# F O R 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 Martimes (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 determinés 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 $(N_F - N_C)10^4$ 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.

Ottawa, le 16 juin 1969.

Mines Branch Information Circular IC 221

# ANALYSES AND CHARACTERISTICS OF OIL SAMPLES FROM MANITOBA

by

R. P. Charbonnier[1], R. G. Draper[1],

W. H. Harper[2] and A. Yates[1]

## ABSTRACT

The 19 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.

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Direction des mines

Circulaire d'information IC 221

# ANALYSES ET CARACTÉRISTIQUES D'ÉCHANTILLONS DE PÉTROLE DU MANITOBA

par

R. P. Charbonnier[1], R. G. Draper[1],

W. H. Harper[2] et A. Yates[1]

## RÉSUMÉ

Les 19 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.

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# MANITOBA

# OIL SAMPLES

## OIL FIELD DATA

Field and Pool: Daly

Location: Twp(s) 9 & 10, Rge(s) 27 & 28, W.P.M.

DISCOVERY DETAILS

Well: Name: Calstan Daly 15-18-10-27

Completed: January 1951; Open Hole 2200-2500

Perforated: No

Treatment: Acidized

GEOLOGY

Producing Zone(s): Mississippian; Lodgepole - Daly Member (Middle & Lower Crinoidal Units)

Trap Type: Stratigraphic and Structural

Lithology: Fossiliferous limestone, altered to dolomite; veinlets of secondary anhydrite present

Maximum Reservoir Thickness: 80 feet

Deepest Formation Penetrated: To Precambrian

DEVELOPMENT DATA

Total Wells: Completed Oil, 237; Gas, 0; Dry and Abandoned, 11; Abandoned Producers, 67;

Producing Oil, 139; Suspended Oil, 24;

Injection or Disposal: Water, 32; Gas, 0;

Flood Injection: Water, 22.

Well Spacing: 40 Acres. Pattern: Centre of LSD

Logging Practice: E: MLL, RA or GRN

Completion Practice: Production string set at top of Miss. section, or (2) at top of main crinoidal, or (3) at top of 1st crinoidal sandfrac.

RESERVOIR DATA

Type of Drive: Water & Solution Gas

Estimated Oil in Place: 155 MM S.T. bbls

Estimated Recoverable Oil: 18.6 MM S.T. bbls

Oil Zone Thickness: Maximum: 80. Average: 40

Porosity: 9.4%

Area: 9600 Acres

Oil Characteristics: Gravity: 0.860 (33.0 °API). Sulphur: 1.47%.

Pour Point: -25°F.

Pressure Maintenance or Secondary Recovery: Daly Water Flood 80 Acre Five-Spot, 49 Wells - 40-Acre Spacing. (Commenced July 1953)

PRODUCTION

MPR: 75 BOPD

Market Outlet: I.P.L. Cromer, Manitoba.

Bibliographical References: Mississippian Oil Fields of Southwestern Manitoba. Hugh R. McCabe. Publication 60-5. Manitoba Dept. of Mines.

## SECONDARY RECOVERY

## RESERVOIR DATA

1) Field: Daly

2) Pool: Mississippian

3) Province: Manitoba

4) Location: Twp 10, Rge 28, W.P.M.

5) Operator: Calstan

6) Project: Daly Water Flood

7) Discovery Date: January, 1951

8) Date Injection Began: July, 1953

9) Main Structural Feature: Stratigraphic Trap

10) Gas Cap: Originally: No. At Present: No

11) Main Drive in Primary Production: Solution Gas

12) Productive Area (Acres) of Reservoir: 9,600; Of Project: 1960

13) Average Depth to Top of Pay (feet): 2550

14) Average Effective Thickness (feet): 40

15) Average Porosity %: 9.4

16) Injection Fluid: Salt Water

17) System: Closed

18) Injection Pattern: 5 Spot

19) Number of Injection Wells at Start: 4

20) Number of Injection Wells at Present: 22 (December 1964)

21) Average Daily Injection Rate per Injection Well at Start (bbls): 130

22) Average Daily Injection Rate per Injection Well at Present (bbls): 165 (December 1964)

23) Average Injection Pressure at Start (psi): 1000

24) Average Injection Pressure at Present (psi): 1000 (March 1965)

25) Number of Producing Wells in Project Area at Present: 24 (December 1964)

26) Average Production Rate in Project Area at Present: 500 (December 1964)

27) Oil Production from Project Area from Start of Injection to Now (bbls): 1.98 MM (Dec. 1964)

28) Total Volume of Injected Fluids at Present (bbls): 9.2 MM (December 1964)

29) Estimated Primary Ultimate Recovery from Project Area (bbls): 981 M

30) Estimated Increase in Ultimate Recovery from Project Area (bbls): 1 MM (Dec. 1964)

31) Well Spacing: 40 Acres

# CRUDE PETROLEUM ANALYSIS

Laboratory Number 2115-54

FIELD: Daly

POOL:

ZONE: Lodgepole

Well Name: Canadian Superior Thomson No. 16-32
Location: Lsd.16, Sec.32, Twp.9, Rge.28, W.P.M.

Interval tested, depth, feet: 2540
Producing Zone: Lodgepole
Geological Age: Mississippian

Province: Manitoba
Sample From: Manitoba Dept. of Mines and Natural Resources
Date Sampled: July 28, 1954
Sampled at: Well

## GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.860
Sulphur, percent by weight: 1.47
Saybolt Universal Viscosity:
at 100°F., sec. 46
at °F., sec.

A.P.I. gravity at 60°F.: 33.0
Pour point, °F.: -25
Colour: Brownish Green
Carbon residue, percent by weight: 3.2 (Conradson)

## DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 758 mm. Hg
First drop, 30°C. (86°F.)

| Fraction No. | Cut at °C. | Cut at °F. | Per Cent | Sum Per Cent | Specific Gravity 60°F. | Degrees A.P.I. 60°F. | Correlation Index | Aniline Point, °C. | Visc. S.U. 100°F. | Cloud Test, °F. | Refractive Index 20°C. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 50 | 122 | 2.1 | 2.1 | 0.659 | 83.2 | - | - | | | 1.3801 |
| 2. | 75 | 167 | 2.6 | 4.7 | 0.678 | 77.2 | 11 | - | | | 1.3830 |
| 3. | 100 | 212 | 4.3 | 9.0 | 0.714 | 66.7 | 18 | 57.1 | | | 1.3974 |
| 4. | 125 | 257 | 5.1 | 14.1 | 0.737 | 60.6 | 20 | 58.6 | | | 1.4069 |
| 5. | 150 | 302 | 4.2 | 18.3 | 0.755 | 56.0 | 21 | 60.7 | | | 1.4171 |
| 6. | 175 | 347 | 4.3 | 22.6 | 0.773 | 51.5 | 23 | 60.5 | | | 1.4274 |
| 7. | 200 | 392 | 4.4 | 27.0 | 0.794 | 46.7 | 27 | 59.9 | | | 1.4401 |
| 8. | 225 | 437 | 4.6 | 31.6 | 0.814 | 42.4 | 31 | 59.7 | | | 1.4508 |
| 9. | 250 | 482 | 5.7 | 37.3 | 0.831 | 38.8 | 33 | 61.3 | | | 1.4609 |
| 10. | 275 | 527 | 6.9 | 44.2 | 0.848 | 35.3 | 37 | 62.9 | | | 1.4714 |
| Stage 2 - Distillation continued at 40 mm. Hg pressure | | | | | | | | | | | |
| 11. | 200 | 392 | 4.9 | 49.1 | 0.870 | 31.2 | 43 | 63.7 | 40 | 0 | 1.4820 |
| 12. | 225 | 437 | 4.8 | 53.9 | 0.882 | 29.0 | 45 | 67.7 | 48 | 25 | 1.4891 |
| 13. | 250 | 482 | 5.4 | 59.3 | 0.895 | 26.6 | 48 | 70.7 | 62 | 40 | 1.4970 |
| 14. | 275 | 527 | 5.4 | 64.7 | 0.908 | 24.3 | 51 | 73.3 | 94 | 65 | 1.5041 |
| 15. | 300 | 572 | 6.9 | 71.6 | 0.914 | 23.3 | 51 | 82.2 | 193 | 90 | 1.5122 |
| Residuum | | | 25.7 | 97.3 | 0.982 | 12.6 | | | | | |

Carbon residue of residuum: 11.0%  Carbon residue of crude: 3.2%

## APPROXIMATE SUMMARY

| | Percent by Vol. | Specific Gravity | Degrees A.P.I. | Viscosity S.U. 100°F. |
|---|---|---|---|---|
| Light gasoline | 9.0 | 0.691 | 73.3 | |
| Total gasoline and naphtha | 27.0 | 0.739 | 60.0 | |
| Kerosine distillate | 4.6 | 0.814 | 42.3 | |
| Gas oil | 20.6 | 0.853 | 34.4 | |
| Nonviscous lubricating distillate | 10.2 | 0.844-0.908 | 28.6-24.3 | 50-100 |
| Medium lubricating distillate | 6.2 | 0.908-0.914 | 24.3-23.3 | 100-200 |
| Viscous lubricating distillate | 3.0 | 0.914-0.917 | 23.3-22.8 | Above 200 |
| Residuum | 25.7 | 0.982 | 12.6 | |
| Distillation loss | 2.7 | | | |

Remarks: The sample as received contained 0.2% by vol. water and sediment (by centrifuge) and 60 lb. salt (as NaCl) per 1000 bbl.

## OIL FIELD DATA

Field and Pool: Ebor

Location: Twp. 9, Rge 29, W.P.M.

DISCOVERY DETAILS

Well: Name: Dome Cox Ebor 14-23-9-29

Completed: August 1954

Perforated: 2616-2634

Treatment: Acidized: Sandfrac

GEOLOGY

Producing Zone(s): Lodgepole, Upper Zone

DEVELOPMENT DATA

Total Wells: Completed Oil, 16;

Producing Oil, 10; Abandoned Oil, 2 ABDP;

Injection or Disposal: Water, 4.

Well Spacing: 40 Acres

Logging Practice: E: MLL: RA

Completion Practice: Perforate: Sandfrac: Acidize

RESERVOIR DATA

Type of Drive: Solution Gas

Estimated Oil in Place: 3 MM S.T. bbls (initially)

Porosity: 9.3%

Oil Characteristics: Gravity: 0.852 (34.6 $^{o}$API). Sulphur: 1.47%. Pour Point: 0$^{o}$F.

Pressure Maintenance or Secondary Recovery: Ebor Unit #1

PRODUCTION

MPR: 35 BOPD

Market Outlet (pipeline): Cromer

## SECONDARY RECOVERY

## RESERVOIR DATA

1) Field: Ebor

2) Pool: Mississippian

3) Province: Manitoba

4) Location: Twp 9, Rge 29, W.P.M.

5) Operator: Sun Oil Company

6) Project: Ebor Unit #1

7) Reservoir: Upper Whitewater Member Mississippian

8) Discovery Date: August 1954

9) Date Injection Began: September 1964

10) Main Structural Feature: Slight Dome

11) Gas Cap: Originally: No. At Present: No

12) Time Required for Initial Results (months): -

13) Initial Results on Production BHP: 970

14) Main Drive in Primary Production: Solution Gas

15) Productive Area (acres) of Reservoir: 440; Of Project: 360; Affected by Injection: 180

16) Average Depth to Top of Pay (feet): 2620

17) Average Effective Thickness (feet): 13.8

18) Average Porosity %: 12.1

19) Average Horizontal Permeability (millidarcys): 8.6

20) Connate Water (% of Pore Space): 40

21) Viscosity at Initial Reservoir Conditions (centipoises):

22) API Gravity: 34

23) Solution Gas/Oil Ratio at Saturation Pressure: 90-100 scf/bbl

24) Bubble Point Pressure (psi): 350-400

25) Original Pressure (psi):

26) Reservoir Pressure at Start of Injection (psi): 300

27) Latest Reservoir Pressure:

28) Injection Fluid: Salt Water

29) Injection Fluid Source: Jurassic Water

30) System: Closed

31) Fluid Treatment before Injection: Filtration, Chlorination, Bactericide: N/A

32) Injection Pattern: 5 Spot

33) Structural Position Injection Wells: Oil Zone

34) Distance Injection Wells to Producers (feet): 1320

35) Number of Injection Wells at Start: 2

36) Number of Injection Wells at Present: 4 (March 1965)

37) Average Daily Injection Rate per Injection Well at Start: 10 bbls

38) Average Daily Injection Rate per Injection Well at Present: 190 bbls (February 1965)

39) Average Injection Pressure at Start (psi): 425

40) Average Injection Pressure at Present (psi): 380 (February 1965)

41) Number of Producing Wells in Project Area at Start: 6

42) Number of Producing Wells in Project Area at Present: 5 (March 1965)

43) Average Production Rate in Project Area at Start (bbls/day): 9

44) Average Production Rate in Project Area at Present: 9 (March 1965)

45) Original Oil in Place in Project Area: 2.8 MM STB's.

46) Original Oil Saturation (% of Pore Space):

47) Primary Recovery from Project Area when Injection Started: 189,000 bbls

48) Oil Saturation at Start of Project (% of Pore Space):

49) Oil Production from Project Area from Start of Injection to Now: 3,869 bbls (February 1965)

50) Total Volume of Injected Fluids at Present: 26,000 bbls (February 1965)

51) Estimated Primary Ultimate Recovery from Project Area (bbls): Primary Depleted

52) Estimated Increase in Ultimate Recovery from Project Area: 200,000 bbls

53) Well Spacing: 40 Acres

54) Oil Volume Factor (initial Reservoir Barrels per Stock-Tank Barrel): 1.06

# CRUDE PETROLEUM ANALYSIS

Laboratory Number 92-56

FIELD: Ebor

POOL:

ZONE: Lodgepole

Well Name: Calstan Ebor No. 15-23
Location: Lsd.15, Sec.23, Twp.9, Rge.29, W.P.M.

Interval tested, depth, feet: 2598-2632
Producing Zone: Lodgepole
Geological Age: Mississippian

Province: Manitoba
Sample From: Manitoba Dept. of Mines & Natural Resources
Date Sampled: March 8, 1956
Sampled at: Before Treater

## GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.852
Sulphur, percent by weight: 1.47
Saybolt Universal Viscosity:
at 100°F., sec. 44
at °F., sec.

A.P.I. gravity at 60°F.: 34.6
Pour point, °F.: 0
Colour: Brownish Black
Carbon residue, percent by weight: 3.8 (Conradson)

## DISTILLATION

(U.S. Bureau of Mines Routine Method)

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

| Fraction No. | Cut at °C. | Cut at °F. | Per Cent | Sum Per Cent | Specific Gravity 60°F. | Degrees A.P.I. 60°F. | Correlation Index | Aniline Point, °C. | Visc. S.U. 100°F. | Cloud Test, °F. | Refractive Index 20°C. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 50 | 122 | 1.5 | 1.5) | | | | | | | |
| 2. | 75 | 167 | 3.0 | 4.5) | 0.684 | 75.4 | - | 61.7 | | | - |
| 3. | 100 | 212 | 4.6 | 9.1 | 0.702 | 70.1 | 13 | 58.3 | | | 1.3947 |
| 4. | 125 | 257 | 4.4 | 13.5 | 0.728 | 62.9 | 16 | 56.9 | | | 1.4050 |
| 5. | 150 | 302 | 4.7 | 18.2 | 0.750 | 57.2 | 19 | 55.9 | | | 1.4165 |
| 6. | 175 | 347 | 4.4 | 22.6 | 0.772 | 51.8 | 23 | 54.2 | | | 1.4291 |
| 7. | 200 | 392 | 4.4 | 27.0 | 0.791 | 47.4 | 25 | 54.8 | | | 1.4400 |
| 8. | 225 | 437 | 4.7 | 31.7 | 0.808 | 43.6 | 28 | 56.9 | | | 1.4490 |
| 9. | 250 | 482 | 4.8 | 36.5 | 0.822 | 40.6 | 29 | 60.0 | | | 1.4571 |
| 10. | 275 | 527 | 7.3 | 43.8 | 0.840 | 37.0 | 33 | 63.0 | | | 1.4678 |
| Stage 2 - Distillation continued at 40 mm. Hg pressure | | | | | | | | | | | |
| 11. | 200 | 392 | 3.1 | 46.9 | 0.861 | 32.8 | 39 | 62.8 | 38 | 5 | 1.4788 |
| 12. | 225 | 437 | 5.5 | 52.4 | 0.871 | 31.0 | 40 | 67.0 | 43 | 30 | 1.4848 |
| 13. | 250 | 482 | 5.7 | 58.1 | 0.884 | 28.6 | 43 | 70.6 | 53 | 50 | 1.4921 |
| 14. | 275 | 527 | 4.8 | 62.9 | 0.898 | 26.1 | 46 | 73.0 | 73 | 65 | 1.4999 |
| 15. | 300 | 572 | 6.5 | 69.4 | 0.909 | 24.2 | 48 | 76.8 | 123 | 85 | 1.5087 |
| Residuum | | | 27.0 | 96.4 | 0.981 | 12.7 | | | | | |

Carbon residue of residuum: 12.1%  Carbon residue of crude: 3.8%

## APPROXIMATE SUMMARY

| | Percent by Vol. | Specific Gravity | Degrees A.P.I. | Viscosity S.U. 100°F. |
|---|---|---|---|---|
| Light gasoline | 9.1 | 0.693 | 72.7 | |
| Total gasoline and naphtha | 27.0 | 0.738 | 60.2 | |
| Kerosine distillate | 9.5 | 0.815 | 42.1 | |
| Gas oil | 17.1 | 0.857 | 33.6 | |
| Nonviscous lubricating distillate | 9.9 | 0.880-0.904 | 29.3-25.0 | 50-100 |
| Medium lubricating distillate | 5.9 | 0.904-0.915 | 25.0-23.1 | 100-200 |
| Viscous lubricating distillate | - | - | - | Above 200 |
| Residuum | 27.0 | 0.981 | 12.7 | |
| Distillation loss | 3.6 | | | |

Remarks: The sample as received contained a trace of water (A.S.T.M.) and 9 lb. salt (as NaCl) per 1000 bbl.

## OIL FIELD DATA

Field and Pool: Kirkella

Location: Twp 12, Rge 29, W.P.M.

DISCOVERY DETAILS

Well: Name: Dillman Kirkella Prov. 1-10-12-29

Completed: September 1957

Perforated: 2400-2409; w/4. cone shots/ft.

Treatment: Acidized

GEOLOGY

Producing Zone(s): Lodgepole. Daly Member (Approx.)

Trap Type: Structural

Lithology: Limestone

DEVELOPMENT DATA

Total Wells: Completed Oil, 12; Dry and Abandoned, 1;

Producing Oil, 9;

Injection or Disposal: Water, 3.

Well Spacing: 40 Acres

Logging Practice: E: RA (Scint), GRN.

Completion Practice: Prod. string through pay. Abrasijet Acidize

RESERVOIR DATA

Type of Drive: Water and Solution Gas

Estimated Oil in Place: 8.8 MM S.T. bbls

Estimated Recoverable Oil: 0.44 MM S.T. bbls

Oil Zone Thickness: Maximum: 26.7'

Porosity: 11.6%

Area: 640 Acres

Oil Characteristics: Gravity: 0.888 (27.8 °API). Sulphur: 1.92%.

Pour Point: 50° F.

PRODUCTION

MPR: 60 BOPD

Market Outlet (pipeline): Cromer

# CRUDE PETROLEUM ANALYSIS

Laboratory Number 89-56

FIELD: Not Defined - Kirkella Area

POOL:

ZONE: Lodgepole

Well Name: Calstan Kirkella No. 13-4
Location: Lsd.13, Sec.4, Twp.12, Rge.29, W.P.M.

Interval tested, depth, feet: 2469-2475
Producing Zone: Lodgepole
Geological Age: Mississippian

Province: Manitoba
Sample From: Manitoba Dept. of Mines and Natural Resources
Date Sampled: March 6, 1956
Sampled at: Tank

## GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.905
Sulphur, percent by weight: 2.13
Salbolt Universal Viscosity:
at 70°F., sec. 173
at 100°F., sec. 93

A.P.I. gravity at 60°F.: 24.8
Pour point, °F.: Below -70
Colour: Brownish Black
Carbon residue, percent by weight: 5.8 (Conradson)

## DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 753 mm. Hg
First drop, 56°C. (133°F.)

| Fraction No. | Cut at °C. | Cut at °F. | Per Cent | Sum Per Cent | Specific Gravity 60°F. | Degrees A.P.I. 60°F. | Correlation 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 | 2.3 | 2.3 | 0.722 | 64.5 | | 57.5 | | | 1.4030 |
| 4. | 125 | 257 | 2.7 | 5.0 | 0.748 | 57.7 | 26 | 56.7 | | | 1.4121 |
| 5. | 150 | 302 | 3.6 | 8.6 | 0.763 | 54.0 | 25 | 59.0 | | | 1.4202 |
| 6. | 175 | 347 | 3.6 | 12.2 | 0.780 | 49.9 | 26 | 60.9 | | | 1.4293 |
| 7. | 200 | 392 | 3.5 | 15.7 | 0.796 | 46.3 | 28 | 61.6 | | | 1.4380 |
| 8. | 225 | 437 | 4.1 | 19.8 | 0.813 | 42.6 | 30 | 61.2 | | | 1.4489 |
| 9. | 250 | 482 | 5.1 | 24.9 | 0.833 | 38.4 | 34 | 60.7 | | | 1.4597 |
| 10. | 275 | 527 | 7.0 | 31.9 | 0.852 | 34.6 | 39 | 60.0 | | | 1.4713 |
| Stage 2 - Distillation continued at 40 mm. Hg pressure | | | | | | | | | | | |
| 11. | 200 | 392 | 3.3 | 35.2 | 0.876 | 30.0 | 46 | 58.6 | 39 | -45 | 1.4837 |
| 12. | 225 | 437 | 4.7 | 39.9 | 0.886 | 28.2 | 47 | 60.2 | 45 | -15 | 1.4915 |
| 13. | 250 | 482 | 7.2 | 47.1 | 0.902 | 25.4 | 51 | 61.5 | 59 | 0 | 1.5013 |
| 14. | 275 | 527 | 6.7 | 53.8 | 0.918 | 22.6 | 56 | 63.1 | 91 | 5 | 1.5112 |
| 15. | 300 | 572 | 6.9 | 60.7 | 0.929 | 20.8 | 58 | 66.5 | 172 | 30 | 1.5180 |
| Residuum | | | 38.2 | 98.9 | 1.003 | 9.6 | | | | | |

Carbon residue of residuum: 13.8%  Carbon residue of crude: 5.8%

## APPROXIMATE SUMMARY

| | Percent by Vol. | Specific Gravity | Degrees A.P.I. | Viscosity S.U. 100°F. |
|---|---|---|---|---|
| Light gasoline | 2.3 | 0.722 | 64.5 | |
| Total gasoline and naphtha | 15.7 | 0.766 | 53.2 | |
| Kerosine distillate | 4.1 | 0.813 | 42.6 | |
| Gas oil | 19.8 | 0.859 | 33.2 | |
| Nonviscous lubricating distillate | 11.6 | 0.891-0.919 | 27.3-22.5 | 50-100 |
| Medium lubricating distillate | 8.4 | 0.919-0.933 | 22.5-20.2 | 100-200 |
| Viscous lubricating distillate | 1.1 | 0.933-0.935 | 20.2-19.8 | Above 200 |
| Residuum | 38.2 | 1.003 | 9.6 | |
| Distillation loss | 1.1 | | | |

Remarks: The sample as received contained no water (A.S.T.M.) and 24 lb. salt (as NaCl) per 1000 bbl.

# CRUDE PETROLEUM ANALYSIS

Laboratory Number 461-57

FIELD: Kirkella

POOL:

ZONE: Lodgepole

Well Name: Dillman Kirkella 16-3-12-29
Location: Lsd.16, Sec.3, Twp.12, Rge.29, W.1st

Interval tested, depth, feet: 2420-2448
Producing Zone: Lodgepole
Geological Age: Mississipian

Province: Manitoba
Sample From: Manitoba Dept. of Mines and Natural Resources
Date Sampled: December 12, 1957
Sampled At: Wellhead

## GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.888
Sulphur, percent by weight: 1.92
Saybolt Universal Viscosity:
at 70°F., sec. 102
at 100°F., sec. 78

A.P.I. gravity at 60°F.: 27.8
Pour point, °F.: Below -50
Colour: Brownish Black
Carbon residue, percent by weight: 3.0 (Conradson)

## DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 759 mm. Hg
First drop, 28°C. (82°F.)

| Fraction No. | Cut at °F. | Sum Per Cent | Specific Gravity 60/60°F. | Degrees A.P.I. °60 F. | Correlation 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 | 0.9 | 0.683 | 75.7 | - | - | | | | |
| 2. | 167 | 2.1 | 0.685 | 75.1 | - | - | | | | |
| 3. | 212 | 4.4 | 0.717 | 65.8 | 20 | 55.2 | | | | |
| 4. | 257 | 7.9 | 0.740 | 59.7 | 22 | 55.8 | | | | |
| 5. | 302 | 11.5 | 0.758 | 55.2 | 23 | 58.6 | | | | |
| 6. | 347 | 14.8 | 0.775 | 51.1 | 24 | 60.5 | | | | |
| 7. | 392 | 18.5 | 0.791 | 47.4 | 25 | 60.5 | | | | |
| 8. | 437 | 22.4 | 0.813 | 42.6 | 30 | 59.8 | | | | |
| 9. | 482 | 27.2 | 0.831 | 38.8 | 33 | 59.6 | | | | |
| 10. | 527 | 33.7 | 0.851 | 34.8 | 38 | 58.6 | | | | |
| Stage 2 - Distillation continued at 40 mm. Hg pressure | | | | | | | | | | |
| 11. | 392 | 37.6 | 0.874 | 30.4 | 45 | 59.3 | 40 | -30 | | |
| 12. | 437 | 43.5 | 0.887 | 28.0 | 47 | 60.8 | 46 | -5 | | |
| 13. | 482 | 49.0 | 0.903 | 25.2 | 52 | 62.7 | 60 | 15 | | |
| 14. | 527 | 54.6 | 0.917 | 22.8 | 55 | 65.2 | 94 | 35 | | |
| 15. | 572 | 61.2 | 0.926 | 21.3 | 56 | 69.6 | 185 | 55 | | |
| Residuum | | 96.4 | 0.999 | 10.1 | | | | | | |

Carbon residue of residuum: 7.6%  Carbon residue of crude: 3.0%

## APPROXIMATE SUMMARY

| | Percent by Vol. | Specific Gravity | Degrees A.P.I. | Viscosity S.U. 100°F. |
|---|---|---|---|---|
| Light gasoline | 4.4 | 0.701 | 70.4 | |
| Total gasoline and naphtha | 18.5 | 0.751 | 56.9 | |
| Kerosine distillate | 3.9 | 0.813 | 42.6 | |
| Gas oil | 19.9 | 0.859 | 33.2 | Below 50 |
| Nonviscous lubricating distillate | 9.9 | 0.892-0.918 | 27.1-22.6 | 50-100 |
| Medium lubricating distillate | 6.7 | 0.918-0.927 | 22.6-21.1 | 100-200 |
| Viscous lubricating distillate | 2.3 | 0.927-0.931 | 21.1-20.5 | Above 200 |
| Residuum | 35.2 | 0.999 | 10.1 | |
| Distillation loss | 3.6 | | | |

## OIL FIELD DATA

Field and Pool: Lulu Lake (abandoned, September 1957)

Location: Twp 1, Rge 21, W.P.M.

DISCOVERY DETAILS

Well: Name: Royal Triad et al. 16-14-1-21

Completed: December 1954

Perforated: 3296-3297

GEOLOGY

Producing Zone(s): Lodgepole, Upper Whitewater

Trap Type: Structural

Lithology: Limestone

DEVELOPMENT DATA

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

Producing Oil, ABD.

Well Spacing: 40 Acres

Logging Practice: E. 109 MLL. RA.

Completion Practice: Selected Perforation

RESERVOIR DATA

Type of Drive: Solution Gas

Estimated Oil in Place: 0.85 MM S.T. bbls

Area: 120 Acres

Oil Characteristics: Gravity: 0.853 (34 °API). Sulphur: 0.92%.

Pour Point: 35° F.

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

Laboratory Number 90-56

FIELD: Lulu Lake

POOL:

ZONE: Lodgepole

Well Name: Royalite Triad et al Lulu Lake No. 1
Location: Lsd.16, Sec.14, Twp.1, Rge.21, W.P.M.

Interval tested, depth, feet: 3313-3318
Producing Zone: Lodgepole
Geological Age: Mississippian

Province: Manitoba
Sample From: Manitoba Dept. of Mines and Natural Resources
Date Sampled: February 29, 1956
Sampled at: After separator

## GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.853
Sulphur, percent by weight: 0.92
Saybolt Universal Viscosity:
at 100°F., sec. 45
at °F., sec.

A.P.I. gravity at 60°F.: 34.0
Pour point, °F.: 35
Colour: Brownish Black
Carbon residue, percent by weight: 3.5
(Conradson)

## DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 755 mm. Hg
First drop, 35°C. (95°F.)

| Fraction No. | Cut at °C. | Cut at °F. | Per Cent | Sum Per Cent | Specific Gravity 60°F. | Degrees A.P.I. 60°F. | Correlation Index | Aniline Point, °C. | Visc. S.U. 100°F. | Cloud Test, °F. | Refractive Index 20°C. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 50 | 122 | | | | | | | | | |
| 2. | 75 | 167 | 4.0 | 4.0 | 0.685 | 75.1 | - | 59.9 | | | 1.3931 |
| 3. | 100 | 212 | 5.2 | 9.2 | 0.706 | 68.9 | 15 | 58.8 | | | 1.3947 |
| 4. | 125 | 257 | 6.6 | 15.8 | 0.729 | 62.6 | 17 | 58.7 | | | 1.4059 |
| 5. | 150 | 302 | 5.0 | 20.8 | 0.748 | 57.7 | 18 | 60.0 | | | 1.4149 |
| 6. | 175 | 347 | 4.1 | 24.9 | 0.766 | 53.2 | 20 | 60.8 | | | 1.4247 |
| 7. | 200 | 392 | 4.2 | 29.1 | 0.785 | 48.8 | 23 | 61.2 | | | 1.4346 |
| 8. | 225 | 437 | 4.3 | 33.4 | 0.804 | 44.5 | 26 | 61.7 | | | 1.4445 |
| 9. | 250 | 482 | 5.1 | 38.5 | 0.820 | 41.1 | 28 | 63.3 | | | 1.4543 |
| 10. | 275 | 527 | 7.0 | 45.5 | 0.839 | 37.2 | 32 | 65.3 | | | 1.4659 |
| Stage 2 - Distillation continued at 40 mm. Hg pressure | | | | | | | | | | | |
| 11. | 200 | 392 | 3.5 | 49.0 | 0.857 | 33.6 | 37 | 66.0 | 38 | 0 | 1.4770 |
| 12. | 225 | 437 | 5.0 | 54.0 | 0.865 | 32.1 | 37 | 70.7 | 43 | 20 | 1.4818 |
| 13. | 250 | 482 | 5.0 | 59.0 | 0.877 | 29.8 | 39 | 74.2 | 53 | 45 | 1.4882 |
| 14. | 275 | 527 | 5.4 | 64.4 | 0.888 | 27.8 | 41 | 77.5 | 73 | 65 | 1.4948 |
| 15. | 300 | 572 | 6.2 | 70.6 | 0.899 | 25.9 | 44 | 82.4 | 124 | 85 | 1.5030 |
| Residuum | | | 27.8 | 98.4 | 0.996 | 10.6 | | | | | |

Carbon residue of residuum: 10.9%  Carbon residue of crude: 3.5%

## APPROXIMATE SUMMARY

| | Percent by Vol. | Specific Gravity | Degrees A.P.I. | Viscosity S.U. 100°F. |
|---|---|---|---|---|
| Light gasoline | 9.2 | 0.697 | 71.5 | |
| Total gasoline and naphtha | 29.1 | 0.735 | 61.0 | |
| Kerosine distillate | 9.4 | 0.813 | 42.6 | |
| Gas oil | 16.6 | 0.853 | 34.4 | |
| Nonviscous lubricating distillate | 9.7 | 0.873-0.894 | 30.6-26.8 | 50-100 |
| Medium lubricating distillate | 5.8 | 0.894-0.905 | 26.8-24.8 | 100-200 |
| Viscous lubricating distillate | - | - | - | Above 200 |
| Residuum | 27.8 | 0.996 | 10.6 | |
| Distillation loss | 1.6 | | | |

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

## OIL FIELD DATA

Field and Pool: Maples

Location: Twp. 10, Rge. 26, W.P.M.

DISCOVERY DETAILS

Well: Name: Imperial Virden 5-9-10-26

Completed: February 1955

Perforated: 2115-2119; 2126-2130; 4 jets/ft.

Treatment: Acidized

GEOLOGY

Producing Zone(s): Lodgepole; Whitewater Lake & Upper Virden Members

Trap Type: Minor Fold

Lithology: Limestone

Maximum Reservoir Thickness: 51 feet

DEVELOPMENT DATA

Total Wells: Completed Oil, 12; Dry and Abandoned: 5 dry, 3 Abd. 'P';

Producing Oil, 9;

Injection or Disposal: Water, 2.

Well Spacing: 40 Acres

Logging Practice: E: MLL

Completion Practice: Production String set at top of lower Virden Member

RESERVOIR DATA

Type of Drive: Water

Estimated Oil in Place: 10.4 MM S.T.bbls

Estimated Recoverable Oil: 523 M S.T.bbls

Oil Zone Thickness: Average: 36

Area: 520 Acres

Oil Characteristics: Gravity: 0.845 (36 °API), Sulphur: 1.39%.

Pour Point: -10°F.

PRODUCTION

MPR: 34 BOPD

Market Outlet (pipeline): Cromer

# CRUDE PETROLEUM ANALYSIS

Laboratory Number 91-56

FIELD: Maples

POOL:

ZONE: Lodgepole

Well Name: Imperial Virden No. 1-8M-10-26
Location: Lsd.1, Sec.8, Twp.10, Rge.26, W.P.M.

Interval tested, depth, feet: 2047-2131
Producing Zone: Lodgepole
Geological Age: Mississippian

Province: Manitoba
Sample From: Manitoba Dept. of Mines and Natural Resources
Date Sampled: February 24, 1956
Sampled at: After Treater

## GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.845
Sulphur, percent by weight: 1.39
Saybolt Universal Viscosity:
at 100°F., sec. 40
at °F., sec.

A.P.I. gravity at 60°F.: 36.0
Pour point, °F.: -10
Colour: Brownish Black
Carbon residue, percent by weight: 3.1 (Conradson)

## DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 762 mm. Hg
First drop, 32°C. (90°F.)

| Fraction No. | Cut at °C. | Cut at °F. | Per Cent | Sum Per Cent | Specific Gravity 60°F. | Degrees A.P.I. 60°F. | Correlation Index | Aniline Point, °C. | Visc. S.U. 100°F. | Cloud Test, °F. | Refractive Index 20°C. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 50 | 122 | 1.9 | 1.9 | 0.649 | 86.5 | - | | | | |
| 2. | 75 | 167 | 2.9 | 4.8 | 0.671 | 79.4 | 8 | 60.3 | | | 1.3891 |
| 3. | 100 | 212 | 3.9 | 8.7 | 0.707 | 68.6 | 15 | 58.0 | | | 1.3982 |
| 4. | 125 | 257 | 5.3 | 14.0 | 0.730 | 62.3 | 17 | 58.4 | | | 1.4060 |
| 5. | 150 | 302 | 4.6 | 18.6 | 0.748 | 57.7 | 18 | 60.5 | | | 1.4150 |
| 6. | 175 | 347 | 4.3 | 22.9 | 0.770 | 52.3 | 22 | 61.0 | | | 1.4258 |
| 7. | 200 | 392 | 4.2 | 27.1 | 0.789 | 47.8 | 24 | 60.1 | | | 1.4370 |
| 8. | 225 | 437 | 5.1 | 32.2 | 0.809 | 43.4 | 28 | 60.1 | | | 1.4481 |
| 9. | 250 | 482 | 5.3 | 37.5 | 0.827 | 39.6 | 31 | 61.3 | | | 1.4592 |
| 10. | 275 | 527 | 7.1 | 44.6 | 0.845 | 36.0 | 35 | 62.8 | | | 1.4703 |
| Stage 2 - Distillation continued at 40 mm. Hg pressure | | | | | | | | | | | |
| 11. | 200 | 392 | 2.7 | 47.3 | 0.868 | 31.5 | 42 | 64.3 | 40 | 0 | 1.4824 |
| 12. | 225 | 437 | 5.1 | 52.4 | 0.875 | 30.2 | 42 | 66.7 | 45 | 15 | 1.4877 |
| 13. | 250 | 482 | 4.5 | 56.9 | 0.889 | 27.7 | 45 | 69.6 | 56 | 40 | 1.4948 |
| 14. | 275 | 527 | 5.1 | 62.0 | 0.902 | 25.4 | 48 | 72.3 | 78 | 60 | 1.5020 |
| 15. | 300 | 572 | 6.4 | 68.4 | 0.911 | 23.8 | 49 | 76.8 | 138 | 80 | 1.5092 |
| Residuum | | | 25.9 | 94.3 | 0.975 | 13.6 | | | | | |

Carbon residue of residuum: 10.3%  Carbon residue of crude: 3.1%

## APPROXIMATE SUMMARY

| | Percent by Vol. | Specific Gravity | Degrees A.P.I. | Viscosity S.U. 100°F. |
|---|---|---|---|---|
| Light gasoline | 8.7 | 0.682 | 76.0 | |
| Total gasoline and naphtha | 27.1 | 0.733 | 61.5 | |
| Kerosine distillate | 5.1 | 0.809 | 43.4 | |
| Gas oil | 19.8 | 0.850 | 35.0 | |
| Nonviscous lubricating distillate | 9.5 | 0.881-0.905 | 29.1-24.8 | 50-100 |
| Medium lubricating distillate | 6.9 | 0.905-0.916 | 24.8-23.0 | 100-200 |
| Viscous lubricating distillate | - | - | - | Above 200 |
| Residuum | 25.9 | 0.975 | 13.6 | |
| Distillation loss | 5.7 | | | |

Remarks: The sample as received contained a trace of water (A.S.T.M.) and 28 lb. salt (as NaCl) per 1000 bbl.

## OIL FIELD DATA

Field and Pool: North Virden Scallion

Location: Twp(s) 11 & 12, Rge 26, W.P.M.

DISCOVERY DETAILS

Well: Name: Calstan Scallion Prov. 3-11-11-26

Completed: December 1953 Open hole (Oolites & Cherty)

Treatment: Acidized

GEOLOGY

Producing Zone(s): Lodgepole; Upper Virden, Lower Virden & Scallion Members

Trap Type: Structural

Maximum Reservoir Thickness: 42 feet

DEVELOPMENT DATA

Total Wells: Completed Oil, 241; Dry and Abandoned, 26; Abd. P., 13;

Producing Oil, 196; Suspended Oil, 29;

Injection or Disposal: Water, 16; Flood Injection, 40.

Well Spacing: 40 Acres

Logging Practice: E.MLL. (Caliper) RA.

Completion Practice: (1) Open Hole in Oolites & Cherty Zone, or (2) Case through Pay Zones, Perforate Selected Intervals, Stimulate

RESERVOIR DATA

Type of Drive: Water and Solution Gas

Estimated Oil in Place: 227 MM S.T.bbls

Estimated Recoverable Oil: (Primary) 27 MM S.T.bbls

Oil Zone Thickness: Average: 41. Porosity: 11%.

Oil Characteristics: Gravity: 0.861 (32.8 $^{o}$API). Sulphur: 1.47%.

Pour Point: -5$^{o}$F.

Pressure Maintenance or Secondary Recovery: See North Virden Scallion Unit #1

PRODUCTION

MPR: 70 BOPD

Market Outlet: I.P.L. Cromer

## SECONDARY RECOVERY

## RESERVOIR DATA

1) Field: North Virden Scallion

2) Pool: Mississippian

3) Province: Manitoba

4) Location: Twp(s) 11 & 12, Rge 26, W.P.M.

5) Operator: California Standard Company

6) Project: North Virden Scallion Unit No. 1

7) Reservoir: Scallion Member and Virden Members, Lodgepole formation, Lower Mississippian Age

8) Field Discovery Date: December 1953

9) Date Injection Began: December 1962

10) Main Structural Feature: Stratigraphic Trap

11) Gas Cap: Originally: No. At Present: No.

12) Time Required for Initial Results (Months):

13) Initial Results on Production: 200 psi; Solution GOR 70

14) Main Drive in Primary Production: Solution Gas; Water Drive

15) Productive Area (Acres) Of Reservoir: 10,600 Acres; Of Project: 8,680 Acres; Affected by Injection: 3,200 Acres

16) Average Depth to Top of Pay (feet): 2010

17) Average Effective Thickness (feet): 41

18) Average Porosity %: 10.7

19) Average horizontal permeability and range in brackets: Cherty 32 md (3.7-98.); oolitic 68 md (9.3-192)

20) Connate Water (% of Pore Space):

21) Viscosity at Initial Reservoir Conditions (Centipoises): 3.52

22) API Gravity: 34.5

23) Solution Gas/Oil Ratio at Saturation Pressure: 70 SCF/bbl

24) Bubble Point Pressure (psi): 135 @ 83°F.

25) Original Pressure (psi): 860

26) Reservoir Pressure at Start of Injection (psi): 200

27) Latest Reservoir Pressure:

28) Injection Fluid: Water

29) Injection Fluid Source: Mississippian and Devonian

30) System: Closed

31) Fluid Treatment before Injection: Filtration

32) Injection Pattern: 5 Spot

33) Structural Position Injection Wells: Oil Zone

34) Distance Injection Wells to Producers (feet): 1320

35) Number of Injection Wells at Start: 5

36) Number of Injection Wells at Present: 40 (March 1965)

37) Average Daily Injection Rate per Injection Well at Start: 2200 BWPD

38) Average Daily Injection Rate per Injection Well at Present: 8866 BWPD

39) Average Injection Pressure at Start (psi): 700

40) Average Injection Pressure at Present (psi): 600 (March 1965)

41) Number of Producing Wells in Project Area at Start: 201

42) Number of Producing Wells in Project Area at Present: 158 (March 1965)

43) Average Production Rate in Project Area at Start (bbls/day): 2950

44) Average Production Rate in Project Area at Present: 4690 (March 1965)

45) Original Oil in Place in Project Area: 194,000,000 bbls.

46) Original Oil Saturation (% of Pore Space): Cherty & Oolitic 71, Crinoidal 48

47) Primary Recovery from Project Area when Injection Started (bbls): 11.5 MM

48) Oil Saturation at Start of Project (% of Pore Space):

49) Oil Production from Project Area from Start of Injection to Now: 3,388,733 bbls (April 1965)

50) Total Volume of Injected Fluids at Present (bbls): 5.5 MM (March 1965)

51) Estimated Primary Ultimate Recovery from Project Area (bbls): 25,000,000

52) Estimated Increase in Ultimate Recovery from Project Area (bbls): 44.2 MM

53) Well Spacing: 40 Acres

54) Oil Volume Factor (Initial Reservoir Barrels per Stock-Tank Barrel): 1.045

# CRUDE PETROLEUM ANALYSIS

Laboratory Number 2114-54

FIELD: North Virden

POOL:

ZONE: Lodgepole

Well Name: Calstan Scallion Province No. 5-11
Location: Lsd.5, Sec.11, Twp.11, Rge.26, W.P.M.

Interval tested, depth, feet: 2027
Producing Zone: Lodgepole
Geological Age: Mississippian

Province: Manitoba
Sample From: Manitoba Dept. of Mines and Natural Resources
Date Sampled: July 28, 1954
Sampled at: Well

## GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.861
Sulphur, percent by Weight: 1.47
Saybolt Universal Viscosity:
at 100°F., sec. 46
at °F., sec.

A.P.I. gravity at 60°F.: 32.8
Pour point, °F.: -5
Colour: Brownish Green
Carbon residue, percent by weight: 3.5 (Conradson)

## DISTILLATION

(U.S. Bureau of Mines Routine Method)

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

| Fraction No. | Cut at °C. | Cut at °F. | Per Cent | Sum Per Cent | Specific Gravity 60°F. | Degrees A.P.I. 60°F. | Correlation Index | Aniline Point, °C. | Visc. S.U. 100°F. | Cloud Test, °F. | Refractive Index 20°C. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 50 | 122 | 2.0 | 2.0 | 0.670 | 79.8 | - | - | | | 1.3808 |
| 2. | 75 | 167 | 2.3 | 4.3 | 0.684 | 75.4 | 14 | - | | | 1.3854 |
| 3. | 100 | 212 | 4.3 | 8.6 | 0.714 | 66.5 | 18 | 57.5 | | | 1.3988 |
| 4. | 125 | 257 | 5.0 | 13.6 | 0.738 | 60.3 | 21 | 58.2 | | | 1.4080 |
| 5. | 150 | 302 | 4.6 | 18.2 | 0.756 | 55.7 | 22 | 59.8 | | | 1.4174 |
| 6. | 175 | 347 | 4.1 | 22.3 | 0.775 | 51.0 | 24 | 59.9 | | | 1.4295 |
| 7. | 200 | 392 | 4.1 | 26.4 | 0.794 | 46.6 | 27 | 59.5 | | | 1.4395 |
| 8. | 225 | 437 | 5.0 | 31.4 | 0.814 | 42.3 | 31 | 60.3 | | | 1.4503 |
| 9. | 250 | 482 | 5.4 | 36.8 | 0.831 | 38.8 | 33 | 62.0 | | | 1.4603 |
| 10. | 275 | 527 | 7.0 | 43.8 | 0.849 | 35.2 | 37 | 62.8 | | | 1.4709 |
| Stage 2 - Distillation continued at 40 mm. Hg pressure | | | | | | | | | | | |
| 11. | 200 | 392 | 3.1 | 46.9 | 0.868 | 31.5 | 42 | 63.2 | 39 | 10 | 1.4811 |
| 12. | 225 | 437 | 5.4 | 52.3 | 0.877 | 29.8 | 43 | 67.8 | 45 | 20 | 1.4868 |
| 13. | 250 | 482 | 6.0 | 58.3 | 0.890 | 27.4 | 46 | 70.7 | 57 | 40 | 1.4948 |
| 14. | 275 | 527 | 7.5 | 65.8 | 0.906 | 24.6 | 50 | 73.8 | 93 | 75 | 1.5039 |
| 15. | 300 | 572 | 6.8 | 72.6 | 0.917 | 22.7 | 52 | 80.7 | 212 | 90 | 1.5142 |
| Residuum | | | 25.5 | 98.1 | 0.978 | 13.3 | | | | | |

Carbon residue of residuum: 12.0%  Carbon residue of crude: 3.5%

## APPROXIMATE SUMMARY

| | Percent by Vol. | Specific Gravity | Degrees A.P.I. | Viscosity S.U. 100°F. |
|---|---|---|---|---|
| Light gasoline | 8.6 | 0.696 | 71.8 | |
| Total gasoline and naphtha | 26.4 | 0.742 | 59.2 | |
| Kerosine distillate | 5.0 | 0.814 | 42.3 | |
| Gas oil | 20.5 | 0.854 | 34.2 | |
| Nonviscous lubricating distillate | 10.5 | 0.882-0.906 | 28.9-24.7 | 50-100 |
| Medium lubricating distillate | 6.1 | 0.906-0.916 | 24.7-23.0 | 100-200 |
| Viscous lubricating distillate | 4.1 | 0.916-0.922 | 23.0-22.0 | Above 200 |
| Residuum | 25.5 | 0.978 | 13.3 | |
| Distillation loss | 1.9 | | | |

Remarks: The sample as received contained 0.06% by vol. water and sediment (by centrifuge) and 45 lb. salt (as NaCl) per 1000 bbl.

## OIL FIELD DATA

Field and Pool: Pierson

Location: Twp 3, Rge 29, W.P.M.

DISCOVERY DETAILS

Well: Name: Sweet Grass Pierson Prov. 7-11-3-29

Completed: January 1954

Perforated: 3249-3274

Treatment: No Details

GEOLOGY

Producing Zone(s): Mission Canyon MC-3

Trap Type: Structural

Lithology: Limestone

DEVELOPMENT DATA

Total Wells: Completed Oil, 9; Dry and Abandoned, 5;

Producing Oil, 6; Suspended Oil, 3 ABD. P.;

Injection or Disposal: Water, 1.

Well Spacing: 40 Acres

Logging Practice: E. Log, Microlog G.R.N.

Completion Practice: Production string through pay; perforation and acidizing.

RESERVOIR DATA

Type of Drive: Water and Solution Gas

Estimated Oil in Place: 5.5 MM S.T.bbls

Estimated Recoverable Oil: 0.55 MM S.T.bbls

Oil Zone Thickness: Maximum: 27 feet

Porosity: 9.7%

Area: 480 Acres

Oil Characteristics: Gravity: 0.853 (34.4 °API). Sulphur: 1.02%

Pour Point: 25°F.

PRODUCTION

MPR: 45 BOPD

Market Outlet (Pipeline): Cromer

# CRUDE PETROLEUM ANALYSIS

Laboratory Number 127-55

FIELD: Pierson

POOL:

ZONE: Mission Canyon

Well Name: Imperial Pierson No. 5-12M-3-29
Location: Lsd.5, Sec.12, Twp.3, Rge.29, W.P.M.

Interval tested, depth, feet: 3275-3282
Producing Zone: Mission Canyon
Geological Age: Mississippian

Province: Manitoba
Sample From: Manitoba Dept. of Mines and Natural Resources
Date Sampled: May 26, 1955
Sampled at: Tank

## GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.853
Sulphur, percent by weight: 1.02
Saybolt Universal Viscosity:
at 100°F., sec. 44
at °F., sec.

A.P.I. gravity at 60°F.: 34.4
Pour point, °F.: 25
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, 752 mm. Hg
First drop, 29°C. (84°F.)

| Fraction No. | Cut at °C. | Cut at °F. | Per Cent | Sum Per Cent | Specific Gravity 60°F. | Degrees A.P.I. 60°F. | Correlation Index | Aniline Point, °C. | Visc. S.U. 100°F. | Cloud Test, °F. | Refractive Index 20°C. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 50 | 122 | 1.7 | 1.7 | - | - | - | | | | - |
| 2. | 75 | 167 | 3.3 | 5.0 | 0.676 | 77.8 | - | - | | | 1.3884 |
| 3. | 100 | 212 | 5.4 | 10.4 | 0.717 | 65.9 | 20 | 52.4 | | | 1.4012 |
| 4. | 125 | 257 | 6.4 | 16.8 | 0.744 | 58.7 | 24 | 49.8 | | | 1.4151 |
| 5. | 150 | 302 | 5.2 | 22.0 | 0.765 | 53.5 | 26 | 49.5 | | | 1.4253 |
| 6. | 175 | 347 | 5.4 | 27.4 | 0.782 | 49.5 | 27 | 51.1 | | | 1.4352 |
| 7. | 200 | 392 | 4.7 | 32.1 | 0.798 | 45.8 | 29 | 54.5 | | | 1.4430 |
| 8. | 225 | 437 | 5.0 | 37.1 | 0.810 | 43.2 | 29 | 58.6 | | | 1.4505 |
| 9. | 250 | 482 | 5.0 | 42.1 | 0.825 | 40.0 | 31 | 62.4 | | | 1.4585 |
| 10. | 275 | 527 | 7.0 | 49.1 | 0.842 | 36.6 | 34 | 66.5 | | | 1.4682 |
| Stage 2 - Distillation continued at 40 mm. Hg pressure | | | | | | | | | | | |
| 11. | 200 | 392 | 2.8 | 51.9 | 0.860 | 33.0 | 38 | 69.3 | 40 | 20 | 1.4781 |
| 12. | 225 | 437 | 4.9 | 56.8 | 0.866 | 31.9 | 37 | 72.1 | 44 | 35 | 1.4817 |
| 13. | 250 | 482 | 4.8 | 61.6 | 0.877 | 29.9 | 39 | 76.1 | 54 | 50 | 1.4877 |
| 14. | 275 | 527 | 4.8 | 66.4 | 0.888 | 27.9 | 41 | 79.7 | 74 | 70 | 1.4940 |
| 15. | 300 | 572 | 6.2 | 72.6 | 0.897 | 26.3 | 43 | 84.2 | 123 | 85 | 1.5034 |
| Residuum | | | 26.6 | 99.2 | 0.976 | 13.5 | | | | | |

Carbon residue of residuum: 14.0%  Carbon residue of crude: 4.3%

## APPROXIMATE SUMMARY

| | Percent by Vol. | Specific Gravity | Degrees A.P.I. | Viscosity S.U. 100°F. |
|---|---|---|---|---|
| Light gasoline | 10.4 | 0.697 | 71.5 | |
| Total gasoline and naphtha | 32.1 | 0.747 | 57.9 | |
| Kerosine distillate | 10.0 | 0.818 | 41.5 | |
| Gas oil | 15.1 | 0.854 | 34.2 | |
| Nonviscous lubricating distillate | 9.8 | 0.872-0.893 | 30.8-27.0 | 50-100 |
| Medium lubricating distillate | 5.6 | 0.893-0.902 | 27.0-25.4 | 100-200 |
| Viscous lubricating distillate | - | - | = | Above 200 |
| Residuum | 26.6 | 0.976 | 13.5 | |
| Distillation loss | 0.8 | | | |

Remarks: The sample as received contained 0.2% by vol. of water and sediment (by centrifuge), and 28 lb. of salt (as NaCl) per 1000 bbl.

## OIL FIELD DATA

Field and Pool: Routledge

Location: Twp 9; Rge 25; W.P.M.

DISCOVERY DETAILS

Well: Name: M & C Routledge 3-33-9-25

Completed: May 1955, Open Hole

Treatment: Acidized

GEOLOGY

Producing Zone(s): Lodgepole - Virden & Scallion Member

Trap Type: Structural

Lithology: Limestone

Deepest Formation Penetrated: Lodgepole

DEVELOPMENT DATA

Total Wells: Completed Oil, 78; Dry and Abandoned, 9 and 7

Producing Oil, 66; Suspended Oil, 9

Injection or Disposal: Water, 4.

Well Spacing: 40 Acres

Logging Practice: E: IND. E.; MLL, Sonic. GR. GRN.

Completion Practice: Prod. CSG to Scallion; Perforate & Acidize Upper Pay Zones.

RESERVOIR DATA

Zone Thickness: 7.5' UV; 7.6' LV; 25.5' SC

Porosity: UV - 9.9%; LV - 11.6%; SC 13.4%

Area: 2,000 Acres

Oil Characteristics: Gravity: 0.849 (35.2 °API). Sulphur: 1.30%.

Pour Point: -15°F.

Pressure Maintenance or Secondary Recovery: No

PRODUCTION

MPR: 60 BOPD

Market Outlet (Pipeline): Cromer

# CRUDE PETROLEUM ANALYSIS

Laboratory Number 86-56

FIELD: Routledge

POOL:

ZONE: Lodgepole

Well Name: Peacock Routledge 14-28-9-25
Location: Lsd.14, Sec.28, Twp.9, Rge.25, W.P.M.

Interval tested, depth, feet: 2055-2077
Producing Zone: Lodgepole
Geological Age: Mississippian

Province: Manitoba
Sample From: Manitoba Dept. of Mines and Natural Resources
Date Sampled: February 27, 1956
Sampled at: Tank

## GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.849
Sulphur, percent by weight: 1.30
Saybolt Universal Viscosity:
at 100°F., sec. 41
at °F., sec.

A.P.I. gravity at 60°F.: 35.2
Pour point, °F.: -15
Colour: Brownish Black
Carbon residue, percent by weight: 3.1 (Conradson)

## DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 758 mm. Hg
First drop, 30°C. (86°F.)

| Fraction No. | Cut at °F. | Sum Per Cent | Specific Gravity 60/60°F. | Degrees A.P.I. °60 F. | Correlation 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 | 0.647 | 87.2 | - | - | | | - | - |
| 2. | 167 | 4.4 | 0.676 | 77.8 | 10 | 57.7 | | | 1.3837 | 73.7 |
| 3. | 212 | 8.6 | 0.713 | 67.0 | 18 | 56.4 | | | 1.3968 | 69.5 |
| 4. | 257 | 13.6 | 0.741 | 59.5 | 22 | 56.4 | | | 1.4091 | 75.0 |
| 5. | 302 | 18.2 | 0.758 | 55.2 | 23 | 57.6 | | | 1.4180 | 78.7 |
| 6. | 347 | 22.5 | 0.775 | 51.1 | 24 | 58.1 | | | 1.4281 | 83.6 |
| 7. | 392 | 26.8 | 0.795 | 46.5 | 27 | 58.5 | | | 1.4402 | 86.5 |
| 8. | 437 | 31.7 | 0.814 | 42.3 | 31 | 59.0 | | | 1.4511 | 97.4 |
| 9. | 482 | 37.1 | 0.831 | 38.8 | 33 | 61.0 | | | 1.4609 | 99.0 |
| 10. | 527 | 44.1 | 0.846 | 35.8 | 36 | 62.6 | | | 1.4712 | 108.6 |
| Stage 2 - Distillation continued at 40 mm. Hg pressure | | | | | | | | | | |
| 11. | 392 | 47.7 | 0.866 | 31.9 | 41 | 64.6 | 40 | -5 | 1.4814 | 112.9 |
| 12. | 437 | 52.9 | 0.875 | 30.2 | 42 | 66.9 | 44 | 20 | 1.4868 | 115.1 |
| 13. | 482 | 58.8 | 0.888 | 27.8 | 45 | 70.0 | 56 | 40 | 1.4941 | 120.3 |
| 14. | 527 | 64.2 | 0.902 | 25.4 | 48 | 72.8 | 80 | 60 | 1.5012 | 128.2 |
| 15. | 572 | 70.8 | 0.912 | 23.6 | 50 | 77.4 | 148 | 80 | 1.5099 | 137.8 |
| Residuum | | 96.7 | 0.977 | 13.3 | | | | | | |

Carbon residue of residuum: 10.4%  Carbon residue of crude: 3.1%

## APPROXIMATE SUMMARY

| | Percent by Vol. | Specific Gravity | Degrees A.P.I. | Viscosity S.U. 100°F. |
|---|---|---|---|---|
| Light gasoline | 8.6 | 0.687 | 74.5 | |
| Total gasoline and naphtha | 26.8 | 0.741 | 59.5 | |
| Kerosine distillate | 4.9 | 0.814 | 42.3 | |
| Gas oil | 21.3 | 0.853 | 34.4 | Below 50 |
| Nonviscous lubricating distillate | 10.3 | 0.881-0.905 | 29.1-24.8 | 50-100 |
| Medium lubricating distillate | 7.5 | 0.905-0.918 | 24.8-22.6 | 100-200 |
| Viscous lubricating distillate | - | - | - | Above 200 |
| Residuum | 25.9 | 0.977 | 13.3 | |
| Distillation loss | 3.3 | | | |

Remarks: The sample as received contained a trace of water (A.S.T.M.)

## OIL FIELD DATA

Field and Pool: Souris Hartney

Location: Twp. 6, Rge. 22, W.P.M.

DISCOVERY DETAILS

Well: Name: Texaco Souris 8-17-6-22

Completed: November 1962

Perforated: 2133-2142

Treatment: Acidized

GEOLOGY

Producing Zone(s): Lodgepole, Upper Virden Member

Trap Type: Permeability

Lithology: Limestone

DEVELOPMENT DATA

Total Wells: Completed Oil, 13; Dry and Abandoned, 5;

Producing Oil, 10; Suspended Oil, 3;

Injection or Disposal: Water, 1.

Well Spacing: 80 Acres

Logging Practice: Ind. E; Sonic GR

Completion Practice: (1) Open Hole or (2) Prod. CSG. through pay, perforate, acidize.

RESERVOIR DATA

Type of Drive: Water

Estimated Oil in Place: 557 bbls/acre-foot

Oil Zone Thickness: Average: 14.3

Porosity: 12.5%; Permeability: 46.4 md

Area: 1200 Acres

Oil Characteristics: Gravity: 0.864 (32.3 $^{o}$API). Sulphur: 1.02%.

Pour Point: -35$^{o}$F. Initial Solution GOR: 70 SCF/STB

PRODUCTION

MPR: 34 BOPD

Market Outlet (pipeline): Cromer

# CRUDE PETROLEUM ANALYSIS

Laboratory Number 409-63

FIELD: Souris-Hartney

POOL:

ZONE: Lodgepole

Well Name: No. 1 Battery
Location: Lsd.4, Sec.16, Twp.6, Rge.22, W.P.M.

Interval tested, depth, feet: 2175
Producing Zone: Lodgepole
Geological Age: Mississipian

Province: Manitoba
Sample From: Manitoba Dept. of Mines and Natural Resources
Date Sampled: October 17, 1963
Sampled at: After Separator

## GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.864
Sulphur, percent by weight: 1.02
Saybolt Universal Viscosity:
at 77°F., sec. 87
at 100°F., sec. 60

A.P.I. gravity at 60°F.: 32.3
Pour point, °F.: -35
Colour: 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, 30°C. (86°F.)

| Fraction No. | Cut at °F. | Sum Per Cent | Specific Gravity 60/60°F. | Degrees A.P.I. °60 F. | Correlation 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 | 1.4 | 0.652 | 85.5 | - | - | | | 1.3780 | 70.3 |
| 2. | 167 | 4.2 | 0.683 | 75.7 | 14 | - | | | 1.3908 | 73.1 |
| 3. | 212 | 8.6 | 0.718 | 65.6 | 20 | 55.2 | | | 1.4016 | 74.2 |
| 4. | 257 | 13.5 | 0.746 | 58.2 | 25 | 55.6 | | | 1.4115 | 79.1 |
| 5. | 302 | 17.7 | 0.766 | 53.2 | 27 | 56.2 | | | 1.4219 | 82.9 |
| 6. | 347 | 21.8 | 0.785 | 48.8 | 29 | 57.0 | | | 1.4323 | 88.1 |
| 7. | 392 | 26.2 | 0.806 | 44.1 | 32 | 57.8 | | | 1.4439 | 92.4 |
| 8. | 437 | 30.4 | 0.819 | 41.3 | 33 | 59.9 | | | 1.4529 | 99.2 |
| 9. | 482 | 34.8 | 0.833 | 38.4 | 34 | 61.0 | | | 1.4613 | 105.6 |
| 10. | 527 | 42.1 | 0.847 | 35.6 | 36 | 63.9 | | | 1.4701 | 109.9 |
| Stage 2 - Distillation continued at 40 mm. Hg pressure | | | | | | | | | | |
| 11. | 392 | 46.9 | 0.866 | 31.9 | 41 | 67.5 | 39 | -5 | 1.4809 | 115.6 |
| 12. | 437 | 51.6 | 0.876 | 30.0 | 42 | 71.2 | 47 | 15 | 1.4859 | 117.8 |
| 13. | 482 | 57.2 | 0.887 | 28.0 | 44 | 75.0 | 60 | 40 | 1.4919 | 122.6 |
| 14. | 527 | 62.8 | 0.898 | 26.1 | 46 | 78.5 | 91 | 55 | 1.4979 | 127.6 |
| 15. | 572 | 68.8 | 0.906 | 24.7 | 47 | 82.5 | 167 | 75 | 1.5051 | 133.0 |
| Residuum | | 97.8 | 0.994 | 10.9 | | | | | | |

Carbon residue of residuum: 16.6%  Carbon residue of crude; 5.5%

## APPROXIMATE SUMMARY

| | Percent by Vol. | Specific Gravity | Degrees A.P.I. | Viscosity S.U. 100°F. |
|---|---|---|---|---|
| Light gasoline | 8.6 | 0.696 | 71.8 | |
| Total gasoline and naphtha | 26.2 | 0.749 | 57.4 | |
| Kerosine distillate | 4.2 | 0.819 | 41.3 | |
| Gas oil | 20.2 | 0.854 | 34.2 | Below 50 |
| Nonviscous lubricating distillate | 10.1 | 0.879-0.899 | 29.5-25.9 | 50-100 |
| Medium lubricating distillate | 7.6 | 0.899-0.909 | 25.9-24.2 | 100-200 |
| Viscous lubricating distillate | 0.5 | 0.909-0.910 | 24.2-24.0 | Above 200 |
| Residuum | 29.0 | 0.994 | 10.9 | |
| Distillation loss | 2.2 | - | - | |

# CRUDE PETROLEUM ANALYSIS

Laboratory Number 87-56

FIELD: Not Defined - South Regent

POOL:

ZONE: Lodgepole

Well Name: Calstan South Regent No. 6-7
Location: Lsd.6, Sec.7, Twp.4, Rge.21, W.P.M.

Interval tested, depth, feet: 2514-2520
Producing Zone: Lodgepole
Geological Age: Mississippian

Province: Manitoba
Sample From: Manitoba Dept. of Mines and Natural Resources
Date Sampled: February 29, 1956
Sampled at: Tank

## GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.871
Sulphur, percent by weight: 1.20
Saybolt Universal Viscosity:
at 70°F., sec. 73
at 100°F., sec. 53

A.P.I. gravity at 60°F.: 31.0
Pour point, °F.: Below -70
Colour: Brownish Black
Carbon residue, percent by weight: 7.0 (Conradson)

## DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 755 mm. Hg
First drop, 30°C. (86°F.)

| Fraction No. | Cut at °C. | Cut at °F. | Per Cent | Sum Per Cent | Specific Gravity 60°F. | Degrees A.P.I. 60°F. | Correlation Index | Aniline Point, °C. | Visc. S.U. 100°F. | Cloud Test, °F. | Refractive Index 20°C. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 50 | 122 | 1.7 | 1.7 | 0.649 | 86.5 | - | - | | | - |
| 2. | 75 | 167 | 2.7 | 4.4 | 0.671 | 79.4 | 8 | - | | | 1.3884 |
| 3. | 100 | 212 | 4.7 | 9.1 | 0.713 | 67.0 | 18 | 55.8 | | | 1.3998 |
| 4. | 125 | 257 | 4.6 | 13.7 | 0.742 | 59.2 | 23 | 53.9 | | | 1.4103 |
| 5. | 150 | 302 | 4.2 | 17.9 | 0.762 | 54.2 | 25 | 54.8 | | | 1.4203 |
| 6. | 175 | 347 | 4.1 | 22.0 | 0.781 | 49.7 | 27 | 55.2 | | | 1.4308 |
| 7. | 200 | 392 | 4.3 | 26.3 | 0.798 | 45.8 | 29 | 55.5 | | | 1.4410 |
| 8. | 225 | 437 | 4.3 | 30.6 | 0.815 | 42.1 | 31 | 56.9 | | | 1.4512 |
| 9. | 250 | 482 | 5.1 | 35.7 | 0.833 | 38.4 | 34 | 58.0 | | | 1.4621 |
| 10. | 275 | 527 | 6.7 | 42.4 | 0.852 | 34.6 | 39 | 59.9 | | | 1.4736 |
| Stage 2 - Distillation continued at 40 mm. Hg pressure | | | | | | | | | | | |
| 11. | 200 | 392 | 3.3 | 45.7 | 0.872 | 30.8 | 44 | 61.8 | 40 | -35 | 1.4847 |
| 12. | 225 | 437 | 4.8 | 50.5 | 0.881 | 29.1 | 45 | 64.6 | 45 | -20 | 1.4892 |
| 13. | 250 | 482 | 4.6 | 55.1 | 0.893 | 27.0 | 47 | 67.5 | 58 | 0 | 1.4959 |
| 14. | 275 | 527 | 5.4 | 60.5 | 0.906 | 24.7 | 50 | 70.9 | 87 | 20 | 1.5028 |
| 15. | 300 | 572 | 6.1 | 66.6 | 0.913 | 23.5 | 50 | 75.5 | 163 | 35 | 1.5089 |
| Residuum | | | 30.8 | 97.4 | 1.009 | 8.7 | - | | | | |

Carbon residue of residuum: 19.8%  Carbon residue of crude: 7.0%

## APPROXIMATE SUMMARY

| | Percent by Vol. | Specific Gravity | Degrees A.P.I. | Viscosity S.U. 100°F. |
|---|---|---|---|---|
| Light gasoline | 9.1 | 0.689 | 73.9 | |
| Total gasoline and naphtha | 26.3 | 0.742 | 59.2 | |
| Kerosine distillate | 4.3 | 0.815 | 42.1 | |
| Gas oil | 19.2 | 0.857 | 33.6 | |
| Nonviscous lubricating distillate | 9.0 | 0.885-0.907 | 28.4-24.5 | 50-100 |
| Medium lubricating distillate | 7.6 | 0.907-0.916 | 24.5-23.0 | 100-200 |
| Viscous lubricating distillate | 0.2 | 0.916-0.917 | 23.0-22.8 | Above 200 |
| Residuum | 30.8 | 1.009 | 8.7 | |
| Distillation loss | 2.6 | | | |

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

## OIL FIELD DATA

Field and Pool: Tilston

Location: Twp(s). 5 & 6, Rge. 29, W.P.M.

DISCOVERY DETAILS

Well: Name: Owen Tilston Prov. 5-32-5-29

Completed: July 1952

Perforated: 3108-3112; 3074-3075; 3110-3122

Treatment: Acidized

GEOLOGY

Producing Zone(s): Mississippian; MC-1 Member

Trap Type: Structural High

Lithology: Limestone

DEVELOPMENT DATA

Total Wells: Completed Oil, 10; Dry and Abandoned, 2;

Producing Oil, 9; Suspended Oil, 1;

Injection or Disposal: Water, 1.

Well Spacing: 40 Acres

Logging Practice: E: RA

Completion Practice: Production String Through Pay. Selective Perforation and Acid Treatment.

RESERVOIR DATA

Type of Drive: Solution Gas

Estimated Oil in Place: 3 MM S.T.bbls

Estimated Recoverable Oil: 0.3 MM S.T.bbls

Oil Zone Thickness: Average: 12

Porosity: 12%

Area: 480 Acres

Oil Characteristics: Gravity: 0.857 (33.6 °API); Sulphur: 0.96%.

Pour Point: -70 °F.

PRODUCTION

MPR: 36 BOPD

Market Outlet (pipeline): Cromer

# CRUDE PETROLEUM ANALYSIS

Laboratory Number 88-56

FIELD: Tilston

POOL:

ZONE: Mission Canyon

Well Name: Northern Tilston No. 9-31
Location: Lsd.9, Sec.31, Twp.5, Rge.29, W.P.M.

Interval tested, depth, feet: 3105-3112
Producing Zone: Mission Canyon
Geological Age: Mississippian

Province: Manitoba
Sample From: Manitoba Dept. of Mines and Natural Resources
Date Sampled: February 28, 1956
Sampled at: After Separator

## GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.857
Sulphur, percent by weight: 0.96
Saybolt Universal Viscosity:
at 100°F., sec. 41
at °F., sec.

A.P.I. gravity at 60°F.: 33.6
Pour point, °F.: Below -70
Colour: Brownish Black
Carbon residue, percent by weight: 3.1 (Conradson)

## DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 748 mm. Hg
First drop, 34°C. (93°F.)

| Fraction No. | Cut at °C. | Cut at °F. | Per Cent | Sum Per Cent | Specific Gravity 60°F. | Degrees A.P.I. 60°F. | Correlation Index | Aniline Point, °C. | Visc. S.U. 100°F. | Cloud Test, °F. | Refractive Index 20°C. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 50 | 122 | | | | | | - | | | - |
| 2. | 75 | 167 | 2.3 | 2.3 | 0.687 | 74.5 | | 61.0 | | | - |
| 3. | 100 | 212 | 4.7 | 7.0 | 0.713 | 67.0 | 18 | 58.0 | | | 1.3973 |
| 4. | 125 | 257 | 7.3 | 14.3 | 0.740 | 59.7 | 22 | 56.6 | | | 1.4091 |
| 5. | 150 | 302 | 6.1 | 20.4 | 0.760 | 54.7 | 24 | 59.1 | | | 1.4188 |
| 6. | 175 | 347 | 5.0 | 25.4 | 0.779 | 50.1 | 26 | 60.8 | | | 1.4284 |
| 7. | 200 | 392 | 4.7 | 30.1 | 0.795 | 46.5 | 27 | 61.2 | | | 1.4381 |
| 8. | 225 | 437 | 5.3 | 35.4 | 0.812 | 42.8 | 30 | 61.6 | | | 1.4480 |
| 9. | 250 | 482 | 5.7 | 41.1 | 0.830 | 39.0 | 33 | 62.0 | | | 1.4580 |
| 10. | 275 | 527 | 7.5 | 48.6 | 0.850 | 35.0 | 38 | 62.5 | | | 1.4691 |
| Stage 2 - Distillation continued at 40 mm. Hg pressure | | | | | | | | | | | |
| 11. | 200 | 392 | 3.6 | 52.2 | 0.865 | 32.1 | 41 | 61.8 | 40 | -30 | 1.4796 |
| 12. | 225 | 437 | 5.9 | 58.1 | 0.877 | 29.8 | 43 | 64.2 | 46 | -5 | 1.4870 |
| 13. | 250 | 482 | 4.5 | 62.6 | 0.892 | 27.1 | 46 | 66.4 | 61 | 20 | 1.4953 |
| 14. | 275 | 527 | 4.8 | 67.4 | 0.905 | 24.8 | 49 | 68.0 | 91 | 35 | 1.5020 |
| 15. | 300 | 572 | 6.4 | 73.8 | 0.916 | 23.0 | 52 | 70.8 | 178 | 60 | 1.5090 |
| Residuum | | | 24.4 | 98.2 | 0.988 | 11.7 | | | | | |

Carbon residue of residuum: 11.1%  Carbon residue of crude: 3.1%

## APPROXIMATE SUMMARY

| | Percent by Vol. | Specific Gravity | Degrees A.P.I. | Viscosity S.U. 100°F. |
|---|---|---|---|---|
| Light gasoline | 7.0 | 0.704 | 69.5 | |
| Total gasoline and naphtha | 30.1 | 0.751 | 56.9 | |
| Kerosine distillate | 5.3 | 0.812 | 42.8 | |
| Gas oil | 21.1 | 0.852 | 34.6 | |
| Nonviscous lubricating distillate | 9.1 | 0.881-0.906 | 29.1-24.7 | 50-100 |
| Medium lubricating distillate | 6.4 | 0.906-0.919 | 24.7-22.5 | 100-200 |
| Viscous lubricating distillate | 1.8 | 0.919-0.922 | 22.5-22.0 | Above 200 |
| Residuum | 24.4 | 0.988 | 11.7 | |
| Distillation loss | 1.8 | | | |

Remarks: The sample as received contained no water (A.S.T.M.) and 17 lb. salt (as NaCl) per 1000 bbl.

## OIL FIELD DATA

Field and Pool: Virden-Roselea

Location: Twp(s). 9, 10 & 11, Rge(s). 25 & 26; W.P.M.

DISCOVERY DETAILS

Well: Name: McIvor Roselea 9-28-10-26

Completed: July 1953; Open Hole 2050-2100

Perforated: No

Treatment: No

GEOLOGY

Producing Zone(s): Miss. Lodgepole; Upper Virden, Lower Virden and Scallion Members

Trap Type: Structural and Stratigraphic

Lithology: Limestone

DEVELOPMENT DATA

Total Wells: Completed Oil, 348; Gas, 0; Dry and Abandoned, 27; Abd.P., 58;

Producing Oil, 238; Suspended Oil, 56;

Injection or Disposal: Water, 16; Gas, 0.

Well Spacing: 40 Acres

Logging Practice: E. MLL. LL - 3. RA (Scint): GRN.

Completion Practice: (1) Production String Run Through Pay, or (2) Production String at Top of Crinoidal or Oolite Section, Acid Treatment.

RESERVOIR DATA

Type of Drive: Solution Gas, Water

Estimated Oil in Place: 152 million S.T.bbls

Estimated Recoverable Oil: 18 million S.T.bbls

Oil Zone Thickness: Average: 33 feet

Porosity: 11.0%

Area: 9600 Acres

Oil Characteristics: Gravity: 0.859 (32.2 °API). Sulphur: 1.43%.

Pour Point: -20°F.

PRODUCTION

MPR: 60 BOPD

Market Outlet (pipeline): I.P.L. (Cromer)

# CRUDE PETROLEUM ANALYSIS

Laboratory Number 2116-54

FIELD: Virden Roselea

POOL:

ZONE: Lodgepole

Well Name: McIvor Roselea No. 1
Location: Lsd.9, Sec.28, Twp.10, Rge.26, W.P.M.
Interval tested, depth, feet: 2100
Producing Zone: Lodgepole
Geological Age: Mississippian

Province: Manitoba
Sample From: Manitoba Dept. of Mines and Natural Resources
Date Sampled: July 28, 1954
Sampled at: Well

## GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.859
Sulphur, percent by weight: 1.43
Saybolt Universal Viscosity:
at 100°F., sec. 48
at °F., sec.

A.P.I. gravity at 60°F.: 33.2
Pour point, °F.: -20
Colour: Brownish Green
Carbon residue, percent by weight: 3.5 (Conradson)

## DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 755 mm. Hg
First drop, 24°C. (75°F.)

| Fraction No. | Cut at °C. | Cut at °F. | Per Cent | Sum Per Cent | Specific Gravity 60°F. | Degrees A.P.I. 60°F. | Correlation Index | Aniline Point, °C. | Visc. S.U. 100°F. | Cloud Test, °F. | Refractive Index 20°C. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 50 | 122 | 3.1 | 3.1 | 0.658 | 83.6 | - | - | | | 1.3793 |
| 2. | 75 | 167 | 2.2 | 5.3 | 0.677 | 77.6 | 11 | - | | | 1.3821 |
| 3. | 100 | 212 | 4.4 | 9.7 | 0.714 | 66.8 | 18 | 56.3 | | | 1.3959 |
| 4. | 125 | 257 | 5.1 | 14.8 | 0.738 | 60.2 | 21 | 56.9 | | | 1.4079 |
| 5. | 150 | 302 | 4.0 | 18.8 | 0.756 | 55.6 | 22 | 58.1 | | | 1.4188 |
| 6. | 175 | 347 | 4.6 | 23.4 | 0.778 | 50.5 | 25 | 57.3 | | | 1.4301 |
| 7. | 200 | 392 | 4.3 | 27.7 | 0.798 | 45.9 | 29 | 56.5 | | | 1.4417 |
| 8. | 225 | 437 | 4.7 | 32.4 | 0.816 | 41.9 | 32 | 57.7 | | | 1.4514 |
| 9. | 250 | 482 | 4.9 | 37.3 | 0.833 | 38.4 | 34 | 60.5 | | | 1.4617 |
| 10. | 275 | 527 | 7.1 | 44.4 | 0.851 | 34.8 | 38 | 62.7 | | | 1.4722 |
| Stage 2 - Distillation continued at 40 mm. Hg pressure | | | | | | | | | | | |
| 11. | 200 | 392 | 3.1 | 47.5 | 0.869 | 31.4 | 43 | 63.3 | 40 | 5 | 1.4819 |
| 12. | 225 | 437 | 4.8 | 52.3 | 0.878 | 29.7 | 43 | 67.3 | 45 | 20 | 1.4874 |
| 13. | 250 | 482 | 5.7 | 58.0 | 0.892 | 27.1 | 46 | 69.9 | 57 | 45 | 1.4951 |
| 14. | 275 | 527 | 5.5 | 63.5 | 0.905 | 24.8 | 49 | 72.3 | 83 | 65 | 1.5031 |
| 15. | 300 | 572 | 5.8 | 69.3 | 0.915 | 23.2 | 51 | 77.9 | 152 | 85 | 1.5109 |
| Residuum | | | 27.8 | 97.1 | 0.982 | 12.6 | | | | | |

Carbon residue of residuum: 10.9%  Carbon residue of crude: 3.5%

## APPROXIMATE SUMMARY

| | Percent by Vol. | Specific Gravity | Degrees A.P.I. | Viscosity S.U. 100°F. |
|---|---|---|---|---|
| Light gasoline | 9.7 | 0.688 | 74.2 | |
| Total gasoline and naphtha | 27.7 | 0.739 | 60.0 | |
| Kerosine distillate | 4.7 | 0.816 | 41.9 | |
| Gas oil | 19.6 | 0.855 | 34.0 | |
| Nonviscous lubricating distillate | 10.2 | 0.884-0.908 | 28.6-24.3 | 50-100 |
| Medium lubricating distillate | 7.1 | 0.908-0.920 | 24.3-22.3 | 100-200 |
| Viscous lubricating distillate | - | - | - | Above 200 |
| Residuum | 27.8 | 0.982 | 12.6 | |
| Distillation loss | 2.9 | | | |

Remarks: The sample as received contained 0.8% by vol. water and sediment (by centrifuge) and 320 lb. salt (as NaCl) per 1000 bbl.

## OIL FIELD DATA

Field and Pool: West Routledge

Location: Twp. 9, Rge. 25, W.P.M.

DISCOVERY DETAILS

Well: Name: Calstan West Routledge Prov. 4-20-9-25

Completed: April 1954

Perforated: 2097-2102

Treatment: Acidized

GEOLOGY

Producing Zone(s): Upper & Lower Virden, Scallion Member, Miss. Lodgepole

Trap Type: Stratigraphic

Lithology: Limestone

Maximum Reservoir Thickness: 39

DEVELOPMENT DATA

Well Spacing: 40 Acres

Logging Practice: E: MLL, INDE, Sonic GR. R.A. logs

Completion Practice: Production String Through Pay Zones. Acid Stimulation. Selective Treatment.

RESERVOIR DATA

Type of Drive: Water

Estimated Oil in Place: 15 MM S.T.bbls

Estimated Recoverable Oil: 3 MM S.T.bbls

Oil Zone Thickness: Average: 7.7' Crinoidal; 10.3' Oolitic; 13.2' Cherty

Porosity: 10.3%

Area: 2000 Acres

Oil Characteristics: Gravity: 0.849 (35.2 °API). Sulphur: 1.37%.

Pour Point: -30°F.

PRODUCTION

MPR: 60 BOPD

Market Outlet (pipeline): Cromer I.P.L.

# CRUDE PETROLEUM ANALYSIS

Laboratory Number 356-59

FIELD: West Routledge

POOL:

ZONE: Lodgepole

Well Name: Hopco Vanderschaeghe 14-17
Location: Lsd.14, Sec.17, Twp. 9, Rge. 25; W. 1st

Interval tested, depth, feet: 2087-2116
Producing Zone: Lodgepole
Geological Age: Mississippian

Province: Manitoba
Sample From: Manitoba Dept. of Mines and Natural Resources
Date Sampled: June 25, 1959
Sampled at: Wellhead

## GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.849
Sulphur, percent by weight: 1.37
Saybolt Universal Viscosity:
at 100°F., sec. 42
at °F., sec.

A.P.I. gravity at 60°F.: 35.2
Pour point, °F.: -30
Colour: Black
Carbon residue, percent by weight: 3.3
(Conradson)

## DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 757 mm. Hg
First drop, 29°C. (84°F.)

| Fraction No. | Cut at °C. | Cut at °F. | Per Cent | Sum Per Cent | Specific Gravity 60°F. | Degrees A.P.I. 60°F. | Correlation Index | Aniline Point, °C. | Viscosity S.U. 100°F. | Cloud Test, °F. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 50 | 122 | 2.5 | 2.5 | 0.661 | 82.6 | - | - | | |
| 2. | 75 | 167 | 2.9 | 5.4 | 0.672 | 79.1 | 8 | - | | |
| 3. | 100 | 212 | 4.9 | 10.3 | 0.713 | 67.0 | 18 | 58.0 | | |
| 4. | 125 | 257 | 4.4 | 14.7 | 0.738 | 60.2 | 21 | 59.0 | | |
| 5. | 150 | 302 | 4.5 | 19.2 | 0.754 | 56.2 | 21 | 61.5 | | |
| 6. | 175 | 347 | 4.2 | 23.4 | 0.772 | 51.8 | 23 | 60.4 | | |
| 7. | 200 | 392 | 4.2 | 27.6 | 0.793 | 46.9 | 26 | 60.4 | | |
| 8. | 225 | 437 | 4.7 | 32.3 | 0.811 | 43.0 | 29 | 60.5 | | |
| 9. | 250 | 482 | 5.5 | 37.8 | 0.828 | 39.4 | 32 | 62.6 | | |
| 10. | 275 | 527 | 7.1 | 44.9 | 0.846 | 35.8 | 36 | 64.6 | | |
| Stage 2 - Distillation continued at 40 mm. Hg pressure | | | | | | | | | | |
| 11. | 200 | 392 | 3.6 | 48.5 | 0.865 | 32.1 | 41 | 64.8 | 39 | 10 |
| 12. | 225 | 437 | 6.0 | 54.5 | 0.876 | 30.0 | 42 | 67.0 | 46 | 20 |
| 13. | 250 | 482 | 5.5 | 60.0 | 0.891 | 27.3 | 46 | 70.2 | 10 | 40 |
| 14. | 275 | 527 | 5.5 | 65.5 | 0.904 | 25.0 | 49 | 73.0 | 92 | 65 |
| 15. | 300 | 572 | 6.0 | 71.5 | 0.913 | 23.5 | 50 | 78.2 | 174 | 90 |
| Residuum | | | 26.0 | 97.5 | 0.984 | 12.3 | | | | |

Carbon residue of residuum: 10.8%  Carbon residue of crude: 3.3%

## APPROXIMATE SUMMARY

| | Percent by Vol. | Specific Gravity | Degrees A.P.I. | Viscosity S.U. 100°F. |
|---|---|---|---|---|
| Light gasoline | 10.3 | 0.689 | 73.9 | |
| Total gasoline and naphtha | 27.6 | 0.736 | 60.7 | |
| Kerosine distillate | 4.7 | 0.811 | 43.0 | |
| Gas oil | 20.8 | 0.851 | 34.8 | |
| Nonviscous lubricating distillate | 10.3 | 0.880-0.904 | 29.3-25.0 | 50-100 |
| Medium lubricating distillate | 7.0 | 0.904-0.915 | 25.0-23.1 | 100-200 |
| Viscous lubricating distillate | 1.1 | 0.915-0.917 | 23.1-22.8 | Above 200 |
| Residuum | 26.0 | 0.984 | 12.3 | |
| Distillation loss | 2.5 | | | |

## OIL FIELD DATA

Field and Pool: Whitewater

Location: Twp. 3, Rge. 21, W.P.M.

DISCOVERY DETAILS

Well: Name: Calstan Whitewater 12-16-3-21

Completed: September 1953; Open Hole

Treatment: Sandfrac

GEOLOGY

Producing Zone(s): Lodgepole: Upper Whitewater Lake

Trap Type: Minor Fold

Lithology: Limestone

DEVELOPMENT DATA

Total Wells: Completed Oil, 6; Dry and Abandoned, 7;

Producing Oil, 5; Suspended Oil, 1.

Well Spacing: 40 Acres

Logging Practice: E, MLL

Completion Practice: Open Hole

RESERVOIR DATA

Type of Drive: Solution Gas

Estimated Oil in Place: 3.3 MM S.T.bbls

Estimated Recoverable Oil: 0.33 MM S.T.bbls

Oil Zone Thickness: Average: 22.6

Porosity: 12.8%

Area: 240 Acres

Oil Characteristics: Gravity: 0.859 (33.2 $^{o}$API). Sulphur: 1.00%.

Pour Point: -70$^{o}$F.

PRODUCTION

MPR: 45 BOPD

Market Outlet (pipeline): Cromer

# CRUDE PETROLEUM ANALYSIS

Laboratory Number 2340-54

FIELD: Whitewater

POOL:

ZONE: Lodgepole

Well Name: Calstan Whitewater No. 12-16
Location: Lsd.12, Sec.16, Twp.3, Rge.21, W.P.M.

Interval tested, depth, feet: 2506-2539
Producing Zone: Lodgepole
Geological Age: Mississippian

Province: Manitoba
Sample From: Manitoba Dept. of Mines and Natural Resources
Date Sampled: August 26, 1954
Sampled at: Tank

## GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.859
Sulphur, percent by weight: 1.00
Saybolt Universal Viscosity:
at 100°F., sec. 46
at °F., sec.

A.P.I. gravity at 60°F.: 33.2
Pour point, °F.: Below -70
Colour: Brownish Black
Carbon residue, percent by weight: 4.7 (Conradson)

## DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 759 mm. Hg
First drop, 27°C. (81°F.)

| Fraction No. | Cut at °C. | Cut at °F. | Per Cent | Sum Per Cent | Specific Gravity 60°F. | Degrees A.P.I. 60°F. | Correlation Index | Aniline Point, °C. | Visc. S.U. 100°F. | Cloud Test, °F. | Refractive Index 20°C. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 50 | 122 | 2.1 | 2.1) | | | | | | | |
| 2. | 75 | 167 | 3.2 | 5.3) | 0.674 | 78.4 | - | | | | - |
| 3. | 100 | 212 | 4.9 | 10.2 | 0.718 | 65.6 | 20 | 55.2 | | | 1.4007 |
| 4. | 125 | 257 | 5.4 | 15.6 | 0.743 | 58.9 | 23 | 53.9 | | | 1.4021 |
| 5. | 150 | 302 | 4.8 | 20.4 | 0.764 | 53.7 | 26 | 53.6 | | | 1.4226 |
| 6. | 175 | 347 | 4.4 | 24.8 | 0.782 | 49.4 | 27 | 54.0 | | | 1.4331 |
| 7. | 200 | 392 | 4.5 | 29.3 | 0.800 | 45.4 | 30 | 54.6 | | | 1.4431 |
| 8. | 225 | 437 | 4.5 | 33.8 | 0.818 | 41.5 | 33 | 57.3 | | | 1.4529 |
| 9. | 250 | 482 | 5.0 | 38.8 | 0.830 | 39.0 | 33 | 60.5 | | | 1.4612 |
| 10. | 275 | 527 | 6.5 | 45.3 | 0.846 | 35.8 | 36 | 63.8 | | | 1.4702 |
| Stage 2 - Distillation continued at 40 mm. Hg pressure | | | | | | | | | | | |
| 11. | 200 | 392 | 3.9 | 49.2 | 0.863 | 32.5 | 40 | 66.0 | 40 | 10 | 1.4799 |
| 12. | 225 | 437 | 7.0 | 56.2 | 0.872 | 30.8 | 40 | 70.9 | 48 | 35 | 1.4849 |
| 13. | 250 | 482 | 4.7 | 60.9 | 0.885 | 28.4 | 43 | 76.5 | 66 | 60 | 1.4922 |
| 14. | 275 | 527 | 4.9 | 65.8 | 0.894 | 26.8 | 44 | 79.9 | 95 | 80 | 1.4983 |
| 15. | 300 | 572 | 5.1 | 70.9 | 0.902 | 25.4 | 45 | 84.2 | 158 | 95 | 1.5048 |
| Residuum | | | 27.6 | 98.5 | 0.991 | 11.3 | | | | | |

Carbon residue of residuum: 14.8% Carbon residue of crude: 4.7%

## APPROXIMATE SUMMARY

| | Percent by Vol. | Specific Gravity | Degrees A.P.I. | Viscosity S.U. 100°F. |
|---|---|---|---|---|
| Light gasoline | 10.2 | 0.695 | 72.1 | |
| Total gasoline and naphtha | 29.3 | 0.744 | 58.7 | |
| Kerosine distillate | 4.5 | 0.818 | 41.5 | |
| Gas oil | 19.5 | 0.850 | 35.0 | |
| Nonviscous lubricating distillate | 10.4 | 0.873-0.894 | 30.6-26.8 | 50-100 |
| Medium lubricating distillate | 7.2 | 0.894-0.906 | 26.8-24.7 | 100-200 |
| Viscous lubricating distillate | - | - | - | Above 200 |
| Residuum | 27.6 | 0.991 | 11.3 | |
| Distillation loss | 1.5 | | | |

Remarks: The sample as received contained a trace of water and sediment (by centrifuge) and 29 lb. salt (as NaCl) per 1000 bbl.

# CRUDE PETROLEUM ANALYSIS

Laboratory Number 410-63

FIELD: Wildcat

POOL:

ZONE: MC-1

Well Name: Kissinger et al., Pierson Prov. 14-20-2-28
Location: Lsd.14, Sec.20, Twp.2, Rge.28, W.P.M.

Interval tested, depth, feet: 3250
Producing Zone: MC-1
Geological Age: Mississippian

Province: Manitoba
Sample From: Manitoba Dept. of Mines and Natural Resources
Date Sampled: October 17, 1963
Sampled at: After Separator

## GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.844
Sulphur, percent by weight: 0.77
Saybolt Universal Viscosity
at 77°F., sec. 94
at 100°F., sec. 65

A.P.I. gravity at 60°F.: 36.2
Pour point, °F.: 50
Colour: Black
Carbon residue, percent by weight: 4.5 (Conradson)

## DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 761 mm. Hg
First drop, 35°C. (95°F.)

| Fraction No. | Cut at °F. | Sum Per Cent | Specific Gravity 60/60°F. | Degrees A.P.I. °60 F. | Correlation 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 | 0.654 | 84.9 | - | - | | | 1.3892 | 75.4 |
| 2. | 167 | 5.0 | 0.677 | 77.5 | 11 | - | | | 1.3923 | 79.6 |
| 3. | 212 | 10.9 | 0.711 | 67.5 | 17 | 55.0 | | | 1.4021 | 83.5 |
| 4. | 257 | 17.8 | 0.743 | 58.9 | 23 | 51.9 | | | 1.4155 | 86.3 |
| 5. | 302 | 23.5 | 0.764 | 53.7 | 26 | 51.4 | | | 1.4258 | 90.0 |
| 6. | 347 | 28.4 | 0.782 | 49.5 | 27 | 52.9 | | | 1.4343 | 93.7 |
| 7. | 392 | 33.5 | 0.796 | 46.3 | 28 | 56.1 | | | 1.4422 | 97.5 |
| 8. | 437 | 38.3 | 0.809 | 43.4 | 28 | 59.8 | | | 1.4489 | 99.8 |
| 9. | 482 | 42.8 | 0.821 | 40.9 | 29 | 64.2 | | | 1.4558 | 103.6 |
| 10. | 527 | 49.3 | 0.837 | 37.6 | 32 | 67.0 | | | 1.4648 | 107.6 |
| Stage 2 - Distillation continued at 40 mm. Hg pressure | | | | | | | | | | |
| 11. | 392 | 54.6 | 0.854 | 34.2 | 36 | 70.2 | 43 | 10 | 1.4738 | 110.5 |
| 12. | 437 | 58.9 | 0.863 | 32.5 | 36 | 74.2 | 49 | 30 | 1.4788 | 112.5 |
| 13. | 482 | 63.6 | 0.872 | 30.8 | 37 | 79.8 | 55 | 50 | 1.4843 | 116.0 |
| 14. | 527 | 68.2 | 0.882 | 28.9 | 39 | 83.4 | 76 | 70 | 1.4907 | 125.0 |
| 15. | 572 | 73.8 | 0.892 | 27.1 | 40 | 87.9 | 130 | 90 | 1.4988 | 130.4 |
| Residuum | | 98.3 | 0.983 | 12.5 | | | | | | |

Carbon residue of residuum: 15.6%  Carbon residue of crude: 4.5%

## APPROXIMATE SUMMARY

| | Percent by Vol. | Specific Gravity | Degrees A.P.I. | Viscosity S.U. 100°F. |
|---|---|---|---|---|
| Light gasoline | 10.9 | 0.692 | 73.0 | |
| Total gasoline and naphtha | 33.5 | 0.744 | 58.7 | |
| Kerosine distillate | 9.3 | 0.815 | 42.1 | |
| Gas oil | 14.8 | 0.848 | 35.4 | Below 50 |
| Nonviscous lubricating distillate | 10.5 | 0.865-0.886 | 32.1-28.2 | 50-100 |
| Medium lubricating distillate | 5.7 | 0.886-0.898 | 28.2-26.1 | 100-200 |
| Viscous lubricating distillate | - | - | - | Above 200 |
| Residuum | 24.5 | 0.983 | 12.5 | |
| Distillation loss | 1.7 | - | - | |

# CRUDE PETROLEUM ANALYSIS

Laboratory Number 192-61

FIELD: Wildcat

POOL:

ZONE: Mission Canyon 3

Well Name: Kissinger et al., Pierson Prov. 14-20-2-28
Location: Lsd.14, Sec.20, Twp.2, Rge.28, W.P.M.

Interval tested, depth, feet: 3248-3250
Producing Zone: Mission Canyon 3
Geological Age: Mississipian

Province: Manitoba
Sample From: Manitoba Dept. of Mines and Natural Resources
Date Sampled: July 7, 1961
Sampled at: Tank

## GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.848
Sulphur, percent by weight: 1.07
Saybolt Universal Viscosity:
at 100°F., sec. 43
at °F., sec.

A.P.I. gravity at 60°F.: 35.4
Pour point, °F.: +40
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, 760 mm. Hg
First drop, 30°C. (86°F.)

| Fraction No. | Cut at °F. | Sum Per Cent | Specific Gravity 60/60°F. | Degrees A.P.I. °60 F. | Correlation Index | Aniline Point, °C. | Visc. S.U. 100°F. | Cloud Test, °F. | Refractive Index @ 20° | Dispersion $(N_F - N_C)\ 10^4$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 122 | 1.7 | 0.645 | 87.9 | - | - | | | | |
| 2. | 167 | 4.5 | 0.674 | 78.4 | 9.4 | - | | | | |
| 3. | 212 | 10.1 | 0.716 | 66.1 | 19 | 53.0 | | | | |
| 4. | 257 | 16.4 | 0.746 | 58.2 | 25 | 50.0 | | | | |
| 5. | 302 | 21.9 | 0.764 | 53.7 | 26 | 50.4 | | | | |
| 6. | 347 | 27.4 | 0.780 | 49.9 | 26 | 52.1 | | | | |
| 7. | 392 | 32.1 | 0.794 | 46.7 | 27 | 55.9 | | | | |
| 8. | 437 | 36.9 | 0.808 | 43.6 | 28 | 60.4 | | | | |
| 9. | 482 | 42.3 | 0.820 | 41.1 | 28 | 64.2 | | | | |
| 10. | 527 | 49.4 | 0.835 | 38.0 | 31 | 67.5 | | | | |
| Stage 2 - Distillation continued at 40 mm. Hg pressure | | | | | | | | | | |
| 11. | 392 | 51.9 | 0.852 | 34.6 | 35 | 70.2 | 38 | 10 | | |
| 12. | 437 | 57.0 | 0.859 | 33.2 | 34 | 74.0 | 43 | 30 | | |
| 13. | 482 | 62.5 | 0.869 | 31.3 | 36 | 78.1 | 54 | 55 | | |
| 14. | 527 | 67.9 | 0.881 | 29.1 | 38 | 83.0 | 74 | 70 | | |
| 15 | 572 | 73.6 | 0.890 | 27.5 | 39 | 88.7 | 122 | 90 | | |
| Residuum | | 98.8 | 0.986 | 12.0 | | | | | | |

Carbon residue of residuum: 15.2% Carbon residue of crude: 4.5%

## APPROXIMATE SUMMARY

| | Percent by Vol. | Specific Gravity | Degrees A.P.I. | Viscosity S.U. 100°F. |
|---|---|---|---|---|
| Light gasoline | 10.1 | 0.692 | 73.0 | |
| Total gasoline and naphtha | 32.1 | 0.745 | 58.4 | |
| Kerosine distillate | 10.2 | 0.814 | 42.3 | |
| Gas oil | 15.6 | 0.848 | 35.4 | Below 50 |
| Nonviscous lubricating distillate | 10.3 | 0.866-0.886 | 31.9-28.2 | 50-100 |
| Medium lubricating distillate | 5.4 | 0.886-0.895 | 28.2-26.6 | 100-200 |
| Viscous lubricating distillate | - | - | - | Above 200 |
| Residuum | 25.2 | 0.986 | 12.0 | |
| Distillation loss | 1.2 | - | - | |

# CRUDE PETROLEUM ANALYSIS

Laboratory Number 411-63

FIELD: Wildcat

POOL:

ZONE: MC-1

Well Name: Plaza North Antler 4-34-2-28
Location: Lsd.4, Sec.34, Twp.2, Rge.28, W.P.M.

Interval tested, depth, feet: 3200
Producing Zone: MC-1
Geological Age: Mississippian

Province: Manitoba
Sample From: Manitoba Dept. of Mines and Natural Resources
Date Sampled: October 17, 1963
Sampled at: After Separator

## GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.870
Sulphur, percent by weight: 1.06
Saybolt Universal Viscosity:
at 77°F., sec. 108
at 100°F., sec. 61

A.P.I. gravity at 60°F.: 31.1
Pour point, °F.: 50
Colour: Black
Carbon residue, percent by weight: 6.0 (Conradson)

## DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 758 mm. Hg
First drop, 43°C. (109°F.)

| Fraction No. | Cut at °F. | Sum per Cent | Specific Gravity 60/60°F. | Degrees A.P.I. °60F. | Correlation 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 | 0.5 | 0.675 | 78.1 | | | | | 1.3927 | 71.7 |
| 2. | 167 | 1.5 | 0.697 | 71.5 | 20 | - | | | 1.3914 | 68.9 |
| 3. | 212 | 4.6 | 0.719 | 65.3 | 21 | 55.5 | | | 1.3993 | 79.0 |
| 4. | 257 | 9.4 | 0.740 | 59.7 | 22 | 54.1 | | | 1.4113 | 81.6 |
| 5. | 302 | 15.2 | 0.760 | 54.7 | 24 | 53.4 | | | 1.4213 | 84.1 |
| 6. | 347 | 20.9 | 0.777 | 50.6 | 25 | 54.5 | | | 1.4311 | 88.1 |
| 7. | 392 | 26.2 | 0.794 | 46.7 | 27 | 57.0 | | | 1.4400 | 91.8 |
| 8. | 437 | 31.0 | 0.807 | 43.8 | 27 | 61.0 | | | 1.4476 | 95.8 |
| 9. | 482 | 36.1 | 0.822 | 40.6 | 29 | 64.8 | | | 1.4557 | 100.9 |
| 10. | 527 | 42.6 | 0.837 | 37.6 | 32 | 68.0 | | | 1.4639 | 106.0 |
| Stage 2 - Distillation continued at 40 mm. Hg presssure | | | | | | | | | | |
| 11. | 392 | 48.3 | 0.854 | 34.2 | 36 | 70.6 | 41 | 5 | 1.4738 | 111.7 |
| 12. | 437 | 53.3 | 0.863 | 32.5 | 36 | 75.1 | 51 | 25 | 1.4789 | 113.7 |
| 13. | 482 | 58.2 | 0.872 | 30.8 | 37 | 80.0 | 55 | 55 | 1.4843 | 118.7 |
| 14. | 527 | 63.8 | 0.883 | 28.8 | 39 | 84.7 | 78 | 75 | 1.4914 | 121.3 |
| 15. | 572 | 70.3 | 0.893 | 27.0 | 41 | 90.1 | 138 | 95 | 1.5007 | 126.8 |
| Residuum | | 99.7 | 0.994 | 10.9 | | | | | | |

Carbon residue of residuum: 17.9% Carbon residue of crude: 6.0%

## APPROXIMATE SUMMARY

| | Percent by Vol. | Specific Gravity | Degrees A.P.I. | Viscosity S.U. 100°F. |
|---|---|---|---|---|
| Light gasoline | 4.6 | 0.709 | 68.1 | |
| Total gasoline and naphtha | 26.2 | 0.758 | 55.2 | |
| Kerosine distillate | 9.9 | 0.815 | 42.1 | Below 50 |
| Gas oil | 14.1 | 0.847 | 35.6 | 50-100 |
| Nonviscous lubricating distillate | 13.0 | 0.862-0.887 | 32.7-28.0 | 100-200 |
| Medium lubricating distillate | 7.1 | 0.887-0.889 | 28.0-25.9 | Above 200 |
| Viscous lubricating distillate | - | - | - | |
| Residuum | 29.4 | 0.944 | 10.9 | |
| Distillation loss | 0.3 | - | - | |

## OIL FIELD DATA

Field and Pool: Woodnorth

Location: Twp. 8, Rge. 27, W.P.M.

DISCOVERY DETAILS

Well: Name: B.A. CDN. SUP. WOODNORTH 3-33-8-27

Completed: April 1954; Open Hole

Perforated: No

Treatment: No

GEOLOGY

Producing Zone(s): Lodgepole (Daly Member Approx.)

Trap Type: Dome

Lithology: Limestone (Crinoidal)

Maximum Reservoir Thickness: 15 feet

DEVELOPMENT DATA

Total Wells: Completed Oil, 16; Dry and Abandoned: 3 dry, 8 Abd. 'P';

Producing Oil, 7;

Injection or Disposal: Water, 2.

Well Spacing: 40 Acres

Logging Practice: E: GRN

Completion Practice: Open Hole; Acid Treatment

RESERVOIR DATA

Type of Drive: Water

Estimated Oil in Place: 3.2 MM S.T.bbls

Estimated Recoverable Oil: 800 M S.T.bbls

Oil Zone Thickness: Maximum: 15; Average: 8.3

Porosity: 8.6%

Area: 800 Acres

Oil Characteristics: Gravity: 0.857 (33.6 $^{o}$API). Sulphur: 1.02%.

Pour Point: -50$^{o}$F.

PRODUCTION

MPR: 45 BOPD

Market Outlet (pipeline): Cromer I.P.L.

# CRUDE PETROLEUM ANALYSIS

Laboratory Number 128-55

FIELD: Woodnorth

POOL:

ZONE: Lodgepole

Well Name: B.A. - Union Woodnorth No. 15-28
Location: Lsd.15, Sec.28, Twp.8, Rge.27, W.P.M.

Interval tested, depth, feet: 2476-2480
Producing Zone: Lodgepole
Geological Age: Mississippian

Province: Manitoba
Sample From: Manitoba Dept. of Mines and Natural Resources
Date Sampled: May 26, 1955
Sampled at: Tank

## GENERAL CHARACTERISTICS

Specific gravity at 60°F.: 0.857
Sulphur, percent by weight: 1.02
Saybolt Universal Viscosity:
at 100°F., sec. 44
at °F., sec.

A.P.I. gravity at 60°F.: 33.6
Pour point, °F.: Below -50
Colour: Brownish Black
Carbon residue, percent by weight: 3.0 (Conradson)

## DISTILLATION

(U.S. Bureau of Mines Routine Method)

Stage 1 - Distillation at atmospheric pressure, 758 mm. Hg
First drop, 28°C. (82°F.)

| Fraction No. | Cut at °C. | Cut at °F. | Per Cent | Sum Per Cent | Specific Gravity 60°F. | Degrees A.P.I. 60°F. | Correlation Index | Aniline Point, °C. | Visc. S.U. 100°F. | Cloud Test, °F. | Refractive Index 20°C. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 50 | 122 | | | | | | | | | |
| 2. | 75 | 167 | 5.1 | 5.1 | 0.672 | 79.1 | - | 59.3 | | | 1.3958 |
| 3. | 100 | 212 | 4.7 | 9.8 | 0.711 | 67.5 | 17 | 57.4 | | | 1.3989 |
| 4. | 125 | 257 | 5.5 | 15.3 | 0.736 | 60.7 | 20 | 58.0 | | | 1.4080 |
| 5. | 150 | 302 | 5.1 | 20.4 | 0.753 | 56.4 | 20 | 59.4 | | | 1.4173 |
| 6. | 175 | 347 | 4.1 | 24.5 | 0.772 | 51.8 | 23 | 59.6 | | | 1.4281 |
| 7. | 200 | 392 | 4.5 | 29.0 | 0.793 | 46.9 | 26 | 58.8 | | | 1.4398 |
| 8. | 225 | 437 | 4.9 | 33.0 | 0.811 | 43.0 | 29 | 59.3 | | | 1.4501 |
| 9. | 250 | 482 | 5.8 | 39.7 | 0.829 | 39.2 | 32 | 60.8 | | | 1.4603 |
| 10. | 275 | 527 | 6.9 | 46.6 | 0.847 | 35.6 | 36 | 63.0 | | | 1.4711 |
| Stage 2 - Distillation continued at 40 mm. Hg pressure | | | | | | | | | | | |
| 11. | 200 | 392 | 3.2 | 49.8 | 0.886 | 31.9 | 41 | 64.5 | 40 | 5 | 1.4818 |
| 12. | 225 | 437 | 5.7 | 55.5 | 0.876 | 30.0 | 42 | 67.4 | 45 | 20 | 1.4871 |
| 13. | 250 | 482 | 4.3 | 59.8 | 0.890 | 27.5 | 46 | 70.5 | 59 | 40 | 1.4953 |
| 14. | 275 | 527 | 4.9 | 64.7 | 0.903 | 25.2 | 49 | 73.3 | 85 | 55 | 1.5028 |
| 15. | 300 | 572 | 5.8 | 70.5 | 0.911 | 23.8 | 49 | 77.4 | 148 | 75 | 1.5100 |
| Residuum | | | 26.2 | 96.7 | 0.977 | 13.3 | | | | | |

Carbon residue of residuum: 10.1%  Carbon residue of crude: 3.0%

## APPROXIMATE SUMMARY

| | Percent by Vol. | Specific Gravity | Degrees A.P.I. | Viscosity S.U. 100°F. |
|---|---|---|---|---|
| Light gasoline | 9.8 | 0.691 | 73.3 | |
| Total gasoline and naphtha | 29.0 | 0.738 | 60.2 | |
| Kerosine distillate | 4.9 | 0.811 | 43.0 | |
| Gas oil | 20.6 | 0.851 | 34.8 | |
| Nonviscous lubricating distillate | 9.0 | 0.881-0.905 | 29.1-24.8 | 50-100 |
| Medium lubricating distillate | 7.0 | 0.905-0.915 | 24.8-23.1 | 100-200 |
| Viscous lubricating distillate | - | - | - | Above 200 |
| Residuum | 26.2 | 0.977 | 13.3 | |
| Distillation loss | 3.3 | | | |

Remarks: The sample as received contained 0.2% by vol. water and sediment (by centrifuge) and 8 lb. salt (as NaCl) per 1000 bbl.