

07

EARLOUGHER ENGINEERING
CORE SUMMARY

Company Kewanee Oil Company Lease Daniels Well No. 110

Location 630 feet south, 1085 feet west, northeast corner

Section 4 Twp. 21-S Rge. 21-E County Anderson State Kansas

Formation Cored Squirrel Sand Type Core No. 6 Baker Barrel

Date Cored 11-30-47 Date Shot _____ Date Completed _____

Depths:

Started coring, shaly sand	595.0 ft.
Top of oil sand	595.5 "
Bottom of oil sand	634.0 "
Net feet of oil sand	32.1 "
Bottom of core, shale	635.6 "
Total cored	40.6 "
Feet analyzed	33.8 "

Shot Record:

Set Packer 604.0 Feet
Plug back to 633.0 ft.

Depth, Feet		Feet	Shell Diameter	Quarts Per Foot	Quarts Total
From	To				
607.	618.	11.	3"	1.5	16.5
618.	633.	15.	4"	2.5	37.5
					54.0

Completion Data:

Hrs. well stood after coring _____; Feet Fluid in Hole _____ (Oil _____ Water _____)

Clean-out time, hrs. _____; Initial production, bbls. day _____ (Oil _____ Water _____)

Remarks:

This core shows 32.1 net feet of oil sand between depths 605.5 and 634.0 feet. The sand section is fairly well developed; however, the oil saturation is somewhat lower than shown by core from Well No. 109, one location west. The 5.1 net feet of sand between depths 613.1 and 618.3 feet has a relatively low average oil saturation of 31 percent for which reason the shot was lightened in this zone.

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PERMEABILITY Average permeability is 17 millidarcys and values range from 0.4 to 58 millidarcys. Permeability capacity is 554 foot millidarcys.

POROSITY Average porosity is 20.4 percent and values range from 14.7 to 24.0 percent.

PERCENT SATURATION Average oil saturation is 39 percent and average water saturation 47 percent. The middle 5.1 net feet of sand has a relatively low average oil saturation of 31 percent and high average water saturation of 57 percent.

OIL CONTENT Average oil content is 612 barrels per acre foot and values range from 400 to 950 barrels per acre foot.

LABORATORY FLOODING TESTS Five samples were flooded with tap water in the laboratory. Average oil recovery was 284 barrels per acre foot and average residual oil saturation 21 percent.

CONCLUSIONS

1. Net feet of oil sand is 32.1 feet, located between depths 595.5 and 634.0 feet.
2. The oil saturation is reasonably good; however, it is somewhat lower than shown by core from Well No. 109, one location to the west.
3. Estimated oil recovery by water flooding is 246 barrels per acre foot, or 7,900 barrels per acre from the area of which this core is representative.

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EARLOUGHER ENGINEERING

RESULTS OF SATURATION TESTS

COMPANY Kewanee Oil Company

WELL Daniels Well No. 110

Sat. No.	Depth Feet	Porosity Per Cent	PER CENT SAT.			Avg. Oil Content Bbls./A. Ft.	FT. OF SAND		Total Oil Content Bbls./Acre
			Oil	Water	Total		Ft.	Cum.	
1	595.6	18.1	31.	50.	81.	430.	1.0	1.0	430.
2	597.9	20.4	41.	37.	78.	650.	0.7	1.7	460.
3	599.1	20.3	38.	51.	89.	590.	0.6	2.3	350.
4	600.2	17.6	41.	52.	93.	550.	1.3	3.6	720.
5	601.3	19.8	42.	43.	85.	640.	1.2	4.8	770.
6	602.3	14.7	49.	63.	112.	560.	1.1	5.9	620.
7	603.3	20.4	31.	48.	79.	480.	1.0	6.9	480.
8	604.4	22.8	31.	39.	70.	550.	0.7	7.6	390.
9	605.4	14.7	44.	60.	104.	500.	1.3	8.9	650.
10	606.5	18.7	36.	62.	98.	520.	0.8	9.7	420.
11	607.4	20.0	37.	51.	88.	580.	0.8	10.5	460.
12	608.4	12.3	25.	84.	109.	240.	1.7*		
13	609.5	22.3	36.	46.	82.	620.	0.8	11.3	500.
14	610.6	23.4	34.	53.	87.	620.	0.6	11.9	370.
15	611.6	22.7	50.	37.	87.	890.	0.9	12.8	800.
16	612.6	23.8	46.	38.	84.	840.	1.1	13.9	920.
17	613.7	24.0	29.	50.	79.	540.	1.3	15.2	700.
18	615.4	15.2	38.	62.	100.	440.	1.8	17.0	790.
19	616.6	19.5	30.	62.	92.	460.	1.0	18.0	460.
20	617.7	21.2	28.	53.	81.	460.	1.0	19.0	460.
21	618.6	22.5	49.	39.	88.	850.	1.0	20.0	850.
22	619.5	22.8	32.	40.	72.	560.	1.0	21.0	560.
23	620.6	22.5	38.	37.	75.	670.	0.7	21.7	470.
24	621.6	22.3	42.	38.	80.	730.	1.0	22.7	730.
25	622.6	21.5	52.	44.	96.	880.	1.1	23.8	970.
26	623.7	22.9	53.	42.	95.	950.	0.6	24.4	570.
28	624.6	21.5	42.	37.	79.	700.	0.7	25.1	490.
29	626.1	17.6	51.	66.	117.	700.	0.6	25.7	420.
30	627.4	22.1	31.	49.	80.	540.	1.0	26.7	540.
31	628.8	23.1	38.	54.	92.	680.	1.1	27.8	750.
32	629.8	21.5	24.	44.	68.	400.	0.8	28.6	320.
33	631.2	22.5	37.	53.	90.	640.	1.3	29.9	830.
34	632.3	19.4	39.	50.	89.	590.	1.0	30.9	590.
35	633.2	20.2	42.	45.	87.	660.	1.2	32.1	790.

* Not included in cumulative feet of sand.

SUMMARY

DEPTH FEET		FEET OF SAND	AVG. POROSITY	AVG. OIL SAT.	AVG. WATER SAT.	AVG. OIL CONTENT BBL./A. FT.	TOTAL OIL CONTENT BBL./ACRE
FROM	TO						
595.5	613.1	13.9	19.6	39.	48.	600.	8,340.
613.1	618.3	5.1	19.4	31.	57.	473.	2,410.
<u>618.3</u>	<u>634.0</u>	<u>13.1</u>	<u>21.7</u>	<u>40.</u>	<u>44.</u>	<u>678.</u>	<u>8,880.</u>
595.5	634.0	32.1	20.4	39.	47.	612.	19,630.

EARLOUGHER ENGINEERING

RESULTS OF PERMEABILITY TESTS

COMPANY **Kewanee Oil Company**

WELL **Daniels Well No. 110**

Sample No.	Depth Feet	Permeability Millidarcys	FEET OF SAND		Capacity Ft. X Md.	Sample No.	Depth Feet	Permeability Millidarcys	FEET OF SAND		Capacity Ft. X Md.
			Ft.	Cum. Ft.					Ft.	Cum. Ft.	
1	595.1	0.6	0.5*			36	616.8	25.	0.6	17.6	15.
2	595.9	2.5	0.6	0.6	1.5	37	617.3	26.	0.4	18.0	10.
3	596.5	2.1	0.4	1.0	0.8	38	618.0	19.	1.0	19.0	19.
4	597.4	Imp.	0.4*			39	618.4	27.	0.5	19.5	14.
5	598.2	0.4	0.7	1.7	0.3	40	618.9	24.	0.5	20.0	12.
6	598.9	3.8	0.6	2.3	2.3	41	619.3	22.	0.4	20.4	8.8
7	599.5	2.7	0.7	3.0	1.9	42	619.8	33.	0.6	21.0	20.
8	600.4	2.4	0.6	3.6	1.4	43	620.4	20.	0.4	21.4	8.0
9	601.1	1.4	0.6	4.2	0.6	44	620.9	31.	0.3	21.7	9.3
10	601.5	4.6	0.6	4.8	2.8	45	621.4	29.	0.5	22.2	15.
11	601.9	32.	0.2	5.0	6.4	46	621.8	29.	0.5	22.7	15.
12	602.2	1.2	0.2	5.2	0.2	47	622.3	24.	0.6	23.3	14.
13	602.7	2.4	0.3	5.5	0.7	48	623.1	17.	0.5	23.8	8.5
14	603.1	12.	0.4	5.9	4.8	49	623.9	21.	0.6	24.4	13.
15	603.6	0.5	1.0	6.9	0.5	50	624.4	20.	0.7	25.1	14.
16	604.7	24.	0.7	7.6	17.	51	625.0	Imp.	0.6*		
17	605.1	3.0	0.6	8.2	1.8	52	625.7	1.4	0.2*		
18	605.7	1.0	0.7	8.9	0.7	53	625.9	1.0	0.3*		
19	606.3	7.3	0.4	9.3	2.9	54	626.6	0.7	0.6	25.7	0.4
20	606.8	8.8	0.4	9.7	3.5	55	627.8	15.	1.0	26.7	15.
21	607.1	4.4	0.4	10.1	1.8	56	629.3	24.	1.1	27.8	26.
22	607.6	2.0	0.4	10.5	3.6	57	630.1	27.	0.8	28.6	22.
23	608.1	Imp.	0.8*			58	630.6	48.	0.4	29.0	19.
24	608.7	-0-	0.9*			59	630.9	36.	0.4	29.4	14.
25	609.8	22.	0.8	11.3	18.	60	631.4	47.	0.5	29.9	24.
26	610.4	21.	0.6	11.9	13.	61	632.0	32.	0.5	30.4	16.
27	610.9	49.	0.4	12.3	20.	62	632.6	16.	0.5	30.9	8.0
28	611.4	8.4	0.5	12.8	4.2	63	633.0	37.	0.4	31.3	15.
29	612.0	1.0	0.2	13.0	0.2	64	633.4	26.	0.4	31.7	10.
30	612.4	30.	0.5	13.5	15.	65	633.9	31.	0.4	32.1	12.
31	613.0	4.2	0.4	13.9	1.7						
32	613.4	58.	0.3	14.2	17.						
33	613.9	38.	0.5	14.7	19.						
34	614.3	13.	0.5	15.2	6.5						
35	615.1	3.4	1.8	17.0	6.1						

* Not included in cumulative feet of sand.

SUMMARY

DEPTH FEET		FEET OF SAND	AVERAGE PERMEABILITY	CAPACITY FT. X MD.
FROM	TO			
595.5	613.1	13.9	9.2	128.
613.1	618.3	5.1	18.	93.
618.3	634.0	13.1	25.	333.
595.5	634.0	32.1	17.	554.

4-21-21E

EARLOUGHER ENGINEERING
RESULTS OF LABORATORY FLOODING TESTS

COMPANY Keweenaw Oil Company LEASE Daniels WELL NO. 110

Sample No.	Depth	Porosity	Perm. Approx.	BEFORE FLOODING ^{1/}			Max. Press. Psi.	Water Thru c.c.	Time Min.	FLOOD POT RESIDUALS			OIL RECOVERY B./A. Ft.	
				Oil Sat.	Water Sat.	Oil Content B./A. Ft.				Oil Sat.	Water Sat.	Oil Content B./A. Ft.	Diff. ^{2/}	Flood Pot
F- 1	599.7	21.4	2.0	34.	--	560.	40.	29.	780.	19.	62.	310.		255.
F- 2	602.1	14.7	8.0	42.	--	480.	40.	3820.	780.	29.	71.	330.		150.
F- 4	611.1	22.7	30.	41.	--	730.	40.	1300.	555.	21.	76.	370.		357.
F- 6	621.1	22.4	31.	44.	--	770.	40.	3865.	780.	19.	76.	330.		444.
F- 7	629.9	22.5	13.	37.	--	640.	40.	4585.	780.	20.	75.	360.		278.

SUMMARY

Sec.	DEPTH, FEET		Net Ft. of Sand	Avg. Por.	Average Core Sat.		CORE OIL CONTENT		PERMEABILITY		FLOOD POT RESIDUALS				OIL RECOVERY Bbl./Ac.	
	From	To			Oil	Water	Avg. B./A. Ft.	Total Bbl./Ac.	Avg. Mds.	Capacity Ft. x Md.	Saturation		Oil Content		Diff.	Flood Pot
1	595.5	613.1	13.9	19.6	39.	48.	600.	8,340.	9.2	128.	23.	70.	350.	4,860.	3,480.	3,530.
2	613.1	618.3	5.1	19.4	31.	57.	473.	2,410.	18.	93.	20.*	--	301.	1,540.	870.	870.
3	618.3	634.0	13.1	21.7	40.	44.	678.	8,880.	25.	333.	20.	76.	337.	4,410.	4,470.	4,730.
All	595.5	634.0	32.1	20.4	39.	47.	612.	19,630.	17.	554.	21.	72.	337.	10,810.	8,820.	9,130.

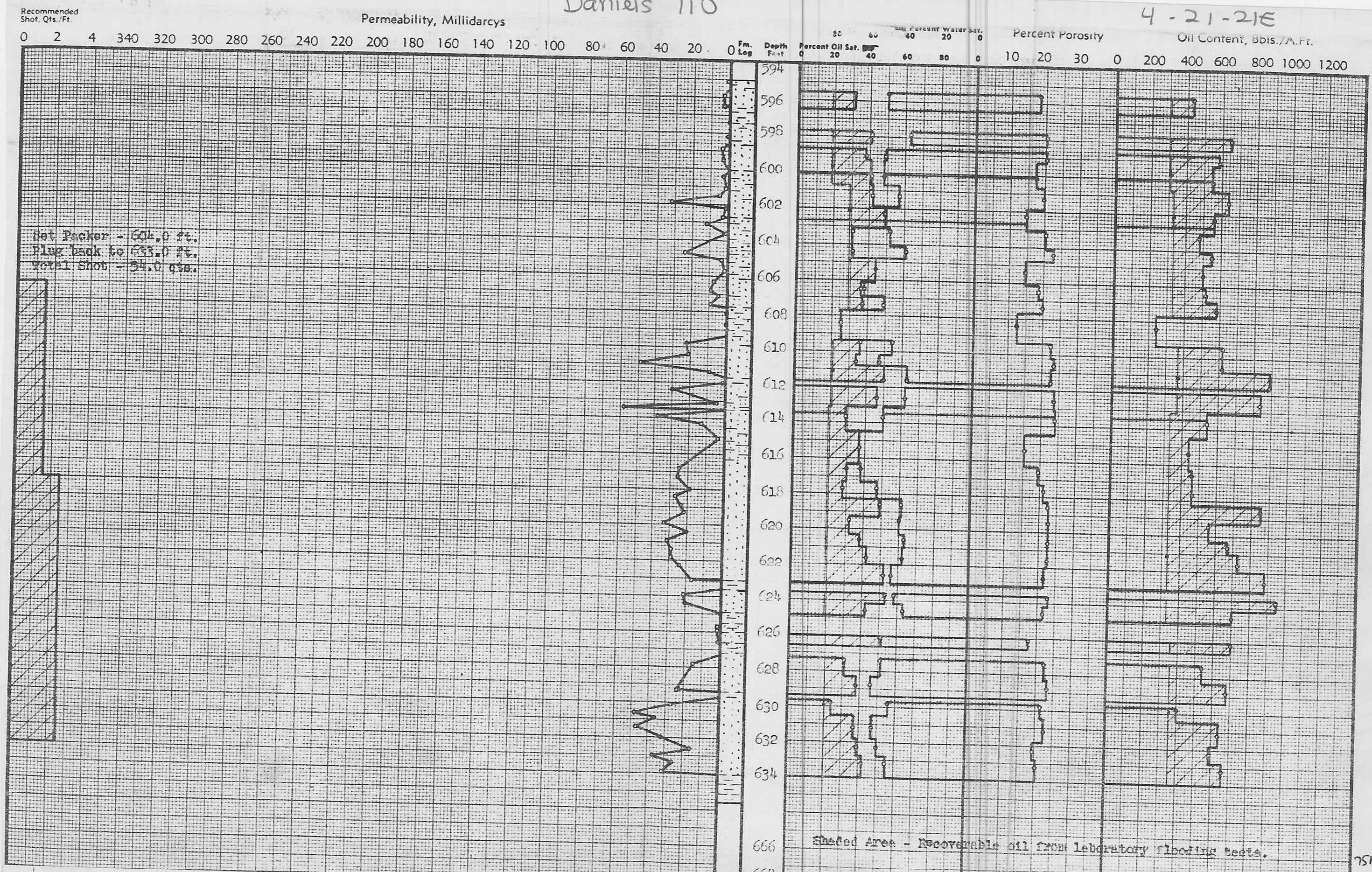
* Residual oil saturation assumed.

REMARKS: ^{1/} Unless otherwise noted, oil content and saturation before flooding equals flood pot oil recovery plus flood pot residual.
^{2/} Oil recovery as B./A. Ft. Diff. equals B./A. Ft. oil content from adjacent saturation sample minus flood pot residual oil content for flood sample.

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Daniels 110

4-21-21E



Sec	Sand	Depth, Feet		Net Ft. of Sand	Avg. Por.	Average Core Sat.		Core Oil Content		Permeability		Flood Pot Residuals			
		From	To			Oil	Water	Avg. B/A Ft.	Total Bbl./Ac.	Avg. Mds.	Capacity Ft. x Md.	Saturation		Oil Content	
												Oil	Water	B/A Ft.	Bbl./Ac.
1	Squirrel Sand	595.5	613.1	13.9	19.6	39.	48.	600.	8,340.	9.2	128.	23.	70.	350.	4,260.
2	Squirrel Sand	613.1	618.3	5.1	19.4	31.	57.	473.	2,410.	18.	93.	20.*	70.	301.	1,240.
3	Squirrel Sand	618.3	634.0	12.1	21.7	40.	44.	678.	8,870.	25.	333.	20.	70.	327.	4,410.
All	Squirrel Sand	595.5	634.0	32.1	20.4	39.	47.	612.	19,630.	17.	554.	21.	72.	337.	10,710.

* Residual oil saturation assumed.

COMPANY KWANA OIL COMPANY
 LEASE DANIELS WELL NO. 110
 LOCATION 630' S, 1065' W, NE Corner
 SEC 4 T 21 S R 21 E COUNTY Anderson
 STATE Kansas DATE 10-13-17
 EARLOUGHER ENGINEERING TULSA, OKLAHOMA