

April 13, 1943

PAW Form 3

To: United States of America
Petroleum Administration for War

INFORMATION REQUIRED TO OBTAIN EXCEPTION
FOR THE DEVELOPMENT OF A SECONDARY CRUDE
OIL RECOVERY PROJECT BY USE OF THE WATER
FLOOD METHOD

We herewith request an exception to Administrative Order #11 as provided by paragraph (c)(10), based on the following representations:

No. 1 Name and address of applicant:

Kewanee Oil Company
P. O. Box 729
Phone L. D. 425
Tulsa, Oklahoma

No. 2 Location of proposed operations:

Sections 28, 32 and 33, Township 20,
Range 21, Anderson County, Kansas,
approximately 9 miles East of
Garnett, Kansas.

No. 3 Description of operations:

We propose to start secondary crude oil recovery operations on above leases by the use of water flood methods. These leases consist of approximately 145 productive acres, with 71 currently producing oil wells located thereon. With a small amount of repair work we expect to utilize all the equipment now in place, and to use these 71 oil wells as our oil producing wells when the flood gets underway.

No. 4 Map of project, in detail, attached:

Photostatic copy of map, showing entire Shoe String and other floods in operation, attached.

No. 5 Reservoir data:

Name of pay - Squirrel Sand.
Depth of pay - 658 feet.
Thickness of pay - 20 to 50 feet.
Character of pay - Porous sand with shale streaks.
Future oil recovery estimated - 4,000 barrels per acre, or a total of 580,000 barrels of oil for the 148 acres, all of which will be to the credit of this water flood project.
Future gas recovery estimated - Nil
Subsurface maps - Not available.
Cross-section maps - Not available.

No. 6 Operating data:

Initial production:

Per well maximum 100 barrels oil first 24 hours after shot, no water.
Per well minimum 15 barrels oil first 24 hours after shot, no water.

Present daily production:

15 barrels of oil gross per day from all 71 wells, or approximately 1/5th barrel of oil per well per day.

Water production:

20 barrels of water per day for all leases. This is produced by 16 wells and averages $1\frac{1}{4}$ barrels of water per day per well, making water.
Note: This water is from behind the casing and these 16 wells will be repaired if this application is approved.

Gas production:

Nil. Just enough for current operations.

Initial bottom hole pressures:

Not available.

Present bottom hole pressures:

Nil.

Existing operations:

These leases are pumped with rods, jacks and gas engine powered band wheel powers and are being produced without application of any secondary recovery methods.

Well spacing:

Oil wells are on a square pattern, approximately 1 well to $2\frac{1}{2}$ acres, located approximately 330 feet apart.

Well spacing:

Water input wells - we propose to drill the water input wells on a five-spot basis, spaced equidistant from the surrounding oil wells. See map attached.

Core analyses:

Two attached.

No. 6 Operating data (Continued):

Maximum operating capacity of water input plant and lines;
4400 barrels in 24 hours @ 700 pounds pressure, or 3000 barrels in
24 hours @ 1050 pounds pressure.

Source of water supply:

We propose to drill a Siliceous Lims well near site of proposed water
plant for our water source.

No. 7 Gravity of crude oil, etc.:

36 Degrees A.P.I. Gravity.

No. 8 Total material requirements:

"A" wells - see Schedule "A" attached.

"B" lease equipment - see Schedule "B" attached.

"C" lease lines - see Schedule "C" attached.

"D" other plants and facilities - see Schedule "D" attached.

"E" Quarter requirements in tons - see Schedule "E" attached.

No. 9 Not applicable.

No. 10 Not applicable.

No. 11 Based on conservative estimate and field data on other projects under-
way in this Shoe String, we can reasonably expect to recover 4000 barrels of
additional crude oil per acre by controlled water flood methods. This will
total 580,000 barrels of crude oil for the 145 acres involved, which otherwise
will not be recovered as these wells have long since passed the economic status
of production by the usual methods of natural flow followed by pumping operations.

To flood this property, based on our proposal, it will take less than
half the amount of materials, labor and other expense than would be necessary if
the properties are permitted to be abandoned and salvaged, and at some future
date redrilled for flooding.

These properties are located about 80 miles South and West of Kansas
City, Missouri, and are in a territory where more oil is needed. See Stanolind
Crude Oil Purchasing Company letter on this subject, attached.

The amount of crude oil to be recovered per ton of new metals required
is 2815 barrels.

The wells on these leases were drilled during 1924, 1925 and 1926, which
accounts for the lack of some of the information called for.

No. 12 Certification:

The undersigned hereby certifies to the Petroleum Administrator for War that:

- (a) The foregoing application has been executed on behalf of and by authority of the above named applicant;
- (b) The facts stated in the foregoing application are, to the best of my knowledge and belief, true and correct;
- (c) If the authorization hereby applied for is granted, use of material existing in stock or obtained by means of any applicable allotment number or preference rating will be made solely in accordance with the terms of the authorization which has been granted, and with the provisions of Petroleum Administrative Order No. 11, as amended from time to time.

KEWANEE OIL COMPANY

Name of Applicant

Signature of Authorized Official

APR 14 1943

Date

Title

J. M. Sands
 D. E. Lounsbury-2
 R. C. Alden (Files)
 Prod. Res. Files
 Extra

PHILLIPS PETROLEUM COMPANY

Core Analysis Summary

PHILLIPS RESEARCH DEPARTMENT CORE LABORATORY

Company Kewanee Oil Lease Cleveland Well No. 21
 Description NW/4 33-208-21E County Anderson State Kansas
 Sec. Twp. Rge. 330' from E.L. and 660' from N.L. of NW/4 (Garnett Shoestring Bush City Pool)
 Dates of Coring: Started 6-12-40 Completed 6-12-40
 Core Barrel Longear (Drag bit) Size Core 2-1/2"
 Elevations: Surface - Starting Point for Depth Measurements Ground
 Depth Measurements by Drill Stem Last Steel Line Measurements -
 Formation Cored: Name Squirrel Sand Character Sandstone
 Depth, Top 604.5 Bottom 647.1
 Purpose of Coring Secondary Recovery Possibilities and Geology

SUMMARY OF LABORATORY ANALYSIS

| Depth, Feet From | To | Feet of Sand | Porosity Percent | Oil Saturation H ₂ O Percent | Oil Content Bbls./Acre Ft. | Oil Content Bbls. Acre | Average Permeability mD | |
|---------------------|-------|-----------------|---------------------|---|-------------------------------|---------------------------|-------------------------------|------|
| *604.5 | 635.4 | 16.2 | 19.2 | 32.9 | 38.6 | 579 | 9,373 | 7.7 |
| | | 14.7 feet shale | | | | | | |
| 635.7 | 647.1 | 9.2 | 19.6 | 33.4 | 45.6 | 711 | 6,544 | 20.1 |

OIL CONTENT OF SAND WITH RESPECT TO PERMEABILITY

| Feet of Sand | Permeability Range (mD's) | | Bbls./Acre Ft. | Bbls./Acre |
|-------------------------------------|---------------------------|------|----------------|------------|
| | From | To | | |
| <u>*Section 604.5 to 635.4 feet</u> | | | | |
| 5.9 | 5. | 35.7 | 587 | 3459 ✓ |
| 4.8 | 10. | 35.7 | 550 | 2644 |
| 1.7 | 20. | 35.7 | 667 | 1138 |
| <u>Section 635.7 to 647.1 feet</u> | | | | |
| 8.9 | 5. | 41.1 | 713 | 6344 ✓ |
| 7.4 | 10. | 41.1 | 795 | 5808 |
| 4.5 | 20. | 41.1 | 803 | 3611 |

DISTRIBUTION OF SAND WITH RESPECT TO PERMEABILITY

| Permeability Range From | To | Feet of Sand Represented | | Cumulative Percentage of Total |
|-------------------------------------|------|--------------------------|-----------------|-----------------------------------|
| | | Feet | Cumulative Feet | |
| <u>*Section 604.5 to 635.4 feet</u> | | | | |
| 0. | 1. | 1.8 | 1.8 | 11.1 |
| 1.1 | 5. | 8.5 | 10.3 | 63.6 |
| 5.1 | 10. | 1.1 | 11.4 | 70.3 |
| 10.1 | 20. | 3.1 | 14.5 | 89.5 |
| 20.1 | 35.7 | 1.7 | 16.2 | 100.0 |
| <u>Section 635.7 to 647.1 feet</u> | | | | |
| 0. | 1. | .0 | 0 | .0 |
| 1.1 | 5. | .3 | .3 | 3. |
| 5.1 | 10. | 1.5 | 1.8 | 19.6 |
| 10.1 | 20. | 2.9 | 4.7 | 51.1 |
| 20.1 | 41.1 | 4.5 | 9.2 | 100. |

*NOTE: These figures are based entirely on numerous tests made from porous laminated sand lenses, varying from one inch to one foot in thickness and scatter thruout the section.

J. M. Sanders
 D. E. Lounsbury (2)
 R. C. Alden (Files)
 Prod. Res. Files
 Extra

PHILLIPS PETROLEUM COMPANY
Core Analysis Summary
 PHILLIPS RESEARCH DEPARTMENT CORE LABORATORY

Company **Kovance Oil** Lease **Kretzker** Well No. **Nov 28**
 Description **22-208-21E** County **Anderson** State **Kansas**
 Sec. Twp. Rge.

660° from south line and 660° from west line of NW/4.
 Dates of Coring: Started **5-30-40** Completed **5-30-40**
 Core Barrel **Longear** Size Core **2"**
 Elevations: Surface Starting Point for Depth Measurements
 Depth Measurements by **Drill pipe** Last Steel Line Measurements
 Formation Cored: Name **Squirrel** Character **Sandstone**
 Depth, Top **597.5'** Bottom **624.9** = **37.4'**
 Purpose of Coring **Secondary Recovery Possibilities**

SUMMARY OF LABORATORY ANALYSIS

| Depth, Feet From To | Feet of Sand | Porosity Percent | H ₂ O % | Oil Saturation Percent | Oil Content Bbls./Acre Ft. | Oil Content Bbls./Acre | Average Permeability Millidarcy |
|------------------------|--------------|--------------------------------|-----------------------|---------------------------|-------------------------------|---------------------------|---------------------------------------|
| 597.5 639.0 | 17.8 | 18.4 | 33.4 | 47.4 | 661 | 11,762 | 11.2 |
| | 6.2 | Very laminated shaly sandstone | | | | | |
| | 7.5 | Shale and sandy shale | | | | | |
| | 31.5 | | | | | | |

DISTRIBUTION OF OIL CONTENT WITH RESPECT TO PERMEABILITY RANGE

| <u>Permeability Range</u> <u>Millidarcys</u> | | <u>Feet of Sand</u> <u>Feet</u> | <u>Oil Content</u> <u>Bbls./Acre Feet</u> | <u>Oil Content</u> <u>Bbls./Acre</u> |
|---|------|------------------------------------|--|---|
| From | To | | | |
| 0 | 30.3 | 17.8 | 661 | 11,762 |
| 1 | 30.3 | 16.9 | 658 | 11,040 |
| 5 | 30.3 | 13.1 | 655 | 8,577 |
| 10 | 30.3 | 9.4 | 657 | 6,173 |
| 20 | 30.3 | 2.5 | 745 | 1,863 |

DISTRIBUTION OF SAND WITH RESPECT TO PERMEABILITY RANGE

| <u>Permeability Range</u> <u>Millidarcys</u> | | <u>Feet of Sand</u> | | <u>Cumulative Percentage</u> <u>of Total Sand</u> |
|---|------|---------------------|----------------|--|
| From | To | Ft. | Cumulative Ft. | |
| 0 | 1 | 0.9 | *2.6 | 5.1 |
| 1.1 | 5 | 3.8 | *2.6 | 26.4 |
| 5.1 | 10 | 3.7 | *0.7 | 47.2 |
| 10.1 | 20 | 6.9 | *0.3 | 86.0 |
| 20.1 | 30.3 | 2.5 | 17.8 | 100. |

*Very laminated shaly sandstone lenses not included in cumulative feet of sand or represented by saturation samples. These thin lenses are not considered to be productive.

NOTE: "We had five feet of good brown sand directly under where they stopped coring making a total of 46' of sand from top to bottom." From Harris letter of June 3, 1940.