

# OILFIELD RESEARCH LABORATORIES

536 NORTH HIGHLAND - CHANUTE, KANSAS 66720 - PHONE (316) 431-2650

July 22, 1982

Humboldt Oil Properties I  
c/o Vic Leis  
RR 2, Box 223  
Yates Center, Kansas 66783

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Leitzbach B Lease, Well No. N-6, located in Allen County, Kansas and submitted to our laboratory on July 19, 1982.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/dlb

5 c to Yates Center, Kansas

**Oilfield Research Laboratories**  
**GENERAL INFORMATION & SUMMARY**

Company Humboldt Oil Properties I Lease Leitzbach B Well No. N-6  
 Location \_\_\_\_\_  
 Section 7 Twp. 26S Rge. 19E County Allen State Kansas

Elevation, Feet .....  
 Name of Sand ..... Bartlesville  
 Top of Core ..... 820.0  
 Bottom of Core ..... 850.0  
 Top of Sand ..... 820.0  
 Bottom of Sand ..... 850.0  
 Total Feet of Permeable Sand ..... 21.3  
 Total Feet of Floodable Sand ..... 5.3

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 10	6.6	6.6
10 - 20	5.0	11.6
20 - 40	6.4	18.0
40 - 61	3.3	21.3

Average Permeability Millidarcys ..... 21.8  
 Average Percent Porosity ..... 18.1  
 Average Percent Oil Saturation ..... 31.2  
 Average Percent Water Saturation ..... 47.2  
 Average Oil Content, Bbls./A. Ft. .... 442.  
 Total Oil Content, Bbls./Acre ..... 11,756.  
 Average Percent Oil Recovery by Laboratory Flooding Tests ..... 5.5  
 Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. .... 90.  
 Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre ..... 477.  
 Total Calculated Oil Recovery, Bbls./Acre .....

See "Calculated Recovery"  
 Section

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-2-

The core was sampled and the samples sealed in plastic bags by a representative of the client. The core was reported to be from a non-virgin area.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
820.0 - 821.3	Brown sandstone.
821.3 - 821.7	Brown slightly calcareous sandstone.
821.7 - 824.7	Gray shale.
824.7 - 829.0	Grayish brown very shaly sandstone.
829.0 - 830.0	Brown very shaly sandstone.
830.0 - 831.0	Brown slightly shaly sandstone.
831.0 - 831.5	Brown shaly sandstone.
831.5 - 831.9	Grayish brown very shaly sandstone.
831.9 - 832.5	Light brown very shaly sandstone.
832.5 - 833.8	Brown very shaly sandstone.
833.8 - 836.0	Brown shaly sandstone.
836.0 - 837.0	Brown slightly shaly sandstone.
837.0 - 850.0	Brown sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 477 barrels of oil per acre was obtained from 5.3 feet of sand. The weighted average percent oil saturation was reduced from 36.1 to 30.6, or represents an average recovery of 5.5 percent. The weighted average effective permeability of the samples is 2.83 millidarcys, while the average initial fluid production pressure is 18.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 27 samples tested, 5 produced water and oil, and 10 produced water only. This indicates that approximately 19 percent of the sand represented by these samples is floodable pay sand.

#### CALCULATED RECOVERY

It would appear from a study of the core data, that efficient primary and waterflood operations in the vicinity of this well should recover approximately 1,560 barrels of oil per acre. This is an average recovery of 294 barrels per acre foot from 5.3 feet of floodable sand analyzed in this core.

These recovery values were calculated using the following data and assumptions:

Original formation volume factor, estimated	1.06
Reservoir water saturation, percent, estimated	30.0
Average porosity, percent	21.4
Oil saturation after flooding, percent	30.6
Performance factor, percent, estimated	50.0
Net floodable sand, feet	5.3

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**RESULTS OF SATURATION & PERMEABILITY TESTS**

**TABLE 1-B**

Company Humboldt Oil Properties I Lease Leitzbach B Well No. N-6

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	820.3	20.7	38	31	69	610	60.	1.3	1.3	793	78.00
2	821.5	15.7	30	53	83	365	27.	0.4	1.7	146	10.80
3	825.8	11.3	20	55	77	175	Imp.	1.3	3.0	228	0.00
4	826.5	13.8	14	71	85	150	Imp.	1.0	4.0	150	0.00
5	827.7	15.3	33	64	97	392	Imp.	1.0	5.0	392	0.00
6	828.6	16.1	33	55	88	412	Imp.	1.0	6.0	412	0.00
7	829.5	16.9	40	50	90	524	Imp.	1.0	7.0	524	0.00
8	830.4	15.3	37	48	85	439	8.3	1.0	8.0	439	8.30
9	831.3	18.0	31	45	76	433	2.3	0.5	8.5	217	1.15
10	832.4	16.8	51	40	91	665	0.57	0.6	9.1	399	0.34
11	833.3	14.4	42	46	88	469	0.60	1.3	10.4	610	0.78
12	834.4	17.2	33	40	73	440	1.6	1.2	11.6	528	1.92
13	835.4	17.1	27	40	67	358	3.0	1.0	12.6	358	3.00
14	836.3	17.9	30	40	70	417	6.3	1.0	13.6	417	6.30
15	837.3	18.7	28	39	67	406	11.	1.0	14.6	406	11.00
16	838.6	21.9	34	33	67	578	49.	1.0	15.6	578	49.00
17	839.5	20.2	33	35	68	517	18.	1.0	16.6	517	18.00
18	840.3	18.6	36	41	77	519	14.	1.0	17.6	519	14.00
19	841.4	19.7	25	40	65	382	17.	1.0	18.6	382	17.00
20	842.4	19.0	37	37	74	545	20.	1.0	19.6	545	20.00
21	843.5	18.5	31	50	81	445	24.	1.0	20.6	445	24.00
22	844.5	22.7	40	42	82	704	38.	1.0	21.6	704	38.00
23	845.6	21.1	27	44	71	442	27.	1.0	22.6	442	27.00
24	846.5	22.3	24	54	78	415	39.	1.0	23.6	415	39.00
25	847.6	23.6	32	49	81	586	42.	1.0	24.6	586	42.00
26	848.6	17.5	26	67	93	353	18.	1.0	25.6	353	18.00
27	849.5	20.2	16	68	84	251	36.	1.0	26.6	251	36.00

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### SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Humboldt Oil Properties I Lease Leitzbach B Well No. N-6

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
820.0 - 838.0	9.3	13.1	121.59
838.0 - 850.0	12.0	28.5	342.00
820.0 - 850.0	21.3	21.8	463.59

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
820.0 - 838.0	14.6	16.3	32.2	47.6	412	6,019
838.0 - 850.0	12.0	20.4	30.1	46.7	478	5,737
820.0 - 850.0	26.6	18.1	31.2	47.2	442	11,756

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## RESULTS OF LABORATORY FLOODING TESTS

### TABLE IV

Company Humboldt Oil Properties I Lease Leitzbach B Well No. N-6

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.
			%	Bbbs./A. Ft.	%	Bbbs./A. Ft.	% Oil	% Water	Bbbs./A. Ft.			
1	820.3	20.6	38	607	10	160	28	43	447	238	3.93	15
2	821.5	15.6	30	363	0	0	30	56	363	5	0.08	50
3	825.8	11.8	19	174	0	0	19	56	174	0	Imp.	-
4	826.5	13.9	14	151	0	0	14	72	151	0	Imp.	-
5	827.7	15.4	33	394	0	0	33	63	394	0	Imp.	-
6	828.6	16.6	32	412	0	0	32	56	412	0	Imp.	-
7	829.5	16.8	40	521	0	0	40	49	521	0	Imp.	-
8	830.4	15.8	36	441	0	0	36	49	441	0	Imp.	-
9	831.3	17.9	31	430	0	0	31	46	430	0	Imp.	-
10	832.4	16.7	51	661	0	0	51	39	661	0	Imp.	-
11	833.3	14.8	41	471	0	0	41	47	471	0	Imp.	-
12	834.4	17.1	33	438	0	0	33	40	438	0	Imp.	-
13	835.4	17.6	26	355	0	0	26	41	355	0	Imp.	-
14	836.3	17.8	30	414	0	0	30	40	414	0	Imp.	-
15	837.3	18.8	28	408	0	0	28	56	408	78	1.27	25
16	838.6	21.8	34	575	3	51	31	50	524	12	0.15	40
17	839.5	20.1	33	515	0	0	33	52	515	6	0.08	50
18	840.3	18.7	36	522	4	58	32	58	464	240	3.50	15
19	841.4	19.6	25	380	0	0	25	60	380	36	0.50	35
20	842.4	18.9	37	543	0	0	37	59	543	80	1.20	25
21	843.5	18.6	31	447	0	0	31	58	447	114	1.35	15
22	844.5	22.6	40	701	6	105	34	50	596	160	2.06	10
23	845.6	21.0	27	440	0	0	27	68	440	146	2.17	15
24	846.5	22.2	24	413	0	0	24	66	413	386	4.50	10
25	847.6	23.5	32	583	3	55	29	59	528	310	4.16	10
26	848.6	17.6	26	355	0	0	26	68	355	154	1.72	15
27	849.5	20.0	16	248	0	0	16	78	248	338	4.50	10

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.

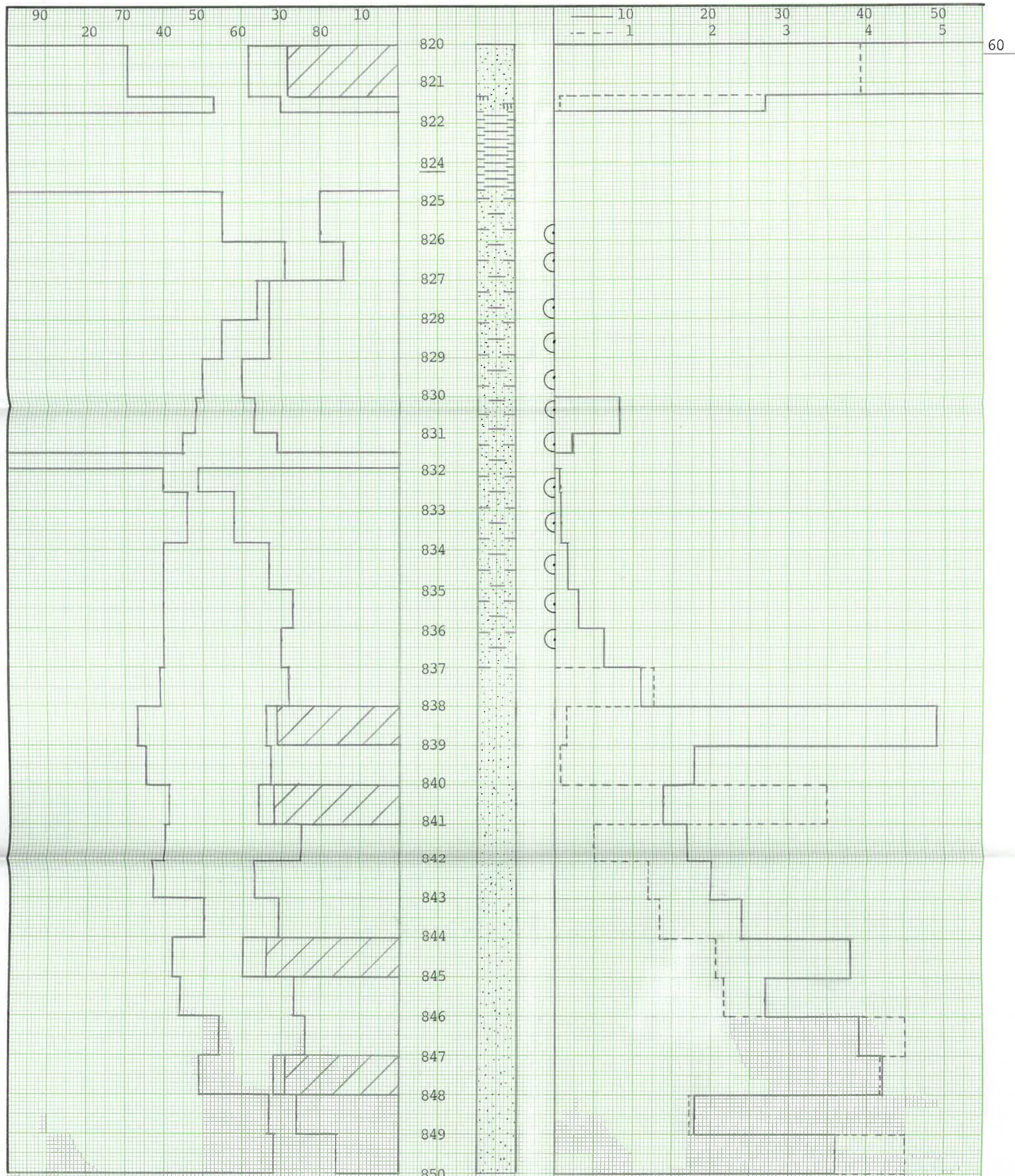
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### SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Humboldt Oil Properties I	Lease	Leitzbach B	Well No.	N-6
Depth Interval, Feet	820.0 - 838.0		838.0 - 850.0		820.0 - 850.0
Feet of Core Analyzed	1.3		4.0		5.3
Average Percent Porosity	20.6		21.7		21.4
Average Percent Original Oil Saturation	38.0		35.5		36.1
Average Percent Oil Recovery	10.0		4.0		5.5
Average Percent Residual Oil Saturation	28.0		31.5		30.6
Average Percent Residual Water Saturation	43.0		54.3		51.5
Average Percent Total Residual Fluid Saturation	71.0		85.8		82.1
Average Original Oil Content, Bbls./A. Ft.	607.		595.		598.
Average Oil Recovery, Bbls./A. Ft.	160.		67.		90.
Average Residual Oil Content, Bbls./A. Ft.	447.		528.		508.
Total Original Oil Content, Bbls./Acre	789.		2,381.		3,170.
Total Oil Recovery, Bbls./Acre	208.		269.		477.
Total Residual Oil Content, Bbls./Acre	581.		2,112.		2,693.
Average Effective Permeability, Millidarcys	3.93		2.47		2.83
Average Initial Fluid Production Pressure, p.s.i.	15.0		18.8		18.0

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



- KEY:**
- SANDSTONE
  - SHALE
  - IMPERMEABLE TO WATER
  - SHALY SANDSTONE
  - CALCAREOUS SANDSTONE
  - FLOODPOT RESIDUAL OIL SATURATION

## HUMBOLDT OIL PROPERTIES I

LEITZBACH B LEASE WELL NO. N-6  
ALLEN COUNTY, KANSAS

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCYS	CALCULATED OIL RECOVERY BBLs. / ACRE
820.0 - 838.0	14.6	16.3	32.2	47.6	13.1	
838.0 - 850.0	12.0	20.4	30.1	46.7	28.5	
820.0 - 850.0	26.6	18.1	31.2	47.2	21.8	1560 (PRIMARY AND WATERFLOODING)