



OILFIELD RESEARCH LABORATORIES

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April 21, 1980

DFW Petroleum, Inc.
1506 Park
Harvey Center
Oklahoma City, Oklahoma 73102

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary cores taken from the D.R. Nelson Lease, Well No. 2-18, Allen County, Kansas, and submitted to our laboratory on March 19, 1980.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/tem

5 c to Oklahoma City, Oklahoma

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The core was sampled and the samples sealed in plastic bags by a representative of the client. Fresh water mud was used as a drilling fluid. 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>
	<u>BARTLESVILLE SAND</u>
734.0 - 736.3	Light brown shaly sandstone.
736.3 - 739.0	Brown and gray laminated sandstone and shale.
739.0 - 743.3	Brown sandstone.
743.3 - 745.8	Brown and gray laminated sandstone and shale.
745.8 - 746.7	Brown sandstone.
746.7 - 748.3	Brown and gray laminated sandstone and shale.
	<u>TUCKER SAND</u>
816.0 - 822.3	Dark brown sandstone.
822.3 - 822.8	Brown shaly sandstone.
822.8 - 824.4	Dark brown sandstone.
824.4 - 825.5	Gray laminated sandstone and shale.
825.5 - 829.5	Dark brown sandstone.
829.5 - 830.8	Grayish brown conglomeratic shaly sandstone.
830.8 - 833.6	Brown sandstone.

LABORATORY FLOODING TESTS

BARTLESVILLE SAND

The sand in this core responded to laboratory flooding tests, as a total recovery of 449 barrels of oil per acre was obtained

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from 5.7 feet of sand. The weighted average percent oil saturation was reduced from 44.4 to 38.3, or represents an average recovery of 6.1 percent. The weighted average effective permeability of the samples is 9.51 millidarcys, while the average initial fluid production pressure is 22.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 13 samples tested, 5 produced water and oil, and 6 samples produced water only. This indicates that approximately 38 percent of the sand represented by these samples is floodable pay sand.

TUCKER SAND

The sand in this core responded to laboratory flooding tests, as a total recovery of 523 barrels of oil per acre was obtained from 7.4 feet of sand. The weighted average percent oil saturation was reduced from 38.5 to 34.2, or represents an average recovery of 4.3 percent. The weighted average effective permeability of the samples is 12.17 millidarcys, while the average initial fluid production pressure is 16.4 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 16 samples tested, 7 produced water and oil, and 7 samples produced water only. This indicates that approximately 44 percent of the sand represented by these samples is floodable pay sand.

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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 recovery approximately 1,440 barrels of oil per acre for the Bartlesville Sand, and approximately 2,160 barrels of oil per acre for the Tucker Sand. This is an average recovery of 253 barrels per acre foot from 5.7 feet of floodable sand from the Bartlesville and 292 barrels per acre foot from 7.4 feet of floodable sand from the Tucker.

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

	<u>BARTLESVILLE</u> <u>SAND</u>	<u>TUCKER</u> <u>SAND</u>
Original formation volume factor, estimated	1.05	1.06
Reservoir water saturation, percent, estimated	20.0	25.0
Average porosity, percent	17.2	20.6
Oil saturation after flooding, percent	38.3	34.2
Performance factor, percent, estimated	50.0	50.0
Net floodable sand, feet	5.7	7.4

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE I-B

Company DFW Petroleum, Incorporated Lease D. R. Nelson Well No. 2-18

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			Ft.	Cum. Ft.		
<u>BARTLESVILLE SAND</u>										
1	734.3	17.7	16	56	220	5.8	1.0	1.0	220	5.80
2	735.6	17.8	16	60	221	0.43	1.3	2.3	287	0.56
3	736.7	17.1	13	59	173	115.	0.7	3.0	121	80.50
4	737.4	18.9	26	41	381	Imp.	1.0	4.0	381	0.00
5	738.4	18.5	31	35	445	149.	1.0	5.0	445	149.00
6	739.5	19.4	36	35	542	169.	1.0	6.0	542	169.00
7	740.6	16.9	33	45	433	110.	1.0	7.0	433	110.00
8	741.5	19.3	18	43	270	105.	1.0	8.0	270	105.00
9	742.5	18.4	37	29	528	118.	1.3	9.3	686	153.40
10	743.6	15.6	40	40	484	Imp.	0.7	10.0	339	0.00
11	744.5	15.6	50	34	605	Imp.	1.8	11.8	1089	0.00
12	746.4	16.5	57	21	730	59.	0.9	12.7	657	53.10
13	747.5	14.2	42	30	463	0.68	1.6	14.3	741	1.09
<u>TUCKER SAND</u>										
1	816.5	20.2	37	35	580	244.	1.0	1.0	580	244.00
2	817.5	20.3	37	32	583	203.	1.0	2.0	583	203.00
3	818.5	19.7	37	35	566	176.	1.0	3.0	566	176.00
4	819.5	19.7	31	39	474	140.	1.0	4.0	474	140.00
5	820.6	20.5	37	35	588	200.	1.0	5.0	588	200.00
6	821.5	20.6	43	31	687	203.	1.3	6.3	893	263.90
7	822.4	22.5	32	41	559	3.5	0.5	6.8	280	1.75
8	823.5	23.4	47	27	853	837.	1.2	8.0	1024	1004.40
9	824.3	21.7	38	40	640	449.	0.4	8.4	256	179.60
10	825.6	17.1	12	57	159	212.	0.5	8.9	80	106.00
11	826.5	22.8	38	32	672	127.	1.5	10.4	1008	190.50

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company DFW Petroleum, Incorporated Lease D. R. Nelson Well No. 2-18

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.		
12	828.6	18.2	31	53	84	226.	1.5	11.9	657	339.00
13	829.4	21.8	35	33	68	117.	0.5	12.4	296	58.50
14	831.5	23.6	31	34	65	329.	1.2	13.6	682	394.80
15	832.5	22.5	28	35	63	319.	1.0	14.6	489	319.00
16	833.5	23.0	22	36	58	288.	0.6	15.2	236	172.80

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	DFW Petroleum, Incorporated	Lease	D.R. Nelson	Well No.	2-18	
	Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.		
		<u>BARTLESVILLE SAND</u>				
	734.0 - 748.3	10.8	76.6	827.45		
		<u>TUCKER SAND</u>				
	816.0 - 833.6	15.2	262.7	3993.25		
		<u>BARTLESVILLE SAND</u>				
	Depth Interval, Feet	Feet of Core Analyzed	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbl./A. Ft.	Total Oil Content Bbls./Acre
		<u>BARTLESVILLE SAND</u>				
	734.0 - 748.3	14.3	33.2	39.7	434	6,211
		<u>TUCKER SAND</u>				
	816.0 - 823.6	15.2	34.7	36.5	572	8,692

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company DFW Petroleum, Incorporated Lease D.R. Nelson Well No. 2-18

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			
<u>BARTLESVILLE SAND</u>											
1	734.3	18.0	16	223	0	0	16	73	223	23.40	10
2	735.6	18.0	16	223	0	0	16	73	223	14.14	10
3	736.7	17.4	13	175	0	0	13	77	175	22.00	10
4	737.4	19.0	26	383	0	0	26	71	383	12.00	15
5	738.4	18.0	32	447	0	0	32	57	447	0.15	50
6	739.5	19.4	36	542	3	45	33	50	497	13.12	15
7	740.6	17.0	33	435	0	0	33	63	435	Imp.	-
8	741.5	19.2	18	268	0	0	18	74	268	16.11	15
9	742.5	18.5	37	531	2	29	35	61	502	24.50	10
10	743.6	16.0	39	484	3	37	36	60	447	3.07	30
11	744.5	15.8	50	613	5	61	45	48	552	0.75	35
12	746.4	16.5	57	730	20	256	37	58	474	6.37	20
13	747.5	14.7	41	468	0	0	41	40	468	Imp.	-
<u>TUCKER SAND</u>											
1	816.5	20.5	37	588	4	64	33	64	524	10.00	20
2	817.5	20.0	37	574	5	78	32	65	496	6.37	20
3	818.5	19.6	37	563	0	0	37	59	563	5.10	25
4	819.5	19.8	31	476	0	0	31	67	476	3.37	25
5	820.6	20.5	37	588	3	48	34	60	540	10.16	15
6	821.5	20.9	43	697	5	81	38	59	616	16.30	15
7	822.4	22.5	32	559	0	0	32	65	559	Imp.	-
8	823.5	23.3	47	850	7	127	40	53	723	21.60	10
9	824.3	21.5	38	634	5	83	33	61	550	19.74	10
10	825.6	17.0	12	158	0	0	12	79	158	19.20	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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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company DFW Petroleum, Incorporated Lease D. R. Nelson Well No. 2-18

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			
11	826.5	22.6	38	666	0	0	38	60	297	10.83	15
12	828.6	18.3	31	440	2	28	29	67	351	5.70	25
13	829.4	22.0	35	597	0	0	35	40	0	Imp.	-
14	831.5	23.3	31	560	0	0	31	63	290	16.28	20
15	832.5	22.5	28	489	0	0	28	67	346	18.42	10
16	833.5	22.6	23	403	0	0	23	69	231	17.50	20

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	DFW Petroleum, Incorporated	Lease	D. R. Nelson	Well No.	2-18
	BARTLESVILLE SAND		TUCKER SAND		
Depth Interval, Feet	734.0 - 748.3		816.0 - 833.6		
Feet of Core Analyzed	5.7		7.4		
Average Percent Porosity	17.2		20.6		
Average Percent Original Oil Saturation	44.4		38.5		
Average Percent Oil Recovery	6.1		4.3		
Average Percent Residual Oil Saturation	38.3		34.2		
Average Percent Residual Water Saturation	54.4		61.4		
Average Percent Total Residual Fluid Saturation	92.7		95.6		
Average Original Oil Content, Bbls./A. Ft.	585.		622.		
Average Oil Recovery, Bbls./A. Ft.	79.		71.		
Average Residual Oil Content, Bbls./A. Ft.	506.		551.		
Total Original Oil Content, Bbls./Acre	3,332.		4,599.		
Total Oil Recovery, Bbls./Acre	449.		523.		
Total Residual Oil Content, Bbls./Acre	2,883.		4,076.		
Average Effective Permeability, Millidarcys	9.51		12.17		
Average Initial Fluid Production Pressure, p.s.i.	22.0		16.4		

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