

July 8, 1952

Atlantic Oil Corporation
306-A Daniels Building
Tulsa, Oklahoma

Gentlemen:

Enclosed herewith is the report of the analysis of the Cable Tool core taken from the Jones Lease, Well No. 2, Crawford County, Kansas, and submitted to our laboratory on June 25, 1952.

Very truly yours,

OILFIELD RESEARCH LABORATORIES



Carl L. Pate

CLP:mm

C. C.

ATLANTIC OIL CORPORATION

CORE ANALYSIS REPORT

JONES LEASE

WELL NO. 2

CRAWFORD COUNTY, KANSAS

OILFIELD RESEARCH LABORATORIES

CHANUTE, KANSAS

JULY 8, 1952

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Atlantic Oil Corporation Lease Jones Well No. 2

Location NE $\frac{1}{4}$, NW $\frac{1}{4}$

Section 38 Twp. 28S Rge. 22E County Crawford State Kansas

Name of Sand **Bartlesville**

Top of Core **388.40**

Bottom of Core **402.00**

Top of ^{Pay}Sand **390.80**

Bottom of ^{Pay}Sand **398.40**

Total Feet of Permeable Sand **8.45**

Total Feet of Floodable Sand **5.65**

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
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0 - 5	2.20	2.20
5 - 10	2.60	4.80
10 - 20	0.90	5.70
20 - 40	1.35	7.05
40 & above	1.40	8.45

Average Permeability Millidarcys **19.52**

Average Percent Porosity **19.14**

Average Percent Oil Saturation **53.47**

Average Percent Water Saturation **36.67**

Average Oil Content, Bbls./A. Ft. **812.**

Total Oil Content, Bbls./Acre **7,182.**

Average Percent Oil Recovery by Laboratory Flooding Tests **24.28**

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. **388.**

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre **2,191.**

Total Calculated Oil Recovery, Bbls./Acre **2,500.**

Packer Setting, Feet

Viscosity, Centipoises @

A. P. I. Gravity, degrees @ 60 °F

Elevation, Feet

It is understood that this well was drilled in virgin territory. In order to get a true water saturation of the sand, oil was used as the circulating fluid in the coring of that part of the sand section extending from 391.40 to 400.00 feet.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
388.40 - 390.15	Gray sandy shale.
390.15 - 392.25	Brown fine grained micaceous sandstone.
392.25 - 392.55	Brown fine grained laminated micaceous carbonaceous sandstone.
392.55 - 392.95	Finely laminated carbonaceous sandstone.
392.95 - 393.90	Brown fine grained laminated micaceous carbonaceous sandstone.
393.90 - 394.20	Brown fine grained micaceous sandstone.
394.20 - 396.45	Dark brown fine grained micaceous sandstone.
396.45 - 398.40	Brown fine grained micaceous sandstone.
398.40 - 398.70	Brown fine grained laminated micaceous carbonaceous sandstone.
398.70 - 399.70	Brown fine grained micaceous sandstone.
399.70 - 400.00	Gray shale.
400.00 - 402.00	According to log, gray shale (Discarded at well).

Coring was started at a depth of 388.40 feet in gray sandy shale and completed at 402.00 feet in gray shale. This core shows a total of 9.45 feet of sandstone. For the most part, the pay is made up of fine grained micaceous sandstone.

PERMEABILITY

For the sake of distribution, the core was divided into two sections. The weighted average permeability of the upper and lower sections is 14.45 and 23.37 millidarcys respectively; the overall average being 19.52 (See Table II). By observing the data given on the coregraph, it is noticeable that the sand has a very irregular permeability profile.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a good weighted average percent oil saturation, namely, 53.47. The weighted average percent oil saturation of the upper and lower sections is 39.85 and 61.76 respectively. The weighted average percent water saturation of the upper and lower sections is 51.54 and 29.11 respectively; the overall average being 36.67 (See Table IV). This gives an overall weighted average total fluid saturation of 90.14 percent.

For future information, all of the saturation samples were analyzed for chloride content. The results of these tests are given in Tables VII and VIII. It is noticeable that the sand has a very irregular chloride content.

The weighted average oil content of the upper and lower sections is 556 and 967 barrels per acre respectively; the overall average being 812. The total oil content, as shown by this core, is 7,182 barrels per acre (See Table IV).

LABORATORY FLOODING TESTS

The sand in this core responded very well to laboratory flooding tests, as a total recovery of 2,191 barrels of oil per acre was

obtained from 5.65 feet of sand. The weighted average percent oil saturation was reduced from 54.19 to 29.91, or represents an average recovery of 24.28 percent. The weighted average effective permeability of the samples is 2.61 millidarcys, while the average initial fluid production pressure is 19.7 pounds per square inch. (See Table VI).

By observing the data given in Table V, you will note that of the 9 samples tested, 3 produced water and 6 oil. This indicates that approximately 67 percent of the sand represented by these samples is floodable. The tests also show that the sand does not have a very uniform effective permeability.

CONCLUSION

From a study of the above data, it is evident that an efficient water flood within the vicinity of this well will recover approximately 2,500 barrels of oil per acre, or an average of 442 barrels per acre foot from the 5.65 feet of floodable sand analyzed. In calculating this recovery, an allowance was made for oil lost during coring, and it was assumed that the true water saturation of the sand is 29 percent and that the well was drilled in virgin territory.

The principle drawback of this core is the fact that it has a thin sand section and is comparatively tight for its depth.

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SHOT RECOMMENDATION

Company **Atlantic Oil Corporation** Lease **Jones** Well No. **2**

<u>Depth Interval, Feet</u>	<u>Feet of Sand</u>	<u>Size of Shell Inches</u>	<u>Qts./Ft.</u>	<u>Total Quarts</u>
393.0 - 399.0	6.0	4½	3.1	18.6

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RESULTS OF PERMEABILITY TESTS
TABLE I

Company Atlantic Oil Corporation Lease Jones Well No. 2

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	390.20	4.8	0.35	0.35	1.68
2	390.73	18.	0.40	0.75	7.20
3	391.00	22.	0.40	1.15	8.80
4	391.64	38.	0.55	1.70	20.90
5	392.06	22.	0.40	2.10	8.80
6	392.45	3.1	0.30	2.40	0.93
7	393.00	2.1	0.30	2.70	0.63
8	393.50	2.2	0.65	3.35	1.43
9	394.02	7.9	0.30	3.65	2.37
10	394.40	61.	0.50	4.15	30.50
11	394.90	51.	0.40	4.55	20.40
12	395.29	13.	0.50	5.05	6.50
13	395.90	67.	0.50	5.55	33.50
14	396.30	7.7	0.35	5.90	2.70
15	396.84	3.1	0.60	6.50	1.86
16	397.30	9.4	0.45	6.95	4.23
17	397.80	8.5	0.50	7.45	4.25
18	398.20	7.7	0.40	7.85	3.08
19	398.73	8.6	0.60	8.45	5.16

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SUMMARY OF PERMEABILITY TESTS

TABLE II

Company Atlantic Oil Corporation Lease Jones Well No. 2

Depth Interval Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity, Ft. x Md.
390.15 - 394.20	3.65	14.45	52.74
394.20 - 399.30	4.80	23.37	112.18
390.15 - 399.30	8.45	19.52	164.92

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RESULTS OF SATURATION TESTS

TABLE III

Company Atlantic Oil Corporation Lease Jones Well No. 2

Sat. No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls./A. Ft.	Feet of Core		Total Oil Content Bbls./Acre
			Oil	Water	Total		Ft.	Cum. Ft.	
1	390.40	16.0	33.0	58.2	91.2	410	0.65	0.65	267
2	391.25	19.3	29.8	60.2	90.0	447	0.90	1.55	402
F-3	392.16	19.6	35.0	-	-	532	0.55	2.10	293
3	392.33	19.6	61.2	34.6	95.8	932	0.30	2.40	280
4	393.25	16.8	50.1	44.1	94.2	653	0.95	3.35	620
5	394.65	21.9	74.1	24.6	98.7	1,260	0.90	4.25	1,134
6	395.55	21.2	60.0	27.4	87.4	1,032	1.35	5.60	1,393
7	396.60	21.8	61.3	33.3	94.6	1,038	0.65	6.25	1,675
8	397.55	18.4	61.3	26.0	87.3	875	1.30	7.55	1,138
9	398.55	17.6	48.0	46.9	94.9	656	0.30	7.85	1,197
10	399.40	17.3	58.3	31.4	89.7	783	1.00	8.85	783
							Total	- - - -	7,182

Oil Field Research Laboratories
SUMMARY OF SATURATION TESTS

TABLE IV

Company	Lease	Well No.				
Atlantic Oil Corporation	Jones	2				
Depth Interval, Feet	Feet of Core Analyzed	Average Percent Porosity	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbls./A. Ft.	Total Oil Content Bbls./Acre
390.15 - 393.90	3.35	18.06	39.85	51.54	556	1,862
393.90 - 399.70	5.50	19.80	61.76	29.11	967	5,320
390.15 - 399.70	8.85	19.14	53.47	36.67	812	7,182

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RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company Atlantic Oil Corporation

Lease Jones

Well No. 2

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation			Volume of Water Recovered cc*	Effective Permeability, Millidarcys**	Initial Fluid Production Pressure Lbs./Sq. In.
			Percent	Bbls./A. Ft.	Percent	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	390.40	16.2	33.3	418	0.0	0	33.3	56.7	418	8	0.155	35
2	391.25	19.4	28.8	453	4.2	63	24.6	67.7	370	71	1.48	20
3	392.15	19.6	35.0	532	8.9	135	26.1	69.9	397	75	1.60	20
4	394.65	21.6	72.2	1211	45.0	755	27.2	71.8	456	91	4.84	15
5	395.55	20.7	58.9	946	25.4	408	33.3	58.8	538	57	0.795	25
7	396.60	22.1	60.0	1030	29.5	507	30.5	62.5	523	268	5.30	15
8	397.55	18.7	59.6	865	26.5	384	35.1	66.7	481	78	2.85	20
9	398.55	17.7	45.9	631	0.0	0	45.9	51.0	631	7	0.274	30
10	399.40	17.1	56.9	757	0.0	0	56.9	41.0	757	0	Imp.	50*

Notes: cc - centimeter
* Volume of water recovered at the time of maximum oil recovery.
** Determined by passing water through sample which still contains residual oil.

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SUMMARY OF LABORATORY FLOODING TESTS

TABLE VI

Company	Lease	Jones	Well No.
Atlantic Oil Corporation			2
Depth Interval, Feet	390.80 - 393.90	394.20 - 398.40	390.80 - 398.40
Feet of Core Analyzed	1.45	4.20	5.65
Average Percent Porosity	19.46	20.46	20.21
Average Percent Original Oil Saturation	31.24	61.91	54.19
Average Percent Oil Recovery	6.00	30.36	24.23
Average Percent Residual Oil Saturation	25.24	31.55	29.91
Average Percent Residual Water Saturation	66.49	64.62	65.61
Average Percent Total Residual Fluid Saturation	93.73	96.17	95.52
Average Original Oil Content, Bbls./A. Ft.	470.	991.	858.
Average Oil Recovery, Bbls./A. Ft.	90.	490.	386.
Average Residual Oil Content, Bbls./A. Ft.	380.	501.	470.
Total Original Oil Content, Bbls./Acre	662.	4,163.	4,845.
Total Oil Recovery, Bbls./Acre	131.	2,060.	2,191.
Total Residual Oil Content, Bbls./Acre	551.	2,103.	2,654.
Average Effective Permeability, Millidarcys	1.53	2.99	2.61
Average Initial Fluid Production Pressure, p.s.i.	20.0	18.6	19.7

NOTE: Only those samples which recovered oil were used in calculating the above averages.

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RESULTS OF WATER DIFFERENTIATION TESTS
TABLE VII

Company Atlantic Oil Corporation Lease Jones Well No. 8

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation	
			Connate	Drilling & Foreign
			Total	
1	390.40	8,650		
2	391.25	6,640		
3	392.33	14,600		
4	393.25	11,800		
5	394.65	12,400		
6	395.55	16,200		
7	396.60	9,140		
8	397.55	19,600		
9	398.55	13,100		
10	399.40	15,900		

Note: ppm - parts per million.

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SUMMARY OF WATER DIFFERENTIATION TESTS

TABLE VIII

Company Atlantic Oil Corporation Lease Jones Well No. 2

Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water
390.15 - 393.90	9,710		
393.90 - 399.70	15,815		
390.15 - 399.70	12,276		

Note: ppm - parts per million.