Delhi Husky Phillips Richfield Bone Creek No. 1 (Lsd 6-34-10-19)

Completed: Oct. 17, 1954. Perforated: 4390-4416' K.B. (4 shots per foot).

Treatment: None. Initial Potential: 115 bbls oil per day; 11.5 Mcf gas, no water.

GEOLOGY

Producing Zone: Upper Shaunavon (J-2-A). Other Shows: None.

Trap Type: Stratigraphic. Lithology: Limy Sandstone.

Maximum Reservoir Thickness: 37 ft. Regional Setting: West Side of Williston Basin.

Deepest Formation Penetrated: Jurassic

DEVELOPMENT DATA

Total Wells: Completed Oil: 39; Gas: 0; Dry and Abandoned: 3

Producing Oil: 29; Suspended Oil: 1

Injection: Water: 9; Gas: None

Well Spacing: 80 Acres; Pattern: Even Legal Sub-Divisions

Logging Practice: Electrical Log, Micro Log

Completion Practice: Perforate and Sand Fracture

RESERVOIR DATA

Type of Drive: Solution Gas

Estimated Oil in Place: 41,280,000 S.T.bbls (685 bbls/acre-foot)

Estimated Recoverable Oil: 12,384,000 S.T.bbls (205 bbls/acre-foot) (Primary & Secondary)

Oil Zone Thickness: Maximum: 37 feet; Average: 15 feet

Gas Zone Thickness: Maximum: Not applicable

Porosity: 13.4%; Permeability: 51 md

Area: 5,760 Acres (Unitized)

Oil Characteristics: Gravity: 23.4 °API; Sulphur: 2.69%

Pour Point: 15°F.; Initial Solution GOR: 100 Scf/Bbl

Pressure Maintenance or Secondary Recovery: Peripheral Water Injection

PRODUCTION

MPR: Not Applicable; BOPD: 2,100

Economic Allowance: N/A.

Market Outlet: South Saskatchewan Pipeline

SECONDARY RECOVERY

RESERVOIR DATA

- 1) Field: Bone Creek
- 2) Pool: Upper Shaunavon (J-2-A)
- 3) Province: Saskatchewan
- 4) Location: Twp(s) 10 and 11, Rge 19, West 3 M
- 5) Operator: Canadian Delhi Oil Ltd.
- 6) Project: Bone Creek Unit
- 7) Reservoir: Upper Shaunavon, Middle Jurassic
- 8) Discovery Date: October 1954
- 9) Date Injection Began: June 1960
- 10) Main Structural Feature: Stratigraphic Trap
- 11) Gas Cap: Originally: No; At Present: No
- 12) Time Required for Initial Results: 6 Months
- 13) Initial Results on Production: GOR lowered; BHP increased
- 14) Main Drive in Primary Production: Solution Gas
- 15) Productive Area (Acres) of Reservoir: 3,120 (based on 80 acre spacing);
Of Project: 5,760 (unitized); Affected
by Injection: 3,120
- 16) Average Depth to Top of Pay (feet): 4,350
- 17) Average Effective Thickness (feet): 15
- 18) Average Porosity %: 13.4
- 19) Average Horizontal Permeability and Range in Brackets: (millidarcys): 51
(0.1-150)
- 20) Connate Water (% of Pore Space): 5
- 21) Viscosity at Initial Reservoir Conditions (centipoises) : 10.81
- 22) API Gravity: 23.4°
- 23) Solution Gas/Oil Ratio at Saturation Pressure (cu.ft./bbl): 98
- 24) Bubble Point Pressure (psi): 690
- 25) Original Pressure: 1,750 psig
- 26) Reservoir Pressure at Start of Injection (psi): 600
- 27) Latest Reservoir Pressure: 2,050 psi (December 1964)
- 28) Injection Fluid: Produced salt water plus Blairmore makeup water
- 29) Injection Fluid Source: Formation plus Blairmore water
- 30) System: Open
- 31) Fluid Treatment before Injection: Filtration, Bactericide
- 32) Injection Pattern: Peripheral
- 33) Structural Position Injection Wells: Oil Zone

- 34) Distance Injection Wells to Producers (feet): 1,850
- 35) Number of Injection Wells at Start: 7
- 36) Number of Injection Wells at Present: 9 on August 2, 1965
- 37) Average Daily Injection Rate per Injection Well at Start: 430 bbls
- 38) Average Daily Injection Rate per Injection Well at Present: 360 bbls (June 1965)
- 39) Average Injection Pressure at Start: 1,400 psig at Surface
- 40) Average Injection Pressure at Present: 2,100 psig on August 2, 1965
- 41) Number of Producing Wells in Project Area at Start: 31
- 42) Number of Producing Wells in Project Area at Present: 29 on August 2, 1965
- 43) Average Production Rate in Project Area at Start (bbls/day): 1,200
- 44) Average Production Rate in Project Area at Present: 2,100 on August 2, 1965
- 45) Original Oil in Place in Project Area (bbls): 41,280,000
- 46) Original Oil Saturation (% of Pore Space): 95
- 47) Primary Recovery from Project Area when Injection Started: 2,346,695 STB Oil
- 48) Oil Saturation at Start of Project (% of Pore Space): 90
- 49) Oil Production from Project Area from Start of Injection to Now: 3,137,790 STB Oil
on July 1, 1965
- 50) Total Volume of Injected Fluids at Present: 5,310,273 bbls on July 1, 1965
- 51) Estimated Primary Ultimate Recovery from Project Area: 3,096,000 STB
- 52) Estimated Increase in Ultimate Recovery from Project Area: 9,288,000 STB
- 53) Well Spacing: 80 Acres
- 54) Oil Volume Factor (Initial reservoir barrels per Stock-Tank barrel): 1.060

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 400-56

FIELD: Bone Creek

POOL: Upper Shaunavon

ZONE: Upper Shaunavon

Well Name: Delhi-Husky-Phillips-Richfield
 Bone Creek No. 12-27

Location: Lsd. 12, Sec. 27, Twp. 10, Rge. 19, W 3rd

Interval tested, depth, feet: 4409-4444

Producing Zone: Upper Shaunavon

Geological Age: Jurassic

Province: Saskatchewan

Sample From: Sask. Dept. of Mineral Resources

Date Sampled: October 31, 1956

Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.906
 Sulphur, percent by weight: 2.91
 Saybolt Universal Viscosity:
 at 100°F., sec. 124
 at 130°F., sec. 74

A.P.I. gravity at 60°F.: 24.7
 Pour point, °F.: -15
 Colour: Brownish Black
 Carbon residue, percent by weight: 5.2
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 750 mm. Hg.
 First drop, 46°C. (115°F.)

Frac-tion No.	Cut at °F.	Sum per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre- lation Index	Aniline Point °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122									
2.	167	2.0	0.668	80.3	-					
3.	212	4.2	0.693	72.7	8					
4.	257	7.3	0.722	64.5	13	58.4				
5.	302	10.6	0.745	58.4	17	56.0				
6.	347	14.2	0.769	52.5	21	54.9				
7.	392	17.7	0.789	47.8	24	54.5				
8.	437	21.4	0.806	44.1	27	55.9				
9.	482	25.4	0.823	40.4	30	58.1				
10.	527	31.1	0.843	36.4	34	59.4				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	34.1	0.862	32.6	39	60.2	38	5		
12.	437	39.2	0.877	29.8	43	61.7	43	25		
13.	482	44.7	0.893	27.0	47	63.5	55	45		
14.	527	50.5	0.910	24.0	52	65.9	85	65		
15.	572	56.7	0.925	21.5	56	68.1	159	85		
Resi- duum		98.2	1.021	7.1						

Carbon residue of residuum: 11.1% Carbon residue of crude: 5.2%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	4.2	0.681	76.3	
Total gasoline and naphtha	17.7	0.739	60.0	
Kerosine distillate	7.7	0.815	42.1	
Gas oil	14.3	0.860	33.0	Below 50
Nonviscous lubricating distillate	9.1	0.886-0.913	28.2-23.5	50-100
Medium lubricating distillate	7.9	0.913-0.933	23.5-20.2	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	41.5	1.021	7.1	
Distillation loss	1.8			

Remarks: The sample as received contained no water (A.S.T.M.) and 13 lb. salt (as NaCl) per 1000 bbl.

OIL FIELD DATA

Field and Pool: Cantuar

Location: Twp(s) 15 & 16, Rge(s) 16 & 17, W 3 M

DISCOVERY DETAILS

Method:

Well: Name: Socony Western-Prairie Cantuar 2-14 (14-2-16-17 W 3 M)

Completed: July 1952

Perforated: 3,210'-3,230' and 3,235'-3,248'

Treatment: None

Initial Potential: 58 BOPD; 5.1% Water Cut

GEOLOGY

Producing Zone(s): Cantuar; Upper Roseray; Lower Roseray

Trap Type: Structural

Lithology: Cantuar: Fine to medium grained, fair to poorly sorted quartzose sand with white clay cement.

U. Roseray: A fine grained sandstone, well sorted subrounded quartz, re-crystallized in part with a white clay cement, calcareous in part.

L. Roseray: A fine grained quartzose sandstone, fair to well sorted, clear glassy subrounded quartz with calcareous cement.

Maximum Reservoir Thickness: Cantuar: 93; U. Roseray: 27; L. Roseray: 54

DEVELOPMENT DATA

Total Wells: Completed Oil: 151; Gas: 0; Dry and Abandoned: 17

Producing Oil: 134; Suspended Oil: 0

Injection or Disposal: Water: 17; Gas: 0

Well Spacing: 40 Acres

Logging Practice: E-Logs; Micro Logs; Gamma Ray-Neutron

Completion Practice: Case through and perforate

RESERVOIR DATA (Cantuuar C, Upper Roseray UR, Lower Roseray LR)

Type of Drive: Cantuar: Gas Cap Expansion; L. Roseray: Water

Estimated Oil in Place: C - 138,750,000 S.T.bbls (1,070.6 bbls/acre-foot)
UR - 8,760,000 S.T.bbls (1,198 bbls/acre-foot)
LR - 116,979,000 S.T.bbls (1,475 bbls/acre-foot)

Estimated Recoverable Oil: C - 24,898,000 S.T.bbls (192.1 bbls/acre-foot)

UR & LR - 4,950,000 S.T.bbls (UR & LR 58 bbls/acre-foot)

Oil Zone Thickness: Maximum: C - 3 $\frac{1}{4}$ Average: C - 16 $\frac{1}{2}$
(feet) UR - 12 UR - 3
LR - 25 LR - 8

Gas Zone Thickness: Maximum: C - 27
(feet) UR - 7
LR - 3

Porosity: C - 26.4% Permeability: C - 285 md
UR - 28.6% UR - 259 md
LR - 27.2% LR - 2,255 md

Area: C - 7,823 Acres
UR - 2,309 Acres
LR - 8,434 Acres

Oil Characteristics: Gravity: C - 0.922 (C - 22.0 °API) Sulphur: C - 2.910%
LR - 0.978 (LR - 13.2 °API) LR - 2.263%

Pour Point: C - +10°F. Initial Solution GOR: 144 Scf/Stb
LR - +10°F.

Pressure Maintenance or Secondary Recovery: Cantuar - Water Injection

SECONDARY RECOVERY

RESERVOIR DATA

- 1) Field: Cantuar
- 2) Pool: Cantuar
- 3) Province: Saskatchewan
- 4) Location: Twp(s) 15 & 16, Rge(s) 16 & 17, W 3 M
- 5) Operator: James A. Lewis Engineering Co. Ltd.
- 6) Project: Cantuar Unit
- 7) Reservoir: Cantuar Sand, Basal Blairmore, Lower Cretaceous
- 8) Discovery Date: July 1952
- 9) Date Injection Began: August 1960
- 10) Main Structural Feature: Stratigraphic Trap
- 11) Gas Cap: Originally: Yes; At Present: Yes
- 12) Time Required for Initial Results: 8 Months
- 13) Initial Results on Production: GOR decline
- 14) Main Drive in Primary Production: Gas Cap
- 15) Productive Area (Acres) of Reservoir:
of Project:) 7,823
Affected by Injection:)
- 16) Average depth to top of pay (feet): 3,170
- 17) Average effective thickness (feet): 16½
- 18) Average porosity %: 26.4
- 19) Average horizontal permeability (millidarcys): 285
- 20) Connate water (% of pore space): 43.6
- 21) Viscosity at initial reservoir conditions (centipoises): 21.3
- 22) API gravity: 22.0°
- 23) Solution Gas/Oil Ratio at Saturation Pressure (cu.ft./bbl): 144
- 24) Bubble Point Pressure (psi): 1,298
- 25) Original pressure (psi): 1,298
- 26) Reservoir pressure at start of injection (psi): 1,000
- 27) Latest reservoir pressure: 868 psi (May 1965)
- 28) Injection Fluid: Salt Water
- 29) Injection Fluid Source: Cantuar & L.Roseray Produced Water
- 30) System: Closed
- 31) Fluid Treatment before Injection: Filtration, Bactericide and Corrosion Inhibitor
- 32) Injection Pattern: Peripheral, Irregular
- 33) Structural Position Injection Wells: Below WOC and Oil Zone

- 34) Distance Injection Wells to Producers (feet): Minimum of 1,320
- 35) Number of Injection Wells at Start: 3
- 36) Number of Injection Wells at Present: 15 (July 1965)
- 37) Average Daily Injection Rate per Injection Well at Start: 1,060 bbls
- 38) Average Daily Injection Rate per Injection Well at Present: 888 bbls (June 1965)
- 39) Average Injection Pressure at Start (psi): 686
- 40) Average Injection Pressure at Present (psi): 633 (June 1965)
- 41) Number of producing wells in project area at start: 130
- 42) Number of producing wells in project area at present: 115 (June 1965)
- 43) Average production rate in project area at start (bbls/day): 2,225
- 44) Average production rate in project area at present: 1,935 (June 1965)
- 45) Original oil in place in project area (bbls): 138,750,000
- 46) Original oil saturation (% of pore space): 56.4
- 47) Primary recovery from project area when injection started (bbls): 5,551,800
- 48) Oil saturation at start of project (% of pore space):
- 49) Oil production from project area from start of injection to now (bbls): 3,701,400
(June 30, 1965)
- 50) Total volume of injected fluids at present (bbls): 9,752,600 (June 30, 1965)
- 51) Estimated primary ultimate recovery from project area (bbls): 12,068,000
- 52) Estimated increase in ultimate recovery from project area (bbls): 12,830,000
- 53) Well spacing: 40 Acres
- 54) Oil volume factor (initial reservoir barrels per Stock-Tank barrel): 1.079

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 479-63

FIELD: Cantuar

POOL:

ZONE: Lower Shaunavon

Well Name: M.O.W.S. South Success 17-13B
 Location: Lsd. 13, Sec. 17, Twp. 16, Rge 16,
 W3 Mer
 Interval tested, depth, feet: 3299-3309
 Producing Zone: Lower Shaunavon
 Geological Age: Jurassic

Province: Saskatchewan
 Sample From: Sask. Dept. of Mineral Resources
 Date Sampled: October 28, 1963
 Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.949
 Sulphur, percent by weight: 3.20
 Saybolt Universal Viscosity:
 at 100°F., sec. 835
 at 130°F., sec. 321

A.P.I. gravity at 60°F.: 17.6
 Pour point, °F.: 0
 Colour: Black
 Carbon residue, percent by weight: 10.6
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 758 mm. Hg.
First drop, 80°C. (76°F.)

Frac-tion No.	Cut at 60°F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122	-	-	-	-	-			-	-
2.	167	-	-	-	-	-			-	-
3.	212	0.7	0.738	60.2	30	-			1.4420	92.0
4.	257	1.9	0.753	56.4	28	58.1			1.4224	81.6
5.	302	3.7	0.765	53.5	26	57.0			1.4220	79.1
6.	347	5.7	0.776	50.9	24	56.2			1.4280	83.6
7.	392	7.8	0.799	45.6	29	55.0			1.4408	89.5
8.	437	10.4	0.819	41.3	33	54.8			1.4521	93.6
9.	482	13.5	0.838	37.4	37	55.2			1.4625	99.0
10.	527	18.9	0.857	33.6	41	56.9			1.4728	103.5

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	22.0	0.876	30.0	46	57.8	40	5	1.4832	114.4
12.	437	27.0	0.887	28.0	47	60.0	46	30	1.4892	118.3
13.	482	32.5	0.897	26.3	49	62.8	58	50	1.4962	122.1
14.	527	38.4	0.910	24.0	52	64.6	86	65	1.5041	128.8
15.	572	46.7	0.921	22.1	54	67.9	160	80	1.5134	138.3

Carbon residue of residuum: 18.5%

Carbon residue of crude: 10.6%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	0.7	0.738	60.2	
Total gasoline and naphtha	7.8	0.773	51.6	
Kerosine distillate	2.6	0.819	41.3	
Gas oil	15.8	0.865	32.1	Below 50
Nonviscous lubricating distillate	10.7	0.390-0.912	27.5-23.7	50-100
Medium lubricating distillate	9.5	0.912-0.945	23.7-18.2	100-200
Viscous lubricating distillate	0.3	0.945-0.947	18.2-17.9	Above 200
Residuum	53.2	1.018	7.5	
Distillation loss	0.1	-	-	

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 478-63

FIELD: Cantuar

POOL:

ZONE: Lower Roseray

Well Name: M.O.W.S. Cantuar 23-3B
 Location: Lsd. 3, Sec. 23, Twp. 16, Rge. 17, W3 Mer
 Interval tested, depth, feet: 3209-3212
 Producing Zone: Lower Roseray
 Geological Age: Jurassic

Province: Saskatchewan
 Sample From: Sask. Dept. of Mineral Resources
 Date Sampled: November 4, 1963
 Sampled at: Separator

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.964
 Sulphur, percent by weight: 3.26
 Saybolt Universal Viscosity:
 at 100°F., sec. 1432
 at 130°F., sec. 531

A.P.I. gravity at 60°F.: 15.3
 Pour point, °F.: 15
 Colour: Black
 Carbon residue, percent by weight: 11.7
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 762 mm. Hg.
First drop, 106°C. (223°F.)

Frac-tion No.	Cut °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. 60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion _{(N_F-N_C) 10⁴}
1.	122	-	-	-	-	-			-	-
2.	167	-	-	-	-	-			-	-
3.	212	-	-	-	-	-			-	-
4.	257)							-	-
5.	302	1.9)	0.772	51.8	-	49.4				-
6.	347	3.7	0.797	46.0	34	48.0			1.4394	91.6
7.	392	5.8	0.816	41.9	37	47.0			1.4499	97.2
8.	437	8.7	0.838	37.4	42	47.5			1.4604	101.5
9.	482	11.7	0.853	34.4	44	48.4			1.4694	105.6
10.	527	16.6	0.873	30.6	49	50.2			1.4818	114.2

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	20.3	0.887	28.0	51	50.1	38	-25	1.4899	122.2
12.	437	25.6	0.900	25.7	54	52.7	46	-10	1.4979	126.2
13.	482	31.1	0.911	23.8	55	56.2	61	15	1.5051	134.1
14.	527	37.2	0.925	21.5	59	59.3	102	35	1.5139	138.5
15.	572	43.3	0.935	19.8	61	62.3	198	50	1.5200	144.6
Resi-duum		99.9	1.024	6.7						

Carbon residue of residuum: 19.5%

Carbon residue of crude: 11.7%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	-	-	-	
Total gasoline and naphtha	5.8	0.796	46.3	
Kerosine distillate	-	-	-	
Gas oil	18.6	0.873	30.6	Below 50
Nonviscous lubricating distillate	9.4	0.902-0.924	25.4-21.6	50-100
Medium lubricating distillate	6.6	0.924-0.935	21.6-19.8	100-200
Viscous lubricating distillate	2.9	0.935-0.940	19.8-19.0	Above 200
Residuum	56.6	1.024	6.7	
Distillation loss	0.1			

Remarks: Analysis on dehydrated sample.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 477-63

FIELD: Cantuar

POOL:

ZONE: Upper Roseray

Well Name: M.O.W.S. Cantuar 15-15B

Province: Saskatchewan

Location: Lsd. 15; Sec. 15; Twp. 16; Rge. 17; W3 Mer
Interval tested, depth, feet: 3156-3186

Sample From: Sask. Dept. of Mineral Resources

Producing Zone: Upper Roseray
Geological Age: Jurassic

Date Sampled: October 28, 1963
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.933
Sulphur, percent by weight: 2.96

A.P.I. gravity at 60°F.: 20.2
Pour point, °F.: -15

Saybolt Universal Viscosity:
at 100°F., sec. 377
at 130°F., sec. 179

Colour: Black
Carbon residue, percent by weight: 9.0
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 760 mm. Hg.
First drop, 83°C. (181°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122	-	-	-	-	-			-	-
2.	167	-	-	-	-	-			-	-
3.	212	1.0	0.712	67.2	18	-			1.3951	73.5
4.	257	3.1	0.727	63.1	16	59.6			1.4050	78.4
5.	302	5.5	0.751	56.9	19	58.6			1.4160	82.2
6.	347	8.6	0.771	52.0	22	56.6			1.4282	86.4
7.	392	12.0	0.792	47.2	25	55.1			1.4393	91.6
8.	437	15.6	0.811	43.0	29	56.0			1.4490	95.8
9.	482	18.6	0.833	38.4	34	58.0			1.4612	101.7
10.	527	23.5	0.846	35.8	36	60.1			1.4684	108.1

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	28.6	0.859	33.2	38	60.2	37	0	1.4768	112.3
12.	437	34.3	0.878	29.7	43	62.0	44	20	1.4864	117.8
13.	482	39.4	0.894	26.8	47	63.8	56	45	1.4952	125.7
14.	527	44.7	0.909	24.2	51	65.4	83	70	1.5042	132.8
Resi-duum		51.9	0.921	22.1	54	67.9	157	80	1.5131	140.8

Carbon residue of residuum: 17.2%

Carbon residue of crude: 9.0%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	1.0	0.712	67.2	
Total gasoline and naphtha	12.0	0.760	54.7	
Kerosine distillate	3.6	0.811	43.0	
Gas oil	18.6	0.857	33.6	Below 50
Nonviscous lubricating distillate	9.3	0.886-0.912	28.2-23.7	50-100
Medium lubricating distillate	8.4	0.912-0.928	23.7-21.0	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	47.7	1.022	7.0	
Distillation loss	0.4			

Remarks: Analysis on dehydrated sample.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 185-58

FIELD: Carnduff

POOL:

ZONE: Midale

Well Name: Imperial-Canadian Superior Carnduff 3-27
Location: Lsd. 3, Sec. 27, Twp. 2, Rge. 33, WPM
Interval tested, depth, feet: 3964'-3978'
Producing Zone: Midale
Geological Age: Mississippian

Province: Saskatchewan
Sample From: Sask. Dept. of Mineral Resources
Date Sampled: June 1958
Sampled at: Tank

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.840
Sulphur, percent by weight: 1.15
Saybolt Universal Viscosity:
at 100°F., sec. 38

A.P.I. gravity at 60°F.: 37.0
Pour point, °F.: 25
Colour: Brownish Black
Carbon residue, percent by weight: 2.8
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 759 mm. Hg.
First drop, 30°C. (86°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122	3.4	0.650	86.2						
2.	167	6.6	0.680	76.6	12					
3.	212	12.1	0.715	66.4	19	52.5				
4.	257	19.1	0.744	58.7	24	50.0				
5.	302	25.4	0.766	53.2	27	48.2				
6.	347	30.9	0.783	49.2	28	50.8				
7.	392	35.5	0.797	46.0	28	54.9				
8.	437	40.6	0.810	43.2	29	58.6				
9.	482	45.2	0.823	40.4	30	62.1				
10.	527	52.4	0.843	36.4	34	65.5				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	55.5	0.858	33.4	37	66.9	38	15		
12.	437	60.8	0.866	31.9	37	70.9	44	35		
13.	482	66.0	0.878	29.7	40	75.2	55	60		
14.	527	71.0	0.889	27.7	42	79.0	78	75		
15.	572	77.2	0.899	25.9	44	84.1	135	90		
Resi-duum		99.7	0.974	13.8						

Carbon residue of residuum: 10.7% Carbon residue of crude: 2.8%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	12.1	0.687	74.5	
Total gasoline and naphtha	35.5	0.742	59.2	
Kerosine distillate	9.7	0.816	41.9	
Gas oil	15.8	0.854	34.2	Below 50
Nonviscous lubricating distillate	9.5	0.873-0.893	30.6-27.0	50-100
Medium lubricating distillate	6.9	0.893-0.904	27.0-25.0	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	22.5	0.974	13.8	
Distillation loss	0.3			

OIL FIELD DATA

Field and Pool: Coleville-Smiley Field - Bakken Sand Pool

Location: Twp 31, Rge(s) 23 & 24, W3 M

DISCOVERY DETAILS

Method: Rotary Tools

Well: Name: Royalite Albercan Smiley #1

Completed: August 1951

Perforated: Open Hole 2676'-2752' K.B.

Treatment: None

Initial Potential: Pumped 89 BOPD

GEOLOGY

Producing Zone(s): Bakken Sand (Mississippian Age)

Other Shows: Viking Sand-Gas (Cretaceous)

Trap Type: Stratigraphic

Lithology: Medium to fine grained, sub-angular quartzose Sandstone

Maximum Reservoir Thickness: 76'

Deepest Formation Penetrated: Exshaw Shale (Devonian?)

DEVELOPMENT DATA (Bakken Sand Development Only)

Total Wells: Completed Oil: 286; Dry and Abandoned: 3

Producing Oil: 229

Injection or Disposal: Water: 57

Well Spacing: 20 Acres; Pattern: NE and SW of LSD's

Logging Practice: Ran standard electric log survey plus a microlog survey

Completion Practice: 10 3/4" casing @ 200-300'; 7" set above pay with open hole completion on early wells. On later wells pay was drilled and casing set thru pay and perforated

RESERVOIR DATA

Type of Drive: Solution Gas

Estimated Oil in Place: 284,000,000 S.T.bbls (1181 bbls/acre-foot)

Estimated Recoverable Oil: 27,000,000 S.T.bbls (111 bbls/acre-foot)

Oil Zone Thickness: Maximum: 76'; Average: 42'

Gas Zone Thickness: Maximum: 22'

Porosity: 24%; Permeability: 448 md

Area: 5,882 Acres

Oil Characteristics: Gravity: 13.5 °API

Initial Solution GOR: 146

Pressure Maintenance or Secondary Recovery: Secondary Recovery

PRODUCTION

MPR: 17,957 BOPD

Economic Allowance: 10,296 BOPD (present); Operating: 11,502 BOPD

Market Outlet (pipeline): British American

Bibliographical Reference: Proposed Waterflood Development, Coleville Bakken Sand Pool, October 1, 1961 report on file with Saskatchewan D.M.R.

SECONDARY RECOVERY

RESERVOIR DATA

- 1) Field: Coleville-Smiley
- 2) Pool: Bakken Sand
- 3) Province: Saskatchewan
- 4) Location: Twp. 31, Rge(s) 23 & 24, W3 M
- 5) Operator: General American Oils Ltd.
- 6) Project: Coleville Bakken Sand Pool Waterflood Project
- 7) Reservoir: Sand member of the Bakken Formation, Mississippian Age
- 8) Discovery Date: August 1951
- 9) Date Injection Began: January 1959
- 10) Main Structural Feature: Stratigraphic Trap 10'-20' per mile
- 11) Gas Cap: Originally: Yes; At Present: Questionable
- 12) Time Required for Initial Results: 10 Months (approx.)
- 13) Initial Results on Production: Decreased GOR, Increased Production and Water-Oil Ratio
- 14) Main Drive in Primary Production: Solution gas with very limited water drive in south portion of field.
- 15) Productive area (acres) of Reservoir: 5,882 Acres; Of Project: 5,882 Acres; Affected by Injection: 5,247 Acres. Only $\frac{1}{2}$ of the 5,247 acres is under flood at this time (7/1/65). The remainder of the area should be under flood by 10/1/65.
- 16) Average Depth to Top of Pay (feet): 2,700
- 17) Average Effective Thickness (feet): 42
- 18) Average Porosity %: 24
- 19) Average Horizontal Permeability and Range in Brackets (millidarcys): 448 (23.4-997)
- 20) Connate Water (% of pore space): 31
- 21) Viscosity at Initial Reservoir Conditions (centipoises): 386
- 22) API Gravity: 13.5°
- 23) Solution Gas/Oil Ratio at Saturation Pressure (cu.ft/bbl): 146
- 24) Bubble Point Pressure: 911 psig
- 25) Original Pressure: 1,040 psig at 355° SS
- 26) Reservoir Pressure at Start of Injection: Approx. 600 psig in area of original pilot flood
- 27) Latest Reservoir Pressure: Approx. 900 psig on 6/14/64 (est. from fluid level shot)
- 28) Injection Fluid: Brackish Water
- 29) Injection Fluid Source: Water Supply Wells (Belly River Sand Aquifer) and Bakken Sand Produced Water.

- 30) System: Closed System
- 31) Fluid Treatment before Injection: Desanded with Cyclone-type Desander.
Bactericide
- 32) Injection Pattern: 5-Spot Pattern and Inverted 9-Spot Pattern
- 33) Structural Position Injection Wells: Oil Zone
- 34) Distance Injection Wells to Producers (feet): 933 in 5-Spot Pattern Area.
933 & 1,320 in Inverted 9-Spot Pattern Area
- 35) Number of Injection Wells at Start: One
- 36) Number of Injection Wells at Present: 57 (July 1, 1965)
- 37) Average Daily Injection Rate per Injection Well at Start: 225 BWPD
- 38) Average Daily Injection Rate per Injection Well at Present: 221 BWPD
(July 1, 1965)
- 39) Average Injection Pressure at Start (psi): Vacuum
- 40) Average Injection Pressure at Present (psi): 150 (July 1, 1965)
Injection Pressures range from vacuum to 500 psig.
- 41) Number of Producing Wells in Project Area at Start: 285
- 42) Number of Producing Wells in Project Area at Present: 229 (July 1, 1965)
- 43) Average Production Rate in Project Area at Start: 3,250 BOPD and 450 BWPD
- 44) Average Production Rate in Project Area at Present: 1,748 BOPD and 3,187 BWPD
(July 1, 1965)
- 45) Original Oil in Place in Project Area: 284 MM Stock Tank bbls/oil
- 46) Original Oil Saturation (% of pore space): 69 - Hydrocarbon Pore Volume as a % of Total Pore Volume
- 47) Primary Recovery from Project Area when Injection Started: 8.5 MM bbls/oil
- 48) Oil Saturation at Start of Project (% of Pore Space): Approx. 65
- 49) Oil Production from Project Area from Start of Injection to Now: 3.9 MM bbls/oil
(July 1, 1965)
- 50) Total Volume of Injected Fluids at Present: 9,762,000 bbls/water (July 1, 1965)
- 51) Estimated Primary Ultimate Recovery from Project Area: 13,600,000 bbls
- 52) Estimated Increase in Ultimate Recovery from Project Area: 13,600,000 bbls
- 53) Well Spacing: 20 Acres
- 54) Oil Volume Factor (Initial Reservoir Barrels per Stock-Tank Barrel): 1.0774
- Remarks: For operational data covering this waterflood project, see waterflood progress reports #1 and #2 dated 1/1/64 and 1/1/65 respectively. These reports are on file with the Saskatchewan D.M.R.

OIL FIELD DATA

Field and Pool: Coleville-Smiley Field - Eureka Viking Sand

Location: Twp 31, Rge 23, W3 M

DISCOVERY DETAILS

Method: Offset

GEOLOGY

Producing Zone: Viking Sand

Other Shows: Viking Chert

Trap Type: Stratigraphic

Lithology: Medium-Grained Shalely Sand

Maximum Reservoir Thickness: 15'

Regional Setting: Western Saskatchewan

Deepest Formation Penetrated: Base of Viking Chert

DEVELOPMENT DATA

Total Wells: Completed Oil: 12; Dry and Abandoned: 0

Producing Oil: 9; Suspended Oil: 0

Injection or Disposal: Water: 1; Gas: 0

Well Spacing: 480 Acres at 40 Acres/Well

Logging Practice: Electrical and Microlog or Gamma Ray Neutron

Completion Practice: Perforate and Sand-Oil Fracture

RESERVOIR DATA

Type of Drive: Solution Gas Drive

Estimated Oil in Place: 5,320,000 S.T.bbls (773 bbls/acre-foot)

Estimated Recoverable Oil: 1,349,000 S.T.bbls (196 bbls/acre-foot)

Oil Zone Thickness: Maximum: 15'; Average: 12'

Porosity: 24.35%; Permeability: 46.53 md

Area: 480 Acres

Oil Characteristics: Gravity: 38 °API

PRODUCTION

MPR: 30; BOPD: 30

Economic Allowance: 35 bbl/day-well (present); Operating: At E.A.

Market Outlet (pipeline): Gibson Petroleum

SECONDARY RECOVERY

RESERVOIR DATA

- 1) Field: Coleville-Smiley
- 2) Pool: Eureka-Viking Sand Pool
- 3) Province: Saskatchewan
- 4) Location: Twp 31, Rge 23, W3 M
- 5) Operator: United Canso
- 6) Project: North Eureka Unit
- 7) Reservoir: Eureka Viking, Viking Formation, Colorado Group, Lower Cretaceous
- 8) Discovery Date:
- 9) Date Injection Began: Pilot Waterflood - March 8, 1963
- 10) Main Structural Feature: Stratigraphic Trap
- 11) Gas Cap: Originally: Yes; At Present: Yes
- 12) Time Required for Initial Results: *
- 13) Initial Results on Production: Lower GOR; Higher BHP
- 14) Main Drive in Primary Production: Solution Gas
- 15) Productive Area (acres) of Project: 480
- 16) Average depth to top of pay (feet): 2,300
- 17) Average effective thickness (feet): 12
- 18) Average porosity %: 25
- 19) Average horizontal permeability: 46.53 md
- 20) Connate water (% of pore space): 55
- 21) Viscosity at initial reservoir conditions (centipoises): 2.7
- 22) API gravity: 38°
- 23) Solution Gas/Oil Ratio at Saturation Pressure (cu.ft/bbl): *
- 24) Bubble Point Pressure (psi): *
- 25) Original Pressure (psi): 874
- 26) Reservoir Pressure at Start of Injection (psi): 874
- 27) Latest Reservoir Pressure: 748 psi (September 1, 1959)
- 28) Injection Fluid: Fresh Water
- 29) Injection Fluid Source: Belly River Formation
- 30) System: Open
- 31) Fluid Treatment before Injection: Potassium Chloride - 1000 ppm; Etho Cluomeen - 10 ppm; Amine - 10 ppm
- 32) Injection Pattern: Modified Nine Spot
- 33) Structural Position Injection Wells: Oil Zone

* - Information Not Available. Contact Unit Operator.

- 34) Distance Injection Wells to Producers (feet): 335
- 35) Number of Injection Wells at Start: One
- 36) Number of Injection Wells at Present: One (August 1965)
- 37) Average Daily Injection Rate per Injection Well at Start: 475 bbls/day
- 38) Average Daily Injection Rate per Injection Well at Present: 0 (June 1965)
- 39) Average Injection Pressure at Start: 1,550 psig
- 40) Average Injection Pressure at Present (psi): 0 (March 1965)
- 41) Number of Producing Wells in Project Area at Start: Nine
- 42) Number of Producing Wells in Project Area at Present: Nine
- 43) Average Production Rate in Project Area at Start (bbls/day/well): Four-Five
- 44) Average Production Rate in Project Area at Present: 29.9 bbl/day (June 1965)
- 45) Original Oil in Place in Project Area (bbls): 5,320,000
- 46) Original Oil Saturation (% of Pore Space): 45
- 47) Primary Recovery from Project Area when Injection Started (bbls): 436,967
- 48) Oil Saturation at Start of Project (% of Pore Space): 38.4
- 49) Oil Production from Project Area from Start of Injection to now (bbls): 36,831
(June 1965)
- 50) Total Volume of Injected Fluids at Present:
- 51) Estimated Primary Ultimate Recovery from Project Area (bbls): 263,034
- 52) Estimated Increase in Ultimate Recovery from Project Area (bbls): 585,200
- 53) Well Spacing: 40 Acres
- 54) Oil Volume Factor (initial reservoir barrels per Stock-Tank barrel): 1.100

SECONDARY RECOVERY

RESERVOIR DATA

- 1) Field: Coleville-Smiley
- 2) Pool: Eureka Viking Sand
- 3) Province: Saskatchewan
- 4) Location: Twp(s) 30 & 31, Rge(s) 22, 23, W3 M
- 5) Operator: Golden Eagle Oil & Gas Limited
- 6) Project: Waterflood Unit
- 7) Reservoir: Viking Sand, Lower Colorado, Cretaceous
- 8) Discovery Date: January 1959
- 9) Date Injection Began: October 1965
- 10) Main Structural Feature: Stratigraphic Trap (dip very variable)
- 11) Gas Cap: Originally: No; At Present: No
- 12) Time Required for Initial Results: Estimated 10 Months
- 13) Initial Results on Production, BHP, GOR, etc:
- 14) Main Drive in Primary Production: Solution Gas
- 15) Productive Area (acres) of Reservoir: Estimated 50,000; Of Project: 2,200
- 16) Average Depth to Top of Pay (feet): 2,300
- 17) Average Effective Thickness (feet): 11.6
- 18) Average Porosity %: 23
- 19) Average Horizontal Permeability and Range in Brackets: (millidarcys): 20
(1-120)
- 20) Connate Water (% of Pore Space): 42
- 21) Viscosity at Initial Reservoir Conditions (centipoises): 3.23
- 22) API gravity: 37.3
- 23) Solution Gas/Oil Ratio at Saturation Pressure (cu.ft/bbl): 162
- 24) Bubble Point Pressure (psi): 672
- 25) Original Pressure (psi): 908
- 26) Reservoir Pressure at Start of Injection (psi): 350
- 27) Latest Reservoir Pressure: 350 psi
- 28) Injection Fluid: Water
- 29) Injection Fluid Source: Formation
- 30) System: Closed
- 31) Fluid Treatment before Injection: Filtration, Bactericide
- 32) Injection Pattern: Invert 9 Spot
- 33) Structural Position Injection Wells: Oil Zone

- 34) Distance Injection Wells to Producers (feet): 1,320
- 35) Number of Injection Wells at Start: 13
- 36) Number of Injection Wells at Present: 13 (October 1965)
- 37) Average Daily Injection Rate per Injection Well at Start: 300 bbl
- 38) Average Daily Injection Rate per Injection Well at Present: 300 bbl
- 39) Average Injection Pressure at Start (psi): 1,300
- 40) Average Injection Pressure at Present (psi): 1,300 (October 1965)
- 41) Number of Producing Wells in Project Area at Start: 40
- 42) Number of Producing Wells in Project Area at Present: 40
- 43) Average Production Rate in Project Area at Start: 400 BPD
- 44) Average Production Rate in Project Area at Present: 400 (October 1965)
- 45) Original Oil in Place in Project Area (bbls): 25,800,000
- 46) Original Oil Saturation (% of Pore Space): 58
- 47) Primary Recovery from Project Area when Injection Started (bbls): 5.6
- 48) Oil Saturation at Start of Project (% of Pore Space): 52.4
- 49) Oil Production from Project Area from Start of Injection to now (bbls): New Project
- 50) Total Volume of Injected Fluids at Present: 30,000 bbl (October 15, 1965)
- 51) Estimated Primary Ultimate Recovery from Project Area (bbls): 2,000,000
- 52) Estimated Increase in Ultimate Recovery from Project Area (bbls): 4,000,000
- 53) Well Spacing: 40 Acres
- 54) Oil Volume Factor (initial reservoir barrels per Stock-Tank barrel): 0.91
- 55) Remarks: New Project Commenced Late in 1965.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 94-56

FIELD: Coleville-Smiley

POOL: Eureka Viking Sand

ZONE: Viking

Well Name: Hudson's Bay Coleville No. 7-26-31-23
 Location: Lsd. 7, Sec. 26, Twp. 31, Rge. 23, W 3rd
 Interval tested, depth, feet: 2359-2374
 Producing Zone: Viking
 Geological Age: Lower Cretaceous

Province: Saskatchewan
 Sample From: Sask. Dept. of Mineral Resources
 Date Sampled: March 14, 1956
 Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.837
 Sulphur, percent by weight: 0.12
 Saybolt Universal Viscosity:
 at 100°F., sec. 39

A.P.I. gravity at 60°F.: 37.6
 Pour point, °F.: 15
 Colour: Dark Green
 Carbon residue, percent by weight: 2.1
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 756 mm. Hg.
 First drop, 31°C. (88°F.)

Fraction No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Viscosity S.U. 100°F.	Cloud Test, °F.
1.	50	122	1.1	1.1	0.647	87.2	-	-		
2.	75	167	2.9	4.0	0.670	79.7	8	-		
3.	100	212	4.7	8.7	0.707	68.6	15	54.7		
4.	125	257	6.1	14.8	0.736	60.8	20	52.4		
5.	150	302	5.7	20.5	0.757	55.4	22	51.5		
6.	175	347	5.2	25.7	0.774	51.3	23	52.1		
7.	200	392	4.5	30.2	0.789	47.8	24	54.6		
8.	225	437	4.5	34.7	0.804	44.5	26	57.6		
9.	250	482	4.7	39.4	0.818	41.5	27	60.2		
10.	275	527	6.7	46.1	0.831	38.8	29	65.7		

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	4.3	50.4	0.849	35.2	33	68.1	38	10
12.	225	437	5.9	56.3	0.856	33.8	33	73.8	43	35
13.	250	482	5.1	61.4	0.866	31.9	34	77.8	53	55
14.	275	527	5.3	66.7	0.877	29.8	36	82.0	73	70
15.	300	572	6.0	72.7	0.890	27.5	39	86.9	124	85
Residuum					23.9	96.6	0.967	14.8		

Carbon residue of residuum: 7.5%

Carbon residue of crude: 2.1%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	8.7	0.687	74.5	
Total gasoline and naphtha	30.2	0.740	59.7	
Kerosine distillate	9.2	0.811	43.0	
Gas oil	17.8	0.845	36.0	
Nonviscous lubricating distillate	9.9	0.863-0.884	32.5-28.6	50-100
Medium lubricating distillate	5.6	0.884-0.897	28.6-26.2	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	23.9	0.967	14.8	
Distillation loss	3.4			

Remarks: The sample as received contained no water (A.S.T.M.) and 18 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 2209-54

FIELD: Coleville-Smiley

POOL: Blairmore Sand

ZONE: Blairmore

Well Name: Eureka No. 1

Location: Lsd. 1, Sec. 22, Twp. 31, Rge. 23, W 3rd
Interval tested, depth, feet: 2484-2498

Producing Zone: Blairmore

Geological Age: Lower Cretaceous

Province: Saskatchewan

Sample From: Sask. Dept. of Mineral Resources

Date Sampled: July 27, 1954

Sampled at: Well

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.947

A.P.I. gravity at 60°F.: 17.9

Sulphur, percent by weight: 2.98

Pour point, °F.: -5

Saybolt Universal Viscosity:

Colour: Brownish Black

at 130°F., sec. 1,800

Carbon residue, percent by weight: 10.4
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 760 mm. Hg.
First drop, 70°C. (158°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122									
2.	75	167									
3.	100	212	1.2	1.2	0.720	65.0	-				1.4032
4.	125	257	1.4	2.6	0.743	58.9	23				1.4124
5.	150	302	2.2	4.8	0.766	53.2	27	52.9			1.4236
6.	175	347	2.6	7.4	0.792	47.2	32	50.8			1.4358
7.	200	392	2.7	10.1	0.815	42.1	37	48.7			1.4478
8.	225	437	2.9	13.0	0.837	37.6	42	47.5			1.4597
9.	250	482	3.5	16.5	0.856	33.8	45	45.6			1.4718
10.	275	527	6.2	22.7	0.882	28.9	53	44.2			1.4863

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	1.4	24.1	0.904	25.0	59	-	-	-	1.5070
12.	225	437	4.0	28.1	0.914	23.3	60	46.1	49	-	1.5050
13.	250	482	5.2	33.3	0.928	21.0	64	48.0	65	-	1.5104
14.	275	527	5.1	38.4	0.940	19.0	66	50.1	128	-	1.5220
15.	300	572	7.4	45.8	0.953	17.0	69	53.0	317	Below -5	1.5282
Resi-duum			53.2	99.0	1.042	4.3					

Carbon residue of residuum: 17.7%

Carbon residue of crude: 10.4%

Note: Distillation made on dehydrated crude.

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	1.2	0.720	65.0	
Total gasoline and naphtha	10.1	0.777	50.6	
Kerosine distillate	-	-	-	
Gas oil	16.3	0.874	30.4	
Nonviscous lubricating distillate	7.2	0.915-0.935	23.1-19.8	50-100
Medium lubricating distillate	4.7	0.935-0.945	19.8-18.2	100-200
Viscous lubricating distillate	7.5	0.945-0.961	18.2-15.7	Above 200
Residuum	53.2	1.042	4.3	
Distillation loss	1.0			

Remarks: The sample as received contained 3.9% by vol. water and sediment (by centrifuge) and 140 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 2210-54

FIELD: Coleville-Smiley

POOL: Viking Sand

ZONE: Viking

Well Name: Imperial Smiley No. 7-9-31-25
 Location: Lsd. 7, Sec. 9, Twp. 31, Rge. 25, W 3rd
 Interval tested, depth, feet: 2329-2359
 Producing Zone: Viking
 Geological Age: Lower Cretaceous

Province: Saskatchewan
 Sample From: Sask. Dept. of Mineral Resources
 Date Sampled: August 10, 1954
 Sampled at: Well

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.852
 Sulphur, percent by weight: 0.28
 Saybolt Universal Viscosity:
 at 100°F., sec. 43

A.P.I. gravity at 60°F.: 34.6
 Pour point, °F.: Below -80
 Colour: Brownish Green
 Carbon residue, percent by weight: 2.8
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 765 mm. Hg.
 First drop, 24°C. (75°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122	2.7	2.7	0.653	85.2					
2.	75	167	3.3	6.0	0.682	76.0	13	58.1			1.4020
3.	100	212	5.9	11.9	0.719	65.3	21	52.5			1.4188
4.	125	257	6.9	18.8	0.750	57.2	27	48.6			1.4294
5.	150	302	5.7	24.5	0.773	51.6	30	45.8			1.4406
6.	175	347	4.5	29.0	0.793	46.9	32	45.0			1.4503
7.	200	392	3.6	32.6	0.812	42.8	35	48.1			1.4585
8.	225	437	4.0	36.6	0.827	39.6	37	52.0			1.4677
9.	250	482	4.8	41.4	0.844	36.2	40	55.5			1.4765
10.	275	527	5.8	47.2	0.856	33.8	41	58.5			

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	3.2	50.4	0.870	31.1	43	61.5	39	5	1.4841
12.	225	437	4.9	55.3	0.876	30.0	42	67.1	47	30	1.4872
13.	250	482	4.1	59.4	0.885	28.4	43	71.3	58	50	1.4921
14.	275	527	5.5	64.9	0.895	26.6	45	75.8	83	70	1.4973
15.	300	572	7.0	71.9	0.904	25.0	46	80.4	154	85	1.5066
Resi-duum			27.4	99.3	0.972	14.1					

Carbon residue of residuum: 8.9%

Carbon residue of crude: 2.8%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	11.9	0.694	72.4	
Total gasoline and naphtha	32.6	0.746	58.2	
Kerosine distillate	-	-		
Gas oil	21.5	0.853	34.4	
Nonviscous lubricating distillate	9.6	0.878-0.897	29.7-26.2	50-100
Medium lubricating distillate	8.2	0.897-0.909	26.2-24.2	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	27.4	0.972	14.1	
Distillation loss	0.7			

Remarks: The sample as received contained 8.6% by vol. water and sediment (by centrifuge) and 350 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 93-56

FIELD: Coleville-Smiley

POOL: Buffalo-Coulee Banff

ZONE: Banff

Well Name: Buffalo Coulee No. 1-1

Location: Lsd. 1, Sec. 22, Twp. 32, Rge. 24, W 3rd
Interval tested, depth, feet: 2650

Producing Zone: Banff

Geological Age: Mississippian

Province: Saskatchewan

Sample From: Sask. Dept of Mineral Resources

Date Sampled: March 13, 1956

Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.989

A.P.I. gravity at 60°F.: 11.6

Sulphur, percent by weight: 3.54

Pour point, °F.: 20

Saybolt Universal Viscosity:

Colour: Brownish Black

at 100°F., sec. 7,230

Carbon residue, percent by weight: 12.1

at 130°F., sec. 2,130

(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 765 mm. Hg.
First drop, 196°C. (385°F.)

Fraction No.	Cut at °C.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Viscosity S.U. 100°F.	Cloud Test, °F.
1.	50	122							
2.	75	167							
3.	100	212							
4.	125	257							
5.	150	302							
6.	175	347							
7.	200	392							
8.	225	437	2.8	0.830	39.0	-	50.0		
9.	250	482	2.9	0.853	34.4	44	47.6		
10.	275	527	6.2	0.876	30.0	50	46.2		

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.2	14.1	0.896	26.4	55	46.2	40
12.	225	437	4.6	18.7	0.908	24.3	57	47.3	47
13.	250	482	6.7	25.4	0.924	21.6	62	47.7	67
14.	275	527	5.4	30.8	0.940	19.0	66	48.9	122
15.	300	572	7.9	38.7	0.951	17.3	68	51.9	300
Residuum			61.3	100.0	1.029	6.0			bl-20

Carbon residue of residuum: 18.9%

Carbon residue of crude: 12.1%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	-	-	-	
Total gasoline and naphtha	-	-	-	
Kerosine distillate	-	-	-	
Gas oil	17.3	0.873	30.6	
Nonviscous lubricating distillate	8.4	0.910-0.934	24.0-20.0	50-100
Medium lubricating distillate	5.3	0.934-0.945	20.0-18.2	100-200
Viscous lubricating distillate	7.7	0.945-0.958	18.2-16.2	Above 200
Residuum	61.3	1.029	6.0	
Distillation loss	0.0			

Remarks: The sample as received contained 17.5% by vol. water (A.S.T.M.) and 500 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 99-56

FIELD: Coleville-Smiley

POOL: Smiley-Dewar Viking Chert

ZONE: Viking

Well Name: Co-op Dewar No. 9-11
 Location: Lsd. 9, Sec. 11, Twp. 31, Rge. 26, W 3rd
 Interval tested, depth, feet: 2,487
 Producing Zone: Viking
 Geological Age: Lower Cretaceous

Province: Saskatchewan
 Sample From: Sask. Dept. of Mineral Resources
 Date Sampled: March 20, 1956
 Sampled at: Before Separator

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.856
 Sulphur, percent by weight: 0.25
 Saybolt Universal Viscosity:
 at 100°F., sec. 43

A.P.I. gravity at 60°F.: 33.8
 Pour point, °F.: Below -60
 Colour: Dark Green
 Carbon residue, percent by weight: 2.8
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 756 mm. Hg.
 First drop, 31°C. (88°F.)

Fraction No.	Cut at		Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Viscosity S.U. 100°F.	Cloud Test, °F.
1.	50	122	1.7	1.7	0.650	86.2	-	61.2		
2.	75	167	3.3	5.0	0.679	76.9	12	57.2		
3.	100	212	5.5	10.5	0.713	67.0	18			
4.	125	257	6.0	16.5	0.744	58.7	24	50.8		
5.	150	302	5.5	22.0	0.770	52.3	28	48.6		
6.	175	347	4.9	26.9	0.788	48.1	30	47.2		
7.	200	392	3.7	30.6	0.808	43.6	33	47.8		
8.	225	437	4.0	34.6	0.824	40.2	35	51.0		
9.	250	482	4.7	39.3	0.840	37.0	38	54.6		
10.	275	527	6.2	45.5	0.857	33.6	41	57.6		

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.8	48.3	0.871	31.0	44	60.2	39	-5
12.	225	437	4.8	53.1	0.878	29.7	43	64.0	44	15
13.	250	482	5.7	58.8	0.889	27.7	45	68.8	58	35
14.	275	527	4.5	63.3	0.900	25.7	47	73.0	90	35
15.	300	572	6.1	69.4	0.910	24.0	49	77.6	177	75
Residuum			28.5	97.9	0.973	13.9				

Carbon residue of residuum: 8.8%

Carbon residue of crude: 2.8%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	10.5	0.692	73.0	
Total gasoline and naphtha	30.6	0.746	58.2	
Kerosine distillate	4.0	0.824	40.2	
Gas oil	18.3	0.860	33.0	
Nonviscous lubricating distillate	8.8	0.883-0.901	28.8-25.6	50-100
Medium lubricating distillate	6.0	0.901-0.913	25.6-23.5	100-200
Viscous lubricating distillate	1.7	0.913-0.916	23.5-23.0	Above 200
Residuum	28.5	0.973	13.9	
Distillation loss	2.1			

Remarks: The sample as received contained a trace of water (A.S.T.M.) and 25 lb. salt (as NaCl) per 1000 bbl.

OIL FIELD DATA

Field and Pool: Dollard; Upper Shaunavon

Location: Twp. 7, Rge(s) 19 & 20, W 3rd M

DISCOVERY DETAILS

Method: Artificial Lift

Well: Name: Dollard Crown 5-21-7-20

Completed: June 1953

Perforated: 4500'-4501'; 4532'-4542'

Treatment: None

Initial Potential: 250 BOPD; 0.4% cut

GEOLOGY

Producing Zone(s): Jurassic

Other Shows: None

Trap Type: Stratigraphic Trap

Lithology: Limy Sandstone

Regional Setting: Southwest Saskatchewan

DEVELOPMENT DATA

Total Wells: Completed Oil: 35; Dry and Abandoned: 7

Producing Oil: 33; Suspended Oil: 2

Injection or Disposal: Water: 14

Well Spacing: 160 Acres; Pattern: Wells located in NW Lsd of $\frac{1}{4}$ Sec.

Logging Practice: Induction or Resistivity and Micro logs

Completion Practice: Drill through, set pipe and perforate

RESERVOIR DATA

Type of Drive: Solution Gas

Estimated Oil in Place: 1,238 bbls/acre-foot

Estimated Recoverable Oil: 58 MM S.T.bbls

Oil Zone Thickness: Maximum: 44; Average: 13.9

Porosity: 20.4%; Permeability: 510 md

Area: 10,200 Acres

Oil Characteristics: Gravity: 23 °API; Sulphur: Trace

Pour Point: 0°F.; Initial Solution GOR: 128 cf/B

Base: Asphalt

Pressure Maintenance or Secondary Recovery: Waterflood in Dollard Unit

PRODUCTION

MPR: None; BOPD: 12,550 (August 1965)

Market Outlet: South Saskatchewan Pipeline

Bibliographical Reference: Success of Dollard Waterflood - M.R. Todd, World Oil, July 1965.

SECONDARY RECOVERY

RESERVOIR DATA

- 1) Field: Dollard Unit
- 2) Pool: Upper Shaunavon
- 3) Province: Saskatchewan
- 4) Location: Twp. 7; Rge(s) 19 & 20; W 3rd M
- 5) Operator: Marathon Oil Company
- 6) Project: Dollard Unit
- 7) Reservoir: Jurassic
- 8) Discovery Date: June 1953
- 9) Date Injection Began: March 1956
- 10) Main Structural Feature: Stratigraphic Trap
- 11) Gas Cap: Originally: No; At Present: No
- 12) Time Required for Initial Results: 6 Months
- 13) Initial Results on Production: BHP Oil Rate
- 14) Main Drive in Primary Production: Solution Gas
- 15) Productive Area (acres): Of Project: 10,200; Affected by Injection: 8,200
- 16) Average Depth to Top of Pay (feet): 4,550
- 17) Average Effective Thickness (feet): 13.9
- 18) Average Porosity %: 20.4
- 19) Average Horizontal Permeability (millidarcys): 523
- 20) Connate Water (% of pore space): 15.0
- 21) Viscosity at Initial Reservoir Conditions (centipoises): 7.6
- 22) API Gravity: 23°
- 23) Solution Gas/Oil Ratio at Saturation Pressure (cu.ft/bbl): About 100 at 917 psig
- 24) Bubble Point Pressure: 917 psi
- 25) Original Pressure (psi): 1,711
- 26) Reservoir Pressure at Start of Injection (psi): 1,425
- 27) Latest Reservoir Pressure: 2,198 psi (August 1964)
- 28) Injection Fluid: Salt Water
- 29) Injection Fluid Source: Formation Water Belly River, Blairmore
- 30) System: Closed
- 31) Fluid Treatment before Injection: Filtration, Bactericide
- 32) Injection Pattern: Semi-Peripheral
- 33) Structural Position Injection Wells: Oil Zone

- 34) Distance Injection Wells to Producers: 160 acre spacing
- 35) Number of Injection Wells at Start: 4
- 36) Number of Injection Wells at Present: 14 (August 1965)
- 37) Average Daily Injection Rate per Injection Well at Start: 893 bbls (March 1956)
- 38) Average Daily Injection Rate per Injection Well at Present: 183 $\frac{1}{4}$ B/D (August 1965)
- 39) Average Injection Pressure at Start (psi): 1,900
- 40) Average Injection Pressure at Present (psi): 2,161 (August 1965)
- 41) Number of Producing Wells in Project Area at Start: 4 Wells after 6 Months
- 42) Number of Producing Wells in Project Area at Present: 33 (August 1965)
- 43) Average Production Rate in Project Area at Start (bbls/day): 200
- 44) Average Production Rate in Project Area at Present: 12,550 BOPD (August 1965)
- 45) Original Oil in Place in Project Area (bbls): 175,524,000
- 46) Original Oil Saturation (% of pore space): 95
- 47) Primary Recovery from Project Area when Injection Started (bbls): 832,861
- 48) Oil Saturation at Start of Project (% of pore space):
- 49) Oil Production from Project Area from Start of Injection to now (bbls): 35,337,856
(September 1, 1965)
- 50) Total Volume of Injected Fluids at Present (bbls): 49,487,325 (September 1, 1965)
- 51) Estimated Primary Ultimate Recovery from Project Area (bbls): 14 MM
- 52) Estimated Increase in Ultimate Recovery from Project Area (bbls): 44 MM
- 53) Well Spacing: 160 Acres
- 54) Oil Volume Factor (initial reservoir barrels per Stock-Tank barrel): 0.91

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 141-55

FIELD: Dollard

POOL: Upper Shaunavon

ZONE: Upper Shaunavon

Well Name: Dollard Crown No. 13-15

Location: Lsd. 13, Sec. 15, Twp. 7, Rge. 20, W 3rd

Interval tested, depth, feet: 4520-4575

Producing Zone: Upper Shaunavon

Geological Age: Jurassic

Province: Saskatchewan

Sample From: Sask. Dept. of Mineral Resources

Date Sampled: June 7, 1955

Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.919

A.P.I. gravity at 60°F.: 22.5

Sulphur, percent by weight: 2.87

Pour point, °F.: 5

Saybolt Universal Viscosity:

Colour: Brownish Black

at 100°F., sec. 188

Carbon residue, percent by weight: 9.9

at 130°F., sec. 111

(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 769 mm. Hg.

First drop, 30°C. (86°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122									
2.	75	167	2.7	2.7	0.666	81.0	-	61.0			1.4039
3.	100	212	2.5	5.2	0.705	69.2	14	58.8			1.4138
4.	125	257	3.4	8.6	0.736	60.8	20	55.7			1.4180
5.	150	302	3.5	12.1	0.761	54.4	24	53.5			1.4249
6.	175	347	3.2	15.3	0.783	49.2	28	52.5			1.4360
7.	200	392	2.8	18.1	0.794	46.7	27	52.8			1.4442
8.	225	437	3.1	21.2	0.817	41.7	32	55.1			1.4534
9.	250	482	3.6	24.8	0.835	38.0	35	56.8			1.4628
10.	275	527	6.3	31.1	0.855	34.0	40	57.8			1.4743

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	1.8	32.9	0.869	31.3	43	57.6	39	5	1.4840
12.	225	437	4.3	37.2	0.886	28.2	47	59.4	45	20	1.4909
13.	250	482	4.8	42.0	0.897	26.2	49	61.2	57	40	1.4985
14.	275	527	4.7	46.7	0.915	23.1	54	62.4	81	60	1.5072
15.	300	572	6.3	53.0	0.925	21.5	56	65.6	155	75	1.5162
Resi-duum			45.6	98.6	1.030	5.9					

Carbon residue of residuum: 19.3%

Carbon residue of crude: 9.9%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	5.2	0.685	75.1	
Total gasoline and naphtha	18.1	0.743	58.9	
Kerosine distillate	3.1	0.817	41.7	
Gas oil	15.8	0.860	33.0	
Nonviscous lubricating distillate	8.8	0.891-0.918	27.3-22.6	50-100
Medium lubricating distillate	7.2	0.918-0.931	22.6-20.5	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	45.6	1.030	5.9	
Distillation loss	1.4			

Remarks: The sample as received contained 0.2% by vol. water and sediment (by centrifuge) and 10 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 447-63

FIELD: Elmore

POOL:

ZONE: Frobisher

Well Name: Co-op Canso Climax; South Carrievale
 Location: Lsd. 9, Sec. 4, Twp. 1, Rge. 31, W1 Mer
 Interval tested, depth, feet: 3972-3982
 Producing Zone: Frobisher
 Geological Age: Mississippian

Province: Saskatchewan
 Sample From: Sask. Dept. of Mineral Resources
 Date Sampled: September 3, 1963
 Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.865

A.P.I. gravity at 60°F.: 32.1

Sulphur, percent by weight: 1.65

Pour point, °F.: 15

Saybolt Universal Viscosity:

Colour: Black

at 100°F., sec. 44

Carbon residue, percent by weight: 4.3
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 754 mm. Hg.
First drop, 34°C. (93°F.)

Frac-tion No.	Cut at °F.	Sum per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. 60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion ($N_F - N_C$) 10 ⁴
1.	122	0.7	0.651	85.9	-	-			-	-
2.	167	3.5	0.688	74.2	16	-			1.3953	81.2
3.	212	8.2	0.723	64.2	23	47.0			1.4069	85.2
4.	257	13.5	0.750	57.2	27	44.0			1.4187	89.0
5.	302	18.4	0.767	53.0	27	45.2			1.4274	92.8
6.	347	23.0	0.782	49.5	27	49.0			1.4358	95.2
7.	392	27.5	0.797	46.0	28	52.8			1.4428	96.2
8.	437	31.8	0.809	43.4	28	56.9			1.4493	97.1
9.	482	36.3	0.824	40.2	30	59.8			1.4573	99.8
10.	527	43.1	0.842	36.6	34	63.2			1.4679	106.6

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	47.5	0.862	32.7	39	64.0	38	10	1.4792	116.7
12.	437	52.4	0.872	30.8	40	68.2	44	30	1.4583	120.3
13.	482	57.7	0.885	28.4	43	71.9	54	55	1.4921	124.1
14.	527	63.7	0.897	26.3	46	75.6	77	65	1.5009	130.8
15.	572	69.9	0.910	24.0	49	79.9	144	85	1.5101	145.7
Resi-duum		98.4	0.993	11.0						

Carbon residue of residuum: 13.1%

Carbon residue of crude: 4.3%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	8.2	0.705	69.2	
Total gasoline and naphtha	27.5	0.753	56.4	
Kerosine distillate	8.8	0.817	41.7	
Gas oil	16.6	0.857	33.6	Below 50
Nonviscous lubricating distillate	9.9	0.880-0.902	29.3-25.4	50-100
Medium lubricating distillate	7.1	0.902-0.917	25.4-22.8	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	28.5	0.993	11.0	
Distillation loss	1.6			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 445-63

FIELD: Elmore

POOL:

ZONE: Midale

Well Name: Co-op Canso Climax; South Carievale
Location: Lsd. 9, Sec. 4, Twp. 1, Rge. 31, Wl Mer
Interval tested, depth, feet: 3851-3877
Producing Zone: Midale
Geological Age: Mississippian

Province: Saskatchewan
Sample From: Sask. Dept. of Mineral Resources
Date Sampled: September 3, 1963
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.841
Sulphur, percent by weight: 0.75
Saybolt Universal Viscosity:
at 100°F., sec. 38

A.P.I. gravity at 60°F.: 36.8
Pour point, °F.: 30
Colour: Brownish Black
Carbon residue, percent by weight: 2.4
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 760 mm. Hg.
First drop, 30°C. (86°F.)

Frac- tion No.	Cut	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60F.	Corre- lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122	2.1	0.651	85.9	-	-			-	-
2.	167	5.3	0.684	75.4	14	-			1.3892	82.2
3.	212	10.6	0.722	64.5	22	50.1			1.4034	82.0
4.	257	18.0	0.748	57.7	26	47.6			1.4160	86.3
5.	302	23.7	0.769	52.5	28	48.0			1.4270	91.6
6.	347	29.1	0.785	48.8	29	50.0			1.4356	95.2
7.	392	34.1	0.798	45.8	29	53.9			1.4429	99.0
8.	437	38.9	0.812	42.8	30	58.2			1.4502	101.5
9.	482	44.2	0.826	39.8	31	61.4			1.4587	104.0
10.	527	50.4	0.841	36.8	33	65.5			1.4681	109.6

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	54.6	0.859	33.2	38	68.0	38	15	1.4777	117.7
12.	437	60.0	0.870	31.1	39	72.0	44	35	1.4829	119.9
13.	482	65.1	0.882	28.9	42	75.5	56	55	1.4893	122.0
14.	527	69.5	0.891	27.3	43	80.0	81	75	1.4963	127.3
15.	572	75.1	0.901	25.6	45	85.1	142	95	1.5069	138.4
Resi- duum		97.5	0.967	14.8						

Carbon residue of residuum: 9.2%

Carbon residue of crude: 2.4%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	10.6	0.696	71.8	
Total gasoline and naphtha	34.1	0.749	57.4	
Kerosine distillate	4.8	0.812	42.8	
Gas oil	21.0	0.848	35.4	Below 50
Nonviscous lubricating distillate	9.0	0.876-0.894	30.0-26.8	50-100
Medium lubricating distillate	6.2	0.894-0.907	26.8-24.5	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	22.4	0.967	14.8	
Distillation loss	2.5			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 2118-54a

FIELD: Forget

POOL: Mission Canyon

ZONE: Mission Canyon

Well Name: Tide Water Forget Crown No. 1
Location: Lsd. 2, Sec. 11, Twp. 9, Rge. 7, W 2nd
Interval tested, depth, feet: 3884-3906
Producing Zone: Mission Canyon
Geological Age: Mississippian

Province: Saskatchewan
Sample From: Sask. Dept. of Mineral Resources
Date Sampled: July 27, 1954
Sampled at: Well

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.871
Sulphur, percent by weight: 2.06
Saybolt Universal Viscosity:
at 77°F., sec. 85
at 100°F., sec. 76

A.P.I. gravity at 60°F.: 31.0
Pour point, °F.: 15
Colour: Brownish Black
Carbon residue, percent by weight: 5.7
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 759 mm. Hg.
First drop, 26°C. (79°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122	2.0	2.0	-	-	-	-			1.3830
2.	75	167	2.9	4.9	0.683	75.7	-	-			1.3893
3.	100	212	3.9	8.8	0.722	64.5	22	53.0			1.4041
4.	125	257	5.3	14.1	0.747	57.9	25	48.2			1.4150
5.	150	302	4.5	18.6	0.766	53.2	27	49.0			1.4256
6.	175	347	4.8	23.4	0.783	49.2	28	51.0			1.4344
7.	200	392	3.5	26.9	0.798	45.8	29	53.5			1.4421
8.	225	437	4.3	31.2	0.812	42.8	30	57.4			1.4502
9.	250	482	4.7	35.9	0.827	39.6	31	59.1			1.4586
10.	275	527	6.1	42.0	0.846	35.8	36	61.0			1.4694

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	3.7	45.7	0.868	31.5	42	62.5	40	15	1.4811
12.	225	437	5.6	51.3	0.877	29.8	43	65.3	46	35	1.4866
13.	250	482	5.5	56.8	0.891	27.3	46	66.5	60	50	1.4945
14.	275	527	5.4	62.2	0.904	25.0	49	71.4	95	75	1.5057
15.	300	572	5.8	68.0	0.918	22.6	53	75.3	182	95	1.5158
Resi-duum			29.2	97.2	1.007	9.0					

Carbon residue of residuum: 16.9%

Carbon residue of crude: 5.7%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	8.8	0.700	70.6	
Total gasoline and naphtha	26.9	0.748	57.7	
Kerosine distillate	4.3	0.812	42.8	
Gas oil	18.9	0.852	34.6	
Nonviscous lubricating distillate	9.8	0.881-0.905	29.1-24.8	50-100
Medium lubricating distillate	6.4	0.905-0.921	24.8-22.1	100-200
Viscous lubricating distillate	1.7	0.921-0.925	22.1-21.5	Above 200
Residuum	29.2	1.007	9.0	
Distillation loss	2.8			

Remarks: The sample as received contained 2.6% by vol. water and sediment (by centrifuge) and 1150 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 2182-54a

FIELD: Fosterton

POOL: Roseray Sand

ZONE: Blairmore

Well Name: Socony-Woodley-Southern, Fosterton No. 2-12B Province: Saskatchewan
Location: Lsd. 12, Sec. 2, Twp. 17, Rge. 18, W 3rd Sample From: Sask. Dept. of Mineral Resources
Interval tested, depth, feet: 3153-3164 Date Sampled: August 2, 1954
Producing Zone: Blairmore Sampled at: Well
Geological Age: Lower Cretaceous

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.919

A.P.I. gravity at 60°F.: 22.5

Sulphur, percent by weight: 2.76

Pour point, °F.: 10

Saybolt Universal Viscosity:

Colour: Brownish Black

at 100°F., sec. 247

Carbon residue, percent by weight: 7.9

at 130°F., sec. 149

(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 762 mm. Hg.
First drop, 30°C. (86°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122	1.0	1.0							
2.	75	167	1.4	2.4	0.677	77.5	-	-			
3.	100	212	2.1	4.5	0.706	68.9	15	59.5			
4.	125	257	2.9	7.4	0.728	62.9	16	57.9			
5.	150	302	3.5	10.9	0.752	56.7	20	56.2			
6.	175	347	3.5	14.4	0.775	51.1	24	55.5			
7.	200	392	2.8	17.2	0.796	46.3	28	54.0			
8.	225	437	3.5	20.7	0.812	42.8	30	56.5			
9.	250	482	3.7	24.4	0.829	39.2	32	58.3			
10.	275	527	5.9	30.3	0.848	35.4	37	60.4			

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.7	33.0	0.870	31.1	43	61.0	40	15	1.4819
12.	225	437	3.9	36.9	0.880	29.3	44	62.0	45	30	1.4872
13.	250	482	5.3	42.2	0.892	27.1	46	63.5	55	45	1.4949
14.	275	527	5.4	47.6	0.910	24.0	52	64.9	82	65	1.5048
15.	300	572	7.7	55.3	0.924	21.6	55	68.5	167	85	1.5153
Residuum			44.1	99.4	1.022	7.0					

Carbon residue of residuum: 16.1%

Carbon residue of crude: 7.9%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	4.5	0.691	73.3	
Total gasoline and naphtha	17.2	0.744	58.7	
Kerosine distillate	3.5	0.812	42.8	
Gas oil	16.5	0.855	34.0	
Nonviscous lubricating distillate	9.1	0.886-0.913	28.2-23.5	50-100
Medium lubricating distillate	7.7	0.913-0.929	23.5-20.8	100-200
Viscous lubricating distillate	1.3	0.929-0.932	20.8-20.3	Above 200
Residuum	44.1	1.022	7.0	
Distillation loss	0.6			

Remarks: The sample as received contained 0.3% by vol. water and sediment (by centrifuge) and and 3 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 144-56

FIELD: Frobisher

POOL: Frobisher Mission Canyon

ZONE: Mission Canyon

Well Name: Gulf Moffatt No. 13

Location: Lsd. 13, Sec. 35, Twp. 3, Rge. 4, W 2nd
Interval tested, depth, feet: 4620-4694

Producing Zone: Mission Canyon

Geological Age: Mississippian

Province: Saskatchewan

Sample From: Sask. Dept. of
Mineral Resources

Date Sampled: March 20, 1956

Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.822

Sulphur, percent by weight: 0.56

Saybolt Universal Viscosity:
at 100°F., sec. 35

A.P.I. gravity at 60°F.: 40.6

Pour point, °F.: 35

Colour: Dark Green

Carbon residue, percent by weight: 1.1
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 762 mm. Hg.
First drop, 26°C. (79°F.)

Fraction No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Viscosity S.U. 100°F.	Cloud Test, °F.
1.	50	122	2.2	2.2	0.650	86.2	-			
2.	75	167	3.4	5.6	0.680	76.6	12			
3.	100	212	6.3	11.9	0.718	65.6	20	50.5		
4.	125	257	7.8	19.7	0.744	58.7	24	46.4		
5.	150	302	6.5	26.2	0.766	53.2	27	46.0		
6.	175	347	5.9	32.1	0.782	49.4	27	48.0		
7.	200	392	5.0	37.1	0.795	46.5	27	52.4		
8.	225	437	5.2	42.3	0.810	43.2	29	57.3		
9.	250	482	5.6	47.9	0.823	40.4	30	61.3		
10.	275	527	6.6	54.5	0.840	37.0	33	64.9		

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	4.1	58.6	0.855	34.0	36	66.9	38	5
12.	225	437	5.3	63.9	0.866	31.9	37	71.0	44	30
13.	250	482	5.3	69.2	0.876	29.7	40	75.2	56	50
14.	275	527	4.7	73.9	0.888	27.8	41	79.6	77	70
15.	300	572	5.0	78.9	0.896	26.4	42	85.0	131	90
Residuum			18.3	97.2	0.946	18.1				

Carbon residue of residuum: 5.2%

Carbon residue of crude: 1.1%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	11.9	0.695	72.1	
Total gasoline and naphtha	37.1	0.745	58.4	
Kerosine distillate	10.8	0.817	41.7	
Gas oil	16.0	0.852	34.6	
Nonviscous lubricating distillate	9.7	0.872-0.891	30.8-27.3	50-100
Medium lubricating distillate	5.3	0.891-0.900	27.3-25.7	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	18.3	0.946	18.1	
Distillation loss	2.8			

Remarks: The sample as received contained no water (A.S.T.M.) and 2 lb. salt (As NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 449-63

FIELD: Gainsborough

POOL:

ZONE: Frobisher

Well Name: Imperial Gainsborough 9-19-2-30

Location: Lsd. 9, Sec. 19, Twp. 2, Rge. 30, Wl Mer
Interval tested, depth, feet: 3500-3519
Producing Zone: Frobisher-Alida
Geological Age: Mississippian

Province: Saskatchewan

Sample From: Sask. Dept. of Mineral Resources

Date Sampled: September 5, 1963
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.858
Sulphur, percent by weight: 1.53
Saybolt Universal Viscosity:
at 77°F., sec. 42

A.P.I. gravity at 60°F.: 33.4
Pour point, °F.: 15
Colour: Brownish Black
Carbon residue, percent by weight: 4.0
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 750 mm. Hg.
First drop, 28°C. (82°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122	2.0	0.654	84.9	-	-			-	-
2.	167	5.2	0.689	73.9	17	-			1.3911	77.0
3.	212	9.5	0.722	64.5	22	50.0			1.4050	80.9
4.	257	14.8	0.746	58.2	25	47.8			1.4152	84.9
5.	302	20.7	0.766	53.2	27	48.2			1.4254	89.8
6.	347	24.9	0.781	49.7	27	50.8			1.4342	93.7
7.	392	29.3	0.796	46.3	28	53.6			1.4424	94.8
8.	437	33.7	0.810	43.2	29	58.2			1.4501	97.2
9.	482	38.6	0.825	40.0	31	60.1			1.4588	100.1
10.	527	44.8	0.842	36.6	34	63.6			1.4688	108.3

Stage 2 - Distillation continued at 40 mm. Hg. pressure

	11.	392	48.5	0.862	32.7	39	65.1	38	10	1.4791	116.7
	12.	437	53.4	0.872	30.8	40	68.0	44	35	1.4853	118.9
	13.	482	58.5	0.884	28.6	43	71.1	55	60	1.4918	125.2
	14.	527	64.3	0.898	26.1	46	75.2	76	75	1.4988	130.4
Resi-duum	15.	572	70.7	0.907	24.5	47	80.1	134	90	1.5109	140.5
Carbon residue of residuum:	98.1	98.1	0.990	11.4							

Carbon residue of crude: 4.0%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	9.5	0.697	71.5	
Total gasoline and naphtha	29.3	0.747	57.9	
Kerosine distillate	9.3	0.818	41.5	
Gas oil	15.0	0.857	33.6	Below 50
Nonviscous lubricating distillate	10.3	0.878-0.902	29.7-25.4	50-100
Medium lubricating distillate	6.8	0.902-0.912	25.4-23.7	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	27.4	0.990	11.4	
Distillation loss	1.9			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 188-58

FIELD: Glen Ewen

POOL:

ZONE: Midale

Well Name: Okalta Beysel Glen Ewen 3-14
 Location: Lsd. 3, Sec. 14, Twp. 3, Rge. 1, Mer W2
 Interval tested, depth, feet: 4170-4299
 Producing Zone: Midale
 Geological Age: Mississippian

Province: Saskatchewan
 Sample From: Sask. Dept. of Mineral Resources
 Date Sampled: June 3, 1958
 Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60° F.: 0.829	A.P.I. Gravity at 60° F.: 39.2
Sulphur, percent by weight: 0.41	Pour point, °F.: 40
Saybolt Universal Viscosity: at 100° F., sec. 35	Colour: Brownish Black
	Carbon residue, percent by weight: 1.0 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 765 mm. Hg.
First drop, 34°C. (93°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122	0.7	0.655	84.5						
2.	167	5.2	0.680	76.6	12					
3.	212	9.8	0.719	65.3	21	54.2				
4.	257	17.7	0.747	57.9	25	46.0				
5.	302	24.8	0.767	53.0	27	45.6				
6.	347	30.7	0.781	49.7	27	47.9				
7.	392	35.8	0.794	46.7	27	52.9				
8.	437	41.8	0.808	43.6	28	58.5				
9.	482	47.4	0.822	40.6	29	62.4				
10.	527	54.3	0.840	37.0	33	65.8				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	59.2	0.858	33.4	37	69.0	39	20		
12.	437	63.9	0.866	31.9	38	73.6	46	45		
13.	482	69.8	0.877	29.8	39	78.1	58	65		
14.	527	74.7	0.887	28.0	41	82.6	84	80		
15.	572	80.1	0.896	26.4	42	87.0	148	95		
Resi-duum		97.2	0.945	18.2						

Carbon residue of residuum: 5.2%

Carbon residue of crude: 1.0%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	9.8	0.697	71.5	
Total gasoline and naphtha	35.8	0.750	57.2	
Kerosine distillate	11.6	0.815	42.1	
Gas oil	16.3	0.853	34.4	Below 50
Nonviscous lubricating distillate	9.8	0.870-0.889	31.1-27.7	50-100
Medium lubricating distillate	6.6	0.889-0.900	27.7-25.7	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	17.1	0.945	18.2	
Distillation loss	2.8			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 142-55

FIELD: Gull Lake

POOL: North Upper Shaunavon

ZONE: Upper Shaunavon

Well Name: Gull Lake No. 14-23A	Province: Saskatchewan
Location: Lsd. 14, Sec. 23, Twp. 13, Rge. 19, W 3rd	Sample From: Sask. Dept. of Mineral Resources
Interval tested, depth, feet: 3745-3792	
Producing Zone: Upper Shaunavon	Date Sampled: May 30, 1955
Geological Age: Jurassic	Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.921
 Sulphur, percent by weight: 2.91
 Saybolt Universal Viscosity:
 at 100°F., sec. 203
 at 130°F., sec. 115

A.P.I. gravity at 60°F.: 22.1
 Pour point, °F.: 10
 Colour: Brownish Black
 Carbon residue, percent by weight: 7.7
 (Conradson)

DISTILLATION
 (U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 760 mm. Hg.
 First drop, 46°C. (115°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122									1.4010
2.	75	167									1.4103
3.	100	212	3.2	3.2	0.699	70.9	-	60.2			1.4221
4.	125	257	2.8	6.0	0.734	61.3	19	57.0			1.4339
5.	150	302	3.1	9.1	0.761	54.4	24	55.0			1.4448
6.	175	347	3.5	12.6	0.782	49.4	27	53.0			1.4539
7.	200	392	3.2	15.8	0.802	44.9	31	52.8			1.4626
8.	225	437	3.3	19.1	0.819	41.3	33	53.8			1.4724
9.	250	482	3.9	23.0	0.836	37.8	36	56.6			
10.	275	527	6.0	29.0	0.853	34.4	39	59.0			

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.9	31.9	0.870	31.1	43	59.0	39	0	1.4818
12.	225	437	5.1	37.0	0.881	29.1	45	61.8	44	20	1.4880
13.	250	482	5.4	42.4	0.895	26.6	48	64.4	56	45	1.4965
14.	275	527	5.9	48.3	0.910	24.0	52	66.4	86	60	1.5058
15.	300	572	6.7	55.0	0.920	22.3	54	69.6	156	80	1.5149
Residuum			44.0	99.0	1.030	5.9					

Carbon residue of residuum: 15.7% Carbon residue of crude: 7.7%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	3.2	0.699	70.9	
Total gasoline and naphtha	15.8	0.757	55.4	
Kerosine distillate	3.3	0.819	41.3	
Gas oil	18.0	0.860	33.0	
Nonviscous lubricating distillate	9.5	0.888-0.912	27.8-23.6	50-100
Medium lubricating distillate	8.4	0.912-0.925	23.6-21.5	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	44.0	1.030	5.9	
Distillation loss	1.0			

Remarks: The sample as received contained 0.2% by vol. water and sediment (by centrifuge) and 18 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 444-56

FIELD: Gull Lake

POOL: SE Midway Upper Shaunavon

ZONE: J-2-A, Upper Shaunavon

Well Name: Secony-Woodley-Southern, S.E. Midway
No. 3-10A

Province: Saskatchewan
Sample From: Sask. Dept. of
Mineral Resources

Location: Lsd. 10, Sec. 3, Twp. 14, Rge. 19, W 3rd.
Interval tested, depth, feet: 3713-3741

Date Sampled: November 19, 1956
Sampled at: Battery No. 35, after
Separator

Producing Zone: J-2-A, Upper Shaunavon
Geological Age: Jurassic

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.924

A.P.I. gravity at 60°F.: 21.6

Sulphur, percent by weight: 2.98

Pour point, °F.: -30

Saybolt Universal Viscosity:

Colour: Brownish Black

at 100°F., sec. 199

Carbon residue, percent by weight; 6.5
(Conradson)

at 130°F., sec. 120

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 756 mm. Hg.
First drop, 450°C. (113°F.)

Fraction No.	Cut at		Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Viscosity S.U. 100°F.	Cloud Test, °F.
	°C.	°F.								
1.	50	122								
2.	75	167	2.9	2.9	0.683	75.7	-			
3.	100	212	1.6	4.5	0.712	67.2	18			
4.	125	257	1.5	6.0	0.733	61.5	18	57.5		
5.	150	302	2.2	8.2	0.756	55.7	22	55.1		
6.	175	347	3.3	11.5	0.779	50.1	26	52.3		
7.	200	392	2.9	14.4	0.800	45.4	30	50.3		
8.	225	437	3.2	17.6	0.819	41.3	33	50.6		
9.	250	482	3.9	21.5	0.838	37.4	37	52.9		
10.	275	527	6.4	27.9	0.857	33.6	41	54.8		

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.5	30.4	0.873	30.6	45	56.4	38	0
12.	225	437	5.4	35.8	0.886	28.2	47	58.0	45	15
13.	250	482	4.6	40.4	0.900	25.7	50	60.6	58	35
14.	275	527	4.8	45.2	0.913	23.5	53	63.4	86	55
15.	300	572	7.6	52.8	0.925	21.5	56	66.3	170	80
Residuum			45.6	98.4	1.021	7.1				

Carbon residue of residuum: 12.9%

Carbon residue of crude: 6.5%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	4.5	0.693	72.7	
Total gasoline and naphtha	14.4	0.748	57.7	
Kerosine distillate	3.2	0.819	41.3	
Gas oil	17.4	0.862	32.6	
Nonviscous lubricating distillate	8.8	0.891-0.915	27.3-23.1	50-100
Medium lubricating distillate	7.4	0.915-0.929	23.1-20.8	100-200
Viscous lubricating distillate	1.6	0.929-0.932	20.8-20.3	Above 200
Residuum	45.6	1.021	7.1	
Distillation loss	1.6			

Remarks: The sample as received contained a trace of water (A.S.T.M.) and 12 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 115-56

FIELD: Hastings

POOL: Mission Canyon

ZONE: Mission Canyon

Well Name: Imperial Hastings No. 10-35M-4-33
 Location: Lsd. 10, Sec. 35, Twp. 4, Rge. 33, W.P.M.
 Interval tested, depth, feet: 3735-3772
 Producing Zone: Mission Canyon
 Geological Age: Mississippian

Province: Saskatchewan
 Sample From: Sask. Dept. of Mineral Resources
 Date Sampled: February 7, 1956
 Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.830
 Sulphur, percent by weight: 0.65
 Saybolt Universal Viscosity:
 at 100°F., sec. 36

A.P.I. gravity at 60°F.: 39.0
 Pour point, °F.: 0
 Colour: Brownish Green
 Carbon residue, percent by weight: 1.3
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 750 mm. Hg.
 First drop, 28°C. (82°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122	1.3	1.3							-
2.	75	167	2.8	4.1	0.684	75.4	-				1.4032
3.	100	212	5.5	9.6	0.717	65.8	20	51.0			1.4183
4.	125	257	7.4	17.0	0.742	59.2	23	46.1			1.4240
5.	150	302	7.1	24.1	0.763	54.0	25	46.8			1.4353
6.	175	347	6.1	30.2	0.778	50.4	25	48.7			1.4423
7.	200	392	4.9	35.1	0.792	47.2	26	53.0			1.4496
8.	225	437	5.2	40.3	0.806	44.1	27	57.0			1.4575
9.	250	482	5.3	45.6	0.819	41.3	28	61.5			1.4671
10.	275	527	6.8	52.4	0.836	37.8	31	64.8			

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	3.3	55.7	0.854	34.2	36	66.9	38	5	1.4770
12.	225	437	5.1	60.8	0.861	32.8	35	70.2	43	25	1.4814
13.	250	482	5.9	66.7	0.872	30.8	37	75.2	54	45	1.4882
14.	275	527	4.5	71.2	0.883	28.8	39	79.1	73	65	1.4945
15.	300	572	6.1	77.3	0.895	26.6	42	84.2	122	90	1.5020

Residuum Carbon residue of residuum: 5.7% Carbon residue of crude: 1.3%

APPROXIMATE SUMMARY

Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	9.6	0.703	69.8
Total gasoline and naphtha	35.1	0.749	57.4
Kerosine distillate	10.5	0.813	42.6
Gas oil	16.1	0.849	35.2
Nonviscous lubricating distillate	10.1	0.868-0.889	31.5-27.7
Medium lubricating distillate	5.5	0.889-0.902	27.7-25.4
Viscous lubricating distillate	-	-	-
Residuum	19.6	0.948	17.8
Distillation loss	3.1		

Remarks: The sample as received contained no water (A.S.T.M.) and 2 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 232-58

FIELD: Hastings

POOL:

ZONE: Frobisher

Well Name: Rio Palmer Crystal Wood 16-22
Location: Lsd. 16, Sec. 22, Twp. 3, Rge. 34, WPM
Interval tested, depth, feet: 4065-4079
Producing Zone: Frobisher
Geological Age: Mississippian

Province: Saskatchewan
Sample From: Sask. Dept. of
Mineral Resources
Date Sampled: June 20, 1958
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.844
Sulphur, percent by weight: 1.04
Saybolt Universal Viscosity:
at 100°F., sec. 38

A.P.I. Gravity at 60°F.: 36.2
Pour point, °F.: 20
Colour: Brownish Black
Carbon residue, percent by weight: 2.4
(Conradson)

DISTILLATION
(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 764 mm. Hg.
First drop, 32°C. (90°F.)

Frac-tion No.	Cut at 0F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. 60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, OF.	Refractive Index @ 20°C.	Dispersion (N _F -N _G) 10 ⁴
1.	122	1.7	0.648	86.9						
2.	167	6.6	0.682	76.0	13					
3.	212	11.3	0.724	63.9	23	48.7				
4.	257	17.6	0.752	56.7	27	44.5				
5.	302	24.2	0.771	52.0	29	44.7				
6.	347	29.5	0.786	48.5	29	47.2				
7.	392	34.7	0.800	45.4	30	52.6				
8.	437	38.8	0.814	42.3	31	56.1				
9.	482	43.9	0.827	39.6	31	61.0				
10.	527	50.5	0.846	35.8	36	64.0				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	53.2	0.862	32.6	39	66.2	39	20		
12.	437	58.0	0.870	31.1	39	68.8	44	40		
13.	482	63.4	0.882	28.9	42	73.7	55	60		
14.	527	68.1	0.894	26.8	44	77.0	76	75		
15.	572	74.1	0.905	24.8	46	81.3	133	95		
Resi-duum		97.0	0.974	13.8						

Carbon residue of residuum: 9.2%

Carbon residue of crude: 2.4%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	11.3	0.694	72.4	
Total gasoline and naphtha	34.7	0.749	57.4	
Kerosine distillate	4.1	0.814	42.3	
Gas oil	19.6	0.850	35.0	Below 50
Nonviscous lubricating distillate	9.6	0.877-0.898	30.0-26.1	50-100
Medium lubricating distillate	6.1	0.898-0.910	26.1-24.0	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	22.9	0.974	13.8	
Distillation loss	3.0			

OIL FIELD DATA

Field and Pool: Instow; Upper Shaunavon

Location: Twp(s) 9 & 10; Rge(s) 18 & 19; W 3rd M

DISCOVERY DETAILS

Method: Artificial Lift

Well: Name: Instow Crown 1-34-9-18

Completed: July 13, 1954

Perforated: 4548'-4558'

Treatment: None

Initial Potential: 175 BOPD; 0.1% cut

GEOLOGY

Producing Zone(s): Jurassic

Other Shows: None

Trap Type: Stratigraphic Trap

Lithology: Limy Sandstone

Regional Setting: Southwest Saskatchewan

DEVELOPMENT DATA

Total Wells: Completed Oil: 39; Dry and Abandoned: 3

Producing Oil: 39; Suspended Oil: 0

Injection or Disposal: Water: 14

Well Spacing: 160 Acres; Pattern: Lsd.'s 1, 3, 9 or 11 (generally)

Logging Practice: Induction or Resistivity and Micro logs

Completion Practice: Drill through, set pipe and perforate

RESERVOIR DATA

Type of Drive: Solution Gas

Estimated Oil in Place: 956 bbls/acre-foot

Estimated Recoverable Oil: 34MM S.T.bbls

Oil Zone Thickness: Maximum: 44'; Average: 14.9'

Gas Zone Thickness: 0

Porosity: 13.8%; Permeability: 117 md

Area: 10,500 Acres

Oil Characteristics: Gravity: 23°API; Sulphur: 3.0%

Pour Point: 20°F.; Initial Solution GOR: 86 cf/B;

Base: Asphalt

Pressure Maintenance or Secondary Recovery: Waterflood in Instow Unit

PRODUCTION

MPR: None; BOPD: 8,955 (August 1965)

Market Outlet: South Saskatchewan Pipeline

SECONDARY RECOVERY

RESERVOIR DATA

- 1) Field: Instow Unit
- 2) Pool: Upper Shaunavon
- 3) Province: Saskatchewan
- 4) Location: Twp(s) 9 & 10; Rge(s) 18 & 19; W 3rd M
- 5) Operator: Marathon Oil Company
- 6) Project: Instow Unit
- 7) Reservoir: Jurassic
- 8) Discovery Date: July 1954
- 9) Date Injection Began: December 1957
- 10) Main Structural Feature: Stratigraphic Trap
- 11) Gas Cap: Originally: No; At Present: No
- 12) Time Required for Initial Results:
- 13) Initial Results on Production, BHP, GOR, etc:
- 14) Main Drive in Primary Production: Solution Gas
- 15) Productive area(acres) of Project: 10,500; Affected by Injection: 5,757
- 16) Average Depth to Top of Pay (feet): 4,550
- 17) Average Effective Thickness (feet): 14.9
- 18) Average Porosity %: 13.8
- 19) Average Horizontal Permeability (millidarcys): 310
- 20) Connate Water (% of Pore Space): 5.0
- 21) Viscosity at Initial Reservoir Conditions (centipoises): 12.1
- 22) API Gravity: 23°
- 23) Solution Gas/Oil Ratio at Saturation Pressure (cu.ft/bbl): About 85 at 694 psig
- 24) Bubble Point Pressure (psi): 813
- 25) Original Pressure (psi): 1,787

- 26) Reservoir Pressure at Start of Injection (psi): 1,600
- 27) Latest Reservoir Pressure: 1,846 psi (September 1964)
- 28) Injection Fluid: Salt Water
- 29) Injection Fluid Source: Formation
- 30) System: Closed
- 31) Fluid Treatment before Injection: Filtration, Bactericide
- 32) Injection Pattern: Peripheral
- 33) Structural Position Injection Wells: Oil Zone
- 34) Distance from Injection Wells to Producers (feet):
- 35) Number of Injection Wells at Start: One
- 36) Number of Injection Wells at Present: 14 (August 1965)
- 37) Average Daily Injection Rate per Injection Well at Start: 3,800 B/D (December 1957)
- 38) Average Daily Injection Rate per Injection Well at Present: 1,418 B/D (August 1965)
- 39) Average Injection Pressure at Start (psi): 1,600
- 40) Average Injection Pressure, August 1965 (psi): Stn. 1: 2,385; Stn. 2: 1,500;
Stn. 3: 1,975
- 41) Number of Producing Wells in Project Area at Start: 4 after 6 months
- 42) Number of Producing Wells in Project Area at Present: 39 (August 1965)
- 43) Average Production Rate in Project Area at Start (bbls/day):
- 44) Average Production Rate in Project Area at Present: 8,955 BOPD (August 1965)
- 45) Original Oil in Place in Project Area (bbls): 149,566,000
- 46) Primary Recovery from Project Area when Injection Started (bbls): 799,243
- 47) Oil Production from Project Area from Start of Injection to Now (bbls): 16,713,332
(September 1, 1965)
- 48) Total Volume of Injected Fluids at Present (bbls): 21,982,469 (September 1, 1965)
- 49) Well Spacing: 160 Acres

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 143-56

FIELD: Kingsford

POOL: Charles

ZONE: Charles

Well Name: Dillman Et Al Margaret Thompson No. 1-27
 Location: Lsd. 1, Sec. 27, Twp. 4, Rge. 2, W 2nd
 Interval tested, depth, feet: 4857-4870
 Producing Zone: Charles
 Geological Age: Mississippian

Province: Saskatchewan
 Sample From: Sask. Dept. of Mineral Resources
 Date Sampled: April 24, 1956
 Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.880
 Sulphur, percent by weight: 1.98
 Saybolt Universal Viscosity:
 at 70°F., sec. 77
 at 100°F., sec. 55

A.P.I. gravity at 60°F.: 29.3
 Pour point, °F.: 25
 Colour: Brownish Black
 Carbon residue, percent by weight: 5.5
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 760 mm. Hg.
First drop, 32°C. (90°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre- lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122									1.3953
2.	75	167	2.3	2.3	0.677	77.5	-	-			1.4033
3.	100	212	4.1	6.4	0.719	65.3	21	46.6			1.4186
4.	125	257	4.7	11.1	0.751	56.9	27	41.8			1.4285
5.	150	302	4.3	15.4	0.768	52.7	27	42.7			1.4359
6.	175	347	4.4	19.8	0.781	49.7	27	46.6			1.4429
7.	200	392	4.7	24.5	0.792	47.2	26	51.0			1.4498
8.	225	437	3.5	28.0	0.807	43.8	27	55.3			1.4580
9.	250	482	4.4	32.4	0.822	40.6	29	58.7			1.4685
10.	275	527	6.1	38.5	0.839	37.2	32	60.4			

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	4.5	43.0	0.865	32.1	41	60.0	38	10	1.4820
12.	225	437	5.2	48.2	0.875	30.2	42	64.4	44	35	1.4892
13.	250	482	5.8	54.0	0.890	27.5	46	67.6	54	55	1.4973
14.	275	527	5.4	59.4	0.904	25.0	49	71.1	80	75	1.5069
15.	300	572	5.7	65.1	0.914	23.3	51	74.4	137	90	-
Resi-duum			33.5	98.6	0.997	10.4					

Carbon residue of residuum: 14.6%

Carbon residue of crude: 5.5%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
		6.4	0.704	69.5
Light gasoline				
Total gasoline and naphtha	24.5	0.755	55.9	
Kerosine distillate	7.9	0.815	42.1	
Gas oil	16.5	0.859	33.2	
Nonviscous lubricating distillate	9.7	0.884-0.907	28.6-24.5	50-100
Medium lubricating distillate	6.5	0.907-0.919	24.5-22.5	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	33.5	0.997	10.4	
Distillation loss	1.4			

Remarks: The sample as received contained no water (A.S.T.M.) and 27 lb salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 118-56

FIELD: Lampman

POOL: Charles

ZONE: Charles

Well Name: Canadian Gulf Walter No. 5
Location: Lsd. 5, Sec. 14, Twp. 5, Rge. 6, W 2nd
Interval tested, depth, feet: 4448-4466
Producing Zone: Charles
Geological Age: Mississippian

Province: Saskatchewan
Sample From: Sask. Dept. of Mineral Resources
Date Sampled: February 7, 1956
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.844
Sulphur, percent by weight: 1.34
Saybolt Universal Viscosity:
at 100°F., sec. 39

A.P.I. gravity at 60°F.: 36.2
Pour point, °F.: 10
Colour: Brownish Black
Carbon residue, percent by weight: 2.8
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 755 mm. Hg.
First drop, 32°C. (90°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122	1.3	1.3	0.676	77.8	-	-			-
2.	75	167	3.0	4.3	0.714	66.7	18	51.3			-
3.	100	212	5.0	9.3	0.741	59.5	22	47.6			1.4006
4.	125	257	6.4	15.7	0.760	54.7	24	47.8			1.4143
5.	150	302	5.3	21.0	0.775	51.1	24	50.4			1.4250
6.	175	347	4.9	25.9	0.805	47.6	25	53.7			1.4332
7.	200	392	4.7	30.6	0.821	44.3	26	57.9			1.4408
8.	225	437	5.7	36.3	0.853	40.8	29	61.5			1.4493
9.	250	482	4.3	40.6	0.882	37.8	31	63.8			1.4581
10.	275	527	6.5	47.1	0.836						1.4670

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	3.7	50.8	0.858	33.4	37	64.5	39	15	1.4786
12.	225	437	5.3	56.1	0.870	31.1	39	69.6	46	40	1.4851
13.	250	482	5.4	61.5	0.879	29.5	40	72.1	54	55	1.4893
14.	275	527	5.1	66.6	0.892	27.1	43	76.0	78	75	1.4982
15.	300	572	6.0	72.6	0.902	25.4	45	80.5	130	95	-
Resi-duum			23.9	96.5	0.975	13.6					

Carbon residue of residuum: 10.2%

Carbon residue of crude: 2.8%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	9.3	0.696	71.8	
Total gasoline and naphtha	30.6	0.744	58.7	
Kerosine distillate	10.0	0.812	42.8	
Gas oil	15.5	0.853	34.4	
Nonviscous lubricating distillate	10.3	0.874-0.896	30.4-26.4	50-100
Medium lubricating distillate	6.2	0.896-0.908	26.4-24.3	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	23.9	0.975	13.6	
Distillation loss	3.5			

Remarks: The sample as received contained no water (A.S.T.M.) and 22 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 480-63

FIELD: Leon Lake

POOL: Shaunavon

ZONE: Shaunavon

Well Name: Leon Lake CR. 9-15
Location: Lsd. 9, Sec. 15, Twp. 8, Rge. 19, W3 Mer
Interval tested, depth, feet: 4480-4545
Producing Zone: Shaunavon
Geological Age: Jurassic

Province: Saskatchewan
Sample From: Sask. Dept. of Mineral Resources
Date Sampled: November 18, 1963
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.927
Sulphur, percent by weight: 3.14
Saybolt Universal Viscosity:
at 100°F., sec. 204
at 130°F., sec. 119

A.P.I. gravity at 60°F.: 21.1
Pour point, °F.: -25
Colour: Black
Carbon residue, percent by weight: 9.1
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 764 mm. Hg.
First drop, 69°C. (156°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122	-	-	-	-	-			-	-
2.	167	-	-	-	-	-			-	-
3.	212	1.7	0.702	70.1	13	-			1.3916	74.5
4.	257	4.5	0.722	64.5	13	59.4			1.4079	78.7
5.	302	7.4	0.746	58.2	17	57.6			1.4170	82.3
6.	347	10.9	0.770	52.3	22	56.2			1.4281	87.7
7.	392	14.4	0.792	47.2	26	55.2			1.4393	90.4
8.	437	17.7	0.818	41.5	33	57.5			1.4534	96.5
9.	482	20.9	0.828	39.4	32	59.0			1.4583	98.5
10.	527	27.0	0.846	35.8	36	59.9			1.4688	105.6

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	30.2	0.869	31.3	43	60.9	38	5	1.4803	113.9
12.	437	35.1	0.881	29.1	45	61.8	44	25	1.4877	116.7
13.	482	39.8	0.894	26.8	47	62.3	55	40	1.4953	123.1
14.	527	45.6	0.909	24.2	51	65.0	80	60	1.5041	130.2
15.	572	52.5	0.924	21.6	55	67.6	158	75	1.5146	137.3
Resi-duum		100.3	1.016	7.8						

Carbon residue of residuum: 17.3% Carbon residue of crude: 9.1%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	1.7	0.702	70.1	
Total gasoline and naphtha	14.4	0.753	56.4	
Kerosine distillate	3.3	0.818	41.5	
Gas oil	17.6	0.857	33.6	Below 50
Nonviscous lubricating distillate	9.0	0.888-0.913	27.9-23.5	50-100
Medium lubricating distillate	8.1	0.913-0.932	23.5-20.3	100-200
Viscous lubricating distillate	0.1	0.932	20.3	Above 200
Residuum	47.8	1.016	7.8	
Distillation gain	0.3			

Remarks: Analysis on dehydrated sample.

OIL FIELD DATA

Field and Pool: Lloydminster Field - North Dulwich

Location: Twp. 49, Rge. 27, W3 M

DISCOVERY DETAILS

Well: Name: Husky Dulwich No. 1 (Cl - 17 - 49 - 27)

Completed: September 1954

Perforated: 1,830-1,835

Treatment: Bailing

Initial Potential: Produced 3,187 barrels of oil and 709 barrels of water.
Suspended, March 1955.

GEOLOGY

Producing Zone: Sparky

Other Shows: None

Trap Type: ST and L

Lithology: Unconsolidated fine sand

Maximum Reservoir Thickness: 30

Regional Setting: -

Deepest Formation Penetrated: 2,241 feet (-141)

DEVELOPMENT DATA

Total Wells: Completed Oil: 10; Gas: 8

Producing Oil: 10

Injection or Disposal: Water: 2; Gas: Nil

Well Spacing: 20 Acres; Market Outlet: Pipeline

Logging Practice: Electrical Log and Gamma-Collar Log

Completion Practice: Perforations

RESERVOIR DATA

Type of Drive: Solution Gas, Water Drive

Estimated Oil in Place: 8,000,000 S.T.bbls (1,260 bbls/acre-foot)

Estimated Recoverable Oil: 800,000 S.T.bbls(13 bbls/acre-foot)

Oil Zone Thickness: Maximum: 12; Average: 10

Gas Zone Thickness: Maximum: Nil

Porosity: 25%; Permeability: 100-3,000 md

Area: 780 Acres

Oil Characteristics: Gravity: 17.2 °API; Sulphur: Nil

Pour Point: 0°F.; Initial Solution GOR: 50

Pressure Maintenance or Secondary Recovery: Steam Flood

SECONDARY RECOVERY

RESERVOIR DATA

- 1) Field: Lloydminster
- 2) Pool: North Dulwich, Sparky Sand
- 3) Province: Saskatchewan
- 4) Location: Twp. 49; Rge. 27; W3 M
- 5) Operator: Husky Oil Canada Ltd.
- 6) Project: North Dulwich Unit
- 7) Reservoir: Sparky Sand, Mannville Formation, Lower Cretaceous
- 8) Discovery Date: September 1950
- 9) Date Injection Began: December 1964
- 10) Main Structural Feature: ST & L 0°-52'
- 11) Gas Cap: Originally: No; At Present: No
- 12) Main Drive in Primary Production: Solution Gas and Water Drive
- 13) Productive Area (acres) of Reservoir: 780; Of Project: 40
- 14) Average Depth to Top of Pay (feet): 1,800
- 15) Average Effective Thickness (feet): 15
- 16) Average Porosity %: 20
- 17) Average Horizontal Permeability and Range in Brackets (millidarcys): 1,000
(100-3,000)
- 18) Connate Water (% of pore space): 25
- 19) Viscosity at Initial Reservoir Conditions (centipoises): 800
- 20) API Gravity: 17.2
- 21) Solution Gas/Oil Ratio at Saturation Pressure (cu.ft/bbl): 50
- 22) Bubble Point Pressure: 400 psia estimated
- 23) Original Pressure: 470 psia estimated
- 24) Reservoir Pressure at Start of Injection (psi): 465 (December 1964)

- 25) Latest Reservoir Pressure: 410 psi (July 1965)
- 26) Injection Fluid: Steam
- 27) Injection Fluid Source: Local Fresh Water Aquifer.
- 28) System: Open
- 29) Fluid Treatment before Injection: Cation Exchange
- 30) Injection Pattern: 5 Spot
- 31) Structural Position Injection Wells: Oil Zone
- 32) Distance Injection Wells to Producers (feet): 1,100
- 33) Number of Injection Wells at Start: One
- 34) Number of Injection Wells at Present: One (September 1965)
- 35) Number of Producing Wells in Project Area at Present: 10 (September 1965)
- 36) Original Oil in Place in Project Area (bbls): 8,000,000
- 37) Original Oil Saturation (% of pore space): 75
- 38) Primary Recovery from Project Area when Injection Started (bbls): 70,000
- 39) Oil Saturation at Start of Project (% of pore space): 74
- 40) Well Spacing: 20 Acres
- 41) Oil Volume Factor (initial reservoir barrels per Stock-Tank barrel): 1.16

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 15671

FIELD: Lloydminster

POOL: Silverdale Sparky Sand

ZONE: Sparky

Well Name: Colony Oil & Gas No. 3

Province: Saskatchewan

Location: Lsd. 5, Sec. 19, Twp. 49, Rge. 27, W 3rd

Sample From: Sask. Dept. of Natural Resources

Interval tested, depth, feet: 1690-1700

Date Sampled: June 1936

Producing Zone: Sparky

Sampled at:

Geological Age: Lower Cretaceous

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.987

A.P.I. gravity at 60°F.: 11.9

Sulphur, percent by weight: 3.05

Pour point, °F.: 25

Saybolt Universal Viscosity:

Colour: Brownish Black

at 100°F., sec. 6,500

Carbon residue, percent by weight: 11.2
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 760 mm. Hg.
First drop, 169°C. (336°F.)

Fraction No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Viscosity S.U. 100°F.	Cloud Test, °F.
1.	50	122								
2.	75	167								
3.	100	212								
4.	125	257								
5.	150	302								
6.	175	347								
7.	200	392	0.5	0.5	-	-	-			
8.	225	437	2.0	2.5	0.847	35.6	46			
9.	250	482	3.7	6.2	0.861	32.8	48			
10.	275	527	6.8	13.0	0.876	30.0	50			

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.8	15.8	0.894	26.8	55		44	-
12.	225	437	6.2	22.0	0.904	25.0	55		55	-
13.	250	482	7.2	29.2	0.917	22.8	58		81	-
14.	275	527	7.3	36.5	0.932	20.3	62		166	5
15.	300	572	11.1	47.6	0.938	19.4	62		238	25
Residuum			50.9	98.5	-	-				

Carbon residue of residuum: 22%

Carbon residue of crude: 11.2%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	-	-	-	-
Total gasoline and naphtha	-	-	-	-
Kerosine distillate	-	-	-	-
Gas oil	16.6	0.872	30.8	-
Nonviscous lubricating distillate	10.7	0.899-0.921	25.9-22.1	50-100
Medium lubricating distillate	9.9	0.921-0.935	22.1-19.8	100-200
Viscous lubricating distillate	10.4	0.935-0.942	19.8-18.7	Above 200
Residuum	50.9	-	-	
Distillation loss	1.5			

Remarks: The sample as received contained 16% by vol. water (A.S.T.M.)

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 17548

FIELD: Lloydminster

POOL: Silverdale Sparky Sand

ZONE: Sparky

Well Name: Triangle No. 1
Location: Lsd. 5, Sec. 35, Twp. 49, Rge. 28, W 3rd
Interval tested, depth, feet: 1703-1713
Producing Zone: Sparky
Geological Age: Lower Cretaceous

Province: Saskatchewan
Sample From: Sask. Dept. of Natural Resources
Date Sampled: June 2, 1937
Sampled at: Well

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 1.014
Sulphur, percent by weight: 3.0
Saybolt Universal Viscosity:
at °F., sec. -

A.P.I. gravity at 60°F.: 8.1
Pour point, °F.:
Colour: Brownish Black
Carbon residue, percent by weight: 14.1
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 760 mm. Hg.

Fraction No.	Cut at °C. °F.		Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Viscosity S.U. 100°F.	Cloud Test, °F.
1.	50	122								
2.	75	167								
3.	100	212								
4.	125	257								
5.	150	302	0.3	0.3						
6.	175	347	0.4	0.7						
7.	200	392	0.6	1.3						
8.	225	437	2.0	3.3	0.849	35.2	-			
9.	250	482	3.4	6.7	0.860	33.0	47			
10.	275	527	7.0	13.7	0.874	30.4	49			

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	4.4	18.1	0.893	27.0	54		43	
12.	225	437	6.2	24.3	0.908	24.3	57		59	
13.	250	482	7.3	31.6	0.922	22.0	61		100	
14.	275	527	3.4	35.0	0.932	20.3	62		191	
15.	300	572	6.6	41.6	0.939	19.2	63		362	
Residuum			58.0	99.6	-	-				

Carbon residue of residuum: 24.3%

Carbon residue of crude: 14.1%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline				
Total gasoline and naphtha				
Kerosine distillate				
Gas oil	18.3	0.873	30.6	
Nonviscous lubricating distillate	9.7	0.900-0.922	25.7-22.0	50-100
Medium lubricating distillate	5.7	0.922-0.933	22.0-20.2	100-200
Viscous lubricating distillate	7.9	0.933-0.943	20.2-18.6	Above 200
Residuum	58.0	-	-	
Distillation loss	0.4			

Remarks: The sample as received contained 30% by vol. water and sediment (by centrifuge).

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 269

FIELD: Lloydminster

POOL: Silverdale Sparky Sand

ZONE: Sparky

Well Name: Colony Oil & Gas No. 3

Location: Lsd. 5, Sec. 19, Twp. 49, Rge. 27, W 3rd
Interval tested, depth, feet: 1690

Producing Zone: Sparky

Geological Age: Lower Cretaceous

Province: Saskatchewan

Sample From: Sask. Dept. of
Natural Resources

Date Sampled: July 25, 1938

Sampled at:

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.975

A.P.I. gravity at 60°F.: 13.6

Sulphur, percent by weight: 2.9

Pour point, °F.: 20

Saybolt Furol Viscosity:

Colour: Black

at 100°F., sec. 410

Carbon residue, percent by weight: 8.6
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 769 mm. Hg.

Fraction No.	Cut at °C.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Viscosity S.U. 100°F.	Cloud Test, °F.
1.	50	122							
2.	75	167							
3.	100	212							
4.	125	257							
5.	150	302							
6.	175	347							
7.	200	392							
8.	225	437	2.4	0.840	37.0	43			
9.	250	482	4.4	0.855	34.0	45			
10.	275	527	6.7	0.870	31.1	47			

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	6.7	20.2	0.893	27.0	54	44	
12.	225	437	6.5	26.7	0.907	24.5	57	59	
13.	250	482	6.2	32.9	0.920	22.3	60	94	
14.	275	527	6.6	39.5	0.934	20.0	63	189	Below 0
15.	300	572	10.2	49.7	0.943	18.6	64	427	Below 0
Residuum			49.5	99.2					

Carbon residue of residuum: 17.3%

Carbon residue of crude: 8.6%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	-	-	-	
Total gasoline and naphtha	-	-	-	
Kerosine distillate	-	-	-	
Gas oil	19.5	0.870	31.1	
Nonviscous lubricating distillate	10.7	0.898-0.921	26.1-22.1	50-100
Medium lubricating distillate	6.4	0.921-0.935	22.1-19.8	100-200
Viscous lubricating distillate	13.1	0.935-0.948	19.8-17.8	Above 200
Residuum	49.5	-	-	
Distillation loss	0.8			

Remarks: The sample as received contained 13.0% by vol. water (A.S.T.M.)

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 6185

FIELD: Lloydminster

POOL: Dulwich G.P. Sand

ZONE: Sparky

Well Name: Community Service No. 4
Location: Lsd. 9, Sec. 10, Twp. 49, Rge. 28, W 3rd
Interval tested, depth, feet: 1866-1882

Province: Saskatchewan
Sample From: Sask. Dept. of
Natural Resources &
Industrial Dev.

Producing Zone: Sparky
Geological Age: Lower Cretaceous

Date Sampled: April 3, 1946
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.970
Sulphur, percent by weight: 3.5
Saybolt Furol Viscosity:
at 100°F., sec. 379
at 122°F., sec. 192

A.P.I. gravity at 60°F.: 14.4
Pour point, °F.: 15
Colour: Black
Carbon residue, percent by weight: 11.0
(Conradson)

DISTILLATION
(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 762 mm. Hg.

Fraction No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Viscosity S.U. 100°F.	Cloud Test, °F.
1.	50	122								
2.	75	167								
3.	100	212								
4.	125	257								
5.	150	302	0.1	0.1						
6.	175	347	0.6	0.7						
7.	200	392	0.7	1.4						
8.	225	437	2.5	3.9	0.837	37.6	42			
9.	250	482	4.3	8.2	0.854	34.2	44			
10.	275	527	6.9	15.1	0.870	31.1	47			

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.0	17.1	0.888	27.9	52		43	
12.	225	437	5.3	22.4	0.897	26.3	52		51	
13.	250	482	6.1	28.5	0.912	23.7	56		72	
14.	275	527	5.7	34.2	0.927	21.1	60		130	-5
15.	300	572	7.6	41.8	0.940	19.0	63		291	30
Residuum			56.6	98.4	1.024	6.7				

Carbon residue of residuum: 19.5%

Carbon residue of crude: 11.0%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline				
Total gasoline and naphtha				
Kerosine distillate				
Gas oil	19.3	0.864	32.3	
Nonviscous lubricating distillate	9.0	0.896-0.919	26.4-22.5	
Medium lubricating distillate	5.9	0.919-0.933	22.5-20.2	100-200
Viscous lubricating distillate	7.6	0.933-0.948	20.2-17.8	Above 200
Residuum	56.6	1.024	6.7	
Distillation loss	1.6			

Remarks: The sample as received contained 4.0% by vol. water (A.S.T.M.) and 0.4% by wt. sediment (by extraction).

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 2337-54

FIELD: Lloydminster

POOL: Dulwich G.P. Sand

ZONE: Sparky

Well Name: Nuco & Associates No. 13-C-33
Location: Lsd. 13, Sec. 33, Twp. 48, Rge. 27, W 3rd
Interval tested, depth, feet: 1828-1832
Producing Zone: Sparky
Geological Age: Lower Cretaceous

Province: Saskatchewan
Sample From: Sask. Dept. of
Mineral Resources
Date Sampled: August 4, 1954
Sampled at: Well

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.956
Sulphur, percent by weight: 3.26
Saybolt Universal Viscosity:
at 130°F., sec. 668

A.P.I. gravity at 60°F.: 16.5
Pour point, °F.: -15
Colour: Brownish Black
Carbon residue, percent by weight: 9.0
(Conradson)

DISTILLATION
(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 764 mm. Hg.
First drop, 85°C. (185°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122									
2.	75	167									
3.	100	212	0.6	0.6	0.717	65.8	-				
4.	125	257	1.0	1.6	0.755	55.9	29	-			
5.	150	302	1.6	3.2	0.770	52.3	28				
6.	175	347	1.1	4.3	0.789	47.8	31				
7.	200	392	1.8	6.1	0.811	43.0	35				
8.	225	437	3.0	9.1	0.830	39.0	38	51.5			1.4573
9.	250	482	4.5	13.6	0.849	35.2	42	53.8			1.4680
10.	275	527	7.6	21.2	0.867	31.7	46	55.0			1.4788

Stage 2 - Distillation continued at 40 mm. Hg. pressure

	11.	200	392	2.0	23.2	0.888	27.8	52	56.0	44	-	1.4907
	12.	225	437	6.0	29.2	0.896	26.4	52	57.2	50	-	1.4951
	13.	250	482	5.1	34.3	0.910	24.0	55	58.4	68	-	1.5030
	14.	275	527	5.7	40.0	0.923	21.8	58	60.4	115	-	1.5108
Resi-duum				53.0	100.0	1.019	7.4	61	63.8	253	-5	1.5178

Carbon residue of residuum: 15.9%

Carbon residue of crude: 9.0%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	0.6	0.717	65.8	
Total gasoline and naphtha	6.1	0.778	50.4	
Kerosine distillate	-	-	-	
Gas oil	20.1	0.863	32.5	
Nonviscous lubricating distillate	9.3	0.896-0.919	26.4-22.5	50-100
Medium lubricating distillate	5.6	0.919-0.930	22.5-20.6	100-200
Viscous lubricating distillate	5.9	0.930-0.942	20.6-18.7	Above 200
Residuum	53.0	1.019	7.4	
Distillation loss	0.0			

Remarks: The sample as received contained 0.25% by vol. water and sediment (by centrifuge) and 8 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 5-64

FIELD: LloyDMINSTER

POOL:

ZONE: Dulwich G.P.Sand

Well Name: N.A. Nuwell No. 2, 9-C-5
 Location: Lsd. 9, Sec. 5, Twp. 49, Rge. 27, W3 Mer
 Interval tested, depth, feet: 1878-1883
 Producing Zone: Dulwich G.P.Sand
 Geological Age: Blairmore (Lower Cretaceous)

Province: Saskatchewan
 Sample From: Sask. Dept. of Mineral Resources
 Date Sampled: September 25, 1963
 Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.963
 Sulphur, percent by weight: 3.31
 Saybolt Universal Viscosity:
 at 100°F., sec. 2980
 at 130°F., sec. 1050

A.P.I. gravity at 60°F.: 15.4
 Pour point, °F.: 20
 Colour: Black
 Carbon residue, percent by weight: 8.9
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 756 mm. Hg.
 First drop, 105°C. (221°F.)

Frac-tion No.	Cut °F.	Cut Per Cent	Specifc Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre- lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion, (N _F -N _C) 10 ⁴
1.	122	-	-	-	-	-			-	-
2.	167	-	-	-	-	-			-	-
3.	212	-	-	-	-	-			-	-
4.	257	1.9	0.734	61.3	19	53.2			1.4090	78.8
5.	302	3.7	0.763	54.0	25	52.5			1.4218	84.1
6.	347	5.7	0.789	47.8	31	51.4			1.4354	89.9
7.	392	8.2	0.813	42.6	36	52.2			1.4480	94.6
8.	437	11.3	0.835	38.0	41	53.9			1.4590	98.6
9.	482	15.2	0.850	35.0	42	55.2			1.4679	104.3
10.	527	21.3	0.869	31.3	47	56.2			1.4791	111.4

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	23.7	0.888	27.9	52	56.4	41	-30	1.4893	118.3
12.	437	28.5	0.898	26.1	53	57.5	50	-15	1.4952	122.0
13.	482	33.7	0.912	23.7	56	58.4	70	15	1.5034	128.6
14.	527	37.9	0.922	22.0	58	60.0	114	35	1.5100	135.0
15.	572	45.0	0.934	20.0	60	63.6	248	50	1.5165	138.8

Residue: 99.6 Carbon residue of residuum: 15.2% Carbon residue of crude: 8.9%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	-	-	-	
Total gasoline and naphtha	8.2	0.778	50.4	
Kerosine distillate	-	-	-	
Gas oil	17.9	0.865	32.1	Below 50
Nonviscous lubricating distillate	8.2	0.898-0.919	26.1-22.5	50-100
Medium lubricating distillate	5.1	0.919-0.930	22.5-20.7	100-200
Viscous lubricating distillate	5.6	0.930-0.941	20.7-18.9	Above 200
Residuum	54.6	1.032	5.6	
Distillation loss	0.4			

Remarks: Analysis on dehydrated sample.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 2339-54

FIELD: Lone Rock

POOL: Lone Rock Sparky Sand

ZONE: Sparky

Well Name: Fargo Oils No. 70

Location: Lsd. 14, Sec. 2, Twp. 47, Rge. 27, W 3rd

Interval tested, depth, feet: 1924-1949

Producing Zone: Sparky

Geological Age: Lower Cretaceous

Province: Saskatchewan

Sample From: Sask. Dept. of

Mineral Resources

Date Sampled: July 27, 1954

Sampled at: Well

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.951

A.P.I. gravity at 60°F.: 17.3

Sulphur, percent by weight: 3.40

Pour point, °F.: -15

Saybolt Universal Viscosity:

Colour: Brownish Black

at 130°F., sec. 472

Carbon residue, percent by weight: 8.6

(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 760 mm. Hg.
First drop, 60°C. (140°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre- lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122									
2.	75	167									
3.	100	212	2.2	2.2	0.746	58.2	-	-			1.4091
4.	125	257	2.4	4.6	0.756	55.7	29	52.5			1.4153
5.	150	302	1.8	6.4	0.771	52.0	29	52.2			1.4249
6.	175	347	2.2	8.6	0.792	47.2	32	51.0			1.4372
7.	200	392	2.6	11.2	0.806	44.1	32	52.2			1.4449
8.	225	437	2.8	14.0	0.828	39.4	37	54.5			1.4564
9.	250	482	3.8	17.8	0.844	36.2	40	55.8			1.4649
10.	275	527	7.2	25.0	0.865	32.1	45	57.0			1.4768

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.5	27.5	0.882	28.9	49	57.6	41	-	1.4877
12.	225	437	4.6	32.1	0.894	26.8	51	58.2	49	-	1.4938
13.	250	482	5.2	37.3	0.910	24.0	55	60.0	70	-	1.5023
14.	275	527	5.0	42.3	0.924	21.6	58	61.2	119	-	1.5109
15.	300	572	9.4	51.7	0.936	19.7	61	63.7	290	+5	1.5196
Resi- duum			48.3	100.0	1.032	5.6					

Carbon residue of residuum: 16.1%

Carbon residue of crude: 8.6%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	2.2	0.746	58.2	
Total gasoline and naphtha	11.2	0.775	51.1	
Kerosine distillate	-	-	-	
Gas oil	18.8	0.861	32.8	
Nonviscous lubricating distillate	7.8	0.895-0.919	26.6-22.5	50-100
Medium lubricating distillate	5.4	0.919-0.930	22.5-20.6	100-200
Viscous lubricating distillate	8.5	0.930-0.944	20.6-18.4	Above 200
Residuum	48.3	1.032	5.6	
Distillation loss	0.0			

Remarks: The sample as received contained 0.2% by vol. water and sediment (by centrifuge) and 87 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 4-64

FIELD: Lone Rock

POOL:

ZONE: North West Epping G.P. Sand

Well Name: Fargo West Epping C15-36
Location: Lsd. 15, Sec. 36, Twp. 47, Rge. 28, W3 Mer
Interval tested, depth, feet: 1892-1896
Producing Zone: North West Epping G.P. Sand
Geological Age: Blairmore, Lower Cretaceous

Province: Saskatchewan
Sample From: Sask. Dept. of Mineral Resources
Date Sampled: September 25, 1963
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.984
Sulphur, percent by weight: 3.67
Saybolt Universal Viscosity:
at 100°F., sec. 7,236
at 130°F., sec. 2,310

A.P.I. gravity at 60°F.: 12.3
Pour point, °F.: 30
Colour: Black
Carbon residue, percent by weight: 13.0
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 756 mm. Hg.
First drop, 125°C. (257°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion ₄ (N _F -N _C) 10 ⁴
1.	122	-	-	-	-	-				
2.	167	-	-	-	-	-				
3.	212	-	-	-	-	-				
4.	257	-	-	-	-	-				
5.	302	0.6	0.770	52.3					1.4379	82.6
6.	347	1.7)								
7.	392	3.4)	0.795	46.5	-	-			1.4389	85.1
8.	437	6.3	0.823	40.4	35	56.1			1.4526	92.5
9.	482	9.8	0.841	36.8	38	57.2			1.4623	96.6
10.	527	15.9	0.861	32.8	43	58.0			1.4739	103.7

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	18.4	0.882	28.9	49	58.3	40	-15	1.4851	112.4
12.	437	22.9	0.895	26.6	51	58.9	49	10	1.4924	116.0
13.	482	27.7	0.910	24.0	55	59.2	66	30	1.5009	124.2
14.	527	32.9	0.923	21.8	58	60.2	113	45	1.5100	131.3
15.	572	40.3	0.937	19.5	62	63.0	258	60	1.5174	136.3
Resi-duum		99.9	1.045	3.9						

Carbon residue of residuum: 20.6% Carbon residue of crude: 13.0%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	-	-	-	
Total gasoline and naphtha	3.4	0.791	47.4	
Kerosine distillate	2.9	0.823	40.4	
Gas oil	14.5	0.865	32.1	Below 50
Nonviscous lubricating distillate	8.1	0.896-0.919	26.4-22.5	50-100
Medium lubricating distillate	5.2	0.919-0.931	22.5-20.5	100-200
Viscous lubricating distillate	6.2	0.931-0.945	20.5-18.2	Above 200
Residuum	59.6	1.045	3.9	
Distillation loss	0.1			

Remarks: Analysis on dehydrated sample.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 6-64

FIELD: Lone Rock

POOL:

ZONE: West Epping G.P. Sand

Well Name: Fargo West Epping A7-24
 Location: Lsd. 7, Sec. 24, Twp. 47, Rge. 28, W 3
 Interval tested, depth, feet: 1906-1910
 Producing Zone: West Epping G.P. Sand
 Geological Age: Blairmore, Lower Cretaceous

Province: Saskatchewan
 Sample From: Sask. Dept. of
 Mineral Resources
 Date Sampled: September 25, 1963
 Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 1.004
 Sulphur, percent by weight: 1.80
 Saybolt Universal Viscosity:
 at 100°F., sec. 11,058
 at 130°F., sec. 3,390

A.P.I. gravity at 60°F.: 9.4
 Pour point, °F.: 20
 Colour: Black
 Carbon residue, percent by weight: 17.2
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 765 mm. Hg.
 First drop, 107°C. (225°F.)

Frac-tion No.	Cut at 0F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. 60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (NF-Nc) 10 ⁴
1.	122	-	-	-						
2.	167	-	-	-						
3.	212	-	-	-						
4.	257	0.9)								
5.	302	2.6)	0.758	55.2	-	54.2			1.4175	83.7
6.	347	4.1	0.782	49.5	27	53.1			1.4320	86.9
7.	392	5.8	0.802	44.9	31	-			1.4413	90.7
8.	437	8.2	0.820	41.1	33	54.5			1.4519	93.6
9.	482	11.5	0.838	37.4	37	56.1			1.4617	96.6
10.	527	16.9	0.859	33.2	42	57.0			1.4731	107.4

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	20.8	0.883	28.8	49	57.2	42	-30	1.4861	117.8
12.	437	23.9	0.894	26.8	51	58.1	49	-10	1.4929	120.1
13.	482	28.1	0.908	24.3	54	59.0	63	15	1.5001	126.6
14.	527	32.9	0.922	22.0	58	61.4	105	35	1.5085	134.6
15.	572	40.7	0.935	19.8	61	63.0	251	50	1.5158	140.0

Residue 100.3 1.079 - Carbon residue of crude: 17.2%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	-	-	-	
Total gasoline and naphtha	5.8	0.777	50.6	
Kerosine distillate	2.4	0.820	41.1	
Gas oil	14.5	0.865	32.1	Below 50
Nonviscous lubricating distillate	7.3	0.895-0.920	26.6-22.3	50-100
Medium lubricating distillate	4.6	0.920-0.930	22.3-20.7	100-200
Viscous lubricating distillate	6.1	0.930-0.943	20.7-18.6	Above 200
Residuum	59.6	1.079	-	
Distillation gain	0.3			

Remarks: Analysis on dehydrated sample.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 7-64

FIELD: Lone Rock

POOL:

ZONE: South Epping G.P. Sand

Well Name: Fargo South Epping A 14-4
Location: Lsd. 14, Sec. 4, Twp. 47, Rge. 27, W 3.
Interval tested, depth, feet: 2002'-2006'
Producing Zone: South Epping G.P. Sand
Geological Age: Blairmore, Lower Cretaceous

Province: Saskatchewan
Sample From: Saskatchewan Dept. of
Mineral Resources
Date Sampled: September 25, 1963
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.984
Sulphur, percent by weight: 3.26
Saybolt Universal Viscosity:
 at 100°F., sec. 5,173
 at 130°F., sec. 1,979

A.P.I. gravity at 60°F.: 12.3
Pour point, °F.: 15
Colour: Black
Carbon residue, percent by weight: 10.9
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 760 mm. Hg.
First drop, 96°C. (205°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122									
2.	167									
3.	212	-	-	-	-	-			-	-
4.	257	1.2	0.761	54.4	32	-			1.4154	82.1
5.	302	2.9	0.771	52.0	29	54.5			1.4231	85.8
6.	347	4.9	0.788	48.1	30	53.0			1.4359	88.7
7.	392	7.2	0.809	43.4	34	53.4			1.4457	91.4
8.	437	9.8	0.826	39.8	36	55.2			1.4548	98.0
9.	482	13.5	0.842	36.6	39	57.0			1.4634	100.8
10.	527	18.5	0.862	32.7	43	58.4			1.4742	106.4

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	22.5	0.881	29.1	48	58.9	41	-30	1.4849	118.9
12.	437	26.6	0.894	26.8	51	59.2	50	-10	1.4922	122.7
13.	482	31.5	0.907	24.5	54	60.6	64	20	1.5009	125.6
14.	527	36.6	0.921	22.1	57	62.5	106	35	1.5097	133.8
15.	572	44.1	0.933	20.2	60	65.8	247	50	1.5178	145.5

Carbon residue of residuum: 18.0%

Carbon residue of crude: 10.9%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	-	-	-	
Total gasoline and naphtha	7.2	0.786	48.5	
Kerosine distillate	-	-	-	
Gas oil	17.3	0.860	33.0	Below 50
Nonviscous lubricating distillate	8.8	0.894-0.919	26.8-22.5	50-100
Medium lubricating distillate	5.0	0.919-0.929	22.5-20.8	100-200
Viscous lubricating distillate	5.8	0.929-0.940	20.8-19.0	Above 200
Residuum	56.9	1.044	4.0	
Distillation gain	1.0			

Remarks: Analysis on dehydrated sample

CRUDE PETROLEUM ANALYSIS

Laboratory Number 448-63

FIELD: Lost Horse Hill

POOL: Frobisher Beds

ZONE: Frobisher

Well Name: I.O.E. B.A. Husky L. Horse Hill 3-10M-10-8
 Location: Lsd. 3, Sec. 10, Twp. 10, Rge. 8, W 2 Mer
 Interval tested, depth, feet: 3802-3821
 Producing Zone: Frobisher Beds
 Geological Age: Mississippian

Province: Saskatchewan
 Sample From: Sask. Dept. of
 Mineral Resources
 Date Sampled: September 17, 1963
 Sampled at: Tubing Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.878
 Sulphur, percent by weight: 2.16
 Saybolt Universal Viscosity:
 at 77°F., sec. 65
 at 100°F., sec. 52

A.P.I. gravity at 60°F.: 29.7
 Pour point, °F.: 10
 Colour: Black
 Carbon residue, percent by weight: 6.1
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 760 mm. Hg.
First drop, 30°C. (86°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion, (N _F -N _C) 10 ⁴
1.	122	1.2	0.655	84.5	-	-	-	-	-	-
2.	167	4.3	0.686	74.8	15	-	-	-	1.3993	81.6
3.	212	8.4	0.721	64.8	22	52.2	-	-	1.4039	82.1
4.	257	13.8	0.747	57.9	25	50.2	-	-	1.4138	86.0
5.	302	18.0	0.764	53.7	26	51.2	-	-	1.4232	88.3
6.	347	22.1	0.779	50.1	26	53.8	-	-	1.4324	93.4
7.	392	26.1	0.795	46.5	27	56.0	-	-	1.4410	95.9
8.	437	30.0	0.811	43.0	29	58.0	-	-	1.4493	97.1
9.	482	34.6	0.827	39.6	31	60.1	-	-	1.4583	101.2
10.	527	39.9	0.845	36.0	35	62.2	-	-	1.4684	109.6

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	43.9	0.865	32.1	41	63.1	38	10	1.4790	128.8
12.	437	49.1	0.878	29.7	43	64.8	44	30	1.4868	132.6
13.	482	54.1	0.891	27.3	46	65.2	56	55	1.4950	131.2
14.	527	58.8	0.906	24.7	50	69.2	81	70	1.5038	135.4
15.	572	64.5	0.916	23.0	52	72.0	143	85	1.5140	143.5

Residuum 97.5 1.013 8.2

Carbon residue of crude: 6.1%

Carbon residue of residuum: 16.0%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	8.4	0.699	70.9	
Total gasoline and naphtha	26.1	0.747	57.9	
Kerosine distillate	3.9	0.811	43.0	
Gas oil	19.0	0.854	34.2	Below 50
Nonviscous lubricating distillate	9.0	0.885-0.909	28.4-24.2	50-100
Medium lubricating distillate	6.5	0.909-0.922	24.2-22.0	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	33.0	1.013	8.2	
Distillation loss	2.5			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 2338-54

FIELD: Maidstone

POOL: Waseca Sand

ZONE: Big Gully

Well Name: Wilrich-Trans Era Maidstone No. 4 Province: Saskatchewan
Location: Lsd. 16, Sec. 10, Twp. 49, Rge. 23, W 3rd Sample From: Sask. Dept. of Mineral
Interval tested, depth, feet: 1566-1572 Resources
Producing Zone: Big Gully Date Sampled: August 19, 1954
Geological Age: Lower Cretaceous Sampled at: Well

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.981 A.P.I. gravity at 60°F.: 12.7
Sulphur, percent by weight: 3.9 Pour point, °F.: 20
Saybolt Universal Viscosity: Colour: Brownish Black
at 130°F., sec. 3,250 Carbon residue, percent by weight: 11.7
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 755 mm. Hg.
First drop, 185°C. (365°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122									
2.	75	167									
3.	100	212									
4.	125	257									
5.	150	302									
6.	175	347									
7.	200	392									
8.	225	437	1.2	1.2)							
9.	250	482	1.5	2.7)	0.869	31.3	-	48.0			1.4735
10.	275	527	6.1	8.8	0.875	30.2	50	51.7			1.4810

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.4	11.2	0.890	27.5	53	52.4	43		1.4896
12.	225	437	5.0	16.2	0.904	25.0	55	53.8	50		1.4971
13.	250	482	6.2	22.4	0.916	23.0	58	56.0	69		1.5055
14.	275	527	6.5	28.9	0.928	21.0	60	57.6	115		1.5132
15.	300	572	8.7	37.6	0.942	18.7	64	61.6	292	Below 0	1.5228
Resi-duum			61.5	99.1	1.038	4.8					

Carbon residue of residuum: 18.0%

Carbon residue of crude: 11.7%

Note: Distillation made on dehydrated crude.

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	-	-	-	
Total gasoline and naphtha	-	-	-	
Kerosine distillate	-	-	-	
Gas oil	13.7	0.881	29.1	
Nonviscous lubricating distillate	9.9	0.904-0.924	25.0-21.6	50-100
Medium lubricating distillate	5.7	0.924-0.935	21.6-19.8	100-200
Viscous lubricating distillate	8.3	0.935-0.950	19.8-17.4	Above 200
Residuum	61.5	1.038	4.8	
Distillation loss	0.9			

Remarks: The sample as received contained 9.2% by vol. water and sediment (by centrifuge) and 2300 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 79-56

FIELD: Marsden

POOL: Dina Sparky Sand

ZONE: Sparky

Well Name: North Canadian Dina No. 3
Location: Lsd. 7, Sec. 28, Twp. 44, Rge. 28, W 3rd
Interval tested, depth, feet: 1802-1824
Producing Zone: Sparky
Geological Age: Lower Cretaceous

Province: Saskatchewan
Sample From: Sask. Dept. of
Mineral Resources
Date Sampled: February 27, 1956
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60° F.: 0.973
Sulphur, percent by weight: 3.51
Saybolt Universal Viscosity:
at 100° F., sec. 5,330
at 130° F., sec. 1,710

A.P.I. gravity at 60° F.: 13.9
Pour point, °F.: 15
Colour: Brownish Black
Carbon residue, percent by weight: 6.9
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 760 mm. Hg.
First drop, 160°C. (320°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60° F.	Degrees A.P.I. 60° F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100° F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122									
2.	75	167									
3.	100	212									
4.	125	257									
5.	150	302									
6.	175	347									
7.	200	392	0.9	0.9	0.828	39.4					1.4475
8.	225	437	1.9	2.8	0.838	37.4	42				1.4564
9.	250	482	3.3	6.1	0.853	34.4	44	52.2			1.4668
10.	275	527	6.2	12.3	0.869	31.3	47	54.9			1.4773

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.5	14.8	0.883	28.8	49	56.2	42	-	1.4887
12.	225	437	5.9	20.7	0.895	26.6	51	57.5	48	-	1.4933
13.	250	482	5.3	26.0	0.909	24.2	55	59.4	63	-	1.5012
14.	275	527	5.9	31.9	0.921	22.1	57	61.0	103	-	1.5098
15.	300	572	10.5	42.4	0.932	20.3	59	63.8	233	Below -15	1.5185
Resi-duum			56.9	99.3	1.029	6.0					

Carbon residue of residuum: 11.5%

Carbon residue of crude: 6.9%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100° F.
Light gasoline	-	-	-	
Total gasoline and naphtha	-	-	-	
Kerosine distillate	-	-	-	
Gas oil	18.5	0.867	31.7	
Nonviscous lubricating distillate	10.0	0.897-0.920	26.2-22.3	50-100
Medium lubricating distillate	6.6	0.920-0.929	22.3-20.8	100-200
Viscous lubricating distillate	7.3	0.929-0.939	20.8-19.2	Above 200
Residuum	56.9	1.029	6.0	
Distillation loss	0.7			

Remarks: The sample as received contained approximately 40% by vol. water and sediment (by centrifuge) and 200 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 80-56

FIELD: Marsden

POOL: Marsden Sparky Sand

ZONE: Sparky

Well Name: North Canadian Marsden No. 6

Location: Lsd. 16, Sec. 35, Twp. 44, Rge. 28, W 3rd

Interval tested, depth, feet: 1992-2000

Producing Zone: Sparky

Geological Age: Lower Cretaceous

Province: Saskatchewan

Sample From: Sask. Dept. of
Mineral Resources

Date Sampled: February 27, 1956

Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.987

A.P.I. gravity at 60°F.: 11.9

Sulphur, percent by weight: 3.93

Pour point, °F.: 35

Saybolt Universal Viscosity:

Colour: Brownish Black

at 100°F., sec. 17,700

Carbon residue, percent by weight: 12.4

at 130°F., sec. 4,460

(Conradson)

DISTILLATION
(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 755 mm. Hg.
First drop, 193°C. (379°F.)

Fraction No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Viscosity S.U. 100°F.	Cloud Test, °F.
1.	50	122								
2.	75	167								
3.	100	212								
4.	125	257								
5.	150	302								
6.	175	347								
7.	200	392								
8.	225	437	3.4	3.4	0.828	39.4	-	54.3		
9.	250	482	3.5	6.9	0.842	36.6	39	55.8		
10.	275	527	6.7	13.6	0.859	33.2	42	57.0		

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.7	16.3	0.879	29.5	47	58.0	40	
12.	225	437	4.7	21.0	0.891	27.3	49	59.0	47	
13.	250	482	5.5	26.5	0.906	24.7	53	59.5	63	
14.	275	527	5.3	31.8	0.923	21.8	58	60.2	113	
15.	300	572	7.5	39.3	0.935	19.8	61	62.7	242	Bl-10
Residuum			60.0	99.3	1.047	3.6				

Carbon residue of residuum: 19.5%

Carbon residue of crude: 12.4%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	-	-	-	
Total gasoline and naphtha	-	-	-	
Kerosine distillate	-	-	-	
Gas oil	19.6	0.858	33.4	
Nonviscous lubricating distillate	8.2	0.894-0.919	26.8-22.5	50-100
Medium lubricating distillate	5.7	0.919-0.931	22.5-20.5	100-200
Viscous lubricating distillate	5.8	0.931-0.942	20.5-18.7	Above 200
Residuum	60.0	1.047	3.6	
Distillation loss	0.7			

Remarks: The sample as received contained 20% by water (A.S.T.M.) and 8000 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 2336-54

FIELD: McLaren

POOL: Waseca Sand

ZONE: Waseca

Well Name: S.C.C. McLaren No. 18
 Location: Lsd. 1, Sec. 12, Twp. 50, Rge. 26, W 3rd
 Interval tested, depth, feet: 1700-1706
 Producing Zone: Waseca
 Geological Age: Lower Cretaceous

Province: Saskatchewan
 Sample From: Dept. of Mineral Resources
 Date Sampled: August 9, 1954
 Sampled at: Well

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.983
 Sulphur, percent by weight: 3.44
 Saybolt Universal Viscosity:
 at 130°F., sec. 2,500

A.P.I. gravity at 60°F.: 12.4
 Pour point, °F.: 35
 Colour: Brownish Black
 Carbon residue, percent by weight: 10.1
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 755 mm. Hg.
 First drop, 214°C. (417°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122									
2.	75	167									
3.	100	212									
4.	125	257									
5.	150	302									
6.	175	347									
7.	200	392									
8.	225	437									
9.	250	482	3.6	3.6	0.857	33.6	-	-			1.4692
10.	275	527	7.4	11.0	0.870	31.1	47	55.0			1.4782

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.4	13.4	0.886	28.2	51	56.2	43	-	1.4890
12.	225	437	6.0	19.4	0.898	26.1	53	57.0	50	-	1.4948
13.	250	482	5.9	25.3	0.912	23.6	56	58.0	68	-	1.5034
14.	275	527	6.3	31.6	0.926	21.3	59	59.9	113	-	1.5116
15.	300	572	9.2	40.8	0.938	19.4	62	62.3	274	Below 5	1.5201
Resi-duum			58.8	99.6	1.046	3.8					

Carbon residue of residuum: 16.2%

Carbon residue of crude: 10.1%

Note: Distillation made on dehydrated crude.

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	-	-	-	
Total gasoline and naphtha	-	-	-	
Kerosine distillate	-	-	-	
Gas oil	16.4	0.874	30.4	
Nonviscous lubricating distillate	10.3	0.898-0.922	26.1-22.0	50-100
Medium lubricating distillate	5.9	0.922-0.932	22.0-20.3	100-200
Viscous lubricating distillate	8.2	0.932-0.945	20.3-18.2	Above 200
Residuum	58.8	1.046	3.8	
Distillation loss	0.4			

Remarks: The sample as received contained 34% by vol. water and sediment (by centrifuge) and 1800 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 81-56

FIELD: McLaren

POOL: Waseca Sand

ZONE: Waseca

Well Name: S.C.C. McLaren No. 18

Location: Lsd. 1, Sec. 12, Twp. 50, Rge. 26, W 3rd
Interval tested, depth, feet: 1700-1720

Producing Zone: Waseca

Geological Age: Lower Cretaceous

Province: Saskatchewan

Sample From: Sask. Dept. of
Mineral Resources

Date Sampled: February 27, 1956

Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.980

Sulphur, percent by weight: 3.73

Saybolt Universal Viscosity:

at 100°F., sec. 8,240

at 130°F., sec. 2,360

A.P.I. gravity at 60°F.: 12.9

Pour point, °F.: 20

Colour: Brownish Black

Carbon residue, percent by weight: 8.3
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 755 mm. Hg.
First drop, 205°C. (401°F.)

Fraction No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Viscosity S.U. 100°F.	Cloud Test, °F.
1.	50	122								
2.	75	167								
3.	100	212								
4.	125	257								
5.	150	302								
6.	175	347								
7.	200	392								
8.	225	437								
9.	250	482	3.9	3.9	0.862	32.6	-	51.3		
10.	275	527	7.3	11.2	0.876	30.0	50	54.9		

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.8	14.0	0.884	28.6	50	56.2	43	-
12.	225	437	5.8	19.8	0.894	26.8	51	58.2	48	-
13.	250	482	6.4	26.2	0.908	24.3	54	58.7	65	-
14.	275	527	5.6	31.8	0.924	21.6	58	59.8	109	-
15.	300	572	7.3	39.1	0.935	19.8	61	62.1	239	Bl-25
Residuum			60.4	99.5	1.029	6.0				

Carbon residue of residuum: 13.0%

Carbon residue of crude: 8.3%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	-	-	-	
Total gasoline and naphtha	-	-	-	
Kerosine distillate	-	-	-	
Gas oil	17.6	0.877	29.8	
Nonviscous lubricating distillate	10.1	0.896-0.921	26.4-22.1	50-100
Medium lubricating distillate	5.8	0.921-0.932	22.1-20.3	100-200
Viscous lubricating distillate	5.6	0.932-0.941	20.3-18.9	Above 200
Residuum	60.4	1.029	6.0	
Distillation loss	0.5			

Remarks: The sample as received contained 4.8% by vol. water (A.S.T.M.) and 1000 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 2117-54

FIELD: Midale

POOL: Charles

ZONE: Charles

Well Name: Shell Midale No. D-7-12
Location: Lsd. 7, Sec. 12, Twp. 6, Rge. 11, W 2nd
Interval tested, depth, feet: 4605-4669
Producing Zone: Charles
Geological Age: Mississippian

Province: Saskatchewan
Sample From: Sask. Dept. of
Mineral Resources
Date Sampled: July 27, 1954
Sampled at: Well

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.890
Sulphur, percent by weight: 2.60
Saybolt Universal Viscosity:
at 77°F., sec. 95
at 100°F., sec. 86

A.P.I. gravity at 60°F.: 27.5
Pour point, °F.: 40
Colour: Brownish Black
Carbon residue, percent by weight: 6.9
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 758 mm. Hg.
First drop, 27°C. (81°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122	2.0	2.0)	0.707	68.6	-	-			-
2.	75	167	2.3	4.3)	0.737	60.5	29	42.0			1.4100
3.	100	212	3.6	7.9	0.757	55.4	30	40.9			1.4134
4.	125	257	4.5	12.4	0.772	51.8	29	44.7			1.4228
5.	150	302	3.8	16.2	0.784	49.0	28	49.5			1.4294
6.	175	347	3.8	20.0	0.798	45.8	29	54.1			1.4359
7.	200	392	3.7	23.7	0.813	42.6	30	57.3			1.4429
8.	225	437	3.9	27.6	0.830	39.0	33	60.3			1.4504
9.	250	482	4.6	32.2	0.849	35.2	37	61.9			1.4599
10.	275	527	6.0	38.2							1.4710

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	4.0	42.2	0.871	31.0	44	62.9	40	20	1.4839
12.	225	437	4.0	46.2	0.882	28.9	45	65.7	46	40	1.4892
13.	250	482	5.0	51.2	0.894	26.8	47	68.3	58	55	1.4959
14.	275	527	5.4	56.6	0.904	25.0	49	71.3	86	75	1.5056
15.	300	572	6.6	63.2	0.915	23.1	51	74.7	149	90	1.5142
Resi-duum			35.8	99.0	1.015	7.9					

Carbon residue of residuum: 17.1% Carbon residue of crude: 6.9%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	7.9	0.721	64.8	
Total gasoline and naphtha	23.7	0.758	55.2	
Kerosine distillate	3.9	0.813	42.6	
Gas oil	18.0	0.855	34.0	
Nonviscous lubricating distillate	9.6	0.886-0.907	28.2-24.5	50-100
Medium lubricating distillate	8.0	0.907-0.921	24.5-22.1	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	35.8	1.015	7.9	
Distillation loss	1.0			

Remarks: The sample as received contained 2.4% by vol. water and sediment (by centrifuge) and 690 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 113-56

FIELD: Midale

POOL: Charles

ZONE: Charles

Well Name: Dome Et Al Canadian Superior
West Midale No. 1-27

Location: Lsd. 1, Sec. 27, Twp. 6, Rge. 11, W 2nd
Interval tested, depth, feet: 4538-4607

Producing Zone: Charles

Geological Age: Mississippian

Province: Saskatchewan

Sample From: Sask. Dept. of Mineral
Resources

Date Sampled: March 12, 1956

Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.870

Sulphur, percent by weight: 2.09

Saybolt Universal Viscosity:

at 77°F., sec. 63

at 100°F., sec. 51

A.P.I. gravity at 60°F.: 31.1

Pour point, °F.: 35

Colour: Brownish Black

Carbon residue, percent by weight: 5.7
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 755 mm. Hg.
First drop, 31°C. (88°F.)

Frac-tion No.	Cut at °C.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre- lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122	1.3	0.658	86.9	-	-			-
2.	75	167	2.2	0.681	76.3	13	48.3			1.4037
3.	100	212	3.7	0.718	65.6	30	-			1.4027
4.	125	257	4.7	0.745	58.4	24	44.6			1.4154
5.	150	302	4.2	0.762	54.2	25	46.4			1.4243
6.	175	347	4.3	0.777	50.6	25	49.3			1.4323
7.	200	392	3.6	0.790	47.6	25	52.5			1.4397
8.	225	437	4.0	0.804	44.5	26	56.0			1.4471
9.	250	482	4.7	0.820	41.1	28	59.6			1.4563
10.	275	527	5.9	0.838	37.4	32	61.4			1.4664

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.5	41.1	0.861	32.8	39	61.6	38	20	1.4789
12.	225	437	4.7	45.8	0.870	31.1	39	64.3	42	30	1.4840
13.	250	482	5.5	51.3	0.882	28.9	42	68.7	53	55	1.4915
14.	275	527	4.8	56.1	0.896	26.4	45	71.5	71	75	1.4999
15.	300	572	6.9	63.0	0.904	25.0	46	75.2	115	95	-
Resi- duum			32.6	95.6	1.010	8.6					

Carbon residue of residuum: 15.1%

Carbon residue of crude: 5.7%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	7.2	0.694	72.4	
Total gasoline and naphtha	24.0	0.745	58.4	
Kerosine distillate	8.7	0.813	42.6	
Gas oil	14.5	0.856	33.8	
Nonviscous lubricating distillate	10.4	0.879-0.901	29.5-25.6	50-100
Medium lubricating distillate	5.4	0.901-0.909	25.6-24.2	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	32.6	1.010	8.6	
Distillation loss	4.4			

Remarks: The sample as received contained no water (A.S.T.M.) and 12 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 117-56

FIELD: Midale

POOL: Mission Canyon

ZONE: Mission Canyon

Well Name: Winter No. 1-26
 Location: Lsd. 1, Sec. 26, Twp. 6, Rge. 11, W 2nd
 Interval tested, depth, feet: 4600-4668
 Producing Zone: Mission Canyon
 Geological Age: Mississippian

Province: Saskatchewan
 Sample From: Sask. Dept. of
 Mineral Resources
 Date Sampled: March 12, 1956
 Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.871
 Sulphur, percent by weight: 1.89
 Saybolt Universal Viscosity:
 at 100°F., sec. 49

A.P.I. gravity at 60°F.: 31.0
 Pour point, °F.: 35
 Colour: Brownish Black
 Carbon residue, percent by weight: 4.9
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 759 mm. Hg.
 First drop, 36°C. (97°F.)

Frac-tion No.	Cut at °C. °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre- lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122	0.8	0.660	82.9	-	-			-
2.	75	167	2.2	0.685	75.1	15	-			1.3933
3.	100	212	4.2	0.723	64.2	23	44.6			1.4054
4.	125	257	4.5	0.750	57.2	27	41.0			1.4195
5.	150	302	4.7	0.764	53.7	26	42.5			1.4281
6.	175	347	4.0	0.779	50.1	26	46.0			1.4352
7.	200	392	3.7	0.792	47.2	26	50.8			1.4422
8.	225	437	4.7	0.807	43.8	27	55.7			1.4498
9.	250	482	4.8	0.821	40.8	29	58.5			1.4581
10.	275	527	6.1	0.840	37.0	33	61.0			1.4682

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.7	42.4	0.858	33.4	37	61.7	38	15	1.4788
12.	225	437	5.4	47.8	0.868	31.5	38	65.6	43	35	1.4848
13.	250	482	5.3	53.1	0.881	29.1	41	69.3	52	50	1.4913
14.	275	527	5.8	58.9	0.894	26.8	44	73.0	74	70	1.5008
15.	300	572	6.7	65.6	0.906	24.7	47	76.1	125	90	-
Resi-duum			32.2	97.8	0.996	10.6					

Carbon residue of residuum: 13.4%

Carbon residue of crude: 4.9%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	7.2	0.704	69.5	
Total gasoline and naphtha	24.1	0.750	57.2	
Kerosine distillate	9.5	0.814	42.3	
Gas oil	15.7	0.856	33.8	
Nonviscous lubricating distillate	9.9	0.878-0.900	29.7-25.7	50-100
Medium lubricating distillate	6.4	0.900-0.912	25.7-23.6	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	32.2	0.996	10.6	
Distillation loss	2.2			

Remarks: The sample as received contained no water (A.S.T.M.) and 9 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 184-58

FIELD: Midale

POOL:

ZONE:

Well Name: Trans Empire Baysel Shell Halbrite 12-30
Location: Lsd. 12, Sec. 30, Twp. 5, Rge. 11, W 2
Interval tested, depth, feet: 4814-4836
Producing Zone: Midale
Geological Age: Mississippian

Province: Saskatchewan
Sample From: Sask. Dept. of
Mineral Resources
Date Sampled: May 30, 1958
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.884
Sulphur, percent by weight: 2.10
Saybolt Universal Viscosity:
at 100°F., sec. 61
at 70°F., sec. 95

A.P.I. gravity at 60°F.: 28.6
Pour point, °F.: 40
Colour: Brownish Black
Carbon residue, percent by weight: 6.1
(Conradson)

DISTILLATION
(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 756 mm. Hg.
First drop, 33°C. (91°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122	1.7	0.670	79.7	-	-				
2.	167	5.1	0.694	72.4	19	50.4				
3.	212	9.2	0.731	62.1	27	43.4				
4.	257	13.9	0.756	55.7	29	41.0				
5.	302	17.3	0.774	51.3	30	43.5				
6.	347	21.2	0.788	48.1	30	47.8				
7.	392	24.2	0.800	45.4	30	51.9				
8.	437	28.5	0.813	42.6	30	55.8				
9.	482	32.6	0.829	39.2	32	58.8				
10.	527	38.3	0.847	35.6	36	61.8				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	40.4	0.863	32.5	40	60.4	38	20		
12.	437	45.1	0.876	30.0	42	64.4	43	35		
13.	482	49.8	0.888	27.8	45	68.4	54	55		
14.	527	55.2	0.900	25.7	47	71.8	78	75		
15.	572	61.6	0.914	23.3	51	75.7	146	90		
Resi-duum		97.2	1.003	9.6						

Carbon residue of residuum: 15.0%

Carbon residue of crude: 6.1%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	9.2	0.706	68.9	
Total gasoline and naphtha	24.2	0.750	57.2	
Kerosine distillate	4.3	0.813	42.6	
Gas oil	17.3	0.854	34.2	
Nonviscous lubricating distillate	8.7	0.884-0.905	28.6-24.8	
Medium lubricating distillate	7.1	0.905-0.922	24.8-22.0	
Viscous lubricating distillate	-	-	-	
Residuum	35.6	1.003	9.6	
Distillation loss	2.8			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 114-56

FIELD: Nottingham

POOL: Nottingham Mission Canyon

ZONE: Mission Canyon

Well Name: Imperial Nottingham No. 12-3M-5-32
Location: Lsd. 12, Sec. 3, Twp. 5, Rge. 32, W.P.M.
Interval tested, depth, feet: 3560-3642
Producing Zone: Mission Canyon
Geological Age: Mississippian

Province: Saskatchewan
Sample From: Sask. Dept. of Mineral Resources
Date Sampled: March 3, 1956
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.828
Sulphur, percent by weight: 0.82
Saybolt Universal Viscosity:
at 100°F., sec. 36

A.P.I. gravity at 60°F.: 39.4
Pour point, °F.: 15
Colour: Brownish Green
Carbon residue, percent by weight: 1.8
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 751 mm. Hg.
First drop, 28°C. (82°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122	1.9	1.9	0.652	85.5	-				-
2.	75	167	3.1	5.0	0.674	78.4	9				-
3.	100	212	5.7	10.7	0.711	67.5	17	51.2			1.4002
4.	125	257	7.2	17.9	0.744	58.7	24	46.5			1.4155
5.	150	302	6.2	24.1	0.764	53.7	26	46.0			1.4270
6.	175	347	5.4	29.5	0.779	50.1	26	47.5			1.4353
7.	200	392	4.7	34.2	0.793	46.9	26	50.2			1.4397
8.	225	437	4.6	38.8	0.806	44.1	27	55.9			1.4489
9.	250	482	5.5	44.3	0.821	40.8	29	59.9			1.4580
10.	275	527	6.5	50.8	0.836	37.8	31	63.9			1.4671

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.8	53.6	0.854	34.2	36	65.5	38	5	1.4771
12.	225	437	4.8	58.4	0.864	32.3	37	69.5	42	30	1.4822
13.	250	482	5.7	64.1	0.874	30.4	38	74.0	52	50	1.4885
14.	275	527	5.1	69.2	0.886	28.2	40	77.9	73	70	1.4954
15.	300	572	5.9	75.1	0.896	26.4	42	82.5	120	90	1.5040
Resi-duum			21.0	96.1	0.953	17.0					

Carbon residue of residuum: 7.6%

Carbon residue of crude: 1.8%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	10.7	0.690	73.6	
Total gasoline and naphtha	34.2	0.743	58.9	
Kerosine distillate	10.1	0.814	42.3	
Gas oil	15.9	0.852	34.6	
Nonviscous lubricating distillate	9.6	0.872-0.892	30.8-27.1	50-100
Medium lubricating distillate	5.3	0.892-0.901	27.1-25.6	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	21.0	0.953	17.0	
Distillation loss	3.9			

Remarks: The sample as received contained no water (A.S.T.M.) and 7 lb. salt (as NaCl) per 1000 bbl.

CRUDE PETROLEUM ANALYSIS

Laboratory Number 189-58

FIELD: Nottingham

POOL:

ZONE:

Well Name: Socony Woodley Southern Nottingham 10-10
Location: Lsd. 10, Sec. 10, Twp. 5, Rge. 32, WPM
Interval tested, depth, feet: 3580-3599
Producing Zone: Frobisher
Geological Age: Mississippian

Province: Saskatchewan
Sample From: Sask. Dept. of
Mineral Resources
Date Sampled: June 4, 1958
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.835
Sulphur, percent by weight: 1.00
Saybolt Universal Viscosity:
at 100°F., sec. 37

A.P.I. gravity at 60°F.: 38.0
Pour point, °F.: 40
Colour: Brownish Black
Carbon residue, percent by weight: 1.9
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 762 mm. Hg.
First drop, 33°C. (91°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122	2.0	0.669	80.0						
2.	167	5.5	0.686	74.8	15					
3.	212	11.3	0.720	65.0	21	50.0				
4.	257	18.3	0.749	57.4	18	46.2				
5.	302	24.4	0.770	52.3	22	46.0				
6.	347	30.2	0.786	48.5	23	49.1				
7.	392	35.6	0.801	45.2	30	53.4				
8.	437	40.5	0.816	41.9	32	59.0				
9.	482	44.8	0.826	39.4	31	61.4				
10.	527	50.9	0.845	36.0	35	65.5				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	54.0	0.859	33.2	38	66.9	39	20		
12.	437	58.3	0.868	31.5	38	69.5	44	40		
13.	482	63.9	0.880	29.3	44	73.5	55	65		
14.	527	69.6	0.892	27.1	43	78.8	80	70		
15.	572	74.6	0.902	25.4	45	82.9	138	95		
Resi-duum		95.6	0.973	13.9						

Carbon residue of residuum: 7.8%

Carbon residue of crude: 1.9%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	11.3	0.700	70.6	
Total gasoline and naphtha	35.6	0.751	56.9	
Kerosine distillate	4.9	0.816	41.9	
Gas oil	18.3	0.849	35.2	Below 50
Nonviscous lubricating distillate	9.9	0.875-0.896	30.2-26.4	50-100
Medium lubricating distillate	5.9	0.896-0.907	26.4-24.5	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	21.0	0.973	13.9	
Distillation loss	4.4			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 450-63

FIELD: Oungre

POOL:

ZONE: Ratcliffe Beds

Well Name: Canpet Oungre 3-28-2-14

Location: Lsd. 3, Sec. 28, Twp. 2, Rge. 14, W2 Mer

Interval tested, depth, feet: 5940-5975

Producing Zone: Ratcliffe Beds

Geological Age: Mississippian

Province: Saskatchewan

Sample From: Sask. Dept. of

Mineral Resources

Date Sampled: September 18, 1963

Sampled at: Wellhead - Tubing

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.863

A.P.I. gravity at 60°F.: 32.5

Sulphur, percent by weight: 1.59

Pour point, °F.: -25

Saybolt Universal Viscosity:
at 100°F., sec. 44

Colour: Brownish Black

Carbon residue, percent by weight: 4.5
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 752 mm. Hg.
First drop, 31°C. (88°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122	1.3	0.653	85.2	-	-			-	-
2.	167	4.8	0.677	77.5	11	-			1.3867	75.2
3.	212	9.9	0.715	66.4	19	51.0			1.4012	79.3
4.	257	16.2	0.745	58.4	24	48.2			1.4148	82.1
5.	302	21.5	0.764	53.7	26	49.1			1.4232	88.3
6.	347	25.0	0.780	49.9	26	51.1			1.4331	89.6
7.	392	30.3	0.795	46.5	27	54.0			1.4418	93.5
8.	437	34.7	0.812	42.8	30	56.2			1.4504	96.0
9.	482	39.9	0.827	39.6	31	59.5			1.4596	101.5
10.	527	45.3	0.844	36.2	35	62.0			1.4685	109.6

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	49.4	0.862	32.7	39	63.0	38	10	1.4780	113.6
12.	437	54.5	0.874	30.4	41	62.2	45	35	1.4854	116.2
13.	482	59.6	0.887	28.0	44	68.0	57	50	1.4931	121.6
14.	527	64.1	0.900	25.7	47	70.8	83	65	1.5008	128.2
15.	572	70.2	0.914	23.3	51	74.1	156	80	1.5108	138.0
Resi-duum		98.5	0.997							

Carbon residue of residuum: 19.9%

Carbon residue of crude: 4.5%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	9.9	0.693	72.7	
Total gasoline and naphtha	30.3	0.744	58.7	
Kerosine distillate	4.4	0.812	42.8	
Gas oil	19.4	0.850	35.0	Below 50
Nonviscous lubricating distillate	8.9	0.880-0.903	29.3-25.2	50-100
Medium lubricating distillate	7.2	0.903-0.922	25.2-22.0	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	28.3	0.997	10.4	
Distillation loss	1.5			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 234-58

FIELD: Parkman

POOL:

ZONE:

Well Name: Imperial Canadian Superior Parkman 4-31
 Location: Lsd. 4, Sec. 31, Twp. 9, Rge. 33, WPM
 Interval tested, depth, feet: 3478-3488
 Producing Zone: Tilston Beds
 Geological Age:

Province: Saskatchewan
 Sample From: Sask. Dept. of Mineral Resources
 Date Sampled: June 26, 1958
 Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.854
 Sulphur, percent by weight: 1.66
 Saybolt Universal Viscosity:
 at 100°F., sec. 44

A.P.I. gravity at 60°F.: 34.2
 Pour point, °F.: +25
 Colour: Black
 Carbon residue, percent by weight: 3.7
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 754 mm. Hg.
 First drop, 33°C. (91°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122	2.4	0.648	86.9						
2.	167	5.1	0.671	79.4	8					
3.	212	9.6	0.706	68.9	15	58.5				
4.	257	14.3	0.732	61.8	18	57.2				
5.	302	19.3	0.754	56.2	21	56.7				
6.	347	23.3	0.774	51.3	24	56.2				
7.	392	27.7	0.794	46.7	27	56.8				
8.	437	31.8	0.810	43.2	29	57.7				
9.	482	36.3	0.826	39.8	31	59.9				
10.	527	42.4	0.843	36.4	34	61.9				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	46.2	0.862	32.6	39	63.1	38	15		
12.	437	52.0	0.872	30.8	40	65.6	44	35		
13.	482	57.1	0.888	27.8	45	68.5	64	60		
14.	527	62.3	0.901	25.6	48	71.8	80	80		
15.	572	68.1	0.911	23.8	49	75.4	140	95		
Resi-duum		95.0	1.000	10.0						

Carbon residue of residuum: 11.6%

Carbon residue of crude: 3.7%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	9.6	0.682	76.0	
Total gasoline and naphtha	27.7	0.734	61.3	
Kerosine distillate	4.1	0.810	43.2	
Gas oil	18.9	0.849	35.2	
Nonviscous lubricating distillate	10.8	0.877-0.904	30.0-25.0	Below 50
Medium lubricating distillate	6.6	0.904-0.916	25.0-23.0	50-100
Viscous lubricating distillate	-	-	-	100-200
Residuum	26.9	1.000	10.0	Above 200
Distillation loss	5.0			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 187-58

FIELD: Pinto

POOL:

ZONE:

Well Name: Co-Op Et Al Souris River 16-12
 Location: Lsd. 16, Sec. 12, Twp. 2, Rge. 5, W 2
 Interval tested, depth, feet: 5185-5199
 Producing Zone: Midale
 Geological Age: Mississippian

Province: Saskatchewan
 Sample From: Sask. Dept. of
 Mineral Resources
 Date Sampled: May 28, 1958
 Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.821
 Sulphur, percent by weight: 0.46
 Saybolt Universal Viscosity:
 at 100°F., sec. 35

A.P.I. gravity at 60°F.: 40.8
 Pour point, °F.: 20
 Colour: Brownish Black
 Carbon residue, percent by weight: 1.2
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 756 mm. Hg.
 First drop, 30°C. (86°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion ₄ (N _F -N _C) 10 ⁴
1.	122	2.6	0.658	83.6						
2.	167	6.6	0.676	77.8	10					
3.	212	12.6	0.713	67.0	18	52.0				
4.	257	20.3	0.746	58.2	25	49.2				
5.	302	26.4	0.767	53.0	27	46.0				
6.	347	32.3	0.786	48.5	29	49.5				
7.	392	38.5	0.795	46.5	27	52.1				
8.	437	43.5	0.810	43.2	29	56.0				
9.	482	48.7	0.824	40.2	30	61.5				
10.	527	55.3	0.840	37.0	33	65.2				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	60.0	0.858	33.4	37	67.4	39	20		
12.	437	64.7	0.868	31.5	38	71.6	46	40		
13.	482	69.8	0.880	29.3	41	76.8	57	65		
14.	527	73.9	0.889	27.7	42	80.1	82	80		
15.	572	79.9	0.895	26.6	42	86.1	141	95		
Resi-duum		97.0	0.954	16.8						

Carbon residue of residuum: 5.8% Carbon residue of crude: 1.2%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	12.6	0.690	73.6	
Total gasoline and naphtha	38.5	0.745	58.4	
Kerosine distillate	10.2	0.817	41.7	
Gas oil	15.4	0.853	34.4	
Nonviscous lubricating distillate	9.3	0.873-0.890	30.6-27.5	
Medium lubricating distillate	6.5	0.890-0.899	27.5-26.0	
Viscous lubricating distillate	-	-	-	
Residuum	17.1	0.954	16.8	
Distillation loss	3.0			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 441-63

FIELD: Pinto

POOL:

ZONE: Frobisher

Well Name: Ashland Blair W' Burne
Location: Lsd. 8, Sec. 6, Twp. 2, Rge. 4, W 2
Interval tested, depth, feet: 5195-5260
Producing Zone: Frobisher
Geological Age: Mississippian

Province: Saskatchewan
Sample From: Dept. of Mineral Resources Regina
Date Sampled: September 18, 1963
Sampled at: Tubing

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.848
Sulphur, percent by weight: 1.12
Saybolt Universal Viscosity:
at 100°F., sec. 44

A.P.I. gravity at 60°F.: 35.4
Pour point, F.: 0
Colour: Black
Carbon residue, percent by weight: 2.5
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 751 mm. Hg.
First drop, 32°C. (90°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122	2.1	0.652	85.5	-	-			1.3919	75.7
2.	167	5.6	0.685	75.1	15	-			1.3924	78.3
3.	212	10.6	0.723	64.2	23	46.0			1.4042	83.6
4.	257	17.3	0.752	56.7	27	45.7			1.4171	88.9
5.	302	23.0	0.771	52.0	29	45.0			1.4280	94.2
6.	347	28.4	0.786	48.5	29	50.8			1.4368	97.0
7.	392	33.6	0.798	45.8	29	52.4			1.4437	99.1
8.	437	38.2	0.812	42.8	30	57.7			1.4508	100.1
9.	482	43.1	0.827	39.6	31	62.0			1.4589	102.8
10.	527	49.7	0.844	36.2	35	65.2			1.4689	109.7

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	54.7	0.864	32.3	40	65.6	42	10	1.4803	118.0
12.	437	59.0	0.874	30.4	41	69.0	50	30	1.4858	120.4
13.	482	64.3	0.885	28.4	43	74.6	56	55	1.4923	125.2
14.	527	70.1	0.898	26.1	46	79.9	82	70	1.4985	127.6
15.	572	75.8	0.908	24.3	48	84.9	148	95	1.5074	135.8
Resi-duum		99.4	0.977	13.3						

Carbon residue of residuum: 9.3%

Carbon residue of crude: 2.5%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	10.6	0.696	71.8	
Total gasoline and naphtha	33.6	0.750	57.2	
Kerosine distillate	4.6	0.812	42.8	
Gas oil	18.7	0.848	35.4	
Nonviscous lubricating distillate	11.8	0.874-0.901	30.4-25.6	Below 50
Medium lubricating distillate	7.1	0.901-0.913	25.6-23.5	50-100
Viscous lubricating distillate	-	-	-	100-200
Residuum	23.6	0.977	13.3	Above 200
Distillation loss	0.6			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 443-63

FIELD: Pinto

POOL:

ZONE: Midale

Well Name: Dome Colo. Shell Pinto 14-31-1-4
 Location: Lsd. 14, Sec. 31, Twp. 1, Rge. 4, W 2 Mer.
 Interval tested, depth, feet: 5230-5270
 Producing Zone: Midale
 Geological Age: Mississippian

Province: Saskatchewan
 Sample From: Sask. Dept. of Mineral Resources
 Date Sampled: September 18, 1963
 Sampled at: Separator

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.825
 Sulphur, percent by weight: 0.36
 Saybolt Universal Viscosity:
 at 100°F., sec. 35

A.P.I. gravity at 60°F.: 40.0
 Pour point, °F.: 0
 Colour: Brownish Black
 Carbon residue, percent by weight: 1.1
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 751 mm. Hg.
 First drop, 31°C. (88°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (NF-Nc) 104
1.	122	2.4	0.646	87.5	-	-			1.3581	80.3
2.	167	6.1	0.677	77.5	11	-			1.3869	75.2
3.	212	12.3	0.716	66.1	19	51.0			1.4018	84.7
4.	257	20.2	0.746	58.2	25	46.5			1.4151	90.3
5.	302	26.3	0.767	53.0	27	45.6			1.4260	93.9
6.	347	32.6	0.784	49.0	28	48.2			1.4356	98.0
7.	392	36.5	0.797	46.0	28	52.0			1.4425	98.8
8.	437	42.2	0.810	43.2	29	56.2			1.4498	100.0
9.	482	49.0	0.824	40.2	30	61.0			1.4578	102.7
10.	527	56.2	0.840	37.0	33	64.0			1.4665	109.3

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	59.9	0.863	32.5	40	67.0	39	10	1.4792	117.8
12.	437	64.6	0.871	31.0	40	71.2	44	30	1.4828	119.9
13.	482	69.7	0.880	29.3	41	75.1	55	50	1.4888	123.5
14.	527	74.2	0.887	28.0	41	80.2	75	70	1.4938	127.0
15.	572	80.1	0.895	26.6	42	84.6	128	95	1.5030	133.7
Resi-duum		98.2	0.943	18.6						

Carbon residue of residuum: 5.5%

Carbon residue of crude: 1.1%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	12.3	0.691	73.3	
Total gasoline and naphtha	36.5	0.743	59.0	
Kerosine distillate	12.5	0.818	41.5	
Gas oil	16.0	0.855	34.0	
Nonviscous lubricating distillate	9.4	0.876-0.891	30.0-27.3	Below 50
Medium lubricating distillate	5.7	0.891-0.899	27.3-25.9	50-100
Viscous lubricating distillate	-	-	-	100-200
Residuum	18.1	0.943	18.6	Above 200
Distillation loss	1.8			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 182-58

FIELD: Queensville

POOL:

ZONE:

Well Name: Imperial Queensville 8-14
Location: Lsd. 8, Sec. 14, Twp. 6, Rge. 2, W 2
Interval tested, depth, feet: 3944-3950
Producing Zone: Frobisher
Geological Age: Mississippian

Province: Saskatchewan
Sample From: Sask. Dept. of Mineral Resources
Date Sampled: June 5, 1958
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.841
Sulphur, percent by weight: 0.97
Saybolt Universal Viscosity:
at 100°F., sec. 38

A.P.I. gravity at 60°F.: 36.8
Pour point, °F.: -10
Colour: Brownish Black
Carbon residue, percent by weight: 2.4
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 760 mm. Hg.
First drop, 27°C. (81°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122	1.9	0.665	81.3						
2.	167	5.6	0.684	75.4	14					
3.	212	10.9	0.719	65.3	21	51.9				
4.	257	17.6	0.747	57.9	25	47.7				
5.	302	23.5	0.769	52.5	28	46.1				
6.	347	28.6	0.784	49.0	28	48.2				
7.	392	33.1	0.798	45.8	29	51.9				
8.	437	37.8	0.811	43.0	29	56.5				
9.	482	42.6	0.825	40.0	31	59.5				
10.	527	49.2	0.842	36.6	34	62.9				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	52.6	0.861	32.8	39	65.6	39	15		
12.	437	57.8	0.870	31.1	39	69.4	44	35		
13.	482	63.6	0.882	28.9	42	73.2	56	60		
14.	527	68.5	0.893	27.0	44	77.0	77	75		
15.	572	74.6	0.906	24.7	47	81.9	133	90		
Resi-duum		97.4	0.977	13.3						

Carbon residue of residuum: 9.2%

Carbon residue of crude: 2.4%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	10.9	0.698	71.2	
Total gasoline and naphtha	33.1	0.747	57.9	
Kerosine distillate	4.7	0.811	43.0	
Gas oil	20.2	0.849	35.2	Below 50
Nonviscous lubricating distillate	10.2	0.876-0.898	30.0-26.1	50-100
Medium lubricating distillate	6.4	0.898-0.913	26.1-23.5	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	22.8	0.977	13.3	
Distillation loss	2.6			

OIL FIELD DATA

Field and Pool: Rapdan, Upper Shaunavon

Location: Twp(s) 3 & 4, Rge(s) 19 & 20, W 3 M

DISCOVERY DETAILS

Well: Name: Rapdan Crown No. 1 (15-2-4-20)

Completed: July 1953

Perforated: 4552'-4590'

Treatment: Acid, Frac.

Initial Potential: 273 BOPD; 0.4% cut

GEOLOGY

Producing Zone(s): Jurassic

Other Shows: None

Trap Type: Stratigraphic Trap

Lithology: Sandy Limestone

Average Reservoir Thickness: Approx. 19'

Regional Setting: Southwest Saskatchewan

Deepest Formation Penetrated: Lower Shaunavon

DEVELOPMENT DATA

Total Wells: Completed Oil: 39; Dry and Abandoned: 17

Producing Oil: 29; Suspended Oil: 0

Injection or Disposal: Water: 12; Gas: 0

Well Spacing: 160 Acres; Pattern: Peripheral injection (Wells located in accordance with special agreement)

Logging Practice: Induction or Resistivity and Micro logs.

Completion Practice: Drill through, set pipe and perforate, acidize and fracture

RESERVOIR DATA

Type of Drive: Solution Gas Drive

Estimated Oil in Place: 120 MM S.T.bbls

Estimated Recoverable Oil: 26.6 MM S.T.bbls

Oil Zone Thickness: Maximum: 41; Average: 18.7'

Gas Zone Thickness: Maximum: Nil

Porosity: 15.4%; Permeability: 52 md

Area: 11,200 Acres

Oil Characteristics: Gravity: 22.2 °API; Sulphur: 3.25%

Pour Point: 20°F.; Base: Asphalt

Pressure Maintenance or Secondary Recovery: Waterflood in Rapdan Unit

PRODUCTION

MPR: None; BOPD: 2,575 (August 1965)

Economic Allowance: None, Unitized

Market Outlet: South Saskatchewan Pipeline

SECONDARY RECOVERY

RESERVOIR DATA

- 1) Field: Rapdan Unit
- 2) Pool: Upper Shaunavon
- 3) Province: Saskatchewan
- 4) Location: Twp(s) 3 & 4, Rge(s) 19 & 20, W 3 M
- 5) Operator: Marathon Oil Company
- 6) Project: Rapdan Unit
- 7) Reservoir: Jurassic
- 8) Discovery Date: July 1953
- 9) Date Injection Began: November 1962
- 10) Main Structural Feature: Stratigraphic Trap
- 11) Gas Cap: Originally: No; At Present: No
- 12) Time Required for Initial Results (months): 24
- 13) Initial Results on Production: Increase Prod. Rate. Reduced GOR
- 14) Main Drive in Primary Production: Solution Gas
- 15) Productive Area (Acres) of Project: 11,200; Affected by Injection: All
- 16) Average Depth to Top of Pay (feet): 4,600
- 17) Average Effective Thickness (feet): 18.7
- 18) Average Porosity %: 15.4
- 19) Average Horizontal Permeability (millidarcys): 52
- 20) Connate Water (% of Pore Space): 5.0
- 21) Viscosity at Initial Reservoir Conditions (centipoises): 10.5
- 22) API Gravity: 22.2
- 23) Solution Gas/Oil Ratio at Saturation Pressure (cu.ft./bbl): 114
- 24) Bubble Point Pressure (psi): 811
- 25) Original Pressure (psi): 1955
- 26) Reservoir Pressure at Start of Injection (psi): 1,020
- 27) Latest Reservoir Pressure: 1,212 psi on October 1, 1964
- 28) Injection Fluid: Salt Water
- 29) Injection Fluid Source: Formation Water Belly River
- 30) System: Closed
- 31) Fluid Treatment before Injection: Filtration, Bactericide
- 32) Injection Pattern: Semi-Peripheral
- 33) Structural Position Injection Wells: Oil Zone

- 34) Distance Injection Wells to Producers: 160 Acre Spacing
- 35) Number of Injection Wells at Start: 4
- 36) Number of Injection Wells at Present: 12 (September 1965)
- 37) Average Daily Injection Rate per Injection Well at Start: 519 bbls (November 1962)
- 38) Average Daily Injection Rate per Injection Well at Present: 742 bbls (August 1965)
- 39) Average Injection Pressure at Start (psi): 1,483
- 40) Average Injection Pressure at Present (psi): Stn. #1: 2,315; Stn. #2: 1,558
(August 1965)
- 41) Number of Producing Wells in Project Area at Start:
- 42) Number of Producing Wells in Project Area at Present: 29 (September 1, 1965)
- 43) Average Production Rate in Project Area at Start (bbls/day): 1,455
- 44) Average Production Rate in Project Area at Present: 2,575 (August 1965)
- 45) Original Oil in Place in Project Area (bbls): 120 MM
- 46) Original Oil Saturation (% of pore space): 80 (Assumed)
- 47) Primary Recovery from Project Area when Injection Started (bbls):
- 48) Oil Saturation at Start of Project (% of pore space): 80 (Assumed)
- 49) Oil Production from Project Area from Start of Injection to now (bbls): 2,466,019
(September 1, 1965)
- 50) Total Volume of Injected Fluids at Present (bbls): 5,175,438 (September 1, 1965)
- 51) Estimated Primary Ultimate Recovery from Project Area (bbls): 4.8 MM
- 52) Estimated Increase in Ultimate Recovery from Project Area (bbls): 21.3 MM
- 53) Well Spacing: 160 Acres
- 54) Oil Volume Factor (initial reservoir barrels per Stock-Tank barrel): 1.070

CRUDE PETROLEUM ANALYSIS

Laboratory Number 389-60

FIELD: Rocanville

POOL:

ZONE:

Well Name: Hudson 8-5
Location: Lsd. 8, Sec. 5, Twp. 16, Rge. 31, W1
Interval tested, depth, feet: 2,330
Producing Zone: Bakken
Geological Age: Mississippian

Province: Saskatchewan
Sample From: Sask. Dept. of Mineral Resources
Date Sampled: June 15, 1960
Sampled at: Before Separator

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.842
Sulphur, percent by weight: 0.50
Saybolt Universal Viscosity:
at 100°F., sec. 38

A.P.I. gravity at 60°F.: 36.6
Pour point, °F.: -65
Colour: Greenish Brown
Carbon residue, percent by weight: 2.2
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 759 mm. Hg.
First drop, 75°C. (167°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122									
2.	167									
3.	212	2.7	0.706	68.9	15	-			1.3992	
4.	257	12.4	0.728	62.9	16	61.0			1.4048	
5.	302	19.8	0.749	57.4	18	62.2			1.4149	
6.	347	26.9	0.766	53.2	20	64.0			1.4241	
7.	392	33.6	0.785	48.8	23	65.5			1.4338	
8.	437	40.1	0.801	45.2	24	66.2			1.4429	
9.	482	46.4	0.821	40.9	29	66.5			1.4540	
10.	527	55.3	0.837	37.6	32	66.8			1.4643	

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	61.4	0.854	34.2	36	66.2	39	10	1.4743	
12.	437	67.0	0.869	31.3	39	68.2	47	30	1.4840	
13.	482	72.9	0.884	28.6	43	69.9	63	55	1.4929	
14.	527	77.5	0.900	25.7	47	71.5	103	70	1.5020	
15.	572	82.8	0.914	23.3	51	72.5	224	85	1.5102	
Resi-duum		99.2	0.980	12.9						

Carbon residue of residuum: 11.3% Carbon residue of crude: 2.2%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	2.7	0.706	68.9	
Total gasoline and naphtha	33.6	0.750	57.2	
Kerosine distillate	12.8	0.811	43.0	
Gas oil	18.9	0.849	35.2	
Nonviscous lubricating distillate	9.5	0.872-0.899	30.8-25.9	Below 50
Medium lubricating distillate	4.4	0.899-0.911	25.9-23.8	50-100
Viscous lubricating distillate	3.6	0.911-0.922	23.8-22.0	100-200
Residuum	16.4	0.980	12.9	Above 200
Distillation loss	0.8			

OIL FIELD DATA

Field and Pool: Smiley-Dewar

Location: Twp. 31, Rge(s) 25 & 26, W 3 M

DISCOVERY DETAILS

Well: Name: Imperial Smiley 7-15V-31-25

Completed: September 1956

GEOLOGY

Producing Zone(s): Upper and Lower Main Sand, Chert

Trap Type: Stratigraphic

Lithology: Sandstone with Varying Amounts of Shale

Maximum Reservoir Thickness: 40'

DEVELOPMENT DATA

Total Wells: Completed Oil: 120; Producing Oil: 120
Injection or Disposal: Water: 1

Well Spacing: 40 Acres

Logging Practice: Electrical; Micro-logs; Radiation logs

Completion Practice: Perf. & Open Hole

RESERVOIR DATA

Type of Drive: Solution Gas and Gas Cap

Estimated Oil in Place: 73,429,000 S.T.bbls (960bbls/acre-foot)

Estimated Recoverable Oil: NA

Oil Zone Thickness: Average: 9.4'

Porosity: 24.0%; Permeability: 40 md

Area: 7,027 Acres

Oil Characteristics: Gravity: 34 °API; Initial Solution GOR: 239

Pressure Maintenance or Secondary Recovery: Sec. Rec. Waterflooding

Market Outlet (pipeline): Mid. Saskatchewan

SECONDARY RECOVERY

RESERVOIR DATA

- 1) Field: Smiley-Dewar Viking Sand
- 2) Pool: Smiley-Dewar Viking Sand
- 3) Province: Saskatchewan
- 4) Location: Twp. 31, Rge(s) 25 & 26, W 3 M
- 5) Operator: Imperial Oil; United Canso; Consumers Co-op
- 6) Project: Unit
- 7) Reservoir: Viking Sand, Cretaceous
- 8) Discovery Date: September 1955
- 9) Date Injection Began: February 1964
- 10) Main Structural Feature: Stratigraphic Trap
- 11) Gas Cap: Originally: Yes; At Present: Yes
- 12) Main Drive in Primary Production: Solution Gas
- 13) Productive Area (acres) of Reservoir: 7,027; Of Project: 7,027; Affected by Injection: 7,027
- 14) Average Depth to Top of Pay (feet): 2,300
- 15) Average Effective Thickness (feet): 9.4
- 16) Average Porosity %: 24.0
- 17) Average Horizontal Permeability and Range in Brackets (millidarcys): 40
(5-700)
- 18) Connate Water (% of pore space): 35.0
- 19) Viscosity at Initial Reservoir Conditions (centipoises): 0.325
- 20) API Gravity: 34°
- 21) Solution Gas/Oil Ratio at Saturation Pressure (cu.ft./bbl): 239
- 22) Bubble Point Pressure (psi): 938
- 23) Original Pressure (psi): 938

- 24) Injection Fluid: Water
- 25) Injection Fluid Source: Belly River Sand & Produced
- 26) System: Closed
- 27) Fluid Treatment before Injection: Filtration
- 28) Injection Pattern: 9 Spot
- 29) Structural Position Injection Wells: Oil Zone
- 30) Distance Injection Wells to Producers (feet): 1,320
- 31) Number of Injection Wells at Start: 40
- 32) Number of Injection Wells at Present: 42 (September 1965)
- 33) Average Daily Injection Rate per Injection Well at Start (bbls): 273
- 34) Average Daily Injection Rate per Injection Well at Present (bbls): 360
(September 1965)
- 35) Number of Producing Wells in Project Area at Start: 86
- 36) Number of Producing Wells in Project Area at Present: 90 (September 1965)
- 37) Original Oil in Place in Project Area (bbls): 73,429,000
- 38) Original Oil Saturation (% of pore space): 65
- 39) Oil Saturation at Start of Project (% of pore space): 55 (approx.)
- 40) Total Volume of Injected Fluids at Present (bbls): 7,418,642 (June 30, 1965)
- 41) Estimated Primary Ultimate Recovery from Project Area (bbls): 14,686,000
- 42) Well Spacing: 40 Acres
- 43) Oil Volume Factor (initial reservoir barrels per Stock-Tank barrel): 1.112

OIL FIELD DATA

Field and Pool: South Eureka Unit - Eureka Viking Sand

Location: Twp. 31, Rge(s) 22 & 23, W 3 M

DISCOVERY DETAILS

Well: Name: Canpet Sarcee S. Eureka 6-6-31-22 W3

Completed: January 4, 1959

Perforated: 2,336 to 49; and 2,351 to 60

Treatment: Sand-Oil Fracture

Initial Potential: 61 BOPD

GEOLOGY

Producing Zone(s): Viking Sand

Other Shows: None

Trap Type: Stratigraphic

Lithology: Fine Sand with Bentonitic Shale Streaks and Infilling

Maximum Reservoir Thickness: 35'

Regional Setting: Area of Low Dip between Alberta & Williston Basins

Deepest Formation Penetrated: Devonian Three Forks

DEVELOPMENT DATA

Total Wells: Completed Oil: 55

Producing Oil: 55

Well Spacing: 40 Acres

Logging Practice: Latero or Guard Log

Completion Practice: Abrazifet & Sand-Oil Fracture

RESERVOIR DATA

Type of Drive: Solution Gas

Estimated Oil in Place: 25,800,000 S.T.bbls (39 $\frac{1}{4}$ bbls/acre-foot)

Estimated Recoverable Oil: 2,500,000 S.T.bbls (39 bbls/acre-foot) primary

Oil Zone Thickness: Maximum: 36'; Average: 29' gross, 12' net

Gas Zone Thickness: -

Porosity: 23%; Permeability: 20 md

Area: 2,200 Acres

Oil Characteristics: Gravity: 36 °API

Pour Point: +35; Initial Solution GOR: 162 cu.ft./reservoir
bbl.

PRODUCTION

Economic Allowance: 34 BOPD (present)

Market Outlet: Mid.-Saskatchewan Pipeline

OIL FIELD DATA

Field and Pool: Steelman - Second North Midale Beds

Location: Twp(s) 4 & 5, Rge(s) 4 & 5, W 2 M

DISCOVERY DETAILS

Method: Stepout Drilling

Well: Name: Dome Douglaston 5-5-5-4

Completed: June 1957

Perforated: 4,410' - 4,424'

Treatment: Acidized with 500 Gallons

Initial Potential: 42 BOPD

GEOLOGY

Producing Zone(s): Midale Beds, Mississippian

Other Shows: Frobisher Beds (Dually Produced)

Trap Type: Stratigraphic

Lithology: Fractured Limestone

Maximum Reservoir Thickness: 40'

Deepest Formation Penetrated: Frobisher Beds

DEVELOPMENT DATA

Total Wells: Completed Oil: 29; Dry and Abandoned: 3

Producing Oil: 24; Injection or Disposal: Water: 5

Well Spacing: 80 Acres; Pattern: Odd-numbered Lsd.'s

Logging Practice: Electrical Log, and Grn or Sonic Log

Completion Practice: Case through, perforate, acidize

RESERVOIR DATA

Type of Drive: Solution Gas, now Waterflood

Estimated Oil in Place: 12,000,000 S.T.bbls

Estimated Recoverable Oil: 3,341,000 S.T.bbls

Oil Zone Thickness: Average: 13.8' net

Porosity: 14.5%; Permeability: 5.4 md

Area: 2,400 Acres

Oil Characteristics: Gravity: 41.6 °API; Initial Solution GOR: 880

Pressure Maintenance or Secondary Recovery: Waterflood

PRODUCTION

MPR: Good Engineering Practice

Economic Allowance: NA

Market Outlet: Producers Pipeline Ltd.

SECONDARY RECOVERY

RESERVOIR DATA

- 1) Field: Steelman
- 2) Pool: Second North Midale Beds
- 3) Province: Saskatchewan
- 4) Location: Twp(s) 4 & 5, Rge(s) 4 & 5, W 2 M
- 5) Operator: Dome Petroleum Limited
- 6) Project: Douglaston-Midale Beds Unit
- 7) Reservoir: Midale
- 8) Discovery Date: June 1957
- 9) Date Injection Began: June 1964
- 10) Main Structural Feature: Stratigraphic Trap
- 11) Gas Cap: Originally: Yes; At Present: Yes
- 12) Time Required for Initial Results: 9 months
- 13) Initial Results on Production: GOR decreased from 8,000 cfpb to less than 1,000 cfpb
- 14) Main Drive in Primary Production: Solution Gas
- 15) Productive Area (acres) of Reservoir: 2,400; Of Project: 1,840; Affected by Injection: 1,840
- 16) Average Depth to Top of Pay (feet): 4,360
- 17) Average Effective Thickness (feet): 13.8
- 18) Average Porosity %: 14.5
- 19) Average Horizontal Permeability and Range in Brackets (millidarcys): 5.4 (0-300)
- 20) Connate Water (% of pore space): 38
- 21) Viscosity at Initial Reservoir Conditions (centipoises): 0.5
- 22) API Gravity: 41.6
- 23) Solution Gas/Oil Ratio at Saturation Pressure (cu.ft./bbl): 880
- 24) Bubble Point Pressure: 2,060 psig
- 25) Original Pressure: 2,060 psig
- 26) Reservoir Pressure at Start of Injection: 1,341 psig
- 27) Latest Reservoir Pressure: 1,409 psi (June 1965)
- 28) Injection Fluid: Water
- 29) Injection Fluid Source: Blairmore Formation
- 30) System: Closed
- 31) Fluid Treatment before Injection: Filtration, Bactericide
- 32) Injection Pattern: Line
- 33) Structural Position Injection Wells: In Oil Zone

- 34) Distance Injection Wells to Producers (feet): 2,640 (min.)
- 35) Number of Injection Wells at Start: 5
- 36) Number of Injection Wells at Present: 5 (July 1965)
- 37) Average Daily Injection Rate per Injection Well at Start (bbls): 600
- 38) Average Daily Injection Rate per Injection Well at Present (bbls): 600
- 39) Average Injection Pressure at Start: 1,080 psig
- 40) Average Injection Pressure at Present (psi): 1,860 (June 1965)
- 41) Number of Producing Wells in Project Area at Start: 18
- 42) Number of Producing Wells in Project Area at Present: 18 (July, 1965)
- 43) Average Production Rate in Project Area at Start (bbls/day): 150
- 44) Average Production Rate in Project Area at Present: 170 BOPD (June 1965)
- 45) Original Oil in Place in Project Area (bbls): 12,000,000
- 46) Original Oil Saturation (% of pore space): 62
- 47) Primary Recovery from Project Area when Injection Started (bbls): 743,830
- 48) Oil Saturation at Start of Project (% of pore space): 58
- 49) Oil Production from Project Area from Start of Injection to now (bbls): 58,154
(June 30, 1965)
- 50) Total Volume of Injected Fluids at Present (bbls or Mcf):
- 51) Estimated Primary Ultimate Recovery from Project Area (bbls): 1,480,000
- 52) Estimated Increase in Ultimate Recovery from Project Area (bbls): 1,861,000
- 53) Well Spacing: 80 Acres
- 54) Oil Volume Factor (initial reservoir barrels per Stock-Tank barrel): 1.525

OIL FIELD DATA

Field and Pool: Steelman Unit 1A

Location: Twp. 4, Rge(s) 5 & 6, W 2 M

DISCOVERY DETAILS

Method: Combination of all available exploratory methods

Well: Name: Imperial Steelman 1-8-4-5

Completed: January 27, 1955

Perforated: 4,785-4,805

Treatment: 1,000 Gal. HCl

Initial Potential: 34 BPD

GEOLOGY

Producing Zone(s): Midale

Other Shows: Mission Canyon

Trap Type: Stratigraphic

Lithology: Limestone

Maximum Reservoir Thickness: 30'

Regional Setting: Erosional Surface on Mississippian

DEVELOPMENT DATA

Total Wells: Completed Oil: 171

Producing Oil: 171

Well Spacing: 80 Acres; Pattern: Odd Lsd.

Logging Practice: Electrical, Radiation

Completion Practice: Perf. and Open Hole

RESERVOIR DATA

Type of Drive: Solution Gas Primary, Waterflood Secondary

Estimated Oil in Place: 115,858,000 S.T.bbls (600 bbls/acre-foot)

Estimated Recoverable Oil: 40,550,000 S.T.bbls (210 bbls/acre-foot)

Oil Zone Thickness: Maximum: 30'; Average: 14.3'

Porosity: 17.1%; Permeability: 7 md

Area: 13,500 Acres

Oil Characteristics: Gravity: 38 °API; Initial Solution GOR: 704

Pressure Maintenance or Secondary Recovery: Waterflooding

PRODUCTION

MPR: 77 BOPD (approx.) (Average before unitization)

Economic Allowance: No Restrictions

Market Outlet (pipeline): Westspur

Bibliographical Reference: Steelman Unitization Proposal

SECONDARY RECOVERY

RESERVOIR DATA

- 1) Field: Steelman
- 2) Pool: Steelman Unit 1A
- 3) Province: Saskatchewan
- 4) Location: Twp. 4, Rge(s) 5 & 6, W 2 M
- 5) Operator: Imperial Oil Limited
- 6) Project: Steelman 1A Unit
- 7) Reservoir: Midale, Charles, Mississ.
- 8) Discovery Date: January 1955
- 9) Date Injection Began: Pilot September 1958; Full Scale July 1961
- 10) Main Structural Feature: Stratigraphic 50'/mile
- 11) Gas Cap: Originally: No; At Present: No
- 12) Time Required for Initial Results: Nil
- 13) Initial Results on Production: 34 BPD; 650 GOR
- 14) Main Drive in Primary Production: Solution Gas
- 15) Productive Area (acres) of Reservoir: 13,500; Of Project: 13,500; Affected by Injection: 13,500
- 16) Average Depth to Top of Pay (feet): 4,650
- 17) Average Effective Thickness (feet): 14.3
- 18) Average Porosity %: 17.1
- 19) Average Horizontal Permeability and Range in Brackets (millidarcys): 7 (0-1,000+)
- 20) Connate Water (% of pore space): 35
- 21) Viscosity at Initial Reservoir Conditions (centipoises): 0.345
- 22) API Gravity: 38°
- 23) Solution Gas/Oil Ratio at Saturation Pressure (cu.ft/bbl): 704
- 24) Bubble Point Pressure (psi): 2,080
- 25) Original Pressure (psi): 2,080
- 26) Reservoir Pressure at Start of Injection (psi): 1,400 (approx.)
- 27) Latest Reservoir Pressure: 1,400 psi (July 1961) (approx.)
- 28) Injection Fluid: Blairmore & Produced Waters
- 29) Injection Fluid Source: Blairmore & Prod. Water
- 30) System: Open, Closed: Both
- 31) Fluid Treatment before Injection: Nil
- 32) Injection Pattern: 9 Spot
- 33) Structural Position Injection Wells: Oil Zone

- 34) Distance Injection Wells to Producers (feet): 1,865
- 35) Number of Injection Wells at Start: 45
- 36) Number of Injection Wells at Present: 45 (August 1965)
- 37) Average Daily Injection Rate per Injection Well at Start: 400 b.
- 38) Average Daily Injection Rate per Injection Well at Present: 400 b. (August 1965)
- 39) Average Injection Pressure at Start (psi): 1,500 (approx.)
- 40) Average Injection Pressure at Present (psi): 1,500 (approx.) (August 1965)
- 41) Number of Producing Wells in Project Area at Start: 125
- 42) Number of Producing Wells in Project Area at Present: 122 (August 1965)
- 43) Average Production Rate in Project Area at Start (bbls/day): 28
- 44) Average Production Rate in Project Area at Present: 60 b/d (August 1965)
- 45) Original Oil in Place in Project Area (bbls): 115,858,000
- 46) Original Oil Saturation (% of pore space): 65
- 47) Primary Recovery from Project Area when Injection Started (bbls): 10,000,000
- 48) Oil Saturation at Start of Project (% of pore space): 59
- 49) Oil Production from Project Area from Start of Injection to now (bbls): 9,000,000
(August 1965)
- 50) Total Volume of Injected Fluids at Present (bbls): 26,000,000 (June 1965)
- 51) Estimated Primary Ultimate Recovery from Project Area (bbls): 18,537,000
- 52) Estimated Increase in Ultimate Recovery from Project Area (bbls): 22,013,000
- 53) Well Spacing: 80 Acres
- 54) Oil Volume Factor (initial reservoir barrels per Stock-Tank barrel): 1.387

Bibliographical Reference: Steelman Unit 1A Progress Reports

OIL FIELD DATA

Field and Pool: Steelman Unit II

Location: Twp. 4, Rge. 6, W 2 M

DISCOVERY DETAILS

Method: Combination of all Available Exploratory Methods

Well: Name: Leach Kapp 8-8-4-6

Completed: August 1955

Perforated: 4833-59

Treatment: 500 Gal. HCl

Initial Potential: 50 BPD

GEOLOGY

Producing Zone(s): Midale

Other Shows: Frobisher

Trap Type: Stratigraphic

Lithology: Limestone

Maximum Reservoir Thickness: 80'

Regional Setting: Erosional Surface on Mississippian

DEVELOPMENT DATA

Total Wells: Completed Oil: 64

Producing Oil: 63; Suspended Oil: 1

Injection or Disposal: Water: 1

Well Spacing: 80 Acres; Pattern: Odd Lsd.

Logging Practice: Electrical, Radiation Logs

Completion Practice: Perforated and Open Hole

RESERVOIR DATA

Type of Drive: Combination SG and WD

Estimated Oil in Place: 82,578,000 S.T.bbls (505 bbls/acre-foot)

Estimated Recoverable Oil: 25,145,000 S.T.bbls (144 bbls/acre-foot)

Oil Zone Thickness: Maximum: 80; Average: 21.0

Porosity: 16.5%; Permeability: 7+ md

Area: 5,300 Acres

Oil Characteristics: Gravity: 38 °API; Initial Solution GOR: 704

Pressure Maintenance or Secondary Recovery: Waterflood

PRODUCTION

MPR: 150 (approx.) BOPD (Average before Unitization)

Economic Allowance: No Restrictions

Market Outlet (pipeline): Westspur

Bibliographical Reference: Steelman Unitization Proposals

SECONDARY RECOVERY

RESERVOIR DATA

- 1) Field: Steelman
- 2) Pool: Steelman Unit II
- 3) Province: Saskatchewan
- 4) Location: Twp. 4, Rge. 6, W 2 M
- 5) Operator: Imperial Oil Limited
- 6) Project: Steelman II Unit
- 7) Reservoir: Midale, Charles, Mississ.
- 8) Discovery Date: August 1955
- 9) Date Injection Began: July 1961
- 10) Main Structural Feature: Stratigraphic 50'/mile
- 11) Gas Cap: Originally: No; At Present: No
- 12) Time Required for Initial Results: Nil
- 13) Initial Results on Production: 50 BPD; GOR: 500
- 14) Main Drive in Primary Production: Solution Gas and Water Drive on Flank
- 15) Productive Area (acres) of Reservoir: 5,300; Of Project: 2,600; Affected by Injection: 2,600
- 16) Average Depth to Top of Pay (feet): 4,650
- 17) Average Effective Thickness (feet): 31.0
- 18) Average Porosity %: 16.5
- 19) Average Horizontal Permeability and Range in Brackets (millidarcys): 7 md (0-1,000)
- 20) Connate Water (% of pore space): 35
- 21) Viscosity at Initial Reservoir Conditions (centipoises): 345
- 22) API Gravity: 38
- 23) Solution Gas/Oil Ratio at Saturation Pressure (cu.ft./bbl): 704
- 24) Bubble Point Pressure (psi): 2,080
- 25) Original Pressure (psi): 2,080
- 26) Reservoir Pressure at Start of Injection (psi): 1,600 (approx.)
- 27) Latest Reservoir Pressure: 1,600 psi (July 1961)
- 28) Injection Fluid: Blairmore & Produced Water
- 29) Injection Fluid Source: As Above
- 30) System: Open, Closed: Both
- 31) Fluid Treatment before Injection: Filtration
- 32) Injection Pattern: 9 Spot
- 33) Structural Position Injection Wells: Oil Zone

- 34) Distance Injection Wells to Producers (feet): 1,865
- 35) Number of Injection Wells at Start: 5
- 36) Number of Injection Wells at Present: 7 (August 1965)
- 37) Average Daily Injection Rate per Injection Well at Start (bbls): 1,200
- 38) Average Daily Injection Rate per Injection Well at Present (bbls): 1,200
- 39) Average Injection Pressure at Start (psi): 1,000 (approx.)
- 40) Average Injection Pressure at Present (psi): 1,000 (approx.) (August 1965)
- 41) Number of Producing Wells in Project Area at Start: 56
- 42) Number of Producing Wells in Project Area at Present: 56 (August 1965)
- 43) Average Production Rate in Project Area at Start (bbls/day): 107
- 44) Average Production Rate in Project Area at Present: 131 (August 1965)
- 45) Original Oil in Place in Project Area (bbls): 82,578,000
- 46) Original Oil Saturation (% of pore space): 65
- 47) Primary Recovery from Project Area when Injection Started (bbls): 11,600,000
- 48) Oil Saturation at Start of Project (% of pore space): 60 (approx.)
- 49) Oil Production from Project Area from Start of Injection to Now (bbls): 9,600,000
(June 1965)
- 50) Total Volume of Injected Fluids at Present (bbls): 8,000,000 (June 1965)
- 51) Estimated Primary Ultimate Recovery from Project Area (bbls): 13,212,000
- 52) Estimated Increase in Ultimate Recovery from Project Area (bbls): 15,690,000
- 53) Well Spacing: 80 Acres
- 54) Oil Volume Factor (initial reservoir barrels per Stock-Tank barrel): 1.387

Bibliographical Reference: Steelman Unit II Progress Reports

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 110-56

FIELD: Steelman

POOL: Charles

ZONE: Charles

Well Name: Imperial Steelman No. 13-8M-4-5
Location: Lsd. 13, Sec. 8, Twp. 4, Rge. 5, W 2nd
Interval tested, depth, feet: 4771-4796
Producing Zone: Charles
Geological Age: Mississippian

Province: Saskatchewan
Sample From: Sask. Dept. of
Mineral Resources
Date Sampled: February 18, 1956
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.832
Sulphur, percent by weight: 0.73
Saybolt Universal Viscosity:
at 100°F., sec. 36

A.P.I. gravity at 60°F.: 38.6
Pour point, °F.: 25
Colour: Brownish Black
Carbon residue, percent by weight: 2.3
(Conradson)

DISTILLATION
(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 755 mm. Hg.
First drop, 33°C. (91°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 200C.
1.	50	122	1.7	1.7	0.693	72.7	-	49.1			-
2.	75	167	3.3	5.0	0.718	65.6	20	45.3			1.4011
3.	100	212	5.5	10.5	0.747	57.9	25	43.9			1.4152
4.	125	257	6.7	17.2	0.767	53.0	27	45.6			1.4268
5.	150	302	6.5	23.7	0.782	49.4	27	50.3			1.4355
6.	175	347	4.8	28.5	0.795	46.5	27	55.3			1.4429
7.	200	392	4.7	33.2	0.808	43.6	28	59.5			1.4498
8.	225	437	5.5	38.7	0.821	40.8	29	62.7			1.4577
9.	250	482	4.6	43.3	0.840						1.4682
10.	275	527	6.8	50.1							

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.7	52.8	0.859	33.2	38	65.4	39	15	1.4790
12.	225	437	6.2	59.0	0.869	31.3	39	69.4	43	30	1.4836
13.	250	482	5.4	64.4	0.879	29.5	40	73.8	53	50	1.4898
14.	275	527	5.3	69.7	0.890	27.5	42	78.7	77	75	1.4979
Resi-duum	300	572	6.5	76.2	0.900	25.7	44	83.4	127	95	-
			20.5	96.7	0.945	18.2					

Carbon residue of residuum: 9.8%

Carbon residue of crude: 2.3%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	10.5	0.706	68.9	
Total gasoline and naphtha	33.2	0.750	57.2	
Kerosine distillate	10.1	0.814	42.3	
Gas oil	16.7	0.856	33.8	
Nonviscous lubricating distillate	9.7	0.876-0.894	30.0-26.8	50-100
Medium lubricating distillate	6.5	0.894-0.905	26.8-24.8	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	20.5	0.945	18.2	
Distillation loss	3.3			

Remarks: The sample as received contained no water (A.S.T.M.) and no salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 2183-54a

FIELD: Success

POOL: Success Roseray Sand

ZONE: Roseray

Well Name: Socony-Woodley-Southern Success No. 9-2B Province: Saskatchewan
 Location: Lsd. 2, Sec. 9, Twp. 17, Rge. 16, W 3rd Sample From: Sask. Dept. of Mineral
 Interval tested, depth, feet: 3112-3115 Resources
 Producing Zone: Roseray Date Sampled: August 2, 1954
 Geological Age: Jurassic Sampled at: Well

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.929
 Sulphur, percent by weight: 2.95
 Saybolt Universal Viscosity:
 at 100°F., sec. 311
 at 130°F., sec. 197

A.P.I. gravity at 60°F.: 20.8
 Pour point, °F.: 5
 Colour: Brownish Black
 Carbon residue, percent by weight: 9.4
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 764 mm. Hg.
 First drop, 35°C. (95°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specifc Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122	0.9	0.9	-	-	-	-			-
2.	75	167	1.1	2.0	0.672	79.1	-	-			-
3.	100	212	2.1	4.1	0.704	69.5	14	60.0			1.3963
4.	125	257	2.3	6.4	0.735	61.0	19	58.1			1.4092
5.	150	302	2.7	9.1	0.760	54.7	24	55.5			1.4216
6.	175	347	2.8	11.9	0.782	49.5	27	54.0			1.4333
7.	200	392	2.9	14.8	0.803	44.7	31	52.6			1.4451
8.	225	437	3.4	18.2	0.823	40.4	35	53.2			1.4553
9.	250	482	4.1	22.3	0.842	36.6	39	55.3			1.4652
10.	275	527	5.8	28.1	0.860	33.0	42	57.1			1.4758

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.2	30.3	0.877	29.8	46	57.8	40	10	1.4854
12.	225	437	5.6	35.9	0.885	28.4	46	61.2	47	25	1.4910
13.	250	482	5.4	41.3	0.900	25.7	50	63.2	62	40	1.4991
14.	275	527	6.6	47.9	0.914	23.3	54	64.9	102	60	1.5083
15.	300	572	6.2	54.1	0.926	21.3	56	66.8	209	80	1.5176
Resi-duum			45.5	99.6	1.029	6.0					

Carbon residue of residuum: 18.6%

Carbon residue of crude: 9.4%

APPROXIMATE SUMMARY

	Percent by Vol.	Specifc Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	4.1	0.688	74.2	
Total gasoline and naphtha	14.8	0.749	57.4	
Kerosine distillate	3.4	0.823	40.4	
Gas oil	15.9	0.863	32.5	
Nonviscous lubricating distillate	10.2	0.388-0.913	27.8-23.5	50-100
Medium lubricating distillate	6.2	0.913-0.925	23.5-21.5	100-200
Viscous lubricating distillate	3.6	0.925-0.932	21.5-20.3	Above 200
Residuum	45.5	1.029	6.0	
Distillation loss	0.4			

Remarks: The sample as received contained 0.1% by vol. water and sediment (by centrifuge) and 9 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 417-56

FIELD: Success

POOL: Success Roseray Sand Alpha

ZONE: Roseray

Well Name: Socony-Woodley-Southern Success No. 3-4B
Location: Lsd. 4, Sec. 3, Twp. 17, Rge. 16, W 3rd
Interval tested, depth, feet: 3098-3144
Producing Zone: Roseray
Geological Age: Jurassic

Province: Saskatchewan
Sample From: Sask. Dept. of
Mineral Resources
Date Sampled: November 6, 1956
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.920
Sulphur, percent by weight: 2.93
Saybolt Universal Viscosity:
at 100°F., sec. 236
at 130°F., sec. 142

A.P.I. gravity at 60°F.: 22.3
Pour point, °F.: 0
Colour: Brownish Black
Carbon residue, percent by weight: 5.3
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 754 mm. Hg.
First drop, 45°C. (113°F.)

Fraction No.	Cut at °C.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Viscosity S.U. 100°F.	Cloud Test, °F.
1.	50	122	2.5	2.5	0.688	74.2	-		
2.	75	167	1.3	3.8	0.706	68.9	15		
3.	100	212	1.9	5.7	0.723	64.2	14	59.5	
4.	125	257	3.1	8.8	0.745	58.4	17	59.3	
5.	150	302	3.1	11.9	0.766	53.2	20	57.8	
6.	175	347	3.1	15.0	0.786	48.5	23	57.0	
7.	200	392	2.7	17.7	0.804	44.5	26	56.7	
8.	225	437	3.9	21.6	0.823	40.4	30	58.8	
9.	250	482	6.5	28.1	0.844	36.2	35	60.2	
10.	275	527							

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.5	30.6	0.865	32.1	41	60.7	39	5
12.	225	437	5.7	36.3	0.877	29.8	43	62.6	44	25
13.	250	482	4.7	41.0	0.890	27.5	46	63.9	56	40
14.	275	527	5.1	46.1	0.908	24.3	51	65.5	83	60
15.	300	572	6.3	52.4	0.919	22.5	53	67.5	146	80
Residuum			45.9	98.3	1.024	6.7				

Carbon residue of residuum: 10.4%

Carbon residue of crude: 5.3%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	3.8	0.694	72.4	
Total gasoline and naphtha	15.0	0.742	59.2	
Kerosine distillate	6.6	0.815	42.1	
Gas oil	14.5	0.860	33.0	
Nonviscous lubricating distillate	9.0	0.884-0.911	28.6-23.8	50-100
Medium lubricating distillate	7.3	0.911-0.925	23.8-21.5	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	45.9	1.024	6.7	
Distillation loss	1.7			

Remarks: The sample as received contained a trace of water (A.S.T.M.) and 18 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 544

FIELD: Vera

POOL: (Not Defined)

ZONE: Basal Blairmore

Well Name: Vera Oil Fields No. 2
 Location: Lsd. 5, Sec. 23, Twp. 41, Rge. 24, W 3rd
 Interval tested, depth, feet: 2091-3001

Producing Zone: Basal Blairmore
 Geological Age: Lower Cretaceous

Province: Saskatchewan
 Sample From: Indian Affairs Branch,
 Dept. of Mines &
 Resources

Date Sampled: October 29, 1938
 Sampled at:

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.994
 Sulphur, percent by weight: 3.41
 Saybolt Furol Viscosity:
 at 122°F., sec. 720

A.P.I. gravity at 60°F.: 10.9
 Pour point, °F.: 40
 Colour: Black
 Carbon residue, percent by weight: 12.3
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 763 mm. Hg.
 First drop, 190°C. (374°F.)

Fraction No.	Cut, at °C.	Cut, at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Viscosity S.U. 100°F.	Cloud Test, °F.
1.	50	122								
2.	75	167								
3.	100	212								
4.	125	257								
5.	150	302								
6.	175	347								
7.	200	392								
8.	225	437	1.2	1.2	0.848	35.4	47			
9.	250	482	2.9	4.1	0.862	32.7	48			
10.	275	527	6.0	10.1	0.877	29.9	50			

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.0	12.1	0.897	26.3	56		43	-
12.	225	437	4.8	16.9	0.913	23.5	60		55	-
13.	250	482	5.1	22.0	0.929	20.8	64		90	-
14.	275	527	6.8	28.8	0.946	18.1	69		194	Below -15
15.	300	572	8.3	37.1	0.955	16.7	70		533	Below -15
Residuum			61.1	98.2	1.018	7.5				

Carbon residue of residuum: 20.1%

Carbon residue of crude: 12.3%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline				
Total gasoline and naphtha				
Kerosine distillate				
Gas oil	13.1	0.876	30.0	
Nonviscous lubricating distillate	7.0	0.906-0.931	24.7-20.5	50-100
Medium lubricating distillate	5.5	0.931-0.946	20.5-18.1	100-200
Viscous lubricating distillate	11.5	0.946-0.960	18.1-15.9	Above 200
Residuum	61.1	1.018	7.5	
Distillation loss	1.8			

Remarks: The sample as received contained 3.4% by vol. water and sediment (by centrifuge).

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 2119-54

FIELD: Wapella

POOL: Jurassic

ZONE: J-2-B, Lower Shaunavon

Well Name: Tide Water Wapella Crown No. 1-4-15-1
 Location: Lsd. 1, Sec. 4, Twp. 15, Rge. 1, W 2nd
 Interval tested, depth, feet: 2419-2425
 Producing Zone: J-2-B, Lower Shaunavon
 Geological Age: Jurassic

Province: Saskatchewan
 Sample From: Sask. Dept. of Mineral Resources
 Date Sampled: July 28, 1954
 Sampled at: Well

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.894
 Sulphur, percent by weight: 1.98
 Saybolt Universal Viscosity:
 at 77°F., sec. 99
 at 100°F., sec. 90

A.P.I. gravity at 60°F.: 26.8
 Pour point, °F.: Below -70
 Colour: Brownish Black
 Carbon residue, percent by weight: 5.7
 (Conradson)

DISTILLATION
 (U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 760 mm. Hg.
 First drop, 29°C. (84°F.)

Frac-tion No.	Cut at		Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
	°C.	°F.									
1.	50	122)	-	-	-	-	-	-			-
2.	75	167)	1.4	1.4)	-	-	-	-			-
3.	100	212	3.1	4.5)	0.729	62.6	-	-			1.4138
4.	125	257	4.9	9.4	0.749	57.4	26	55.2			1.4144
5.	150	302	4.2	13.6	0.764	53.7	26	58.0			1.4213
6.	175	347	2.9	16.5	0.786	48.5	29	60.0			1.4332
7.	200	392	4.0	20.5	0.798	45.8	29	60.8			1.4424
8.	225	437	4.8	25.3	0.815	42.1	31	61.8			1.4501
9.	250	482	5.6	30.9	0.829	39.2	32	63.1			1.4597
10.	275	527	6.5	37.4	0.848	35.4	37	-			1.4706

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	3.0	40.4	0.864	32.3	40	63.8	40	-5	1.4795
12.	225	437	5.5	45.9	0.873	30.6	41	64.2	46	20	1.4869
13.	250	482	7.1	53.0	0.890	27.5	46	65.0	51	40	1.4964
14.	275	527	5.3	58.3	0.906	24.7	50	65.2	94	60	1.5064
15.	300	572	7.0	65.3	0.920	22.3	54	67.5	190	85	1.5166
Resi-duum			32.3	97.6	1.006	9.2					

Carbon residue of residuum: 15.6%

Carbon residue of crude: 5.7%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	4.5	0.729	62.6	
Total gasoline and naphtha	20.5	0.762	54.2	
Kerosine distillate	4.8	0.815	42.1	
Gas oil	23.1	0.855	34.0	
Nonviscous lubricating distillate	7.6	0.887-0.907	28.0-24.5	50-100
Medium lubricating distillate	6.4	0.907-0.921	24.5-22.1	100-200
Viscous lubricating distillate	2.9	0.921-0.928	22.1-21.0	Above 200
Residuum	32.3	1.006	9.2	
Distillation loss	2.4			

Remarks: The sample as received contained 0.4% by vol. water and sediment (by centrifuge) and 43 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 111-56

FIELD: Wapella

POOL: Wapella Sand

ZONE: Blairmore

Well Name: Tidewater Imperial Wapella No. 9-33-14-1
Location: Lsd. 9, Sec. 33, Twp. 14, Rge. 1, W 2nd
Interval tested, depth, feet: 2224-2252
Producing Zone: Blairmore
Geological Age: Lower Cretaceous

Province: Saskatchewan
Sample From: Sask. Dept. of Mineral Resources
Date Sampled: March 8, 1956
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.896

A.P.I. gravity at 60°F.: 26.4

Sulphur, percent by weight: 1.87

Pour point, °F.: -35

Saybolt Universal Viscosity:

Colour: Brownish Black

at 77°F., sec. 97

Carbon residue, percent by weight: 5.2

at 100°F., sec. 69

(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 757 mm. Hg.
First drop, 64°C. (147°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122									
2.	75	167	1.3	1.3							
3.	100	212	3.3	4.6	0.736	60.8	-	-			
4.	125	257	2.7	7.3	0.754	56.2	28	55.5			1.4139
5.	150	302	3.6	10.9	0.764	53.7	26	58.0			1.4192
6.	175	347	4.2	15.1	0.778	50.4	25	60.4			1.4286
7.	200	392	4.1	19.2	0.793	46.9	26	61.3			1.4361
8.	225	437	4.5	23.7	0.810	43.2	29	62.0			1.4456
9.	250	482	5.1	28.8	0.827	39.6	31	62.5			1.4552
10.	275	527	8.2	37.0	0.846	35.8	36	62.8			1.4670

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	3.7	40.7	0.866	31.9	41	63.2	40	5	1.4790
12.	225	437	5.9	46.6	0.877	29.8	43	64.6	45	20	1.4854
13.	250	482	6.0	52.6	0.891	27.3	46	65.5	56	35	1.4943
14.	275	527	6.5	59.1	0.907	24.5	50	66.0	86	55	1.5048
15.	300	572	6.9	66.0	0.921	22.1	54	67.6	160	75	-
Resi-duum			33.0	99.0	1.005	9.3					

Carbon residue of residuum: 14.1%

Carbon residue of crude: 5.2%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	4.6	0.736	60.8	
Total gasoline and naphtha	19.2	0.765	53.5	
Kerosine distillate	4.5	0.810	43.2	
Gas oil	22.7	0.852	34.6	
Nonviscous lubricating distillate	10.7	0.883-0.910	28.8-24.0	50-100
Medium lubricating distillate	8.9	0.910-0.928	24.0-21.0	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	33.0	1.005	9.3	
Distillation loss	1.0			

Remarks: The sample as received contained 0.6% by vol. water (A.S.T.M.) and 45 lb. salt (as NaCl) per 1000 bbl.

CRUDE PETROLEUM ANALYSIS

Laboratory Number 237-58

FIELD: Wapella

POOL:

ZONE: Basal Blairmore - Jurassic

Well Name: Tidewater - Wapella 9-33
Location: Lsd. 9, Sec. 33, Twp. 1 $\frac{1}{4}$, Rge. 1, W 2
Interval tested, depth, feet: 2214-2448
Producing Zone: Basal Blairmore - Jurassic
Geological Age: Lower Cretaceous - Jurassic

Province: Saskatchewan
Sample From: Sask. Dept. of
Mineral Resources
Date Sampled: June 26, 1958
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.905
Sulphur, percent by weight: 2.03
Saybolt Universal Viscosity:
at 70°F., sec. 153
at 100°F., sec. 80

A.P.I. gravity at 60°F.: 24.8
Pour point, °F.: -5
Colour: Black
Carbon residue, percent by weight: 5.1
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 750 mm. Hg.
First drop, 68°C. (154°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122									
2.	167									
3.	212	4.0	0.740	59.7	31	56.5				
4.	257	7.5	0.756	55.7	29	-				
5.	302	10.5	0.768	52.7	27	59.0				
6.	347	13.6	0.781	49.7	27	60.1				
7.	392	17.4	0.798	45.8	29	61.2				
8.	437	21.9	0.815	42.1	31	61.9				
9.	482	27.3	0.831	38.8	33	62.2				
10.	527	34.6	0.849	35.2	37	62.9				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	38.0	0.866	31.9	41	63.6	40	15		
12.	437	44.5	0.876	30.0	42	64.3	46	30		
13.	482	54.3	0.892	27.1	46	65.9	59	45		
14.	527	60.0	0.908	24.3	51	66.5	88	65		
15.	572	68.0	0.922	22.0	55	68.0	173	85		
Resi-duum		101.9	1.015	7.9						

Carbon residue of residuum: 13.5%

Carbon residue of crude: 5.1%

APPROXIMATE SUMMARY

Light gasoline	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
	4.0	0.740	59.7	
Total gasoline and naphtha	17.4	0.768	52.7	
Kerosine distillate	4.5	0.815	42.1	
Gas oil	21.9	0.854	34.2	Below 50
Nonviscous lubricating distillate	14.4	0.881-0.910	29.1-24.0	50-100
Medium lubricating distillate	9.8	0.910-0.930	24.0-20.7	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	33.9	1.015	7.9	
Distillation gain	1.9			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 309-56

FIELD: Waseca

POOL: Waseca Sand

ZONE: Blairmore

Well Name: S.C.C. Waseca No. 5
 Location: Lsd. 9, Sec. 22, Twp. 49, Rge. 24, W 3rd
 Interval tested, depth, feet: 1672-1688
 Producing Zone: Blairmore
 Geological Age: Lower Cretaceous

Province: Saskatchewan
 Sample From: Sask. Dept. of
 Mineral Resources
 Date Sampled: August 8, 1956
 Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.984
 Sulphur, percent by weight: 3.65
 Saybolt Universal Viscosity:
 at 100°F., sec. 9,200
 at 130°F., sec. 2,600

A.P.I. gravity at 60°F.: 12.3
 Pour point, °F.: 30
 Colour: Brownish Black
 Carbon residue, percent by weight: 11.3
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 762 mm. Hg.
 First drop, 196°C. (385°F.)

Fraction No.	Cut at °C. °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Viscosity S.U. 100°F.	Cloud Test, °F.
1.	50	122							
2.	75	167							
3.	100	212							
4.	125	257							
5.	150	302							
6.	175	347							
7.	200	392							
8.	225	437	2.0	2.0	0.839	37.2	-	46.5	
9.	250	482	3.4	5.4	0.856	33.8	45	48.0	
10.	275	527	8.5	13.9	0.873	30.6	49	50.9	

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.2	16.1	0.890	27.5	53	53.0	45	-
12.	225	437	5.1	21.2	0.898	26.1	53	55.8	48	-
13.	250	482	5.8	27.0	0.911	23.8	55	57.6	66	-
14.	275	527	5.9	32.9	0.924	21.6	58	59.5	111	-
15.	300	572	8.5	41.4	0.938	19.4	62	62.4	271	
Residuum		58.6	100.0	1.034		5.4				

Carbon residue of residuum: 18.2%

Carbon residue of crude: 11.3%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	-	-	-	
Total gasoline and naphtha	-	-	-	
Kerosine distillate	-	-	-	
Gas oil	19.3	0.872	30.8	
Nonviscous lubricating distillate	9.2	0.900-0.921	25.7-22.1	50-100
Medium lubricating distillate	5.4	0.921-0.932	22.1-20.3	100-200
Viscous lubricating distillate	7.5	0.932-0.946	20.3-18.1	Above 200
Residuum	58.6	1.034	5.4	
Distillation loss	0.0			

Remarks: The sample as received contained 8.6% by vol. water (A.S.T.M.) and 1600 lb. salt (as NaCl) per 1000 bbl.

OIL FIELD DATA

Field and Pool: West Carnduff Unit

Location: Twp(s) 2 & 3, Rge 3 $\frac{1}{4}$, W 2 M

DISCOVERY DETAILS

Method: Combination of all exploratory methods

Well: Name: Imp. Florence 9-22-2-3 $\frac{1}{4}$

GEOLOGY

Producing Zone(s): Midale

Other Shows: Frobisher

Trap Type: Stratigraphic

Lithology: Limestone

Maximum Reservoir Thickness: 40'

Regional Setting: Erosional Surface on Mississippian

DEVELOPMENT DATA

Total Wells: Completed Oil: 65

Producing Oil: 44

Injection or Disposal: Water 15

Well Spacing: 80 Acres; Pattern: Odd Lsd.

Logging Practice: Electrical, Radiation

Completion Practice: Perf. and O.H.

RESERVOIR DATA

Type of Drive: Solution Gas

Estimated Oil in Place: 21,200,000 S.T.bbls (700 bbls/acre-foot)

Estimated Recoverable Oil: 6,600,000 S.T.bbls (216 bbls/acre-foot)

Oil Zone Thickness: Maximum: 40'; Average: 6.5'

Porosity: 13.7%

Area: 4,680 Acres (approx.)

Oil Characteristics: Gravity: 40 °API; Initial Solution GOR: 600

Pressure Maintenance or Secondary Recovery: Waterflood

PRODUCTION

Economic Allowance: No Restriction

Market Outlet (pipeline): Producers

SECONDARY RECOVERY

RESERVOIR DATA

- 1) Field: West Carnduff Unit
- 2) Pool: Carnduff
- 3) Province: Saskatchewan
- 4) Location: Twp(s) 2 & 3, Rge 3 $\frac{1}{4}$, W 2 M
- 5) Operator: Imperial Oil Limited
- 6) Project: West Carnduff Unit
- 7) Reservoir: Midale, Charles, Mississ.
- 8) Discovery Date: December 1955
- 9) Date Injection Began: June 1961
- 10) Main Structural Feature: Stratigraphic Trap, 50 feet/mile dip
- 11) Gas Cap: Originally: No; At Present: No
- 12) Time Required for Initial Results:
- 13) Initial Results on Production, BHP, GOR, etc:
- 14) Main Drive in Primary Production: Solution Gas
- 15) Productive Area (acres) of Reservoir: 4,680 (approx.); Of Project: 4,680 (approx.); Affected by Injection: 4,680 (approx.)
- 16) Average Depth to Top of Pay (feet): 4,200
- 17) Average Effective Thickness (feet): 6.5
- 18) Average Porosity %: 13.7
- 19) Average Horizontal Permeability and Range in Brackets (millidarcys): NA (0-1,000)
- 20) Connate Water (% of pore space): 30
- 21) Viscosity at Initial Reservoir Conditions (centipoises): 0.345 (approx.)
- 22) API Gravity: 40
- 23) Solution Gas/Oil Ratio at Saturation Pressure (cu.ft/bbl): 680
- 24) Bubble Point Pressure (psi): 1,785
- 25) Original Pressure (psi): 2,200
- 26) Reservoir Pressure at Start of Injection (psi): 1,200 (approx.)
- 27) Latest Reservoir Pressure: 1,200 psi (1960)
- 28) Injection Fluid: Water
- 29) Injection Fluid Source: Blairmore & Produced
- 30) System: Open, Closed: Combination
- 31) Fluid Treatment before Injection: Nil
- 32) Injection Pattern: 9 Spot
- 33) Structural Position Injection 'cells': Oil Zone

- 34) Distance Injection Wells to Producers (feet): 1,865
- 35) Number of Injection Wells at Start: 15
- 36) Number of Injection Wells at Present: 15 (August 1965)
- 37) Average Daily Injection Rate per Injection Well at Start (bbls): 660
- 38) Average Daily Injection Rate per Injection Well at Present (bbls): 400
(August 1965)
- 39) Average Injection Pressure at Start (psi): 1,000 (approx.)
- 40) Average Injection Pressure at Present (psi): 500 (approx.) (August 1965)
- 41) Number of Producing Wells in Project Area at Start: 50
- 42) Number of Producing Wells in Project Area at Present: 44 (June 1965)
- 43) Average Production Rate in Project Area at start (bbls/day): 20
- 44) Average Production Rate in Project Area at Present: 25 (August 1965)
- 45) Original Oil in Place in Project Area (bbls): 21,200,000
- 46) Original Oil Saturation (% of pore space): 70
- 47) Primary Recovery from Project Area when Injection Started (bbls): 2,900,000
- 48) Oil Saturation at Start of Project (% of pore space): 60 (approx.)
- 49) Oil Production from Project Area from Start of Injection to Now (bbls): 2,500,000
(August 1956)
- 50) Total Volume of Injected Fluids at Present (bbls): 9,500,000 (August 1965)
- 51) Estimated Primary Ultimate Recovery from Project Area (bbls): 2,760,000
- 52) Estimated Increase in Ultimate Recovery from Project Area (bbls): 3,800,000
- 53) Well Spacing: 80 Acres
- 54) Oil Volume Factor (initial reservoir barrels per Stock-Tank barrel): 1.433

Bibliographical Reference: West Carnduff Unit Proposal

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 444-63

FIELD: West Kingsford

POOL:

ZONE: Midale

Well Name: Dillman Thompson 3-27
Location: Lsd. 3, Sec. 27, Twp. 4, Rge. 7, W 2 Mer
Interval tested, depth, feet: 4845-4876
Producing Zone: Midale
Geological Age: Mississippian

Province: Saskatchewan
Sample From: Sask. Dept. of Mineral Resources
Date Sampled: October 17, 1963
Sampled at: Tubing

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.881
Sulphur, percent by weight: 1.85
Saybolt Universal Viscosity:
at 77°F., sec. 67
at 100°F., sec. 53

A.P.I. gravity at 60°F.: 29.1
Pour point, °F.: 15
Colour: Black
Carbon residue, percent by weight: 5.2
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 762 mm. Hg.
First drop, 34°C. (93°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. 60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _G) 10 ⁴
1.	122	0.8	0.667	80.6	-	-			-	-
2.	167	6.1	0.708	68.4	26	-			1.4013	84.7
3.	212	9.2	0.746	58.2	34	42.5			1.4188	90.6
4.	257	12.6	0.764	53.7	33	41.0			1.4250	92.6
5.	302	16.5	0.774	51.3	30	42.0			1.4311	96.1
6.	347	20.6	0.785	48.8	29	45.2			1.4373	96.9
7.	392	24.7	0.798	45.8	29	49.0			1.4442	100.7
8.	437	28.6	0.813	42.6	30	54.0			1.4513	102.9
9.	482	33.3	0.829	39.2	32	56.9			1.4607	107.1
10.	527	39.0	0.847	35.6	36	60.6			1.4718	115.6

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	43.2	0.871	31.0	43	62.4	39	20	1.4841	122.8
12.	437	48.5	0.882	28.9	45	66.3	45	40	1.4901	127.8
13.	482	53.0	0.896	26.4	48	70.1	56	55	1.4971	132.7
14.	527	58.1	0.905	24.9	49	72.9	78	75	1.5049	142.1
15.	572	64.8	0.914	23.3	51	75.6	143	95	1.5151	141.2
Resi-duum		97.6	1.002	9.7						

Carbon residue of residuum: 13.9% Carbon residue of crude: 5.2%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	9.2	0.717	65.9	
Total gasoline and naphtha	24.7	0.757	55.4	
Kerosine distillate	3.9	0.813	42.6	
Gas oil	19.4	0.857	33.6	
Nonviscous lubricating distillate	9.6	0.888-0.908	27.9-24.3	Below 50
Medium lubricating distillate	7.2	0.908-0.919	24.3-22.5	50-100
Viscous lubricating distillate	-	-	-	100-200
Residuum	32.8	1.002	9.7	Above 200
Distillation loss	2.4			

OIL FIELD DATA

Field and Pool: Weyburn, Central Midale Beds

Location: Twp(s) 5, 6 & 7, Rge(s) 12, 13 & 14, W 2 M

DISCOVERY DETAILS

Method: Rotary Drill

Well: Name: CDR Ralph 14-6-7-13 W 2 M; Completed: January 1955; Perforated: 4,447-4,453; 4,455-4,459; Treatment: 1,875 Gal. Acid; Initial Potential: 102 bbl/day oil

GEOLOGY AND DEVELOPMENT DATA

Producing Zone(s): Midale Beds

Other Shows: None

Trap Type: Stratigraphic

Lithology: Limestone

Maximum Reservoir Thickness: 75'

Regional Setting: Northeast Flank of Williston Basin

Deepest Formation Penetrated: Ashern Formation Middle Devonian

Well Spacing: 80 Acres; Pattern: Even Lsd's

Logging Practice: ES, IES, LL, SGR, MLL

Completion Practice: Case through and Perforate

RESERVOIR DATA

Type of Drive: Solution Gas

Oil Zone Thickness: Maximum: 75'; Average: 26'

Gas Zone Thickness: Nil

Porosity: 17%; Permeability: 0.1-500 md

Area: 48,640 acres (Weyburn Unit, March 1, 1965)

Oil Characteristics: Gravity: 28.5°API; Sulphur: 2.25%; Pour Point: -25°F. Initial Solution GOR: 185 cu ft/bbl

Pressure Maintenance or Secondary Recovery: Yes

Market Outlet: Trans-Prairie Pipelines Ltd.

- Bibliographical References:
1. "Effective Oil Pore Volume, Midale Beds Reservoir, Weyburn Field, Saskatchewan", July 1962, Weyburn Working Engineering Geological Sub-Committee, Pore Volume Group.
 2. "Pressure Maintenance by Waterflood, Midale Beds Reservoir, Weyburn Field, Saskatchewan", February 1963, Weyburn Engineering Geological Sub-Committee Project Group.
 3. Coons, R.M., "Largest Waterflood on Stream", Oilweek, July 13, 1964, pp. 17-22.
 4. Chetin, A.K. and Fitkin, W.W., "Geology of the Weyburn Field, Saskatchewan", Canadian Mining and Metallurgical Bulletin, December 1959, 52: 751-761.
 5. Central-Del Rio Oils Limited, "Engineering and Producing History of the Weyburn Field", Canadian Mining and Metallurgical Bulletin, December 1959, 52: 762-770.

SECONDARY RECOVERY

RESERVOIR DATA

- 1) Field: Weyburn
- 2) Pool: Central Midale Beds
- 3) Province: Saskatchewan
- 4) Location: Twp(s) 5, 6 & 7, Rge(s) 12, 13 & 14, W 2 M
- 5) Operator: Central-Del Rio Oils Limited
- 6) Project: Weyburn Unit
- 7) Reservoir: Midale Beds and Frobisher Beds, Charles, Mississippian
- 8) Discovery Date: January 7, 1955
- 9) Date Injection Began: April 1964
- 10) Main Structural Feature: Stratigraphic Trap, 50 feet/mile dip
- 11) Gas Cap: Originally: No; At Present: No
- 12) Time Required for Initial Results: 6 Weeks
- 13) Initial Results on Production: Production Rate Increase
- 14) Main Drive in Primary Production: Solution Gas
- 15) Productive Area (acres) of Reservoir: 52,000; Of Project: 48,640;
Affected by Injection: 15,680
- 16) Average Depth to Top of Pay (feet): 4,600
- 17) Average Effective Thickness (feet): 26
- 18) Average Porosity %: 17
- 19) Average Horizontal Permeability and Range in Brackets (millidarcys): NA
(0.1-500 md)
- 20) Connate Water (% of pore space): 31
- 21) Viscosity at Initial Reservoir Conditions (centipoises): 2.6
- 22) API Gravity: 28.5°
- 23) Solution Gas/Oil Ratio at Saturation Pressure: 185 cu.ft./bbl

- 24) Bubble Point Pressure: 85⁴ psi
- 25) Original Pressure: 2,117 psi at -2,650'
- 26) Injection Fluid: Salt Water
- 27) Injection Fluid Source: Blairmore & Midale Beds Water
- 28) System: Closed
- 29) Fluid Treatment Before Injection: Filtration
- 30) Injection Pattern: Inverted 9 Spot
- 31) Structural Position Injection Wells: Oil Zone
- 32) Distance Injection Wells to Producers (feet): 1,867
- 33) Number of Injection Wells at Start: 70
- 34) Number of Injection Wells at Present: 122 (July 31, 1965)
- 35) Average Daily Injection Rate per Injection Well at Start: 800 bbl/day (April 1964)
- 36) Average Daily Injection Rate per Injection Well at Present: 830 bbl/day during July 1965
- 37) Average Injection Pressure at Start: 250 psi
- 38) Average Injection Pressure at Present: 1,400 psi (July 31, 1965)
- 39) Number of Producing Wells in Project Area at Start: 429
- 40) Number of Producing Wells in Project Area at Present: 486 (July 31, 1965)
- 41) Average Production Rate in Project Area at Start: 31,342 bbl/day
- 42) Average Production Rate in Project Area at present: 44,055 b/d (July 1965)
- 43) Original Oil Saturation (% of pore space): 69
- 44) Total Volume of Injected Fluids at Present: 41,006,958 bbl (July 31, 1965)
- 45) Well Spacing: 80 Acres
- 46) Oil Volume Factor (initial reservoir barrels per Stock-Tank barrel): 1.124

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 112-56

FIELD: Weyburn

POOL: Charles

ZONE: Charles

Well Name: Central Del Rio South Ralph No. 16-15
 Location: Lsd. 16, Sec. 15, Twp. 6, Rge. 13, W 2nd
 Interval tested, depth, feet: 4603-4659
 Producing Zone: Charles
 Geological Age: Mississippian

Province: Saskatchewan
 Sample From: Sask. Dept. of Mineral Resources
 Date Sampled: March 12, 1956
 Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.867
 Sulphur, percent by weight: 2.12
 Saybolt Universal Viscosity:
 at 100°F., sec. 46

A.P.I. gravity at 60°F.: 31.7
 Pour point, °F.: 0
 Colour: Brownish Black
 Carbon residue, percent by weight: 5.9
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 752 mm. Hg.
 First drop, 35°C. (95°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122	0.8	0.8	0.696	71.8	-				-
2.	75	167	5.3	6.1	0.720	65.0	21	50.7			1.4054
3.	100	212	3.1	9.2	0.746	58.2	25	50.5			1.4143
4.	125	257	5.1	14.3	0.762	54.2	25	52.4			1.4220
5.	150	302	5.5	19.8	0.777	50.6	25	53.7			1.4306
6.	175	347	4.6	24.4	0.792	47.2	26	55.2			1.4397
7.	200	392	4.0	28.4	0.809	43.4	28	57.6			1.4482
8.	225	437	4.7	33.1	0.824	40.2	30	59.7			1.4572
9.	250	482	4.2	37.3	0.843	36.4	34	61.6			1.4678
10.	275	527	6.4	43.7							

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.0	45.7	0.864	32.3	40	63.1	39	10	1.4789
12.	225	437	5.8	51.5	0.875	30.2	42	64.8	44	30	1.4858
13.	250	482	5.0	56.6	0.891	27.3	46	66.2	55	50	1.4943
14.	275	527	4.2	60.7	0.905	24.8	49	69.1	81	70	1.5030
15.	300	572	5.2	65.9	0.918	22.6	53	69.6	138	85	-
Residuum			29.4	95.3	1.024	6.7					

Carbon residue of residuum: 17.0%

Carbon residue of crude: 5.9%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A. P. I.	Viscosity S. U. 100°F.
Light gasoline	9.2	0.704	69.5	
Total gasoline and naphtha	28.4	0.747	57.9	
Kerosine distillate	8.9	0.816	41.9	
Gas oil	14.3	0.859	33.2	
Nonviscous lubricating distillate	8.6	0.884-0.909	28.6-24.2	
Medium lubricating distillate	5.7	0.909-0.925	24.2-21.5	50-100
Viscous lubricating distillate	-	-	-	100-200
Residuum	29.4	1.024	6.7	Above 200
Distillation loss	4.7			

Remarks: The sample as received contained 0.5% by vol. water (A.S.T.M.) and 29 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S .

Laboratory Number 116-56

FIELD: Weyburn

POOL: Mission Canyon

ZONE: Mission Canyon

Well Name: Central Del Rio Ralph No. 10-6

Province: Saskatchewan

Location: Lsd. 10, Sec. 6, Twp. 7, Rge. 13, W 2nd
Interval tested, depth, feet: 4451-4488

Sample From: Sask. Dept. of
Mineral Resources

Producing Zone: Mission Canyon
Geological Age: Mississippian

Date Sampled: February 18, 1956
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.848
Sulphur, percent by weight: 1.66
Saybolt Universal Viscosity:
at 100°F., sec. 39

A.P.I. gravity at 60°F.: 35.4
Pour point, °F.: Below -50
Colour: Brownish Black
Carbon residue, percent by weight: 4.3
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 758 mm. Hg.
First drop, 27°C. (81°F.)

Frac-tion No.	Cut at °C.	Cut at °F.	Per Cent	Sum Per Cent	Specific Gravity 60°F.	Degrees A.P.I. 60°F.	Corre- lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index 20°C.
1.	50	122	2.7	2.7	0.657	83.9	-	-			-
2.	75	167	3.7	6.4	0.686	74.8	15	-			1.3877
3.	100	212	6.5	12.9	0.720	65.0	21	53.3			1.4018
4.	125	257	7.8	20.7	0.744	58.7	24	52.1			1.4141
5.	150	302	5.0	25.7	0.763	54.0	25	52.4			1.4245
6.	175	347	4.7	30.4	0.782	49.4	27	52.7			1.4347
7.	200	392	4.0	34.4	0.801	45.2	30	53.8			1.4440
8.	225	437	4.4	38.8	0.815	42.1	31	56.4			1.4529
9.	250	482	4.5	43.3	0.828	39.4	32	59.2			1.4608
10.	275	527	6.4	49.7	0.844	36.2	35	61.9			1.4702

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	200	392	2.2	51.9	0.857	33.6	37	61.7	38	10	1.4778
12.	225	437	5.1	57.0	0.871	31.0	40	65.0	44	30	1.4851
13.	250	482	4.9	61.9	0.883	28.8	42	67.0	55	45	1.4928
14.	275	527	4.4	66.3	0.899	25.9	47	68.6	80	65	1.5012
15.	300	572	5.8	72.1	0.912	23.6	50	69.6	148	80	1.5116
Resi- duum			23.7	95.8	1.006	9.2					

Carbon residue of residuum: 15.4%

Carbon residue of crude: 4.3%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	12.9	0.697	71.5	
Total gasoline and naphtha	34.4	0.741	59.5	
Kerosine distillate	4.4	0.815	42.1	
Gas oil	18.4	0.849	35.2	
Nonviscous lubricating distillate	8.4	0.877-0.903	29.8-25.2	50-100
Medium lubricating distillate	6.5	0.903-0.920	25.2-22.3	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	23.7	1.006	9.2	
Distillation loss	4.2			

Remarks: The sample as received contained no water (A.S.T.M.) and 12 lb. salt (as NaCl) per 1000 bbl.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 181-58

FIELD: Weyburn

POOL:

ZONE: Midale

Well Name: Sohio South Roughbark 16-31
Location: Lsd. 16, Sec. 31, Twp. 5, Rge. 13, W 2
Interval tested, depth, feet: 4730-4765
Producing Zone: Midale
Geological Age: Mississippian

Province: Saskatchewan
Sample From: Sask. Dept. of Mineral Resources
Date Sampled: June 19, 1958
Sampled at: Tank

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.893
Sulphur, percent by weight: 2.65
Saybolt Universal Viscosity:
at 100°F., sec. 74
at 70°F., sec. 146

A.P.I. gravity at 60°F.: 27.0
Pour point, °F.: 60
Colour: Brownish Black
Carbon residue, percent by weight: 7.2
(Conradson)

DISTILLATION
(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 759 mm. Hg.
First drop, 34°C. (93°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. 60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122	1.6	0.674	78.4						
2.	167	4.2	0.689	73.9	17					
3.	212	7.6	0.726	63.4	24	53.8				
4.	257	11.6	0.753	56.4	28	49.0				
5.	302	15.4	0.771	52.0	29	45.5				
6.	347	18.9	0.783	49.2	28	48.2				
7.	392	22.2	0.796	46.3	28	52.4				
8.	437	25.5	0.810	43.2	29	56.9				
9.	482	30.3	0.824	40.2	31	58.9				
10.	527	36.7	0.844	36.2	35	61.4				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	38.8	0.868	31.5	42	62.7	38	15		
12.	437	43.8	0.878	29.7	43	63.6	43	35		
13.	482	48.8	0.892	27.1	46	67.5	55	60		
14.	527	53.1	0.905	24.9	49	69.6	74	75		
15.	572	60.0	0.917	22.8	52	71.8	137	90		
Resi-duum		98.4	1.017	7.6						

Carbon residue of residuum: 16.4%

Carbon residue of crude: 7.2%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	7.6	0.702	70.1	
Total gasoline and naphtha	22.2	0.750	57.2	
Kerosine distillate	8.1	0.810	43.2	
Gas oil	13.8	0.850	33.2	
Nonviscous lubricating distillate	9.1	0.886-0.910	28.2-24.0	Below 50
Medium lubricating distillate	6.8	0.910-0.924	24.0-21.6	50-100
Viscous lubricating distillate	-	-	-	100-200
Residuum	38.4	1.017	7.6	Above 200
Distillation loss	1.6			

OIL FIELD DATA

Field and Pool: Whiteside Viking Oil Pool

Location: Twp. 30, Rge(s) 25 & 26, W 3 M

DISCOVERY DETAILS

Well: Name: Phillips Husky Whiteside No. 1

Completed: August 13, 1955

Perforated: 2,480-2,490

Treatment: Fractured with 40,000 lb. 20-40 sand.

Initial Potential: 25 bbls/day GOR 800

GEOLOGY

Producing Zone(s): Viking

Trap Type: Stratigraphic

Lithology: Sandstone, Salt and Pepper, Fine Grained Sub Angular Glauconitic with Chert Pebbles

Maximum Reservoir Thickness: 40'

Regional Setting: 225 miles West and North of Regina

Deepest Formation Penetrated: Viking

DEVELOPMENT DATA

Total Wells: Completed Oil: 33; Dry and Abandoned: 4

Producing Oil: 18; Suspended Oil: 15

Injection or Disposal: Water: 1; Gas: None

Well Spacing: 80 Acres

Logging Practice: Electric log and Micro Schlumberger

Completion Practice: Perforate and fracture.

RESERVOIR DATA

Type of Drive: Sol. Gas

Estimated Oil in Place: 15,000,000 S.T.bbls

Estimated Recoverable Oil: 1,200,000 S.T.bbls

Oil Zone Thickness: Maximum: 40'; Average: 36'

Gas Zone Thickness: Maximum: 36'

Porosity: 24%

Area: 2,000 Acres

Oil Characteristics: Gravity: 30.5 °API; Initial Solution GOR: 800

PRODUCTION

MPR: 47.5 BOPD

Economic Allowance: 35 (present)

Market Outlet: Truck to Colville Sale to Britamoil

SECONDARY RECOVERY

RESERVOIR DATA

- 1) Field: Whiteside
- 2) Pool: Viking
- 3) Province: Saskatchewan
- 4) Location: Twp. 30, Rge(s) 25 & 26, W 3 M
- 5) Operator: Altana Exploration Company
- 6) Project: Whiteside Unit
- 7) Reservoir: Viking Cretaceous
- 8) Discovery Date: September 1954
- 9) Date Injection Began: May 27, 1965
- 10) Main Structural Feature: Stratigraphic Trap
- 11) Gas Cap: Originally: Yes; At Present: Yes
- 12) Main Drive in Primary Production: Solution Gas
- 13) Productive Area (acres) of Reservoir: 2,800; Of Project: 2,800
- 14) Average Depth to Top of Pay (feet): 2,500
- 15) Average Effective Thickness (feet): 36
- 16) Average Porosity %: 24
- 17) Connate Water (% of pore space): 35
- 18) API Gravity: 30.5
- 19) Reservoir Pressure at Start of Injection: 703 psig
- 20) Latest Reservoir Pressure: 703 psi (October 21, 1964)
- 21) Injection Fluid: Water
- 22) Injection Fluid Source: Belly River Form

- 23) System: Open
- 24) Fluid Treatment before Injection: Filtered to 10 Micro
- 25) Injection Pattern: 1 Well Pilot
- 26) Structural Position Injection Wells: Between Gas Cap and Oil Leg
- 27) Distance Injection Wells to Producers (feet): 1,980
- 28) Number of Injection Wells at Start: One
- 29) Number of Injection Wells at Present: One (July 21, 1965)
- 30) Average Daily Injection Rate per Injection Well at Start (bbls): 420
- 31) Average Daily Injection Rate per Injection Well at Present (bbls): 420
(July 21, 1965)
- 32) Average Injection Pressure at Start: 1,000 psig
- 33) Average Injection Pressure at Present (psi): 1,540 (July 12, 1965)
- 34) Number of Producing Wells in Project Area at Start: 18
- 35) Number of Producing Wells in Project Area at Present: 17 (July 12, 1965)
- 36) Average Production Rate in Project Area at Start (bbls/day): 162
- 37) Average Production Rate in Project Area at Present: 174 (June 30, 1965)
- 38) Original Oil in Place in Project Area (bbls): 15,000,000
- 39) Original Oil Saturation (% of pore space): 65
- 40) Oil Production from Project Area from Start of Injection to Now (bbls): 6,000
(June 30, 1965)
- 41) Total Volume of Injected Fluids at Present (bbls): 13,965 (July 21, 1965)
- 42) Estimated Increase in Ultimate Recovery from Project Area (bbls):
- 43) Well Spacing: 80 Acres

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 446-63

FIELD: Wildcat

POOL:

ZONE: Hummingbird (Upper Red River)

Well Name: C.D.R. Scurry S. Lake Alma 1-14-1-17 Province: Saskatchewan
 Location: Lsd. 1, Sec. 14, Twp. 1, Rge. 17, W 2 Mer Sample From: Sask. Dept. of Mineral
 Interval tested, depth, feet: 10115-10117 Resources
 Producing Zone: Hummingbird (Upper Red River) Date Sampled: September 18, 1963
 Geological Age: Ordovician Sampled at: Treater

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.853
 Sulphur, percent by weight: 0.39
 Saybolt Universal Viscosity:
 at 77°F., sec. 62
 at 100°F., sec. 51

A.P.I. gravity at 60°F.: 34.4
 Pour point, °F.: -10
 Colour: Black
 Carbon residue, percent by weight: 2.9
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 756 mm. Hg.
 First drop, 30°C. (86°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. 60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122	1.1	0.658	83.6	-	-			-	-
2.	167	3.3	0.680	76.6	12	-			1.3862	79.1
3.	212	6.4	0.700	70.6	12	61.6			1.4001	77.8
4.	257	10.3	0.722	64.5	13	60.5			1.4039	78.2
5.	302	14.6	0.740	59.7	14	63.2			1.4124	80.4
6.	347	19.3	0.756	55.7	15	66.0			1.4208	82.8
7.	392	24.0	0.769	52.5	15	68.1			1.4280	84.8
8.	437	29.8	0.786	48.5	17	71.2			1.4370	88.9
9.	482	36.9	0.800	45.4	19	73.8			1.4450	94.0
10.	527	46.0	0.815	42.1	21	76.6			1.4532	97.7

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	50.9	0.828	39.4	23	77.2	37	15	1.4609	99.0
12.	437	56.1	0.844	36.2	27	79.6	42	30	1.4689	104.4
13.	482	60.3	0.862	32.7	32	80.1	50	45	1.4799	111.6
14.	527	64.5	0.880	29.3	38	81.0	68	55	1.4901	119.6
15.	572	69.8	0.892	27.1	40	82.6	111	70	1.4989	127.8
Resi-duum		100.5	0.988	11.7						

Carbon residue of residuum: 8.2%

Carbon residue of crude: 2.9%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	6.4	0.686	74.8	
Total gasoline and naphtha	24.0	0.731	62.1	
Kerosine distillate	22.0	0.803	44.7	
Gas oil	12.2	0.840	37.0	
Nonviscous lubricating distillate	7.7	0.862-0.889	32.7-27.7	Below 50
Medium lubricating distillate	3.9	0.889-0.899	27.7-25.9	50-100
Viscous lubricating distillate	-	-	-	100-200
Residuum	30.7	0.988	11.7	Above 200
Distillation gain	0.5	-	-	

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 183-58

FIELD: Wilmar

POOL:

ZONE: Frobisher

Well Name: Imperial Dalesboro 15-5
 Location: Lsd. 15, Sec. 5, Twp. 6, Rge. 3, W 2
 Interval tested, depth, feet: 4100-4122
 Producing Zone: Frobisher
 Geological Age: Mississippian

Province: Saskatchewan
 Sample From: Sask. Dept. of
 Mineral Resources
 Date Sampled: May 29, 1958
 Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.843
 Sulphur, percent by weight: 1.13
 Saybolt Universal Viscosity:
 at 100°F., sec. 38

A.P.I. gravity at 60°F.: 36.4
 Pour point, °F.: 25
 Colour: Brownish Black
 Carbon residue, percent by weight: 2.8
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 755 mm. Hg.
 First drop, 27°C. (81°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C)10 ⁴
1.	122	2.1	0.661	82.6						
2.	167	5.9	0.686	74.8	15					
3.	212	11.6	0.723	64.2	23	49.9				
4.	257	17.8	0.748	57.7	26	46.9				
5.	302	23.2	0.771	52.0	29	47.0				
6.	347	28.5	0.787	48.3	30	51.0				
7.	392	32.6	0.802	44.9	31	54.9				
8.	437	37.6	0.815	42.1	31	58.7				
9.	482	42.3	0.828	39.4	32	63.2				
10.	527	48.7	0.845	36.0	35	66.5				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	51.4	0.859	33.2	38	67.2	38	10		
12.	437	56.0	0.871	31.0	40	68.8	44	30		
13.	482	61.0	0.882	28.9	42	73.2	53	55		
14.	527	66.1	0.894	26.8	44	77.5	75	75		
15.	572	72.3	0.906	24.7	47	82.2	131	90		
Resi-duum		96.0	0.982	12.6						

Carbon residue of residuum: 10.2%

Carbon residue of crude: 2.8%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	11.6	0.700	70.6	
Total gasoline and naphtha	32.6	0.748	57.7	
Kerosine distillate	5.0	0.815	42.1	
Gas oil	19.3	0.851	34.8	
Nonviscous lubricating distillate	9.2	0.878-0.899	29.7-25.9	Below 50
Medium lubricating distillate	6.2	0.899-0.913	25.9-23.5	50-100
Viscous lubricating distillate	-	-	-	100-200
Residuum	23.7	0.982	12.6	Above 200
Distillation loss	4.0			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 442-63

FIELD: Workman

POOL:

ZONE: Frobisher

Well Name: K.P.L. Workman 5-34-1-32
 Location: Lsd. 5, Sec. 34, Twp. 1, Rge. 32, W 1 Mer
 Interval tested, depth, feet: 3961-4010
 Producing Zone: Frobisher
 Geological Age: Mississippian

Province: Saskatchewan
 Sample From: Sask. Dept. of Mineral Resources
 Date Sampled: September 3, 1963
 Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.845
 Sulphur, percent by weight: 1.10
 Saybolt Universal Viscosity:
 at 100°F., sec. 42

A.P.I. gravity at 60°F.: 36.0
 Pour point, °F.: 20
 Colour: Black
 Carbon residue, percent by weight: 3.1
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 755 mm. Hg.
 First drop, 31°C. (88°F.)

Frac-tion No.	Cut at of F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. @ 60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, 8°F.	Refractive Index @ 20°C.	Dispersion _{NF-NC} 10 ⁴
1.	122	1.7	0.654	84.9	-	-			-	-
2.	167	5.0	0.686	74.8	15	-			1.3933	78.4
3.	212	10.0	0.722	64.5	22	48.6			1.4052	83.8
4.	257	15.9	0.753	56.4	28	52.0			1.4179	90.6
5.	302	21.8	0.769	52.5	28	47.0			1.4273	94.1
6.	347	27.0	0.783	49.2	28	50.0			1.4354	95.1
7.	392	31.5	0.797	46.0	28	54.0			1.4423	97.5
8.	437	35.3	0.810	43.2	29	57.5			1.4493	99.8
9.	482	40.0	0.824	40.2	30	62.7			1.4578	103.8
10.	527	46.1	0.840	37.0	33	65.0			1.4674	109.5

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	51.2	0.859	33.2	38	66.9	38	15	1.4778	117.7
12.	437	56.9	0.870	31.1	39	70.1	45	35	1.4844	121.3
13.	482	62.1	0.883	28.8	42	76.0	56	55	1.4913	126.5
14.	527	67.3	0.895	26.6	45	79.6	80	70	1.5003	133.2
15.	572	73.5	0.904	25.0	46	84.1	140	95	1.5099	144.3
Resi-duum		99.1	0.972	14.1						

Carbon residue of residuum: 10.5%

Carbon residue of crude: 3.1%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	10.0	0.699	70.9	
Total gasoline and naphtha	31.5	0.750	57.2	
Kerosine distillate	8.5	0.818	41.5	
Gas oil	16.5	0.855	34.0	Below 50
Nonviscous lubricating distillate	10.1	0.876-0.898	30.0-26.1	50-100
Medium lubricating distillate	6.9	0.898-0.909	26.1-24.2	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	25.6	0.972	14.1	
Distillation loss	0.9			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 253-58

FIELD: Miscellaneous

POOL:

ZONE: Cantuar Sand

Well Name: Mows Beverley X 11-15 Province: Saskatchewan
 Location: Lsd. 11, Sec. 15, Twp. 15, Rge. 16, W 3rd Sample From: Sask. Dept. of Mineral
 Interval tested, depth, feet: 3,191 Resources
 Producing Zone: Cantuar Sand--Basal Blairmore Date Sampled: July 22, 1958
 Geological Age: Lower Cretaceous Sampled at: Before Separator

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.967	A.P.I. gravity at 60°F.: 14.8
Sulphur, percent by weight: 3.45	Pour point, °F.: 5
Saybolt Universal Viscosity: at 100°F., sec. 1,756	Colour: Black
at 130°F., sec. 635	Carbon residue, percent by weight: 5.7 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 754 mm. Hg.
 First drop, 80°C. (176°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122									
2.	167									
3.	212	0.7	0.736	60.7	29					
4.	257	1.2)								
5.	302	2.1)								
6.	347	3.8)	0.780	49.9	-	49.5				
7.	392	6.0	0.813	42.5	36	46.3				
8.	437	9.0	0.834	38.1	40	45.2				
9.	482	13.0	0.853	34.4	44	47.5				
10.	527	19.1	0.871	30.9	48	49.1				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	21.2	0.890	27.5	53	50.7	40	-5		
12.	437	25.4	0.901	25.5	54	52.8	48	+15		
13.	482	30.4	0.912	23.6	56	54.6	62	+30		
14.	527	36.9	0.925	21.5	59	56.4	97	+50		
15.	572	-	-	-	-	-	-	-		
Resi-duum		97.8	1.031	5.7						

Carbon residue of residuum: 18.8% Carbon residue of crude: 5.7%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	0.7	0.736	60.7	
Total gasoline and naphtha	6.0	0.787	48.3	
Kerosine distillate	-	-	-	
Gas oil	17.9	0.867	31.7	Below 50
Nonviscous lubricating distillate	10.2	0.902-0.927	25.4-21.1	50-100
Medium lubricating distillate	2.8	0.927-0.935	21.1-19.8	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	60.9	1.031	5.7	
Distillation loss	2.2			

NOTE: 15% Water.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 235-58

FIELD: Miscellaneous

POOL:

ZONE:

Well Name: Tidewater Forget Crown #1
Location: Lsd. 2, Sec. 11, Twp. 9, Rge. 7, W 2
Interval tested, depth, feet: 3876-3886
Producing Zone: Frobisher
Geological Age: Mississippian

Province: Saskatchewan
Sample From: Sask. Dept. of
Mineral Resources
Date Sampled: June 26, 1958
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.871
Sulphur, percent by weight: 1.62
Saybolt Universal Viscosity:
at 100°F., sec. 48

A.P.I. gravity at 60°F.: 31.0
Pour point, °F.: -5
Colour: Black
Carbon residue, percent by weight: 5.1
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 750 mm. Hg.
First drop, 30°C. (86°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. 60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122	1.5	0.648	86.9						
2.	167	4.3	0.679	76.9	12					
3.	212	8.5	0.723	64.2	23					
4.	257	13.6	0.748	57.7	26	48.5				
5.	302	18.0	0.765	53.5	26	49.2				
6.	347	22.2	0.780	49.9	26	51.2				
7.	392	26.7	0.796	46.3	28	53.4				
8.	437	29.6	0.810	43.2	29	57.0				
9.	482	33.9	0.826	39.8	31	59.1				
10.	527	40.2	0.843	36.4	34	61.6				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	42.9	0.862	32.6	39	63.2	38	15		
12.	437	48.6	0.872	30.8	40	65.3	44	35		
13.	482	53.7	0.886	28.2	44	67.5	54	60		
14.	527	59.0	0.899	25.9	51	69.9	75	80		
15.	572	65.2	0.913	23.5	50	73.8	132	95		
Resi-duum		96.7	1.006	9.2						

Carbon residue of residuum: 14.1%

Carbon residue of crude: 5.1%

APPROXIMATE SUMMARY

Light gasoline	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
	8.5	0.695	72.1	
Total gasoline and naphtha	26.7	0.747	57.9	
Kerosine distillate	2.9	0.810	43.2	
Gas oil	19.4	0.851	34.8	Below 50
Nonviscous lubricating distillate	10.9	0.880-0.908	29.3-24.3	50-100
Medium lubricating distillate	5.3	0.908-0.921	24.3-22.1	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	31.5	1.006	9.2	
Distillation loss	3.3			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 186-58

FIELD: Miscellaneous

POOL:

ZONE:

Well Name: White Rose, Canadian Superior 3-31
 Location: Lsd. 3, Sec. 14, Twp. 7, Rge. 31, WPM
 Interval tested, depth, feet: 3386-3390
 Producing Zone: Frobisher
 Geological Age: Mississippian

Province: Saskatchewan
 Sample From: Sask. Dept. of
 Mineral Resources
 Date Sampled: June 6, 1958
 Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.848
 Sulphur, percent by weight: 1.14
 Saybolt Universal Viscosity:
 at 100°F., sec. 40

A.P.I. gravity at 60°F.: 35.4
 Pour point, °F.: 20
 Colour: Brownish Black
 Carbon residue, percent by weight: 2.7
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 758 mm. Hg.
 First drop, 31°C. (88°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122	1.6	0.658	83.6						
2.	167	5.0	0.671	79.4	8					
3.	212	9.3	0.711	67.5	17	54.5				
4.	257	15.0	0.742	59.2	23	51.9				
5.	302	20.7	0.763	54.0	25	49.2				
6.	347	25.6	0.785	48.8	29	50.0				
7.	392	29.5	0.800	45.4	30	53.1				
8.	437	34.5	0.812	42.8	30	56.2				
9.	482	39.8	0.827	39.6	31	60.0				
10.	527	46.7	0.845	36.0	35	64.1				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	50.1	0.861	32.8	39	66.0	38	20		
12.	437	55.3	0.870	31.1	39	68.7	45	40		
13.	482	61.3	0.883	28.8	42	72.3	56	60		
14.	527	66.0	0.894	26.8	44	76.5	81	75		
15.	572	72.9	0.904	25.0	46	82.0	144	95		
Resi-duum		97.3	0.971	14.2						

Carbon residue of residuum: 9.6%

Carbon residue of crude: 2.7%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	9.3	0.687	74.5	
Total gasoline and naphtha	29.5	0.744	58.7	
Kerosine distillate	5.0	0.812	42.8	
Gas oil	20.7	0.849	35.2	
Nonviscous lubricating distillate	10.2	0.876-0.897	30.0-26.3	
Medium lubricating distillate	7.5	0.897-0.910	26.3-24.0	
Viscous lubricating distillate	-	-	-	
Residuum	24.4	0.971	14.2	
Distillation loss	2.7			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 197-63

FIELD: Miscellaneous

POOL:

ZONE: Upper Shaunavon

Well Name: BA Eastend Grundler 16-29
 Location: Lsd. 16, Sec. 29, Twp. 5, Rge. 20, W 3
 Interval tested, depth, feet: 4708-4720
 Producing Zone: Upper Shaunavon
 Geological Age: Jurassic

Province: Saskatchewan
 Sample From: Sask. Dept. of Mineral Resources
 Date Sampled: May 9, 1963
 Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.924

A.P.I. gravity at 60°F.: 21.6

Sulphur, percent by weight: 3.36

Pour point, °F.: -10

Saybolt Universal Viscosity:

Colour: Black

at 100°F., sec. 286

Carbon residue, percent by weight: 8.4

at 130°F., sec. 119

(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 758 mm. Hg.
 First drop, 64°C. (147°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. 60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122									-
2.	167									-
3.	212	3.3	0.691	73.3	-				1.4600	87.3
4.	257	5.6	0.719	65.3	12	57.2			1.4160	79.0
5.	302	8.5	0.743	58.9	16	56.0			1.4260	90.9
6.	347	11.5	0.766	53.2	20	55.1			1.4367	91.3
7.	392	14.5	0.785	48.8	23	54.7			1.4456	91.5
8.	437	17.2	0.804	44.5	26	55.5			1.4680	95.8
9.	482	20.9	0.823	40.4	30	56.2			1.4810	104.9
10.	527	27.0	0.844	36.2	35	57.1				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	28.9	0.868	31.5	42	-	37	0	1.4810	110.9
12.	437	34.2	0.882	28.9	45	58.4	42	20	1.4882	119.4
13.	482	38.9	0.897	26.2	49	60.2	54	40	1.4971	125.5
14.	527	43.9	0.913	23.5	53	62.7	78	60	1.5059	133.1
15.	572	49.9	0.924	21.6	55	65.2	143	85	1.5171	143.0
Resi-duum		97.0	1.025	6.6						

Carbon residue of residuum: 16.2%

Carbon residue of crude: 8.4%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	3.3	0.691	73.3	
Total gasoline and naphtha	14.5	0.741	59.5	
Kerosine distillate	6.4	0.815	42.1	
Gas oil	14.0	0.864	32.3	
Nonviscous lubricating distillate	8.4	0.892-0.917	27.1-22.8	Below 50
Medium lubricating distillate	6.6	0.917-0.930	22.8-20.6	50-100
Viscous lubricating distillate	-	-	-	100-200
Residuum	47.1	1.025	6.6	Above 200
Distillation loss	3.0			

C R U D E P E T R O L E U M A N A L Y S I S .

Laboratory Number 135-61

FIELD: Miscellaneous

POOL:

ZONE:

Well Name: BA E+Al Robinson 15-3
 Location: Lsd. 15, Sec. 3, Twp. 5, Rge. 21, W 3
 Interval tested, depth, feet: 4579-4596
 Producing Zone: Upper Shaunavon
 Geological Age: Jurassic

Province: Saskatchewan
 Sample From: Sask. Dept. of
 Mineral Resources
 Date Sampled: June 1, 1961
 Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific Gravity at 60°F.: 0.956
 Sulphur, percent by weight: 3.74
 Saybolt Universal Viscosity:
 at 100°F., sec. 1,050
 at 130°F., sec. 559

A.P.I. gravity at 60°F.: 16.5
 Pour point, °F.: +10
 Colour: Black
 Carbon residue, percent by weight: 9.6
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 755 mm. Hg.
 First drop, 75°C. (167°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. 60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122									
2.	167									
3.	212	2.2	0.739	60.0	30					
4.	257	3.0)								
5.	302	4.4)	0.758	55.2	-	-				
6.	347	6.4	0.782	49.4	27	49.0				
7.	392	9.5	0.806	44.1	32	47.9				
8.	437	12.7	0.825	40.0	36	48.5				
9.	482	16.2	0.841	36.8	38	51.9				
10.	527	21.8	0.861	32.8	43	53.7				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	24.1	0.879	29.5	47	55.6	38	-5		
12.	437	28.6	0.888	27.8	48	58.0	44	+20		
13.	482	34.2	0.900	25.7	50	61.0	57	+45		
14.	527	39.9	0.914	23.3	54	64.6	88	+60		
15.	572	47.2	0.929	20.8	58	69.7	174	+75		
Resi-duum		100.0	1.001	9.9						

Carbon residue of residuum: 17.0%

Carbon residue of crude: 9.6%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	2.2	0.739	60.0	
Total gasoline and naphtha	9.5	0.774	51.3	
Kerosine distillate	3.2	0.825	40.0	
Gas oil	15.9	0.867	31.7	Below 50
Nonviscous lubricating distillate	9.4	0.893-0.916	27.0-23.0	50-100
Medium lubricating distillate	7.4	0.916-0.933	23.0-20.2	100-200
Viscous lubricating distillate	1.8	0.933-0.938	20.2-19.4	Above 200
Residuum	52.8	1.001	9.9	
Distillation loss	0.0			

Remarks: Percent water in sample as received - 40%. Analysis done on dehydrated sample.

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 74-59

FIELD: Miscellaneous (Outpost Wildcat)

POOL:

ZONE: Upper Shaunavon

Well Name: Oliphant Tidewater Rapdan Cr. 4-19
Location: Lsd. 4, Sec. 19, Twp. 4, Rge. 19, W 3
Interval tested, depth, feet: 4689-4713
Producing Zone: Upper Shaunavon
Geological Age: Jurassic

Province: Saskatchewan
Sample From: Sask. Dept. of
Mineral Resources
Date Sampled: February 19, 1959
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.930
Sulphur, percent by weight: 2.95
Saybolt Universal Viscosity:
at 100°F., sec. 220
at 130°F., sec. 117

A.P.I. gravity at 60°F.: 20.6
Pour point, °F.: 25
Colour: Black
Carbon residue, percent by weight: 8.9
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 750 mm. Hg.
First drop, 70°C. (158°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. 60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 200°C.	Dispersion ₄ (N _F -N _C) 10 ⁴
1.	122									
2.	167									
3.	212	1.6	0.691	73.3	7.5	61.2				
4.	257	3.6	0.725	63.7	15.	57.6				
5.	302	6.6	0.750	57.2	19.	55.9				
6.	347	9.9	0.774	51.3	23	55.0				
7.	392	13.0	0.794	46.7	27	55.9				
8.	437	17.0	0.813	42.5	30	56.8				
9.	482	21.3	0.831	38.8	33	57.7				
10.	527	27.1	0.851	34.8	38	59.0				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	29.8	0.870	31.1	43	59.5	38	5		
12.	437	35.7	0.884	28.6	46	60.5	45	30		
13.	482	40.6	0.899	25.9	50	62.0	58	50		
14.	527	45.5	0.913	23.5	53	63.9	86	70		
15.	572	53.0	0.927	21.1	57	66.0	164	85		
Resi-duum		100.0	1.017	7.6						

Carbon residue of residuum: 17.2%

Carbon residue of crude: 8.9%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	1.6	0.691	73.3	
Total gasoline and naphtha	13.0	0.755	55.9	
Kerosine distillate	4.0	0.813	42.5	
Gas oil	17.8	0.857	33.6	Below 50
Nonviscous lubricating distillate	9.3	0.889-0.915	27.7-23.1	50-100
Medium lubricating distillate	8.4	0.915-0.934	23.1-20.0	100-200
Viscous lubricating distillate	0.5	0.934-0.935	20.0-19.8	Above 200
Residuum	47.2	1.017	7.6	
Distillation loss	0.0			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 196-63

FIELD: Miscellaneous

POOL:

ZONE: Upper Shaunavon

Well Name: Pure Garden Head 4-14
 Location: Lsd. 4, Sec. 14, Twp. 11, Rge. 20, W 3
 Interval tested, depth, feet: 4263-4273
 Producing Zone: Upper Shaunavon
 Geological Age: Jurassic

Province: Saskatchewan
 Sample From: Sask. Dept. of Mineral Resources
 Date Sampled: May 24, 1963
 Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.914
 Sulphur, percent by weight: 2.91
 Saybolt Universal Viscosity:
 at 100°F., sec. 141.1
 at 130°F., sec. 37.6

A.P.I. gravity at 60°F.: 23.3
 Pour point, °F.: -15
 Colour: Brownish Black
 Carbon residue, percent by weight: 8.8
 (Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 760 mm. Hg.
 First drop, 55°C. (131°F.)

Frac-tion No.	Cut °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122									
2.	167	1.0	0.677	77.5	-	-	-	-	1.4042	-
3.	212	2.4	0.695	72.1	9.4	-	-	-	1.4056	77.6
4.	257	5.3	0.721	64.8	13	58.0	-	-	1.4150	75.9
5.	302	8.7	0.745	58.4	17	57.5	-	-	1.4260	81.4
6.	347	12.0	0.765	53.5	19	56.1	-	-	1.4364	82.2
7.	392	15.2	0.786	48.5	23	57.6	-	-	1.4464	87.5
8.	437	19.1	0.807	43.8	27	58.1	-	-	1.4565	91.4
9.	482	23.5	0.824	40.2	30	58.4	-	-	1.4668	93.6
10.	527	29.5	0.843	36.4	34	60.0	-	-		101.4

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	32.5	0.864	32.3	40	61.0	38	0	1.4794	108.3
12.	437	37.1	0.877	29.8	43	62.3	43	20	1.4857	113.1
13.	482	42.3	0.891	27.3	46	64.1	52	40	1.4935	119.1
14.	527	47.2	0.908	24.3	51	66.1	74	65	1.5031	127.2
15.	572	54.8	0.921	22.1	54	68.2	136	85	1.5150	136.7
Resi-duum		98.0	1.019	7.4						

Carbon residue of residuum: 18.3% Carbon residue of crude: 8.8%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	2.4	0.688	74.2	
Total gasoline and naphtha	15.2	0.744	58.7	
Kerosine distillate	8.3	0.816	41.9	
Gas oil	15.0	0.862	32.6	Below 50
Nonviscous lubricating distillate	8.9	0.888-0.914	27.8-23.3	50-100
Medium lubricating distillate	7.4	0.914-0.929	23.3-20.8	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	43.2	1.019	7.4	
Distillation loss	2.0			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 115-60

FIELD: Miscellaneous

POOL:

ZONE: Viking

Well Name: Geepee Fitzpatrick No. 6-32-30-19-W3
 Location: Lsd. 6, Sec. 32, Twp. 30, Rge. 19, W3
 Interval tested, depth, feet: 2,380
 Producing Zone: Viking
 Geological Age: Lower Cretaceous

Province: Saskatchewan
 Sample From: Sask. Dept. of Mineral Resources
 Date Sampled: February 10, 1960
 Sampled at: Tank Sample

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.831
 Sulphur, percent by weight: 0.23
 Saybolt Universal Viscosity:
 at 100°F., sec. 39

A.P.I. gravity at 60°F.: 38.8
 Pour point, °F.: 40
 Colour: Brownish Black
 Carbon residue, percent by weight: 2.0
 (Conradson)

DISTILLATION
 (U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 750 mm. Hg.
 First drop, 26°C. (79°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. °60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C)10 ⁴
1.	122	3.0	0.643	88.6	-					
2.	167	5.9	0.671	79.4	8	-				
3.	212	10.6	0.709	68.1	16	-				
4.	257	16.2	0.737	60.5	20	54.2				
5.	302	21.3	0.758	55.2	23	53.8				
6.	347	26.0	0.776	50.9	24	54.4				
7.	392	30.2	0.794	46.7	27	56.5				
8.	437	34.6	0.808	43.6	28	60.0				
9.	482	39.1	0.822	40.6	29	64.0				
10.	527	45.8	0.835	38.0	31	66.5				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	49.2	0.847	35.6	32	69.5	38	20		
12.	437	54.3	0.855	34.0	32	74.2	44	40		
13.	482	58.7	0.864	32.3	33	79.4	54	60		
14.	527	63.9	0.874	30.4	35	82.8	74	75		
15.	572	70.2	0.888	27.9	38	85.1	126	90		
Resi-duum		94.8	0.952	17.1						

Carbon residue of residuum: 7.0%

Carbon residue of crude: 2.0%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	10.6	0.680	76.6	
Total gasoline and naphtha	30.2	0.735	61.0	
Kerosine distillate	8.9	0.815	42.1	
Gas oil	15.5	0.845	36.0	Below 50
Nonviscous lubricating distillate	9.6	0.860-0.881	33.0-29.1	50-100
Medium lubricating distillate	6.0	0.881-0.896	29.1-26.4	100-200
Viscous lubricating distillate	-	-	-	Above 200
Residuum	24.6	0.952	17.1	
Distillation loss	5.2			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 321-58

FIELD: Miscellaneous

POOL:

ZONE: Viking Sand

Well Name: Highwood Vanalta Eagle Lake #11-11
Location: Lsd. 11, Sec. 11, Twp. 31, Rge. 21, W 3
Interval tested, depth, feet: 2192-2198
Producing Zone: Viking
Geological Age: Lower Cretaceous

Province: Saskatchewan
Sample From: Sask. Dept. of Mineral Resources
Date Sampled: September 18, 1958
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.841
Sulphur, percent by weight: 0.42
Saybolt Universal Viscosity:
at 100°F., sec. 40

A.P.I. gravity at 60°F.: 36.8
Pour point, °F.: -5
Colour: Brownish Black
Carbon residue, percent by weight: 2.1
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 758 mm. Hg.
First drop, 31°C. (88°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/60°F.	Degrees A.P.I. @ 60 F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122	1.7	0.653	85.2						
2.	167	4.8	0.676	77.8	15					
3.	212	9.9	0.716	66.1	19	54.2				
4.	257	16.2	0.744	58.7	24	51.2				
5.	302	22.0	0.765	53.5	26	50.2				
6.	347	27.0	0.783	49.2	28	51.5				
7.	392	31.0	0.799	45.8	29	54.8				
8.	437	35.2	0.812	42.8	30	58.7				
9.	482	40.3	0.825	40.0	31	62.1				
10.	527	46.6	0.838	37.4	32	66.5				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	50.3	0.852	34.6	35	69.0	39	20		
12.	437	56.4	0.859	33.2	34	73.6	45	40		
13.	482	61.8	0.871	31.0	37	78.0	56	65		
14.	527	66.4	0.881	29.1	38	81.2	76	80		
15.	572	72.6	0.893	27.0	41	85.1	131	95		
Resi-duum		95.8	1.006	9.2						

Carbon residue of residuum: 7.6%

Carbon residue of crude: 2.1%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	9.9	0.693	72.7	
Total gasoline and naphtha	31.0	0.745	58.4	
Kerosine distillate	4.2	0.812	42.8	
Gas oil	21.2	0.843	36.4	
Nonviscous lubricating distillate	10.2	0.364-0.886	32.3-28.2	
Medium lubricating distillate	6.0	0.886-0.900	28.2-25.7	
Viscous lubricating distillate	-	-	-	
Residuum	23.2	1.006	9.2	
Distillation loss	4.2			

C R U D E P E T R O L E U M A N A L Y S I S

Laboratory Number 388-58

FIELD: Miscellaneous

POOL:

ZONE: Viking

Well Name: Highwood Vanalta Glenneath #10-11
Location: Lsd. 10, Sec. 11, Twp. 31, Rge. 22, W 3
Interval tested, depth, feet: 2,299
Producing Zone: Viking
Geological Age: Lower Cretaceous

Province: Saskatchewan
Sample From: Sask. Dept. of
Mineral Resources
Date Sampled: October 28, 1958
Sampled at: Wellhead

GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.841
Sulphur, percent by weight: 0.15
Saybolt Universal Viscosity:
at 100°F., sec. 39

A.P.I. gravity at 60°F.: 36.8
Pour point, °F.: -50
Colour: Brownish Black
Carbon residue, percent by weight: 21
(Conradson)

DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 740 mm. Hg.
First drop, 31°C. (88°F.)

Frac-tion No.	Cut at °F.	Sum Per Cent	Specific Gravity 60/600°F.	Degrees A.P.I. 60°F.	Corre-lation Index	Aniline Point, °C.	Visc. S.U. 100°F.	Cloud Test, °F.	Refractive Index @ 20°C.	Dispersion (N _F -N _C) 10 ⁴
1.	122	1.6	0.657	83.9						
2.	167	4.5	0.682	76.0	13					
3.	212	10.0	0.717	65.8	20	54.2				
4.	257	16.9	0.746	58.2	25	51.2				
5.	302	23.1	0.768	52.7	27	50.5				
6.	347	28.4	0.787	48.3	30	52.0				
7.	392	32.9	0.802	44.9	31	55.0				
8.	437	38.0	0.817	41.7	32	58.5				
9.	482	42.2	0.828	39.4	32	61.7				
10.	527	48.3	0.839	37.2	32	64.0				

Stage 2 - Distillation continued at 40 mm. Hg. pressure

11.	392	51.8	0.853	34.4	35	69.4	39	20		
12.	437	57.3	0.860	33.0	35	73.8	45	45		
13.	482	62.8	0.870	31.1	36	78.2	56	65		
14.	527	67.2	0.882	28.9	39	82.5	76	80		
15.	572	73.7	0.892	27.1	40	87.1	129	95		
Resi-duum		97.2	0.963	15.4						

Carbon residue of residuum: 7.7% Carbon residue of crude: 2.1%

APPROXIMATE SUMMARY

	Percent by Vol.	Specific Gravity	Degrees A.P.I.	Viscosity S.U. 100°F.
Light gasoline	10.0	0.697	71.5	
Total gasoline and naphtha	32.9	0.750	57.2	
Kerosine distillate	5.1	0.817	41.7	
Gas oil	19.2	0.845	36.0	
Nonviscous lubricating distillate	10.3	0.865-0.887	32.1-28.0	
Medium lubricating distillate	6.2	0.887-0.897	28.0-26.2	
Viscous lubricating distillate	-	-	-	
Residuum	23.5	0.963	15.4	
Distillation loss	2.8			

