

EARLOUGHER ENGINEERING

PETROLEUM CONSULTANTS - CORE ANALYSES

319 EAST FOURTH STREET

TULSA 3, OKLAHOMA

February 25, 1952

Belleair Oil Corporation
281 Greenwich Avenue
Greenwich, Connecticut

Attention - Mr. George W. Cain

Re - Core Analysis
Barker Well No. 0-21
Sec. 4, T. 27-S., R. 18-E.
Neosho County, Kansas

Gentlemen:

Attached are results of analysis, together with profile and summary,
covering core received from your above well.

Yours very truly

EARLOUGHER ENGINEERING

R. C. Earlougher
JMR

R. C. Earlougher, Engineer

JMR w
Encl - 1
cc - Lloyd Burton (2)

921
763
+156

EARLOUGHER ENGINEERING
CORE SUMMARY

Company Belleair Oil Corporation Lease Barker Well No. 0-21
Location 1,095 feet West, 590 feet South of Center of Section
Section 4 Twp. 27-S Rge. 18-E County Neosho State Kansas
Formation Cored Bartlesville Sand Type Core Rotary, 3-inch
Date Cored 2-11-52 Date Shot 2-12-52 Coring Fluid Water

Depths:	Ground Elevation	921.0 Feet
	Started coring, shale	720.0 "
	Top of oil pay sand	727.5 "
	Bottom of oil pay sand	745.5 "
	Net feet of oil pay	16.7 "
	Top of watered-out oil sand	745.5 "
	Bottom of watered-out oil sand	759.1 "
	Net feet of water-out oil sand	13.6 "
	Black sand	759.1 - 763.7 "
	Bottom of core, shale	765.2 "
	Total cored	45.2 "
	Feet analyzed	36.7 "

Shot Record: Set Packer _____ Feet

Depth, Feet		Feet	Shell Diameter	Quarts Per Foot	Quarts Total
From	To				
735	741	6	4-1/2"	3.2	19.2

Set packer with bottom of cement at 731.0 feet
Plug back with cement to 745.0 feet.

* Set 8 hours after reaming made 13 barrels of water. Set 2 hours 5 barrels of water.
Set 1 hour made 2 barrels of water. ** Bailed after shot made 12 bailers of water and
Completion Data: light show of oil. Made 12 bailers of water per hour. Set 8 hours
made 21 bailers of water.
Hrs. well stood after coring _____; Feet Fluid in Hole _____ * (Oil _____ Water _____)
Clean-out time, hrs. _____; Initial production, bbls. day _____ ** (Oil _____ Water _____)

Remarks: The Bartlesville section was rotary cored from 720.0 to 765.2 feet and core sampled by Earllougher Engineering. Coring was commenced and completed in shale.

The core indicates a relatively clean continuous oil sand section from 727.5 to 763.7 feet for which results of analysis are summarized in 8 sections based on variance in oil saturation and permeability. The top 16.7 net feet in Sections 2, 3, 4 and 5 probably represents the oil pay sand insofar as water flooding is concerned. The 13.6 net feet of sand in Sections 6 and 7 has very high permeability and already been

watered-out to a very great extent. The bottom 4.6 net feet of sand in Section 8 is black non-floodable sand.

PERMEABILITY Weighted average permeability of the oil pay sand is 114 millidarcys while that of the watered-out oil sand is 1,341 millidarcys. The respective Sections 2, 3, 4, 5, 6 and 7 have an average permeability of 21, 49, 96, 369, 1,722 and 684 millidarcys.

POROSITY Weighted average porosity of the oil pay section is 21.5 per cent compared with the high average of 28.4 per cent for the watered-out sand.

PER CENT SATURATION The oil saturation varies over a wide range throughout the oil sand but generally is highest in the sand of low permeability. The over-all sand section probably has been effected by an accidental flood with the upper part being enriched and the bottom watered-out.

Average oil saturation of the 16.7 net feet of oil pay is 40 per cent and average core water saturation 38 per cent. The 13.6 net feet of probable watered-out oil sand has an average oil saturation of 23 per cent and average core water saturation of 58 per cent.

OIL CONTENT Average oil content of the oil pay sand is 668 barrels per acre-foot while that of the watered-out sand is 515 barrels per acre-foot. The high oil content in the watered-out sand reflects the very high porosity of that section.

LABORATORY FLOODING TESTS Laboratory water flooding tests indicated an average residual oil saturation of 15 per cent in the oil pay section and an average of 14 per cent in the watered-out section. Total indicated flood net oil recovery from the 16.7 net feet of oil pay was 6 950 barrels per acre

compared with 2,710 barrels per acre from the 13.6 net feet of watered-out sand. The relatively high oil recovery from the watered-out oil sand is due to the high porosity. However, because of the low oil saturation flooding efficiency is low and appreciable oil recovery should not be expected by water flooding in the field from this watered-out section.

CONCLUSIONS

1. This core shows 30.3 net feet of oil sand; however, only the top 16.7 net feet is believed to represent the oil pay section insofar as water flooding is concerned. The bottom 13.6 net feet has already been watered-out to a marked degree probably by an accidental flood.
2. Average oil saturation of the oil pay section is 40 per cent compared with the average of 23 per cent for the probable watered-out oil sand.
3. Permeability is very high in the watered-out section averaging 1,341 millidarcys compared with the average of 114 millidarcys for the oil pay section.
4. After coring and before shot the hole filled up with 100 feet of water and only a trace of oil.
5. In view of the good oil recovery indicated from the top part of the sand, it was recommended the hole be plugged back with cement to 745 feet. This should reduce water production and probably result in a more efficient drive on the richer sand in the top of the section. Also, it was recommended that packer be set and cemented at 731 feet because of the vertical fracture in the top of the oil sand.

6. Estimated oil recovery by water flooding is 5,900 barrels per acre from the area of which this core is representative.

Respectfully submitted

EARLOUGHER ENGINEERING



J. M. Robinson, Engineer

JMR w

EARLOUGH ENGINEERING

SUMMARY OF CORE ANALYSES DATA

WELL NO. 0-21

Belleair Oil Corporation

LEASE Barker

Formation	Depth, Ft.		Net Ft. of Sand	Avg. Por.	Avg. Core Saturation		Core Oil Content		Permeability		Flood Pot Residuals				Oil Recovery Bbl./Acre	
											Saturation		Oil Content			
	From	To			Oil	Water	Avg. B/A, Ft.	Total B/Ac.	Avg. Md.	Capacity Ft. x Md.	Oil	Water	B/A, Ft.	B/Ac.	Diff.	Flood Pot
<u>ARTLESVILLE</u>																
Oil Pay	726.1	727.5	1.1	20.3	22.	49.	350.	390.	7.5	8.2	--	--	--	--	--	--
Oil Pay	727.5	729.9	2.4	17.4	40.	42.	537.	1,290.	21.	51.	20.	80.	270.	650.	640.	630.
Oil Pay	729.9	737.3	7.4	20.6	49.	36.	788.	5,830.	49.	366.	16.	80.	256.	1,890.	3,940.	3,930.
Oil Pay	737.6	742.4	3.9	21.0	37.	36.	600.	2,340.	98.	384.	16.	77.	261.	1,020.	1,320.	1,070.
Oil Pay	742.4	745.5	3.0	27.7	26.	45.	566.	1,700.	369.	1,107.	10.	88.	215.	650.	1,050.	1,070.
Oil Sand	745.5	754.1	8.6	30.2	20.	59.	473.	4,070.	1,722.	14,815.	13.	79.	305.	2,620.	1,450.	1,440.
Oil Sand	754.1	759.1	5.0	25.3	30.	56.	586.	2,930.	684.	3,420.	17.	85.	334.	1,670.	1,260.	1,360.
Black Sand	759.1	763.7	4.6	20.5	33.	62.	528.	2,430.	99.	456.	39.	61.	620.	2,850.	-0-	16.
Oil Sand	745.5	759.1	13.6	28.4	23.	58.	515.	7,000.	1341.	18,235.	14.	81.	315.	4,290.	2,710.	2,800.
Oil Pay	727.5	745.5	16.7	21.5	40.	38.	668.	11,160.	114.	1,908.	15.	81.	252.	4,210.	6,950.	6,700.
Oil Sand	727.5	759.1	30.3	24.6	31.	47.	599.	18,160.	664.	20,143.	15.	81.	280.	8,500.	9,660.	9,500.

EARLOUGHER ENGINEERING
RESULTS OF SATURATION TESTS

COMPANY Belleair Oil Corporation

WELL Barker No. 0-21

Sat. No.	Depth Feet	Porosity Per Cent	Per Cent Saturation			Avg. Oil Content Bbl./A. Ft.	Feet of Sand		Total Oil Content Bbl./Acre
			Oil	Water	Total		Ft.	Cum.	
1	727.4	20.3	22.	49.	71.	350.	1.1	1.1	390.
F-2	728.6	16.2	41.	--	--	520.	1.3	2.4	680.
3	729.7	18.8	38.	42.	80.	550.	1.1	3.5	610.
F-4	730.7	20.2	45.	--	--	700.	1.3	4.8	910.
5	731.8	20.4	50.	33.	83.	800.	1.3	6.1	1,040.
F-6	732.9	20.1	58.	--	--	900.	0.8	6.9	720.
7	733.7	21.3	52.	32.	84.	870.	1.0	7.9	870.
F-8	734.6	21.3	48.	--	--	790.	0.9	8.8	710.
9	735.8	20.3	47.	42.	89.	740.	1.2	10.0	890.
F-10	736.8	20.8	48.	--	--	770.	0.9	10.9	690.
11	737.8	22.3	34.	41.	75.	580.	0.8	11.7	460.
F-12	738.7	18.5	38.	--	--	550.	1.0	12.7	550.
13	739.6	21.6	46.	31.	77.	770.	0.7	13.4	540.
F-14	740.3	11.3	26.	--	--	230.	0.7*		
15	741.2	22.9	40.	36.	76.	710.	0.5	13.9	360.
F-16	742.0	20.9	30.	--	--	480.	0.9	14.8	430.
17	743.7	27.2	26.	45.	71.	550.	1.8	16.6	990.
F-18	744.8	28.5	27.	--	--	590.	1.2	17.8	710.
19	745.7	30.9	19.	58.	77.	460.	0.9	18.7	410.
F-20	746.7	30.2	22.	--	--	520.	1.3	20.0	680.
21	747.9	31.7	21.	53.	74.	520.	0.8	20.8	420.
F-22	748.8	30.3	18.	--	--	430.	0.8	21.6	340.
23	749.8	30.4	19.	66.	85.	460.	0.7	22.3	320.
F-24	750.7	30.4	20.	--	--	480.	1.5	23.8	720.
F-26	752.6	25.8	22.	--	--	440.	1.4	25.2	620.
27	753.7	33.2	18.	58.	76.	470.	1.2	26.4	560.
F-28	754.9	24.6	28.	--	--	530.	1.1	27.5	580.
29	755.9	29.0	27.	46.	73.	600.	0.8	28.3	480.
F-30	756.8	23.1	35.	--	--	620.	1.3	29.6	810.
31	757.9	26.9	28.	65.	93.	580.	0.9	30.5	520.
F-32	758.8	24.3	32.	--	--	600.	0.9	31.4	540.
33	759.9	25.5	26.	61.	87.	520.	1.6	33.0	830.
F-34	761.0	22.7	35.	--	--	620.	0.7	33.7	430.
35	761.9	16.7	36.	64.	100.	460.	0.8	34.5	370.
F-36	762.9	15.9	44.	--	--	540.	0.9	35.4	490.
37	763.5	16.2	40.	60.	100.	510.	0.6	36.0	310.

* Not included in cumulative feet of sand.

EARLOUGHER ENGINEERING

RESULTS OF LABORATORY FLOODING TESTS

Belleair Oil Corporation

LEASE

Barker

WELL NO. 0-21

	Depth	Porosity	Perm. Approx.	Before Flooding 1/			Max. Press. Psi.	Water Through C.C.	Time Min.	Flood Pot Residual			Flood Pot Oil Recovery Bbl./A. Ft.
				Oil Sat.	Water Sat.	Oil Content Bbl./A. Ft.				Oil Sat.	Water Sat.	Oil Content Bbl./A. Ft.	
0	728.6	16.2	18.	41.	--	520.	70.	4,705.	855.	20.	87.	260.	264.
0	730.7	20.2	54.	45.	--	700.	70.	13,174.	855.	16.	77.	250.	451.
0	732.9	20.1	38.	58.	--	900.	40-70.	14,057.	795.	18.	82.	280.	617.
0	734.6	21.3	62.	48.	--	790.	70.	14,915.	855.	14.	81.	240.	549.
0	736.8	20.8	54.	48.	--	770.	40-70.	8,288.	675.	16.	81.	260.	508.
2	738.7	18.5	29.	38.	--	550.	70.	4,699.	795.	13.	75.	190.	362.
4	740.3	11.3	28.	26.	--	230.	70.	44.	615.	21.	79.	180.	52.
5	742.0	20.9	67.	30.	--	480.	30-70.	15,266.	675.	18.	78.	290.	187.
8	744.8	28.5	340.	27.	--	590.	20-40.	12,530.	675.	10.	88.	230.	355.
0	746.7	30.2	1,098.	22.	--	520.	20-40.	16,389.	675.	13.	71.	310.	212.
0	748.8	30.3	1,490.	18.	--	430.	20-40.	21,498.	675.	13.	79.	290.	142.
2	750.7	30.4	2,157.	20.	--	480.	20-40.	22,210.	675.	13.	83.	320.	164.
4	752.6	25.8	310.	22.	--	440.	20-40.	22,894.	675.	14.	84.	290.	154.
5	754.9	24.6	896.	28.	--	530.	20-40.	19,167.	675.	14.	86.	260.	267.
8	756.8	23.1	208.	35.	--	620.	20-40.	19,752.	675.	18.	78.	330.	290.
0	758.8	24.3	423.	32.	--	600.	20-40.	15,624.	615.	18.	90.	340.	258.
2	761.0	22.7	160.	35.	--	620.	40.	7,734.	555.	35.	73.	610.	7.
4	762.9	15.9	2.0	44.	--	540.	40.	10.	555.	43.	57.	540.	+

Unless otherwise noted, oil content and saturation before flooding equals flood pot oil recovery plus flood pot residual.

EARLOUGHER ENGINEERING
RESULTS OF PERMEABILITY TESTS

COMPANY Belleair Oil Corporation

WELL Barker No. 0-21

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	726.1	9.3	0.6	0.6	5.6	40	746.1	2,012.	0.5	18.7	1,006.
2	726.9	5.2	0.5	1.1	2.6	41	746.5	835.	0.3	19.0	251.
3	727.6	35.	0.4	1.5	14.	42	747.0	1,360.	0.6	19.6	816.
4	728.3	25.	0.9	2.4	23.	43	747.6	344.	0.4	20.0	138.
5	728.8	13.	0.5	2.9	6.5	44	748.1	1,569.	0.5	20.5	785.
6	729.4	12.	0.6	3.5	7.2	45	748.5	1,463.	0.3	20.8	439.
7	729.9	30.	0.4	3.9	12.	46	749.0	1,518.	0.8	21.6	1,214.
8	730.5	52.	0.4	4.3	21.	47	749.5	1,855.	0.4	22.0	742.
9	731.0	56.	0.5	4.8	28.	48	750.0	1,308.	0.3	22.3	392.
10	731.6	38.	0.7	5.5	27.	49	750.4	2,875.	0.9	23.2	2,588.
11	732.1	47.	0.6	6.1	28.	50	750.9	1,439.	0.4	23.6	576.
12	732.6	60.	0.5	6.6	30.	51	751.4	687.	0.2	23.8	137.
13	733.1	21.	0.3	6.9	6.3	52	751.9	1,516.	0.4	24.2	606.
14	733.5	76.	0.6	7.5	46.	53	752.3	3,069.	0.8	25.0	2,455.
15	734.2	32.	0.4	7.9	13.	54	752.8	44.	0.2	25.2	8.8
16	734.8	77.	0.9	8.8	70.	55	753.4	835.	0.6	25.8	501.
17	735.3	15.	0.3	9.1	4.5	56	753.9	2,640.	0.6	26.4	1,584.
18	736.1	38.	0.9	10.0	31.	57	754.5	1,439.	0.9	27.3	1,295.
19	736.5	55.	0.5	10.5	28.	58	755.1	354.	0.2	27.5	71.
20	737.1	52.	0.4	10.9	21.	59	755.6	1,361.	0.8	28.3	1,089.
21	737.5	8.3	0.1*			60	756.1	31.	0.4	28.7	12.
22	738.0	105.	0.8	11.7	84.	61	756.4	220.	0.2	28.9	44.
23	738.4	24.	0.4	12.1	9.6	62	757.0	217.	0.7	29.6	152.
24	738.9	34.	0.3	12.4	10.	63	757.6	408.	0.9	30.5	367.
25	739.3	49.	0.3	12.7	15.	64	758.1	Cracked			
26	739.8	233.	0.5	13.2	117.	65	758.6	433.	0.9	31.4	390.
27	740.1	54.	0.2	13.4	11.	66	759.1	413.	0.4	31.8	165.
28	740.6	1.2	0.7*			67	759.7	17.	0.3	32.1	5.1
29	741.0	7.7	0.2	13.6	1.5	68	760.2	110.	0.9	33.0	99.
30	741.5	114.	0.3	13.9	34.	69	760.7	236.	0.4	33.4	94.
31	741.8	80.	0.5	14.4	80.	70	761.2	138.	0.3	33.7	41.
32	742.3	54.	0.4	14.8	22.	71	761.6	38.	0.8	34.5	30.
33	742.9	546.	0.6	15.4	328.	72	762.2	4.4	0.2	34.7	0.9
34	743.2	394.	0.3	15.7	118.	73	762.6	1.9	0.5	35.2	1.0
35	743.5	325.	0.6	16.3	195.	74	763.1	0.9	0.2	35.4	0.2
36	744.0	48.	0.3	16.6	14.	75	763.3	34.	0.6	36.0	20.
37	744.6	462.	0.5	17.1	231.						
38	745.1	315.	0.7	17.8	221.						
39	745.5	1,439.	0.4	18.2	576.						

* Not included in cumulative feet of sand.

BARKER 0-21



0 2 4 340 320 300 280 260 240 220 200 180 160 140 120 100 80 60

Set packer with bottom of cement at 731.0 feet.
Plug back with cement to 745.0 feet.
Total Shot - 19.2 Qts

546. ✓
394. ✓

462. ✓

1459. ✓

2012.0

835.0

1360.0

344.0

1569.0

1462.0

1518.0

1855.0

1208.0

2874.0

1412.0

687.0

1516.0

3069.0

835. ✓

2640.0

1439.0

354.0

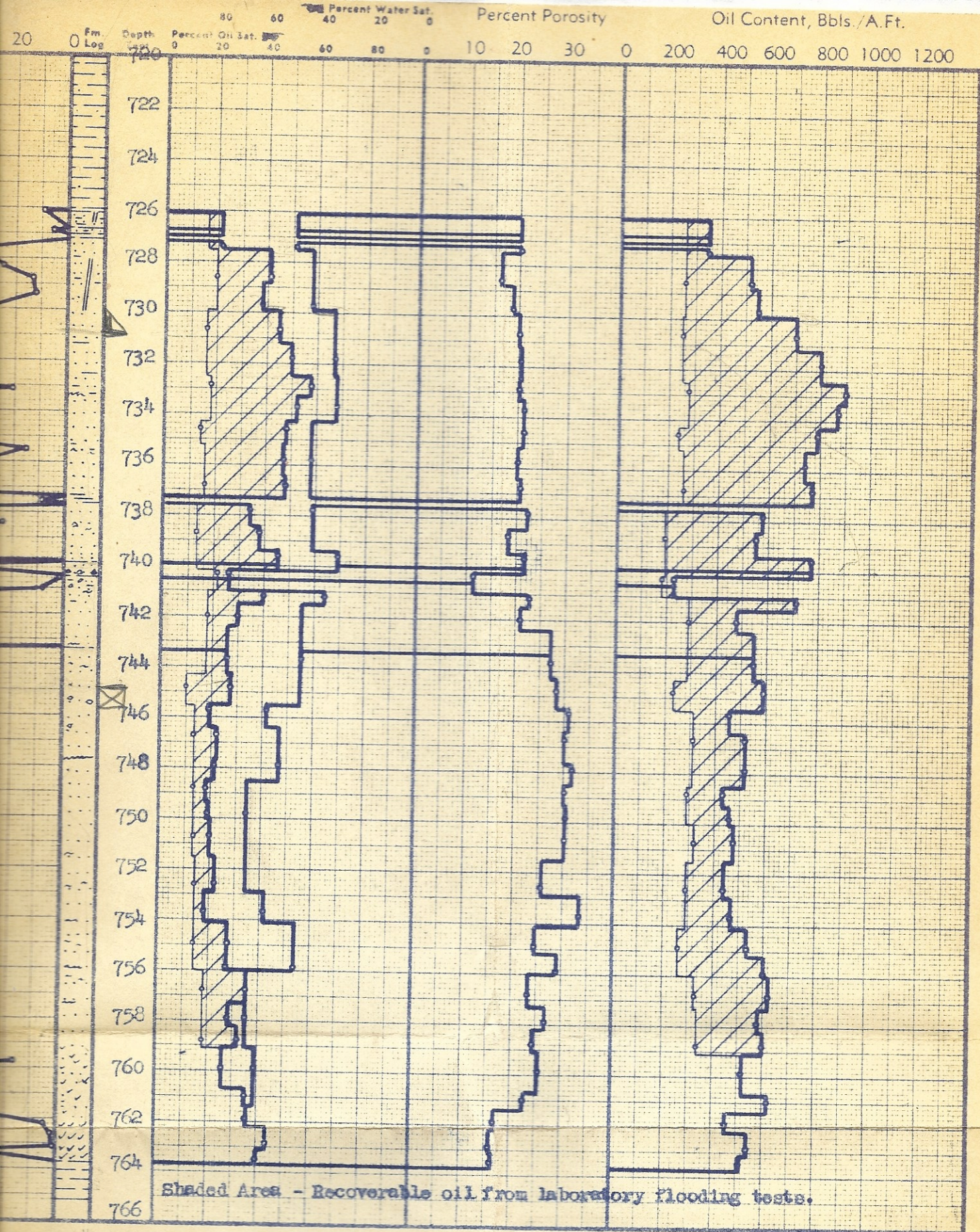
1361.0

408. ✓

433.0

417.0

Sec.	Sand	Depth, Feet		Net Ft. of Sand	Avg. Por.	Average Core Sat.		Core Oil Content		A M
		From	To			Oil	Water	Avg. B / A.Ft.	Total Bbl / Ac.	
1	<u>BARTLESVILLE</u>	726.1	727.5	1.1	20.3	22.	49.	350.	390.	
2	Oil Pay Sand	727.5	729.9	2.4	17.4	40.	42.	537.	1,290.	
3	Oil Pay Sand	729.9	737.3	7.4	20.6	49.	36.	788.	5,830.	
4	Oil Pay Sand	737.6	742.4	3.9	21.0	37.	36.	600.	2,340.	
5	Oil Pay Sand	742.4	745.5	3.0	27.7	26.	45.	566.	1,700.	3
6	Oil Sand	745.5	754.1	8.6	30.2	20.	59.	473.	4,070.	17
7	Oil Sand	754.1	759.1	5.0	25.3	30.	36.	586.	2,930.	6
8	Black Sand	759.1	763.7	4.6	20.5	33.	62.	528.	2,430.	



Capacity Ft. x Md.	Flood Pot. Residuals		Oil Content	
	Saturation Oil	Water	B / A Ft.	Bbl. / Ac.
8.2	--	--	--	--
51.	20.	80.	270.	650.
366.	16.	80.	256.	1,890.
384.	16.	77.	261.	1,020.
1,107.	10.	88.	215.	650.
14,815.	13.	79.	305.	2,620.
3,420.	17.	85.	334.	1,670.
156.	39.	61.	620.	2,850.

COMPANY **HELEFAIR OIL CORPORATION**
 LEASE **BARKER** WELL NO **0-21**
 LOCATION **1095' W., 590' S. of Center of Section**
 SEC **4** T **27-S** R **18-E** COUNTY **Neosho**
 STATE **Kansas** DATE **2-23-52**
 EARLOUGHER ENGINEERING TULSA, OKLAHOMA