ANDERSON EXPLORATION COMPANY

CORE ANALYSIS REPORT

IRA COX LEASE WELL NO. 3-CT

ANDERSON COUNTY, KANSAS

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OILFIELD RESEARCH LABORATORIES

536 N. HIGHLAND
CHANUTE, KANSAS

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Chanute, Kansas
October 24, 1964

Anderson Exploration Company
P.O. Box 53
Topeka, Kansas

Gentlemen:

Enclosed herewith is the report of the analysis of the Rotary core taken from the Ira Cox Lease, Well No. 3-CT, Anderson County, Kansas, and submitted to our laboratory on October 22, 1964.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman

Benjamin R. Pearman

BRP:rf

4 c. - Topeka, Kansas
2 c. - Max Loy

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Anderson Exploration Co. Lease Ira Cox Well No. 3-CT

Location NW

Section 28 Twp. 22S Rge. 19E County Anderson State Kansas

Name of Sand	Squirrel
Top of Core	853.0
Bottom of Core	881.0
Top of Sand	853.8
Bottom of Sand	864.4
Total Feet of Permeable Sand	10.1
Total Feet of Floodable Sand	7.8

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
4 - 20	4.6	4.6
20 - 50	2.7	7.3
50 - 100	0.8	8.1
100 & above	2.0	10.1

Average Permeability Millidarcys	43.3
Average Percent Porosity	18.5
Average Percent Oil Saturation	57.1
Average Percent Water Saturation	18.4
Average Oil Content, Bbls./A. Ft.	820.
Total Oil Content, Bbls./Acre	8,361.
Average Percent Oil Recovery by Laboratory Flooding Tests	18.2
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	280.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	1,850.
Total Calculated Oil Recovery, Bbls./Acre (Primary & Secondary)	2,930.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

Fresh water mud was used as the circulating fluid while taking this core. The core was sampled and the samples sealed in cans by a representative of Oilfield Research Laboratories. The well was drilled in virgin territory.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
853.0 - 853.8	Gray sandy shale.
853.8 - 857.9	Brown, slightly laminated, slightly shaly sandstone.
857.9 - 858.2	Grayish light brown, shaly sandstone.
858.2 - 859.0	Brown sandstone.
859.0 - 859.2	Grayish light brown, shaly sandstone.
859.2 - 861.6	Brown sandstone.
861.6 - 863.9	Brown, slightly shaly sandstone.
863.9 - 864.4	Brown, laminated, shaly sandstone.
864.4 - 881.0	Sandy shale.

Coring was started at a depth of 853.0 feet in sandy shale and completed at 881.0 feet also in sandy shale. This core shows a total of 10.6 feet of sandstone. For the most part, the pay is made up of brown, slightly shaly sandstone.

PERMEABILITY

The weighted average permeability of the core is 43.3 millidarcys (See Table III). By observing the data given on the coregraph, it is noticeable that the sand has an irregular permeability profile. The permeability of the sand varies from 4.5 to a maximum of 112. millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a good weighted average percent oil

saturation, namely, 57.1. The weighted average percent water saturation is 18.4 (See Table III). This gives an overall weighted average total fluid saturation of 75.5 percent. This low total fluid saturation indicates considerable fluid was lost during coring most of which was probably oil.

The weighted average oil content of the core is 820 barrels per acre foot. The total oil content, as shown by this core, is 8,361 barrels per acre (See Table III).

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 1,850 barrels of oil per acre was obtained from 6.6 feet of sand. The weighted average percent oil saturation was reduced from 58.8 to 40.6, or represents an average recovery of 18.2 percent. The weighted average effective permeability of the samples is 0.885 millidarcys, while the average initial fluid production pressure is 36.7 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 11 samples tested, 6 produced water and oil. This indicates that approximately 55 percent of the sand represented by these samples is floodable pay sand. The tests also show that the sand has a wide variation in effective permeability to water.

CONCLUSION

Based on the results of the laboratory tests, it appears that efficient primary and secondary operations in the vicinity of this well should recover approximately 570 and 2,360 barrels of oil per acre respectively. These recovery values were calculated using the following data and assumptions:

Original formation volume factor	1.06
Reservoir water saturation, percent	12.0
Expected primary recovery, estimated, percent	5.0
Average porosity, percent	20.1
Oil saturation after flooding, percent	40.6
Performance factor, percent	50.0
Net floodable pay sand, feet	7.8

This core shows a pay sand section having a good oil saturation, a moderate water saturation and a wide variation in effective permeability to water.

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Anderson Exploration Co. Lease Ira Cos Well No. 3-CT

Sample No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls. / A Ft.	Perm., Mill.	Feet of Sand		Total Oil Content	Perm. Capacity Ft. X md.
			Oil	Water	Total			Ft.	Cum. Ft.		
1	854.1	15.1	54	22	76	633	6.3	0.8	0.8	506	5.04
2	855.1	15.6	54	25	79	653	13.	1.0	1.8	653	13.00
3	856.1	15.6	60	24	84	725	14.	1.0	2.8	725	14.00
4	857.1	15.8	62	17	79	760	20.	1.3	4.1	988	26.00
F-5	858.1	14.9	58	-	-	669	-	0.3	4.4	200	-
5	858.3	20.2	49	21	70	768	57.	0.8	5.2	615	45.60
6	859.1	12.7	46	45	91	454	-	0.2	5.4	91	-
P-6	859.3	-	-	-	-	-	39.	0.4	5.8	-	15.60
7	860.1	21.4	57	16	73	947	108.	1.0	6.8	947	108.00
8	861.1	22.5	59	12	71	1,030	112.	1.0	7.8	1,030	112.00
9	862.1	22.4	55	12	67	955	49.	1.0	8.8	955	49.00
10	863.1	22.0	59	9	68	1,007	36.	1.3	10.1	1,309	46.80
11	864.1	14.2	62	33	95	684	4.5	0.5	10.6	342	2.25
								Total	-------	8,361	

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Anderson Exploration Co. Lease Ira Cox Well No. 3-CT

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
853.8 - 864.4	10.1	43.3	437.29

Depth Interval, Feet	Feet of Core Analyzed	Average Percent Porosity	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbl./A. Ft.	Total Oil Content Bbls./Acre
853.8 - 864.4	10.2	18.5	57.1	18.4	820	8,361

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Anderson Exploration Co. Lease Ira Cox Well No. 3-CT

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.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	854.1	15.0	54	628	0	0	54	23	628	0	Imp.	-
2	855.1	15.6	53	641	0	0	53	28	641	0	Imp.	-
3	856.1	15.9	60	740	18	222	42	50	518	2	0.200	50
4	857.1	16.2	62	779	23	289	39	47	490	5	0.200	50
5	858.1	14.9	58	669	0	0	58	22	669	0	Imp.	-
6	859.1	13.0	49	494	0	0	49	44	494	0	Imp.	-
7	860.1	21.8	57	964	18	304	39	46	660	52	1.50	30
8	861.1	23.0	59	1,052	19	338	40	46	714	83	2.60	30
9	862.1	22.0	55	937	12	204	43	46	733	5	0.500	30
10	863.1	22.4	59	1,024	18	312	41	42	712	23	0.600	30
11	864.1	14.0	62	673	0	0	62	35	673	0	Imp.	-

Notes: cc—cubic 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 V

Company Anderson Exploration Co. Lease Ira Cos Well No. 3-CT

Depth Interval, Feet	853.8 - 864.4
Feet of Core Analyzed	6.6
Average Percent Porosity	20.1
Average Percent Original Oil Saturation	58.8
Average Percent Oil Recovery	18.2
Average Percent Residual Oil Saturation	40.6
Average Percent Residual Water Saturation	46.0
Average Percent Total Residual Fluid Saturation	86.6
Average Original Oil Content, Bbls./A. Ft.	914.
Average Oil Recovery, Bbls./A. Ft.	280.
Average Residual Oil Content, Bbls./A. Ft.	634.
Total Original Oil Content, Bbls./Acre	6,037.
Total Oil Recovery, Bbls./Acre	1,850.
Total Residual Oil Content, Bbls./Acre	4,187.
Average Effective Permeability, Millidarcys	0.885
Average Initial Fluid Production Pressure, p.s.i.	36.7

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