JAA

8-19-58

# CAPILLARY PRESSURE DETERMINATIONS

FOR

## A. D. ALLISON

WILDCAT

BUTLER COUNTY, KANSAS

CORE LAB

PETROLEUM RESERVOIR ENGINEERING

CORE LABORATORIES, INC.
*Petroleum Reservoir Engineering*
DALLAS, TEXAS

August 19, 1958

REPLY TO
707 MID-CONTINENT BLDG.
TULSA, OKLAHOMA

T. 26 R5E. 4E Sec. 15

Mr. A. D. Allison
3212 East Kellogg
Wichita, Kansas

Subject: Revised Estimates of Recoverable Oil
Berndson No. 1 Well
Wildcat
Butler County, Kansas

Dear Sir:

The estimates of recoverable oil presented in the report for the subject well dated, April 14, 1958, have been revised using the capillary pressure data recently available for formation from this well and the Turner No. 1 well. In revising these recovery estimates, however, the entire interval, 2445 to 2459 feet, has been included since it is reported that little or no water production has been experienced from these wells. Please insert these revised data into the report which you previously received.

Thank you for this additional opportunity to be of service.

Very truly yours,

Core Laboratories, Inc.

J. G. Evertson, Jr.

J. G. Evertson, Jr.,
District Manager

JGE:JDJ:dw
7 cc. - Addressee

Form F-11B

**CORE LABORATORIES, INC.**

*Petroleum Reservoir Engineering*

DALLAS, TEXAS



Well Berndson No. 1

## CORE SUMMARY AND CALCULATED RECOVERABLE OIL

**FORMATION NAME AND DEPTH INTERVAL:** Simpson 2445.0-2459.0

| | | | | |
|---|---|---|---|---|
| FEET OF CORE RECOVERED FROM ABOVE INTERVAL | 14.0 | AVERAGE TOTAL WATER SATURATION: PER CENT OF PORE SPACE | | 41.4 |
| FEET OF CORE INCLUDED IN AVERAGES | 14.0 | AVERAGE CONNATE WATER SATURATION: PER CENT OF PORE SPACE | (e) | 28 |
| AVERAGE PERMEABILITY: MILLIDARCYS | 44 | OIL GRAVITY: °API | (e) | 47 |
| PRODUCTIVE CAPACITY: MILLIDARCY-FEET | 616 | ORIGINAL SOLUTION GAS-OIL RATIO: CUBIC FEET PER BARREL | (e) | 160 |
| AVERAGE POROSITY: PER CENT | 13.8 | ORIGINAL FORMATION VOLUME FACTOR: BARRELS SATURATED OIL PER BARREL STOCK-TANK OIL | (e) | 1.14 |
| AVERAGE RESIDUAL OIL SATURATION: PER CENT OF PORE SPACE | 25.7 | CALCULATED ORIGINAL STOCK-TANK OIL IN PLACE: BARRELS PER ACRE-FOOT | | 672 |

Calculated maximum solution gas drive recovery is 198 barrels per acre-foot, assuming production could be continued until reservoir pressure declined to zero psig. Calculated maximum water drive recovery is 402 barrels per acre-foot, assuming full maintenance of original reservoir pressure, 100% areal and vertical coverage, and continuation of production to 100% water cut. (*Please refer to footnotes for further discussion of recovery estimates.*)

**FORMATION NAME AND DEPTH INTERVAL:**

| | | | |
|---|---|---|---|
| FEET OF CORE RECOVERED FROM ABOVE INTERVAL | | AVERAGE TOTAL WATER SATURATION: PER CENT OF PORE SPACE | |
| FEET OF CORE INCLUDED IN AVERAGES | | AVERAGE CONNATE WATER SATURATION: PER CENT OF PORE SPACE | |
| AVERAGE PERMEABILITY: MILLIDARCYS | | OIL GRAVITY: °API | |
| PRODUCTIVE CAPACITY: MILLIDARCY-FEET | | ORIGINAL SOLUTION GAS-OIL RATIO: CUBIC FEET PER BARREL | |
| AVERAGE POROSITY: PER CENT | | ORIGINAL FORMATION VOLUME FACTOR: BARRELS SATURATED OIL PER BARREL STOCK-TANK OIL | |
| AVERAGE RESIDUAL OIL SATURATION: PER CENT OF PORE SPACE | | CALCULATED ORIGINAL STOCK-TANK OIL IN PLACE: BARRELS PER ACRE-FOOT | |

Calculated maximum solution gas drive recovery is barrels per acre-foot, assuming production could be continued until reservoir pressure declined to zero psig. Calculated maximum water drive recovery is barrels per acre-foot, assuming full maintenance of original reservoir pressure, 100% areal and vertical coverage, and continuation of production to 100% water cut. (*Please refer to footnotes for further discussion of recovery estimates.*)

(c) Calculated (e) Estimated (m) Measured (*) Refer to attached letter.

*These recovery estimates represent theoretical maximum values for solution gas and water drive. They assume that production is started at original reservoir pressure; i.e., no account is taken of production to date or of prior drainage to other areas. The effects of factors tending to reduce actual ultimate recovery, such as economic limits on oil production rates, gas-oil ratios, or water-oil ratios, have not been taken into account. Neither have factors been considered which may result in actual recovery intermediate between solution gas and complete water drive recoveries, such as gas cap expansion, gravity drainage, or partial water drive. Detailed predictions of ultimate oil recovery to specific abandonment conditions may be made in an engineering study in which consideration is given to overall reservoir characteristics and economic factors.*

CORE LABORATORIES, INC.
*Petroleum Reservoir Engineering*
DALLAS, TEXAS

August 7, 1958

A. D. Allison
3212 East Kellogg Street
Wichita, Kansas

Subject: Capillary Pressure Determinations
Simpson Sand
Butler County, Kansas
Our File Number: SCAL 58142

Gentlemen:

This is to present the results of single point capillary pressure determinations performed on samples of Simpson Sand from Butler County, Kansas. The core samples used in this study were taken from the Turner No. 1 and the Berndson No. 1 wells and are identified as to depth on page one of this report.

In preparation for these measurements, the selected samples were thoroughly extracted, leached and dried. Their air permeabilities were measured. They were then evacuated and saturated under 2000 PSI pressure with brine. A portion of this brine was then displaced in a capillary pressure cell at 16 PSI. The equilibrium brine saturations obtained at this pressure were determined gravimetrically.

Results of these measurements are recorded tabularly on page two of this report. A plot of the brine saturations as a function of air permeability is presented on page three. These brine saturation values should represent the reservoir connate water contents 25 to 30 feet above the oil-water contact.

We are pleased to be of service.

Very truly yours,

Core Laboratories, Inc.

WR Aufricht

W. R. Aufricht, Engineer in Charge
Special Core Analysis Laboratory

WRA:ds
7 cc. - Addressee

CORE LABORATORIES, INC.
*Petroleum Reservoir Engineering*
DALLAS, TEXAS


File SCAL 58142

Company A. D. Allison
Number of Wells Two
Field Wildcat
Formation Simpson
County Butler
State Kansas

## Identification of Samples

| Sample Number | Company | Well | Depth, Feet |
|---|---|---|---|
| 1 | A. D. Allison | Turner No. 1 | 2450-51 |
| 2 | | Berndson No. 1 | 2457-58 |
| 3 | | Berndson No. 1 | 2454-55 |
| 4 | | Berndson No. 1 | 2446-47 |
| 5 | | Berndson No. 1 | 2451-52 |
| 6 | | Turner No. 1 | 2469-70 |
| 7 | | Turner No. 1 | 2457-58 |

CORE LABORATORIES, INC.
*Petroleum Reservoir Engineering*
DALLAS, TEXAS



File SCAL 58142

Brine Saturation at 16 PSI

| Sample Number | Permeability, Millidarcys | Porosity, Per Cent | Brine Saturation, Per Cent Pore Space 16 PSI | |
|---|---|---|---|---|
| 1 | 259 | 10.7 | 10.5 | |
| 2 | 206 | 14.6 | 14.3 | B 2457-58 |
| 3 | 83 | 13.3 | 22.5 | B 2454-55 |
| 4 | 79 | 12.4 | 15.5 | B 2446-47 |
| 5 | 45 | 10.7 | 22.9 | B 2451-52 |
| 6 | 23 | 11.5 | 34.4 | |
| 7 | 6.4 | 8.4 | 33.8 | |

Company A. D. Allison | Formation Simpson
Well Turner No. 1 & Berndson No. 1 | County Butler
Field Wildcat | State Kansas