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DWIGHT H. GREEN, *Governor*
DEPARTMENT OF REGISTRATION AND EDUCATION
FRANK G. THOMPSON, *Director*

DIVISION OF THE
STATE GEOLOGICAL SURVEY
M. M. LEIGHTON, *Chief*
URBANA

REPORT OF INVESTIGATIONS — No. 88

CHEMICAL CHARACTERISTICS OF ILLINOIS
CRUDE OILS WITH A DISCUSSION OF
THEIR GEOLOGIC OCCURRENCE

BY

O. W. REES, P. W. HENLINE, AND A. H. BELL



PRINTED BY AUTHORITY OF THE STATE OF ILLINOIS

URBANA, ILLINOIS

1943

ILLINOIS STATE GEOLOGICAL SURVEY



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Topographic Mapping in Cooperation with the United States Geological Survey.
This Report is a Contribution of the Analytical Division.

CONTENTS

| | PAGE |
|--|------|
| Geologic occurrence | 7 |
| Methods of analysis | 7 |
| Specific gravity | 7 |
| Viscosity | 7 |
| Carbon residue | 16 |
| Pour point | 16 |
| Cloud point | 16 |
| Moisture in petroleum | 16 |
| Sulfur | 16 |
| Fractional distillation | 16 |
| Correlation index | 17 |
| Characterization factor | 19 |
| Results | 19 |
| Discussion | 19 |
| General characteristics of Illinois crude oils | 19 |
| General characteristics as related to geologic age of the producing strata | 21 |
| Correlation of sulfur content with geographic location | 24 |
| Bibliography | 24 |
| Appendix—Chemical analyses of Illinois crude oils | 37 |

TABLES

| | PAGE |
|--|-------|
| 1. Geologic column for southern Illinois | 8 |
| 2. Oil and gas producing strata in Illinois | 9-15 |
| 3. Analytical data for crude oils arranged according to geologic age of producing strata . . . | 29-36 |

ILLUSTRATIONS

| FIGURE | PAGE |
|---|------|
| 1. Gasoline yields as related to boiling point | 18 |
| 2. Chemical characteristics of Illinois crude oils as shown by correlation index numbers | 20 |
| 3. Chemical characteristics of Illinois crude oils as shown by characterization factors | 22 |
| 4. Average chemical characteristics of Illinois crude oils from different producing formations | 23 |
| 5. Sulfur content of Illinois crude oils, distributed by counties | 25 |
| 6. Oil and gas fields of Illinois, as of November, 1942 | 26 |

CHEMICAL CHARACTERISTICS OF ILLINOIS CRUDE OILS WITH A DISCUSSION OF THEIR GEOLOGIC OCCURRENCE

BY

O. W. REES, P. W. HENLINE, and A. H. BELL

THROUGH THE DISCOVERY and development of new fields, the annual production of crude oil in Illinois has increased rapidly in the last few years until in 1940 it reached approximately 147,647,000 barrels or nearly four and one-half times the 1908 peak of 33,686,000 barrels. In 1942 Illinois produced 106,590,000 barrels of crude oil. With this production Illinois ranked fifth as a major petroleum-producing state. As the petroleum industry is of such importance in this State, and as the war has created an urgent demand for crude oils especially suited for the production of high-octane gasoline, toluene, and synthetic rubber, this report has been prepared which deals rather comprehensively with the chemical characteristics of Illinois crude oils, together with a discussion of their geologic occurrence.

GEOLOGIC OCCURRENCE

All of the oil so far produced in Illinois is from rocks of Paleozoic age. In the order of descending amount of total production the oil-producing strata are in the following systems, first Mississippian, second Pennsylvanian, third Devonian, and fourth Ordovician. In the old fields of Illinois, Pennsylvanian sandstones produced more than half of the oil, whereas in the new fields Mississippian sandstones and limestones are far in the lead. The Ordovician system has been of minor importance in both old and new fields. Devonian limestone was of minor importance in the old fields but has yielded substantial quantities of oil in some new fields. Table 1 shows the geologic column

for southern Illinois, and Table 2 lists the oil- and gas-producing strata in Illinois. Figure 6 is a map of the oil and gas fields of Illinois showing old and new fields.

METHODS OF ANALYSIS

Most of the data presented herein are based on analyses made in the University of Illinois analytical laboratory and the State Geological Survey laboratories. For the most part these analyses were made according to standard procedures of the American Society for Testing Materials (1)* and the U. S. Bureau of Mines (2). In this connection a brief discussion of tests commonly made on petroleum and the significance of these tests seem appropriate.

1. *Specific gravity*.—Specific gravity of petroleum may be determined by the use of hydrometers, picnometers, or the Westphal balance. The last is commonly used in this laboratory. Values are ordinarily reported in terms of A. P. I. gravity, the lower values indicating heavier crude oils containing a preponderance of higher boiling, higher molecular weight compounds, while the higher values indicate lighter crude oils containing a preponderance of lower boiling, lower molecular weight compounds. The specific gravity value gives information on the general character of the crude oil.

2. *Viscosity*.—Viscosity of petroleum may be determined by several different

* Italic numbers in parentheses refer to bibliography, p. 24.

TABLE 1.—GEOLOGIC COLUMN FOR SOUTHERN ILLINOIS

| System or Series | Group or Formation, and Lithology* |
|--|---|
| Pleistocene | Glacial drift and loess |
| Pliocene | Chert gravel |
| Eocene | Sand and clay } Southern tip of State |
| Cretaceous |  | Sand and clay } |
| Pennsylvanian | McLeansboro group — sh., ss., thin ls., and coal Carbondale group — sh., ls., ss., coal Tradewater group — ss., sh., and thin coal Caseyville group — ss., sh., and thin coal |
| Chester (Upper Mississippian) series | Kinkaid — ls., sh. Degonia — ss. Clare — ls., sh. Palestine — ss. Menard — ls., sh. Waltersburg — ss. Vienna — ls., sh. Tar Springs — ss. Glen Dean — ls., sh. Hardinsburg — ss. Golconda — ls., sh. Cypress — ss. Paint Creek — ls., sh. Bethel — ss. Renault — ls., sh., ss. Aux Vases — ss. |
| Iowa (Lower Mississippian) series | Ste. Genevieve — ls. } Levias — ls. } Rosiclare—ss. } Fredonia — ls. St. Louis — ls. Salem — ls. Warsaw — ls. } Keokuk — ls. } Burlington — ls. } Fern Glen — ls. } Kinderhook — sh., ls., ss. |
| Mississippian and Devonian | Chattanooga — New Albany sh. |
| Devonian | Limestone } (formations undifferentiated) Dolomite } |
| Silurian | |
| Ordovician | Maquoketa—sh. Kimmswick — ls. Plattin — ls. Joachim — ls. St. Peter — ss. |
| Pre-St. Peter | Unidentified |

*ls.—limestone; ss.—sandstone; sh.—shale

TABLE 2.—OIL AND GAS PRODUCING STRATA IN ILLINOIS

| System or Series | Group or Formation | Producing Strata ^o | Pool | County | Approximate depth, feet |
|--------------------------------------|----------------------------------|-------------------------------|----------------------|-------------------|-------------------------|
| Pennsylvanian system | McLeansboro group | Upper Siggins gas | Siggins | Cumberland, Clark | 370 |
| | Carbondale group | Bellair 500 | Bellair | Crawford, Jasper | 560 |
| | | Casey | Casey | Clark | 450 |
| | | Dykstra | Junction City | Marion | 510 |
| | | Wilson | " | " | 610 |
| | | Claypool | North Johnson | Clark | 420 |
| | | Lower Siggins | Siggins | Cumberland, Clark | 560 |
| | | Upper Partlow | South Johnson | Clark | 490 |
| | Tradewater and Caseyville groups | Bridgeport | Albion | Edwards | 1570 |
| | | Biehl and Jordan | Allendale | Wabash | 1450 |
| | | Bellair 800 | Bellair | Crawford, Jasper | 800 |
| | | Pennsylvanian | Carlville* | Macoupin | 380 |
| | | " | Carlville North | " | 435 |
| | | " | Gillespie-Benld gas* | " | 540 |
| | | " | Gillespie-Wyen | " | 670 |
| | | " | Herald | White | 1500 |
| | | " | Inman East | Gallatin | 780 |
| | | " | Jacksonville gas* | Morgan | 250 |
| | | Biehl | Keensburg Consol. | Wabash | 1740 |
| | | Bridgeport | Lawrence | Lawrence | 903-950 |
| | | Buchanan | " | " | 1250 |
| | | " | Lawrence South | " | 1370 |
| | | Pennsylvanian | Litchfield* | Montgomery | 660 |
| | | Robinson | Main, Birds, etc. | Crawford | 900-1000 |
| | | Pennsylvanian | Maunie | White | 1315 |
| | | " | Maunie South | " | 1400 |
| | | Biehl | Mt. Carmel | Wabash | 1490 |
| | | Pennsylvanian | New Bellair | Crawford | 1175 |
| | | Biehl | New Harmony Consol. | White | 1880 |
| | | " | Patton | Wabash | 1470 |
| | | Pennsylvanian | Plainview | Macoupin | 400 |
| | | " | Raymond | Montgomery | 600 |
| Buchanan | | Ruark | Lawrence | 1510 | |
| Bridgeport | | Russelville gas | " | 730 | |
| Buchanan | | " | " | 1090 | |
| Lower Partlow | | South Johnson | Clark | 600 | |
| Pennsylvanian | Spanish Needle Creek* | Macoupin | 300 | | |
| " | Staunton gas* | " | 460 | | |
| " | Waggoner | Montgomery | 610 | | |
| Petro | Wamac | Marion, Clinton, Washington | 720 | | |
| Pennsylvanian | Warrenton-Borton | Edgar | 160 | | |
| " | Westfield | Clark | 290 | | |
| Chester (Upper Mississippian) series | Degonia ss. | Degonia | Epworth | White | 2090 |
| | | " | Maunie South | " | 1905 |
| | | " | Phillipstown | " | 2000 |
| | Clore fm. | Clore | Epworth | White | 2070 |
| | | " | Inman East | Gallatin | 1725 |
| | | " | Keensburg Consol. | Wabash | 1760 |
| | | " | Phillipstown | White | 2020 |
| | Palestine ss. | Palestine | Epworth | White | 2100 |
| | | " | Inman | Gallatin | 1830 |
| | | " | Inman East | " | 1840 |
| | | " | Keensburg Consol. | Wabash | 1830 |
| | | " | Maunie | White | 2010 |
| " | | Maunie South | " | 2020 | |
| " | | Mt. Carmel | Wabash | 1540 | |
| " | Omaha | Gallatin | 1670 | | |
| " | Phillipstown | White | 2050 | | |

^o Sandstones unless otherwise noted.

* Abandoned.

ILLINOIS CRUDE OILS

TABLE 2—OIL AND GAS PRODUCING STRATA IN ILLINOIS—Continued

| System or Series | Group or Formation | Producing Strata ^o | Pool | County | Approximate depth, feet |
|--------------------------------------|--------------------|-------------------------------|---------------------|-----------------|-------------------------|
| Chester (Upper Mississippian) series | Waltersburg ss. | Waltersburg | Albion | Edwards | 2370 |
| | | " | Allendale | Wabash | 1540 |
| | | " | Inman East | Gallatin | 1980 |
| | | " | Junction | " | 1760 |
| | | " | Maud | Wabash | 1920 |
| | | " | Maunie South | White | 2210 |
| | | " | New Harmony Consol. | " | 2150 |
| | | " | New Harmony South | " | 2220 |
| | | " | Roland | White, Gallatin | 2170 |
| | " | Samsville | Edwards | 2400 | |
| | " | Storms | White | 2230 | |
| | Tar Springs ss. | Tar Springs | Allendale | Wabash | 1610 |
| | | " | Ava-Campbell Hill* | Jackson | 560 |
| | | " | Benton | Franklin | 2110 |
| | | " | Centerville East | White | 2475 |
| | | " | Flora | Clay | 2320 |
| | | " | Herald | White | 2260 |
| | | " | Inman East | Gallatin | 2080 |
| | | " | Iron | White | 2420 |
| | | " | Keensburg Consol. | Wabash | 2090 |
| | | " | Maunie | White | 2190 |
| | | " | Maunie South | " | 2260 |
| | | " | Mt. Carmel West | Wabash | 1950 |
| | | " | New Harmony Consol. | White | 2200 |
| | | " | New Harmony South | " | 2350 |
| | | " | New Haven | " | 2110 |
| | | " | Omaha | Gallatin | 1880 |
| | | " | Phillipstown | White | 2290 |
| | " | Roland | White, Gallatin | 2240 | |
| | " | Sailor Springs | Clay | 2330 | |
| | " | Stokes | White | 2295 | |
| | " | Storms | " | 2300 | |
| | " | Walpole | Hamilton | 2465 | |
| " | West Frankfort | Franklin | 2040 | | |
| Hardinsburg ss. | Hardinsburg | Iron | White | 2710 | |
| | | New Haven | " | 2350 | |
| Golconda ls. | Golconda ls. | St. James | Fayette | 1490 | |
| Cypress ss. | Cypress | Akin | Franklin | 2840 | |
| | " | Allendale | Wabash | 1920 | |
| | " | Ava-Campbell Hill* | Jackson | 780 | |
| | Carlyle | Bartelso | Clinton | 980 | |
| | Bellair 900 | Bellair | Crawford, Jasper | 890 | |
| | Cypress | Bible Grove | Clay | 2490 | |
| | " | Brown | Marion | 1640 | |
| | Carlyle | Carlyle | Clinton | 1030 | |
| | Cypress | Centerville East | White | 2915 | |
| | Weiler | Centralia | Clinton, Marion | 1200 | |
| | Weiler | Clay City Consol. | Clay, Wayne | 2670 | |
| | Cypress | Cowling | Edwards | 2620 | |
| | " | Dale-Hoodville Consol. | Hamilton | 2680 | |
| | " | Dundas Consol. | Richland, Jasper | 2490 | |
| | Weiler | Flora | Clay | 2600 | |
| | Carlyle | Frogtown* | Clinton | 950 | |
| | " | Grayville West | White | 2870 | |
| | Upper Lindley | Greenville gas* | Bond | 930 | |
| | Weiler | Hoffman | Clinton | 1200 | |
| Cypress | Inman East | Gallatin | 2430 | | |
| Weiler | Inman West | " | 2480 | | |
| " | Iron | White | 2710 | | |

^o Sandstones unless otherwise noted.

* Abandoned.

Revised November 1, 1942

TABLE 2—OIL AND GAS PRODUCING STRATA IN ILLINOIS—Continued

| System or Series | Group or Formation | Producing Strata ^o | Pool | County | Approximate depth, feet |
|--------------------------------------|--------------------|-------------------------------|---------------------|--------------------|-------------------------|
| Chester (Upper Mississippian) series | Cypress ss. | Cypress | Keensburg Consol. | Wabash | 2430 |
| | | " | Langewisch-Kuester | Marion | 1600 |
| | | Kirkwood | Lawrence | Lawrence | 1400 |
| | | Weiler | Louden | Fayette, Effingham | 1470 |
| | | " | Mattoon | Coles | 1830 |
| | | " | Mt. Carmel | Wabash | 2010 |
| | | " | New Harmony Consol. | White | 2570 |
| | | " | New Haven | " | 2450 |
| | | " | Noble | Richland | 2550 |
| | | " | Parkersburg | Edwards | 2830 |
| | | Cypress | Patoka East | Marion | 1350 |
| | | " | Posey | Clinton | 1100 |
| | | Weiler | Roland | White, Gallatin | 2570 |
| | | Cypress | Rural Hill | Hamilton | 2710 |
| | | " | St. James | Fayette | 1600 |
| | | Weiler | Sailor Springs | Clay | 2600 |
| | | Sparta gas | Sparta* | Randolph | 850 |
| | | Cypress | Storms | White | 2680 |
| | " | Tamaroa | Perry | 1130 | |
| | Weiler | Woodlawn | Jefferson | 1815 | |
| | Paint Creek fm. | Stray | Benton North | Franklin | 2605 |
| | | Paint Creek | New Harmony Consol. | White | 2670 |
| | | " | Keensburg Consol. | Wabash | 2560 |
| | | Stray | Louden | Fayette, Effingham | 1530 |
| | | Paint Creek | Parkersburg | Edwards | 2955 |
| | | Stray | Patoka East | Marion | 1335 |
| | | Paint Creek | Roland | White | 2750 |
| | " | Stokes | " | 2800 | |
| | " | Storms | " | 2805 | |
| | Bethel ss. | Bethel | Albion | Edwards | 2900 |
| | | " | Allendale | Wabash | 2010 |
| | | " | Alma | Marion | 1930 |
| | | " | Beaver Creek | Bond | 1115 |
| | | " | Benton North | Franklin | 2610 |
| | | " | Bonpas West | Richland | 2930 |
| | | " | Boulder | Clinton | 1195 |
| " | | Centerville East | White | 2960 | |
| Benoist | | Centralia | Clinton, Marion | 1350 | |
| Bethel | | Centralia West | Clinton | 1410 | |
| " | | Clay City Consol. | Clay, Wayne | 2880 | |
| Benoist | | Cordes | Washington | 1260 | |
| " | | Cravat | Jefferson | 2070 | |
| Bethel | | Dale-Hoodville Consol. | Hamilton | 2950 | |
| Benoist | | Dix | Jefferson, Marion | 1950 | |
| " | | Dubois | Washington | 1360 | |
| " | | Dubois West | " | 1345 | |
| " | | Elkville | Jackson | 2200 | |
| " | | Fairman | Marion, Clinton | 1430 | |
| Bethel | | Flora | Clay | 2780 | |
| " | | Friendsville | Wabash | 2465 | |
| " | | Herald | White | 2790 | |
| " | | Hoffman | Clinton | 1320 | |
| " | Iola | Clay | 2280 | | |
| " | Iron | White | 2790 | | |
| " | Irvington | Washington | 1540 | | |
| " | Keensburg Consol. | Wabash | 2570 | | |
| " | Kenner | Clay | 2660 | | |
| " | Lakewood | Shelby | 1700 | | |
| " | Lancaster | Wabash | 2535 | | |
| Tracey | Lawrence | Lawrence | 1560 | | |
| Bethel | Lawrence South | Lawrence, Wabash | 2015 | | |

^o Sandstones unless otherwise noted.

* Abandoned.

ILLINOIS CRUDE OILS

TABLE 2—OIL AND GAS PRODUCING STRATA IN ILLINOIS—Continued

| System or Series | Group or Formation | Producing Strata ^o | Pool | County | Approximate depth, feet |
|--------------------------------------|---------------------|-------------------------------|------------------------|--------------------|-------------------------|
| Chester (Upper Mississippian) series | Bethel ss. | Benoist | Louden | Fayette, Effingham | 1550 |
| | | Bethel | McKinley | Washington | 980 |
| | | " | Mason South | Effingham | 2295 |
| | | " | Maud | Wabash | 2120 |
| | | " | Maunie North | White | 2840 |
| | | " | Mt. Carmel | Wabash | 2100 |
| | | " | New Harmony Consol. | White | 2710 |
| | | Benoist | Patoka | Marion | 1420 |
| | | " | Patoka East | " | 1470 |
| | | " | Roland | White, Gallatin | 2750 |
| | | Bethel | St. Francisville | Lawrence | 1840 |
| | | " | St. Francisville East | " | 1750 |
| | | " | St. Paul | Fayette | 1880 |
| | | Benoist | Salem | Marion | 1770 |
| | | " | Sandoval | " | 1540 |
| | | " | Stokes | White | 2810 |
| | | Bethel | Storms | " | 2805 |
| | | Benoist | Tonti | Marion | 1940 |
| | | Bethel | Woburn | Bond | 1910 |
| | " | Woodlawn | Jefferson | 1910 | |
| | Aux Vases ss. | Aux Vases | Aden | Wayne, Hamilton | 3190 |
| | | " | Albion | Edwards | 3040 |
| | | " | Albion North | " | 3055 |
| | | Lower Lindley | Ayers gas | Bond | 940 |
| | | Aux Vases | Benton North | Franklin | 2690 |
| | | " | Bible Grove South | Clay | 2735 |
| | | " | Blairsville | Hamilton | 3295 |
| | | " | Bungay | " | 3270 |
| | | " | Carmi North | White | 3230 |
| | | " | Centerville East | " | 3075 |
| | | Bradley | Cisne | Wayne | 2980 |
| | | Aux Vases | Clay City Consol. | Clay, Wayne | 2910 |
| | | " | Coil | Wayne | 2918 |
| | | " | Concord | White | 2905 |
| | | " | Cooks Mills | Coles | 1830 |
| | | " | Covington | Wayne | 3115 |
| | | " | Dale-Hoodville Consol. | Hamilton | 2970 |
| | | " | Dundas Consol. | Jasper, Richland | 2700 |
| | | " | Fairfield | Wayne | 3235 |
| " | | Geff | " | 3065 | |
| " | Geff West | " | 3130 | | |
| " | Goldengate | " | 3255 | | |
| " | Keensburg Consol. | Wabash | 2760 | | |
| " | Inman North | Gallatin | 2815 | | |
| " | Iola*** | Clay | 2360 | | |
| " | Johnsonville | Wayne | 2990 | | |
| " | Johnsonville South | " | 3030 | | |
| " | King | Jefferson | 2740 | | |
| " | Lakewood | Shelby | 1720 | | |
| " | Mason South | Effingham | 2360 | | |
| " | Maunie | White | 2845 | | |
| " | Maunie South | " | 2840 | | |
| " | Mt. Erie | Wayne | 2935 | | |
| " | Mill Shoals | White, Hamilton | 3220 | | |
| " | New Harmony Consol. | White | 2840 | | |
| " | New Haven | " | 2715 | | |
| " | Phillipstown | " | 2940 | | |
| " | Roland | White, Gallatin | 2880 | | |
| " | Rural Hill | Hamilton | 3140 | | |
| " | Salem | Marion | 1840 | | |
| " | Sesser | Franklin | 2700 | | |
| " | Sims | Wayne | 3020 | | |

^o Sandstones unless otherwise noted.

*** Abandoned; revived 1941.

Revised November 1, 1942

TABLE 2—OIL AND GAS PRODUCING STRATA IN ILLINOIS—Continued

| System or Series | Group or Formation | Producing Strata ^o | Pool | County | Approximate depth, feet | |
|--------------------------------------|--------------------------|-------------------------------|------------------------|------------------------|-------------------------|------|
| Chester (Upper Mississippian) series | | Aux Vases | Sims North | Wayne | 3030 | |
| | | " | Stewardson | Shelby | 1940 | |
| | | " | Tonti | Marion | 2010 | |
| | | " | Walpole | Hamilton | 3070 | |
| | | " | West Frankfort | Franklin | 2700 | |
| | | " | Xenia | Clay | 2790 | |
| Iowa (Lower Mississippian) series | Levias member | Levias ls. | Benton North | Franklin | 2710 | |
| | | " | Bonpas West | Richland | 3070 | |
| | | " | Boos North | Jasper | 2780 | |
| | | " | Boyleston | Wayne | 3310 | |
| | | " | Carmi | White | 3150 | |
| | | " | Centerville East | " | 3175 | |
| | | " | Coil West | Jefferson | 2795 | |
| | | " | Covington | Wayne | 3210 | |
| | | " | Dale-Hoodville Consol. | Hamilton | 3000 | |
| | | " | Dundas East | Jasper | 2940 | |
| | | " | King | Jefferson | 2770 | |
| | | " | Markham City | " | 3075 | |
| | | " | Maunie South | White | 2880 | |
| | | " | Roaches | Jefferson | 2160 | |
| | " | Rural Hill | Hamilton | 3210 | | |
| | " | Sims | Wayne | 3070 | | |
| | Ste. Genevieve formation | Rosiclare member | Rosiclare | Alma | Marion | 2070 |
| | | | " | Barnhill | Wayne | 3340 |
| | | | " | Benton North | Franklin | 2800 |
| | | | " | Boos North | Jasper | 2810 |
| | | | " | Boyleston | Wayne | 3280 |
| | | | " | Burnt Prairie | White | 3260 |
| | | | " | Cisne | Wayne | 3090 |
| | | | " | Clay City Consol. | Clay, Wayne | 2970 |
| | | | " | Cooks Mills | Coles | 1805 |
| | | | " | Covington | Wayne | 3240 |
| | | | " | Dale-Hoodville Consol. | Hamilton | 3050 |
| | | | " | Dix | Marion | 2100 |
| | | | " | Dundas Consol. | Richland, Jasper | 2800 |
| | | | " | Goldengate | Wayne | 3320 |
| | | " | Inman | Gallatin | 2800 | |
| | | " | Maud | Wabash | 2640 | |
| | | " | Maunie North | White | 3000 | |
| | | " | Mt. Carmel | Wabash | 2360 | |
| | | " | Mt. Erie | Wayne | 3070 | |
| | | " | Mt. Erie South | " | 3255 | |
| " | | New Harmony Consol. | White | 2910 | | |
| " | | Patoka | Marion | 1550 | | |
| " | Patton | Wabash | 2220 | | | |
| " | Phillipstown | White | 2960 | | | |
| " | Roaches | Jefferson | 2190 | | | |
| " | Rural Hill | Hamilton | 3160 | | | |
| " | Salem | Marion | 2060 | | | |
| " | Sims | Wayne | 3090 | | | |
| " | Sims North | " | 3150 | | | |
| Fredonia member | McClosky "lime" | Aden | Wayne, Hamilton | 3290 | | |
| | " | Aden North | Wayne | 3310 | | |
| | " | Albion | Edwards | 3110 | | |
| | " | Allendale | Wabash | 2280 | | |
| | " | Amity | Richland | 2960 | | |
| | " | Barnhill | Wayne | 3390 | | |
| | " | Belle Prairie | Hamilton | 3460 | | |
| | " | Benton North | Franklin | 2780 | | |
| " | Bible Grove | Clay | 2810 | | | |
| " | Bone Gap | Edwards | 3270 | | | |

^o Sandstones unless otherwise noted.

TABLE 2—OIL AND GAS PRODUCING STRATA IN ILLINOIS—Continued

| System or Series | Group or Formation | Producing Strata ^o | Pool | County | Approximate depth, feet | | |
|-----------------------------------|--------------------------|-------------------------------|-------------------|------------------------|-------------------------|-----------|------|
| Iowa (Lower Mississippian) series | Ste. Genevieve formation | Fredonia member | McClosky "lime" | Bonpas | Richland | 3130 | |
| | | | " | Bonpas West | " | 3170 | |
| | | | " | Boos North | Jasper | 2800 | |
| | | | " | Boyleston | Wayne | 3250 | |
| | | | " | Burnt Prairie | White | 3420 | |
| | | | " | Carmi**** | " | 3150 | |
| | | | " | Centerville | " | 3340 | |
| | | | " | Centerville East | " | 3215 | |
| | | | " | Cisne | Wayne | 3120 | |
| | | | " | Cisne North | " | 3170 | |
| | | | " | Clay City Consol. | Clay, Wayne | 2980 | |
| | | | " | Clay City West | Clay | 3050 | |
| | | | " | Coil West | Jefferson | 2845 | |
| | | | " | Covington | Wayne | 3240 | |
| | | | " | Dahlgren | Hamilton | 3340 | |
| | | | " | Dale-Hoodville Consol. | " | 3130 | |
| | | | " | Dundas Consol. | Richland, Jasper | 2840 | |
| | | | " | Dundas East | Richland | 3000 | |
| | | | " | Eldorado | Saline | 2940 | |
| | | | " | Elk Prairie* | Jefferson | 2720 | |
| | | | " | Ellery | Edwards, Wayne | 3340 | |
| | | | " | Flora | Clay | 2970 | |
| | | | " | Goldengate | Wayne | 3370 | |
| | | | " | Grayville | Edwards, White | 3130 | |
| | | | " | Grayville West | White | 3190 | |
| | | | " | Hidalgo | Jasper | 2540 | |
| | | | " | Ingraham* | Clay | 3100 | |
| | | | " | Inman | Gallatin | 2730 | |
| | | | " | Inman East | " | 2740 | |
| | | | " | Inman North | " | 2870 | |
| | | | " | Iron | White | 3050 | |
| | | | " | Johnsonville | Wayne | 3100 | |
| | | | " | Johnsonville South | " | 3210 | |
| | | | " | Johnsonville West | " | 3105 | |
| | | | " | Keensburg Consol. | Wabash | 2790 | |
| | | | " | Keensburg East | " | 2710 | |
| | | | " | Kell | Jefferson | 2625 | |
| | | | " | King | " | 2825 | |
| | | | " | Lancaster | Wabash, Lawrence | 2670 | |
| | | | " | Lawrence | Lawrence | 1700 | |
| | | | " | Leech Twp. | Wayne | 3410 | |
| | | | " | Oblong "sand" | Main | 1340 | |
| | | | " | McClosky "lime" | Marcoc* | Jefferson | 2750 |
| | | | " | " | Markham City | " | 3120 |
| | | | " | " | Mason | Effingham | 2490 |
| | | | " | " | Mason South | " | 2450 |
| | | | " | " | Mattoon | Coles | 2000 |
| " | " | Maud | Wabash | 2650 | | | |
| " | " | Maunie North | White | 3050 | | | |
| " | " | Maunie South | " | 2870 | | | |
| " | " | Mayberry | Wayne | 3380 | | | |
| " | " | Mill Shoals | White, Hamilton | 3350 | | | |
| " | " | Mt. Carmel | Wabash | 2370 | | | |
| " | " | Mt. Erie | Wayne | 3080 | | | |
| " | " | Mt. Erie South**** | " | 3130 | | | |
| " | " | New Harmony Consol. | White | 2930 | | | |
| " | " | New Harmony South | " | 3010 | | | |
| " | " | New Haven | " | 2820 | | | |
| " | " | Noble | Richland | 2960 | | | |
| " | " | Olney | " | 3050 | | | |
| " | " | Patton | Wabash | 2310 | | | |
| " | " | Parkersburg | Richland, Edwards | 3130 | | | |

^o Sandstones unless otherwise noted.

* Abandoned.

**** Abandoned; revived 1942.

Revised November 1, 1942

TABLE 2.—OIL AND GAS PRODUCING STRATA IN ILLINOIS—CONTINUED

| System or Series | Group or Formation | Producing Strata ^o | Pool | County | Approximate depth, feet |
|-----------------------------------|---|-------------------------------|----------------------|--------------------|-------------------------|
| Iowa (Lower Mississippian) series | Ste. Genevieve formation Fredonia member | McClosky "lime" | Phillipstown | White | 2960 |
| | | " | Rinard* | Wayne | 3140 |
| | | " | Roaches | Jefferson | 2200 |
| | | " | Roland | White, Gallatin | 3155 |
| | | " | Roundprairie | Wayne | 3170 |
| | | " | Rural Hill | Hamilton | 3250 |
| | | " | Ste. Marie | Jasper | 2830 |
| | | " | Sailor Springs | Clay | 3050 |
| | | " | Sailor Springs South | " | 2940 |
| | | " | Salem | Marion | 1990 |
| | | " | Schnell | Richland | 3010 |
| | | " | Sims | Wayne | 3160 |
| | | " | Sims North | " | 3180 |
| | | " | Stokes | White | 3080 |
| | | " | Stringtown | Richland | 3030 |
| | | " | Thompsonville | Franklin | 3110 |
| " | Toliver | Clay | 2790 | | |
| " | Tonti | Marion | 2130 | | |
| " | Valier | Franklin | 2715 | | |
| " | Whittington | " | 2870 | | |
| Iowa (Lower Mississippian) series | St. Louis ls. | St. Louis ls. | Ina* | Jefferson | 3000 |
| | | Martinsville "sand" | Martinsville | Clark | 480 |
| | | Westfield ls. | Westfield | " | 330 |
| | | St. Louis ls. | Whittington | Franklin | 3060 |
| Iowa (Lower Mississippian) series | Salem ls. | Salem ls. | Barnhill | Wayne | 3790 |
| | | " | Jacksonville gas* | Morgan | 300 |
| | | " | Salem | Marion | 2180 |
| Iowa (Lower Mississippian) series | Westfield ls. | Westfield | Westfield | Clark | 380 |
| | | Carper | Casey | Clark | 1280 |
| Iowa (Lower Mississippian) series | Osage Group | " | Martinsville | " | 1340 |
| | | " | Westfield | " | 910 |
| | | Devonian ls. | Bartelso | Clinton | 2420 |
| Devonian system | Devonian ls. | " | Boulder | " | 2585 |
| | | " | Centralia | " , Marion | 2860 |
| | | Hoing | Colmar-Plymouth | Hancock, McDonough | 450 |
| | | Devonian ls. | Irington | Washington | 3090 |
| | | " | Louden | Fayette, Effingham | 3000 |
| | | " | McKinley | Washington | 2250 |
| | | " | Martinsville | Clark | 1550 |
| | | " | Salem | Marion | 3340 |
| | | " | Sandoval | " | 2920 |
| | | " | Sorento | Bond | 1800 |
| | | " | Tonti | Marion | 3490 |
| Dev. Sil. | Devonian-Silurian ls. | Collinsville* | Madison | 1300 | |
| Silurian system | Silurian ls. | Pittsfield (Pike.Co.) gas* | Pike | 270 | |
| Ordovician system | "Trenton" ls. | Centralia | Clinton | 4020 | |
| | | Dupo | St. Clair | 500 | |
| | | Martinsville* | Clark | 2680 | |
| | | St. Jacob | Madison | 2335 | |
| | | Salem | Marion | 4500 | |
| | | Waterloo** | Monroe | 410 | |
| " | Westfield | Clark | 2260 | | |

^o Sandstones unless otherwise noted.

* Abandoned.

** Abandoned; revived 1939.

procedures of which a very common one is the use of the Saybolt viscosimeter. In brief the determination by this procedure consists of determining the time necessary for a measured portion of oil to pass a standard orifice at some designated temperature. The common temperatures used are 70°F. and 100°F. and the results are reported as Saybolt seconds. The Saybolt Universal viscosimeter is commonly used for oils having flow times of more than 32 seconds and less than 1000 seconds, whereas oils having flow times of the order of 1000 seconds and higher are tested by means of the Saybolt Furol viscosimeter. Viscosity values give additional general information on the crude oils, those having high viscosity being made up of the higher boiling heavier compounds and those with lower viscosities containing more lower boiling lighter compounds. This value, together with the A. P. I. gravity value, gives general information on gasoline content and has a direct bearing on pumping and transportation costs of the crude oil.

3. *Carbon residue*.—The carbon residue value is commonly determined in the Conradson carbon residue apparatus. In brief this consists of heating a weighed portion of oil under specified conditions, effecting volatilization of all volatile materials, with subsequent weighing of the residue. This determination is commonly made on the residuum remaining after the fractional distillation of crude oil in routine analysis, and the values are reported both as per cent of residuum and as per cent of total crude oil obtained by calculation. Carbon residue indicates to some extent the amount of asphalt contained in the oil and is a factor indicating its suitability for the production of lubricating oils. Crude oils having low carbon residues, such as the Pennsylvania crude oils, are considered to be superior lubricating oil stock.

4. *Pour point*.—Pour point is determined by chilling a measured portion of oil and determining the temperature at which flow ceases. It provides information to some extent as to how the crude oil will behave in transportation and storage. Oils with pour points higher than 50°F. are likely to cause difficulty by

solidifying during the winter in tanks and pipe lines.

5. *Cloud point*.—Cloud point is determined by chilling a portion of oil and determining the temperature at which wax first forms. This test is commonly applied to the lubricating fractions obtained from fractional distillation of the crude oil and gives information as to the distribution of wax in these lubricating fractions. Such information is of importance to the refiner in determining necessary solvent refining in lubricating oil production.

6. *Moisture in petroleum*.—Moisture in petroleum is determined by a special distillation in a suitable apparatus so arranged that the water is condensed and its volume is determined. This simply gives a measure of the percentage of water present in the crude oil and may indicate to some extent the possibility of emulsification during handling.

7. *Sulfur*.—Sulfur in petroleum may be conveniently determined in the oxygen bomb in which a weighed portion of oil is burned in oxygen, whereupon the sulfur is converted to sulfate which may be dissolved in water, precipitated as barium sulfate, and weighed. Knowledge of the sulfur content of a crude oil is important in chemical relationships and refining value, and it is to some extent indicative of the amount of asphalt present in the crude. In refining, the sulfur value is important in determining the treatment necessary to produce gasoline of low-sulfur content.

8. *Fractional distillation*.—Fractional distillations of petroleum are made in various ways. For general studies the Hempel distillation procedure (2) gives good information. This is a combination of atmospheric distillation plus low-pressure distillation, the low pressure part of which gives additional information on the higher boiling or lubricating fractions. The fractional distillation gives information on the refining value of the crude oil, that is, it gives a rough survey of the approximate amounts of gasoline, kerosene, gas oil, lubricating stock, and residuum to be expected in refining. Specific gravities of all fractions and

viscosities of lubricating fractions obtained by distillation are usually determined to give further information. This is the most important step in the laboratory evaluation of crude oils. According to the Bureau of Mines (3), using the modified Hempel distillation procedure, the rules for calculating the summary are as follows:

1) "The (sum) total percentage of all fractions distilling at atmospheric pressure below 100°C. (212°F.) is reported as the percentage of light gasoline. This figure approximates the yield of gasoline with a maximum boiling point of 125°C. (257°F.).

2) "The (sum) total percentage of all fractions distilling at atmospheric pressure below 200°C. (392°F.) is reported as the total percentage of gasoline and naphtha if no fraction in this range has a gravity heavier than 0.825 (40° A.P.I.). This figure approximates the yield of gasoline or naphtha with a maximum boiling point of 215°C. (419°F.). (If fractions boiling below 200°C. have gravities heavier than 0.825, they are classed as gas oil.)

3) "The (sum) total percentage of all fractions distilling at atmospheric pressure above 200°C. (392°F.) but below 275°C. (527°F.) that have gravities of 0.825 (40° A.P.I.) or lighter is reported as kerosene distillate.

4) "The (sum) total percentage of all fractions distilling at atmospheric pressure below 275°C. (527°F.) that have gravities heavier than 0.825 (40° A.P.I.) plus all vacuum distillate with a viscosity less than 50 seconds (Saybolt Universal at 100°F.) is reported as gas oil.

5) "Lubricating distillates are classified as follows: Distillate with a viscosity range (Saybolt Universal at 100°F.) between 50 and 100 seconds is reported as non-viscous lubricating distillate. Distillate with viscosity between 100 and 200 seconds is reported as medium lubricating distillate. Distillate with viscosity above 200 seconds is reported as viscous lubricating distillate. The percentages of the lubricating distillates are calculated by plotting the gravities and viscosities of the individual fractions separately against "volume sum percentages" and noting where the 50-second, 100-second, and 200-second points on the viscosity curve intercept the "volume sum percentage" coordinate. The gravities corresponding to these intercepts give the gravity ranges of the distillates."

The above eight determinations constitute the more common tests made on

crude oils for general information. In industry much more detailed information is desired and innumerable tests are made, depending on the particular interest and refining process in use by those for whom the tests are made.

Many methods for further interpretation of analytical data have been published of which two in particular have been used in this report. These are the correlation index as developed by Harold M. Smith of the United States Bureau of Mines (4), and the characterization factor as developed by members of the staff of the Universal Oil Products Company (6, 7, 8). Correlation index numbers and characterization factors have been used for further comparisons of the characteristics of crude oils from newer Illinois fields. Due to incomplete analyses available for crude oils from the older Illinois fields it was impossible to obtain their correlation index numbers, but it was possible to estimate their characterization factors for the gasoline and kerosene fractions, which gave a means of further comparison.

CORRELATION INDEX

A description of the correlation index and its use in interpreting crude oil analyses was published first in 1940 by Smith (4). Further use of it was made in a report by Smith (5) in interpreting analyses of certain Illinois crude oils. In U. S. Bureau of Mines, R. I. 3532 Mr. Smith explains the correlation index as follows (4):

"The correlation index is a number whose magnitude indicates certain characteristics of a crude-oil distillation fraction. If a fraction were composed exclusively of normal paraffin hydrocarbons, the value of the index number would be zero. If the fraction be from a paraffin-base crude oil of the usual type, its index will not be zero but will be small, while fractions from intermediate and naphthene-base crude oils will have increasingly greater values for the indexes.

"Index numbers, therefore, range from zero for the normal paraffins to approximately 75 for the very naphthenic distillates. The index system, which is based upon the average boiling point and specific gravity of the Hempel fractions, has been so arranged that benzene has an index of 100; and certain crude oils, such as

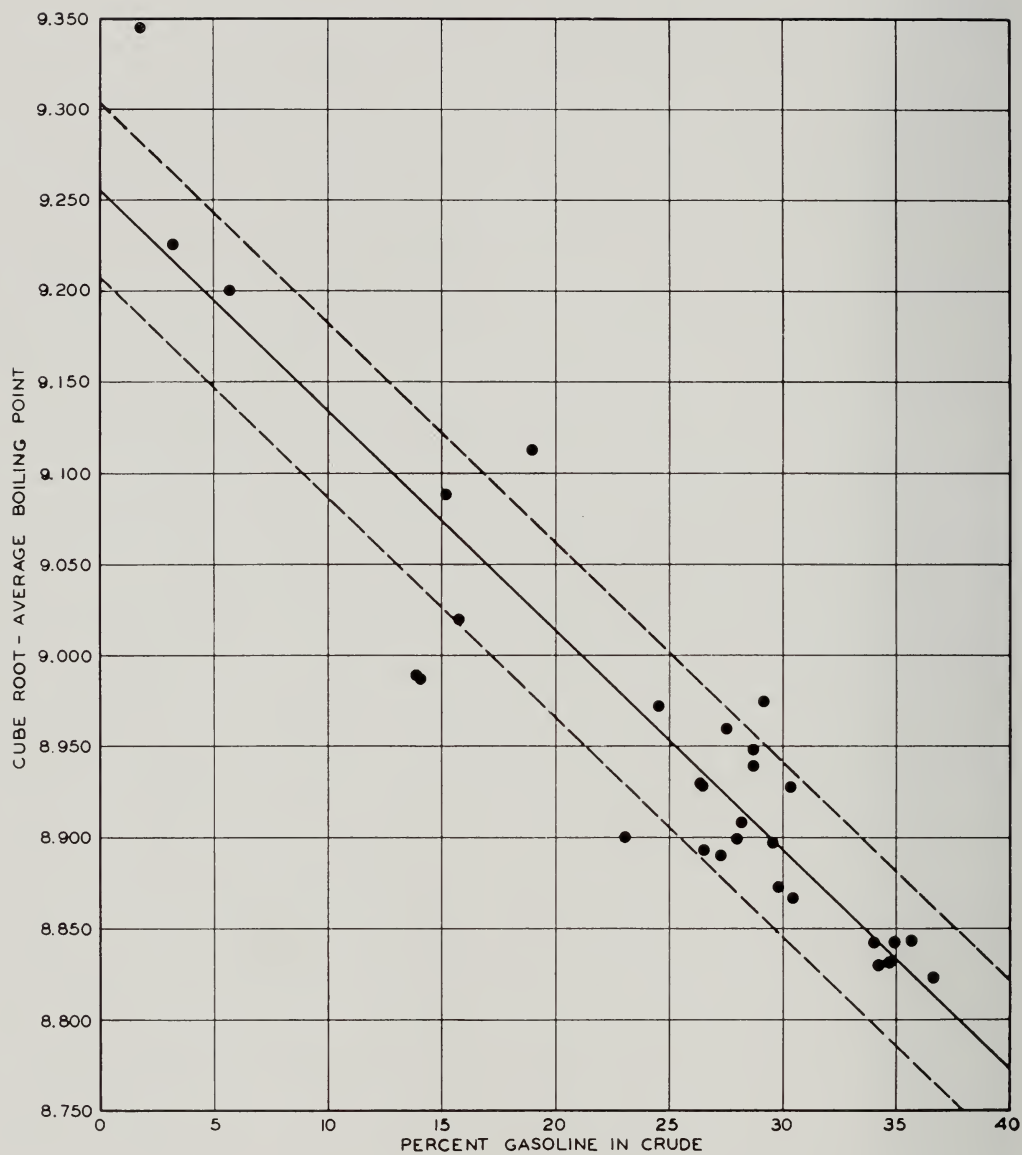


FIG. 1.—Gasoline yields as related to boiling point.

those from Borneo, may have numbers exceeding 100, indicating the probable presence of polycyclic aromatic compounds."

The general equation, according to Smith (4), for calculating the correlation index of a fraction is

$$\text{C.I.} = \frac{48640}{K} + 473.7G - 456.8$$

where C.I. is the correlation index, K the average boiling point of the fraction in degrees Kelvin, and G. is the specific gravity of the fraction at 60° F/60° F.

CHARACTERIZATION FACTOR

The characterization factor is mathematically defined as the ratio of the cube root of the average boiling point to the specific gravity at 60° F. or

$$K = \frac{(T_B)^{1/3}}{d}$$

where K = characterization factor

d = specific gravity at 60° F.

T_B = average atmospheric boiling point, ° Rankine.

This factor is not a constant over the entire boiling range of the crude oil, as the fractions vary in their chemical composition. In general, the characterization factor is higher for the lower boiling fractions of a crude oil and decreases for the higher boiling fractions. Numerically, a "characterization factor" value of 12.5-13.0 indicates high paraffinicity whereas values of 10 or below indicate high naphthenicity. Increase in values between 10 and 12 indicates increase in paraffinicity.

The average boiling points for Hempel fractions, as reported by Smith (4), together with specific gravity values determined in this laboratory were used for estimating correlation index numbers and characterization factors. For estimating correlation index numbers for the individual Hempel fractions of crude oils from the newer oil fields, the average boiling points reported by Smith (4) were used directly. However, for estimating characterization factors for gasoline and kerosene of crudes from both older and newer fields (T_B)^{1/3} values (cube root of volumetric average boiling point of

each fraction making up the gasoline or kerosene) were calculated from determined yields and average fractional boiling points reported by Smith. In determining kerosene yield from the Hempel analysis usually one or two and occasionally three fractions are included. Since the number of fractions making up the kerosene is small, and since the variation in ratios between these fractions is small, (T_B)^{1/3} values for kerosene were estimated directly without plotting calculated data. This was done in the following manner. If the yield of kerosene was zero to 6 per cent, the average boiling point of fraction No. 8 was assumed to be the average boiling point of the kerosene. If the yield was 6 to 11 per cent, the average boiling point was calculated from the average boiling points of fractions Nos. 8 and 9 using average volumes estimated statistically. If the yield was above 11 per cent the average boiling points were calculated from fractions 8, 9, and 10 in the same manner.

In determining gasoline yield from the Hempel analysis seven fractions usually are included. Due to the larger number of fractions and to the variations of the volumetric ratios of these fractions from crude to crude, it is necessary to obtain (T_B)^{1/3} values by plotting individual calculated values for each crude and determining the line of best fit by the method of least squares. This was done and is shown in fig 1. Applying this method to data for newer crude oils it was found that characterization factors for gasolines showed a standard deviation of plus or minus 0.06.

RESULTS

Table 3 presents certain analytical data for crude oils from both older and newer oil fields of Illinois arranged according to geologic age of producing formation. In addition the fields, producing sands, and depths are listed.

Complete analyses for crude oils from newer developments are given in the appendix.

DISCUSSION

General chemical characteristics of Illinois crude oils.—The analytical data in table 3 have not been divided to show those for older and newer fields. Never-

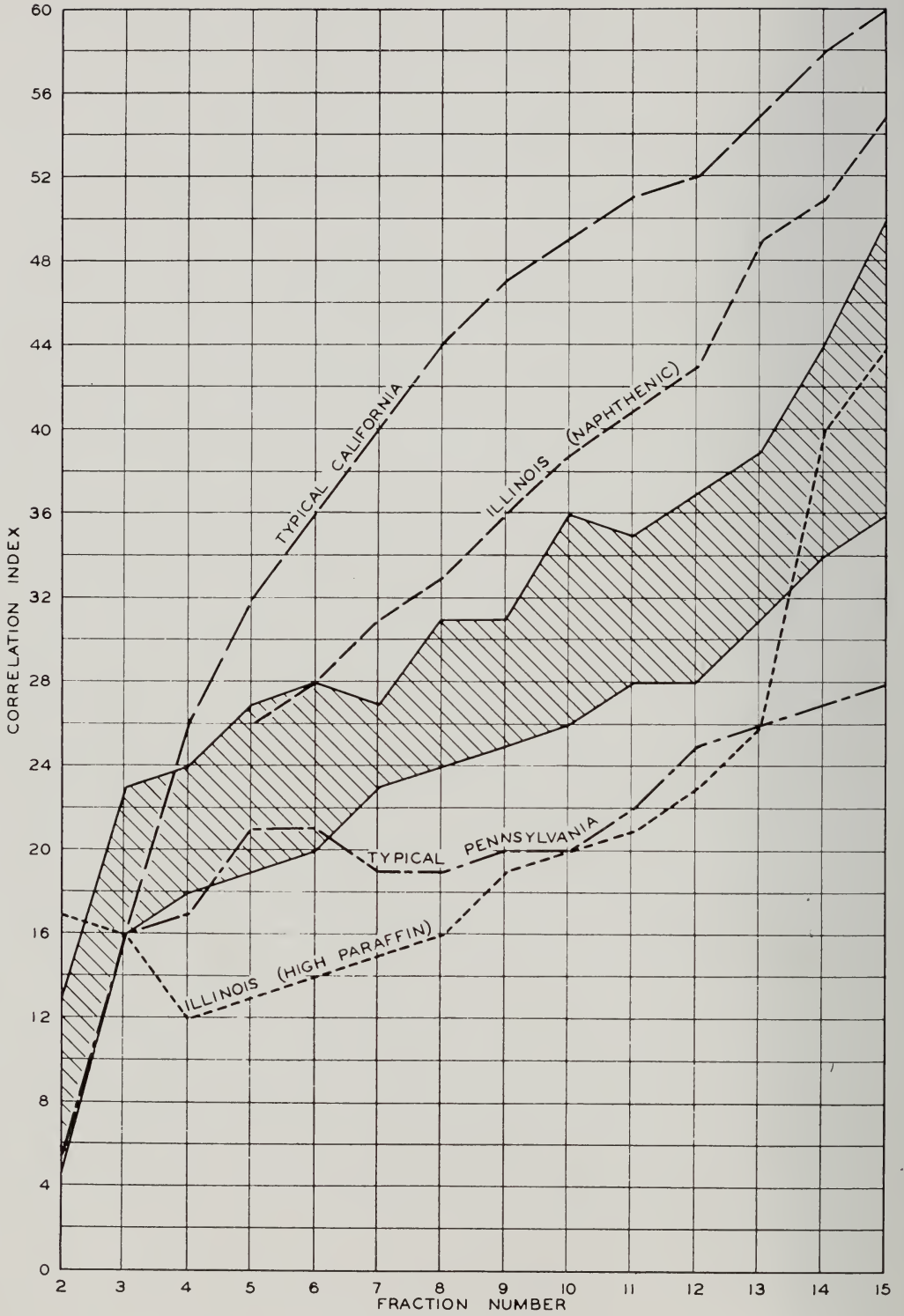


FIG. 2.—Chemical characteristics of Illinois crude oils as shown by correlation index numbers

theless, the crude oils from the older fields, for which data are included in this report, were produced mainly from the Pennsylvanian system but the newer fields have produced very little oil from Pennsylvanian strata. This enables us to compare the chemical characteristics of the crude oils from the older and newer fields.

In general crude oils from newer fields show higher A. P. I. gravities, higher gasoline yields, and lower kerosene yields. The average A. P. I. gravity for crude oils from older fields based on data available is 32.3 as compared to 37.2 for crude oils from the newer fields. The average gasoline yield for the crude oils from old fields is 23.7 per cent as compared to 31.8 per cent for the crude oils from newer fields. The average kerosene yield for the crude oils from old fields is 16.6 per cent as compared to 10.2 per cent for the crude oils from new fields. The average sulfur values for the crude oils from old and new fields are the same being 0.24 per cent for both. The specific gravities and characterization factors for gasoline and kerosene from crude oils from old and new fields are about the same. In general the oils from the newer fields are produced from greater depths than are those from the older fields.

The more complete data available for crude oils from the newer fields permit us to study their chemical characteristics in more detail. For this purpose correlation index numbers and characterization factors have been determined for the individual fractions obtained in the distillation test. These values are recorded in the complete analysis reports presented in the appendix of this report.

In figure 2 correlation index characteristics for these Illinois crude oils are presented graphically. The shaded portion of this figure indicates the range of correlation index numbers for all fractions throughout the entire distillation range that includes about 70 per cent of the crude oils studied. This range indicates crude oils of intermediate base, and we see that the larger majority of our Illinois oils fall in this classification. However certain of the crude oils studied do not fall in this range, as exemplified by curves "Illinois naphthenic" and "Illinois high-paraffin" which are included in figure 2. For comparison, data for a typical

California crude oil (which is distinctly naphthenic) and for a typical Pennsylvanian crude oil (which is distinctly paraffinic) have been included in the figure. It will be noted that although the Illinois naphthenic crude oil is distinctly outside the range of correlation index numbers into which the majority of the Illinois crude oils fall, it is not nearly so naphthenic as the typical California crude oil. On the other hand the Illinois high-paraffin crude oil appears to be even more paraffinic than the typical Pennsylvania crude oil in the lower boiling fractions but is less paraffinic or more naphthenic in the higher boiling or lubricating oil fractions.

Although correlation index numbers are not additive on any basis, characterization factors are additive on a weight basis. As this is true it follows that characterization factors may be associated with volumes distilled, in order to present a more quantitative picture of the distribution of characteristics throughout the crude oil. Such a distribution is presented in figure 3. The shaded portion indicates the ranges of characterization factors within which fall approximately 70 per cent of the crude oils studied. Also additional information is presented in this figure on the characterization factor ranges of fractions such as light gasoline, gasoline and naphtha, kerosene, gas oil etc. to be obtained from these crude oils. However it should be stated that the boundaries of these ranges do not represent specific crude oils but rather statistical averages obtained by calculation of all data on the crude oils studied. Furthermore the component volumes are not to be considered cumulative but rather based on statistical averages of all data. An Illinois high-paraffin crude oil and an Illinois naphthenic crude oil are included in figure 3 as representative of those Illinois crude oils which differ from the general average, together with typical California and Pennsylvania crude oils for further comparison.

General characteristics as related to geologic age of the producing strata.— Certain data from the crude-oil analyses are shown in Table 3 in which the arrangement is by geologic age of the producing formation. Averages for each producing formation and each geologic system are included. A. P. I. gravity,

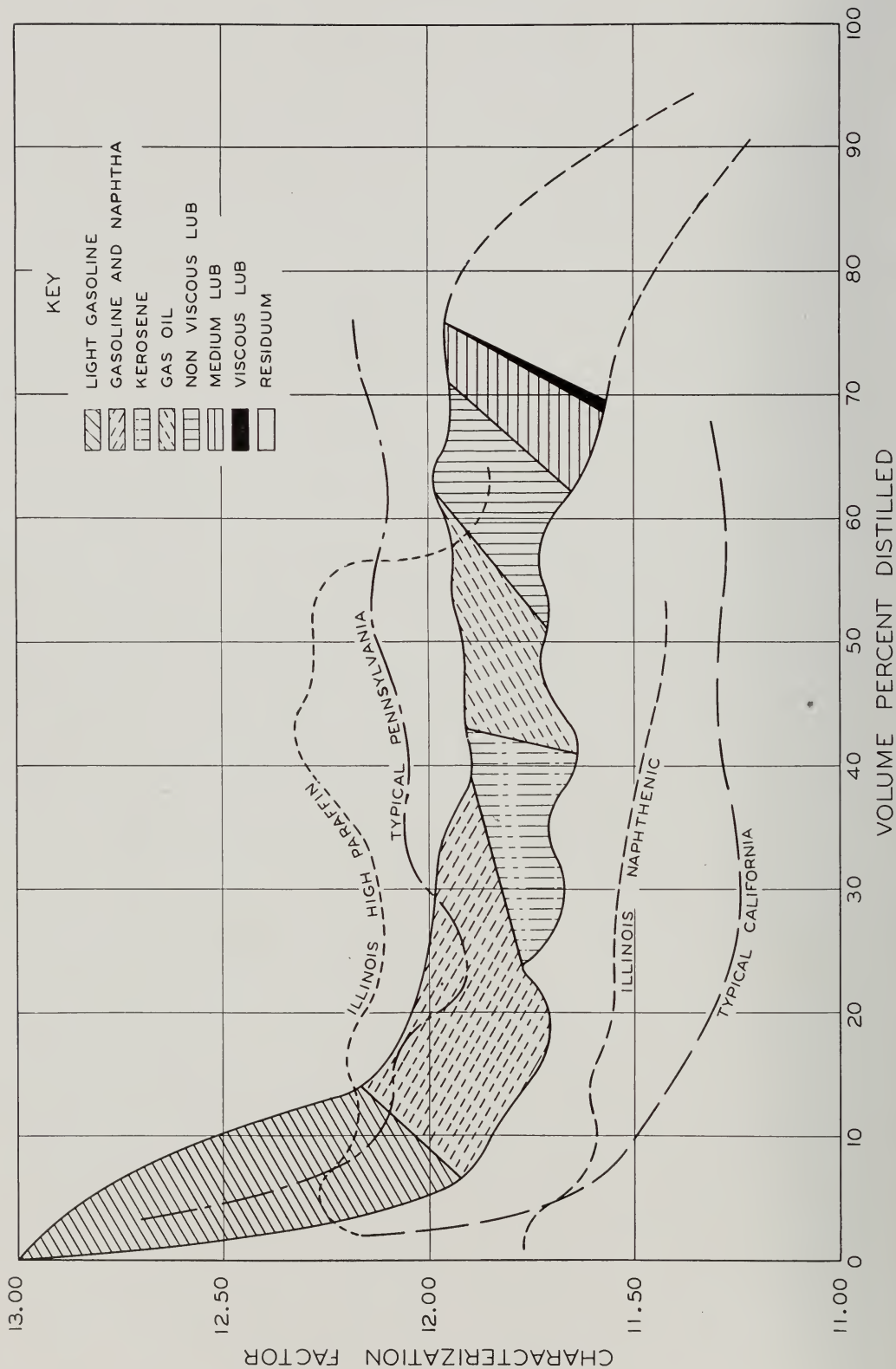


FIG. 3.—Chemical characteristics of Illinois crude oils as shown by characterization factors.

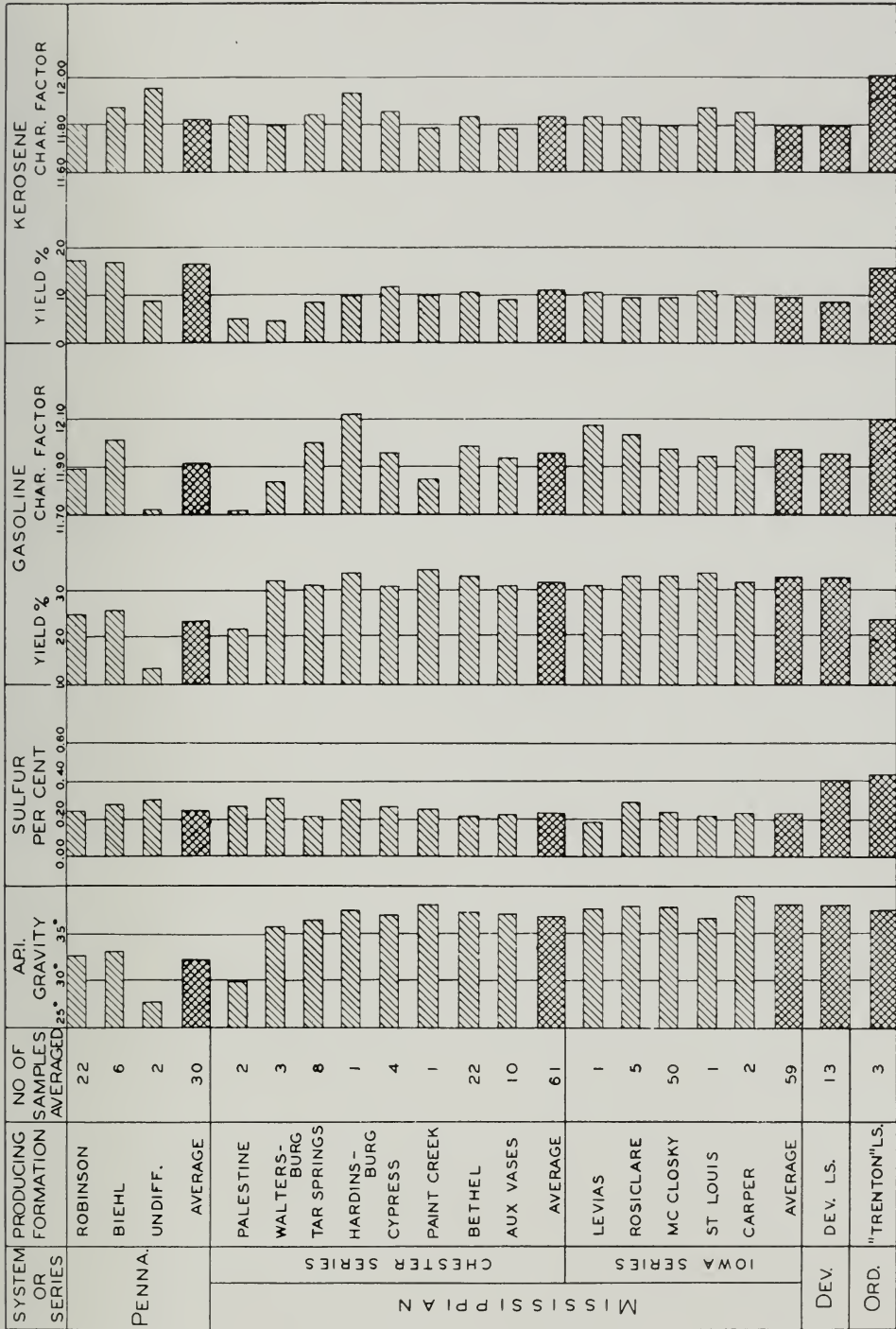


FIG. 4.—Average chemical characteristics of Illinois crude oils from different producing formations.

sulfur content, and gasoline and kerosene yields are shown graphically in figure 4. In general there is a fairly consistent increase in A. P. I. gravity with increase in the geologic age of the producing formation. Gasoline yield shows a tendency to increase and kerosene yield to decrease, with geologic age. Sulfur content does not seem to vary consistently with geologic age. The highest average sulfur content is in oils from the Devonian and Ordovician limestones. The Lower Mississippian oils—mostly from the McClosky oolitic limestone—have an average sulfur content only slightly higher than do the oils from the Chester (Upper Mississippian) sandstones.

Correlation of sulfur content with geographic location.—Figure 5 shows the distribution of higher and lower sulfur crude oils by the counties in which they are produced. For this purpose a dividing value of 0.20 per cent sulfur has been adopted, those sulfur values of 0.20 per cent and above being considered higher and those below 0.20 being considered lower. It appears that higher sulfur crudes are prevalent in the eastern Illinois counties including Crawford, Wabash, White, and Gallatin counties. Immediately west of this zone of higher sulfur crudes we find a predominance of lower sulfur crudes in Richland, Wayne, Hamilton, Franklin, and Washington counties. Continuing east and northeast we find a mixture of higher and lower sulfurs with a decided trend toward a predominance of higher sulfur crude oils. These trends appear to be in general agreement with the trends found by Smith (5) in studying certain Illinois crude oils.

Figure 6 presents the producing fields of Illinois located according to counties.

By comparing figures 5 and 6, general information may be obtained as to the sulfur characteristics of crude oils produced in various fields. Reference to the complete analyses in the appendix will give more exact information.

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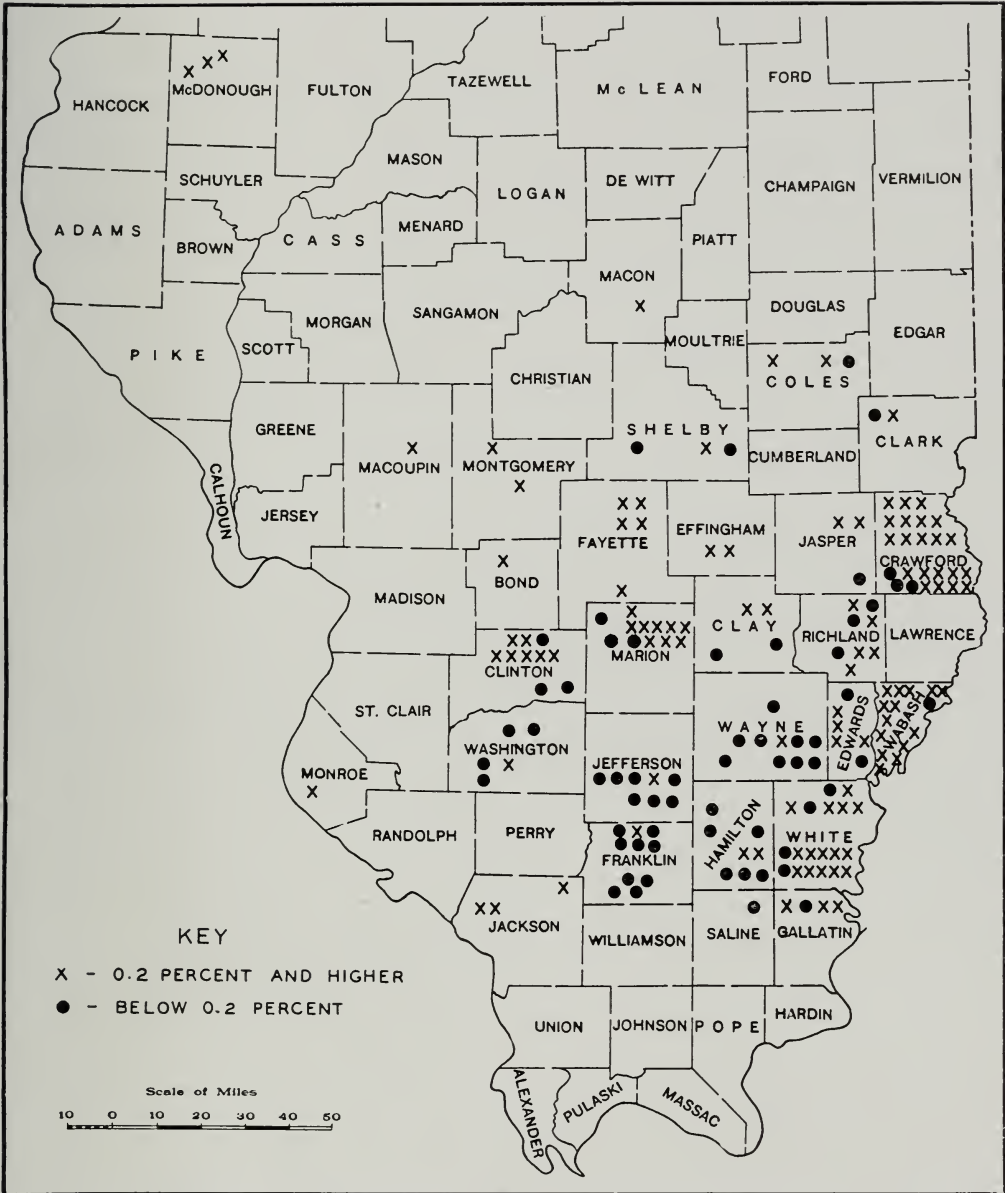


FIG. 5.—Sulfur content of Illinois crude oils, distributed by counties.

INDEX TO POOL NUMBERS

November 1, 1942

Name of Pool—County

- 1 Colmar—Plymouth—McDonough, Hancock * †
- 2 Pittsfield (gas, abd. 1930)—Pike *
- 3 Jacksonville (gas, abd. 1937)—Morgan *
- 4 Carlinville North—Macoupin
- 5 Carlinville (abd. 1925)—Macoupin *
- 6 Spanish Needle Creek (gas, abd. 1934)—Macoupin *
- 7 Plainview—Macoupin
- 8 Gillespie—Wyen—Macoupin *
- 9 Gillespie—Benld (gas, abd. 1935)—Macoupin *
- 10 Staunton (gas, abd. 1919)—Macoupin *
- 11 St. Jacob—Madison
- 12 Collinsville (abd. 1921)—Madison *
- 13 Dupo—St. Clair *
- 14 Waterloo—Monroe * †
- 15 Waggoner—Montgomery
- 16 Raymond—Montgomery
- 17 Litchfield (abd. 1904)—Montgomery *
- 18 Sorento—Bond
- 19 Ayers (gas)—Bond *
- 20 Beaver Creek—Bond
- 21 Woburn—Bond †
- 22 Greenville (gas, abd. 1923)—Bond *
- 23 Boulder—Clinton
- 24 Frogtown (abd. 1933)—Clinton *
- 25 Carlyle—Clinton * †
- 26 Bartelso—Clinton * †
- 27 Posey—Clinton
- 28 Hoffman—Clinton †
- 29 Centralia—Clinton, Marion †
- 30 Centralia West—Clinton
- 31 Irvington—Washington †
- 32 McKinley—Washington
- 33 Cordes—Washington †
- 34 Dubois—Washington †
- 35 Dubois West—Washington
- 36 Sparta (gas, abd. 1900)—Randolph *
- 37 Tamaroa—Perry
- 38 Ava—Campbell Hill (gas, abd. 1934)—Jackson * †
- 39 Elkhville—Jackson
- 40 Lakewood—Shelby
- 41 Stewardson—Shelby †
- 42 Loudon—Fayette, Effingham †
- 43 St. James—Fayette †
- 44 St. Paul—Fayette
- 45 Patoka—Marion †
- 46 Patoka East—Marion
- 47 Alma—Marion
- 48 Fairman—Marion, Clinton †
- 49 Sandoval—Marion * †
- 50 Tonti—Marion †
- 51 Junction City—Marion *
- 52 Salem—Marion †
- 53 Langewisch—Kuester—Marion *
- 54 Brown—Marion *
- 55 Wamac—Marion, Clinton, Washington *
- 56 Cravat—Jefferson †
- 57 Dix—Jefferson, Marion †
- 58 Kell—Jefferson, Marion
- 59 Roaches—Jefferson †
- 60 Woodlawn—Jefferson
- 61 Marcoe (abd. 1941)—Jefferson †
- 62 King—Jefferson
- 63 Markham City—Jefferson
- 64 Elk Prairie (abd. 1940)—Jefferson

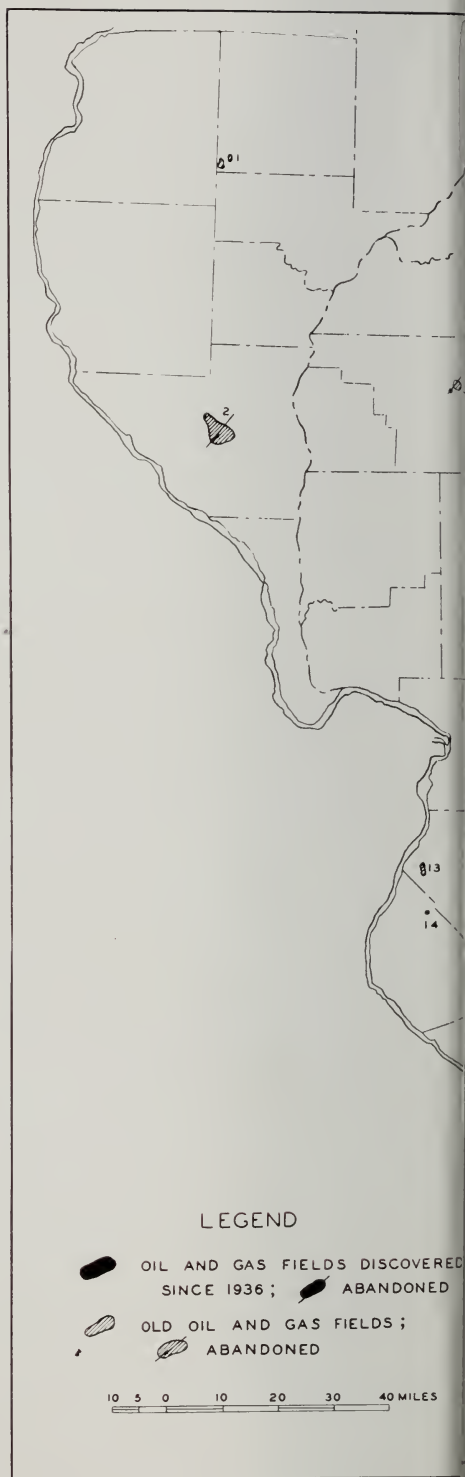
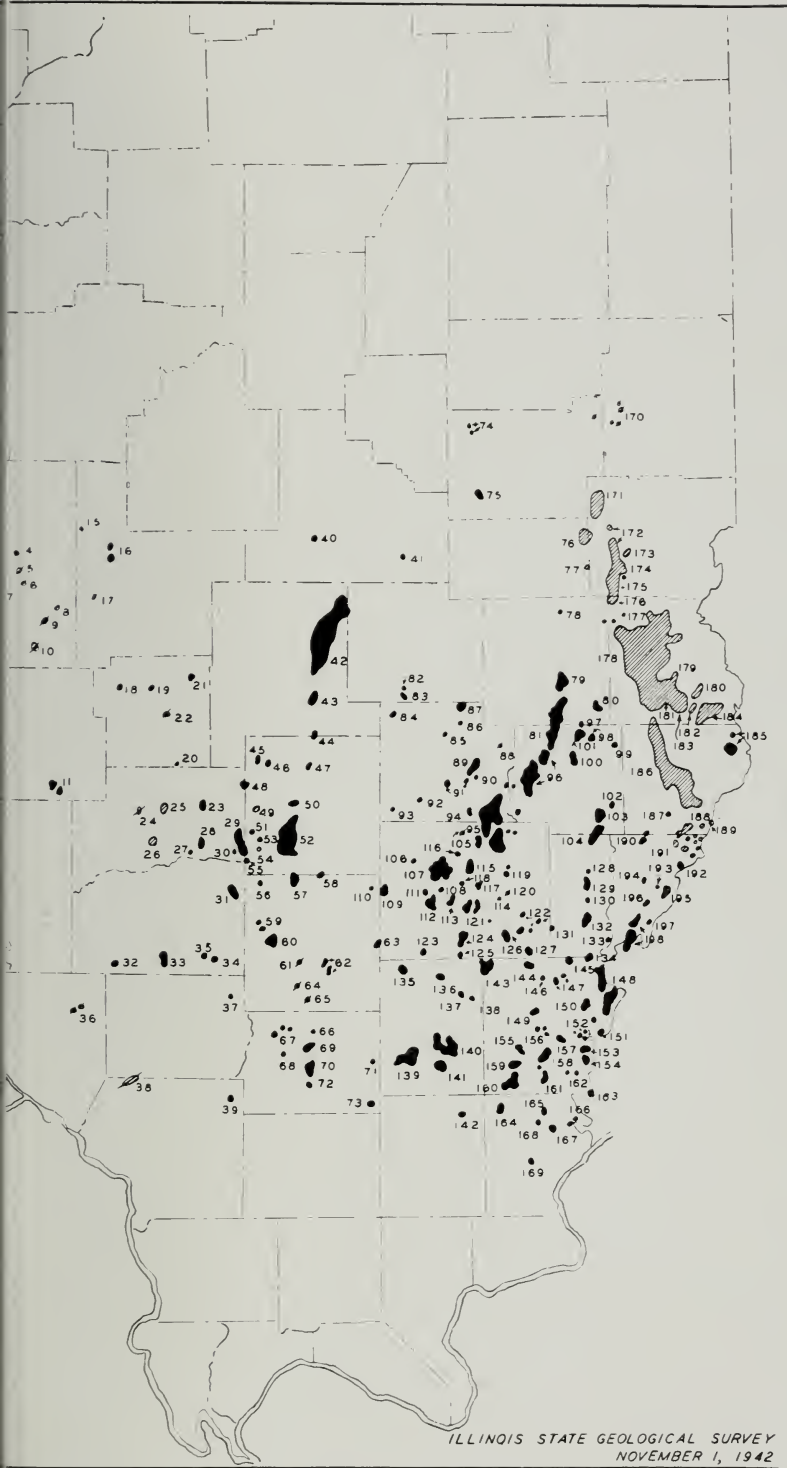


FIG. 6.—Oil an



s fields of Illinois, as of November, 1942.

INDEX TO POOL NUMBERS (Continued)

| <i>Name of Pool—County</i> | <i>Name of Pool—County</i> |
|--------------------------------------|---------------------------------------|
| 65 Ina (abd. 1941)—Jefferson † | 134 Grayville—Edwards, White † |
| 66 Whittington—Franklin † | 135 Dahlgren—Hamilton |
| 67 Sesser—Franklin | 136 Belle Prairie—Hamilton † |
| 68 Valier—Franklin | 137 Blairsville—Hamilton |
| 69 Benton North—Franklin | 138 Bungay—Hamilton † |
| 70 Benton—Franklin | 139 Rural Hill—Hamilton |
| 71 Akin—Franklin | 140 Dale-Hoodville Consol.—Hamilton † |
| 72 West Frankford—Franklin | 141 Walpole—Hamilton |
| 73 Thompsonville—Franklin † | 142 Eldorado—Saline |
| 74 Cooks Mills—Coles | 143 Mill Shoals—White, Hamilton † |
| 75 Mattoon—Coles † | 144 Burnt Prairie—White † |
| 76 Siggins—Cumberland, Clark * | 145 Grayville West—White |
| 77 York—Cumberland * | 146 Centerville—White |
| 78 Hidalgo—Jasper | 147 Centerville East—White |
| 79 Boos North—Jasper † | 148 New Harmony Consol.—White † |
| 80 Ste. Marie—Jasper | 149 Carmi North—White |
| 81 Dundas Consol.—Jasper, Richard † | 150 Phillipstown—White † |
| 82 Mason—Effingham | 151 New Harmony South—White |
| 83 Mason South—Effingham | 152 Maunie North—White |
| 84 Iola—Clay † | 153 Maunie—White |
| 85 Toliver—Clay | 154 Maunie South—White |
| 86 Bible Grove South—Clay | 155 Stokes—White † |
| 87 Bible Grove—Clay | 156 Carmi—White |
| 88 Ingraham (abd. 1942)—Clay | 157 Epworth—White |
| 89 Sailor Springs—Clay | 158 Storms—White † |
| 90 Sailor Springs South—Clay | 159 Iron—White † |
| 91 Flora—Clay † | 160 Roland—White, Gallatin |
| 92 Kenner—Clay | 161 Herald—White |
| 93 Xenia—Clay | 162 Concord—White |
| 94 Clay City West—Clay | 163 New Haven—White |
| 95 Clay City Consol.—Clay, Wayne † | 164 Omaha—Gallatin † |
| 96 Noble—Richland † | 165 Inman North—Gallatin |
| 97 Dundas East—Richland, Jasper | 166 Inman East—Gallatin |
| 98 Stringtown—Richland | 167 Inman—Gallatin † |
| 99 Amity—Richland | 168 Inman West—Gallatin |
| 100 Olney—Richland † | 169 Junction—Gallatin † |
| 101 Schnell—Richland † | 170 Warrentown—Borton—Egar * |
| 102 Bonpas—Richland | 171 Westfield—Clark, Coles * † |
| 103 Bonpas West—Richland | 172 Casey—Clark * |
| 104 Parkersburg—Richland, Edwards | 173 Martinsville—Clark * † |
| 105 Rinard (abd. 1942)—Wayne | 174 North Johnson—Clark * |
| 106 Johnsonville West—Wayne | 175 South Johnson—Clark * |
| 107 Johnsonville—Wayne | 176 Bellair—Crawford, Jasper * |
| 108 Johnsonville South—Wayne | 177 New Bellair—Crawford |
| 109 Coil—Wayne | 178 Main—Crawford * † |
| 110 Coil West—Jefferson | 179 New Hebron—Crawford * |
| 111 Sims North—Wayne | 180 Flat Rock—Crawford * |
| 112 Sims—Wayne | 181 Chapman—Crawford * |
| 113 Covington—Wayne | 182 Allison-Weger—Crawford * |
| 114 Fairfield—Wayne | 183 Parker—Crawford * |
| 115 Cisne—Wayne † | 184 Birds—Crawford, Lawrence * |
| 116 Cisne North—Wayne | 185 Russellville (gas)—Lawrence |
| 117 Geff—Wayne | 186 Lawrence—Lawrence, Crawford * † |
| 118 Geff West—Wayne | 187 Ruark—Lawrence |
| 119 Mt. Erie—Wayne † | 188 St. Francisville—Lawrence * |
| 120 Mt. Erie South (abd. 1941)—Wayne | 189 St. Francisville East—Lawrence |
| 121 Boyleston—Wayne † | 190 Lancaster—Wabash, Lawrence † |
| 122 Goldengate—Wayne † | 191 Allendale—Wabash * † |
| 123 Mayberry—Wayne | 192 Patton—Wabash |
| 124 Aden North—Wayne † | 193 Mt. Carmel West—Wabash |
| 125 Aden—Wayne, Hamilton | 194 Friendsville—Wabash |
| 126 Barnhill—Wayne † | 195 Mt. Carmel—Wabash † |
| 127 Leech Twp.—Wayne † | 196 Maud—Wabash † |
| 128 Samsville—Edwards | 197 Keensburg East—Wabash † |
| 129 Bone Gap—Edwards | 198 Keensburg Consol.—Wabash † |
| 130 Albion North—Edwards | |
| 131 Ellery—Edwards, Wayne | |
| 132 Albion—Edwards † | |
| 133 Cowling—Edwards † | |

* Pools discovered prior to January 1, 1937.

† Pools, samples from which are represented by analyses in this report.

TABLE 3—ANALYTICAL DATA FOR CRUDE OILS ARRANGED ACCORDING TO GEOLOGIC AGE OF PRODUCING STRATA

| Oil-producing Strata | Pool or Field | County | Map Index Number (fig. 6) | Average Depth in feet | Lab. No. | Depth feet | A. P. I. Gravity | Sulfur per cent | GASOLINE | | | KEROSENE | | |
|--|---------------|----------|---------------------------|-----------------------|----------|------------|------------------|-----------------|----------|--------|-------------------------|----------|--------|-------------------------|
| | | | | | | | | | Yield | Sp. G. | Characterization Factor | Yield | Sp. G. | Characterization Factor |
| Pennsylvanian system Robinson sd..... | Main | Crawford | 159 | 900-1000 | 15034 | 925 | 32.2 | 0.26 | 20.4 | 0.751 | 11.98 | 17.9 | 0.815 | 11.90 |
| | Main | Crawford | 159 | ..... | 15035 | 1000 | 33.7 | 0.23 | 28.2 | 0.751 | 11.87 | 18.5 | 0.820 | 11.83 |
| | Main | Crawford | 159 | ..... | 15036 | 887 | 30.0 | 0.28 | 17.2 | 0.770 | 11.74 | 19.3 | 0.825 | 11.75 |
| | Main | Crawford | 159 | ..... | 15037 | ..... | 32.6 | 0.26 | 24.5 | 0.754 | 11.88 | 16.9 | 0.823 | 11.78 |
| | Main | Crawford | 159 | ..... | 15038 | 1000 | 28.7 | 0.25 | 15.5 | 0.766 | 11.83 | 16.3 | 0.831 | 11.67 |
| | Main | Crawford | 159 | ..... | 15039 | 1000 | 32.6 | 0.22 | 25.2 | 0.754 | 11.86 | 16.8 | 0.824 | 11.77 |
| | Main | Crawford | 159 | ..... | 15040 | 1025 | 34.7 | 0.21 | 28.8 | 0.740 | 12.04 | 15.7 | 0.821 | 11.81 |
| | Main | Crawford | 159 | ..... | 15041 | 973 | 32.2 | 0.23 | 21.5 | 0.755 | 11.90 | 17.2 | 0.816 | 11.88 |
| | Main | Crawford | 159 | ..... | 15042 | 900 | 34.3 | 0.19 | 26.6 | 0.736 | 12.13 | 16.0 | 0.813 | 11.88 |
| | Main | Crawford | 159 | ..... | 15043 | 1000 | 32.6 | 0.22 | 23.8 | 0.753 | 11.90 | 17.4 | 0.820 | 11.83 |
| | Main | Crawford | 159 | ..... | 15044 | 1000 | 32.6 | 0.21 | 25.1 | 0.757 | 11.82 | 16.7 | 0.825 | 11.75 |
| | Main | Crawford | 159 | ..... | 15079 | ..... | 30.0 | 0.27 | 20.3 | 0.761 | 11.83 | 16.3 | 0.830 | 11.68 |
| | Main | Crawford | 159 | ..... | 15080 | 1000 | 33.2 | 0.23 | 23.9 | 0.752 | 11.91 | 17.4 | 0.820 | 11.83 |
| | Main | Crawford | 159 | ..... | 15081 | 1020 | 33.5 | 0.23 | 27.8 | 0.752 | 11.86 | 16.2 | 0.823 | 11.78 |
| | Main | Crawford | 159 | ..... | 15083 | 920 | 33.5 | 0.19 | 27.5 | 0.750 | 11.89 | 21.6 | 0.819 | 11.84 |
| | Main | Crawford | 159 | ..... | 15084 | 1006 | 34.7 | 0.19 | 28.8 | 0.745 | 11.96 | 17.8 | 0.818 | 11.85 |
| | Main | Crawford | 159 | ..... | 15085 | 1000 | 34.7 | 0.21 | 30.1 | 0.745 | 11.94 | 16.3 | 0.820 | 11.83 |
| | Main | Crawford | 159 | ..... | 15086 | 900 | 30.4 | 0.23 | 18.6 | 0.760 | 11.87 | 17.1 | 0.820 | 11.83 |
| | Main | Crawford | 159 | ..... | 15087 | 925 | 32.4 | 0.22 | 23.8 | 0.754 | 11.90 | 18.3 | 0.819 | 11.84 |
| | Main | Crawford | 159 | ..... | 15090 | 1000 | 33.6 | 0.23 | 26.3 | 0.752 | 11.82 | 16.2 | 0.824 | 11.77 |
| Main | Crawford | 159 | ..... | 15091 | 1000 | 30.7 | 0.21 | 21.3 | 0.761 | 11.81 | 16.7 | 0.831 | 11.67 | |
| Main | Crawford | 159 | ..... | 15092 | 1000 | 33.6 | 0.23 | 27.7 | 0.744 | 11.99 | 16.7 | 0.821 | 11.81 | |
| Robinson Av.)..... | ..... | ..... | ..... | ..... | ..... | ..... | 32.5 | 0.23 | 24.4 | 0.753 | 11.89 | 17.2 | 0.824 | 11.80 |
| Biehl sd..... | Allendale | Wabash | 173 | 1450 | 14663 | 1510 | 34.7 | 0.30 | 29.0 | 0.738 | 12.07 | 16.3 | 0.818 | 11.85 |
| | Allendale | Wabash | 173 | ..... | 14664 | 1526 | 30.4 | 0.28 | 19.0 | 0.758 | 11.89 | 19.7 | 0.816 | 11.88 |
| | Allendale | Wabash | 173 | ..... | 14665 | 1586 | 28.7 | 0.26 | 17.5 | 0.755 | 11.96 | 19.0 | 0.819 | 11.84 |
| | Allendale | Wabash | 173 | ..... | 14666 | 1580 | 34.7 | 0.21 | 29.4 | 0.738 | 12.06 | 16.0 | 0.816 | 11.88 |

TABLE 3—ANALYTICAL DATA FOR CRUDE OILS ARRANGED ACCORDING TO GEOLOGIC AGE OF PRODUCING STRATA—Continued

| Oil-producing Strata | Pool or Field | County | Map Index Number (fig. 6) | Average Depth in feet | Lab. No. | Depth feet | A. P. I. Gravity | Sulfur per cent | GASOLINE | | | KEROSENE | | | | |
|---|--|-------------------------------|---------------------------|------------------------------|----------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|----------------------------------|----------------------------------|-----------------------------|----------------------------------|----------------------------------|--|--|
| | | | | | | | | | Yield | Sp. G. | Characterization Factor | Yield | Sp. G. | Characterization factor | | |
| | | | | | | | | | | | | | | | | |
| Bieh1 sd. | Allendale | Wabash | 173 | ..... | 14667 | 1366 | 34.9 | 0.25 | 29.0 | 0.733 | 12.15 | 15.6 | 0.817 | 11.87 | | |
| | Allendale | Wabash | 173 | ..... | 14668 | 1513 | 34.5 | 0.32 | 28.7 | 0.736 | 12.10 | 15.6 | 0.815 | 11.90 | | |
| Penn. sd. | Raymond Carlinville North | Montgomery Macoupin | 16 4 | 600 435 | 0-260 0-293 | 598 474 | 34.8 20.3 | 0.22 0.35 | 24.6 1.9 | 0.738 0.817 | 12.14 11.30 | 17.7 0.0 | 0.811 | 11.96 | | |
| | | | | | | | | | | | | | | | | |
| (Penn. sd. Av.) | | | | | | | 27.6 | 0.29 | 13.3 | 0.778 | 11.72 | | | | | |
| (Pennsylvanian Av.) | | | | | | | 32.3 | 0.24 | 23.7 | 0.753 | 11.91 | 16.6 | 0.820 | 11.82 | | |
| Mississippian system Chester (Upper Miss.) series Palestine fm. | Omaha Maunie | Gallatin White | 146 153 | 1670 2010 | 0-257 0-274 | 2136 2018 | 25.9 33.8 | 0.23 0.28 | 14.1 29.4 | 0.789 0.747 | 11.50 11.92 | 0.0 10.1 | 0.811 | 11.84 | | |
| | | | | | | | | | | | | | | | | |
| (Palestine Av.) | | | | | | | 29.9 | 0.26 | 21.8 | 0.768 | 11.71 | | | | | |
| Waltersburg fm. | Junction Storms New Harmony Cons. | Gallatin White White | 150 140 129 | 1794 2230 2150 | 0-181 0-204 0-224 | 1794 2270 2209 | 37.2 32.1 37.6 | 0.22 0.28 0.40 | 33.0 28.1 34.2 | 0.753 0.763 0.730 | 11.77 11.68 12.13 | 4.8 0.0 9.9 | 0.811 0.809 | 11.73 11.87 | | |
| | | | | | | | | | | | | | | | | |
| (Waltersburg Av.) | | | | | | | 35.6 | 0.30 | 31.7 | 0.748 | 11.86 | 3.7 | 0.810 | 11.80 | | |
| Tar Springs fm. | New Harmony Cons. Benton Herald W. Frankfort | White Franklin White Franklin | 129 70 161 72 | 2090 2110 2260 2040 | 0-248 0-263 0-265 0-267 | 2205 2148 2266 2080 | 36.0 41.7 37.2 38.4 | 0.19 0.12 0.24 0.13 | 32.2 34.0 31.9 32.9 | 0.741 0.733 0.735 0.731 | 11.97 12.07 12.07 12.12 | 10.2 10.0 9.6 10.1 | 0.807 0.807 0.814 0.810 | 11.90 11.90 11.80 11.85 | | |

TABLE 3—ANALYTICAL DATA FOR CRUDE OILS ARRANGED ACCORDING TO GEOLOGIC AGE OF PRODUCING STRATA—Continued

| Oil-producing Strata | Pool or Field | County | Map Index Number (fig. 6) | Average Depth in feet | Lab. No. | Depth feet | A. P. I. Gravity | Sulfur per cent | GASOLINE | | | KEROSENE | | |
|------------------------|------------------|----------------------------------|---------------------------|-----------------------|----------|------------|------------------|-----------------|----------|--------|-------------------------|----------|--------|-------------------------|
| | | | | | | | | | Yield | Sp. G. | Characterization Factor | Yield | Sp. G. | Characterization Factor |
| Tar Springs fm., Cont. | New Haven | White | 163 | 2110 | 0-269 | 2129 | 36.4 | 0.27 | 34.8 | 0.735 | 12.01 | 4.5 | 0.815 | 11.67 |
| | Sailor Springs | Clay | 89 | 2330 | 0-297 | 2326 | 37.0 | 0.17 | 31.3 | 0.736 | 12.06 | 9.4 | 0.807 | 11.90 |
| | Inman East | Gallatin | 166 | 2080 | 0-298 | 2081 | 34.6 | 0.24 | 32.0 | 0.737 | 12.04 | 10.6 | 0.812 | 11.83 |
| | Centerville East | White | 147 | 2475 | 0-302 | 2551 | 37.2 | 0.20 | 33.4 | 0.733 | 12.08 | 9.3 | 0.811 | 11.85 |
| | Omaha | Gallatin | 164 | 1880 | 0-319 | 1932 | 27.0 | 0.24 | 13.9 | 0.788 | 11.53 | 0.0 | ..... | ..... |
| (Tar Springs Av.) | ..... | ..... | ..... | ..... | ..... | ..... | 36.2 | 0.20 | 30.7 | 0.741 | 11.99 | 8.2 | 0.810 | 11.84 |
| Hardinsburg fm. | Iron | White | 141 | 2710 | 0-215 | 2528 | 37.2 | 0.29 | 33.1 | 0.732 | 12.11 | 9.6 | 0.805 | 11.93 |
| Cypress fm. | Mattoon | Coles | 68 | 1830 | 0-162 | 1877 | 44.1 | 0.16 | 32.0 | 0.751 | 11.65 | 10.5 | 0.817 | 11.75 |
| Cypress fm. | Keensburg Cons. | Wabash | 179 | 2430 | 0-169 | 2424 | 38.6 | 0.29 | 33.7 | 0.753 | 11.76 | 4.9 | 0.810 | 11.75 |
| Cypress fm. | Barrelso | Clinton | 24 | 980 | 0-175 | 1017 | 36.2 | 0.20 | 32.7 | 0.754 | 11.76 | 11.1 | 0.815 | 11.78 |
| Weiler sd. | Louden | Fayette | 39 | 1470 | 0-184 | 1540 | 36.6 | 0.25 | 29.8 | 0.737 | 12.07 | 9.8 | 0.811 | 11.84 |
| Weiler sd. | St. James | Fayette | 40 | 1600 | 0-192 | 1631 | 34.4 | 0.31 | 26.6 | 0.747 | 11.95 | 9.4 | 0.815 | 11.78 |
| Carlyle sd. | Carlyle | Clinton | 23 | 1030 | 0-199 | 1060 | 35.2 | 0.26 | 30.9 | 0.751 | 11.83 | 4.9 | 0.814 | 11.69 |
| Weiler sd. | Noble | Richland | 84 | 2550 | 0-213 | 2592 | 34.6 | 0.27 | 28.7 | 0.743 | 11.99 | 11.0 | 0.804 | 11.94 |
| Cypress fm. | Dale | Hamilton | 121 | 2680 | 0-220 | 2700 | 37.6 | 0.25 | 32.9 | 0.730 | 12.14 | 15.4 | 0.815 | 11.90 |
| Cypress fm. | Cowling | Edwards | 114 | 2620 | 0-246 | 2640 | 36.6 | 0.23 | 31.3 | 0.732 | 12.13 | 10.5 | 0.806 | 11.91 |
| Weiler sd. | Paroka E. | Marion | 46 | 1350 | 0-270 | 1370 | 36.0 | 0.18 | 31.3 | 0.733 | 12.11 | 10.2 | 0.812 | 11.83 |
| Weiler sd. | Posey | Clinton | 27 | 1100 | 0-273 | 1108 | 35.8 | 0.17 | 30.0 | 0.738 | 12.05 | 10.3 | 0.807 | 11.90 |
| Cypress fm. | Inman E. | Gallatin | 166 | 2430 | 0-299 | 2447 | 35.2 | 0.23 | 30.8 | 0.747 | 11.89 | 10.3 | 0.813 | 11.81 |
| Cypress fm. | Ava-C. H. | Jackson | 35 | 780 | 15088 | 950 | 35.3 | 0.33 | 28.2 | 0.740 | 12.04 | 19.6 | 0.810 | 11.97 |
| Cypress fm. | Ava-C. H. | Jackson | 35 | 780 | 15089 | 950 | 36.9 | 0.35 | 28.4 | 0.743 | 11.99 | 21.0 | 0.804 | 12.06 |
| (Cypress Av.) | ..... | ..... | ..... | ..... | ..... | ..... | 36.7 | 0.25 | 30.5 | 0.743 | 11.95 | 11.4 | 0.811 | 11.85 |
| Paint Creek fm. | Louden | Fayette | 39 | 1530 | 0-209 | 1579 | 37.8 | 0.24 | 33.7 | 0.748 | 11.84 | 9.7 | 0.815 | 11.78 |
| Bethel fm. | Patoka Centralia | Marion { Clinton Marion | 42 | 1420 | 0-142 | 1418 | 37.0 | ..... | 33.0 | 0.734 | 12.08 | 13.0 | 0.813 | 11.93 |
| | | | 27 | 1350 | 0-147 | 1361 | 37.7 | ..... | 35.0 | 0.736 | 12.02 | 14.0 | 0.816 | 11.88 |

TABLE 3—ANALYTICAL DATA FOR CRUDE OILS ARRANGED ACCORDING TO GEOLOGIC AGE OF PRODUCING STRATA—Continued

| Oil-producing Strata | Pool or Field | County | Map Index Number (fig. 6) | Average Depth in feet | Lab. No. | Depth feet | A. P. I. Gravity | Sulfur per cent | GASOLINE | | | KEROSENE | | | | |
|----------------------|------------------------|------------|---------------------------|-----------------------|----------|------------|------------------|-----------------|----------|--------|-------------------------|----------|--------|-------------------------|--|--|
| | | | | | | | | | Yield | Sp. G. | Characterization Factor | Yield | Sp. G. | Characterization Factor | | |
| Bethel fm.—Cont. | Salem | Marion | 49 | 1770 | 0-157 | 1702 | 39.4 | 0.18 | 34.4 | 0.734 | 12.06 | 13.5 | 0.813 | 11.93 | | |
| | Cordes | Washington | 31 | 1260 | 0-173 | 1281 | 37.4 | 0.19 | 32.5 | 0.754 | 11.76 | 10.0 | 0.817 | 11.75 | | |
| | Salem | Marion | 49 | 1770 | 0-174 | 1871 | 38.2 | 0.19 | 33.6 | 0.742 | 11.94 | 9.5 | 0.820 | 11.71 | | |
| | Salem | Marion | 49 | 1770 | 0-177 | 1793 | 38.8 | 0.22 | 34.9 | 0.758 | 11.67 | 4.9 | 0.810 | 11.75 | | |
| | Fairman | (Marion) | | | | | | | | | | | | | | |
| | DuBois | (Clinton) | | | | | | | | | | | | | | |
| | Hoffman | Washington | 32 | 1360 | 0-230 | 1370 | 31.0 | 0.26 | 27.5 | 0.765 | 11.65 | 4.6 | 0.823 | 11.57 | | |
| | Cravat | Clinton | 26 | 1320 | 0-233 | 1329 | 33.2 | 0.21 | 27.6 | 0.748 | 11.93 | 11.7 | 0.805 | 11.93 | | |
| | Dix | Jefferson | 53 | 2070 | 0-238 | 2079 | 35.4 | 0.23 | 31.7 | 0.741 | 11.98 | 10.4 | 0.813 | 11.81 | | |
| | New Harmony Cons. | Jefferson | 54 | 1950 | 0-240 | 1964 | 38.0 | 0.18 | 34.0 | 0.742 | 11.93 | 4.6 | 0.813 | 11.70 | | |
| | Irvington | White | 129 | 2370 | 0-247 | 2719 | 36.0 | 0.24 | 33.6 | 0.738 | 12.00 | 10.5 | 0.810 | 11.85 | | |
| | Woburn | Washington | 29 | 1540 | 0-256 | 1534 | 37.6 | 0.16 | 34.3 | 0.733 | 12.08 | 10.1 | 0.809 | 11.87 | | |
| | McKinley | Bond | 19 | 1010 | 0.259 | 1020 | 36.4 | 0.20 | 29.4 | 0.739 | 12.04 | 9.8 | 0.809 | 11.87 | | |
| | Dale-Hoodville Consol. | Washington | 32 | 980 | 0-261 | 1034 | 44.1 | 0.18 | 42.0 | 0.725 | 12.07 | 10.1 | 0.814 | 11.80 | | |
| | Woodlawn | Hamilton | 140 | 2950 | 0-268 | 2959 | 38.2 | 0.14 | 31.8 | 0.736 | 12.05 | 9.9 | 0.814 | 11.80 | | |
| | Elkville | Jefferson | 60 | 1910 | 0-280 | 2017 | 37.8 | 0.16 | 35.0 | 0.750 | 11.78 | 9.4 | 0.813 | 11.81 | | |
| | Woodlawn | Jackson | 39 | 2200 | 0-285 | 2028 | 35.8 | 0.22 | 28.0 | 0.729 | 12.23 | 16.0 | 0.812 | 11.94 | | |
| | Benton N. | Jefferson | 60 | 1910 | 0-287 | 1991 | 38.2 | 0.16 | 33.8 | 0.733 | 12.07 | 9.8 | 0.805 | 11.93 | | |
| | St. Paul | Franklin | 69 | 2610 | 0-307 | 2623 | 38.4 | 0.15 | 34.6 | 0.732 | 12.07 | 10.5 | 0.811 | 11.84 | | |
| | Centralia West | Fayette | 44 | 1880 | 0-308 | 1909 | 33.2 | 0.21 | 26.5 | 0.743 | 12.03 | 10.3 | 0.808 | 11.88 | | |
| (Bethel Av.) | Clinton | 30 | 1410 | 0-310 | 1441 | 37.8 | 0.17 | 35.0 | 0.729 | 12.12 | 10.1 | 0.809 | 11.87 | | | |
| Mill Shoals | (White) | | | | | | | | | | | | | | | |
| Salem | (Hamilton) | 124 | 3220 | 0-170 | 3258 | 39.8 | 0.14 | 33.8 | 0.756 | 11.71 | 5.3 | 0.823 | 11.56 | | | |
| Stewardson | Marion | 49 | 1840 | 0-176 | 1838 | 38.6 | 0.21 | 33.7 | 0.759 | 11.66 | 4.8 | 0.813 | 11.70 | | | |
| | Shelby | 38 | 1940 | 0-178 | 1969 | 37.8 | 0.18 | 33.5 | 0.750 | 11.81 | 4.6 | 0.812 | 11.72 | | | |

TABLE 3.—ANALYTICAL DATA FOR CRUDE OILS ARRANGED ACCORDING TO GEOLOGIC AGE OF PRODUCING STRATA—Continued

| Oil-producing Strata | Pool or Field | County | Map Index Number (fig. 6) | Average Depth in feet | Lab. No. | Depth feet | A. P. I. Gravity | Sulfur per cent | GASOLINE | | | KEROSENE | | |
|---|------------------------|---------------------|---------------------------|-----------------------|----------|------------|------------------|-----------------|----------|--------|-------------------------|----------|--------|-------------------------|
| | | | | | | | | | Yield | Sp. G. | Characterization Factor | Yield | Sp. G. | Characterization factor |
| Aux Vases fm.—Cont. | Iola | Clay | 77 | 2360 | 0-190 | 2356 | 35.4 | 0.25 | 31.4 | 0.738 | 12.03 | 9.4 | 0.815 | 11.78 |
| | Dale-Hoodville Consol. | Hamilton | 140 | 2970 | 0-272 | 3081 | 39.4 | 0.17 | 33.0 | 0.732 | 12.10 | 9.3 | 0.812 | 11.85 |
| | Lakewood | Shelby | 40 | 1720 | 0-282 | 1735 | 31.7 | 0.23 | 19.0 | 0.764 | 11.81 | 10.8 | 0.810 | 11.85 |
| | Xenia | Clay | 93 | 2790 | 0-292 | 2790 | 35.2 | 0.19 | 31.0 | 0.732 | 12.13 | 9.3 | 0.809 | 11.87 |
| | Cooks Mills | Coles | 74 | 1830 | 0-295 | 1842 | 36.4 | 0.40 | 30.0 | 0.740 | 12.02 | 9.5 | 0.809 | 11.87 |
| | Eldorado | Saline | 142 | 2865 | 0-300 | 2920 | 34.2 | 0.14 | 23.1 | 0.751 | 11.95 | 9.9 | 0.815 | 11.78 |
| | Benton N. | Franklin | 69 | 2690 | 0-304 | 2726 | 39.0 | 0.15 | 34.3 | 0.732 | 12.08 | 16.0 | 0.813 | 11.81 |
| (Aux Vases Av.) | | | | | | | 36.8 | 0.21 | 30.3 | 0.745 | 11.93 | 8.9 | 0.813 | 11.78 |
| (Chester Av.) | | | | | | | 36.5 | 0.22 | 31.2 | 0.743 | 11.95 | 10.9 | 0.812 | 11.83 |
| Iowa (Lower Miss.) series Ste. Genevieve fm. (Levias) | Patoka | Marion | 42 | 1550 | 0-158 | 1612 | 40.9 | 0.31 | 34.6 | 0.735 | 11.97 | 9.9 | 0.807 | 11.90 |
| Rosiclare member | Burnt Prairie | White | 125 | 3260 | 0-223 | 3505 | 37.0 | 0.28 | 34.7 | 0.737 | 12.00 | 10.5 | 0.809 | 11.87 |
| | Mt. Carmel | Wabash | 176 | 2370 | 0-226 | 2408 | 36.6 | 0.36 | 31.5 | 0.747 | 11.89 | 4.9 | 0.820 | 11.60 |
| | Benton N. | Franklin | 69 | 2800 | 0-305 | 2794 | 38.4 | 0.15 | 33.9 | 0.732 | 12.09 | 9.5 | 0.813 | 11.81 |
| | Benton N. | Franklin | 69 | 2710 | 0-306 | 2772 | 37.4 | 0.17 | 30.7 | 0.736 | 12.07 | 10.5 | 0.812 | 11.83 |
| | Alma | Marion | 47 | 2070 | 0-311 | 2101 | 36.2 | 0.26 | 31.0 | 0.729 | 12.18 | 9.9 | 0.804 | 11.94 |
| (Rosiclare Av.) | | | | | | | 37.8 | 0.26 | 32.7 | 0.736 | 12.03 | 9.2 | 0.811 | 11.83 |
| McClosky "lime" | Clay City Cons. | { Clay Wayne | 83 | 2980 | 0-143 | 3002 | 39.0 | ..... | 34.5 | 0.739 | 11.97 | 10.5 | 0.816 | 11.77 |
| | Noble | Richland | 84 | 2960 | 0-144 | 2985 | 39.0 | ..... | 33.0 | 0.740 | 11.98 | 12.1 | 0.814 | 11.80 |
| | Lawrence | Lawrence | 167 | 1700 | 0-148 | 1755 | 41.3 | ..... | 35.2 | 0.752 | 11.76 | 12.3 | 0.819 | 11.72 |
| | Mill Shoals | { White Hamilton | 124 | 3350 | 0-166 | 3380 | 38.0 | 0.16 | 33.7 | 0.766 | 11.57 | 4.7 | 0.819 | 11.62 |

TABLE 3—ANALYTICAL DATA FOR CRUDE OILS ARRANGED ACCORDING TO GEOLOGIC AGE OF PRODUCING STRATA—Continued

| Oil-producing Strata | Pool or Field | County | Map Index Number (fig. 6) | Average Depth in feet | Lab. No. | Depth feet | A. P. I. Gravity | Sulfur per cent | GASOLINE | | | KEROSENE | | | |
|---------------------------|-----------------|------------|---------------------------|-----------------------|----------|------------|------------------|-----------------|----------|--------|-------------------------|----------|--------|-------------------------|--|
| | | | | | | | | | Yield | Sp. G. | Characterization Factor | Yield | Sp. G. | Characterization factor | |
| McClosky "lime"— Cont. | Goldengate | Wayne | 103 | 3370 | 0-168 | 3381 | 34.4 | 0.18 | 24.6 | 0.748 | 11.64 | 4.4 | 0.817 | 11.65 | |
| | Tonti | Marion | 47 | 2130 | 0-172 | 2212 | 39.4 | 0.21 | 34.0 | 0.748 | 11.84 | 4.8 | 0.817 | 11.65 | |
| | Keensburg Cons. | Wabash | 179 | 2710 | 0-180 | 2881 | 37.0 | 0.38 | 33.5 | 0.744 | 11.86 | 4.3 | 0.821 | 11.59 | |
| | Boyleston | Wayne | 102 | 3250 | 0-185 | 3253 | 40.2 | 0.14 | 35.8 | 0.740 | 11.95 | 5.1 | 0.813 | 11.70 | |
| | Grayville | { Edwards | | | | | | | | | | | | | |
| | | { White | | | | | | | | | | | | | |
| | Mt. Erie | Wayne | 115 | 3130 | 0-186 | 3155 | 35.8 | 0.31 | 30.6 | 0.747 | 11.90 | 4.5 | 0.815 | 11.67 | |
| | Cisne | Wayne | 100 | 3080 | 0-191 | 3135 | 39.8 | 0.18 | 33.7 | 0.741 | 11.95 | 4.6 | 0.813 | 11.70 | |
| | North Aden | Wayne | 98 | 3120 | 0-193 | 3141 | 35.8 | 0.24 | 30.5 | 0.753 | 11.79 | 10.4 | 0.817 | 11.75 | |
| | Phillipstown | Wayne | 105 | 3310 | 0-203 | 3408 | 39.0 | 0.17 | 33.2 | 0.742 | 11.94 | 9.5 | 0.818 | 11.74 | |
| | Grayville | { White | | | | | | | | | | | | | |
| | | { Edwards | | | | | | | | | | | | | |
| | Tonti | Marion | 115 | 3130 | 0-207 | 3032 | 31.9 | 0.33 | 30.4 | 0.764 | 11.64 | 5.6 | 0.818 | 11.63 | |
| | Flora | Clay | 47 | 2130 | 0-208 | 2149 | 38.4 | 0.25 | 33.3 | 0.738 | 12.00 | 9.7 | 0.816 | 11.77 | |
| | Whittington* | Franklin | 80 | 2970 | 0-210 | 2983 | 37.2 | 0.24 | 32.6 | 0.748 | 11.86 | 10.1 | 0.817 | 11.75 | |
| | Lancaster | Wabash | 61 | 2870 | 0-212 | 3068 | 37.6 | 0.24 | 34.1 | 0.745 | 11.99 | 10.3 | 0.809 | 11.87 | |
| | E. Keensburg | Wabash | 172 | 2670 | 0-214 | 2741 | 39.8 | 0.28 | 36.0 | 0.727 | 12.11 | 9.6 | 0.809 | 11.87 | |
| | Inman | Wabash | 178 | 2710 | 0-216 | 2714 | 37.6 | 0.26 | 32.3 | 0.732 | 12.12 | 9.4 | 0.810 | 11.85 | |
| | Alb'on | Gallatin | 149 | ..... | 0-217 | 3007 | 38.0 | 0.20 | 31.9 | 0.736 | 12.06 | 9.8 | 0.811 | 11.84 | |
| | Dundas Cons. | Edwards | 113 | 3110 | 0-218 | 3175 | 40.0 | 0.18 | 35.9 | 0.731 | 12.07 | 9.6 | 0.812 | 11.83 | |
| | | { Jasper | | | | | | | | | | | | | |
| | | { Richland | | | | | | | | | | | | | |
| | Schnell | Richland | 74 | 2840 | 0-221 | 2847 | 39.6 | 0.26 | 35.8 | 0.727 | 12.14 | 15.3 | 0.813 | 11.93 | |
| | Olney | Richland | 88 | 3010 | 0-225 | 3036 | 37.0 | 0.19 | 31.0 | 0.749 | 11.86 | 10.4 | 0.818 | 11.74 | |
| | Dundas Cons. | Richland | 86 | 3050 | 0-227 | 3090 | 37.2 | 0.19 | 32.5 | 0.748 | 11.86 | 10.6 | 0.815 | 11.78 | |
| | { Jasper | | | | | | | | | | | | | | |
| | { Richland | | | | | | | | | | | | | | |
| Mattoon | Coles | 74 | 2840 | 0-232 | 2915 | 38.4 | 0.17 | 35.0 | 0.737 | 12.00 | 10.1 | 0.812 | 11.83 | | |
| | | 68 | 2000 | 0-234 | 2026 | 36.6 | 0.29 | 32.6 | 0.738 | 12.02 | 10.6 | 0.811 | 11.84 | | |
| Leech Twp. | Wayne | 108 | 3410 | 0-235 | 3485 | 39.0 | 0.19 | 32.0 | 0.736 | 12.06 | 10.1 | 0.814 | 11.80 | | |
| Barnhill | Wayne | 107 | 3390 | 0-236 | 3411 | 37.6 | 0.17 | 30.9 | 0.748 | 11.88 | 10.3 | 0.819 | 11.72 | | |
| Stokes | White | 137 | 3080 | 0-237 | 3149 | 35.8 | 0.26 | 31.4 | 0.741 | 11.98 | 10.1 | 0.814 | 11.80 | | |

* Production from both McClosky and St. Louis limestones.

TABLE 3.—ANALYTICAL DATA FOR CRUDE OILS ARRANGED ACCORDING TO GEOLOGIC AGE OF PRODUCING STRATA—Continued

| Oil-producing Strata | Pool or Field | County | Map Index Number (fig. 6) | Average Depth in feet | Lab. No. | Depth feet | A. P. I. Gravity | Sulfur per cent | GASOLINE | | | KEROSENE | | |
|---------------------------|-------------------|-----------|---------------------------|-----------------------|----------|------------|------------------|-----------------|----------|--------|-------------------------|----------|--------|-------------------------|
| | | | | | | | | | Yield | Sp. G. | Characterization Factor | Yield | Sp. G. | Characterization factor |
| McClosky "lime"— Cont. | Roaches | Jefferson | 56 | 2200 | 0-242 | 2258 | 37.0 | 0.22 | 32.5 | 0.736 | 12.05 | 9.7 | 0.811 | 11.84 |
| | N. Boos | Jasper | 72 | 2840 | 0-245 | 2882 | 38.6 | 0.20 | 34.9 | 0.734 | 12.05 | 10.5 | 0.811 | 11.84 |
| | New Harmony Cons. | White | 129 | 2930 | 0-250 | 2906 | 39.2 | 0.20 | 34.6 | 0.731 | 12.10 | 10.0 | 0.807 | 11.90 |
| | Maud | Wabash | 177 | 2610 | 0-251 | 2655 | 38.0 | 0.30 | 32.5 | 0.733 | 12.10 | 9.6 | 0.811 | 11.84 |
| | Thompsonville | Franklin | 66 | 3110 | 0-252 | 3113 | 37.8 | 0.16 | 31.2 | 0.728 | 12.20 | 15.9 | 0.806 | 12.03 |
| | (S.) Barnhill | Wayne | 107 | 3390 | 0-253 | 3496 | 46.0 | 0.16 | 48.4 | 0.735 | 12.01 | 12.1 | 0.811 | 11.96 |
| | Bungay | Hamilton | 118 | 3340 | 0-254 | 3446 | 36.8 | 0.24 | 30.3 | 0.738 | 12.05 | 9.3 | 0.808 | 11.88 |
| | Marcoe | Jefferson | 58 | 2750 | 0-255 | 2800 | 23.2 | 0.54 | 5.8 | 0.787 | 11.69 | 3.1 | 0.820 | 11.60 |
| | Belle Prairie | Hamilton | 117 | 3460 | 0-258 | 3506 | 37.0 | 0.12 | 31.5 | 0.732 | 12.13 | 9.0 | 0.811 | 11.84 |
| | Mason | Effingham | 82 | 2490 | 0-262 | 2503 | 38.4 | 0.21 | 31.9 | 0.733 | 12.10 | 9.8 | 0.812 | 11.83 |
| | Bone Gap | Edwards | 129 | 3270 | 0-264 | 3325 | 40.5 | 0.33 | 33.1 | 0.728 | 12.16 | 8.9 | 0.820 | 11.71 |
| | Dahlgren | Hamilton | 135 | 3340 | 0-266 | 3359 | 39.2 | 0.16 | 34.2 | 0.731 | 12.10 | 9.6 | 0.812 | 11.83 |
| | Bonpas | Richland | 102 | 3130 | 0-281 | 3129 | 36.2 | 0.23 | 30.9 | 0.748 | 11.87 | 4.1 | 0.820 | 11.60 |
| | Mayberry | Wayne | 123 | 3380 | 0-288 | 3380 | 38.0 | 0.16 | 33.6 | 0.737 | 12.01 | 9.6 | 0.809 | 11.87 |
| | Johnsonville | Wayne | 107 | 3100 | 0-289 | 3215 | 38.0 | 0.17 | 33.8 | 0.738 | 11.89 | 9.7 | 0.812 | 11.83 |
| Parkersburg | Richland | 104 | 3130 | 0-290 | 3129 | 38.0 | 0.31 | 32.9 | 0.734 | 12.07 | 9.7 | 0.814 | 11.80 | |
| Springtown | Richland | 98 | 3030 | 0-294 | 3033 | 39.8 | 0.24 | 34.5 | 0.735 | 12.03 | 9.5 | 0.811 | 11.84 | |
| Ste. Marie | Jasper | 80 | 2830 | 0-296 | 2935 | 40.2 | 0.14 | 35.5 | 0.731 | 12.08 | 9.7 | 0.809 | 11.87 | |
| Inman N. | Gallatin | 165 | 2870 | 0-301 | 3020 | 36.6 | 0.19 | 32.2 | 0.738 | 12.01 | 10.4 | 0.813 | 11.81 | |
| Centerville | White | 146 | 3340 | 0-303 | 3375 | 36.8 | 0.17 | 35.7 | 0.734 | 12.02 | 10.1 | 0.812 | 11.87 | |
| Main | Crawford | 159 | 1340 | 15082 | 1400 | 33.9 | 0.22 | 28.5 | 0.749 | 11.90 | 15.9 | 0.825 | 11.75 | |
| Oblong "sd." | (McClosky Ave.) | | | | | | 37.8 | 0.22 | 32.7 | 0.741 | 11.97 | 9.3 | 0.814 | 11.79 |
| | St. Louis fm. | Jefferson | 60 | 3000 | 0-241 | 3061 | 36.4 | 0.20 | 33.2 | 0.742 | 11.94 | 10.7 | 0.809 | 11.87 |
| Osage group Carper sd. | Martinsville | Clark | 154 | 1340 | 13658 | 1300 | 38.7 | | 29.8 | 0.748 | 11.89 | 13.6 | | |
| | Martinsville | Clark | 154 | 1340 | 14601 | 1600 | 38.5 | 0.23 | 32.7 | 0.734 | 12.08 | 16.0 | 0.819 | 11.84 |
| (Carper Av.) | | | | | | | 38.6 | 0.23 | 31.2 | 0.741 | 11.98 | 14.8 | 0.819 | 11.84 |
| | (Lower Miss. Av.) | | | | | | 37.8 | 0.22 | 32.6 | 0.741 | 11.97 | 9.5 | 0.813 | 11.79 |

TABLE 3—ANALYTICAL DATA FOR CRUDE OILS ARRANGED ACCORDING TO GEOLOGIC AGE OF PRODUCING STRATA—Continued

| Oil-producing Strata | Pool or Field | County | Map Index Number (fig. 6) | Average Depth in feet | Lab. No. | Depth feet | A. P. I. Gravity | Sulfur per cent | GASOLINE | | | KEROSENE | | | |
|---|------------------------------------|-----------------------|---------------------------|-----------------------|----------|------------|------------------|-----------------|----------|--------|-------------------------|----------|--------|-------------------------|-------|
| | | | | | | | | | Yield | Sp. G. | Characterization Factor | Yield | Sp. G. | Characterization factor | |
| | | | | | | | | | | | | | | | Yield | Sp. G. | Characterization Factor |
| Devonian system Limestone—undifferentiated | Decatur** | Macon | ..... | 2020 | 14600 | ..... | 40.3 | 0.32 | 36.8 | 0.731 | 12.08 | 15.8 | 0.827 | 11.73 | |
| | Sandoval | Marion | 46 | 2920 | 0-156 | 2926 | 39.0 | 0.41 | 31.5 | 0.729 | 12.18 | 13.1 | 0.813 | 11.93 | |
| | Colmar-Plymouth | {McDonough Hancock | 1 | 450 | 0-159 | 450 | 37.6 | 0.38 | 26.6 | 0.729 | 12.25 | 16.6 | 0.806 | 12.03 | |
| | Sandoval | Marion | 46 | 2920 | 0-188 | 3055 | 38.0 | 0.38 | 29.5 | 0.740 | 12.02 | 5.0 | 0.814 | 11.69 | |
| | Prairie Creek | Vigo, Ind. | ..... | 2074 | 0-196 | 2171 | 35.2 | 0.62 | 34.1 | 0.761 | 11.63 | 0.0 | ..... | ..... |  |
| | Siosi | Sullivan, Ind. | ..... | 2100 | 0-197 | 2245 | 46.0 | 0.64 | 50.5 | 0.733 | 11.99 | 5.5 | 0.821 | 11.59 | |
| | Salem | Marion | 49 | 3340 | 0-198 | 3502 | 42.1 | 0.28 | 35.1 | 0.733 | 12.05 | 8.7 | 0.817 | 11.75 | |
| | Bartelso | Clinton | 24 | 2420 | 0-200 | 2431 | 41.5 | 0.27 | 36.6 | 0.736 | 11.99 | 4.7 | 0.813 | 11.70 | |
| | Centralia | Clinton | 27 | 2860 | 0-219 | 2915 | 37.4 | 0.38 | 33.0 | 0.734 | 12.07 | 9.8 | 0.810 | 11.85 | |
| | Boulder | Clinton | 23 | 2585 | 0-286 | 2684 | 27.0 | 0.34 | 15.2 | 0.799 | 11.35 | 0.0 | ..... | ..... |  |
| | Mam | Crawford | 178 | 2794 | 0-291 | 2965 | 37.0 | 0.43 | 32.4 | 0.738 | 12.01 | 4.1 | 0.815 | 11.67 | |
| | Colmar-Plymouth | {McDonough Hancock | 1 | 450 | 0-228 | 520 | 35.2 | 0.29 | 29.1 | 0.750 | 11.87 | 10.2 | 0.814 | 11.80 | |
| | Colmar-Plymouth | {McDonough Hancock | 1 | 450 | 0-229 | 540 | 35.0 | 0.28 | 28.7 | 0.748 | 11.91 | 17.3 | 0.814 | 11.91 | |
| | (Devonian Av.) | | | | | | | 37.8 | 0.39 | 32.2 | 0.743 | 11.95 | 8.5 | 0.815 | 11.79 |
| | Ordovician system "Trenton" ls. | Westfield | Clark | 152 | 2260 | 0-183 | | 38.2 | 0.18 | 29.6 | 0.751 | 11.85 | 10.7 | 0.810 | 11.85 |
| Waterloo | | Monroe | 13 | 410 | 0-231 | 425 | 30.2 | 0.79 | 15.9 | 0.741 | 12.22 | 18.2 | 0.802 | 12.09 | |
| Centralia | | Clinton | 27 | 4020 | 0-239 | 4068 | 43.2 | 0.28 | 34.3 | 0.725 | 12.21 | 17.9 | 0.802 | 12.09 | |
| (Ordovician Av.) | ..... | ..... | ..... | ..... | ..... | ..... | 37.2 | 0.42 | 26.6 | 0.739 | 12.09 | 15.6 | 0.805 | 12.01 | |

** Not commercial production.

APPENDIX

CHEMICAL ANALYSES OF ILLINOIS CRUDE OILS

ARRANGED BY LABORATORY NUMBER

(See Table 3 for cross-index by age of producing formation)

Lab. No. O-209

Oil from: Paint Creek Stray
Chester (Upper Miss.) series
Depth 1579 feet

Fayette County
Sec. 9, T. 7 N., R. 3 E.
Louden field

General Characteristics

Specific gravity: 0.836
Sulfur, per cent: 0.24
Saybolt Universal Viscosity (100°F): 41.0

A. P. I. Gravity: 37.8°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 750.3 First drop, 81° F.

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.5 | 3.5 | 0.675 | 78.1 | — | — | | |
| 2 | 75 | 167 | 3.4 | 6.9 | 0.703 | 69.8 | — | — | 23 | 11.96 |
| 3 | 100 | 212 | 6.0 | 12.9 | 0.729 | 62.6 | — | — | 26 | 11.84 |
| 4 | 125 | 257 | 6.1 | 19.0 | 0.755 | 55.9 | — | — | 29 | 11.69 |
| 5 | 150 | 302 | 5.0 | 24.0 | 0.766 | 53.2 | — | — | 27 | 11.75 |
| 6 | 175 | 347 | 5.4 | 29.4 | 0.784 | 49.0 | — | — | 28 | 11.73 |
| 7 | 200 | 392 | 4.3 | 33.7 | 0.794 | 46.7 | — | — | 27 | 11.80 |
| 8 | 225 | 437 | 4.7 | 38.4 | 0.807 | 43.8 | — | — | 27 | 11.77 |
| 9 | 250 | 482 | 5.0 | 43.4 | 0.822 | 40.6 | — | — | 29 | 11.78 |
| 10 | 275 | 527 | 6.0 | 49.4 | 0.838 | 37.4 | — | — | 32 | 11.74 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.4 | 53.8 | 0.854 | 34.2 | 40 | 10 | 36 | 11.69 |
| 12 | 225 | 437 | 5.5 | 59.3 | 0.863 | 32.5 | 47 | 30 | 36 | 11.73 |
| 13 | 250 | 482 | 4.0 | 63.3 | 0.874 | 30.4 | 57 | 50 | 38 | 11.73 |
| 14 | 275 | 527 | 5.0 | 68.3 | 0.883 | 28.8 | 85 | 65 | 39 | 11.81 |
| 15 | 300 | 572 | 5.2 | 73.5 | 0.896 | 26.4 | 160 | 85 | 42 | 11.79 |

Carbon residue of residuum, 9.4%

Carbon residue of crude, 2.6%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 12.9 | 0.707 | 68.6 | |
| Gasoline and naphtha | 33.7 | 0.748 | 57.7 | |
| Kerosene | 9.7 | 0.815 | 42.1 | |
| Gas oil | 14.6 | 0.850 | 35.0 | below 50 |
| Non-viscous lub. dist. | 8.8 | 0.867-0.885 | 31.7-28.4 | 50-100 |
| Medium lub. dist. | 6.7 | 0.885-0.903 | 28.4-25.2 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 23.4 | 0.964 | 15.3 | |
| Distillation loss | 3.1 | | | |

¹Correlation Index²Characterization Factor

Lab. No. 0-210

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2983 feet

Clay County
Sec. 13, T. 3 N., R. 6 E.
Flora field

General Characteristics

Specific gravity: 0.839
Sulfur, per cent: 0.24
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 37.2°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 748.9 First drop, 74°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.4 | 2.4 | 0.647 | 87.2 | — | — | | |
| 2 | 75 | 167 | 2.4 | 4.8 | 0.687 | 74.5 | — | — | 16 | 12.23 |
| 3 | 100 | 212 | 5.3 | 10.1 | 0.724 | 63.9 | — | — | 23 | 11.93 |
| 4 | 125 | 257 | 6.6 | 16.7 | 0.749 | 57.4 | — | — | 26 | 11.78 |
| 5 | 150 | 302 | 5.5 | 22.2 | 0.766 | 53.2 | — | — | 27 | 11.75 |
| 6 | 175 | 347 | 5.6 | 27.8 | 0.781 | 49.7 | — | — | 27 | 11.77 |
| 7 | 200 | 392 | 4.8 | 32.6 | 0.793 | 46.9 | — | — | 26 | 11.82 |
| 8 | 225 | 437 | 4.9 | 37.5 | 0.808 | 43.6 | — | — | 28 | 11.75 |
| 9 | 250 | 482 | 5.2 | 42.7 | 0.825 | 40.0 | — | — | 31 | 11.74 |
| 10 | 275 | 527 | 5.2 | 48.9 | 0.840 | 37.0 | — | — | 33 | 11.71 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.8 | 53.7 | 0.856 | 33.8 | 40 | 5 | 37 | 11.67 |
| 12 | 225 | 437 | 5.8 | 59.5 | 0.868 | 31.5 | 45 | 20 | 38 | 11.65 |
| 13 | 250 | 482 | 4.6 | 64.1 | 0.881 | 29.1 | 64 | 45 | 41 | 11.65 |
| 14 | 275 | 527 | 5.1 | 69.2 | 0.890 | 27.5 | 90 | 60 | 42 | 11.70 |
| 15 | 300 | 572 | 6.0 | 75.2 | 0.901 | 25.6 | 170 | 75 | 45 | 11.71 |

Carbon residue of residuum, 10.5%

Carbon residue of crude, 2.9%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 10.1 | 0.697 | 71.5 | |
| Gasoline and naphtha | 32.6 | 0.748 | 57.7 | |
| Kerosene | 10.1 | 0.817 | 41.7 | |
| Gas oil | 15.3 | 0.853 | 34.4 | below 50 |
| Non-viscous lub. dist. | 9.4 | 0.872-0.892 | 30.8-27.1 | 50-100 |
| Medium lub. dist. | 6.8 | 0.892-0.905 | 27.1-24.9 | 100-200 |
| Viscous lub. dist. | 1.0 | 0.905-0.907 | 24.9-24.5 | above 200 |
| Residuum | 23.3 | 0.958 | 16.2 | |
| Distillation loss | 1.5 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-211

Oil from: Bethel formation
 Chester (Upper Miss.) series
 Depth 1439 feet

Marion County
 Sec. 18, T. 3 N., R. 1 E.
 Fairman field

General Characteristics

Specific gravity: 0.849
 Sulfur, per cent: 0.27
 Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 35.2°
 Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 748.9 First drop, 85°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.1 | 3.1 | 0.637 | 90.6 | — | — | | |
| 2 | 75 | 167 | 3.0 | 6.1 | 0.680 | 76.6 | — | — | 12 | 12.36 |
| 3 | 100 | 212 | 5.2 | 11.3 | 0.719 | 65.3 | — | — | 21 | 12.02 |
| 4 | 125 | 257 | 6.0 | 17.3 | 0.745 | 58.4 | — | — | 24 | 11.84 |
| 5 | 150 | 302 | 5.1 | 22.4 | 0.765 | 53.5 | — | — | 26 | 11.77 |
| 6 | 175 | 347 | 5.6 | 28.0 | 0.780 | 49.9 | — | — | 26 | 11.79 |
| 7 | 200 | 392 | 4.8 | 32.8 | 0.795 | 46.5 | — | — | 27 | 11.79 |
| 8 | 225 | 437 | 5.3 | 38.1 | 0.810 | 43.2 | — | — | 29 | 11.72 |
| 9 | 250 | 482 | 4.7 | 42.8 | 0.825 | 40.0 | — | — | 31 | 11.74 |
| 10 | 275 | 527 | 6.3 | 49.1 | 0.838 | 37.4 | — | — | 32 | 11.74 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.3 | 53.4 | 0.850 | 35.0 | 40 | 10 | 34 | 11.75 |
| 12 | 225 | 437 | 4.8 | 58.2 | 0.863 | 32.5 | 46 | 30 | 36 | 11.73 |
| 13 | 250 | 482 | 4.7 | 62.9 | 0.875 | 30.2 | 61 | 50 | 38 | 11.72 |
| 14 | 275 | 527 | 4.6 | 67.5 | 0.890 | 27.5 | 85 | 65 | 46 | 11.62 |
| 15 | 300 | 572 | 5.7 | 73.2 | 0.897 | 26.3 | 150 | 85 | 46 | 11.66 |

Carbon residue of residuum, 10.5%

Carbon residue of crude, 2.8%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 11.3 | 0.686 | 74.8 | |
| Gasoline and naphtha | 32.8 | 0.741 | 59.5 | |
| Kerosene | 10.0 | 0.817 | 41.7 | |
| Gas oil | 14.3 | 0.848 | 35.4 | below 50 |
| Non-viscous lub. dist. | 9.4 | 0.866-0.892 | 31.9-27.1 | 50-100 |
| Medium lub. dist. | 6.7 | 0.892-0.901 | 27.1-25.6 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 26.0 | 0.961 | 15.7 | |
| Distillation loss | 0.8 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-212

Oil from: St. Louis ls. and McClosky "lime"
Iowa (Lower Miss.) series
Depth 3068 feet

Franklin County
Sec. 19, T. 5 S., R. 3 E
Whittington field

General Characteristics

Specific gravity: 0.837
Sulfur, per cent: 0.24
Saybolt Universal Viscosity (100°F): 39.0

A.P.I. Gravity: 37.6°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 758.4 First drop, 79°F | | | | | | | |
|------------------------------|-----------|-----|--|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | 2.8 | 2.8 | 0.647 | 87.2 | — | — | | |
| 2 | 75 | 167 | 3.8 | 6.6 | 0.695 | 72.1 | — | — | 19 | 12.10 |
| 3 | 100 | 212 | 4.4 | 11.0 | 0.737 | 60.5 | — | — | 29 | 11.71 |
| 4 | 125 | 257 | 6.8 | 17.8 | 0.748 | 57.7 | — | — | 26 | 11.80 |
| 5 | 150 | 302 | 5.6 | 23.4 | 0.761 | 54.5 | — | — | 24 | 11.83 |
| 6 | 175 | 347 | 5.7 | 29.1 | 0.775 | 51.1 | — | — | 24 | 11.87 |
| 7 | 200 | 392 | 5.0 | 34.1 | 0.790 | 47.6 | — | — | 25 | 11.87 |
| 8 | 225 | 437 | 5.1 | 39.2 | 0.802 | 44.9 | — | — | 25 | 11.85 |
| 9 | 250 | 482 | 5.2 | 44.4 | 0.815 | 42.1 | — | — | 26 | 11.87 |
| 10 | 275 | 527 | 6.6 | 51.0 | 0.835 | 38.0 | — | — | 31 | 11.78 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.9 | 54.9 | 0.851 | 34.8 | 39 | 10 | 34 | 11.74 |
| 12 | 225 | 437 | 5.1 | 60.0 | 0.863 | 32.5 | 45 | 30 | 36 | 11.73 |
| 13 | 250 | 482 | 5.0 | 65.0 | 0.870 | 31.1 | 56 | 50 | 36 | 11.79 |
| 14 | 275 | 527 | 4.7 | 69.7 | 0.882 | 28.9 | 80 | 65 | 39 | 11.82 |
| 15 | 300 | 572 | 6.0 | 75.7 | 0.895 | 26.6 | 150 | 80 | 42 | 11.80 |

Carbon residue of residuum, 8.1%

Carbon residue of crude, 2.1%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 11.0 | 0.700 | 70.6 | |
| Gasoline and naphtha | 34.1 | 0.745 | 58.4 | |
| Kerosene | 10.3 | 0.809 | 43.4 | |
| Gas oil | 15.4 | 0.848 | 35.4 | below 50 |
| Non-viscous lub. dist. | 9.1 | 0.866-0.886 | 31.9-28.2 | 50-100 |
| Medium lub. dist. | 6.8 | 0.866-0.902 | 28.2-25.4 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 22.3 | 0.952 | 17.1 | |
| Distillation loss | 2.0 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-213

Oil from: Weiler sand
 Chester (Upper Miss.) series
 Depth 2592 feet

Richland County
 Sec. 4, T. 4 N., R. 9 E.
 Noble field

General Characteristics

Specific gravity: 0.852
 Sulfur, per cent: 0.27
 Saybolt Universal Viscosity (100°F): 48.0

A.P.I. Gravity: 34.6°
 Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 753.2 First drop, 100°F | | | | | | | |
|------------------------------|-----------|-----------|---|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | 0.5 | 0.5 | 0.678 | 77.2 | — | — | | |
| 2 | 75 | 167 | 3.1 | 3.6 | 0.692 | 73.0 | — | — | 18 | 12.15 |
| 3 | 100 | 212 | 2.3 | 5.9 | 0.713 | 67.0 | — | — | 18 | 12.13 |
| 4 | 125 | 257 | 5.9 | 11.8 | 0.730 | 62.3 | — | — | 17 | 12.08 |
| 5 | 150 | 302 | 6.0 | 17.8 | 0.748 | 57.7 | — | — | 18 | 12.03 |
| 6 | 175 | 347 | 5.8 | 23.6 | 0.765 | 53.5 | — | — | 19 | 12.01 |
| 7 | 200 | 392 | 5.1 | 28.7 | 0.778 | 50.4 | — | — | 19 | 12.05 |
| 8 | 225 | 437 | 5.4 | 34.1 | 0.795 | 46.5 | — | — | 22 | 11.97 |
| 9 | 250 | 482 | 5.6 | 39.7 | 0.813 | 42.5 | — | — | 25 | 11.90 |
| 10 | 275 | 527 | 7.0 | 46.7 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.9 | 50.6 | 0.842 | 36.6 | 39 | 5 | 30 | 11.86 |
| 12 | 225 | 437 | 5.7 | 56.3 | 0.852 | 34.6 | 44 | 25 | 31 | 11.88 |
| 13 | 250 | 482 | 5.6 | 61.9 | 0.865 | 32.1 | 57 | 45 | 34 | 11.86 |
| 14 | 275 | 527 | 4.9 | 66.8 | 0.874 | 30.4 | 85 | 70 | 39 | 11.82 |
| 15 | 300 | 572 | 6.2 | 73.0 | 0.890 | 27.5 | 150 | 85 | 43 | 11.76 |

Carbon residue of residuum, 10.7%

Carbon residue of crude, 3.3%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 5.9 | 0.699 | 70.9 | |
| Gasoline and naphtha | 28.7 | 0.743 | 59.0 | |
| Kerosene | 11.0 | 0.804 | 44.5 | |
| Gas oil | 16.4 | 0.842 | 36.6 | below 50 |
| Non-viscous lub. dist. | 9.5 | 0.858-0.877 | 33.4-29.8 | 50-100 |
| Medium lub. dist. | 7.4 | 0.877-0.899 | 29.8-25.9 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 26.6 | 0.958 | 16.2 | |
| Distillation loss | 0.4 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-214

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2741 feet

Wabash County
Sec. 4, T. 1 N., R. 13 W.
Lancaster field

General Characteristics

Specific gravity: 0.826
Sulfur, per cent: 0.28
Saybolt Universal Viscosity (100°F): 40.0

A.P.I. Gravity: 39.8°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | | Barometer Reading 749.8 First drop, 78°F | | | | | | |
|------------------------------|-----------|-----------|--------------|--|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | 4.7 | 4.7 | 0.630 | 93.1 | — | — | | |
| 2 | 75 | 167 | 3.3 | 8.0 | 0.672 | 79.1 | — | — | 8.4 | 12.56 |
| 3 | 100 | 212 | 5.8 | 13.8 | 0.710 | 67.8 | — | — | 17 | 12.17 |
| 4 | 125 | 257 | 6.7 | 20.5 | 0.735 | 61.0 | — | — | 19 | 11.99 |
| 5 | 150 | 302 | 5.4 | 25.9 | 0.755 | 55.9 | — | — | 21 | 11.91 |
| 6 | 175 | 347 | 5.3 | 31.2 | 0.770 | 52.3 | — | — | 22 | 11.94 |
| 7 | 200 | 392 | 4.8 | 36.0 | 0.787 | 48.3 | — | — | 23 | 11.91 |
| 8 | 225 | 437 | 5.0 | 41.0 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 4.6 | 45.6 | 0.815 | 42.1 | — | — | 26 | 11.87 |
| 10 | 275 | 527 | 5.9 | 51.5 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|---------|----|-------|
| 11 | 200 | 392 | 4.1 | 55.6 | 0.847 | 35.6 | 39 | below 5 | 32 | 11.80 |
| 12 | 225 | 437 | 4.3 | 59.9 | 0.854 | 34.2 | 45 | 30 | 32 | 11.86 |
| 13 | 250 | 482 | 4.4 | 64.3 | 0.864 | 32.3 | 54 | 45 | 33 | 11.87 |
| 14 | 275 | 527 | 4.5 | 68.8 | 0.878 | 29.7 | 90 | 65 | 40 | 11.77 |
| 15 | 300 | 572 | 5.3 | 74.1 | 0.885 | 28.4 | 160 | 85 | 41 | 11.82 |

Carbon residue of residuum, 7.1%

Carbon residue of crude, 1.9%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 13.8 | 0.674 | 78.4 | |
| Gasoline and naphtha | 36.0 | 0.727 | 63.1 | |
| Kerosene | 9.6 | 0.809 | 43.4 | |
| Gas oil | 14.6 | 0.844 | 36.2 | below 50 |
| Non-viscous lub. dist. | 7.1 | 0.860-0.878 | 33.0-29.7 | 50-100 |
| Medium lub. dist. | 6.8 | 0.878-0.889 | 29.7-27.7 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 22.6 | 0.942 | 18.7 | |
| Distillation loss | 3.3 | | | |

Correlation Index

Characterization Factor

Lab. No. O-215

Oil from: Hardinsburg formation
 Chester (Upper Miss.) series
 Depth 2528 feet

White County
 Sec. 25, T. 6 S., R. 8 E.
 Iron field

General Characteristics

Specific gravity: 0.839
 Sulfur, per cent: 0.29
 Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 37.2°
 Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 751.3 First drop, 81°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 103°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.6 | 3.6 | 0.628 | 93.8 | — | — | | |
| 2 | 75 | 167 | 2.6 | 6.2 | 0.678 | 77.2 | — | — | 11 | 12.40 |
| 3 | 100 | 212 | 5.4 | 11.6 | 0.711 | 67.5 | — | — | 17 | 12.16 |
| 4 | 125 | 257 | 6.2 | 17.8 | 0.736 | 60.7 | — | — | 20 | 11.97 |
| 5 | 150 | 302 | 5.4 | 23.2 | 0.753 | 56.4 | — | — | 20 | 11.95 |
| 6 | 175 | 347 | 5.1 | 28.3 | 0.773 | 51.5 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 4.8 | 33.1 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 4.7 | 37.8 | 0.799 | 45.6 | — | — | 24 | 11.90 |
| 9 | 250 | 482 | 4.9 | 42.7 | 0.810 | 43.2 | — | — | 23 | 11.94 |
| 10 | 275 | 527 | 5.8 | 48.5 | 0.827 | 39.6 | — | — | 27 | 11.88 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.4 | 52.9 | 0.843 | 36.4 | 39 | 5 | 30 | 11.84 |
| 12 | 225 | 437 | 4.7 | 57.6 | 0.853 | 34.4 | 46 | 30 | 31 | 11.87 |
| 13 | 250 | 482 | 4.7 | 62.3 | 0.867 | 31.7 | 56 | 50 | 35 | 11.83 |
| 14 | 275 | 527 | 4.6 | 66.9 | 0.881 | 29.1 | 90 | 70 | 41 | 11.73 |
| 15 | 300 | 572 | 5.8 | 72.7 | 0.890 | 27.5 | 160 | 90 | 43 | 11.76 |

Carbon residue of residuum, 10.7%

Carbon residue of crude, 3.1%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 11.6 | 0.678 | 77.2 | |
| Gasoline and naphtha | 33.1 | 0.732 | 61.8 | |
| Kerosene | 9.6 | 0.805 | 44.3 | |
| Gas oil | 14.5 | 0.840 | 37.0 | below 50 |
| Non-viscous lub. dist. | 8.1 | 0.859-0.882 | 33.2-28.9 | 50-100 |
| Medium lub. dist. | 7.4 | 0.882-0.895 | 28.9-26.6 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 24.5 | 0.966 | 15.0 | |
| Distillation loss | 2.8 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-216

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2714 feet

Wabash County
Sec. 11, T. 2 S., R. 13 W
East Keensburg field

General Characteristics

Specific gravity: 0.837
Sulfur, per cent: 0.26
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 37.6°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 747.9 First drop, 79°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.3 | 3.3 | 0.628 | 93.8 | — | — | | |
| 2 | 75 | 167 | 3.1 | 6.4 | 0.662 | 82.2 | — | — | 3.7 | 12.79 |
| 3 | 100 | 212 | 4.6 | 11.0 | 0.717 | 65.9 | — | — | 20 | 12.06 |
| 4 | 125 | 257 | 6.3 | 17.3 | 0.738 | 60.2 | — | — | 21 | 11.94 |
| 5 | 150 | 302 | 5.2 | 22.5 | 0.758 | 55.2 | — | — | 23 | 11.87 |
| 6 | 175 | 347 | 5.1 | 27.6 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 4.7 | 32.3 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 4.5 | 36.8 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 4.9 | 41.7 | 0.817 | 41.7 | — | — | 27 | 11.84 |
| 10 | 275 | 527 | 5.7 | 47.4 | 0.828 | 39.4 | — | — | 27 | 11.87 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.2 | 51.6 | 0.842 | 36.6 | 40 | 10 | 30 | 11.86 |
| 12 | 225 | 437 | 5.1 | 56.7 | 0.850 | 35.0 | 45 | 30 | 30 | 11.91 |
| 13 | 250 | 482 | 4.9 | 61.6 | 0.863 | 32.5 | 59 | 55 | 33 | 11.88 |
| 14 | 275 | 527 | 4.5 | 66.1 | 0.872 | 30.8 | 85 | 70 | 38 | 11.84 |
| 15 | 300 | 572 | 6.0 | 72.1 | 0.882 | 28.9 | 160 | 85 | 39 | 11.86 |

Carbon residue of residuum, 5.2%

Carbon residue of crude, 1.6%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-------------|
| Light gasoline | 11.0 | 0.675 | 78.1 | |
| Gasoline and naphtha | 32.3 | 0.732 | 61.8 | |
| Kerosene | 9.4 | 0.810 | 43.2 | |
| Gas oil | 14.3 | 0.839 | 37.2 | below 50 |
| Non-viscous lub. dist. | 8.9 | 0.855-0.874 | 34.0-30.4 | ■ 50-100 |
| Medium lub. dist. | 6.9 | 0.874-0.887 | 30.4-28.0 | ■ 100-200 |
| Viscous lub. dist. | 0.3 | 0.887-0.888 | 28.0-27.9 | ■ above 200 |
| Residuum | 27.0 | 0.938 | 19.4 | |
| Distillation loss | 0.9 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-217

Oil from: Rosiclare member
Iowa (Lower Miss.) series
Depth 3007 feet

Gallatin County
Sec. 25, T. 8 S., R. 9 E.
Extension to Inman field; well abd.

General Characteristics

Specific gravity: 0.835
Sulfur, per cent: 0.20
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 38.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 752.1 First drop, 79°F | | | | | | | |
|------------------------------|-----------|-----|--|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | 3.2 | 3.2 | 0.632 | 92.4 | — | — | | |
| 2 | 75 | 167 | 2.4 | 5.6 | 0.679 | 76.9 | — | — | 12 | 12.38 |
| 3 | 100 | 212 | 5.1 | 10.7 | 0.723 | 64.2 | — | — | 23 | 11.95 |
| 4 | 125 | 257 | 6.2 | 16.9 | 0.740 | 59.7 | — | — | 22 | 11.91 |
| 5 | 150 | 302 | 5.3 | 22.2 | 0.755 | 55.9 | — | — | 21 | 11.91 |
| 6 | 175 | 347 | 4.9 | 27.1 | 0.770 | 52.3 | — | — | 22 | 11.94 |
| 7 | 200 | 392 | 4.8 | 31.9 | 0.785 | 48.8 | — | — | 23 | 11.94 |
| 8 | 225 | 437 | 4.9 | 36.8 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 4.9 | 41.7 | 0.818 | 41.5 | — | — | 27 | 11.83 |
| 10 | 275 | 527 | 6.0 | 47.7 | 0.829 | 39.2 | — | — | 28 | 11.86 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.8 | 51.5 | 0.838 | 37.4 | 40 | 10 | 28 | 11.92 |
| 12 | 225 | 437 | 5.1 | 56.6 | 0.850 | 35.0 | 46 | 25 | 30 | 11.91 |
| 13 | 250 | 482 | 5.1 | 61.7 | 0.860 | 33.0 | 57 | 55 | 31 | 11.92 |
| 14 | 275 | 527 | 4.8 | 66.5 | 0.872 | 30.8 | 90 | 75 | 38 | 11.84 |
| 15 | 300 | 572 | 6.5 | 73.0 | 0.880 | 29.3 | 140 | 85 | 38 | 11.88 |

Carbon residue of residuum, 4.7%

Carbon residue of crude, 1.4%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 10.7 | 0.686 | 74.8 | |
| Gasoline and naphtha | 31.9 | 0.736 | 60.8 | |
| Kerosene | 9.8 | 0.811 | 43.0 | |
| Gas oil | 14.3 | 0.838 | 37.4 | below 50 |
| Non-viscous lub. dist. | 9.2 | 0.854-0.873 | 34.2-30.6 | 50-100 |
| Medium lub. dist. | 7.8 | 0.873-0.885 | 30.6-28.4 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 26.0 | 0.933 | 20.2 | |
| Distillation loss | 1.0 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-218

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3175 feet

Edwards County
Sec. 24, T. 2 S., R. 10 E.
Albion field

General Characteristics

Specific gravity: 0.825
Sulfur, per cent: 0.18
Saybolt Universal Viscosity (100°F): 40.0

A.P.I. Gravity: 40.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 749.7 First drop, 80°F

| Fraction No. 1 | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|----------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 4.7 | 4.7 | 0.637 | 90.6 | — | — | | |
| 2 | 75 | 167 | 3.9 | 8.6 | 0.672 | 79.1 | — | — | 8.4 | 12.56 |
| 3 | 100 | 212 | 5.4 | 14.0 | 0.722 | 64.5 | — | — | 22 | 11.96 |
| 4 | 125 | 257 | 6.7 | 20.7 | 0.743 | 59.0 | — | — | 23 | 11.86 |
| 5 | 150 | 302 | 5.4 | 26.1 | 0.760 | 54.7 | — | — | 24 | 11.84 |
| 6 | 175 | 347 | 5.3 | 31.4 | 0.775 | 51.1 | — | — | 24 | 11.87 |
| 7 | 200 | 392 | 4.5 | 35.9 | 0.790 | 47.6 | — | — | 25 | 11.87 |
| 8 | 225 | 437 | 4.7 | 40.6 | 0.805 | 44.3 | — | — | 26 | 11.80 |
| 9 | 250 | 482 | 4.9 | 45.5 | 0.818 | 41.5 | — | — | 27 | 11.83 |
| 10 | 275 | 527 | 5.7 | 51.2 | 0.832 | 38.6 | — | — | 29 | 11.82 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.0 | 55.2 | 0.843 | 36.4 | 40 | 5 | 30 | 11.84 |
| 12 | 225 | 437 | 4.5 | 59.7 | 0.853 | 34.4 | 47 | 25 | 31 | 11.87 |
| 13 | 250 | 482 | 4.2 | 63.9 | 0.867 | 31.7 | 65 | 45 | 35 | 11.83 |
| 14 | 275 | 527 | 3.9 | 67.8 | 0.876 | 30.0 | 95 | 65 | 39 | 11.81 |
| 15 | 300 | 572 | 5.3 | 73.1 | 0.890 | 27.5 | 180 | 80 | 43 | 11.76 |

Carbon residue of residuum, 6.3%

Carbon residue of crude, 1.7%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 14.0 | 0.680 | 76.6 | |
| Gasoline and naphtha | 35.9 | 0.731 | 62.1 | |
| Kerosene | 9.6 | 0.812 | 42.8 | |
| Gas oil | 12.7 | 0.840 | 37.0 | below 50 |
| Non-viscous lub. dist. | 8.0 | 0.855-0.877 | 34.0-29.8 | 50-100 |
| Medium lub. dist. | 5.4 | 0.877-0.893 | 29.8-27.0 | 100-200 |
| Viscous lub. dist. | 1.5 | 0.893-0.898 | 27.0-26.1 | above 200 |
| Residuum | 23.2 | 0.945 | 18.2 | |
| Distillation loss | 3.7 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-219

Oil from: Undifferentiated limestone
Devonian system
Depth 2915 feet

Clinton County
Sec. 13, T. 1 N., R. 1 W.
Centralia field

General Characteristics

Specific gravity: 0.838
Sulfur, per cent: 0.38
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 37.4°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 748.7 First drop, 89°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.0 | 2.0 | 0.632 | 92.4 | — | — | | |
| 2 | 75 | 167 | 4.2 | 6.2 | 0.675 | 78.1 | — | — | 9.8 | 12.48 |
| 3 | 100 | 212 | 5.8 | 12.0 | 0.715 | 66.4 | — | — | 19 | 12.10 |
| 4 | 125 | 257 | 4.8 | 16.8 | 0.735 | 61.0 | — | — | 19 | 11.99 |
| 5 | 150 | 302 | 5.8 | 22.6 | 0.750 | 57.2 | — | — | 19 | 12.00 |
| 6 | 175 | 347 | 5.6 | 28.2 | 0.768 | 52.8 | — | — | 21 | 11.97 |
| 7 | 200 | 392 | 4.8 | 33.0 | 0.790 | 47.6 | — | — | 25 | 11.87 |
| 8 | 225 | 437 | 4.9 | 37.9 | 0.804 | 44.5 | — | — | 26 | 11.81 |
| 9 | 250 | 482 | 4.9 | 42.8 | 0.815 | 42.1 | — | — | 26 | 11.87 |
| 10 | 275 | 527 | 6.6 | 49.4 | 0.828 | 39.4 | — | — | 27 | 11.87 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.1 | 53.5 | 0.840 | 37.0 | 40 | 5 | 29 | 11.89 |
| 12 | 225 | 437 | 5.1 | 58.6 | 0.853 | 34.4 | 47 | 25 | 31 | 11.87 |
| 13 | 250 | 482 | 4.8 | 63.4 | 0.863 | 32.5 | 61 | 50 | 33 | 11.88 |
| 14 | 275 | 527 | 4.4 | 67.8 | 0.876 | 30.0 | 85 | 70 | 39 | 11.81 |
| 15 | 300 | 572 | 6.4 | 74.2 | 0.885 | 28.4 | 170 | 90 | 41 | 11.82 |

Carbon residue of residuum, 6.7%

Carbon residue of crude, 1.9%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 12.0 | 0.687 | 74.5 | |
| Gasoline and naphtha | 33.0 | 0.734 | 61.3 | |
| Kerosene | 9.8 | 0.810 | 43.2 | |
| Gas oil | 14.4 | 0.837 | 37.6 | below 50 |
| Non-viscous lub. dist. | 9.4 | 0.855-0.878 | 34.0-29.7 | 50-100 |
| Medium lub. dist. | 6.2 | 0.878-0.888 | 29.7-27.9 | 100-200 |
| Viscous lub. dist. | 1.4 | 0.888-0.890 | 27.9-27.5 | above 200 |
| Residuum | 24.8 | 0.942 | 18.7 | |
| Distillation loss | 1.0 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-220

Oil from: Cypress formation
Chester (Upper Miss.) series
Depth 2700 feet

Hamilton County
Sec. 6, T. 6 S., R. 7 E.
Dale field

General Characteristics

Specific gravity: 0.837
Sulfur, per cent: 0.25
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 37.6°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 750.3 First drop, 88°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.6 | 3.6 | 0.634 | 91.7 | — | — | | |
| 2 | 75 | 167 | 3.1 | 6.7 | 0.668 | 80.3 | — | — | 6.5 | 12.65 |
| 3 | 100 | 212 | 5.4 | 12.1 | 0.716 | 66.1 | — | — | 19 | 12.08 |
| 4 | 125 | 257 | 5.6 | 17.7 | 0.735 | 61.0 | — | — | 19 | 11.99 |
| 5 | 150 | 302 | 5.4 | 23.1 | 0.753 | 56.4 | — | — | 20 | 11.95 |
| 6 | 175 | 347 | 5.3 | 28.4 | 0.768 | 52.8 | — | — | 21 | 11.97 |
| 7 | 200 | 392 | 4.5 | 32.9 | 0.786 | 48.5 | — | — | 23 | 11.92 |
| 8 | 225 | 437 | 4.7 | 37.6 | 0.801 | 45.2 | — | — | 24 | 11.87 |
| 9 | 250 | 482 | 4.7 | 42.3 | 0.816 | 41.9 | — | — | 26 | 11.86 |
| 10 | 275 | 527 | 6.0 | 48.3 | 0.825 | 40.0 | — | — | 26 | 11.91 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.0 | 52.3 | 0.843 | 36.4 | 39 | 10 | 30 | 11.84 |
| 12 | 225 | 437 | 4.6 | 56.9 | 0.853 | 34.4 | 45 | 30 | 31 | 11.87 |
| 13 | 250 | 482 | 4.7 | 61.6 | 0.863 | 32.5 | 57 | 55 | 33 | 11.88 |
| 14 | 275 | 527 | 4.6 | 66.2 | 0.876 | 30.0 | 85 | 75 | 39 | 11.81 |
| 15 | 300 | 572 | 5.6 | 71.8 | 0.885 | 28.4 | 150 | 90 | 41 | 11.82 |

Carbon residue of residuum, 9.0%

Carbon residue of crude, 2.6%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 12.1 | 0.679 | 76.9 | |
| Gasoline and naphtha | 32.9 | 0.730 | 62.3 | |
| Kerosene | 15.4 | 0.815 | 42.1 | |
| Gas oil | 8.3 | 0.848 | 35.4 | below 50 |
| Non-viscous lub. dist. | 8.5 | 0.857-0.878 | 33.6-29.7 | 50-100 |
| Medium lub. dist. | 6.7 | 0.878-0.890 | 29.7-27.7 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 25.4 | 0.956 | 16.5 | |
| Distillation loss | 2.8 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-221

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2847 feet

Jasper County
Sec. 33, T. 6 N., R. 10 E.
Boos field

General Characteristics

Specific gravity: 0.827
Sulfur, per cent: 0.26
Saybolt Universal Viscosity (100°F): 39.C

A.P.I. Gravity: 39.6°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 752.4 First drop, 85°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 160°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 4.4 | 4.4 | 0.637 | 90.6 | — | — | | |
| 2 | 75 | 167 | 3.5 | 7.9 | 0.674 | 78.4 | — | — | 9.4 | 12.50 |
| 3 | 100 | 212 | 5.7 | 13.6 | 0.710 | 67.8 | — | — | 17 | 12.17 |
| 4 | 125 | 257 | 6.5 | 20.1 | 0.734 | 61.3 | — | — | 19 | 12.00 |
| 5 | 150 | 302 | 5.6 | 25.7 | 0.752 | 56.7 | — | — | 20 | 11.97 |
| 6 | 175 | 347 | 5.3 | 31.0 | 0.768 | 52.8 | — | — | 21 | 11.97 |
| 7 | 200 | 392 | 4.8 | 35.8 | 0.785 | 48.8 | — | — | 23 | 11.94 |
| 8 | 225 | 437 | 4.8 | 40.6 | 0.800 | 45.4 | — | — | 24 | 11.89 |
| 9 | 250 | 482 | 5.0 | 45.6 | 0.813 | 42.6 | — | — | 25 | 11.90 |
| 10 | 275 | 527 | 5.5 | 51.1 | 0.824 | 40.2 | — | — | 25 | 11.92 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|---------|----|-------|
| 11 | 200 | 392 | 4.3 | 55.4 | 0.840 | 37.0 | 40 | below 5 | 29 | 11.89 |
| 12 | 225 | 437 | 4.5 | 59.9 | 0.850 | 35.0 | 45 | 20 | 30 | 11.91 |
| 13 | 250 | 482 | 4.4 | 64.3 | 0.863 | 32.5 | 57 | 45 | 33 | 11.88 |
| 14 | 275 | 527 | 4.2 | 68.5 | 0.876 | 30.0 | 85 | 70 | 39 | 11.81 |
| 15 | 300 | 572 | 5.3 | 73.8 | 0.885 | 28.4 | 160 | 85 | 41 | 11.82 |

Carbon residue of residuum, 6.3%

Carbon residue of crude, 1.7%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 13.6 | 0.677 | 77.5 | |
| Gasoline and naphtha | 35.8 | 0.727 | 63.1 | |
| Kerosene | 15.3 | 0.813 | 42.6 | |
| Gas oil | 8.4 | 0.845 | 36.0 | below 50 |
| Non-viscous lub. dist. | 7.8 | 0.855-0.878 | 34.0-29.7 | 50-100 |
| Medium lub. dist. | 6.5 | 0.878-0.890 | 29.7-27.5 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 22.7 | 0.943 | 18.6 | |
| Distillation loss | 3.5 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-223

Oil from: McClosky-Rosiclare
Iowa (Lower Miss.) series
Depth 3505 feet

White County
Sec., 28, T. 3 S., R. 9 E.
Burnt Prairie field

General Characteristics

Specific gravity: 0.840
Sulfur, per cent: 0.28
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 37.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 751.6 First drop, 83°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.7 | 2.7 | 0.638 | 90.3 | — | — | | |
| 3 | 75 | 167 | 3.0 | 5.7 | 0.680 | 76.6 | — | — | 12 | 12.36 |
| 3 | 100 | 212 | 5.5 | 11.2 | 0.715 | 66.4 | — | — | 19 | 12.10 |
| 4 | 125 | 257 | 6.8 | 18.0 | 0.738 | 60.2 | — | — | 21 | 11.94 |
| 5 | 150 | 302 | 5.9 | 23.9 | 0.753 | 56.4 | — | — | 20 | 11.95 |
| 6 | 175 | 347 | 5.7 | 29.6 | 0.770 | 52.3 | — | — | 22 | 11.94 |
| 7 | 200 | 392 | 5.1 | 34.7 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 5.2 | 39.9 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 5.3 | 45.2 | 0.815 | 42.1 | — | — | 26 | 11.87 |
| 10 | 275 | 527 | 6.3 | 51.5 | 0.829 | 39.2 | — | — | 28 | 11.86 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.6 | 56.1 | 0.842 | 36.6 | 40 | 5 | 30 | 11.86 |
| 12 | 225 | 437 | 5.1 | 61.2 | 0.852 | 34.6 | 46 | 30 | 31 | 11.88 |
| 13 | 250 | 482 | 4.5 | 65.7 | 0.865 | 32.1 | 60 | 50 | 34 | 11.86 |
| 14 | 275 | 527 | 4.5 | 70.2 | 0.876 | 30.0 | 90 | 70 | 39 | 11.81 |
| 15 | 300 | 572 | 5.6 | 75.8 | 0.886 | 28.2 | 160 | 85 | 42 | 11.80 |

Carbon residue of residuum, 6.1%

Carbon residue of crude, 1.7%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 11.2 | 0.687 | 74.5 | |
| Gasoline and naphtha | 34.7 | 0.737 | 60.5 | |
| Kerosene | 10.5 | 0.809 | 43.4 | |
| Gas oil | 15.0 | 0.839 | 37.2 | below 50 |
| Non-viscous lub. dist. | 8.5 | 0.856-0.878 | 33.8-29.7 | 50-100 |
| Medium lub. dist. | 7.1 | 0.878-0.892 | 29.7-27.1 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 24.1 | 0.944 | 18.4 | |
| Distillation loss | 0.1 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-224

Oil from: Waltersburg formation
 Chester (Upper Miss.) series
 Depth 2209 feet

Posey County, Indiana
 Sec. 9, T. 15 S., R. 14 W.
 New Harmony field

General Characteristics

Specific gravity: 0.837
 Sulfur, per cent: 0.40
 Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 37.6°
 Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 749.6 First drop, 79°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.7 | 3.7 | 0.632 | 92.4 | — | — | | |
| 2 | 75 | 167 | 3.1 | 6.8 | 0.674 | 78.4 | — | — | 9.4 | 12.50 |
| 3 | 100 | 212 | 5.6 | 12.4 | 0.714 | 66.7 | — | — | 18 | 12.11 |
| 4 | 125 | 257 | 6.5 | 18.9 | 0.737 | 60.5 | — | — | 20 | 11.96 |
| 5 | 150 | 302 | 5.5 | 24.4 | 0.753 | 56.4 | — | — | 20 | 11.95 |
| 6 | 175 | 347 | 5.1 | 29.5 | 0.770 | 52.3 | — | — | 22 | 11.94 |
| 7 | 200 | 392 | 4.7 | 34.2 | 0.785 | 48.8 | — | — | 23 | 11.94 |
| 8 | 225 | 437 | 4.9 | 39.1 | 0.800 | 45.4 | — | — | 24 | 11.89 |
| 9 | 250 | 482 | 5.0 | 44.1 | 0.818 | 41.5 | — | — | 27 | 11.83 |
| 10 | 275 | 527 | 6.2 | 50.3 | 0.830 | 39.0 | — | — | 28 | 11.84 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.0 | 54.3 | 0.843 | 36.4 | 40 | 10 | 30 | 11.84 |
| 12 | 225 | 437 | 4.9 | 59.2 | 0.853 | 34.4 | 45 | 30 | 31 | 11.87 |
| 13 | 250 | 482 | 4.9 | 64.1 | 0.865 | 32.1 | 60 | 55 | 34 | 11.86 |
| 14 | 275 | 527 | 4.8 | 68.9 | 0.876 | 30.0 | 90 | 75 | 39 | 11.81 |
| 15 | 300 | 572 | 5.8 | 74.7 | 0.887 | 28.0 | 170 | 90 | 42 | 11.79 |

Carbon residue of residuum, 9.9%

Carbon residue of crude, 2.6%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 12.4 | 0.680 | 76.6 | |
| Gasoline and naphtha | 34.2 | 0.730 | 62.3 | |
| Kerosene | 9.9 | 0.809 | 43.4 | |
| Gas oil | 14.3 | 0.840 | 37.0 | below 50 |
| Non-viscous lub. dist. | 8.7 | 0.857-0.877 | 33.6-29.8 | 50-100 |
| Medium lub. dist. | 6.7 | 0.877-0.891 | 29.8-27.3 | 100-200 |
| Viscous lub. dist. | 0.9 | 0.891-0.893 | 27.3-27.0 | above 200 |
| Residuum | 21.9 | 0.972 | 14.1 | |
| Distillation loss | 3.4 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-225

Oil from: McClosky "fine"
Iowa (Lower Miss.) series
Depth 3036 feet

Richland County
Sec. 7, T. 2 N., R. 9 E.
Schnell field

General Characteristics

Specific gravity: 0.840
Sulfur, per cent: 0.19
Saybolt Universal Viscosity (100°F): 44.0

A.P.I. Gravity: 37.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 744.1 First drop, 90°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.1 | 2.1 | 0.651 | 85.9 | — | — | | |
| 2 | 75 | 167 | 2.2 | 4.3 | 0.680 | 76.6 | — | — | 12 | 12.36 |
| 3 | 100 | 212 | 5.1 | 9.4 | 0.725 | 63.7 | — | — | 24 | 11.91 |
| 4 | 125 | 257 | 5.8 | 15.2 | 0.750 | 57.2 | — | — | 27 | 11.77 |
| 5 | 150 | 302 | 5.3 | 20.5 | 0.765 | 53.5 | — | — | 26 | 11.77 |
| 6 | 175 | 347 | 5.7 | 26.2 | 0.780 | 49.9 | — | — | 26 | 11.79 |
| 7 | 200 | 392 | 4.8 | 31.0 | 0.795 | 46.5 | — | — | 27 | 11.79 |
| 8 | 225 | 437 | 5.0 | 36.0 | 0.810 | 43.2 | — | — | 29 | 11.72 |
| 9 | 250 | 482 | 5.4 | 41.4 | 0.825 | 40.0 | — | — | 31 | 11.74 |
| 10 | 275 | 527 | 6.1 | 47.5 | 0.840 | 37.0 | — | — | 33 | 11.71 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.6 | 52.1 | 0.850 | 35.0 | 40 | 10 | 34 | 11.75 |
| 12 | 225 | 437 | 4.4 | 56.5 | 0.860 | 33.0 | 47 | 30 | 35 | 11.77 |
| 13 | 250 | 482 | 4.3 | 60.8 | 0.870 | 31.1 | 65 | 50 | 36 | 11.79 |
| 14 | 275 | 527 | 4.3 | 65.1 | 0.885 | 28.4 | 95 | 70 | 43 | 11.67 |
| 15 | 300 | 572 | 6.2 | 71.3 | 0.897 | 26.3 | 170 | 85 | 46 | 11.66 |

Carbon residue of residuum, 5.3%

Carbon residue of crude, 1.7%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 9.4 | 0.698 | 71.2 | |
| Gasoline and naphtha | 31.0 | 0.749 | 57.4 | |
| Kerosene | 10.4 | 0.818 | 41.5 | |
| Gas oil | 13.6 | 0.847 | 35.6 | below 50 |
| Non-viscous lub. dist. | 8.3 | 0.862-0.886 | 32.7-28.2 | 50-100 |
| Medium lub. dist. | 7.1 | 0.886-0.902 | 28.2-25.4 | 100-200 |
| Viscous lub. dist. | 0.9 | 0.902-0.904 | 25.4-25.0 | above 200 |
| Residuum | 28.2 | 0.935 | 19.8 | |
| Distillation loss | 0.5 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-226

Oil from: Rosiclare member
Iowa (Lower Miss.) series
Depth 2408 feet

Wabash County
Sec. 19, T. 1 S., R. 12 W
Mt. Carmel field

General Characteristics

Specific gravity: 0.842
Sulfur, per cent: 0.36
Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 36.6°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 744.7 First drop, 89°F

| Fraction No. | Cut at | | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|--------|-----|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| | °C | °F | | | | | | | | |
| 1 | 50 | 122 | 2.9 | 2.9 | 0.642 | 88.9 | — | — | | |
| 2 | 75 | 167 | 2.8 | 5.7 | 0.687 | 74.5 | — | — | 16 | 12.23 |
| 3 | 100 | 212 | 5.4 | 11.1 | 0.728 | 62.9 | — | — | 25 | 11.86 |
| 4 | 125 | 257 | 6.4 | 17.5 | 0.753 | 56.4 | — | — | 28 | 11.72 |
| 5 | 150 | 302 | 5.3 | 22.8 | 0.768 | 52.8 | — | — | 27 | 11.72 |
| 6 | 175 | 347 | 4.4 | 27.2 | 0.789 | 47.8 | — | — | 31 | 11.66 |
| 7 | 200 | 392 | 4.3 | 31.5 | 0.805 | 44.3 | — | — | 32 | 11.62 |
| 8 | 225 | 437 | 4.9 | 36.4 | 0.820 | 41.1 | — | — | 33 | 11.58 |
| 9 | 250 | 482 | 5.1 | 41.5 | 0.830 | 39.0 | — | — | 33 | 11.68 |
| 10 | 275 | 527 | 7.0 | 48.5 | 0.840 | 37.0 | — | — | 33 | 11.71 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.5 | 53.0 | 0.850 | 35.0 | 40 | 10 | 34 | 11.75 |
| 12 | 225 | 437 | 5.0 | 58.0 | 0.860 | 33.0 | 47 | 30 | 35 | 11.77 |
| 13 | 250 | 482 | 5.0 | 63.0 | 0.873 | 30.6 | 59 | 50 | 37 | 11.75 |
| 14 | 275 | 527 | 5.6 | 68.6 | 0.885 | 28.4 | 90 | 70 | 43 | 11.67 |
| 15 | 300 | 572 | 5.9 | 74.5 | 0.895 | 26.6 | 160 | 85 | 45 | 11.70 |

Carbon residue of residuum, 6.1%

Carbon residue of crude, 1.8%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 11.1 | 0.695 | 72.1 | |
| Gasoline and naphtha | 31.5 | 0.747 | 57.9 | |
| Kerosene | 4.9 | 0.820 | 41.1 | |
| Gas oil | 20.3 | 0.843 | 36.4 | below 50 |
| Non-viscous lub. dist. | 9.9 | 0.863-0.886 | 32.5-28.2 | 50-100 |
| Medium lub. dist. | 7.9 | 0.886-0.900 | 28.2-25.7 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 25.5 | 0.948 | 17.8 | |
| Distillation loss | 0.0 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-227

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3090 feet

Richland County
Sec. 27, T. 4 N., R. 10 E.
Olney field

General Characteristics

Specific gravity: 0.839
Sulfur, per cent: 0.19
Saybolt Universal Viscosity (100°F): 42.2

A.P.I. Gravity: 37.2°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 748.3 First drop, 87°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.4 | 2.4 | 0.649 | 86.5 | — | — | | |
| 2 | 75 | 167 | 2.3 | 4.7 | 0.679 | 76.9 | — | — | 12 | 12.38 |
| 3 | 100 | 212 | 4.6 | 9.3 | 0.720 | 65.0 | — | — | 21 | 12.00 |
| 4 | 125 | 257 | 6.1 | 15.4 | 0.749 | 57.4 | — | — | 26 | 11.78 |
| 5 | 150 | 302 | 5.9 | 21.3 | 0.763 | 54.0 | — | — | 25 | 11.80 |
| 6 | 175 | 347 | 6.0 | 27.3 | 0.780 | 49.9 | — | — | 26 | 11.79 |
| 7 | 200 | 392 | 5.2 | 32.5 | 0.795 | 46.5 | — | — | 27 | 11.79 |
| 8 | 225 | 437 | 5.4 | 37.9 | 0.808 | 43.6 | — | — | 28 | 11.75 |
| 9 | 250 | 482 | 5.2 | 43.1 | 0.823 | 40.4 | — | — | 30 | 11.77 |
| 10 | 275 | 527 | 6.1 | 49.2 | 0.835 | 38.0 | — | — | 31 | 11.78 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.5 | 53.7 | 0.849 | 35.2 | 39 | 10 | 33 | 11.77 |
| 12 | 225 | 437 | 4.9 | 58.6 | 0.863 | 32.5 | 45 | 30 | 36 | 11.73 |
| 13 | 250 | 482 | 4.8 | 63.4 | 0.875 | 30.2 | 58 | 50 | 38 | 11.72 |
| 14 | 275 | 527 | 4.7 | 68.1 | 0.885 | 28.4 | 95 | 70 | 43 | 11.67 |
| 15 | 300 | 572 | 5.9 | 74.0 | 0.896 | 26.4 | 170 | 90 | 46 | 11.67 |

Carbon residue of residuum, 5.3%

Carbon residue of crude, 1.5%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 9.3 | 0.692 | 73.0 | |
| Gasoline and naphtha | 32.5 | 0.748 | 57.7 | |
| Kerosene | 10.6 | 0.815 | 42.1 | |
| Gas oil | 15.0 | 0.847 | 35.6 | below 50 |
| Non-viscous lub. dist. | 8.1 | 0.868-0.886 | 31.5-28.2 | 50-100 |
| Medium lub. dist. | 7.0 | 0.886-0.900 | 28.2-25.7 | 100-200 |
| Viscous lub. dist. | 0.8 | 0.900-0.902 | 25.7-25.4 | above 200 |
| Residuum | 25.9 | 0.935 | 19.8 | |
| Distillation loss | 0.1 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-228

Oil from: Hoing sand
Devonian system
Depth 520 feet

McDonough County
Sec. 19, T. 4 N., R. 4 W.
Plymouth-Colmar field

General Characteristics

Specific gravity: 0.849
Sulfur, per cent: 0.29
Saybolt Universal Viscosity (100°F): 46.1

A.P.I. Gravity: 35.2°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 747.9 First drop, 95°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 1.4 | 1.4 | 0.649 | 86.5 | — | — | | |
| 2 | 75 | 167 | 2.3 | 3.7 | 0.680 | 76.6 | — | — | 12 | 12.36 |
| 3 | 100 | 212 | 3.0 | 6.7 | 0.719 | 65.3 | — | — | 21 | 12.02 |
| 4 | 125 | 257 | 6.5 | 13.2 | 0.744 | 58.7 | — | — | 24 | 11.85 |
| 5 | 150 | 302 | 5.6 | 18.8 | 0.762 | 54.2 | — | — | 25 | 11.81 |
| 6 | 175 | 347 | 5.3 | 24.1 | 0.778 | 50.4 | — | — | 25 | 11.82 |
| 7 | 200 | 392 | 5.0 | 29.1 | 0.793 | 46.9 | — | — | 26 | 11.82 |
| 8 | 225 | 437 | 5.2 | 34.3 | 0.808 | 43.6 | — | — | 28 | 11.75 |
| 9 | 250 | 482 | 5.0 | 39.3 | 0.820 | 41.1 | — | — | 28 | 11.81 |
| 10 | 275 | 527 | 7.0 | 46.3 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 5.1 | 51.4 | 0.845 | 36.0 | 40 | 15 | 31 | 11.82 |
| 12 | 225 | 437 | 5.3 | 56.7 | 0.855 | 34.0 | 46 | 30 | 32 | 11.84 |
| 13 | 250 | 482 | 5.6 | 62.3 | 0.865 | 32.1 | 59 | 55 | 34 | 11.86 |
| 14 | 275 | 527 | 5.3 | 67.6 | 0.882 | 28.9 | 90 | 65 | 43 | 11.68 |
| 15 | 300 | 572 | 5.7 | 73.3 | 0.897 | 26.3 | 150 | 80 | 46 | 11.66 |

Carbon residue of residuum, 8.8%

Carbon residue of crude, 2.7%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 6.7 | 0.691 | 73.3 | |
| Gasoline and naphtha | 29.1 | 0.750 | 57.2 | |
| Kerosene | 10.2 | 0.814 | 42.3 | |
| Gas oil | 16.5 | 0.842 | 36.6 | below 50 |
| Non-viscous lub. dist. | 10.1 | 0.858-0.885 | 33.4-28.4 | 50-100 |
| Medium lub. dist. | 7.4 | 0.885-0.904 | 28.4-25.0 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 26.7 | 0.957 | 16.4 | |
| Distillation loss | 0.0 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-229

Oil from: Hoing sand
Devonian system
Depth 540 feet

McDonough County
Sec. 15, T. 4 N., R. 4 W.
Plymouth-Colmar field

General Characteristics

Specific gravity: 0.850
Sulfur, per cent: 0.28
Saybolt Universal Viscosity (100°F): 47.0

A.P.I. Gravity: 35.0°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 746.5 First drop, 96°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 1.1 | 1.1 | 0.650 | 86.2 | — | — | | |
| 2 | 75 | 167 | 2.1 | 3.2 | 0.677 | 77.5 | — | — | 11 | 12.43 |
| 3 | 100 | 212 | 3.0 | 6.2 | 0.715 | 66.4 | — | — | 19 | 12.10 |
| 4 | 125 | 257 | 5.9 | 12.1 | 0.743 | 59.0 | — | — | 23 | 11.86 |
| 5 | 150 | 302 | 5.9 | 18.0 | 0.757 | 55.4 | — | — | 22 | 11.88 |
| 6 | 175 | 347 | 5.4 | 23.4 | 0.770 | 52.3 | — | — | 22 | 11.94 |
| 7 | 200 | 392 | 5.3 | 28.7 | 0.787 | 48.3 | — | — | 23 | 11.91 |
| 8 | 225 | 437 | 5.3 | 34.0 | 0.800 | 45.4 | — | — | 24 | 11.89 |
| 9 | 250 | 482 | 5.4 | 39.4 | 0.813 | 42.6 | — | — | 25 | 11.90 |
| 10 | 275 | 527 | 6.6 | 46.0 | 0.825 | 40.0 | — | — | 26 | 11.91 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 5.1 | 51.1 | 0.835 | 38.0 | 39 | 15 | 27 | 11.96 |
| 12 | 225 | 437 | 5.4 | 56.5 | 0.845 | 36.0 | 45 | 35 | 28 | 11.99 |
| 13 | 250 | 482 | 5.4 | 61.9 | 0.860 | 33.0 | 57 | 50 | 31 | 11.92 |
| 14 | 275 | 527 | 5.7 | 67.6 | 0.881 | 29.1 | 85 | 65 | 41 | 11.75 |
| 15 | 300 | 572 | 5.9 | 73.5 | 0.897 | 26.3 | 160 | 75 | 46 | 11.66 |

Carbon residue of residuum, 8.2%

Carbon residue of crude, 2.5%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 6.2 | 0.691 | 73.3 | |
| Gasoline and naphtha | 28.7 | 0.748 | 57.7 | |
| Kerosene | 17.3 | 0.814 | 42.3 | |
| Gas oil | 10.1 | 0.840 | 37.0 | below 50 |
| Non-viscous lub. dist. | 9.9 | 0.851-0.884 | 34.8-28.6 | 50-100 |
| Medium lub. dist. | 7.5 | 0.884-0.905 | 28.6-24.9 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 26.5 | 0.958 | 16.2 | |
| Distillation loss | 0.0 | | | |

Correlation Index

Characterization Factor

Lab. No. O-230

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 1370 feet

Washington County
Sec. 19, T. 3 S., R. 1 W.
Dubois field

General Characteristics

Specific gravity: 0.871
Sulfur, per cent: 0.26
Saybolt Universal Viscosity (100°F): 54.0

A.P.I. Gravity: 31.0°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 747.7 First drop, 90°F | | | | | | | |
|------------------------------|-----------|-----------|--|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | 1.4 | 1.4 | 0.675 | 78.1 | — | — | | |
| 2 | 75 | 167 | 1.4 | 2.8 | 0.714 | 66.7 | — | — | 28 | 11.76 |
| 3 | 100 | 212 | 3.8 | 6.6 | 0.750 | 57.2 | — | — | 36 | 11.52 |
| 4 | 125 | 257 | 6.2 | 12.8 | 0.757 | 55.4 | — | — | 30 | 11.66 |
| 5 | 150 | 302 | 5.3 | 18.1 | 0.770 | 52.3 | — | — | 28 | 11.69 |
| 6 | 175 | 347 | 5.1 | 23.2 | 0.785 | 48.8 | — | — | 29 | 11.71 |
| 7 | 200 | 392 | 4.3 | 27.5 | 0.805 | 44.3 | — | — | 32 | 11.62 |
| 8 | 225 | 437 | 4.6 | 32.1 | 0.823 | 40.4 | — | — | 35 | 11.54 |
| 9 | 250 | 482 | 5.1 | 37.2 | 0.838 | 37.4 | — | — | 37 | 11.58 |
| 10 | 275 | 527 | 6.6 | 43.8 | 0.850 | 35.0 | — | — | 38 | 11.59 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|---------|----|-------|
| 11 | 200 | 392 | 4.8 | 48.6 | 0.860 | 33.0 | 41 | below 5 | 38 | 11.62 |
| 12 | 225 | 437 | 5.1 | 53.7 | 0.870 | 31.1 | 51 | " | 39 | 11.63 |
| 13 | 250 | 482 | 5.0 | 58.7 | 0.880 | 29.3 | 72 | " | 41 | 11.66 |
| 14 | 275 | 527 | 5.1 | 63.8 | 0.892 | 27.1 | 115 | " | 47 | 11.59 |
| 15 | 300 | 572 | 7.0 | 70.8 | 0.902 | 25.4 | 250 | 15 | 49 | 11.60 |

Carbon residue of residuum, 12.1%

Carbon residue of crude, 3.8%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 6.6 | 0.726 | 63.4 | |
| Gasoline and naphtha | 27.5 | 0.765 | 53.5 | |
| Kerosene | 4.6 | 0.823 | 40.4 | |
| Gas oil | 18.6 | 0.851 | 34.8 | below 50 |
| Non-viscous lub. dist. | 8.9 | 0.869-0.888 | 31.3-27.9 | 50-100 |
| Medium lub. dist. | 5.4 | 0.888-0.898 | 27.9-26.1 | 100-200 |
| Viscous lub. dist. | 5.8 | 0.898-0.908 | 26.1-24.3 | above 200 |
| Residuum | 27.8 | 0.974 | 13.8 | |
| Distillation loss | 1.4 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-231

Oil from: "Trenton" limestone
 Ordovician system
 Depth 425 feet

Monroe County
 Sec. 35, T. 1 S., R. 10 W.
 Waterloo field

General Characteristics

Specific gravity: 0.875
 Sulfur, per cent: 0.79
 Saybolt Universal Viscosity (100°F): 81.0

A.P.I. Gravity: 30.2°
 Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 749.2 First drop, 136°F | | | | | | | |
|------------------------------|-----------|-----------|---|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | | | | | | | | |
| 2 | 75 | 167 | 1.6 | 1.6 | 0.691 | 73.3 | — | — | 17 | 12.16 |
| 3 | 100 | 212 | 1.0 | 2.6 | 0.709 | 68.1 | — | — | 16 | 12.19 |
| 4 | 125 | 257 | 2.6 | 5.2 | 0.719 | 65.3 | — | — | 12 | 12.27 |
| 5 | 150 | 302 | 2.7 | 7.9 | 0.738 | 60.2 | — | — | 13 | 12.18 |
| 6 | 175 | 347 | 3.6 | 11.5 | 0.755 | 55.9 | — | — | 14 | 12.17 |
| 7 | 200 | 392 | 4.4 | 15.9 | 0.770 | 52.3 | — | — | 15 | 12.19 |
| 8 | 225 | 437 | 4.4 | 20.3 | 0.783 | 49.2 | — | — | 16 | 12.15 |
| 9 | 250 | 482 | 5.4 | 25.7 | 0.800 | 45.4 | — | — | 19 | 12.10 |
| 10 | 275 | 527 | 8.4 | 34.1 | 0.813 | 42.6 | — | — | 20 | 12.13 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 6.7 | 40.8 | 0.823 | 40.4 | 38 | 20 | 21 | 12.34 |
| 12 | 225 | 437 | 6.3 | 47.1 | 0.835 | 38.0 | 43 | 35 | 23 | 12.28 |
| 13 | 250 | 482 | 5.2 | 52.3 | 0.848 | 35.4 | 53 | 55 | 26 | 12.28 |
| 14 | 275 | 527 | 5.4 | 57.7 | 0.877 | 29.8 | 80 | 75 | 40 | 11.79 |
| 15 | 300 | 572 | 6.5 | 64.2 | 0.892 | 27.1 | 140 | 95 | 44 | 11.72 |

Carbon residue of residuum, 11.5%

Carbon residue of crude, 4.6%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 2.6 | 0.698 | 71.2 | |
| Gasoline and naphtha | 15.9 | 0.741 | 59.5 | |
| Kerosene | 18.2 | 0.802 | 44.9 | |
| Gas oil | 13.9 | 0.830 | 39.0 | below 50 |
| Non-viscous lub. dist. | 9.0 | 0.844-0.882 | 36.2-28.9 | 50-100 |
| Medium lub. dist. | 7.2 | 0.882-0.900 | 28.9-25.7 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 35.8 | 0.968 | 14.7 | |
| Distillation loss | 0.0 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-232

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2915 feet

Richland County
Sec. 36, T. 5 N., R. 9 E.
Dundas field

General Characteristics

Specific gravity: 0.833
Sulfur, per cent: 0.17
Saybolt Universal Viscosity (100°F): 40.0

A.P.I. Gravity: 38.4°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 746.4 First drop, 86°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.3 | 3.3 | 0.644 | 88.2 | — | — | | |
| 2 | 75 | 167 | 3.3 | 6.6 | 0.677 | 77.5 | — | — | 11 | 12.43 |
| 3 | 100 | 212 | 5.4 | 12.0 | 0.715 | 66.4 | — | — | 19 | 12.10 |
| 4 | 125 | 257 | 6.9 | 18.9 | 0.740 | 59.7 | — | — | 22 | 11.91 |
| 5 | 150 | 302 | 5.3 | 24.2 | 0.760 | 54.7 | — | — | 24 | 11.84 |
| 6 | 175 | 347 | 5.9 | 30.1 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 4.9 | 35.0 | 0.790 | 47.6 | — | — | 25 | 11.87 |
| 8 | 225 | 437 | 5.0 | 40.0 | 0.805 | 44.3 | — | — | 26 | 11.80 |
| 9 | 250 | 482 | 5.1 | 45.1 | 0.818 | 41.5 | — | — | 27 | 11.83 |
| 10 | 275 | 527 | 5.8 | 50.9 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.8 | 55.7 | 0.843 | 36.4 | 39 | 5 | 30 | 11.84 |
| 12 | 225 | 437 | 4.9 | 60.6 | 0.855 | 34.0 | 46 | 30 | 32 | 11.84 |
| 13 | 250 | 482 | 4.8 | 65.4 | 0.868 | 31.5 | 62 | 55 | 35 | 11.82 |
| 14 | 275 | 527 | 4.2 | 69.6 | 0.878 | 29.7 | 90 | 75 | 40 | 11.79 |
| 15 | 300 | 572 | 5.6 | 75.2 | 0.887 | 28.0 | 160 | 95 | 42 | 11.80 |

Carbon residue of residuum, 6.8%

Carbon residue of crude, 1.8%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 12.0 | 0.685 | 75.1 | |
| Gasoline and naphtha | 35.0 | 0.737 | 60.5 | |
| Kerosene | 10.1 | 0.812 | 42.8 | |
| Gas oil | 14.3 | 0.842 | 36.6 | below 50 |
| Non-viscous lub. dist. | 8.8 | 0.858-0.879 | 33.4-29.5 | 50-100 |
| Medium lub. dist. | 6.9 | 0.879-0.892 | 29.5-27.1 | 100-200 |
| Viscous lub. dist. | 0.1 | 0.892-0.892 | 27.1-27.1 | above 200 |
| Residuum | 22.8 | 0.946 | 18.1 | |
| Distillation loss | 2.0 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-233

Oil from: Bethel formation
 Chester (Upper Miss.) series
 Depth 1329 feet

Clinton County
 Sec. 2, T. 1 N., R. 2 W.
 Hoffman field

General Characteristics

Specific gravity: 0.859
 Sulfur, per cent: 0.21
 Saybolt Universal Viscosity (100°F): 49.0

A.P.I. Gravity: 33.2°
 Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 750.2 First drop, 119°F | | | | | | | |
|------------------------------|-----------|-----------|---|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | | | | | | | | |
| 2 | 75 | 167 | 2.0 | 2.0 | 0.685 | 75.1 | — | — | 15 | 12.26 |
| 3 | 100 | 212 | 2.0 | 4.0 | 0.710 | 67.8 | — | — | 17 | 12.17 |
| 4 | 125 | 257 | 5.9 | 9.9 | 0.729 | 62.6 | — | — | 17 | 12.10 |
| 5 | 150 | 302 | 6.3 | 16.2 | 0.749 | 57.4 | — | — | 18 | 12.02 |
| 6 | 175 | 347 | 5.7 | 21.9 | 0.765 | 53.5 | — | — | 19 | 12.01 |
| 7 | 200 | 392 | 5.7 | 27.6 | 0.783 | 49.2 | — | — | 22 | 11.96 |
| 8 | 225 | 437 | 6.0 | 33.6 | 0.798 | 45.8 | — | — | 23 | 11.92 |
| 9 | 250 | 482 | 5.7 | 39.3 | 0.813 | 42.6 | — | — | 25 | 11.90 |
| 10 | 275 | 527 | 7.2 | 46.5 | 0.830 | 39.0 | — | — | 28 | 11.84 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.2 | 50.7 | 0.843 | 36.4 | 41 | 10 | 30 | 11.84 |
| 12 | 225 | 437 | 6.1 | 56.8 | 0.853 | 34.4 | 45 | 35 | 31 | 11.87 |
| 13 | 250 | 482 | 6.0 | 62.8 | 0.865 | 32.1 | 59 | 60 | 34 | 11.86 |
| 14 | 275 | 527 | 5.3 | 68.1 | 0.876 | 30.0 | 85 | 75 | 38 | 11.83 |
| 15 | 300 | 572 | 6.4 | 74.5 | 0.887 | 28.0 | 150 | 95 | 42 | 11.80 |

Carbon residue of residuum, 9.7%

Carbon residue of crude, 2.8%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 4.0 | 0.698 | 71.2 | |
| Gasoline and naphtha | 27.6 | 0.748 | 57.7 | |
| Kerosene | 11.7 | 0.805 | 44.3 | |
| Gas oil | 16.6 | 0.840 | 37.0 | below 50 |
| Non-viscous lub. dist. | 10.9 | 0.857-0.878 | 33.6-29.7 | 50-100 |
| Medium lub. dist. | 7.7 | 0.878-0.893 | 29.7-27.0 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 25.0 | 0.967 | 14.8 | |
| Distillation loss | 0.5 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-234

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2026 feet

Coles County
Sec. 35, T. 12 N., R. 7 E.
Mattoon field

General Characteristics

Specific gravity: 0.842
Sulfur, per cent: 0.29
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 36.6°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 749.4 First drop, 89°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.1 | 3.1 | 0.642 | 88.9 | — | — | | |
| 2 | 75 | 167 | 2.7 | 5.8 | 0.677 | 77.5 | — | — | 11 | 12.43 |
| 3 | 100 | 212 | 5.2 | 11.0 | 0.725 | 63.7 | — | — | 24 | 11.91 |
| 4 | 125 | 257 | 6.5 | 17.5 | 0.743 | 59.0 | — | — | 23 | 11.86 |
| 5 | 150 | 302 | 5.9 | 23.4 | 0.758 | 55.2 | — | — | 23 | 11.87 |
| 6 | 175 | 347 | 4.8 | 28.2 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 4.4 | 32.6 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 5.3 | 37.9 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 5.3 | 43.2 | 0.818 | 41.5 | — | — | 27 | 11.83 |
| 10 | 275 | 527 | 6.9 | 50.1 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.1 | 54.2 | 0.843 | 36.4 | 41 | 10 | 30 | 11.84 |
| 12 | 225 | 437 | 4.5 | 58.7 | 0.853 | 34.4 | 45 | 35 | 31 | 11.87 |
| 13 | 250 | 482 | 4.9 | 63.6 | 0.865 | 32.1 | 57 | 55 | 34 | 11.86 |
| 14 | 275 | 527 | 5.1 | 68.7 | 0.877 | 29.8 | 85 | 80 | 40 | 11.79 |
| 15 | 300 | 572 | 6.0 | 74.7 | 0.892 | 27.1 | 150 | 95 | 44 | 11.72 |

Carbon residue of residuum, 7.7%

Carbon residue of crude, 2.2%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 11.0 | 0.690 | 73.6 | |
| Gasoline and naphtha | 32.6 | 0.738 | 60.2 | |
| Kerosene | 10.6 | 0.811 | 43.0 | |
| Gas oil | 15.2 | 0.841 | 36.8 | below 50 |
| Non-viscous lub. dist. | 9.2 | 0.858-0.881 | 33.4-29.1 | 50-100 |
| Medium lub. dist. | 7.1 | 0.881-0.900 | 29.1-25.7 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 24.5 | 0.955 | 16.7 | |
| Distillation loss | 0.8 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-235

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3485 feet

Wayne County
Sec. 8, T. 3 S., R. 9 E.
Leech Township field

General Characteristics

Specific gravity: 0.830
Sulfur, per cent: 0.19
Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 39.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 744.3 First drop, 92°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.3 | 3.3 | 0.637 | 90.6 | — | — | | |
| 2 | 75 | 167 | 4.1 | 7.4 | 0.683 | 75.7 | — | — | 14 | 12.30 |
| 3 | 100 | 212 | 4.0 | 11.4 | 0.719 | 65.3 | — | — | 21 | 12.02 |
| 4 | 125 | 257 | 4.4 | 15.8 | 0.743 | 59.0 | — | — | 23 | 11.86 |
| 5 | 150 | 302 | 5.7 | 21.5 | 0.758 | 55.2 | — | — | 23 | 11.87 |
| 6 | 175 | 347 | 5.7 | 27.2 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 4.8 | 32.0 | 0.789 | 47.8 | — | — | 24 | 11.88 |
| 8 | 225 | 437 | 5.4 | 37.4 | 0.807 | 43.8 | — | — | 27 | 11.77 |
| 9 | 250 | 482 | 4.7 | 42.1 | 0.823 | 40.4 | — | — | 30 | 11.77 |
| 10 | 275 | 527 | 6.4 | 48.5 | 0.837 | 37.6 | — | — | 32 | 11.75 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 1.8 | 50.3 | 0.850 | 35.0 | 40 | 10 | 34 | 11.75 |
| 12 | 225 | 437 | 4.2 | 54.5 | 0.860 | 33.0 | 47 | 30 | 35 | 11.77 |
| 13 | 250 | 482 | 5.2 | 59.7 | 0.872 | 30.8 | 60 | 45 | 37 | 11.76 |
| 14 | 275 | 527 | 4.7 | 64.4 | 0.880 | 29.3 | 85 | 65 | 38 | 11.84 |
| 15 | 300 | 572 | 5.5 | 69.9 | 0.891 | 27.3 | 160 | 80 | 40 | 11.85 |

Carbon residue of residuum, 4.1%

Carbon residue of crude, 1.3%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 11.4 | 0.682 | 76.0 | |
| Gasoline and naphtha | 32.0 | 0.736 | 60.8 | |
| Kerosene | 10.1 | 0.814 | 42.3 | |
| Gas oil | 11.6 | 0.845 | 36.0 | below 50 |
| Non-viscous lub. dist. | 9.4 | 0.863-0.882 | 32.5-28.9 | 50-100 |
| Medium lub. dist. | 6.8 | 0.882-0.897 | 28.9-26.3 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 27.7 | 0.927 | 21.2 | |
| Distillation loss | 2.4 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-236

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3411 feet

Wayne County
Sec. 26, T. 2 S., R. 8 E.
Barnhill field

General Characteristics

Specific gravity: 0.837
Sulfur, per cent: 0.17
Saybolt Universal Viscosity (100°F): 44.0

A.P.I. Gravity: 37.6°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 747.6 First drop, 89°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.0 | 2.0 | 0.643 | 88.6 | — | — | | |
| 2 | 75 | 167 | 2.5 | 4.5 | 0.678 | 77.2 | — | — | 11 | 12.40 |
| 3 | 100 | 212 | 4.5 | 9.0 | 0.719 | 65.3 | — | — | 21 | 12.02 |
| 4 | 125 | 257 | 6.3 | 15.3 | 0.745 | 58.4 | — | — | 24 | 11.84 |
| 5 | 150 | 302 | 5.1 | 20.4 | 0.765 | 53.5 | — | — | 26 | 11.77 |
| 6 | 175 | 347 | 5.5 | 25.9 | 0.785 | 48.8 | — | — | 29 | 11.71 |
| 7 | 200 | 392 | 5.0 | 30.9 | 0.798 | 45.8 | — | — | 29 | 11.74 |
| 8 | 225 | 437 | 5.2 | 36.1 | 0.813 | 42.6 | — | — | 30 | 11.68 |
| 9 | 250 | 482 | 5.1 | 41.2 | 0.825 | 40.0 | — | — | 31 | 11.74 |
| 10 | 275 | 527 | 6.5 | 47.7 | 0.840 | 37.0 | — | — | 33 | 11.71 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.4 | 51.1 | 0.849 | 35.2 | 39 | 5 | 33 | 11.77 |
| 12 | 225 | 437 | 5.3 | 56.4 | 0.860 | 33.0 | 46 | 25 | 35 | 11.77 |
| 13 | 250 | 482 | 5.4 | 61.8 | 0.870 | 31.1 | 62 | 50 | 36 | 11.79 |
| 14 | 275 | 527 | 4.6 | 66.4 | 0.876 | 30.0 | 95 | 70 | 40 | 11.80 |
| 15 | 300 | 572 | 5.8 | 72.2 | 0.885 | 28.4 | 160 | 85 | 41 | 11.81 |

Carbon residue of residuum, 4.4%

Carbon residue of crude, 1.3%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 9.0 | 0.691 | 73.3 | |
| Gasoline and naphtha | 30.9 | 0.748 | 57.7 | |
| Kerosene | 10.3 | 0.819 | 41.3 | |
| Gas oil | 13.9 | 0.847 | 35.6 | below 50 |
| Non-viscous lub. dist. | 9.4 | 0.862-0.877 | 32.7-29.8 | 50-100 |
| Medium lub. dist. | 7.7 | 0.877-0.890 | 29.8-27.5 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 25.9 | 0.935 | 19.8 | |
| Distillation loss | 1.9 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-237

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3149 feet

White County
Sec. 12, T. 6 S., R. 8 E
Stokes field

General Characteristics

Specific gravity: 0.846
Sulfur, per cent: 0.26
Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 35.8°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 742.7 First drop, 95°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 1.8 | 1.8 | 0.640 | 89.6 | — | — | | |
| 2 | 75 | 167 | 2.6 | 4.4 | 0.670 | 79.7 | — | — | 7.5 | 12.60 |
| 3 | 100 | 212 | 5.1 | 9.5 | 0.710 | 67.8 | — | — | 17 | 12.17 |
| 4 | 125 | 257 | 6.3 | 15.8 | 0.738 | 60.2 | — | — | 21 | 11.94 |
| 5 | 150 | 302 | 5.7 | 21.5 | 0.760 | 54.7 | — | — | 24 | 11.84 |
| 6 | 175 | 347 | 4.9 | 26.4 | 0.777 | 50.6 | — | — | 25 | 11.83 |
| 7 | 200 | 392 | 5.0 | 31.4 | 0.792 | 47.2 | — | — | 26 | 11.84 |
| 8 | 225 | 437 | 5.2 | 36.6 | 0.808 | 43.6 | — | — | 28 | 11.75 |
| 9 | 250 | 482 | 4.9 | 41.5 | 0.820 | 41.1 | — | — | 28 | 11.81 |
| 10 | 275 | 527 | 6.1 | 47.6 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.0 | 51.6 | 0.845 | 36.0 | 40 | 5 | 31 | 11.82 |
| 12 | 225 | 437 | 4.7 | 56.3 | 0.855 | 34.0 | 47 | 30 | 32 | 11.84 |
| 13 | 250 | 482 | 5.2 | 61.5 | 0.870 | 31.2 | 60 | 50 | 36 | 11.79 |
| 14 | 275 | 527 | 5.0 | 66.5 | 0.881 | 29.1 | 90 | 70 | 42 | 11.71 |
| 15 | 300 | 572 | 6.0 | 72.5 | 0.890 | 27.5 | 150 | 90 | 43 | 11.76 |

Carbon residue of residuum, 5.4%

Carbon residue of crude, 1.6%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 9.5 | 0.686 | 74.8 | |
| Gasoline and naphtha | 31.4 | 0.741 | 59.5 | |
| Kerosene | 10.1 | 0.814 | 42.3 | |
| Gas oil | 13.7 | 0.842 | 36.6 | below 50 |
| Non-viscous lub. dist. | 9.7 | 0.859-0.883 | 33.2-28.8 | 50-100 |
| Medium lub. dist. | 7.6 | 0.883-0.895 | 28.8-26.6 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 26.4 | 0.938 | 19.4 | |
| Distillation loss | 1.1 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-238

Oil from: Bethel formation
 Chester (Upper Miss.) series
 Depth 2079 feet

Jefferson County
 Sec. 9, T. 1 S., R. 1 E
 Cravat field

General Characteristics

Specific gravity: 0.848
 Sulfur, per cent: 0.23
 Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 35.4°
 Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 746.2 First drop, 98°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.4 | 2.4 | 0.643 | 88.6 | — | — | | |
| 2 | 75 | 167 | 3.3 | 5.7 | 0.683 | 75.7 | — | — | 14 | 12.30 |
| 3 | 100 | 212 | 5.1 | 10.8 | 0.717 | 65.9 | — | — | 20 | 12.06 |
| 4 | 125 | 257 | 5.8 | 16.6 | 0.743 | 59.0 | — | — | 23 | 11.86 |
| 5 | 150 | 302 | 5.1 | 21.7 | 0.762 | 54.2 | — | — | 25 | 11.81 |
| 6 | 175 | 347 | 5.0 | 26.7 | 0.775 | 51.1 | — | — | 24 | 11.87 |
| 7 | 200 | 392 | 5.0 | 31.7 | 0.790 | 47.6 | — | — | 25 | 11.87 |
| 8 | 225 | 437 | 5.1 | 36.8 | 0.805 | 44.3 | — | — | 26 | 11.80 |
| 9 | 250 | 482 | 5.3 | 42.1 | 0.820 | 41.1 | — | — | 28 | 11.81 |
| 10 | 275 | 527 | 7.3 | 49.4 | 0.838 | 37.4 | — | — | 32 | 11.74 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.8 | 53.2 | 0.848 | 35.4 | 39 | 10 | 33 | 11.78 |
| 12 | 225 | 437 | 4.7 | 57.9 | 0.863 | 32.5 | 46 | 30 | 36 | 11.73 |
| 13 | 250 | 482 | 6.2 | 64.1 | 0.873 | 30.6 | 62 | 60 | 37 | 11.75 |
| 14 | 275 | 527 | 5.5 | 69.6 | 0.883 | 28.8 | 100 | 80 | 39 | 11.81 |
| 15 | 300 | 572 | 6.6 | 76.2 | 0.893 | 27.0 | 200 | 95 | 41 | 11.82 |

Carbon residue of residuum, 8.7%

Carbon residue of crude, 2.4%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 10.8 | 0.690 | 73.6 | |
| Gasoline and naphtha | 31.7 | 0.741 | 59.5 | |
| Kerosene | 10.4 | 0.813 | 42.6 | |
| Gas oil | 14.8 | 0.846 | 35.8 | below 50 |
| Non-viscous lub. dist. | 10.0 | 0.866-0.883 | 31.9-28.8 | 50-100 |
| Medium lub. dist. | 6.0 | 0.883-0.893 | 28.8-27.0 | 100-200 |
| Viscous lub. dist. | 3.3 | 0.893-0.899 | 27.0-25.9 | above 200 |
| Residuum | 21.7 | 0.954 | 16.8 | |
| Distillation loss | 2.1 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-239

Oil from: "Trenton" limestone
Ordovician system
Depth 4068 feet

Clinton County
Sec. 12, T. 1 N., R. 1 W.
Centralia field

General Characteristics

Specific gravity: 0.810
Sulfur, per cent: 0.28
Saybolt Universal Viscosity (100°F): 39.0

A.P.I. Gravity: 43.2°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 748.2 First drop, 94°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 4.4 | 4.4 | 0.651 | 85.9 | — | — | | |
| 2 | 75 | 167 | 4.4 | 8.8 | 0.681 | 76.3 | — | — | 13 | 12.34 |
| 3 | 100 | 212 | 4.6 | 13.4 | 0.718 | 65.6 | — | — | 20 | 12.04 |
| 4 | 125 | 257 | 5.1 | 18.5 | 0.730 | 62.3 | — | — | 17 | 12.08 |
| 5 | 150 | 302 | 5.1 | 23.6 | 0.748 | 57.7 | — | — | 18 | 12.03 |
| 6 | 175 | 347 | 5.4 | 29.0 | 0.759 | 54.9 | — | — | 16 | 12.10 |
| 7 | 200 | 392 | 5.3 | 34.3 | 0.768 | 52.8 | — | — | 14 | 12.22 |
| 8 | 225 | 437 | 5.3 | 39.6 | 0.788 | 48.1 | — | — | 18 | 12.07 |
| 9 | 250 | 482 | 5.6 | 45.2 | 0.800 | 45.4 | — | — | 19 | 12.10 |
| 10 | 275 | 527 | 7.0 | 52.2 | 0.813 | 42.6 | — | — | 20 | 12.13 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.7 | 55.9 | 0.828 | 39.4 | 38 | 15 | 23 | 12.08 |
| 12 | 225 | 437 | 5.1 | 61.0 | 0.843 | 36.4 | 42 | 30 | 27 | 12.02 |
| 13 | 250 | 482 | 5.0 | 66.0 | 0.855 | 34.0 | 53 | 50 | 29 | 12.00 |
| 14 | 275 | 527 | 4.6 | 70.6 | 0.871 | 31.0 | 75 | 80 | 37 | 11.86 |
| 15 | 300 | 572 | 4.9 | 75.5 | 0.885 | 28.4 | 120 | 95 | 41 | 11.82 |

Carbon residue of residuum, 6.0%

Carbon residue of crude, 1.5%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 13.4 | 0.684 | 75.4 | |
| Gasoline and naphtha | 34.3 | 0.725 | 63.7 | |
| Kerosene | 17.9 | 0.802 | 44.9 | |
| Gas oil | 10.0 | 0.838 | 37.4 | below 50 |
| Non-viscous lub. dist. | 8.8 | 0.852-0.879 | 34.6-29.5 | 50-100 |
| Medium lub. dist. | 4.5 | 0.879-0.892 | 29.5-27.1 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 20.7 | 0.937 | 19.5 | |
| Distillation loss | 3.8 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-240

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 1964 feet

Jefferson County
Sec. 10, T. 1 S., R. 2 E.
Dix field

General Characteristics

Specific gravity: 0.835
Sulfur, per cent: 0.18
Saybolt Universal Viscosity (100°F): 40.0

A.P.I. Gravity: 38.0°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 750.1 First drop, 93°F | | | | | | | |
|------------------------------|-----------|-----|--|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | 3.9 | 3.9 | 0.647 | 87.2 | — | — | | |
| 2 | 75 | 167 | 3.6 | 7.5 | 0.686 | 74.8 | — | — | 15 | 12.25 |
| 3 | 100 | 212 | 5.4 | 12.9 | 0.735 | 61.0 | — | — | 28 | 11.74 |
| 4 | 125 | 257 | 6.1 | 19.0 | 0.750 | 57.2 | — | — | 27 | 11.77 |
| 5 | 150 | 302 | 4.9 | 23.9 | 0.765 | 53.5 | — | — | 26 | 11.77 |
| 6 | 175 | 347 | 5.4 | 29.3 | 0.780 | 49.9 | — | — | 26 | 11.79 |
| 7 | 200 | 392 | 4.7 | 34.0 | 0.795 | 46.5 | — | — | 27 | 11.79 |
| 8 | 225 | 437 | 4.6 | 38.6 | 0.813 | 42.6 | — | — | 30 | 11.68 |
| 9 | 250 | 482 | 4.9 | 43.5 | 0.828 | 39.4 | — | — | 32 | 11.71 |
| 10 | 275 | 527 | 7.1 | 50.6 | 0.838 | 37.4 | — | — | 32 | 11.74 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.1 | 53.7 | 0.847 | 35.6 | 39 | 10 | 32 | 11.80 |
| 12 | 225 | 437 | 4.7 | 58.4 | 0.857 | 33.6 | 45 | 35 | 34 | 11.80 |
| 13 | 250 | 482 | 5.1 | 63.5 | 0.867 | 31.7 | 56 | 55 | 35 | 11.83 |
| 14 | 275 | 527 | 5.3 | 68.8 | 0.878 | 29.7 | 85 | 75 | 37 | 11.86 |
| 15 | 300 | 572 | 6.3 | 75.1 | 0.888 | 27.9 | 150 | 95 | 38 | 11.88 |

Carbon residue of residuum, 10.1%

Carbon residue of crude, 2.6%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 12.9 | 0.695 | 72.1 | |
| Gasoline and naphtha | 34.0 | 0.742 | 59.2 | |
| Kerosene | 4.6 | 0.813 | 42.6 | |
| Gas oil | 19.7 | 0.841 | 36.8 | below 50 |
| Non-viscous lub. dist. | 9.3 | 0.862-0.880 | 32.7-29.3 | 50-100 |
| Medium lub. dist. | 7.5 | 0.880-0.894 | 29.3-26.8 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 22.2 | 0.963 | 15.4 | |
| Distillation loss | 2.7 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-241

Oil from: St. Louis limestone
Iowa (Lower Miss.) series
Depth 3061 feet

Jefferson County
Sec. 25, T. 4 S., R. 2 E.
Ina field

General Characteristics

Specific gravity: 0.843
Sulfur, per cent: 0.20
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 36.4°
Color: Green

DISTILLATION BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Baromet r Reading 748.6 First drop, 91°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 1.9 | 1.9 | 0.638 | 90.3 | — | — | | |
| 2 | 75 | 167 | 2.8 | 4.7 | 0.668 | 80.3 | — | — | 6.5 | 12.65 |
| 3 | 100 | 212 | 4.8 | 9.5 | 0.714 | 66.7 | — | — | 18 | 12.11 |
| 4 | 125 | 257 | 6.6 | 16.1 | 0.743 | 59.0 | — | — | 23 | 11.86 |
| 5 | 150 | 302 | 5.8 | 21.9 | 0.758 | 55.2 | — | — | 23 | 11.87 |
| 6 | 175 | 347 | 6.0 | 27.9 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 5.3 | 33.2 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 5.2 | 38.4 | 0.800 | 45.4 | — | — | 24 | 11.89 |
| 9 | 250 | 482 | 5.5 | 43.9 | 0.818 | 41.5 | — | — | 27 | 11.83 |
| 10 | 275 | 527 | 5.8 | 49.7 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.7 | 53.4 | 0.845 | 36.0 | 39 | 5 | 31 | 11.82 |
| 12 | 225 | 437 | 5.1 | 58.5 | 0.858 | 33.4 | 45 | 30 | 34 | 11.80 |
| 13 | 250 | 482 | 5.3 | 63.8 | 0.870 | 31.1 | 59 | 50 | 36 | 11.79 |
| 14 | 275 | 527 | 5.0 | 68.8 | 0.881 | 29.1 | 85 | 65 | 41 | 11.73 |
| 15 | 300 | 572 | 6.2 | 75.0 | 0.892 | 27.1 | 150 | 85 | 45 | 11.71 |

Carbon residue of residuum, 7.7%

Carbon residue of crude, 2.1%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 9.5 | 0.685 | 75.1 | |
| Gasoline and naphtha | 33.2 | 0.742 | 59.2 | |
| Kerosene | 10.7 | 0.809 | 43.4 | |
| Gas oil | 13.9 | 0.843 | 36.4 | below 50 |
| Non-viscous lub. dist. | 9.8 | 0.862-0.884 | 32.7-28.6 | 50-100 |
| Medium lub. dist. | 7.4 | 0.884-0.898 | 28.6-26.1 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 23.4 | 0.951 | 17.3 | |
| Distillation loss | 1.6 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-242

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2258 feet

Jefferson County
Sec. 22, T. 2 S., R. 1 E.
Roaches field

General Characteristics

Specific gravity: 0.840
Sulfur, per cent: 0.22
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 37.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | Barometer Reading 746.9 First drop, 91°F | | | | | | | | |
|------------------------------|-----------|--|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | 2.9 | 2.9 | 0.639 | 89.9 | — | — | | |
| 2 | 75 | 167 | 3.3 | 6.2 | 0.672 | 79.1 | — | — | 8.4 | 12.56 |
| 3 | 100 | 212 | 4.7 | 10.9 | 0.718 | 65.6 | — | — | 20 | 12.04 |
| 4 | 125 | 257 | 6.3 | 17.2 | 0.740 | 59.7 | — | — | 22 | 11.91 |
| 5 | 150 | 302 | 5.3 | 22.5 | 0.759 | 54.9 | — | — | 23 | 11.85 |
| 6 | 175 | 347 | 5.2 | 27.7 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 4.8 | 32.5 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 4.7 | 37.2 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 5.0 | 42.2 | 0.818 | 41.5 | — | — | 27 | 11.83 |
| 10 | 275 | 527 | 5.9 | 48.1 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.3 | 52.4 | 0.848 | 35.4 | 39 | 5 | 33 | 11.78 |
| 12 | 225 | 437 | 5.1 | 57.5 | 0.858 | 33.4 | 45 | 30 | 34 | 11.80 |
| 13 | 250 | 482 | 5.2 | 62.7 | 0.872 | 30.8 | 57 | 45 | 37 | 11.76 |
| 14 | 275 | 527 | 4.9 | 67.6 | 0.878 | 29.7 | 85 | 65 | 40 | 11.77 |
| 15 | 300 | 572 | 6.0 | 73.6 | 0.890 | 27.5 | 150 | 85 | 43 | 11.76 |

Carbon residue of residuum, 9.4%

Carbon residue of crude, 2.6%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 10.9 | 0.683 | 75.7 | |
| Gasoline and naphtha | 32.5 | 0.736 | 60.8 | |
| Kerosene | 9.7 | 0.811 | 43.0 | |
| Gas oil | 14.9 | 0.845 | 36.0 | below 50 |
| Non-viscous lub. dist. | 9.3 | 0.864-0.881 | 32.3-29.1 | 50-100 |
| Medium lub. dist. | 7.2 | 0.881-0.897 | 29.1-26.3 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 23.8 | 0.961 | 15.7 | |
| Distillation loss | 2.6 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-245

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2882 feet

Jasper County
Sec. 16, T. 6 N., R. 10 E.
N. Boos field

General Characteristics

Specific gravity: 0.832
Sulfur, per cent: 0.20
Saybolt Universal Viscosity (100°F): 39.8

A.P.I. Gravity: 38.6°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 747.9 First drop, 96°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.7 | 2.7 | 0.642 | 88.9 | — | — | | |
| 2 | 75 | 167 | 3.4 | 6.1 | 0.667 | 80.6 | — | — | 6.1 | 12.68 |
| 3 | 100 | 212 | 5.4 | 11.5 | 0.709 | 68.1 | — | — | 16 | 12.19 |
| 4 | 125 | 257 | 6.7 | 18.2 | 0.735 | 61.0 | — | — | 19 | 11.99 |
| 5 | 150 | 302 | 6.1 | 24.3 | 0.755 | 55.9 | — | — | 21 | 11.91 |
| 6 | 175 | 347 | 5.5 | 29.8 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 5.1 | 34.9 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 5.2 | 40.1 | 0.804 | 44.5 | — | — | 26 | 11.81 |
| 9 | 250 | 482 | 5.3 | 45.4 | 0.818 | 41.5 | — | — | 27 | 11.83 |
| 10 | 275 | 527 | 6.1 | 51.5 | 0.835 | 38.0 | — | — | 31 | 11.78 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.3 | 55.8 | 0.848 | 35.4 | 39 | 10 | 33 | 11.78 |
| 12 | 225 | 437 | 4.6 | 60.4 | 0.858 | 33.4 | 45 | 30 | 34 | 11.80 |
| 13 | 250 | 482 | 4.7 | 65.1 | 0.868 | 31.5 | 56 | 50 | 35 | 11.82 |
| 14 | 275 | 527 | 4.9 | 70.0 | 0.878 | 29.7 | 85 | 75 | 40 | 11.77 |
| 15 | 300 | 572 | 5.6 | 75.6 | 0.890 | 27.5 | 150 | 90 | 43 | 11.76 |

Carbon residue of residuum, 8.8%

Carbon residue of crude, 2.3%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 11.5 | 0.681 | 76.3 | |
| Gasoline and naphtha | 34.9 | 0.734 | 61.3 | |
| Kerosene | 10.5 | 0.811 | 42.9 | |
| Gas oil | 14.8 | 0.846 | 35.8 | below 50 |
| Non-viscous lub. dist. | 8.6 | 0.863-0.881 | 32.5-29.1 | 50-100 |
| Medium lub. dist. | 6.8 | 0.881-0.897 | 29.1-26.3 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 22.4 | 0.956 | 16.5 | |
| Distillation loss | 2.0 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-246

Oil from: Cypress formation
Chester (Upper Miss.) series
Depth 2640 feet

Edwards County
Sec. 34, T. 2 S., R. 14 W
Cowling field

General Characteristics

Specific gravity: 0.842
Sulfur, per cent: 0.23
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 36.6°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 747.8 First drop, 92°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.6 | 2.6 | 0.646 | 87.5 | — | — | | |
| 2 | 75 | 167 | 2.7 | 5.3 | 0.666 | 81.0 | — | — | 5.6 | 12.70 |
| 3 | 100 | 212 | 4.6 | 9.9 | 0.709 | 68.1 | — | — | 16 | 12.19 |
| 4 | 125 | 257 | 6.4 | 16.3 | 0.732 | 61.8 | — | — | 18 | 12.04 |
| 5 | 150 | 302 | 5.5 | 21.8 | 0.748 | 57.7 | — | — | 18 | 12.03 |
| 6 | 175 | 347 | 4.9 | 26.7 | 0.768 | 52.8 | — | — | 21 | 11.97 |
| 7 | 200 | 392 | 4.6 | 31.3 | 0.785 | 48.8 | — | — | 23 | 11.94 |
| 8 | 225 | 437 | 5.2 | 36.5 | 0.798 | 45.8 | — | — | 23 | 11.92 |
| 9 | 250 | 482 | 5.3 | 41.8 | 0.813 | 42.6 | — | — | 25 | 11.90 |
| 10 | 275 | 527 | 5.8 | 47.6 | 0.830 | 39.0 | — | — | 28 | 11.84 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.9 | 52.5 | 0.843 | 36.4 | 38 | 5 | 30 | 11.84 |
| 12 | 225 | 437 | 5.3 | 57.8 | 0.853 | 34.4 | 44 | 30 | 31 | 11.87 |
| 13 | 250 | 482 | 5.1 | 62.9 | 0.865 | 32.1 | 57 | 60 | 34 | 11.86 |
| 14 | 275 | 527 | 4.7 | 67.6 | 0.873 | 30.6 | 80 | 75 | 39 | 11.82 |
| 15 | 300 | 572 | 5.8 | 73.4 | 0.882 | 28.9 | 150 | 85 | 40 | 11.83 |

Carbon residue of residuum, 10.5%

Carbon residue of crude, 3.1%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 9.9 | 0.681 | 76.3 | |
| Gasoline and naphtha | 31.3 | 0.732 | 61.8 | |
| Kerosene | 10.5 | 0.806 | 44.1 | |
| Gas oil | 15.8 | 0.841 | 36.8 | below 50 |
| Non-viscous lub. dist. | 9.2 | 0.858-0.876 | 33.4-30.0 | 50-100 |
| Medium lub. dist. | 6.6 | 0.876-0.887 | 30.0-28.0 | 100-200 |
| Viscous lub. dist | 0.0 | | | |
| Residuum | 24.9 | 0.965 | 15.1 | |
| Distillation loss | 1.7 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-247

Oil from: Bethel formation
 Chester (Upper Miss.) series
 Depth 2719 feet

White County
 Sec. 9, T. 4 S., R. 14 W.
 Calvin field

General Characteristics

Specific gravity: 0.845
 Sulfur, per cent: 0.24
 Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 36.0°
 Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 748.6 First drop, 101°F | | | | | | | |
|------------------------------|-----------|-----------|---|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | 2.0 | 2.0 | 0.643 | 88.6 | — | — | | |
| 2 | 75 | 167 | 5.1 | 7.1 | 0.678 | 77.2 | — | — | 11 | 12.40 |
| 3 | 100 | 212 | 5.0 | 12.1 | 0.725 | 63.7 | — | — | 24 | 11.91 |
| 4 | 125 | 257 | 6.4 | 18.5 | 0.745 | 58.4 | — | — | 24 | 11.84 |
| 5 | 150 | 302 | 5.3 | 23.8 | 0.760 | 54.7 | — | — | 24 | 11.84 |
| 6 | 175 | 347 | 5.2 | 29.0 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 4.6 | 33.6 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 5.3 | 38.9 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 5.2 | 44.1 | 0.818 | 41.5 | — | — | 27 | 11.83 |
| 10 | 275 | 527 | 5.7 | 49.8 | 0.830 | 39.0 | — | — | 28 | 11.84 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.0 | 53.8 | 0.843 | 36.4 | 38 | 5 | 30 | 11.84 |
| 12 | 225 | 437 | 5.2 | 59.0 | 0.855 | 34.0 | 44 | 30 | 32 | 11.84 |
| 13 | 250 | 482 | 4.6 | 63.6 | 0.868 | 31.5 | 59 | 50 | 35 | 11.82 |
| 14 | 275 | 527 | 4.6 | 68.2 | 0.878 | 29.7 | 85 | 65 | 40 | 11.77 |
| 15 | 300 | 572 | 5.3 | 73.5 | 0.890 | 27.5 | 150 | 80 | 43 | 11.76 |

Carbon residue of residuum, 7.8%

Carbon residue of crude, 2.2%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 12.1 | 0.692 | 73.0 | |
| Gasoline and naphtha | 33.6 | 0.738 | 60.2 | |
| Kerosene | 10.5 | 0.810 | 43.2 | |
| Gas oil | 14.3 | 0.841 | 36.8 | below 50 |
| Non-viscous lub. dist. | 8.7 | 0.860-0.881 | 33.0-29.1 | 50-100 |
| Medium lub. dist. | 6.4 | 0.881-0.896 | 29.1-26.4 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 24.6 | 0.976 | 13.5 | |
| Distillation loss | 1.9 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-248

Oil from: Tar Springs formation
 Chester (Upper Miss.) series
 Depth 2205 feet

White County
 Sec. 9, T. 4 S., R. 14 W.
 Calvin field

General Characteristics

Specific gravity: 0.845
 Sulfur, per cent: 0.19
 Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 36.0°
 Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 746.4 First drop, 91°F | | | | | | | |
|------------------------------|-----------|-----------|--|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | 2.6 | 2.6 | 0.646 | 87.5 | — | — | | |
| 2 | 75 | 167 | 3.3 | 5.9 | 0.681 | 76.3 | — | — | 13 | 12.34 |
| 3 | 100 | 212 | 5.2 | 11.1 | 0.725 | 63.7 | — | — | 24 | 11.91 |
| 4 | 125 | 257 | 5.9 | 17.0 | 0.747 | 57.9 | — | — | 25 | 11.81 |
| 5 | 150 | 302 | 5.5 | 22.5 | 0.758 | 55.2 | — | — | 23 | 11.87 |
| 6 | 175 | 347 | 4.8 | 27.3 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 4.9 | 32.2 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 4.9 | 37.1 | 0.800 | 45.4 | — | — | 24 | 11.89 |
| 9 | 250 | 482 | 5.3 | 42.4 | 0.813 | 42.6 | — | — | 25 | 11.90 |
| 10 | 275 | 527 | 6.0 | 48.4 | 0.828 | 39.4 | — | — | 27 | 11.87 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.3 | 52.7 | 0.840 | 37.0 | 38 | 5 | 29 | 11.89 |
| 12 | 225 | 437 | 4.8 | 57.5 | 0.850 | 35.0 | 44 | 35 | 30 | 11.91 |
| 13 | 250 | 482 | 5.1 | 62.6 | 0.863 | 32.5 | 57 | 55 | 33 | 11.88 |
| 14 | 275 | 527 | 5.4 | 68.0 | 0.878 | 29.7 | 80 | 75 | 40 | 11.77 |
| 15 | 300 | 572 | 5.4 | 73.4 | 0.892 | 27.1 | 150 | 90 | 45 | 11.71 |

Carbon residue of residuum, 8.9%

Carbon residue of crude, 2.5%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 11.1 | 0.693 | 72.7 | |
| Gasoline and naphtha | 32.2 | 0.741 | 59.5 | |
| Kerosene | 10.2 | 0.807 | 43.8 | |
| Gas oil | 15.0 | 0.838 | 37.4 | below 50 |
| Non-viscous lub. dist. | 9.4 | 0.856-0.881 | 33.8-29.1 | 50-100 |
| Medium lub. dist. | 6.6 | 0.881-0.900 | 29.1-25.7 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 23.7 | 0.970 | 14.4 | |
| Distillation loss | 2.9 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-250

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2906 feet

White County
Sec. 27, T. 4 S., R. 14 W.
New Harmony field

General Characteristics

Specific gravity: 0.829
Sulfur, per cent: 0.20
Saybolt Universal Viscosity (100°F): 38.5

A.P.I. Gravity: 39.2°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 749.3 First drop, 88°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.5 | 3.5 | 0.639 | 89.9 | — | — | | |
| 2 | 75 | 167 | 3.9 | 7.4 | 0.667 | 80.6 | — | — | 6.1 | 12.68 |
| 3 | 100 | 212 | 5.2 | 12.6 | 0.720 | 65.0 | — | — | 21 | 12.00 |
| 4 | 125 | 257 | 6.8 | 19.4 | 0.740 | 59.7 | — | — | 22 | 11.91 |
| 5 | 150 | 302 | 5.4 | 24.8 | 0.754 | 56.2 | — | — | 21 | 11.93 |
| 6 | 175 | 347 | 5.0 | 29.8 | 0.768 | 52.8 | — | — | 21 | 11.97 |
| 7 | 200 | 392 | 4.8 | 34.6 | 0.785 | 48.8 | — | — | 23 | 11.94 |
| 8 | 225 | 437 | 5.1 | 39.7 | 0.800 | 45.4 | — | — | 24 | 11.89 |
| 9 | 250 | 482 | 4.9 | 44.6 | 0.814 | 42.3 | — | — | 25 | 11.88 |
| 10 | 275 | 527 | 6.1 | 50.7 | 0.830 | 39.0 | — | — | 28 | 11.84 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.4 | 55.1 | 0.845 | 36.0 | 39 | 5 | 31 | 11.82 |
| 12 | 225 | 437 | 4.6 | 59.7 | 0.858 | 33.4 | 45 | 30 | 34 | 11.80 |
| 13 | 250 | 482 | 5.3 | 65.0 | 0.868 | 31.5 | 61 | 50 | 35 | 11.82 |
| 14 | 275 | 527 | 5.0 | 70.0 | 0.878 | 29.7 | 90 | 70 | 40 | 11.77 |
| 15 | 300 | 572 | 5.6 | 75.6 | 0.887 | 28.0 | 160 | 95 | 42 | 11.79 |

Carbon residue of residuum, 7.6%

Carbon residue of crude, 1.9%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 12.6 | 0.681 | 76.3 | |
| Gasoline and naphtha | 34.6 | 0.731 | 62.1 | |
| Kerosene | 10.0 | 0.807 | 43.8 | |
| Gas oil | 14.3 | 0.842 | 36.6 | below 50 |
| Non-viscous lub. dist. | 9.3 | 0.861-0.879 | 32.8-29.5 | 50-100 |
| Medium lub. dist. | 7.4 | 0.879-0.892 | 29.5-27.1 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 21.1 | 0.962 | 15.6 | |
| Distillation loss | 3.3 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-251

Oil from: McClosky-Rosiclare
Iowa (Lower Miss.) series
Depth 2655 feet

Wabash County
Sec. 26, T. 1 S., R. 13 W.
Maud field

General Characteristics

Specific gravity: 0.835
Sulfur, per cent: 0.30
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 38.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 747.8 First drop, 88°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.7 | 3.7 | 0.646 | 87.5 | — | — | | |
| 2 | 75 | 167 | 3.9 | 7.6 | 0.673 | 78.8 | — | — | 8.9 | 12.53 |
| 3 | 100 | 212 | 5.4 | 13.0 | 0.728 | 62.9 | — | — | 25 | 11.86 |
| 4 | 125 | 257 | 5.9 | 18.9 | 0.745 | 58.4 | — | — | 24 | 11.84 |
| 5 | 150 | 302 | 5.2 | 24.1 | 0.757 | 55.4 | — | — | 22 | 11.88 |
| 6 | 175 | 347 | 4.4 | 28.5 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 4.0 | 32.5 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 4.6 | 37.1 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 5.0 | 42.1 | 0.818 | 41.5 | — | — | 27 | 11.83 |
| 10 | 275 | 527 | 6.1 | 48.2 | 0.830 | 39.0 | — | — | 28 | 11.84 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.6 | 52.8 | 0.843 | 36.4 | 39 | 5 | 30 | 11.84 |
| 12 | 225 | 437 | 4.6 | 57.4 | 0.855 | 34.0 | 46 | 30 | 32 | 11.84 |
| 13 | 250 | 482 | 5.0 | 62.4 | 0.870 | 31.1 | 61 | 45 | 36 | 11.79 |
| 14 | 275 | 527 | 4.6 | 67.0 | 0.883 | 28.8 | 90 | 65 | 39 | 11.81 |
| 15 | 300 | 572 | 5.4 | 72.4 | 0.893 | 27.0 | 160 | 80 | 41 | 11.82 |

Carbon residue of residuum, 6.2%

Carbon residue of crude, 1.8%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 13.0 | 0.688 | 74.2 | |
| Gasoline and naphtha | 32.5 | 0.733 | 61.6 | |
| Kerosene | 9.6 | 0.811 | 42.9 | |
| Gas oil | 14.3 | 0.840 | 37.0 | below 50 |
| Non-viscous lub. dist. | 9.0 | 0.859-0.885 | 33.2-28.4 | 50-100 |
| Medium lub. dist. | 7.0 | 0.885-0.898 | 28.4-26.1 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 24.6 | 0.949 | 17.6 | |
| Distillation loss | 3.0 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-252

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3113 feet

Franklin County
Sec. 35, T. 7 S., R. 4 E.
Thompsonville field

General Characteristics

Specific gravity: 0.836
Sulfur, per cent: 0.16
Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 37.8°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 748.2 First drop, 94°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.8 | 2.8 | 0.644 | 88.2 | — | — | | |
| 2 | 75 | 167 | 3.0 | 5.8 | 0.668 | 80.3 | — | — | 6.5 | 12.65 |
| 3 | 100 | 212 | 4.8 | 10.6 | 0.709 | 68.1 | — | — | 16 | 12.19 |
| 4 | 125 | 257 | 6.1 | 16.7 | 0.733 | 61.6 | — | — | 18 | 12.02 |
| 5 | 150 | 302 | 5.0 | 21.7 | 0.748 | 57.7 | — | — | 18 | 12.03 |
| 6 | 175 | 347 | 4.7 | 26.4 | 0.763 | 54.0 | — | — | 18 | 12.05 |
| 7 | 200 | 392 | 4.8 | 31.2 | 0.775 | 51.1 | — | — | 18 | 12.10 |
| 8 | 225 | 437 | 5.1 | 36.2 | 0.790 | 47.6 | — | — | 19 | 12.04 |
| 9 | 250 | 482 | 4.9 | 41.2 | 0.805 | 44.3 | — | — | 21 | 12.01 |
| 10 | 275 | 527 | 5.9 | 47.1 | 0.820 | 41.1 | — | — | 23 | 11.98 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.2 | 51.3 | 0.835 | 38.0 | 39 | 10 | 27 | 11.96 |
| 12 | 225 | 437 | 5.0 | 56.3 | 0.848 | 35.4 | 46 | 35 | 29 | 11.94 |
| 13 | 250 | 482 | 4.8 | 61.1 | 0.860 | 33.0 | 58 | 50 | 31 | 11.92 |
| 14 | 275 | 527 | 4.7 | 65.8 | 0.868 | 31.5 | 85 | 70 | 36 | 11.88 |
| 15 | 300 | 572 | 5.5 | 71.3 | 0.878 | 29.7 | 140 | 85 | 37 | 11.92 |

Carbon residue of residuum, 8.7%

Carbon residue of crude, 2.7%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 10.6 | 0.680 | 76.6 | |
| Gasoline and naphtha | 31.2 | 0.728 | 62.9 | |
| Kerosene | 15.9 | 0.806 | 44.1 | |
| Gas oil | 8.3 | 0.840 | 37.0 | below 50 |
| Non-viscous lub. dist. | 9.5 | 0.852-0.871 | 34.6-31.0 | 50-100 |
| Medium lub. dist. | 6.4 | 0.871-0.883 | 31.0-28.8 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 26.1 | 0.958 | 16.2 | |
| Distillation loss | 2.6 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-253

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3496 feet

Wayne County
Sec. 4, T. 3 S., R. 8 E.
Barnhill field

General Characteristics

Specific gravity: 0.797
Sulfur, per cent: 0.16
Saybolt Universal Viscosity (100°F): 33.0

A.P.I. Gravity: 46.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 747.6 First drop, 75°F | | | | | | | |
|------------------------------|-----------|-----------|--|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | 5.4 | 5.4 | 0.639 | 89.9 | — | — | | |
| 2 | 75 | 167 | 4.8 | 10.2 | 0.678 | 77.2 | — | — | 11 | 12.40 |
| 3 | 100 | 212 | 8.0 | 18.2 | 0.724 | 64.0 | — | — | 23 | 11.93 |
| 4 | 125 | 257 | 9.1 | 27.3 | 0.743 | 59.0 | — | — | 23 | 11.86 |
| 5 | 150 | 302 | 7.3 | 34.6 | 0.758 | 55.2 | — | — | 23 | 11.87 |
| 6 | 175 | 347 | 7.5 | 42.1 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 6.3 | 48.4 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 5.9 | 54.3 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 6.2 | 60.5 | 0.818 | 41.5 | — | — | 27 | 11.83 |
| 10 | 275 | 527 | 7.4 | 67.9 | 0.830 | 39.0 | — | — | 28 | 11.84 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 5.4 | 73.3 | 0.848 | 35.4 | 39 | 0 | 33 | 11.78 |
| 12 | 225 | 437 | 5.1 | 78.4 | 0.863 | 32.5 | 46 | 25 | 36 | 11.73 |
| 13 | 250 | 482 | 3.8 | 82.2 | 0.880 | 29.3 | 60 | 45 | 41 | 11.66 |
| 14 | 275 | 527 | 3.3 | 85.5 | 0.892 | 27.1 | 90 | 65 | 47 | 11.59 |
| 15 | 300 | 572 | 3.9 | 89.4 | 0.907 | 24.5 | 190 | 95 | 51 | 11.53 |

Carbon residue of residuum, 9.4%

Carbon residue of crude, 1.0%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 18.2 | 0.687 | 74.5 | |
| Gasoline and naphtha | 48.4 | 0.735 | 61.0 | |
| Kerosene | 12.1 | 0.811 | 42.9 | |
| Gas oil | 16.7 | 0.843 | 36.4 | below 50 |
| Non-viscous lub. dist. | 7.1 | 0.868-0.894 | 31.5-26.8 | 50-100 |
| Medium lub. dist. | 3.6 | 0.894-0.908 | 26.8-24.3 | 100-200 |
| Viscous lub. dist. | 1.5 | 0.908-0.915 | 24.3-23.2 | above 200 |
| Residuum | 8.7 | 0.970 | 14.4 | |
| Distillation loss | 1.9 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-254

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3446 feet

Hamilton County
Sec. 26, T. 4 S., R. 7 E.
Bungay field

General Characteristics

Specific gravity: 0.841
Sulfur, per cent: 0.24
Saybolt Universal Viscosity (100°F): 45.0

A.P.I. Gravity: 36.8°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 747.8 First drop, 91°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.3 | 2.3 | 0.644 | 88.2 | — | — | | |
| 2 | 75 | 167 | 2.8 | 5.1 | 0.674 | 78.4 | — | — | 9.4 | 12.50 |
| 3 | 100 | 212 | 4.6 | 9.7 | 0.722 | 64.5 | — | — | 22 | 11.96 |
| 4 | 125 | 257 | 5.6 | 15.3 | 0.739 | 60.0 | — | — | 21 | 11.93 |
| 5 | 150 | 302 | 5.4 | 20.7 | 0.755 | 55.9 | — | — | 21 | 11.91 |
| 6 | 175 | 347 | 5.0 | 25.7 | 0.770 | 52.3 | — | — | 22 | 11.94 |
| 7 | 200 | 392 | 4.6 | 30.3 | 0.785 | 48.8 | — | — | 23 | 11.94 |
| 8 | 225 | 437 | 4.6 | 34.9 | 0.800 | 45.4 | — | — | 24 | 11.89 |
| 9 | 250 | 482 | 4.7 | 39.6 | 0.815 | 42.1 | — | — | 26 | 11.87 |
| 10 | 275 | 527 | 5.9 | 45.5 | 0.832 | 38.6 | — | — | 29 | 11.82 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.2 | 48.7 | 0.843 | 36.4 | 39 | 10 | 30 | 11.84 |
| 12 | 225 | 437 | 4.1 | 52.8 | 0.853 | 34.4 | 45 | 30 | 31 | 11.87 |
| 13 | 250 | 482 | 5.0 | 57.8 | 0.863 | 32.5 | 58 | 40 | 33 | 11.88 |
| 14 | 275 | 527 | 4.7 | 62.5 | 0.877 | 29.8 | 85 | 60 | 40 | 11.79 |
| 15 | 300 | 572 | 5.7 | 68.2 | 0.890 | 27.5 | 150 | 80 | 43 | 11.76 |

Carbon residue of residuum, 3.2%

Carbon residue of crude, 1.1%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 9.7 | 0.690 | 73.6 | |
| Gasoline and naphtha | 30.3 | 0.738 | 60.2 | |
| Kerosene | 9.3 | 0.808 | 43.6 | |
| Gas oil | 13.1 | 0.841 | 36.8 | below 50 |
| Non-viscous lub. dist. | 8.7 | 0.857-0.880 | 33.6-29.3 | 50-100 |
| Medium lub. dist. | 6.8 | 0.880-0.897 | 29.3-26.3 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 29.6 | 0.928 | 21.0 | |
| Distillation loss | 2.2 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-255

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2800 feet

Jefferson County
Sec. 22, T. 3 S., R. 2 E.
Marcoe field

General Characteristics

Specific gravity: 0.915
Sulfur, per cent: 0.54
Saybolt Universal Viscosity (100°F): 243.0

A.P.I. Gravity: 23.2°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 749.1 First drop, 244°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | | | | | | | | |
| 2 | 75 | 167 | | | | | | | | |
| 3 | 100 | 212 | | | | | | | | |
| 4 | 125 | 257 | | | | | | | | |
| 5 | 150 | 302 | 1.5 | 1.5 | 0.765 | 53.5 | — | — | 26 | 11.77 |
| 6 | 175 | 347 | 1.8 | 3.3 | 0.783 | 49.2 | — | — | 28 | 11.75 |
| 7 | 200 | 392 | 2.5 | 5.8 | 0.803 | 44.7 | — | — | 31 | 11.65 |
| 8 | 225 | 437 | 3.1 | 8.9 | 0.820 | 41.1 | — | — | 33 | 11.58 |
| 9 | 250 | 482 | 4.1 | 13.0 | 0.837 | 37.6 | — | — | 36 | 11.60 |
| 10 | 275 | 527 | 6.1 | 19.1 | 0.852 | 34.6 | — | — | 39 | 11.55 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----------------------|----|-------|
| 11 | 200 | 392 | 3.6 | 22.7 | 0.865 | 32.1 | 41 | — | 41 | 11.55 |
| 12 | 225 | 437 | 6.5 | 29.2 | 0.878 | 29.7 | 49 | — | 43 | 11.54 |
| 13 | 250 | 482 | 7.3 | 36.5 | 0.893 | 27.0 | 74 | — | 47 | 11.50 |
| 14 | 275 | 527 | 7.8 | 44.3 | 0.901 | 25.6 | 120 | below 5 ³ | 48 | 11.55 |
| 15 | 300 | 572 | 9.0 | 53.3 | 0.916 | 23.0 | 210 | 25 ³ | 52 | 11.52 |

Carbon residue of residuum, 7.1%

Carbon residue of crude, 3.5%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 0.0 | | | |
| Gasoline and naphtha | 5.8 | 0.787 | 48.3 | |
| Kerosene | 3.1 | 0.820 | 41.1 | |
| Gas oil | 17.3 | 0.856 | 33.8 | below 50 |
| Non-viscous lub. dist. | 11.0 | 0.879-0.898 | 29.5-26.1 | 50-100 |
| Medium lub. dist. | 9.8 | 0.898-0.913 | 26.1-23.5 | 100-200 |
| Viscous lub. dist. | 6.3 | 0.913-0.924 | 23.5-21.6 | above 200 |
| Residuum | 46.7 | 0.952 | 17.1 | |
| Distillation loss | 0.0 | | | |

¹Correlation Index

²Characterization Factor

³Pour Point—no wax

Lab. No. O-256

Oil from: Bethel formation
 Chester (Upper Miss.) series
 Depth 1534 feet

Washington County
 Sec. 27, T. 1 S., R. 1 W.
 Irvington field

General Characteristics

Specific gravity: 0.837
 Sulfur, per cent: 0.16
 Saybolt Universal Viscosity (100°F): 39.0

A.P.I. Gravity: 37.6°
 Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 743.6 First drop, 80°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.8 | 3.8 | 0.642 | 88.9 | — | — | | |
| 2 | 75 | 167 | 3.6 | 7.4 | 0.672 | 79.1 | — | — | 8.4 | 12.56 |
| 3 | 100 | 212 | 5.5 | 12.9 | 0.720 | 65.0 | — | — | 21 | 12.00 |
| 4 | 125 | 257 | 6.0 | 18.9 | 0.740 | 59.7 | — | — | 22 | 11.91 |
| 5 | 150 | 302 | 5.6 | 24.5 | 0.755 | 55.9 | — | — | 21 | 11.91 |
| 6 | 175 | 347 | 5.1 | 29.6 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 4.7 | 34.3 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 5.0 | 39.0 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 5.1 | 44.4 | 0.815 | 42.1 | — | — | 26 | 11.87 |
| 10 | 275 | 527 | 6.1 | 50.5 | 0.830 | 39.0 | — | — | 28 | 11.84 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.0 | 54.5 | 0.843 | 36.4 | 39 | 5 | 30 | 11.84 |
| 12 | 225 | 437 | 4.9 | 59.4 | 0.855 | 34.0 | 45 | 30 | 32 | 11.84 |
| 13 | 250 | 482 | 4.9 | 64.3 | 0.868 | 31.5 | 57 | 40 | 35 | 11.82 |
| 14 | 275 | 527 | 4.9 | 69.2 | 0.882 | 28.9 | 90 | 60 | 42 | 11.70 |
| 15 | 300 | 572 | 5.2 | 74.4 | 0.895 | 26.6 | 150 | 85 | 46 | 11.68 |

Carbon residue of residuum, 8.2%

Carbon residue of crude, 2.1%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 12.9 | 0.684 | 75.4 | |
| Gasoline and naphtha | 34.3 | 0.733 | 61.6 | |
| Kerosene | 10.1 | 0.809 | 43.4 | |
| Gas oil | 14.6 | 0.841 | 36.8 | below 50 |
| Non-viscous lub. dist. | 8.6 | 0.860-0.884 | 33.0-28.6 | 50-100 |
| Medium lub. dist. | 6.8 | 0.884-0.902 | 28.6-25.4 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 21.9 | 0.967 | 14.8 | |
| Distillation loss | 3.7 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-257

Oil from: Palestine formation
Chester (Upper Miss.) series
Depth 2136 feet

Gallatin County
Sec. 33, T. 7 S., R. 8 E.
Omaha field

General Characteristics

Specific gravity: 0.899
Sulfur, per cent: 0.23
Saybolt Universal Viscosity (100°F): 109.0

A.P.I. Gravity: 25.9°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 747.8 First drop, 146°F | | | | | | | |
|------------------------------|-----------|-----------|---|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | | | | | | | | |
| 2 | 75 | 167 | | | | | | | | |
| 3 | 100 | 212 | 3.1 | 3.1 | 0.764 | 53.7 | — | — | | |
| 4 | 125 | 257 | 3.0 | 6.1 | 0.775 | 51.1 | — | — | 38 | 11.37 |
| 5 | 150 | 302 | 2.4 | 8.5 | 0.785 | 48.8 | — | — | 36 | 11.47 |
| 6 | 175 | 347 | 2.5 | 11.0 | 0.798 | 45.8 | — | — | 35 | 11.51 |
| 7 | 200 | 392 | 3.1 | 14.1 | 0.823 | 40.4 | — | — | 41 | 11.39 |
| 8 | 225 | 437 | 3.6 | 17.7 | 0.845 | 36.0 | — | — | 45 | 11.26 |
| 9 | 250 | 482 | 4.1 | 21.8 | 0.855 | 34.0 | — | — | 45 | 11.33 |
| 10 | 275 | 527 | 6.2 | 28.0 | 0.865 | 32.1 | — | — | 45 | 11.38 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----------------------|----|-------|
| 11 | 200 | 392 | 4.7 | 32.7 | 0.870 | 31.1 | 41 | — | 43 | 11.49 |
| 12 | 225 | 437 | 5.2 | 37.9 | 0.875 | 30.2 | 50 | — | 42 | 11.58 |
| 13 | 250 | 482 | 6.0 | 43.9 | 0.885 | 28.4 | 69 | — | 43 | 11.61 |
| 14 | 275 | 527 | 7.1 | 51.0 | 0.892 | 27.1 | 125 | below 5 ³ | 47 | 11.60 |
| 15 | 300 | 572 | 7.4 | 58.4 | 0.905 | 24.9 | 200 | 15 ³ | 50 | 11.58 |

Carbon residue of residuum, 6.2%

Carbon residue of crude, 2.7%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 3.1 | 0.764 | 53.7 | |
| Gasoline and naphtha | 14.1 | 0.789 | 47.8 | |
| Kerosene | 0.0 | | | |
| Gas oil | 21.2 | 0.862 | 32.7 | below 50 |
| Non-viscous lub. dist. | 9.3 | 0.875-0.889 | 30.2-27.7 | 50-100 |
| Medium lub. dist. | 10.1 | 0.889-0.905 | 27.7-24.9 | 100-200 |
| Viscous lub. dist. | 3.7 | 0.905-0.912 | 24.9-23.7 | above 200 |
| Residuum | 40.9 | 0.949 | 17.6 | |
| Distillation loss | 0.7 | | | |

¹Correlation Index²Characterization Factor³Pour Point—trace wax

Lab. No. O-258

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3506 feet

Hamilton County
Sec. 3, T. 4 S., R. 6 E.
Belle Prairie field

General Characteristics

Specific gravity: 0.840
Sulfur, per cent: 0.12
Saybolt Universal Viscosity (100°F): 44.0

A.P.I. Gravity: 37.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 749.3 First drop, 88°F | | | | | | | |
|------------------------------|-----------|-----------|--|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | 3.4 | 3.4 | 0.642 | 88.9 | — | — | | |
| 2 | 75 | 167 | 3.4 | 6.8 | 0.672 | 79.1 | — | — | 8.4 | 12.56 |
| 3 | 100 | 212 | 4.6 | 11.4 | 0.715 | 66.4 | — | — | 19 | 12.10 |
| 4 | 125 | 257 | 6.1 | 17.5 | 0.740 | 59.7 | — | — | 22 | 11.91 |
| 5 | 150 | 302 | 5.4 | 22.9 | 0.758 | 55.2 | — | — | 23 | 11.87 |
| 6 | 175 | 347 | 4.6 | 27.5 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 4.0 | 31.5 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 4.3 | 35.8 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 4.7 | 40.5 | 0.818 | 41.5 | — | — | 27 | 11.83 |
| 10 | 275 | 527 | 5.6 | 46.1 | 0.830 | 39.0 | — | — | 28 | 11.84 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.1 | 50.2 | 0.843 | 36.4 | 39 | 5 | 30 | 11.84 |
| 12 | 225 | 437 | 5.2 | 55.4 | 0.858 | 33.4 | 45 | 25 | 34 | 11.80 |
| 13 | 250 | 482 | 5.4 | 60.8 | 0.868 | 31.5 | 61 | 50 | 35 | 11.82 |
| 14 | 275 | 527 | 4.4 | 65.2 | 0.877 | 29.8 | 90 | 75 | 40 | 11.79 |
| 15 | 300 | 572 | 4.3 | 69.5 | 0.890 | 27.5 | 150 | 90 | 43 | 11.76 |

Carbon residue of residuum, 4.3%

Carbon residue of crude, 1.4%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 11.4 | 0.680 | 76.6 | |
| Gasoline and naphtha | 31.5 | 0.732 | 61.8 | |
| Kerosene | 9.0 | 0.811 ↓ | 42.9 | |
| Gas oil | 13.9 | 0.842 ↓ | 36.6 | below 50 |
| Non-viscous lub. dist. | 9.3 | 0.861-0.879 | 32.8-29.5 | 50-100 |
| Medium lub. dist. | 5.8 | 0.879-0.896 | 29.5-26.4 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 28.7 | 0.934 | 20.0 | |
| Distillation loss | 1.8 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-259

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 1020 feet

Bond County
Sec. 10, T. 6 N., R. 2 W.
Woburn field

General Characteristics

Specific gravity: 0.843
Sulfur, per cent: 0.20
Saybolt Universal Viscosity (100°F): 44.0

A.P.I. Gravity: 36.4°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 748.4 First drop, 87°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 1.7 | 1.7 | 0.645 | 87.9 | — | — | | |
| 2 | 75 | 167 | 2.6 | 4.3 | 0.671 | 79.4 | — | — | 8.0 | 12.58 |
| 3 | 100 | 212 | 4.3 | 8.6 | 0.712 | 67.2 | — | — | 18 | 12.14 |
| 4 | 125 | 257 | 5.8 | 14.4 | 0.735 | 61.0 | — | — | 19 | 11.99 |
| 5 | 150 | 302 | 5.3 | 19.7 | 0.753 | 56.4 | — | — | 20 | 11.95 |
| 6 | 175 | 347 | 4.8 | 24.5 | 0.770 | 52.3 | — | — | 22 | 11.94 |
| 7 | 200 | 392 | 4.9 | 29.4 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 4.6 | 34.0 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 5.2 | 39.2 | 0.815 | 42.1 | — | — | 26 | 11.87 |
| 10 | 275 | 527 | 6.4 | 45.6 | 0.828 | 39.4 | — | — | 27 | 11.87 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.6 | 50.2 | 0.843 | 36.4 | 39 | 15 | 30 | 11.84 |
| 12 | 225 | 437 | 5.7 | 55.9 | 0.853 | 34.4 | 44 | 35 | 31 | 11.87 |
| 13 | 250 | 482 | 5.4 | 61.3 | 0.863 | 32.5 | 55 | 50 | 33 | 11.88 |
| 14 | 275 | 527 | 5.9 | 67.2 | 0.872 | 30.8 | 80 | 70 | 38 | 11.84 |
| 15 | 300 | 572 | 6.0 | 73.2 | 0.889 | 27.7 | 130 | 90 | 43 | 11.77 |

Carbon residue of residuum, 5.3%

Carbon residue of crude, 1.5%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 8.6 | 0.686 | 74.8 | |
| Gasoline and naphtha | 29.4 | 0.739 | 60.0 | |
| Kerosene | 9.8 | 0.809 | 43.4 | |
| Gas oil | 16.9 | 0.841 | 36.8 | below 50 |
| Non-viscous lub. dist. | 10.6 | 0.858-0.879 | 33.4-29.5 | 50-100 |
| Medium lub. dist. | 6.5 | 0.879-0.897 | 29.5-26.3 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 25.3 | 0.943 | 18.6 | |
| Distillation loss | 1.5 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-260

Oil from: Sandstone
Pennsylvanian system
Depth 598 feet

Montgomery County
Sec. 12, T. 10 N., R. 2 W.
Raymond field

General Characteristics

Specific gravity: 0.851
Sulfur, per cent: 0.22
Saybolt Universal Viscosity (100°F): 55.0

A.P.I. Gravity: 34.8°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 744.2 First drop, 117°F | | | | | | | |
|------------------------------|-----------|-----------|---|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Stm per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | | | | | | | | |
| 2 | 75 | 167 | 2.0 | 2.0 | 0.677 | 77.5 | — | — | 11 | 12.43 |
| 3 | 100 | 212 | 2.6 | 4.6 | 0.693 | 72.7 | — | — | 8.5 | 12.48 |
| 4 | 125 | 257 | 5.3 | 9.9 | 0.722 | 64.5 | — | — | 13 | 12.22 |
| 5 | 150 | 302 | 5.1 | 15.0 | 0.743 | 59.0 | — | — | 16 | 12.11 |
| 6 | 175 | 347 | 4.8 | 19.8 | 0.760 | 54.7 | — | — | 17 | 12.09 |
| 7 | 200 | 392 | 4.8 | 24.6 | 0.778 | 50.4 | — | — | 19 | 12.05 |
| 8 | 225 | 437 | 5.1 | 29.7 | 0.795 | 46.5 | — | — | 22 | 11.97 |
| 9 | 250 | 482 | 5.9 | 35.6 | 0.810 | 43.2 | — | — | 23 | 11.94 |
| 10 | 275 | 527 | 6.7 | 42.3 | 0.823 | 40.4 | — | — | 25 | 11.94 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.4 | 45.7 | 0.834 | 38.2 | 39 | 5 | 26 | 11.97 |
| 12 | 225 | 437 | 5.4 | 51.1 | 0.845 | 36.0 | 45 | 30 | 28 | 11.99 |
| 13 | 250 | 482 | 5.1 | 56.2 | 0.857 | 33.6 | 56 | 55 | 30 | 11.97 |
| 14 | 275 | 527 | 5.6 | 61.8 | 0.868 | 31.5 | 80 | 70 | 36 | 12.00 |
| 15 | 300 | 572 | 7.3 | 69.1 | 0.881 | 29.1 | 140 | 85 | 38 | 11.98 |

Carbon residue of residuum, 9.7%

Carbon residue of crude, 3.3%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 4.6 | 0.686 | 74.8 | |
| Gasoline and naphtha | 24.6 | 0.738 | 60.2 | |
| Kerosene | 17.7 | 0.811 | 42.9 | |
| Gas oil | 8.4 | 0.840 | 37.0 | below 50 |
| Non-viscous lub. dist. | 10.5 | 0.850-0.872 | 35.0-30.8 | 50-100 |
| Medium lub. dist. | 7.9 | 0.872-0.888 | 30.8-27.9 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 30.6 | 0.951 | 17.3 | |
| Distillation loss | 0.3 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-261

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 1034 feet

Washington County
Sec. 29, T. 3 S., R. 4 W.
McKinley field

General Characteristics

Specific gravity: 0.806
Sulfur, per cent: 0.18
Saybolt Universal Viscosity (100°F): 36.0

A.P.I. Gravity: 44.1°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 745.3 First drop, 92°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 4.9 | 4.9 | 0.639 | 89.9 | — | — | | |
| 2 | 75 | 167 | 5.1 | 10.0 | 0.667 | 80.6 | — | — | 6.1 | 12.68 |
| 3 | 100 | 212 | 6.4 | 16.4 | 0.705 | 69.2 | — | — | 14 | 12.26 |
| 4 | 125 | 257 | 8.3 | 24.7 | 0.732 | 61.8 | — | — | 18 | 12.04 |
| 5 | 150 | 302 | 6.2 | 30.9 | 0.752 | 56.7 | — | — | 20 | 11.97 |
| 6 | 175 | 347 | 5.9 | 36.8 | 0.774 | 51.3 | — | — | 23 | 11.88 |
| 7 | 200 | 392 | 5.2 | 42.0 | 0.792 | 47.2 | — | — | 26 | 11.84 |
| 8 | 225 | 437 | 4.9 | 46.9 | 0.808 | 43.6 | — | — | 28 | 11.75 |
| 9 | 250 | 482 | 5.2 | 52.1 | 0.820 | 41.1 | — | — | 28 | 11.81 |
| 10 | 275 | 527 | 5.9 | 58.0 | 0.838 | 37.4 | — | — | 32 | 11.74 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.8 | 61.8 | 0.848 | 35.4 | 39 | 5 | 33 | 11.78 |
| 12 | 225 | 437 | 4.5 | 66.3 | 0.858 | 33.4 | 45 | 30 | 34 | 11.80 |
| 13 | 250 | 482 | 4.4 | 70.7 | 0.868 | 31.5 | 58 | 55 | 35 | 11.82 |
| 14 | 275 | 527 | 3.9 | 74.6 | 0.881 | 29.1 | 85 | 70 | 41 | 11.73 |
| 15 | 300 | 572 | 5.1 | 79.7 | 0.892 | 27.1 | 160 | 85 | 45 | 11.71 |

Carbon residue of residuum, 7.8%

Carbon residue of crude, 1.6%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 16.4 | 0.673 | 78.8 | |
| Gasoline and naphtha | 42.0 | 0.725 | 63.7 | |
| Kerosene | 10.1 | 0.814 | 42.3 | |
| Gas oil | 13.7 | 0.846 | 35.8 | below 50 |
| Non-viscous lub. dist. | 7.8 | 0.862-0.883 | 32.7-28.8 | 50-100 |
| Medium lub. dist. | 6.0 | 0.883-0.898 | 28.8-26.1 | 100-200 |
| Viscous lub. dist. | 0.1 | 0.898-0.898 | 26.1-26.1 | above 200 |
| Residuum | 16.7 | 0.949 | 17.6 | |
| Distillation loss | 3.6 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-262

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2503 feet

Effingham County
Sec. 22, T. 6 N., R. 5 E.
Mason field

General Characteristics

Specific gravity: 0.833
Sulfur, per cent: 0.21
Saybolt Universal Viscosity (100°F): 44.0

A.P.I. Gravity: 38.4°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 745.6 First drop, 93°F

| Fraction No. | Cut at °C | °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.7 | 2.7 | 0.642 | 88.9 | — | — | | |
| 2 | 75 | 167 | 3.2 | 5.9 | 0.664 | 81.6 | — | — | 4.6 | 12.75 |
| 3 | 100 | 212 | 4.8 | 10.7 | 0.712 | 67.2 | — | — | 18 | 12.14 |
| 4 | 125 | 257 | 6.1 | 16.8 | 0.733 | 61.6 | — | — | 18 | 12.02 |
| 5 | 150 | 302 | 5.4 | 22.2 | 0.754 | 56.2 | — | — | 21 | 11.93 |
| 6 | 175 | 347 | 5.1 | 27.3 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 4.6 | 31.9 | 0.790 | 47.6 | — | — | 25 | 11.87 |
| 8 | 225 | 437 | 4.7 | 36.6 | 0.805 | 44.3 | — | — | 26 | 11.80 |
| 9 | 250 | 482 | 5.1 | 41.7 | 0.819 | 41.3 | — | — | 28 | 11.82 |
| 10 | 275 | 527 | 5.4 | 47.1 | 0.835 | 38.0 | — | — | 31 | 11.78 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.0 | 51.1 | 0.848 | 35.4 | 38 | 5 | 33 | 11.78 |
| 12 | 225 | 437 | 5.1 | 56.2 | 0.855 | 34.0 | 44 | 30 | 32 | 11.84 |
| 13 | 250 | 482 | 4.8 | 61.0 | 0.865 | 32.1 | 57 | 55 | 34 | 11.86 |
| 14 | 275 | 527 | 5.0 | 66.0 | 0.873 | 30.6 | 85 | 70 | 39 | 11.82 |
| 15 | 300 | 572 | 5.7 | 71.7 | 0.885 | 28.4 | 140 | 85 | 41 | 11.82 |

Carbon residue of residuum, 7.6%

Carbon residue of crude, 2.3%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 10.7 | 0.680 | 76.6 | |
| Gasoline and naphtha | 31.9 | 0.733 | 61.6 | |
| Kerosene | 9.8 | 0.812 | 42.8 | |
| Gas oil | 14.2 | 0.845 | 36.0 | below 50 |
| Non-viscous lub. dist. | 9.0 | 0.860-0.876 | 33.0-30.0 | 50-100 |
| Medium lub. dist. | 6.8 | 0.876-0.891 | 30.0-27.3 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 25.7 | 0.954 | 16.8 | |
| Distillation loss | 2.6 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-263

Oil from: Tar Springs formation
Chester (Upper Miss.) series
Depth 2148 feet

Franklin County
Sec. 24, T. 6 S., R. 2 E.
Benton field

General Characteristics

Specific gravity: 0.817
Sulfur, per cent: 0.12
Saybolt Universal Viscosity (100°F): 40.0

A.P.I. Gravity: 41.7°
Color Green:

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 746.2 First drop, 89°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.3 | 3.3 | 0.644 | 88.2 | — | — | | |
| 2 | 75 | 167 | 3.6 | 6.9 | 0.662 | 82.2 | — | — | 3.7 | 12.79 |
| 3 | 100 | 212 | 5.1 | 12.0 | 0.700 | 70.6 | — | — | 12 | 12.35 |
| 4 | 125 | 257 | 6.4 | 18.4 | 0.728 | 62.9 | — | — | 16 | 12.11 |
| 5 | 150 | 302 | 5.8 | 24.2 | 0.748 | 57.7 | — | — | 18 | 12.03 |
| 6 | 175 | 347 | 5.2 | 29.4 | 0.768 | 52.8 | — | — | 21 | 11.97 |
| 7 | 200 | 392 | 4.9 | 34.3 | 0.785 | 48.8 | — | — | 23 | 11.94 |
| 8 | 225 | 437 | 4.9 | 39.2 | 0.800 | 45.4 | — | — | 24 | 11.89 |
| 9 | 250 | 482 | 5.1 | 44.3 | 0.813 | 42.6 | — | — | 25 | 11.90 |
| 10 | 275 | 527 | 5.8 | 50.1 | 0.828 | 39.4 | — | — | 27 | 11.87 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.9 | 54.0 | 0.840 | 37.0 | 38 | 5 | 29 | 11.89 |
| 12 | 225 | 437 | 4.6 | 58.6 | 0.853 | 34.4 | 44 | 25 | 31 | 11.87 |
| 13 | 250 | 482 | 4.5 | 63.1 | 0.865 | 32.1 | 57 | 50 | 34 | 11.86 |
| 14 | 275 | 527 | 4.6 | 67.7 | 0.871 | 31.0 | 85 | 70 | 37 | 11.85 |
| 15 | 300 | 572 | 5.7 | 73.4 | 0.885 | 28.4 | 130 | 80 | 41 | 11.82 |

Carbon residue of residuum, 7.0%

Carbon residue of crude, 1.9%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 12.0 | 0.673 | 78.8 | |
| Gasoline and naphtha | 34.0 | 0.733 | 61.6 | |
| Kerosene | 10.0 | 0.807 | 43.8 | |
| Gas oil | 14.2 | 0.839 | 37.2 | below 50 |
| Non-viscous lub. dist. | 8.6 | 0.859-0.876 | 33.2-30.0 | 50-100 |
| Medium lub. dist. | 6.3 | 0.876-0.893 | 30.0-27.0 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 22.7 | 0.940 | 19.0 | |
| Distillation loss | 3.9 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-264

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3325 feet

Edwards County
Sec. 13, T. 1 S., R. 10 E.
Bone Gap field

General Characteristics

Specific gravity: 0.823
Sulfur, per cent: 0.33
Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 40.5°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 744.0 First drop, 88°F | | | | | | | |
|------------------------------|-----------|-----------|--|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | 4.1 | 4.1 | 0.650 | 86.2 | — | — | | |
| 2 | 75 | 167 | 3.9 | 8.0 | 0.668 | 80.3 | — | — | 6.5 | 12.65 |
| 3 | 100 | 212 | 5.4 | 13.4 | 0.702 | 70.1 | — | — | 13 | 12.31 |
| 4 | 125 | 257 | 5.9 | 19.3 | 0.732 | 61.8 | — | — | 18 | 12.04 |
| 5 | 150 | 302 | 5.0 | 24.3 | 0.752 | 56.7 | — | — | 20 | 11.97 |
| 6 | 175 | 347 | 4.7 | 29.0 | 0.779 | 50.2 | — | — | 26 | 11.80 |
| 7 | 200 | 392 | 4.1 | 33.1 | 0.800 | 45.4 | — | — | 30 | 11.70 |
| 8 | 225 | 437 | 4.4 | 37.5 | 0.815 | 42.1 | — | — | 31 | 11.66 |
| 9 | 250 | 482 | 4.5 | 42.0 | 0.825 | 40.0 | — | — | 31 | 11.74 |
| 10 | 275 | 527 | 5.5 | 47.5 | 0.835 | 38.0 | — | — | 31 | 11.78 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.3 | 50.8 | 0.845 | 36.0 | 39 | 5 | 31 | 11.82 |
| 12 | 225 | 437 | 4.5 | 55.3 | 0.855 | 34.0 | 45 | 25 | 32 | 11.84 |
| 13 | 250 | 482 | 4.5 | 59.8 | 0.865 | 32.1 | 59 | 50 | 34 | 11.86 |
| 14 | 275 | 527 | 4.0 | 63.8 | 0.876 | 30.0 | 90 | 65 | 39 | 11.81 |
| 15 | 300 | 572 | 5.7 | 69.5 | 0.885 | 28.4 | 150 | 80 | 41 | 11.82 |

Carbon residue of residuum, 5.4%

Carbon residue of crude, 1.6%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 13.4 | 0.676 | 77.8 | |
| Gasoline and naphtha | 33.1 | 0.728 | 62.9 | |
| Kerosene | 8.9 | 0.820 | 41.1 | |
| Gas oil | 12.7 | 0.843 | 36.4 | below 50 |
| Non-viscous lub. dist. | 7.9 | 0.859-0.878 | 33.2-29.7 | 50-100 |
| Medium lub. dist. | 6.9 | 0.878-0.890 | 29.7-27.5 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 26.2 | 0.930 | 20.7 | |
| Distillation loss | 4.3 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-265

Oil from: Tar Springs formation
Chester (Upper Miss.) series
Depth 2266 feet

White County
Sec. 10, T. 7 S., R. 9 E.
S. W. Herald Pool Extension

General Characteristics

Specific gravity: 0.839
Sulfur, per cent: 0.24
Saybolt Universal Viscosity (100°F): 44.0

A.P.I. Gravity: 37.2°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | | Barometer Reading 746.1 First drop, 84°F | | | | | | |
|------------------------------|-----------|-----------|--------------|--|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | 2.8 | 2.8 | 0.652 | 85.5 | — | — | | |
| 2 | 75 | 167 | 3.0 | 5.8 | 0.665 | 81.3 | — | — | 5.1 | 12.72 |
| 3 | 100 | 212 | 5.3 | 11.1 | 0.702 | 70.1 | — | — | 13 | 12.31 |
| 4 | 125 | 257 | 6.0 | 17.1 | 0.739 | 60.0 | — | — | 21 | 11.93 |
| 5 | 150 | 302 | 5.8 | 22.9 | 0.755 | 55.9 | — | — | 21 | 11.91 |
| 6 | 175 | 347 | 4.6 | 27.5 | 0.779 | 50.2 | — | — | 26 | 11.80 |
| 7 | 200 | 392 | 4.4 | 31.9 | 0.795 | 46.5 | — | — | 27 | 11.79 |
| 8 | 225 | 437 | 4.6 | 36.5 | 0.807 | 43.8 | — | — | 27 | 11.77 |
| 9 | 250 | 482 | 5.0 | 41.5 | 0.820 | 41.1 | — | — | 28 | 11.81 |
| 10 | 275 | 527 | 6.6 | 48.1 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.9 | 52.0 | 0.847 | 35.6 | 39 | 5 | 32 | 11.80 |
| 12 | 225 | 437 | 4.9 | 56.9 | 0.860 | 33.0 | 44 | 30 | 35 | 11.77 |
| 13 | 250 | 482 | 4.4 | 61.3 | 0.870 | 31.1 | 57 | 50 | 36 | 11.79 |
| 14 | 275 | 527 | 5.1 | 66.4 | 0.881 | 29.1 | 90 | 65 | 41 | 11.73 |
| 15 | 300 | 572 | 6.4 | 72.8 | 0.897 | 26.3 | 170 | 85 | 46 | 11.66 |

Carbon residue of residuum, 10.0%

Carbon residue of crude, 2.9%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 11.1 | 0.679 | 76.9 | |
| Gasoline and naphtha | 31.9 | 0.735 | 61.0 | |
| Kerosene | 9.6 | 0.814 | 42.3 | |
| Gas oil | 15.1 | 0.845 | 36.0 | below 50 |
| Non-viscous lub. dist. | 8.0 | 0.865-0.883 | 32.1-28.8 | 50-100 |
| Medium lub. dist. | 7.2 | 0.883-0.903 | 28.8-25.2 | 100-200 |
| Viscous lub. dist. | 1.0 | 0.903-0.906 | 25.2-24.7 | above 200 |
| Residuum | 24.5 | 0.961 | 15.7 | |
| Distillation loss | 2.7 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-266

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3359 feet

Hamilton County
Sec. 34, T. 3 S., R. 5 E.
Dahlgren field

General Characteristics

Specific gravity: 0.829
Sulfur, per cent: 0.16
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 39.2°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 746.3 First drop, 85°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.9 | 3.9 | 0.649 | 86.5 | — | — | | |
| 2 | 75 | 167 | 3.5 | 7.4 | 0.668 | 80.3 | — | — | 6.5 | 12.65 |
| 3 | 100 | 212 | 5.1 | 12.5 | 0.708 | 68.4 | — | — | 16 | 12.20 |
| 4 | 125 | 257 | 6.1 | 18.6 | 0.735 | 61.0 | — | — | 19 | 11.99 |
| 5 | 150 | 302 | 5.7 | 24.3 | 0.755 | 55.9 | — | — | 21 | 11.91 |
| 6 | 175 | 347 | 5.0 | 29.3 | 0.774 | 51.3 | — | — | 23 | 11.88 |
| 7 | 200 | 392 | 4.9 | 34.2 | 0.790 | 47.6 | — | — | 25 | 11.87 |
| 8 | 225 | 437 | 4.9 | 39.1 | 0.805 | 44.3 | — | — | 26 | 11.80 |
| 9 | 250 | 482 | 4.7 | 43.8 | 0.820 | 41.1 | — | — | 28 | 11.81 |
| 10 | 275 | 527 | 6.3 | 50.1 | 0.835 | 38.0 | — | — | 31 | 11.78 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.3 | 53.4 | 0.845 | 36.0 | 38 | 5 | 31 | 11.82 |
| 12 | 225 | 437 | 4.1 | 57.5 | 0.855 | 34.0 | 46 | 25 | 32 | 11.84 |
| 13 | 250 | 482 | 4.6 | 62.1 | 0.865 | 32.1 | 56 | 50 | 34 | 11.86 |
| 14 | 275 | 527 | 4.5 | 66.6 | 0.876 | 30.0 | 85 | 65 | 39 | 11.81 |
| 15 | 300 | 572 | 5.3 | 71.9 | 0.887 | 28.0 | 150 | 80 | 42 | 11.79 |

Carbon residue of residuum, 6.5%

Carbon residue of crude, 1.8%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 12.5 | 0.678 | 77.2 | |
| Gasoline and naphtha | 34.2 | 0.731 | 62.1 | |
| Kerosene | 9.6 | 0.812 | 42.8 | |
| Gas oil | 13.4 | 0.843 | 36.4 | below 50 |
| Non-viscous lub. dist. | 8.4 | 0.859-0.879 | 33.2-29.5 | 50-100 |
| Medium lub. dist. | 6.3 | 0.879-0.893 | 29.5-27.0 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 23.8 | 0.941 | 18.9 | |
| Distillation loss | 4.3 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-267

Oil from: Tar Springs formation
Chester (Upper Miss.) series
Depth 2080 feet

Franklin County
Sec. 12, T. 7 S., R. 2 E.
W. Frankfort field

General Characteristics

Specific gravity: 0.833
Sulfur, per cent: 0.13
Saybolt Universal Viscosity (100°F): 44.0

A.P.I. Gravity: 38.4°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 746.2 First drop, 87°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.9 | 2.9 | 0.645 | 87.9 | — | — | | |
| 2 | 75 | 167 | 3.7 | 6.6 | 0.665 | 81.3 | — | — | 5.1 | 12.72 |
| 3 | 100 | 212 | 4.6 | 11.2 | 0.705 | 69.2 | — | — | 14 | 12.26 |
| 4 | 125 | 257 | 6.3 | 17.5 | 0.733 | 61.6 | — | — | 18 | 12.02 |
| 5 | 150 | 302 | 5.7 | 23.2 | 0.755 | 55.9 | — | — | 21 | 11.91 |
| 6 | 175 | 347 | 5.1 | 28.3 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 4.6 | 32.9 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 5.0 | 37.9 | 0.802 | 44.9 | — | — | 25 | 11.85 |
| 9 | 250 | 482 | 5.1 | 43.0 | 0.818 | 41.5 | — | — | 27 | 11.83 |
| 10 | 275 | 527 | 6.0 | 49.0 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.1 | 53.1 | 0.843 | 36.4 | 39 | 5 | 30 | 11.84 |
| 12 | 225 | 437 | 4.6 | 57.7 | 0.853 | 34.4 | 43 | 30 | 31 | 11.87 |
| 13 | 250 | 482 | 4.8 | 62.5 | 0.865 | 32.1 | 55 | 55 | 34 | 11.86 |
| 14 | 275 | 527 | 4.5 | 67.0 | 0.871 | 31.0 | 80 | 70 | 37 | 11.85 |
| 15 | 300 | 572 | 5.7 | 72.7 | 0.885 | 28.4 | 130 | 85 | 40 | 11.83 |

Carbon residue of residuum, 7.0%

Carbon residue of crude, 2.0%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 11.2 | 0.676 | 77.8 | |
| Gasoline and naphtha | 32.9 | 0.731 | 62.1 | |
| Kerosene | 10.1 | 0.810 | 43.2 | |
| Gas oil | 15.1 | 0.843 | 36.4 | below 50 |
| Non-viscous lub. dist. | 8.8 | 0.860-0.877 | 33.0-29.8 | 50-100 |
| Medium lub. dist. | 5.8 | 0.877-0.893 | 29.8-27.0 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 25.2 | 0.942 | 18.7 | |
| Distillation loss | 2.1 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-268

Oil from: Bethel formation
 Chester (Upper Miss.) series
 Depth 2959 feet

Hamilton County
 Sec. 27, T. 5 S., R. 6 E.
 Hoodville field

General Characteristics

Specific gravity: 0.834
 Sulfur, per cent: 0.14
 Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 38.2°
 Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 746.9 First drop, 91°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.5 | 2.5 | 0.649 | 86.5 | — | — | | |
| 2 | 75 | 167 | 2.7 | 5.2 | 0.668 | 80.3 | — | — | 6.5 | 12.65 |
| 3 | 100 | 212 | 5.0 | 10.2 | 0.708 | 68.4 | — | — | 16 | 12.20 |
| 4 | 125 | 257 | 6.2 | 16.4 | 0.735 | 61.0 | — | — | 19 | 11.99 |
| 5 | 150 | 302 | 5.6 | 22.0 | 0.753 | 56.4 | — | — | 20 | 11.95 |
| 6 | 175 | 347 | 4.9 | 26.9 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 4.9 | 31.8 | 0.793 | 46.9 | — | — | 26 | 11.82 |
| 8 | 225 | 437 | 4.9 | 36.7 | 0.808 | 43.6 | — | — | 28 | 11.75 |
| 9 | 250 | 482 | 5.0 | 41.7 | 0.820 | 41.1 | — | — | 28 | 11.81 |
| 10 | 275 | 527 | 6.1 | 47.8 | 0.835 | 38.0 | — | — | 31 | 11.78 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.9 | 51.7 | 0.843 | 36.4 | 39 | 5 | 30 | 11.84 |
| 12 | 225 | 437 | 4.7 | 56.4 | 0.854 | 34.2 | 44 | 25 | 32 | 11.86 |
| 13 | 250 | 482 | 5.1 | 61.5 | 0.865 | 32.1 | 58 | 50 | 34 | 11.86 |
| 14 | 275 | 527 | 5.0 | 66.5 | 0.878 | 29.7 | 85 | 65 | 40 | 11.77 |
| 15 | 300 | 572 | 5.4 | 71.9 | 0.890 | 27.5 | 130 | 80 | 43 | 11.77 |

Carbon residue of residuum, 5.4%

Carbon residue of crude, 1.6%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 10.2 | 0.683 | 75.7 | |
| Gasoline and naphtha | 31.8 | 0.736 | 60.8 | |
| Kerosene | 9.9 | 0.814 | 42.3 | |
| Gas oil | 14.5 | 0.843 | 36.4 | below 50 |
| Non-viscous lub. dist. | 9.5 | 0.859-0.882 | 33.2-28.9 | 50-100 |
| Medium lub. dist. | 6.2 | 0.882-0.897 | 28.9-26.3 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 25.9 | 0.939 | 19.2 | |
| Distillation loss | 2.2 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-269

Oil from: Tar Springs formation
Chester (Upper Miss.) series
Depth 2129 feet

White County
Sec. 19, T. 7 S., R. 11 E.
New Haven field

General Characteristics

Specific gravity: 0.843
Sulfur, per cent: 0.27
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 36.4°
Color: Greenish brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 744.2 First drop, 85°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.8 | 2.8 | 0.649 | 86.5 | — | — | | |
| 2 | 75 | 167 | 3.7 | 6.5 | 0.670 | 79.7 | — | — | 7.5 | 12.60 |
| 3 | 100 | 212 | 6.1 | 12.6 | 0.708 | 68.4 | — | — | 16 | 12.20 |
| 4 | 125 | 257 | 7.2 | 19.8 | 0.740 | 59.7 | — | — | 22 | 11.91 |
| 5 | 150 | 302 | 5.7 | 25.5 | 0.758 | 55.2 | — | — | 23 | 11.87 |
| 6 | 175 | 347 | 4.6 | 30.1 | 0.778 | 50.4 | — | — | 25 | 11.82 |
| 7 | 200 | 392 | 4.7 | 34.8 | 0.798 | 45.8 | — | — | 29 | 11.74 |
| 8 | 225 | 437 | 4.5 | 39.3 | 0.815 | 42.1 | — | — | 31 | 11.66 |
| 9 | 250 | 482 | 5.0 | 44.3 | 0.829 | 39.2 | — | — | 32 | 11.70 |
| 10 | 275 | 527 | 6.4 | 50.7 | 0.845 | 36.0 | — | — | 35 | 11.64 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|---------|----|-------|
| 11 | 200 | 392 | 3.6 | 54.3 | 0.854 | 34.2 | 39 | below 5 | 36 | 11.69 |
| 12 | 225 | 437 | 4.8 | 59.1 | 0.865 | 32.1 | 45 | 25 | 37 | 11.70 |
| 13 | 250 | 482 | 4.9 | 64.0 | 0.878 | 29.7 | 59 | 50 | 40 | 11.68 |
| 14 | 275 | 527 | 4.6 | 68.6 | 0.891 | 27.3 | 90 | 65 | 43 | 11.68 |
| 15 | 300 | 572 | 6.7 | 75.3 | 0.909 | 24.2 | 180 | 80 | 48 | 11.61 |

Carbon residue of residuum, 9.6%

Carbon residue of crude, 2.6%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 12.6 | 0.684 | 75.4 | |
| Gasoline and naphtha | 34.8 | 0.735 | 61.0 | |
| Kerosene | 4.5 | 0.815 | 42.1 | |
| Gas oil | 19.1 | 0.847 | 35.6 | below 50 |
| Non-viscous lub. dist. | 8.5 | 0.870-0.893 | 31.1-27.0 | 50-100 |
| Medium lub. dist. | 6.4 | 0.893-0.913 | 27.0-23.5 | 100-200 |
| Viscous lub. dist. | 2.0 | 0.913-0.920 | 23.5-22.3 | above 200 |
| Residuum | 23.3 | 0.971 | 14.2 | |
| Distillation loss | 1.4 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-270

Oil from: Weiler sand
 Chester (Upper Miss.) series
 Depth 1370 feet

Marion County
 Sec. 34, T. 4 N., R. 1 E.
 East Patoka field

General Characteristics

Specific gravity: 0.845
 Sulfur, per cent: 0.18
 Saybolt Universal Viscosity (100°F): 46.0

A.P.I. Gravity: 36.0°
 Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 744.8 First drop, 89°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.0 | 2.0 | 0.645 | 87.9 | — | — | | |
| 2 | 75 | 167 | 2.3 | 4.3 | 0.665 | 81.3 | — | — | 5.1 | 12.72 |
| 3 | 100 | 212 | 4.6 | 8.9 | 0.703 | 69.8 | — | — | 13 | 12.30 |
| 4 | 125 | 257 | 6.1 | 15.0 | 0.728 | 62.9 | — | — | 16 | 12.11 |
| 5 | 150 | 302 | 5.5 | 20.5 | 0.748 | 57.7 | — | — | 18 | 12.03 |
| 6 | 175 | 347 | 5.4 | 25.9 | 0.765 | 53.5 | — | — | 19 | 12.01 |
| 7 | 200 | 392 | 5.4 | 31.3 | 0.780 | 49.9 | — | — | 20 | 12.01 |
| 8 | 225 | 437 | 5.0 | 36.3 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 5.2 | 41.5 | 0.820 | 41.1 | — | — | 28 | 11.81 |
| 10 | 275 | 527 | 6.3 | 47.8 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.3 | 52.1 | 0.843 | 36.4 | 39 | 5 | 30 | 11.84 |
| 12 | 225 | 437 | 5.0 | 57.1 | 0.855 | 34.0 | 45 | 30 | 32 | 11.84 |
| 13 | 250 | 482 | 5.3 | 62.4 | 0.865 | 32.1 | 56 | 55 | 34 | 11.86 |
| 14 | 275 | 527 | 5.0 | 67.4 | 0.878 | 29.7 | 85 | 70 | 40 | 11.77 |
| 15 | 300 | 572 | 6.0 | 73.4 | 0.890 | 27.5 | 140 | 85 | 43 | 11.77 |

Carbon residue of residuum, 10.5%

Carbon residue of crude, 3.2%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 8.9 | 0.680 | 76.6 | |
| Gasoline and naphtha | 31.3 | 0.733 | 61.6 | |
| Kerosene | 10.2 | 0.812 | 42.8 | |
| Gas oil | 15.6 | 0.843 | 36.4 | below 50 |
| Non-viscous lub. dist. | 9.3 | 0.860-0.881 | 33.0-29.1 | 50-100 |
| Medium lub. dist. | 7.0 | 0.881-0.897 | 29.1-26.3 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 25.8 | 0.964 | 15.3 | |
| Distillation loss | 0.8 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-272

Oil from: Aux Vases formation
Chester (Upper Miss.) series
Depth 3081 feet

Hamilton County
Sec. 3, T. 6 S., R. 6 E
Hoodville field

General Characteristics

Specific gravity: 0.828
Sulfur, per cent: 0.17
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 39.4°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 745.2 First drop, 87°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.7 | 3.7 | 0.647 | 87.2 | — | — | | |
| 2 | 75 | 167 | 3.1 | 6.8 | 0.668 | 80.3 | — | — | 6.5 | 12.65 |
| 3 | 100 | 212 | 4.8 | 11.6 | 0.708 | 68.4 | — | — | 16 | 12.20 |
| 4 | 125 | 257 | 6.0 | 17.6 | 0.737 | 60.5 | — | — | 20 | 11.96 |
| 5 | 150 | 302 | 5.6 | 23.2 | 0.755 | 55.9 | — | — | 21 | 11.91 |
| 6 | 175 | 347 | 5.0 | 28.2 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 4.8 | 33.0 | 0.790 | 47.6 | — | — | 25 | 11.87 |
| 8 | 225 | 437 | 4.6 | 37.6 | 0.805 | 44.3 | — | — | 26 | 11.80 |
| 9 | 250 | 482 | 4.7 | 42.3 | 0.818 | 41.5 | — | — | 27 | 11.83 |
| 10 | 275 | 527 | 5.7 | 48.0 | 0.834 | 38.2 | — | — | 30 | 11.80 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.3 | 52.3 | 0.843 | 36.4 | 38 | 5 | 30 | 11.84 |
| 12 | 225 | 437 | 4.6 | 56.9 | 0.853 | 34.4 | 45 | 25 | 31 | 11.87 |
| 13 | 250 | 482 | 4.9 | 61.8 | 0.863 | 32.5 | 58 | 50 | 33 | 11.88 |
| 14 | 275 | 527 | 4.4 | 66.2 | 0.873 | 30.6 | 85 | 65 | 39 | 11.82 |
| 15 | 300 | 572 | 5.8 | 72.0 | 0.885 | 28.4 | 140 | 80 | 40 | 11.83 |

Carbon residue of residuum, 6.1%

Carbon residue of crude, 1.8%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 11.6 | 0.678 | 77.2 | |
| Gasoline and naphtha | 33.0 | 0.732 | 61.8 | |
| Kerosene | 9.3 | 0.812 | 42.8 | |
| Gas oil | 14.1 | 0.842 | 36.6 | below 50 |
| Non-viscous lub. dist. | 9.0 | 0.857-0.877 | 33.6-29.8 | 50-100 |
| Medium lub. dist. | 6.6 | 0.877-0.892 | 29.8-27.1 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 25.6 | 0.940 | 19.0 | |
| Distillation loss | 2.4 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-273

Oil from: Weiler sand
Chester (Upper Miss.) series
Depth 1108 feet

Clinton County
Sec. 16, T. 1 N., R. 2 W.
Posey field

General Characteristics

Specific gravity: 0.846
Sulfur, per cent: 0.17
Saybolt Universal Viscosity (100°F): 46.0

A.P.I. Gravity: 35.8°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 744.8 First drop, 113°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | | | | | | | | |
| 2 | 75 | 167 | 2.7 | 2.7 | 0.663 | 81.9 | — | — | 4.2 | 12.77 |
| 3 | 100 | 212 | 4.0 | 6.7 | 0.700 | 70.6 | — | — | 12 | 12.35 |
| 4 | 125 | 257 | 6.7 | 13.4 | 0.727 | 63.1 | — | — | 16 | 12.13 |
| 5 | 150 | 302 | 6.2 | 19.6 | 0.747 | 57.9 | — | — | 18 | 12.05 |
| 6 | 175 | 347 | 5.4 | 25.0 | 0.765 | 53.5 | — | — | 19 | 12.01 |
| 7 | 200 | 392 | 5.0 | 30.0 | 0.783 | 49.2 | — | — | 21 | 11.96 |
| 8 | 225 | 437 | 5.0 | 35.0 | 0.798 | 45.8 | — | — | 23 | 11.92 |
| 9 | 250 | 482 | 5.3 | 40.3 | 0.815 | 42.1 | — | — | 26 | 11.87 |
| 10 | 275 | 527 | 6.4 | 46.7 | 0.830 | 39.0 | — | — | 28 | 11.84 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.6 | 51.3 | 0.840 | 37.0 | 38 | 10 | 29 | 11.89 |
| 12 | 225 | 437 | 5.3 | 56.6 | 0.850 | 35.0 | 45 | 30 | 30 | 11.91 |
| 13 | 250 | 482 | 5.2 | 61.8 | 0.860 | 33.0 | 55 | 60 | 31 | 11.92 |
| 14 | 275 | 527 | 5.1 | 66.9 | 0.872 | 30.8 | 80 | 70 | 38 | 11.83 |
| 15 | 300 | 572 | 6.6 | 73.5 | 0.885 | 28.4 | 140 | 85 | 40 | 11.83 |

Carbon residue of residuum, 10.5%

Carbon residue of crude, 3.2%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 6.7 | 0.685 | 75.1 | |
| Gasoline and naphtha | 30.0 | 0.738 | 60.2 | |
| Kerosene | 10.3 | 0.807 | 43.8 | |
| Gas oil | 16.2 | 0.839 | 37.2 | below 50 |
| Non-viscous lub. dist. | 9.7 | 0.855-0.876 | 34.0-30.0 | 50-100 |
| Medium lub. dist. | 7.3 | 0.876-0.893 | 30.0-27.0 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 26.3 | 0.959 | 16.1 | |
| Distillation loss | 0.2 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-274

Oil from: Palestine formation
Chester (Upper Miss.) series
Depth 2018 feet

White County
Sec. 7, T. 6 S., R. 11 E.
Maunie field

General Characteristics

Specific gravity: 0.856
Sulfur, per cent: 0.28
Saybolt Universal Viscosity (100°F): 47.0

A.P.I. Gravity: 33.8°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 742.4 First drop, 108°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | | | | | | | | |
| 2 | 75 | 167 | 2.8 | 2.8 | 0.662 | 82.2 | — | — | 3.7 | 12.79 |
| 3 | 100 | 212 | 3.9 | 6.7 | 0.718 | 65.6 | — | — | 20 | 12.04 |
| 4 | 125 | 257 | 6.4 | 13.1 | 0.740 | 59.7 | — | — | 22 | 11.91 |
| 5 | 150 | 302 | 5.8 | 18.9 | 0.755 | 55.9 | — | — | 21 | 11.91 |
| 6 | 175 | 347 | 5.2 | 24.1 | 0.772 | 51.8 | — | — | 23 | 11.91 |
| 7 | 200 | 392 | 5.3 | 29.4 | 0.787 | 48.3 | — | — | 24 | 11.91 |
| 8 | 225 | 437 | 4.9 | 34.3 | 0.804 | 44.5 | — | — | 26 | 11.81 |
| 9 | 250 | 482 | 5.2 | 39.5 | 0.818 | 41.5 | — | — | 27 | 11.83 |
| 10 | 275 | 527 | 6.5 | 46.0 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 5.0 | 51.0 | 0.845 | 36.0 | 41 | 10 | 31 | 11.82 |
| 12 | 225 | 437 | 5.1 | 56.1 | 0.863 | 32.5 | 47 | 30 | 36 | 11.73 |
| 13 | 250 | 482 | 5.3 | 61.4 | 0.878 | 29.7 | 64 | 55 | 40 | 11.68 |
| 14 | 275 | 527 | 5.2 | 66.6 | 0.885 | 28.4 | 95 | 70 | 43 | 11.67 |
| 15 | 300 | 572 | 6.9 | 73.5 | 0.900 | 25.7 | 200 | 90 | 47 | 11.63 |

Carbon residue of residuum, 15.7%

Carbon residue of crude, 4.6%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 6.7 | 0.695 | 72.1 | |
| Gasoline and naphtha | 29.4 | 0.747 | 57.9 | |
| Kerosene | 10.1 | 0.811 | 42.9 | |
| Gas oil | 14.9 | 0.843 | 36.4 | below 50 |
| Non-viscous lub. dist. | 9.8 | 0.865-0.886 | 32.1-28.2 | 50-100 |
| Medium lub. dist. | 5.9 | 0.886-0.900 | 28.2-25.7 | 100-200 |
| Viscous lub. dist. | 3.4 | 0.900-0.908 | 25.7-24.3 | above 200 |
| Residuum | 24.9 | 0.986 | 12.0 | |
| Distillation loss | 1.6 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-280

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 2017 feet

Jefferson County
Sec. 25, T. 2 S., R. 1 E.
Woodlawn field

General Characteristics

Specific gravity: 0.836
Sulfur, per cent: 0.16
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 37.8°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 738.6 First drop, 91°F | | | | | | | |
|------------------------------|-----------|-----------|--|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | 2.5 | 2.5 | 0.668 | 80.3 | — | — | | |
| 2 | 75 | 167 | 4.4 | 6.9 | 0.694 | 72.4 | — | — | 19 | 12.12 |
| 3 | 100 | 212 | 5.4 | 12.3 | 0.743 | 59.0 | — | — | 32 | 11.63 |
| 4 | 125 | 257 | 6.4 | 18.7 | 0.757 | 55.4 | — | — | 30 | 11.66 |
| 5 | 150 | 302 | 5.8 | 24.5 | 0.767 | 53.0 | — | — | 27 | 11.74 |
| 6 | 175 | 347 | 5.5 | 30.0 | 0.777 | 50.6 | — | — | 25 | 11.83 |
| 7 | 200 | 392 | 5.0 | 35.0 | 0.790 | 47.6 | — | — | 25 | 11.87 |
| 8 | 225 | 437 | 4.5 | 39.5 | 0.805 | 44.3 | — | — | 26 | 11.80 |
| 9 | 250 | 482 | 4.9 | 44.4 | 0.820 | 41.1 | — | — | 28 | 11.81 |
| 10 | 275 | 527 | 5.6 | 50.0 | 0.837 | 37.6 | — | — | 32 | 11.75 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.7 | 53.7 | 0.845 | 36.0 | 39 | 5 | 31 | 11.82 |
| 12 | 225 | 437 | 4.6 | 58.3 | 0.858 | 33.4 | 44 | 30 | 34 | 11.80 |
| 13 | 250 | 482 | 4.8 | 63.1 | 0.868 | 31.5 | 55 | 50 | 35 | 11.82 |
| 14 | 275 | 527 | 4.9 | 68.0 | 0.873 | 30.6 | 80 | 65 | 38 | 11.83 |
| 15 | 300 | 572 | 5.7 | 73.7 | 0.887 | 28.0 | 130 | 85 | 42 | 11.80 |

Carbon residue of residuum, 10.1%

Carbon residue or crude, 2.8%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 12.3 | 0.710 | 67.8 | |
| Gasoline and naphtha | 35.0 | 0.750 | 57.2 | |
| Kerosene | 9.4 | 0.813 | 42.6 | |
| Gas oil | 14.1 | 0.846 | 35.8 | below 50 |
| Non-viscous lub. dist. | 9.2 | 0.863-0.878 | 32.5-29.7 | 50-100 |
| Medium lub. dist. | 6.0 | 0.878-0.894 | 29.7-26.8 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 23.6 | 0.959 | 16.1 | |
| Distillation loss | 2.7 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-281

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3129 feet

Richland County
Sec. 34, T. 3 N., R. 14 W.
Bonpas field

General Characteristics

Specific gravity: 0.844
Sulfur, per cent: 0.23
Saybolt Universal Viscosity (100°F): 46.0

A.P.I. Gravity: 36.2°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 740.8 First drop, 89°F | | | | | | | |
|------------------------------|-----------|-----------|--|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | 2.6 | 2.6 | 0.649 | 86.5 | — | — | | |
| 2 | 75 | 167 | 3.4 | 6.0 | 0.689 | 73.9 | — | — | 17 | 12.20 |
| 3 | 100 | 212 | 5.5 | 11.5 | 0.729 | 62.6 | — | — | 26 | 11.84 |
| 4 | 125 | 257 | 5.9 | 17.4 | 0.752 | 56.7 | — | — | 27 | 11.73 |
| 5 | 150 | 302 | 4.5 | 21.9 | 0.770 | 52.3 | — | — | 28 | 11.69 |
| 6 | 175 | 347 | 4.6 | 26.5 | 0.788 | 48.1 | — | — | 30 | 11.67 |
| 7 | 200 | 392 | 4.4 | 30.9 | 0.808 | 43.6 | — | — | 33 | 11.58 |
| 8 | 225 | 437 | 4.1 | 35.0 | 0.820 | 41.1 | — | — | 33 | 11.58 |
| 9 | 250 | 482 | 4.8 | 39.8 | 0.829 | 39.2 | — | — | 32 | 11.70 |
| 10 | 275 | 527 | 6.5 | 46.3 | 0.838 | 37.4 | — | — | 32 | 11.74 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.6 | 49.9 | 0.845 | 36.0 | 39 | 5 | 31 | 11.82 |
| 12 | 225 | 437 | 3.9 | 53.8 | 0.855 | 34.0 | 45 | 30 | 32 | 11.84 |
| 13 | 250 | 482 | 5.4 | 59.2 | 0.865 | 32.1 | 57 | 50 | 34 | 11.86 |
| 14 | 275 | 527 | 5.7 | 64.9 | 0.877 | 29.8 | 85 | 65 | 40 | 11.79 |
| 15 | 300 | 572 | 6.3 | 71.2 | 0.887 | 28.0 | 160 | 85 | 42 | 11.80 |

Carbon residue of residuum, 4.6%

Carbon residue or crude, 1.4%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 11.5 | 0.699 | 70.9 | |
| Gasoline and naphtha | 30.9 | 0.748 | 57.7 | |
| Kerosene | 4.1 | 0.820 | 41.1 | |
| Gas oil | 18.8 | 0.841 | 36.8 | below 50 |
| Non-viscous lub. dist. | 9.5 | 0.859-0.879 | 33.2-29.5 | 50-100 |
| Medium lub. dist. | 7.9 | 0.879-0.892 | 29.5-27.1 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 26.8 | 0.937 | 19.5 | |
| Distillation loss | 2.0 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-282

Oil from: Aux Vases formation
Chester (Upper Miss.) series
Depth 1735 feet

Shelby County
Sec. 12, T. 10 N., R. 2 E.
Lakewood field

General Characteristics

Specific gravity: 0.867
Sulfur, per cent: 0.23
Saybolt Universal Viscosity (100°F): 65.0

A.P.I. Gravity: 31.7°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 744.2 First drop, 210°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | | | | | | | | |
| 2 | 75 | 167 | | | | | | | | |
| 3 | 100 | 212 | | | | | | | | |
| 4 | 125 | 257 | 2.6 | 2.6 | 0.730 | 62.3 | — | — | 17 | 12.98 |
| 5 | 150 | 302 | 5.9 | 8.5 | 0.753 | 56.4 | — | — | 20 | 11.95 |
| 6 | 175 | 347 | 5.5 | 14.0 | 0.770 | 52.3 | — | — | 22 | 11.04 |
| 7 | 200 | 392 | 5.0 | 19.0 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 4.8 | 23.8 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 6.0 | 29.8 | 0.815 | 42.1 | — | — | 26 | 11.87 |
| 10 | 275 | 527 | 7.2 | 37.0 | 0.835 | 38.0 | — | — | 31 | 11.78 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 5.6 | 42.6 | 0.844 | 36.2 | 40 | 15 | 31 | 11.83 |
| 12 | 225 | 437 | 6.6 | 49.2 | 0.855 | 34.0 | 45 | 35 | 32 | 11.84 |
| 13 | 250 | 482 | 6.0 | 55.2 | 0.865 | 32.1 | 58 | 60 | 34 | 11.86 |
| 14 | 275 | 527 | 5.8 | 61.0 | 0.873 | 30.6 | 80 | 80 | 38 | 11.83 |
| 15 | 300 | 572 | 7.3 | 68.3 | 0.887 | 28.0 | 140 | 95 | 42 | 11.80 |

Carbon residue of residuum, 10.5%

Carbon residue of crude, 3.7%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 0.0 | | | |
| Gasoline and naphtha | 19.0 | 0.764 | 53.7 | |
| Kerosene | 10.8 | 0.810 | 43.2 | |
| Gas oil | 18.6 | 0.844 | 36.2 | below 50 |
| Non-viscous lub. dist. | 11.9 | 0.859-0.878 | 33.2-29.7 | 50-100 |
| Medium lub. dist. | 8.0 | 0.878-0.895 | 29.7-26.6 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 31.6 | 0.958 | 16.2 | |
| Distillation loss | 0.1 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-285

Oil from: Bethel formation
 Chester (Upper Miss.) series
 Depth 2028 feet

Jackson County
 Sec. 22, T. 7 S., R. 1 W.
 Elkville field

General Characteristics

Specific gravity: 0.846
 Sulfur, per cent: 0.22
 Saybolt Universal Viscosity (100°F): 49.0

A.P.I. Gravity: 35.8°
 Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 747.6 First drop, 89°F

| Fraction No. | Cut at °C | °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 1.8 | 1.8 | 0.639 | 89.9 | — | — | | |
| 2 | 75 | 167 | 3.1 | 4.9 | 0.665 | 81.3 | — | — | 5.1 | 12.72 |
| 3 | 100 | 212 | 2.9 | 7.8 | 0.694 | 72.4 | — | — | 8.9 | 12.46 |
| 4 | 125 | 257 | 5.1 | 12.9 | 0.725 | 63.7 | — | — | 15 | 12.17 |
| 5 | 150 | 302 | 5.4 | 18.3 | 0.743 | 59.0 | — | — | 16 | 12.11 |
| 6 | 175 | 347 | 5.1 | 23.4 | 0.763 | 54.0 | — | — | 18 | 12.05 |
| 7 | 200 | 392 | 4.6 | 28.0 | 0.780 | 49.9 | — | — | 20 | 12.01 |
| 8 | 225 | 437 | 4.4 | 32.4 | 0.795 | 46.5 | — | — | 22 | 11.97 |
| 9 | 250 | 482 | 5.0 | 37.4 | 0.810 | 43.2 | — | — | 23 | 11.94 |
| 10 | 275 | 527 | 6.6 | 44.0 | 0.825 | 40.0 | — | — | 26 | 11.91 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.7 | 48.7 | 0.835 | 38.0 | 40 | 5 | 27 | 11.96 |
| 12 | 225 | 437 | 5.3 | 54.0 | 0.848 | 35.4 | 45 | 30 | 29 | 11.94 |
| 13 | 250 | 482 | 4.9 | 58.9 | 0.860 | 33.0 | 58 | 55 | 31 | 11.92 |
| 14 | 275 | 527 | 5.1 | 64.0 | 0.866 | 31.9 | 85 | 70 | 31 | 12.02 |
| 15 | 300 | 572 | 5.7 | 69.7 | 0.880 | 29.3 | 140 | 85 | 35 | 12.00 |

Carbon residue of residuum, 6.8%

Carbon residue or crude, 2.2%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 7.8 | 0.670 | 79.7 | |
| Gasoline and naphtha | 28.0 | 0.729 | 62.6 | |
| Kerosene | 16.0 | 0.812 | 42.8 | |
| Gas oil | 9.4 | 0.841 | 36.8 | below 50 |
| Non-viscous lub. dist. | 9.5 | 0.853-0.870 | 34.4-31.1 | 50-100 |
| Medium lub. dist. | 6.8 | 0.870-0.887 | 31.1-28.0 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 28.2 | 0.965 | 15.1 | |
| Distillation loss | 2.1 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-286

Oil from: Devonian limestone
Devonian system
Depth 2684 feet

Clinton County
Sec. 35, T. 3 N., R. 2 W.
Boulder field

General Characteristics

Specific gravity: 0.893
Sulfur, per cent: 0.34
Saybolt Universal Viscosity (100°F): 91.0

A.P.I. Gravity: 27.0°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 745.9 First drop, 195°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | | | | | | | | |
| 2 | 75 | 167 | | | | | | | | |
| 3 | 100 | 212 | | | | | | | | |
| 4 | 125 | 257 | 3.6 | 3.6 | 0.779 | 50.2 | — | — | 40 | 11.32 |
| 5 | 150 | 302 | 3.9 | 7.5 | 0.789 | 47.8 | — | — | 37 | 11.41 |
| 6 | 175 | 347 | 3.6 | 11.1 | 0.805 | 44.3 | — | — | 38 | 11.40 |
| 7 | 200 | 392 | 4.1 | 15.2 | 0.820 | 41.1 | — | — | 39 | 11.42 |
| 8 | 225 | 437 | 4.5 | 19.7 | 0.833 | 38.4 | — | — | 40 | 11.41 |
| 9 | 250 | 482 | 5.1 | 24.8 | 0.845 | 36.0 | — | — | 40 | 11.48 |
| 10 | 275 | 527 | 7.1 | 31.9 | 0.858 | 33.4 | — | — | 41 | 11.47 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 5.6 | 37.5 | 0.865 | 32.1 | 40 | 5 | 41 | 11.55 |
| 12 | 225 | 437 | 6.0 | 43.5 | 0.875 | 30.2 | 48 | 30 | 42 | 11.58 |
| 13 | 250 | 482 | 5.8 | 49.3 | 0.885 | 28.4 | 65 | 50 | 43 | 11.61 |
| 14 | 275 | 527 | 5.8 | 55.1 | 0.892 | 27.1 | 100 | 70 | 43 | 11.67 |
| 15 | 300 | 572 | 7.7 | 62.8 | 0.907 | 24.5 | 200 | 90 | 47 | 11.63 |

Carbon residue of residuum, 5.9%

Carbon residue of crude, 2.3%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 0.0 | | | |
| Gasoline and naphtha | 15.2 | 0.799 | 45.6 | |
| Kerosene | 0.0 | | | |
| Gas oil | 26.0 | 0.855 | 34.0 | below 50 |
| Non-viscous lub. dist. | 11.0 | 0.876-0.892 | 30.0-27.1 | 50-100 |
| Medium lub. dist. | 6.8 | 0.892-0.907 | 27.1-24.5 | 100-200 |
| Viscous lub. dist. | 3.8 | 0.907-0.915 | 24.5-23.2 | above 200 |
| Residuum | 37.1 | 0.945 | 18.2 | |
| Distillation loss | 0.1 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-287

Oil from: Bethel formation
 Chester (Upper Miss.) series
 Depth 1991 feet

Jefferson County
 Sec. 35, T. 2 S., R. 1 E.
 Woodlawn field

General Characteristics

Specific gravity: 0.834
 Sulfur, per cent: 0.16
 Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 38.2°
 Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 747.1 First drop, 87°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.0 | 3.0 | 0.648 | 86.9 | — | — | | |
| 2 | 75 | 167 | 3.1 | 6.1 | 0.664 | 81.6 | — | — | 4.6 | 12.75 |
| 3 | 100 | 212 | 4.9 | 11.0 | 0.712 | 67.2 | — | — | 18 | 12.14 |
| 4 | 125 | 257 | 6.5 | 17.5 | 0.737 | 60.5 | — | — | 20 | 11.96 |
| 5 | 150 | 302 | 5.9 | 23.4 | 0.752 | 56.7 | — | — | 20 | 11.97 |
| 6 | 175 | 347 | 5.4 | 28.8 | 0.768 | 52.8 | — | — | 21 | 11.97 |
| 7 | 200 | 392 | 5.0 | 33.8 | 0.785 | 48.8 | — | — | 23 | 11.94 |
| 8 | 225 | 437 | 5.0 | 38.8 | 0.798 | 45.8 | — | — | 23 | 11.92 |
| 9 | 250 | 482 | 4.8 | 43.6 | 0.813 | 42.6 | — | — | 25 | 11.90 |
| 10 | 275 | 527 | 6.2 | 49.8 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.7 | 54.5 | 0.843 | 36.4 | 39 | 5 | 30 | 11.84 |
| 12 | 225 | 437 | 5.1 | 59.6 | 0.853 | 34.4 | 46 | 25 | 31 | 11.87 |
| 13 | 250 | 482 | 5.4 | 65.0 | 0.865 | 32.1 | 61 | 50 | 34 | 11.85 |
| 14 | 275 | 527 | 5.1 | 70.1 | 0.871 | 31.0 | 95 | 65 | 33 | 11.96 |
| 15 | 300 | 572 | 5.4 | 75.5 | 0.885 | 28.4 | 150 | 85 | 37 | 11.93 |

Carbon residue of residuum, 9.0%

Carbon residue of crude, 2.5%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 11.0 | 0.681 | 76.3 | |
| Gasoline and naphtha | 33.8 | 0.733 | 61.6 | |
| Kerosene | 9.8 | 0.805 | 44.3 | |
| Gas oil | 14.9 | 0.841 | 36.8 | below 50 |
| Non-viscous lub. dist. | 9.5 | 0.856-0.872 | 33.8-30.8 | 50-100 |
| Medium lub. dist. | 7.5 | 0.872-0.892 | 30.8-27.1 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 23.4 | 0.957 | 16.4 | |
| Distillation loss | 0.6 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-288

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3380 feet

Wayne County
Sec. 8, T. 3 S., R. 6 E.
Mayberry field

General Characteristics

Specific gravity: 0.835
Sulfur, per cent: 0.16
Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 38.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 746.8 First drop, 91°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.7 | 2.7 | 0.645 | 87.9 | — | — | | |
| 2 | 75 | 167 | 3.0 | 5.7 | 0.668 | 80.3 | — | — | 6.5 | 12.65 |
| 3 | 100 | 212 | 4.9 | 10.6 | 0.710 | 67.8 | — | — | 17 | 12.17 |
| 4 | 125 | 257 | 6.4 | 17.0 | 0.738 | 60.2 | — | — | 21 | 11.94 |
| 5 | 150 | 302 | 6.0 | 23.0 | 0.755 | 55.9 | — | — | 21 | 11.91 |
| 6 | 175 | 347 | 5.6 | 28.6 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 5.0 | 33.6 | 0.790 | 47.6 | — | — | 25 | 11.87 |
| 8 | 225 | 437 | 4.8 | 38.4 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 4.8 | 43.2 | 0.815 | 42.1 | — | — | 26 | 11.87 |
| 10 | 275 | 527 | 5.7 | 48.9 | 0.830 | 39.0 | — | — | 28 | 11.84 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.7 | 53.6 | 0.838 | 37.4 | 38 | 5 | 28 | 11.92 |
| 12 | 225 | 437 | 4.6 | 58.2 | 0.848 | 35.4 | 44 | 30 | 29 | 11.94 |
| 13 | 250 | 482 | 4.6 | 62.8 | 0.863 | 32.5 | 58 | 50 | 33 | 11.88 |
| 14 | 275 | 527 | 4.5 | 67.3 | 0.871 | 31.0 | 90 | 70 | 33 | 11.96 |
| 15 | 300 | 572 | 5.7 | 73.0 | 0.882 | 28.9 | 140 | 90 | 36 | 11.97 |

Carbon residue of residuum, 6.2%

Carbon residue of crude, 1.9%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 10.6 | 0.682 | 76.0 | |
| Gasoline and naphtha | 33.6 | 0.737 | 60.5 | |
| Kerosene | 9.6 | 0.809 | 43.4 | |
| Gas oil | 14.8 | 0.838 | 37.4 | below 50 |
| Non-viscous lub. dist. | 8.1 | 0.855-0.873 | 34.0-30.6 | 50-100 |
| Medium lub. dist. | 6.9 | 0.873-0.888 | 30.6-27.9 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 26.1 | 0.942 | 18.7 | |
| Distillation loss | 0.9 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-289

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3215 feet

Wayne County
Sec. 33, T. 1 N., R. 6 E.
Johnsonville field

General Characteristics

Specific gravity: 0.835
Sulfur, per cent: 0.17
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 38.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 745.8 First drop, 89°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.3 | 2.3 | 0.647 | 87.2 | — | — | | |
| 2 | 75 | 167 | 3.0 | 5.3 | 0.667 | 80.6 | — | — | 6.1 | 12.68 |
| 3 | 100 | 212 | 5.5 | 10.8 | 0.712 | 67.2 | — | — | 18 | 12.14 |
| 4 | 125 | 257 | 6.8 | 17.6 | 0.740 | 59.7 | — | — | 22 | 11.91 |
| 5 | 150 | 302 | 5.9 | 23.5 | 0.755 | 55.9 | — | — | 21 | 11.91 |
| 6 | 175 | 347 | 5.3 | 28.8 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 5.0 | 33.8 | 0.790 | 47.6 | — | — | 25 | 11.87 |
| 8 | 225 | 437 | 4.6 | 38.4 | 0.805 | 44.3 | — | — | 26 | 11.80 |
| 9 | 250 | 482 | 5.1 | 43.5 | 0.818 | 41.5 | — | — | 27 | 11.83 |
| 10 | 275 | 527 | 5.7 | 49.2 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.5 | 53.7 | 0.840 | 37.0 | 38 | 5 | 29 | 11.89 |
| 12 | 225 | 437 | 5.2 | 58.9 | 0.850 | 35.0 | 44 | 25 | 30 | 11.91 |
| 13 | 250 | 482 | 5.5 | 64.4 | 0.863 | 32.5 | 57 | 50 | 33 | 11.88 |
| 14 | 275 | 527 | 5.4 | 69.8 | 0.871 | 31.0 | 90 | 70 | 33 | 11.96 |
| 15 | 300 | 572 | 5.8 | 75.6 | 0.887 | 28.0 | 140 | 90 | 38 | 11.90 |

Carbon residue of residuum, 6.1%

Carbon residue of crude, 1.7%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 10.8 | 0.686 | 74.8 | |
| Gasoline and naphtha | 33.8 | 0.738 | 60.2 | |
| Kerosene | 9.7 | 0.812 | 42.8 | |
| Gas oil | 15.3 | 0.841 | 36.8 | below 50 |
| Non-viscous lub. dist. | 9.4 | 0.856-0.874 | 33.8-30.4 | 50-100 |
| Medium lub. dist. | 7.4 | 0.874-0.895 | 30.4-26.6 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 23.7 | 0.948 | 17.8 | |
| Distillation loss | 0.7 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-290

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3129 feet

Richland County
Sec. 29, T. 2 N., R. 14 W.
Parkersburg field

General Characteristics

Specific gravity: 0.835
Sulfur, per cent: 0.31
Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 38.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | Barometer Reading 744.5 First drop, 91°F | | | | | | | | |
|------------------------------|-----------|--|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | 2.1 | 2.1 | 0.632 | 92.4 | — | — | | |
| 2 | 75 | 167 | 4.1 | 6.2 | 0.669 | 80.0 | — | — | 7.0 | 12.63 |
| 3 | 100 | 212 | 4.9 | 11.1 | 0.712 | 67.2 | — | — | 18 | 12.14 |
| 4 | 125 | 257 | 6.4 | 17.5 | 0.735 | 61.0 | — | — | 19 | 11.99 |
| 5 | 150 | 302 | 5.8 | 23.3 | 0.754 | 56.2 | — | — | 21 | 11.93 |
| 6 | 175 | 347 | 5.2 | 28.5 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 4.4 | 32.9 | 0.792 | 47.2 | — | — | 26 | 11.84 |
| 8 | 225 | 437 | 4.6 | 37.5 | 0.807 | 43.8 | — | — | 27 | 11.77 |
| 9 | 250 | 482 | 5.1 | 42.6 | 0.820 | 41.1 | — | — | 28 | 11.81 |
| 10 | 275 | 527 | 5.4 | 48.0 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.4 | 52.4 | 0.843 | 36.4 | 39 | 5 | 30 | 11.84 |
| 12 | 225 | 437 | 4.6 | 57.0 | 0.855 | 34.0 | 46 | 30 | 32 | 11.84 |
| 13 | 250 | 482 | 4.4 | 61.4 | 0.868 | 31.5 | 58 | 50 | 35 | 11.82 |
| 14 | 275 | 527 | 4.7 | 66.1 | 0.876 | 30.0 | 85 | 65 | 36 | 11.88 |
| 15 | 300 | 572 | 5.7 | 71.8 | 0.890 | 27.5 | 160 | 85 | 39 | 11.86 |

Carbon residue of residuum, 4.2%

Carbon residue of crude, 1.3%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 11.1 | 0.681 | 76.3 | |
| Gasoline and naphtha | 32.9 | 0.734 | 61.3 | |
| Kerosene | 9.7 | 0.814 | 42.3 | |
| Gas oil | 13.6 | 0.842 | 36.6 | below 50 |
| Non-viscous lub. dist. | 8.7 | 0.859-0.879 | 33.2-29.5 | 50-100 |
| Medium lub. dist. | 6.8 | 0.879-0.897 | 29.5-26.3 | 100-200 |
| Viscous lub. dist. | 0.1 | 0.897-0.897 | 26.3-26.3 | above 200 |
| Residuum | 27.3 | 0.930 | 20.7 | |
| Distillation loss | 0.9 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-291

Oil from: Devonian limestone
Devonian system
Depth 2965 feet

Crawford County
Sec. 9, T. 6 N., R. 13 W.
Crawford Main field

General Characteristics

Specific gravity: 0.840
Sulfur, per cent: 0.43
Saybolt Universal Viscosity (100°F): 44.0

A.P.I. Gravity: 37.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 743.0 First drop, 86°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.3 | 3.3 | 0.645 | 87.9 | — | — | | |
| 2 | 75 | 167 | 2.9 | 6.2 | 0.667 | 80.6 | — | — | 6.1 | 12.17 |
| 3 | 100 | 212 | 5.2 | 11.4 | 0.710 | 67.8 | — | — | 17 | 12.79 |
| 4 | 125 | 257 | 6.1 | 17.5 | 0.738 | 60.2 | — | — | 21 | 11.94 |
| 5 | 150 | 302 | 5.3 | 22.8 | 0.763 | 54.0 | — | — | 25 | 11.80 |
| 6 | 175 | 347 | 5.1 | 27.9 | 0.783 | 49.2 | — | — | 28 | 11.75 |
| 7 | 200 | 392 | 4.5 | 32.4 | 0.803 | 44.7 | — | — | 31 | 11.65 |
| 8 | 225 | 437 | 4.1 | 36.5 | 0.815 | 42.1 | — | — | 31 | 11.66 |
| 9 | 250 | 482 | 4.9 | 41.4 | 0.828 | 39.4 | — | — | 32 | 11.71 |
| 10 | 275 | 527 | 5.4 | 46.8 | 0.840 | 37.0 | — | — | 33 | 11.71 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.7 | 50.5 | 0.850 | 35.0 | 39 | 5 | 34 | 11.75 |
| 12 | 225 | 437 | 4.4 | 54.9 | 0.860 | 33.0 | 44 | 30 | 35 | 11.77 |
| 13 | 250 | 482 | 4.9 | 59.8 | 0.870 | 31.1 | 57 | 50 | 36 | 11.79 |
| 14 | 275 | 527 | 4.9 | 64.7 | 0.878 | 29.7 | 90 | 70 | 37 | 11.86 |
| 15 | 300 | 572 | 5.3 | 70.0 | 0.890 | 27.5 | 150 | 85 | 39 | 11.86 |

Carbon residue of residuum, 5.4%

Carbon residue of crude, 1.8%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 11.4 | 0.680 | 76.6 | |
| Gasoline and naphtha | 32.4 | 0.738 | 60.2 | |
| Kerosene | 4.1 | 0.815 | 42.1 | |
| Gas oil | 18.4 | 0.844 | 36.2 | below 50 |
| Non-viscous lub. dist. | 8.2 | 0.865-0.880 | 32.1-29.3 | 50-100 |
| Medium lub. dist. | 6.9 | 0.880-0.896 | 29.3-26.4 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 29.0 | 0.948 | 17.8 | |
| Distillation loss | 1.0 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-292

Oil from: Aux Vases formation
 Chester (Upper Miss.) series
 Depth 2790 feet

Clay County
 Sec. 4, T. 2 N., R. 5 E.
 Xenia field

General Characteristics

Specific gravity: 0.849
 Sulfur, per cent: 0.19
 Saybolt Universal Viscosity (100°F): 49.0

A.P.I. Gravity: 35.2°
 Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 745.2 First drop, 87°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.2 | 2.2 | 0.649 | 86.5 | — | — | | |
| 2 | 75 | 167 | 3.8 | 6.0 | 0.669 | 80.0 | — | — | 7.0 | 12.63 |
| 3 | 100 | 212 | 4.0 | 10.0 | 0.707 | 68.6 | — | — | 15 | 12.22 |
| 4 | 125 | 257 | 6.2 | 16.2 | 0.729 | 62.6 | — | — | 17 | 12.10 |
| 5 | 150 | 302 | 5.4 | 21.6 | 0.749 | 57.4 | — | — | 18 | 12.02 |
| 6 | 175 | 347 | 5.0 | 26.6 | 0.770 | 52.3 | — | — | 22 | 11.94 |
| 7 | 200 | 392 | 4.4 | 31.0 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 4.5 | 35.5 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 4.8 | 40.3 | 0.815 | 42.1 | — | — | 26 | 11.87 |
| 10 | 275 | 527 | 5.4 | 45.7 | 0.828 | 39.4 | — | — | 27 | 11.87 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.7 | 49.4 | 0.840 | 37.0 | 40 | 5 | 29 | 11.89 |
| 12 | 225 | 437 | 5.2 | 54.6 | 0.853 | 34.4 | 45 | 25 | 31 | 11.87 |
| 13 | 250 | 482 | 5.0 | 59.6 | 0.865 | 32.1 | 59 | 50 | 34 | 11.85 |
| 14 | 275 | 527 | 5.2 | 64.8 | 0.871 | 31.0 | 95 | 65 | 33 | 11.96 |
| 15 | 300 | 572 | 5.8 | 70.6 | 0.885 | 28.4 | 160 | 85 | 37 | 11.93 |

Carbon residue of residuum, 9.8%

Carbon residue of crude, 3.2%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 10.0 | 0.680 | 76.6 | |
| Gasoline and naphtha | 31.0 | 0.732 | 61.8 | |
| Kerosene | 9.3 | 0.809 | 43.4 | |
| Gas oil | 13.5 | 0.839 | 37.2 | below 50 |
| Non-viscous lub. dist. | 8.8 | 0.857-0.872 | 33.6-30.8 | 50-100 |
| Medium lub. dist. | 8.0 | 0.872-0.892 | 30.8-27.1 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 28.2 | 0.972 | 14.1 | |
| Distillation loss | 1.2 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-293

Oil from: Pennsylvania sand
Pennsylvanian system
Depth 474 feet

Macoupin County
Sec. 20, T. 10 N., R. 7 W.
Carlinville North field

General Characteristics

Specific gravity: 0.932
Sulfur, per cent: 0.35
Saybolt Universal Viscosity (100°F): 544

A.P.I. Gravity: 20.3°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 744.6 First drop, 335°F | | | | | | | |
|------------------------------|-----------|-----------|---|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | | | | | | | | |
| 2 | 75 | 167 | | | | | | | | |
| 3 | 100 | 212 | | | | | | | | |
| 4 | 125 | 257 | | | | | | | | |
| 5 | 150 | 302 | | | | | | | | |
| 6 | 175 | 347 | | | | | | | | |
| 7 | 200 | 392 | 1.9 | 1.9 | 0.817 | 41.7 | — | — | 38 | 11.45 |
| 8 | 225 | 437 | 2.4 | 4.3 | 0.829 | 39.2 | — | — | 38 | 11.45 |
| 9 | 250 | 482 | 3.8 | 8.1 | 0.849 | 35.2 | — | — | 42 | 11.42 |
| 10 | 275 | 527 | 5.9 | 14.0 | 0.862 | 32.7 | — | — | 43 | 11.41 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|---|----|-------|
| 11 | 200 | 392 | 5.4 | 19.4 | 0.872 | 30.8 | 42 | — | 44 | 11.46 |
| 12 | 225 | 437 | 6.4 | 25.8 | 0.883 | 28.8 | 48 | — | 46 | 11.48 |
| 13 | 250 | 482 | 6.9 | 32.7 | 0.898 | 26.1 | 70 | — | 49 | 11.45 |
| 14 | 275 | 527 | 6.6 | 39.3 | 0.910 | 24.0 | 125 | — | 52 | 11.44 |
| 15 | 300 | 572 | 9.5 | 48.8 | 0.923 | 21.8 | 230 | 3 | 55 | 11.43 |

Carbon residue of residuum, 9.1%

Carbon residue of crude, 4.9%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 0.0 | | | |
| Gasoline and naphtha | 1.9 | 0.817 | 41.7 | |
| Kerosene | 0.0 | — | — | |
| Gas oil | 24.4 | 0.865 | 32.1 | below 50 |
| Non-viscous lub. dist. | 6.6 | 0.891-0.904 | 27.3-25.0 | 50-100 |
| Medium lub. dist. | 8.9 | 0.904-0.919 | 25.0-22.5 | 100-200 |
| Viscous lub. dist. | 7.0 | 0.919-0.930 | 22.5-20.7 | above 200 |
| Residuum | 51.2 | 0.969 | 14.5 | |
| Distillation loss | 0.0 | | | |

¹Correlation Index²Characterization Factor³Pour point below 5°F—no wax

Lab. No. O-294

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3033 feet

Richland County
Sec. 6, T. 4 N., R. 14 W.
Springtown field

General Characteristics

Specific gravity: 0.826
Sulfur, per cent: 0.24
Saybolt Universal Viscosity (100°F): 40.0

A.P.I. Gravity: 39.8°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 743.7 First drop, 82°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.3 | 3.3 | 0.647 | 87.2 | — | — | | |
| 2 | 75 | 167 | 3.2 | 6.5 | 0.667 | 80.6 | — | — | 6.1 | 12.68 |
| 3 | 100 | 212 | 5.5 | 12.0 | 0.718 | 65.6 | — | — | 20 | 12.04 |
| 4 | 125 | 257 | 6.4 | 18.4 | 0.740 | 59.7 | — | — | 22 | 11.91 |
| 5 | 150 | 302 | 5.7 | 24.1 | 0.755 | 55.9 | — | — | 21 | 11.91 |
| 6 | 175 | 347 | 5.6 | 29.7 | 0.770 | 52.3 | — | — | 22 | 11.94 |
| 7 | 200 | 392 | 4.8 | 34.5 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 4.6 | 39.1 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 4.9 | 44.0 | 0.818 | 41.5 | — | — | 27 | 11.83 |
| 10 | 275 | 527 | 6.3 | 50.3 | 0.832 | 38.6 | — | — | 29 | 11.82 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.0 | 54.3 | 0.843 | 36.4 | 40 | 10 | 30 | 11.84 |
| 12 | 225 | 437 | 4.6 | 58.9 | 0.855 | 34.0 | 46 | 30 | 32 | 11.84 |
| 13 | 250 | 482 | 4.5 | 63.4 | 0.865 | 32.1 | 59 | 50 | 34 | 11.85 |
| 14 | 275 | 527 | 4.5 | 67.9 | 0.873 | 30.6 | 90 | 65 | 34 | 11.93 |
| 15 | 300 | 572 | 5.4 | 73.3 | 0.885 | 28.4 | 150 | 80 | 37 | 11.93 |

Carbon residue of residuum, 5.2%

Carbon residue of crude, 1.4%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 12.0 | 0.685 | 75.1 | |
| Gasoline and naphtha | 34.5 | 0.735 | 61.0 | |
| Kerosene | 9.5 | 0.811 | 42.9 | |
| Gas oil | 14.0 | 0.841 | 36.8 | below 50 |
| Non-viscous lub. dist. | 8.4 | 0.858-0.875 | 33.4-30.2 | 50-100 |
| Medium lub. dist. | 6.9 | 0.875-0.892 | 30.2-27.1 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 22.9 | 0.935 | 19.8 | |
| Distillation loss | 3.8 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-295

Oil from: Aux Vases formation
Chester (Upper Miss.) series
Depth 1842 feet

Coles County
Sec. 2, T. 13 N., R. 7 E.
Cook's Mills field

General Characteristics

Specific gravity: 0.843
Sulfur, per cent: 0.40
Saybolt Universal Viscosity (100°F): 45.0

A.P.I. Gravity: 36.4°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | Barometer Reading 746.6 First drop, 98°F | | | | | | | | |
|------------------------------|-----------|--|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | 2.2 | 2.2 | 0.663 | 81.9 | — | — | 4.2 | 12.77 |
| 2 | 75 | 167 | 2.4 | 4.6 | | | | | | |
| 3 | 100 | 212 | 4.8 | 9.4 | 0.718 | 65.6 | — | — | 20 | 12.04 |
| 4 | 125 | 257 | 5.8 | 15.2 | 0.738 | 60.2 | — | — | 21 | 11.94 |
| 5 | 150 | 302 | 5.0 | 20.2 | 0.758 | 55.2 | — | — | 23 | 11.87 |
| 6 | 175 | 347 | 5.2 | 25.4 | 0.770 | 52.3 | — | — | 22 | 11.94 |
| 7 | 200 | 392 | 4.6 | 30.0 | 0.789 | 47.8 | — | — | 24 | 11.88 |
| 8 | 225 | 437 | 4.8 | 34.8 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 4.7 | 39.5 | 0.815 | 42.1 | — | — | 26 | 11.87 |
| 10 | 275 | 527 | 6.4 | 45.9 | 0.830 | 39.0 | — | — | 28 | 11.84 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|---------|----|-------|
| 11 | 200 | 392 | 4.4 | 50.3 | 0.843 | 36.4 | 39 | below 5 | 30 | 11.84 |
| 12 | 225 | 437 | 4.6 | 54.9 | 0.853 | 34.4 | 44 | 25 | 31 | 11.87 |
| 13 | 250 | 482 | 5.3 | 60.2 | 0.863 | 32.5 | 56 | 50 | 33 | 11.88 |
| 14 | 275 | 527 | 5.6 | 65.8 | 0.871 | 31.0 | 85 | 70 | 33 | 11.96 |
| 15 | 300 | 572 | 6.8 | 72.6 | 0.882 | 28.9 | 150 | 80 | 36 | 11.97 |

Carbon residue of residuum, 7.9%

Carbon residue of crude, 2.3%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 9.4 | 0.691 | 73.3 | |
| Gasoline and naphtha | 30.0 | 0.740 | 59.7 | |
| Kerosene | 9.5 | 0.809 | 43.4 | |
| Gas oil | 15.6 | 0.841 | 36.8 | below 50 |
| Non-viscous lub. dist. | 9.3 | 0.858-0.873 | 33.4-30.6 | 50-100 |
| Medium lub. dist. | 8.2 | 0.873-0.888 | 30.6-27.9 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 25.8 | 0.951 | 17.3 | |
| Distillation loss | 1.6 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-296

Oil from: McClosky Fredonia zone
Iowa (Lower Miss.) series
Depth 2935 feet

Jasper County
Sec. 5, T. 5 N., R. 14 W.
Ste. Marie field

General Characteristics

Specific gravity: 0.824
Sulfur, per cent: 0.14
Saybolt Universal Viscosity (100°F): 39.0

A.P.I. Gravity: 40.2°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 744.6 First drop, 84°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.9 | 3.9 | 0.645 | 87.9 | — | — | | |
| 2 | 75 | 167 | 3.3 | 7.2 | 0.663 | 81.9 | — | — | 4.2 | 12.77 |
| 3 | 100 | 212 | 5.5 | 12.7 | 0.712 | 67.2 | — | — | 18 | 12.14 |
| 4 | 125 | 257 | 6.4 | 19.1 | 0.737 | 60.5 | — | — | 20 | 11.96 |
| 5 | 150 | 302 | 6.0 | 25.1 | 0.753 | 56.4 | — | — | 20 | 11.95 |
| 6 | 175 | 347 | 5.4 | 30.5 | 0.770 | 52.3 | — | — | 22 | 11.94 |
| 7 | 200 | 392 | 5.0 | 35.5 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 5.0 | 40.5 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 4.7 | 45.2 | 0.815 | 42.1 | — | — | 26 | 11.87 |
| 10 | 275 | 527 | 5.7 | 50.9 | 0.830 | 39.0 | — | — | 28 | 11.84 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.5 | 55.4 | 0.843 | 36.4 | 40 | 10 | 30 | 11.84 |
| 12 | 225 | 437 | 4.6 | 60.0 | 0.853 | 34.4 | 46 | 30 | 31 | 11.87 |
| 13 | 250 | 482 | 4.4 | 64.4 | 0.863 | 32.5 | 58 | 50 | 33 | 11.88 |
| 14 | 275 | 527 | 4.5 | 68.9 | 0.873 | 30.6 | 90 | 65 | 34 | 11.93 |
| 15 | 300 | 572 | 5.7 | 74.6 | 0.885 | 28.4 | 160 | 80 | 37 | 11.93 |

Carbon residue of residuum, 5.8%

Carbon residue of crude, 1.5%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 12.7 | 0.679 | 76.9 | |
| Gasoline and naphtha | 35.5 | 0.731 | 62.1 | |
| Kerosene | 9.7 | 0.809 | 43.4 | |
| Gas oil | 14.0 | 0.840 | 37.0 | below 50 |
| Non-viscous lub. dist. | 8.2 | 0.856-0.875 | 33.8-30.2 | 50-100 |
| Medium lub. dist. | 7.2 | 0.875-0.892 | 30.2-27.1 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 22.0 | 0.938 | 19.4 | |
| Distillation loss | 3.4 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-297

Oil from: Tar Springs formation
Chester (Upper Miss.) series
Depth 2326 feet

Clay County
Sec. 26, T. 4 N., R. 7 E.
Sailor Springs field

General Characteristics

Specific gravity: 0.840
Sulfur, per cent: 0.17
Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 37.0°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 745.2 First drop, 90°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.4 | 2.4 | 0.650 | 86.2 | — | — | | |
| 2 | 75 | 167 | 2.8 | 5.2 | 0.668 | 80.3 | — | — | 6.5 | 12.65 |
| 3 | 100 | 212 | 5.0 | 10.2 | 0.713 | 67.0 | — | — | 18 | 12.13 |
| 4 | 125 | 257 | 6.3 | 16.5 | 0.738 | 60.2 | — | — | 21 | 11.94 |
| 5 | 150 | 302 | 5.2 | 21.7 | 0.753 | 56.4 | — | — | 20 | 11.95 |
| 6 | 175 | 347 | 4.9 | 26.6 | 0.770 | 52.3 | — | — | 22 | 11.94 |
| 7 | 200 | 392 | 4.7 | 31.3 | 0.785 | 48.8 | — | — | 23 | 11.94 |
| 8 | 225 | 437 | 4.8 | 36.1 | 0.800 | 45.4 | — | — | 24 | 11.89 |
| 9 | 250 | 482 | 4.6 | 40.7 | 0.815 | 42.1 | — | — | 26 | 11.87 |
| 10 | 275 | 527 | 6.7 | 47.4 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|---------|----|-------|
| 11 | 200 | 392 | 3.9 | 51.3 | 0.843 | 36.4 | 39 | below 5 | 30 | 11.84 |
| 12 | 225 | 437 | 4.6 | 55.9 | 0.853 | 34.4 | 46 | 25 | 31 | 11.87 |
| 13 | 250 | 482 | 4.7 | 60.6 | 0.863 | 32.5 | 61 | 50 | 33 | 11.88 |
| 14 | 275 | 527 | 5.1 | 65.7 | 0.873 | 30.6 | 95 | 65 | 34 | 11.93 |
| 15 | 300 | 572 | 6.4 | 72.1 | 0.885 | 28.4 | 160 | 80 | 37 | 11.93 |

Carbon residue of residuum, 7.6%

Carbon residue of crude, 2.2%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 10.2 | 0.686 | 74.8 | |
| Gasoline and naphtha | 31.3 | 0.736 | 60.8 | |
| Kerosene | 9.4 | 0.807 | 43.8 | |
| Gas oil | 14.1 | 0.840 | 37.0 | below 50 |
| Non-viscous lub. dist. | 8.8 | 0.856-0.874 | 33.8-30.4 | 50-100 |
| Medium lub. dist. | 8.5 | 0.874-0.892 | 30.4-27.1 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 24.7 | 0.951 | 17.3 | |
| Distillation loss | 3.2 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-298

Oil from: Tar Springs formation
Chester (Upper Miss.) series
Depth 2081 feet

Gallatin County
Sec. 15, T. 8 S., R. 10 E.
Inman East field

General Characteristics

Specific gravity: 0.852
Sulfur, per cent: 0.24
Saybolt Universal Viscosity (100°F): 46.0

A.P.I. Gravity: 34.6°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 745.3 First drop, 88°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.1 | 2.1 | | | | | | |
| 2 | 75 | 167 | 2.6 | 4.7 | 0.664 | 81.6 | — | — | 4.6 | 12.75 |
| 3 | 100 | 212 | 5.3 | 10.0 | 0.710 | 67.8 | — | — | 17 | 12.17 |
| 4 | 125 | 257 | 6.5 | 16.5 | 0.735 | 61.0 | — | — | 19 | 11.95 |
| 5 | 150 | 302 | 5.7 | 22.2 | 0.753 | 56.4 | — | — | 20 | 11.95 |
| 6 | 175 | 347 | 4.9 | 27.1 | 0.770 | 52.3 | — | — | 22 | 11.94 |
| 7 | 200 | 392 | 4.9 | 32.0 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 4.9 | 36.9 | 0.805 | 44.3 | — | — | 26 | 11.80 |
| 9 | 250 | 482 | 5.7 | 42.6 | 0.818 | 41.5 | — | — | 27 | 11.83 |
| 10 | 275 | 527 | 7.2 | 49.8 | 0.835 | 38.0 | — | — | 31 | 11.78 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.3 | 53.1 | 0.845 | 36.0 | 41 | 10 | 31 | 11.82 |
| 12 | 225 | 437 | 4.6 | 57.7 | 0.858 | 33.4 | 45 | 35 | 34 | 11.80 |
| 13 | 250 | 482 | 5.0 | 62.7 | 0.868 | 31.5 | 63 | 55 | 35 | 11.82 |
| 14 | 275 | 527 | 5.6 | 68.3 | 0.882 | 28.9 | 100 | 65 | 39 | 11.82 |
| 15 | 300 | 572 | 6.1 | 74.4 | 0.897 | 26.3 | 180 | 80 | 43 | 11.77 |

Carbon residue of residuum, 9.9%

Carbon residue of crude, 2.9%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 10.0 | 0.688 | 74.2 | |
| Gasoline and naphtha | 32.0 | 0.737 | 60.5 | |
| Kerosene | 10.6 | 0.812 | 42.8 | |
| Gas oil | 14.1 | 0.843 | 36.4 | below 50 |
| Non-viscous lub. dist. | 8.8 | 0.861-0.882 | 32.8-28.9 | 50-100 |
| Medium lub. dist. | 7.3 | 0.882-0.900 | 28.9-25.7 | 100-200 |
| Viscous lub. dist. | 1.6 | 0.900-0.905 | 25.7-24.9 | above 200 |
| Residuum | 24.9 | 0.970 | 14.4 | |
| Distillation loss | 0.7 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-299

Oil from: Cypress formation
 Chester (Upper Miss.) series
 Depth 2447 feet

Gallatin County
 Sec. 15, T. 8 S., R. 10 E.
 Inman East field

General Characteristics

Specific gravity: 0.849
 Sulfur, per cent: 0.23
 Saybolt Universal Viscosity (100°F): 44.0

A.P.I. Gravity: 35.2°
 Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 746.0 First drop, 91°F | | | | | | | |
|------------------------------|--------|-----|--|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at | | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| | °C | °F | | | | | | | | |
| 1 | 50 | 122 | 0.7 | 0.7 | | | | | | |
| 2 | 75 | 167 | 1.8 | 2.5 | 0.698 | 71.2 | — | — | 21 | 12.04 |
| 3 | 100 | 212 | 4.6 | 7.1 | 0.710 | 67.8 | — | — | 17 | 12.17 |
| 4 | 125 | 257 | 7.0 | 14.1 | 0.735 | 61.0 | — | — | 19 | 11.99 |
| 5 | 150 | 302 | 6.0 | 20.1 | 0.753 | 56.4 | — | — | 20 | 11.95 |
| 6 | 175 | 347 | 5.7 | 25.8 | 0.770 | 52.3 | — | — | 22 | 11.94 |
| 7 | 200 | 392 | 5.0 | 30.8 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 5.1 | 35.9 | 0.805 | 44.3 | — | — | 26 | 11.80 |
| 9 | 250 | 482 | 5.2 | 41.1 | 0.820 | 41.1 | — | — | 28 | 11.81 |
| 10 | 275 | 527 | 6.8 | 47.9 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.8 | 52.7 | 0.843 | 36.4 | 40 | 5 | 30 | 11.84 |
| 12 | 225 | 437 | 4.9 | 57.6 | 0.853 | 34.4 | 46 | 25 | 31 | 11.87 |
| 13 | 250 | 482 | 5.2 | 62.8 | 0.863 | 32.5 | 64 | 50 | 33 | 11.88 |
| 14 | 275 | 527 | 7.0 | 69.8 | 0.873 | 30.6 | 100 | 70 | 3+ | 11.93 |
| 15 | 300 | 572 | 7.9 | 77.7 | 0.892 | 27.1 | 210 | 85 | 40 | 11.83 |

Carbon residue of residuum, 8.6%

Carbon residue of crude, 2.2%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 7.1 | 0.706 | 68.9 | |
| Gasoline and naphtha | 30.8 | 0.747 | 57.9 | |
| Kerosene | 10.3 | 0.813 | 42.6 | |
| Gas oil | 15.2 | 0.841 | 36.8 | below 50 |
| Non-viscous lub. dist. | 10.0 | 0.855-0.873 | 34.0-30.6 | 50-100 |
| Medium lub. dist. | 6.9 | 0.873-0.891 | 30.6-27.3 | 100-200 |
| Viscous lub. dist. | 4.5 | 0.891-0.902 | 27.3-25.4 | above 200 |
| Residuum | 21.8 | 0.961 | 15.7 | |
| Distillation loss | 0.5 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-300

Oil from: Aux Vases formation
 Chester (Upper Miss.) series
 Depth 2920 feet

Saline County
 Sec. 8, T. 8 S., R. 7 E.
 Eldorado field

General Characteristics

Specific gravity: 0.854
 Sulfur, per cent: 0.14
 Saybolt Universal Viscosity (100°F): 62.0
 A.P.I. Gravity: 34.2°
 Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure _____ Barometer Reading 744.2 First drop, 86°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 0.8 | 0.8 | | | | | | |
| 2 | 75 | 167 | 2.8 | 3.6 | 0.689 | 73.9 | — | — | 17 | 12.20 |
| 3 | 100 | 212 | 3.1 | 6.7 | 0.724 | 64.0 | — | — | 23 | 11.93 |
| 4 | 125 | 257 | 4.6 | 11.3 | 0.744 | 58.7 | — | — | 24 | 11.85 |
| 5 | 150 | 302 | 4.0 | 15.3 | 0.762 | 54.2 | — | — | 25 | 11.81 |
| 6 | 175 | 347 | 4.0 | 19.3 | 0.782 | 49.5 | — | — | 27 | 11.76 |
| 7 | 200 | 392 | 3.8 | 23.1 | 0.798 | 45.8 | — | — | 29 | 11.74 |
| 8 | 225 | 437 | 4.7 | 27.8 | 0.810 | 43.2 | — | — | 29 | 11.72 |
| 9 | 250 | 482 | 5.2 | 33.0 | 0.820 | 41.1 | — | — | 28 | 11.81 |
| 10 | 275 | 527 | 6.2 | 39.2 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|---------|----|-------|
| 11 | 200 | 392 | 4.0 | 43.2 | 0.840 | 37.0 | 39 | below 5 | 29 | 11.89 |
| 12 | 225 | 437 | 4.2 | 47.4 | 0.850 | 35.0 | 46 | 25 | 30 | 11.91 |
| 13 | 250 | 482 | 4.8 | 52.2 | 0.860 | 33.0 | 57 | 45 | 31 | 11.92 |
| 14 | 275 | 527 | 4.6 | 56.8 | 0.870 | 31.1 | 80 | 65 | 33 | 11.97 |
| 15 | 300 | 572 | 6.9 | 63.7 | 0.884 | 28.5 | 140 | 80 | 37 | 11.94 |

Carbon residue of residuum, 2.7%

Carbon residue of crude, 1.0%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 6.7 | 0.705 | 69.2 | |
| Gasoline and naphtha | 23.1 | 0.751 | 56.9 | |
| Kerosene | 9.9 | 0.815 | 42.1 | |
| Gas oil | 14.0 | 0.840 | 37.0 | below 50 |
| Non-viscous lub. dist. | 9.4 | 0.854-0.875 | 34.2-30.2 | 50-100 |
| Medium lub. dist. | 7.3 | 0.875-0.892 | 30.2-27.1 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 33.7 | 0.919 | 22.5 | |
| Distillation loss | 2.6 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-301

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3020 feet

Gallatin County
Sec. 2, T. 8 S., R. 9 E.
Inman North field

General Characteristics

Specific gravity: 0.842
Sulfur, per cent: 0.19
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 36.6°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 746.4 First drop, 86°F

| Fraction No. | Cut at °C | °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S U visc 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----|--------------|--------------|-----------------|--------------|----------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.1 | 2.1 | 0.655 | 84.5 | — | — | | |
| 2 | 75 | 167 | 2.9 | 5.0 | 0.672 | 79.1 | — | — | 8.4 | 12.56 |
| 3 | 100 | 212 | 4.1 | 9.1 | 0.708 | 68.3 | — | — | 16 | 12.20 |
| 4 | 125 | 257 | 6.7 | 15.8 | 0.734 | 61.3 | — | — | 19 | 12.00 |
| 5 | 150 | 302 | 5.8 | 21.6 | 0.752 | 56.7 | — | — | 20 | 11.97 |
| 6 | 175 | 347 | 5.4 | 27.0 | 0.770 | 52.3 | — | — | 22 | 11.94 |
| 7 | 200 | 392 | 5.2 | 32.2 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 5.0 | 37.2 | 0.805 | 44.3 | — | — | 26 | 11.80 |
| 9 | 250 | 482 | 5.4 | 42.6 | 0.820 | 41.1 | — | — | 28 | 11.81 |
| 10 | 275 | 527 | 6.7 | 49.3 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.4 | 53.7 | 0.843 | 36.4 | 40 | 5 | 30 | 11.84 |
| 12 | 225 | 437 | 4.7 | 58.4 | 0.855 | 34.0 | 48 | 30 | 32 | 11.84 |
| 13 | 250 | 482 | 5.1 | 63.5 | 0.865 | 32.1 | 61 | 50 | 34 | 11.85 |
| 14 | 275 | 527 | 4.7 | 68.2 | 0.876 | 30.0 | 95 | 65 | 36 | 11.88 |
| 15 | 300 | 572 | 6.2 | 74.4 | 0.889 | 27.7 | 150 | 80 | 39 | 11.87 |

Carbon residue of residuum, 6.0%

Carbon residue of crude, 1.7%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 9.1 | 0.684 | 75.4 | |
| Gasoline and naphtha | 32.2 | 0.738 | 60.2 | |
| Kerosene | 10.4 | 0.813 | 42.6 | |
| Gas oil | 14.2 | 0.840 | 37.0 | below 50 |
| Non-viscous lub. dist. | 9.6 | 0.856-0.877 | 33.8-29.8 | 50-100 |
| Medium lub. dist. | 8.0 | 0.877-0.896 | 29.8-26.4 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 24.7 | 0.945 | 18.2 | |
| Distillation loss | 0.9 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-302

Oil from: Tar Springs formation
Chester (Upper Miss.) series
Depth 2551 feet

White County
Sec. 7, T. 4 S., R. 10 E.
East Centerville field

General Characteristics

Specific gravity: 0.839
Sulfur, per cent: 0.20
Saybolt Universal Viscosity (100°F): 40.0

A.P.I. Gravity: 37.2°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 744.4 First drop, 83°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr 60/60°F | °A P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.1 | 3.1 | 0.649 | 86.5 | — | — | | |
| 2 | 75 | 167 | 2.8 | 5.9 | 0.667 | 80.6 | — | — | 6.1 | 12.68 |
| 3 | 100 | 212 | 5.0 | 10.9 | 0.708 | 68.4 | — | — | 16 | 12.20 |
| 4 | 125 | 257 | 6.5 | 17.4 | 0.733 | 61.6 | — | — | 18 | 12.02 |
| 5 | 150 | 302 | 5.7 | 23.1 | 0.750 | 57.2 | — | — | 19 | 12.00 |
| 6 | 175 | 347 | 5.3 | 28.4 | 0.770 | 52.3 | — | — | 22 | 11.94 |
| 7 | 200 | 392 | 5.0 | 33.4 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 4.6 | 38.0 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 4.7 | 42.7 | 0.818 | 41.5 | — | — | 27 | 11.83 |
| 10 | 275 | 527 | 6.0 | 48.7 | 0.830 | 39.0 | — | — | 28 | 11.84 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|---------|----|-------|
| 11 | 200 | 392 | 4.8 | 53.5 | 0.840 | 37.0 | 39 | below 5 | 29 | 11.89 |
| 12 | 225 | 437 | 4.6 | 58.1 | 0.850 | 35.0 | 45 | 25 | 30 | 11.91 |
| 13 | 250 | 482 | 4.6 | 62.7 | 0.863 | 32.5 | 58 | 50 | 33 | 11.88 |
| 14 | 275 | 527 | 4.5 | 67.2 | 0.876 | 30.0 | 90 | 70 | 36 | 11.88 |
| 15 | 300 | 572 | 5.2 | 72.4 | 0.887 | 28.0 | 140 | 85 | 38 | 11.90 |

Carbon residue of residuum, 10.2%

Carbon residue of crude, 2.9%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 10.9 | 0.681 | 76.3 | |
| Gasoline and naphtha | 33.4 | 0.733 | 61.5 | |
| Kerosene | 9.3 | 0.811 | 43.0 | |
| Gas oil | 14.9 | 0.839 | 37.2 | below 50 |
| Non-viscous lub. dist. | 8.4 | 0.855-0.878 | 34.0-29.7 | 50-100 |
| Medium lub. dist. | 6.4 | 0.878-0.893 | 29.7-27.0 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 24.1 | 0.968 | 14.7 | |
| Distillation loss | 3.5 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-303

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3375 feet

White County
Sec. 2, T. 4 S., R. 9 E.
Centerville field

General Characteristics

Specific gravity: 0.841
Sulfur, per cent: 0.17
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 36.8°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 745.2 First drop, 88°F | | | | | | | |
|------------------------------|-----------|-----------|--|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | 2.8 | 2.8 | 0.645 | 87.9 | — | — | | |
| 2 | 75 | 167 | 3.7 | 6.5 | 0.670 | 79.7 | — | — | 7.5 | 12.60 |
| 3 | 100 | 212 | 5.9 | 12.4 | 0.710 | 67.8 | — | — | 17 | 12.17 |
| 4 | 125 | 257 | 7.2 | 19.6 | 0.738 | 60.2 | — | — | 21 | 11.94 |
| 5 | 150 | 302 | 5.8 | 25.4 | 0.753 | 56.4 | — | — | 20 | 11.95 |
| 6 | 175 | 347 | 5.5 | 30.9 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 4.8 | 35.7 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 5.0 | 40.7 | 0.805 | 44.3 | — | — | 26 | 11.83 |
| 9 | 250 | 482 | 5.1 | 45.8 | 0.818 | 41.5 | — | — | 27 | 11.83 |
| 10 | 275 | 527 | 6.1 | 51.9 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.7 | 55.6 | 0.840 | 37.0 | 40 | 10 | 29 | 11.89 |
| 12 | 225 | 437 | 4.4 | 60.0 | 0.850 | 35.0 | 44 | 30 | 30 | 11.91 |
| 13 | 250 | 482 | 4.5 | 64.5 | 0.860 | 33.0 | 58 | 50 | 31 | 11.92 |
| 14 | 275 | 527 | 4.7 | 69.2 | 0.873 | 30.6 | 85 | 65 | 34 | 11.93 |
| 15 | 300 | 572 | 6.0 | 75.2 | 0.887 | 28.0 | 150 | 80 | 38 | 11.90 |

Carbon residue of residuum, 5.8%

Carbon residue of crude, 1.6%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 12.4 | 0.683 | 75.7 | |
| Gasoline and naphtha | 35.7 | 0.734 | 61.3 | |
| Kerosene | 10.1 | 0.812 | 42.8 | |
| Gas oil | 13.9 | 0.840 | 37.0 | below 50 |
| Non-viscous lub. dist. | 8.4 | 0.854-0.876 | 34.2-30.0 | 50-100 |
| Medium lub. dist. | 7.1 | 0.876-0.895 | 30.0-26.6 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 23.4 | 0.942 | 18.7 | |
| Distillation loss | 1.4 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-304

Oil from: Aux Vases formation
Chester (Upper Miss.) series
Depth 2726 feet

Franklin County
Sec. 11, T. 6 S., R. 2 E.
N. Benton field

General Characteristics

Specific gravity: 0.830
Sulfur, per cent: 0.15
Saybolt Universal Viscosity (100°F): 40.0

A.P.I. Gravity: 39.0°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 744.3 First drop, 85°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.1 | 3.1 | 0.648 | 86.9 | — | — | | |
| 2 | 75 | 167 | 3.3 | 6.4 | 0.664 | 81.6 | — | — | 4.6 | 12.75 |
| 3 | 100 | 212 | 5.1 | 11.5 | 0.710 | 67.8 | — | — | 17 | 12.17 |
| 4 | 125 | 257 | 6.4 | 17.9 | 0.733 | 61.6 | — | — | 18 | 12.02 |
| 5 | 150 | 302 | 5.8 | 23.7 | 0.750 | 57.2 | — | — | 19 | 12.00 |
| 6 | 175 | 347 | 5.6 | 29.3 | 0.769 | 52.5 | — | — | 21 | 11.95 |
| 7 | 200 | 392 | 5.0 | 34.3 | 0.785 | 48.8 | — | — | 23 | 11.94 |
| 8 | 225 | 437 | 4.8 | 39.1 | 0.799 | 45.6 | — | — | 24 | 11.90 |
| 9 | 250 | 482 | 5.2 | 44.3 | 0.813 | 42.6 | — | — | 25 | 11.90 |
| 10 | 275 | 527 | 6.0 | 50.3 | 0.825 | 40.0 | — | — | 26 | 11.91 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.8 | 55.1 | 0.835 | 38.0 | 39 | 10 | 27 | 11.96 |
| 12 | 225 | 437 | 5.0 | 60.1 | 0.848 | 35.4 | 45 | 30 | 29 | 11.94 |
| 13 | 250 | 482 | 4.5 | 64.6 | 0.858 | 33.4 | 57 | 50 | 30 | 11.96 |
| 14 | 275 | 527 | 4.9 | 69.5 | 0.871 | 31.0 | 80 | 70 | 33 | 11.96 |
| 15 | 300 | 572 | 6.1 | 75.6 | 0.885 | 28.4 | 140 | 85 | 37 | 11.93 |

Carbon residue of residuum, 7.5%

Carbon residue of crude, 2.0%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 11.5 | 0.680 | 76.6 | |
| Gasoline and naphtha | 34.3 | 0.732 | 61.8 | |
| Kerosene | 16.0 | 0.813 | 42.6 | |
| Gas oil | 9.3 | 0.841 | 36.8 | below 50 |
| Non-viscous lub. dist. | 9.3 | 0.852-0.876 | 34.6-30.0 | 50-100 |
| Medium lub. dist. | 6.7 | 0.876-0.893 | 30.0-27.0 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 22.2 | 0.950 | 17.5 | |
| Distillation loss | 2.2 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-305

Oil from: Rosiclare member
Iowa (Lower Miss.) series
Depth 2794 feet

Franklin County
Sec. 11, T. 6 S., R. 2 E.
N. Benton field

General Characteristics

Specific gravity: 0.833
Sulfur, per cent: 0.15
Saybolt Universal Viscosity (100°F): 40.0

A.P.I. Gravity: 38.4°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure

Barometer Reading 745.2 First drop, 84°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 3.5 | 3.5 | 0.648 | 86.9 | — | — | | |
| 2 | 75 | 167 | 2.9 | 6.4 | 0.663 | 81.9 | — | — | 4.2 | 12.77 |
| 3 | 100 | 212 | 4.9 | 11.3 | 0.709 | 68.1 | — | — | 16 | 12.19 |
| 4 | 125 | 257 | 6.7 | 18.0 | 0.734 | 61.3 | — | — | 19 | 12.00 |
| 5 | 150 | 302 | 5.6 | 23.6 | 0.750 | 57.2 | — | — | 19 | 12.00 |
| 6 | 175 | 347 | 5.2 | 28.8 | 0.770 | 52.3 | — | — | 22 | 11.94 |
| 7 | 200 | 392 | 5.1 | 33.9 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 4.6 | 38.5 | 0.805 | 44.3 | — | — | 26 | 11.80 |
| 9 | 250 | 482 | 4.9 | 43.4 | 0.820 | 41.1 | — | — | 28 | 11.81 |
| 10 | 275 | 527 | 6.1 | 49.5 | 0.832 | 38.6 | — | — | 29 | 11.82 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.2 | 53.7 | 0.840 | 37.0 | 40 | 10 | 29 | 11.89 |
| 12 | 225 | 437 | 4.5 | 58.2 | 0.850 | 35.0 | 45 | 30 | 30 | 11.91 |
| 13 | 250 | 482 | 4.4 | 62.6 | 0.860 | 33.0 | 57 | 50 | 31 | 11.92 |
| 14 | 275 | 527 | 4.8 | 67.4 | 0.873 | 30.6 | 85 | 65 | 34 | 11.93 |
| 15 | 300 | 572 | 6.4 | 73.8 | 0.887 | 28.0 | 160 | 80 | 38 | 11.90 |

Carbon residue of residuum, 8.1%

Carbon residue of crude, 2.2%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 11.3 | 0.678 | 77.2 | |
| Gasoline and naphtha | 33.9 | 0.732 | 61.8 | |
| Kerosene | 9.5 | 0.813 | 42.6 | |
| Gas oil | 14.4 | 0.839 | 37.2 | below 50 |
| Non-viscous lub. dist. | 8.3 | 0.854-0.876 | 34.2-30.0 | 50-100 |
| Medium lub. dist. | 7.4 | 0.876-0.894 | 30.0-26.8 | 100-200 |
| Viscous lub. dist. | 0.3 | 0.894-0.895 | 26.8-26.6 | above 200 |
| Residuum | 23.2 | 0.948 | 17.8 | |
| Distillation loss | 3.0 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-306

Oil from: Levias member
Iowa (Lower Miss.) series
Depth 2772 feet

Franklin County
Sec. 11, T. 6 S., R. 2 E.
N. Benton field

General Characteristics

Specific gravity: 0.838
Sulfur, per cent: 0.17
Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 37.4°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 736.3 First drop, 88°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.4 | 2.4 | 0.645 | 87.9 | — | — | | |
| 2 | 75 | 167 | 3.0 | 5.4 | 0.663 | 81.9 | — | — | 4.2 | 12.77 |
| 3 | 100 | 212 | 4.9 | 10.3 | 0.712 | 67.2 | — | — | 18 | 12.14 |
| 4 | 125 | 257 | 5.8 | 16.1 | 0.736 | 60.8 | — | — | 20 | 11.97 |
| 5 | 150 | 302 | 5.0 | 21.1 | 0.756 | 55.7 | — | — | 22 | 11.90 |
| 6 | 175 | 347 | 4.9 | 26.0 | 0.776 | 50.9 | — | — | 24 | 11.85 |
| 7 | 200 | 392 | 4.7 | 30.7 | 0.791 | 47.4 | — | — | 25 | 11.86 |
| 8 | 225 | 437 | 5.1 | 35.8 | 0.805 | 44.3 | — | — | 26 | 11.80 |
| 9 | 250 | 482 | 5.4 | 41.2 | 0.819 | 41.3 | — | — | 28 | 11.82 |
| 10 | 275 | 527 | 6.4 | 47.6 | 0.832 | 38.6 | — | — | 29 | 11.82 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 2.8 | 50.4 | 0.842 | 36.6 | 39 | 5 | 30 | 11.86 |
| 12 | 225 | 437 | 4.6 | 55.0 | 0.852 | 34.6 | 44 | 25 | 31 | 11.88 |
| 13 | 250 | 482 | 5.6 | 60.6 | 0.863 | 32.5 | 57 | 45 | 33 | 11.88 |
| 14 | 275 | 527 | 5.7 | 66.3 | 0.873 | 30.6 | 90 | 65 | 34 | 11.93 |
| 15 | 300 | 572 | 6.1 | 72.4 | 0.885 | 28.4 | 150 | 75 | 37 | 11.93 |

Carbon residue of residuum, 8.5%

Carbon residue of crude, 2.4%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 10.3 | 0.682 | 76.0 | |
| Gasoline and naphtha | 30.7 | 0.736 | 60.8 | |
| Kerosene | 10.5 | 0.812 | 42.8 | |
| Gas oil | 13.9 | 0.841 | 36.8 | below 50 |
| Non-viscous lub. dist. | 9.4 | 0.857-0.875 | 33.6-30.2 | 50-100 |
| Medium lub. dist. | 7.9 | 0.875-0.891 | 30.2-27.3 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 25.6 | 0.946 | 18.1 | |
| Distillation loss | 2.0 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-307

Oil from: Bethel formation
 Chester (Upper Miss.) series
 Depth 2623 feet

Franklin County
 Sec. 1, T. 6 S., R. 2 E.
 N. Benton field

General Characteristics

Specific gravity: 0.833
 Sulfur, per cent: 0.15
 Saybolt Universal Viscosity (100°F): 40.0

A.P.I. Gravity: 38.4°
 Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 735.4 First drop, 87°F | | | | | | | |
|------------------------------|-----------|-----------|--|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | 4.0 | 4.0 | 0.652 | 85.5 | — | — | | |
| 2 | 75 | 167 | 3.1 | 7.1 | 0.664 | 81.6 | — | — | 4.6 | 12.75 |
| 3 | 100 | 212 | 4.3 | 11.4 | 0.709 | 68.1 | — | — | 16 | 12.19 |
| 4 | 125 | 257 | 6.9 | 18.3 | 0.737 | 60.5 | — | — | 20 | 11.96 |
| 5 | 150 | 302 | 6.0 | 24.3 | 0.753 | 56.4 | — | — | 20 | 11.95 |
| 6 | 175 | 347 | 5.5 | 29.8 | 0.770 | 52.3 | — | — | 22 | 11.94 |
| 7 | 200 | 392 | 4.8 | 34.6 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 5.5 | 40.1 | 0.803 | 44.7 | — | — | 25 | 11.83 |
| 9 | 250 | 482 | 5.0 | 45.1 | 0.819 | 41.3 | — | — | 28 | 11.82 |
| 10 | 275 | 527 | 6.2 | 51.3 | 0.832 | 38.6 | — | — | 29 | 11.82 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 4.0 | 55.3 | 0.842 | 36.6 | 40 | 10 | 30 | 11.86 |
| 12 | 225 | 437 | 4.4 | 59.7 | 0.853 | 34.4 | 46 | 30 | 31 | 11.87 |
| 13 | 250 | 482 | 4.6 | 64.3 | 0.863 | 32.5 | 61 | 50 | 33 | 11.88 |
| 14 | 275 | 527 | 4.6 | 68.9 | 0.873 | 30.6 | 88 | 65 | 34 | 11.93 |
| 15 | 300 | 572 | 5.7 | 74.6 | 0.885 | 28.4 | 150 | 80 | 37 | 11.93 |

Carbon residue of residuum, 12.1%

Carbon residue of crude, 3.3%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 11.4 | 0.677 | 77.5 | |
| Gasoline and naphtha | 34.6 | 0.732 | 61.8 | |
| Kerosene | 10.5 | 0.811 | 43.0 | |
| Gas oil | 13.6 | 0.840 | 37.0 | below 50 |
| Non-viscous lub. dist. | 8.9 | 0.856-0.875 | 33.8-30.2 | 50-100 |
| Medium lub. dist. | 7.0 | 0.875-0.891 | 30.2-27.3 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 23.8 | 0.965 | 15.1 | |
| Distillation loss | 1.6 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-308

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 1909 feet

Fayette County
Sec. 30, T. 5 N., R. 3 E.
St. Paul field

General Characteristics

Specific gravity: 0.859
Sulfur, per cent: 0.21
Saybolt Universal Viscosity (100 F): 52.0

A.P.I. Gravity: 33.2°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | | | Barometer Reading 739.6 First drop, 105°F | | | | | |
|------------------------------|--------|-----|--------------|--------------|---|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at | | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| | °C | °F | | | | | | | | |
| 1 | 50 | 122 | 0.6 | 0.6 | | | | | | |
| 2 | 75 | 167 | 2.3 | 2.9 | 0.667 | 80.6 | — | — | 6.1 | 12.68 |
| 3 | 100 | 212 | 3.6 | 6.5 | 0.707 | 68.6 | — | — | 15 | 12.22 |
| 4 | 125 | 257 | 5.8 | 12.3 | 0.733 | 61.6 | — | — | 18 | 12.02 |
| 5 | 150 | 302 | 4.9 | 17.2 | 0.753 | 56.4 | — | — | 20 | 11.95 |
| 6 | 175 | 347 | 4.8 | 22.0 | 0.773 | 51.6 | — | — | 23 | 11.90 |
| 7 | 200 | 392 | 4.5 | 26.5 | 0.788 | 48.1 | — | — | 24 | 11.90 |
| 8 | 225 | 437 | 4.8 | 31.3 | 0.800 | 45.4 | — | — | 24 | 11.89 |
| 9 | 250 | 482 | 5.5 | 36.8 | 0.815 | 42.1 | — | — | 26 | 11.87 |
| 10 | 275 | 527 | 6.5 | 43.3 | 0.833 | 38.4 | — | — | 30 | 11.81 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.7 | 47.0 | 0.843 | 36.4 | 40 | 10 | 30 | 11.84 |
| 12 | 225 | 437 | 5.0 | 52.0 | 0.853 | 34.4 | 45 | 25 | 31 | 11.87 |
| 13 | 250 | 482 | 5.1 | 57.1 | 0.863 | 32.5 | 57 | 45 | 33 | 11.88 |
| 14 | 275 | 527 | 5.6 | 62.7 | 0.873 | 30.6 | 90 | 65 | 34 | 11.93 |
| 15 | 300 | 572 | 8.1 | 70.8 | 0.885 | 28.4 | 155 | 80 | 37 | 11.93 |

Carbon residue of residuum, 12.3%

Carbon residue of crude, 3.9%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 6.5 | 0.689 | 73.9 | |
| Gasoline and naphtha | 26.5 | 0.743 | 59.0 | |
| Kerosene | 10.3 | 0.808 | 43.6 | |
| Gas oil | 14.8 | 0.841 | 36.8 | below 50 |
| Non-viscous lub. dist. | 9.4 | 0.857-0.875 | 33.6-30.2 | 50-100 |
| Medium lub. dist. | 9.8 | 0.875-0.892 | 30.2-27.1 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 28.0 | 0.967 | 14.8 | |
| Distillation loss | 1.2 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-310

Oil from: Bethel formation
 Chester (Upper Miss.) series
 Depth 1441 feet

Clinton County
 Sec. 14, T. 1 N., R. 1 W.
 West Centralia field

General Characteristics

Specific gravity: 0.836
 Sulfur, per cent: 0.17
 Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 37.8°
 Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | Barometer Reading 744.3 First drop, 90°F | | | | | | | |
|------------------------------|--------|-----|--|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at | | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| | °C | °F | | | | | | | | |
| 1 | 50 | 122 | 4.0 | 4.0 | 0.640 | 89.6 | — | — | | |
| 2 | 75 | 167 | 2.9 | 6.9 | 0.663 | 81.9 | — | — | 4.2 | 12.77 |
| 3 | 100 | 212 | 5.5 | 12.4 | 0.705 | 69.2 | — | — | 14 | 12.26 |
| 4 | 125 | 257 | 6.4 | 18.8 | 0.733 | 61.6 | — | — | 18 | 12.02 |
| 5 | 150 | 302 | 5.7 | 24.5 | 0.752 | 56.7 | — | — | 20 | 11.97 |
| 6 | 175 | 347 | 5.5 | 30.0 | 0.772 | 51.8 | — | — | 23 | 11.91 |
| 7 | 200 | 392 | 5.0 | 35.0 | 0.789 | 47.8 | — | — | 24 | 11.88 |
| 8 | 225 | 437 | 5.1 | 40.1 | 0.802 | 44.9 | — | — | 25 | 11.85 |
| 9 | 250 | 482 | 5.0 | 45.1 | 0.816 | 41.9 | — | — | 26 | 11.86 |
| 10 | 275 | 527 | 6.6 | 51.7 | 0.831 | 38.8 | — | — | 29 | 11.83 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.4 | 55.1 | 0.843 | 36.4 | 40 | 10 | 30 | 11.84 |
| 12 | 225 | 437 | 4.8 | 59.9 | 0.852 | 34.6 | 45 | 25 | 31 | 11.88 |
| 13 | 250 | 482 | 4.6 | 64.5 | 0.863 | 32.5 | 59 | 45 | 33 | 11.88 |
| 14 | 275 | 527 | 5.8 | 70.3 | 0.873 | 30.6 | 84 | 65 | 34 | 11.93 |
| 15 | 300 | 572 | 5.3 | 75.6 | 0.887 | 28.0 | 155 | 80 | 38 | 11.90 |

Carbon residue of residuum, 9.9%

Carbon residue of crude, 2.7%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 12.4 | 0.674 | 78.4 | |
| Gasoline and naphtha | 35.0 | 0.729 | 62.6 | |
| Kerosene | 10.1 | 0.809 | 43.4 | |
| Gas oil | 14.1 | 0.840 | 37.0 | below 50 |
| Non-viscous lub. dist. | 9.5 | 0.856-0.876 | 33.8-30.0 | 50-100 |
| Medium lub. dist. | 6.9 | 0.876-0.893 | 30.0-27.0 | 100-200 |
| Viscous lub. dist. | 0.0 | | | |
| Residuum | 23.3 | 0.964 | 15.3 | |
| Distillation loss | 1.1 | | | |

¹Correlation Index²Characterization Factor

Lab. No. O-311

Oil from: Rosiclare member
Iowa (Lower Miss.) series
Depth 2101 feet

Marion County
Sec. 36, T. 4 N., R. 2 E.
Alma field

General Characteristics

Specific gravity: 0.844
Sulfur, per cent: 0.26
Saybolt Universal Viscosity (100°F): 44.0

A.P.I. Gravity: 36.2°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure Barometer Reading 746.0 First drop, 94°F

| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
|--------------|-----------|-----------|--------------|--------------|-----------------|--------------|------------------|---------------|-------------------|----------------|
| 1 | 50 | 122 | 2.6 | 2.6 | 0.653 | 85.2 | — | — | | |
| 2 | 75 | 167 | 3.9 | 6.5 | 0.663 | 81.9 | — | — | 4.2 | 12.77 |
| 3 | 100 | 212 | 3.6 | 10.1 | 0.708 | 68.4 | — | — | 16 | 12.20 |
| 4 | 125 | 257 | 5.8 | 15.9 | 0.728 | 62.9 | — | — | 16 | 12.11 |
| 5 | 150 | 302 | 5.1 | 21.0 | 0.748 | 57.7 | — | — | 18 | 12.03 |
| 6 | 175 | 347 | 5.5 | 26.5 | 0.765 | 53.5 | — | — | 19 | 12.01 |
| 7 | 200 | 392 | 4.5 | 31.0 | 0.783 | 49.2 | — | — | 22 | 11.96 |
| 8 | 225 | 437 | 4.9 | 35.9 | 0.797 | 46.0 | — | — | 23 | 11.93 |
| 9 | 250 | 482 | 5.0 | 40.9 | 0.810 | 43.2 | — | — | 23 | 11.94 |
| 10 | 275 | 527 | 6.7 | 47.6 | 0.827 | 39.6 | — | — | 27 | 11.88 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|----|----|-------|
| 11 | 200 | 392 | 3.9 | 51.5 | 0.839 | 37.2 | 40 | 10 | 28 | 11.90 |
| 12 | 225 | 437 | 5.1 | 56.6 | 0.847 | 35.6 | 46 | 30 | 28 | 11.96 |
| 13 | 250 | 482 | 4.8 | 61.4 | 0.858 | 33.4 | 58 | 50 | 30 | 11.96 |
| 14 | 275 | 527 | 6.4 | 67.8 | 0.873 | 30.6 | 86 | 70 | 34 | 11.93 |
| 15 | 300 | 572 | 8.1 | 75.9 | 0.885 | 28.4 | 175 | 85 | 37 | 11.93 |

Carbon residue of residuum, 11.0%

Carbon residue of crude, 2.8%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 10.1 | 0.676 | 77.8 | |
| Gasoline and naphtha | 31.0 | 0.729 | 62.6 | |
| Kerosene | 9.9 | 0.804 | 44.5 | |
| Gas oil | 14.8 | 0.836 | 37.8 | below 50 |
| Non-viscous lub. dist. | 10.2 | 0.851-0.875 | 34.8-30.2 | 50-100 |
| Medium lub. dist. | 8.0 | 0.875-0.888 | 30.2-27.9 | 100-200 |
| Viscous lub. dist. | 2.0 | 0.888-0.892 | 27.9-27.1 | above 200 |
| Residuum | 22.2 | 0.968 | 14.7 | |
| Distillation loss | 1.9 | | | |

¹Correlation Index

²Characterization Factor

Lab. No. O-319

Oil from: Tar Springs formation
Chester (Upper Miss.) series
Depth 1932 feet

Gallatin County
Sec. 4, T. 8 S., R. 8 E.
Omaha field

General Characteristics

Specific gravity: 0.893
Sulfur, per cent: 0.24
Saybolt Universal Viscosity (100°F): 102.0

A.P.I. Gravity: 27.0°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

| Distillation Atmos. Pressure | | | | Barometer Reading 747.5 First drop, 169°F | | | | | | |
|------------------------------|-----------|-----------|--------------|---|-----------------|--------------|------------------|---------------|-------------------|----------------|
| Fraction No. | Cut at °C | Cut at °F | Per cent cut | Sum per cent | Sp. gr. 60/60°F | °A.P.I. 60°F | S.U. visc. 100°F | Cloud Test °F | C.I. ¹ | K ² |
| 1 | 50 | 122 | | | | | | | | |
| 2 | 75 | 167 | | | | | | | | |
| 3 | 100 | 212 | 3.2 | 3.2 | 0.762 | 54.2 | — | — | 41 | 11.30 |
| 4 | 125 | 257 | 2.4 | 5.6 | 0.763 | 54.0 | — | — | 33 | 11.56 |
| 5 | 150 | 302 | 2.5 | 8.1 | 0.782 | 49.5 | — | — | 34 | 11.51 |
| 6 | 175 | 347 | 2.7 | 10.8 | 0.804 | 44.5 | — | — | 38 | 11.42 |
| 7 | 200 | 392 | 3.1 | 13.9 | 0.824 | 40.2 | — | — | 41 | 11.37 |
| 8 | 225 | 437 | 3.9 | 17.8 | 0.839 | 37.2 | — | — | 42 | 11.33 |
| 9 | 250 | 482 | 4.9 | 22.7 | 0.853 | 34.4 | — | — | 44 | 11.36 |
| 10 | 275 | 527 | 7.5 | 30.2 | 0.860 | 33.0 | — | — | 42 | 11.44 |

Vacuum distillation at 40 mm.

| | | | | | | | | | | |
|----|-----|-----|-----|------|-------|------|-----|---------|----|-------|
| 11 | 200 | 392 | 2.6 | 32.8 | 0.866 | 31.9 | 41 | below 5 | 41 | 11.54 |
| 12 | 225 | 437 | 5.3 | 38.1 | 0.874 | 30.4 | 50 | below 5 | 41 | 11.59 |
| 13 | 250 | 482 | 5.4 | 43.5 | 0.880 | 29.3 | 65 | 10 | 41 | 11.66 |
| 14 | 275 | 527 | 6.5 | 50.0 | 0.889 | 27.7 | 98 | 40 | 42 | 11.71 |
| 15 | 300 | 572 | 7.4 | 57.4 | 0.900 | 25.7 | 185 | 65 | 44 | 11.72 |

Carbon residue of residuum, 7.3%

Carbon residue of crude, 3.1%

APPROXIMATE SUMMARY

| | Per cent | Sp. gr. | °A.P.I. | Viscosity |
|------------------------|----------|-------------|-----------|-----------|
| Light gasoline | 3.2 | 0.762 | 54.2 | |
| Gasoline and naphtha | 13.9 | 0.788 | 48.1 | |
| Kerosene | 0.0 | | | |
| Gas oil | 21.6 | 0.857 | 33.6 | below 50 |
| Non-viscous lub. dist. | 11.5 | 0.874-0.889 | 30.4-27.7 | 50-100 |
| Medium lub. dist. | 7.9 | 0.889-0.902 | 27.7-25.4 | 100-200 |
| Viscous lub. dist. | 2.5 | 0.902-0.906 | 25.4-24.7 | above 200 |
| Residuum | 40.6 | 0.944 | 18.4 | |
| Distillation loss | 2.0 | | | |

¹Correlation Index²Characterization Factor

ILLINOIS STATE GEOLOGICAL SURVEY
REPORT OF INVESTIGATIONS No. 88
1942



