

EARLOUGH ENGINEERING  
CORE SUMMARY

Company Kewanee Oil Company Lease Daniels Well No. 109  
 Location 620 feet south, 1430 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 11-21-47 Date Shot \_\_\_\_\_ Date Completed \_\_\_\_\_

Depths:

Started coring, sandy shale	600.0 ft.
Top of oil sand	600.5 "
Bottom of oil sand	634.2 "
Net feet of oil sand	23.0 "
Bottom of sand section	640.0 "
Bottom of core	641.0 "
Total cored	41.0 "
Feet analyzed	28.8 "

Shot Record:

Set Packer 606.0 Feet  
 Plug back to 634.0 ft.

Depth, Feet		Feet	Shell Diameter	Quarts Per Foot	Quarts Total
From	To				
609.	612.	3.	3-1/2"	2.0	6.0
612.	623.	11.	4-1/2"	3.2	35.2
623.	634.	11.	3-1/2"	2.0	22.0
					63.2

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 23.0 net feet of oil pay with good oil saturation located between depths 600.5 and 634.2 feet. Results of analysis are summarized in two sections on the basis of oil saturation with the upper 8.7 net feet showing a somewhat lower oil saturation which is characteristic of other cores from this lease.

(Continued following page)

PERMEABILITY Average permeability is 13 millidarcys and values range from 0.5 to 57 millidarcys. Permeability capacity is 298 foot millidarcys.

POROSITY Average porosity is 20.0 percent and values range from 15.0 to 24.8 percent.

PERCENT SATURATION Average oil saturation of the top 8.7 net feet of sand is 39 percent and of the bottom 14.3 net feet 48 percent.

Over-all average oil saturation is 45 percent and average core water saturation 46 percent.

OIL CONTENT Average oil content is 691 barrels per acre foot and values range from 450 to 1010 barrels per acre foot.

LABORATORY FLOODING TESTS Four core samples were flooded with tap water in the laboratory. Average oil recovery was 424 barrels per acre foot which is above the average that should be expected from the full sand section because of poor representation. Average residual oil saturation after laboratory flooding tests was 24 percent.

#### CONCLUSIONS

1. Net feet of oil pay is 23.0 feet, located between depths 600.5 and 634.2 feet.
2. Oil saturation is good throughout the core and is somewhat higher than shown by cores from the Bandy lease to the north.
3. Estimated oil recovery by water flooding is 294 barrels per acre foot, or 6,800 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 No. 109

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.	
F- 1	601.1	20.4	43.	--	--	680.	0.7	0.7	480.
1	602.1	15.0	39.	56.	95.	450.	1.0	1.7	450.
2	603.8	24.0	31.	47.	78.	590.	1.0	2.7	590.
3	605.5	18.6	44.	56.	100.	640.	1.4	4.1	900.
4	606.4	22.6	41.	49.	90.	720.	0.4	4.5	290.
5	608.0	21.8	50.	49.	99.	850.	1.0	5.5	850.
F- 2	608.9	24.1	44.	--	--	820.	0.6	6.1	490.
6	609.3	24.1	33.	38.	71.	610.	0.9	7.0	550.
7	611.6	24.8	40.	38.	78.	770.	0.7	7.7	540.
8	613.0	18.7	30.	50.	80.	440.	1.0	8.7	440.
F- 3	614.6	18.0	51.	--	--	720.	0.5	9.2	360.
10	616.2	17.9	57.	43.	100.	790.	1.0	10.2	790.
11	618.4	18.4	34.	48.	82.	490.	1.1	11.3	540.
12	619.5	17.6	20.	63.	83.	270.	1.0*		
13	620.4	18.4	45.	43.	88.	650.	0.6	11.9	390.
14	620.8	17.3	51.	49.	100.	690.	0.9	12.8	620.
15	622.0	21.5	32.	41.	73.	530.	1.4	14.2	740.
16	623.3	19.8	48.	52.	100.	730.	1.5	15.7	1,100.
17	625.6	19.5	47.	44.	91.	710.	0.9	16.6	640.
18	626.5	18.0	52.	48.	100.	730.	1.1	17.7	800.
19	627.9	16.9	50.	50.	100.	660.	0.8	18.5	530.
20	628.9	19.5	67.	33.	100.	1,010.	0.6	19.1	610.
21	630.5	22.6	49.	33.	82.	860.	1.4	20.5	1,200.
22	632.3	18.5	42.	58.	100.	600.	1.0	21.5	600.
23	633.5	21.6	57.	39.	96.	930.	1.5	23.0	1,400.
24	635.2	13.3	27.	73.	100.	280.	1.8*		
25	636.5	13.3	37.	63.	100.	380.	1.1*		
26	637.7	14.2	44.	56.	100.	480.	1.1*		530.
27	639.5	15.9	42.	58.	100.	520.	0.8*		420.

\* Not included in cumulative feet of sand.

**SUMMARY**

DEPTH FEET		FEET OF SAND	AVG. POROSITY	AVG. OIL SAT.	AVG. WATER SAT.	AVG. OIL CONTENT BBLs./A. FT.	TOTAL OIL CONTENT BBLs./ACRE
FROM	TO						
600.5	613.3	8.7	21.0	39.	48.	641.	5,580.
614.5	634.2	14.3	19.4	48.	45.	722.	10,320.
600.5	634.2	23.0	20.0	45.	46.	691.	15,900.

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EARLOUGHER ENGINEERING  
RESULTS OF PERMEABILITY TESTS  
EARLOUGHER ENGINEERING  
RESULTS OF LABORATORY FLOODING TESTS

COMPANY Kewanee Oil Company LEASE Daniels WELL NO. 109

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	601.1	20.4	0.5	43.		680.	40.	1781.	795.	24.	76.	380.		302.
F 2	608.9	24.1	20.	44.		820.	40.	1752.	795.	24.	74.	440.		377.
F 3	614.6	18.0	4.0	51.		720.	40.	1939.	795.	26.	74.	370.		345.
F 7	630.8	22.5	36.	56.		980.	40.	3510.	675.	22.	71.	380.		604.

SUMMARY

Sec.	DEPTH, FEET		Net Ft. of Sand	Avg. Por.	Average Core Sat.		CORE OIL CONTENT		PERMEABILITY		FLOOD POT RESIDUALS				OIL RECOVERY 3bl./Ac.	
	From	To			Oil	Water	Avg. B./A. Ft.	Total Bbl./Ac.	Avg. Mds.	Capacity Ft. x Md.	Saturation		Oil Content		Diff.	Flood Pot
											Oil	Water	B./A. Ft.	Bbl./Ac.		
1	600.5	613.3	8.7	21.0	39.	48.	641.	5,580.	16.	136.	24.	75.	391.	3,400.	2,18.	2,960.
2	614.5	634.2	14.3	19.4	48.	45.	722.	10,320.	11.	162.	24.	73.	361.	5,160.	5,16.	6,790.
1&2	600.5	634.2	23.0	20.0	45.	46.	691.	15,900.	13.	298.	24.	74.	372.	8,560.	7,34.	9,750.
SUMMARY																

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.

8.7 16. 136.  
14.3 11. 162.  
23.0 13. 298.

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**EARLOUGHER ENGINEERING**

**RESULTS OF PERMEABILITY TESTS**

COMPANY **Kewanee Oil Company**

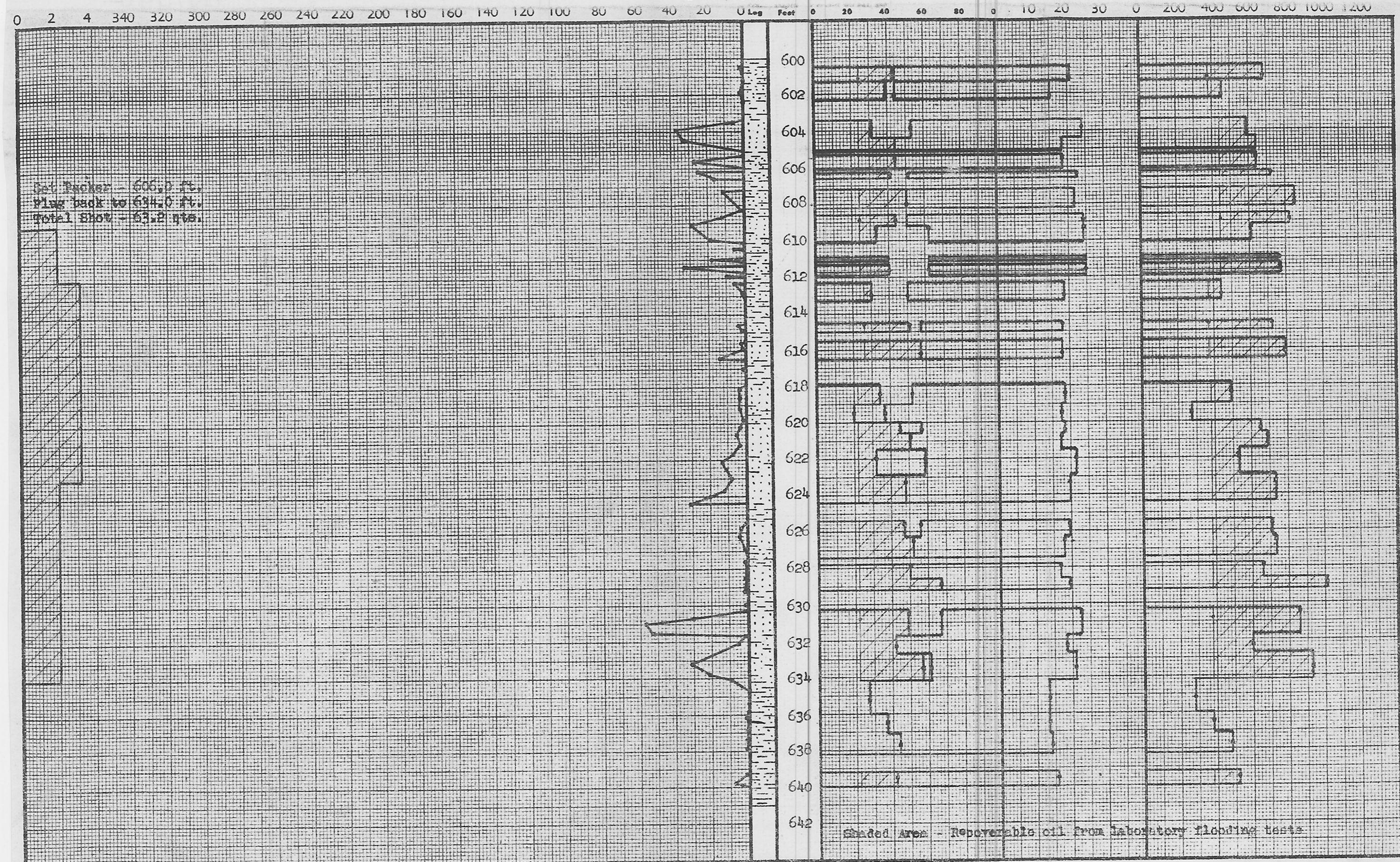
WELL **Daniels No. 109**

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	600.5	0.7 ✓	0.7	0.7	0.5	34	620.6	4.9 ✓	0.4	12.3	2.0
2	601.2	Imp.	0.1*			35	621.2	2.8 ✓	0.5	12.8	1.4
3	601.9	1.2 ✓	1.0	1.7	1.2	36	621.7	7.1 ✓	0.6	13.4	4.3
4	602.4	Imp.	1.1*			37	622.1	13. ✓	0.8	14.2	10.
5	603.5	5.2 ✓	0.4	2.1	2.1	38	623.0	7.9 ✓	0.7	14.9	5.3
6	603.9	37. ✓	0.6	2.7	22.	39	623.7	12. ✓	0.3	15.2	3.6
7	604.5	33. ✓	0.7	3.4	23.	40	624.0	20. ✓	0.3	15.5	6.0
8	605.2	Cracked				41	624.4	31. ✓	0.2	15.7	6.2
9	605.6	27. ✓	0.7	4.1	19.	42	625.8	3.2 ✓	0.5	16.2	1.6
10	606.2	25. ✓	0.2	4.3	5.0	43	626.2	4.2 ✓	0.4	16.6	1.7
11	606.6	16. ✓	0.2	4.5	3.2	44	626.9	1.2 ✓	1.1	17.7	1.3
12	607.3	11. ✓	1.0	5.5	11.	45	627.6	0.4 ✓	0.4*		
13	608.3	1.7 ✓	0.4*			46	628.5	0.5 ✓	0.8	18.5	0.4
14	608.7	12. ✓	0.3	5.8	3.6	47	629.2	1.4 ✓	0.6	19.1	0.8
15	609.1	29. ✓	0.3	6.1	8.7	48	630.0	0.6 ✓	1.1*		
16	609.9	19. ✓	0.9	7.0	17.	49	630.7	30. ✓	0.4	19.5	12.
17	610.4	5.2 ✓	0.2*			50	631.0	57. ✓	0.6	20.1	34.
18	611.0	18. ✓	0.2	7.2	3.6	50A	631.5	53. ✓	0.4	20.5	21.
19	611.4	33. ✓	0.4	7.6	13.	51	631.7	1.1 ✓	0.3	20.8	0.3
20	611.9	9.8 ✓	0.1	7.7	1.0	52	632.1	5.3 ✓	0.7	21.5	3.7
21	612.3	5.6 ✓	0.3	8.0	1.7	53	633.2	31. ✓	0.7	22.2	22.
22	612.8	0.6 ✓	0.7	8.7	0.4	54	633.8	21. ✓	0.4	22.6	2.4
23	614.6	3.7 ✓	0.2	8.9	0.7	55	634.1	9.0 ✓	0.4	23.0	3.6
24	614.9	1.4 ✓	0.3	9.2	0.4	56	634.7	-0-	1.0*		
25	615.6	1.9 ✓	0.3	9.5	0.6	57	635.4	-0-	0.8*		
26	615.9	0.7 ✓	0.3	9.8	0.2	58	636.2	0.5	0.5*		
27	616.4	14. ✓	0.4	10.2	5.6	59	636.9	0.1	0.6*		
28	617.0	0.7 ✓	0.5*			60	637.4	0.6	0.5*		0.1
29	618.1	2.9 ✓	0.6	10.8	1.7	61	637.9	0.5	0.6*		0.3
30	618.6	2.7 ✓	0.5	11.3	1.4	62	639.3	0.4	0.4*		0.2
31	619.2	2.9 ✓	0.5*			63	639.8	7.2 ✓	0.4*		2.9
32	619.8	1.1 ✓	0.5*								
33	620.2	2.7 ✓	0.6	11.9	1.6						

\* Not included in cumulative feet of sand.

**SUMMARY**

DEPTH FEET		FEET OF SAND	AVERAGE PERMEABILITY	CAPACITY FT. X MD.
FROM	TO			
600.5	613.3	8.7	16.	136.
<u>614.5</u>	<u>634.2</u>	<u>14.3</u>	<u>11.</u>	<u>162.</u>
600.5	634.2	23.0	13.	298.



Set Packer - 606.0 ft.  
 Plug back to 634.0 ft.  
 Total Shot - 63.2 pts.

Shaded Area - Recoverable oil from laboratory flooding tests

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	
1	Squirrel Sand	600.5	613.3	8.7	21.0	39.	48.	641.	5,580.	16.	136.	24.	75.	391.	3,400.
2	Squirrel Sand	614.5	634.2	14.3	19.4	48.	45.	722.	10,320.	11.	162.	24.	73.	361.	5,160.
1&2	Squirrel Sand	600.5	634.2	23.0	20.0	45.	46.	691.	15,900.	13.	298.	24.	74.	372.	8,560.

COMPANY KEWANEE OIL COMPANY  
 LEASE DANIELS WELL NO. 109  
 LOCATION 620' S. 1430' W, NE Corner  
 SEC. 4 T. 21S R. 21E COUNTY Anderson  
 STATE Kansas DATE 12-12-47 1071  
 EARLOUGHER ENGINEERING TULSA, OKLAHOMA