



# OILFIELD RESEARCH LABORATORIES

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November 25, 1980

North Slope Properties, Ltd.  
c/o Davis Oil Company  
Box 1004  
Independence, Kansas 67301

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Johnson Lease, Well No. 1-A, located in Linn County, Kansas and submitted to our laboratory on September 8, 1980.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

  
Benjamin R. Pearman

BRP/(SAM)/kas

3 c to Independence, Kansas  
2 c to Clayton, Missouri

# Oilfield Research Laboratories

## GENERAL INFORMATION & SUMMARY

Company North Slope Properties, Ltd., Lease Johnson Well No. 1-A

Location -

Section 6 Twp. 21S Rge. 24E County Linn State Kansas

Elevation, Feet -

Name of Sand	Banberi
Top of Core	234.0
Bottom of Core	255.8
Top of Sand	234.0
Bottom of Sand	254.6
Total Feet of Permeable Sand	18.9
Total Feet of Floodable Sand	5.9

**Distribution of Permeable Sand:**  
Permeability Range  
Millidarcys

**Feet**

**Cum. Ft.**

	Feet	Cum. Ft.
0 - 10	3.7	3.7
10 - 20	2.1	5.8
20 - 30	3.0	8.8
30 - 40	4.0	12.8
40 - 50	3.0	15.8
50 & Above	3.1	18.9

Average Permeability Millidarcys	30.3
Average Percent Porosity	16.9
Average Percent Oil Saturation	50.3
Average Percent Water Saturation	39.1
Average Oil Content, Bbls./A. Ft.	666.
Total Oil Content, Bbls./Acre	13,723.
Average Percent Oil Recovery by Laboratory Flooding Tests	9.6
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	129.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	762.
Total Calculated Oil Recovery, Bbls./Acre	See "Calculated Recovery" Section

The core was sampled and the samples sealed in plastic bags by a representative of the client.

#### FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
234.0 - 234.9	Grayish light brown very shaly sandstone.
234.9 - 237.7	Brown shaly slightly calcareous sandstone.
237.7 - 245.8	Dark brown slightly calcareous sandstone.
245.8 - 246.7	Brown and gray laminated slightly calcareous sandstone and shale.
246.7 - 253.8	Brown slightly calcareous sandstone.
253.8 - 254.6	Grayish brown very shaly sandstone.
254.6 - 255.8	Gray sandy shale.

#### LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 762 barrels of oil per acre was obtained from 5.9 feet of sand. The weighted average percent oil saturation was reduced from 55.2 to 45.6, or represents an average recovery of 9.6 percent. The weighted average effective permeability of the samples is 0.22 millidarcys, while the average initial fluid production pressure is 46.7 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 21 samples tested, 6 produced water and oil, and 2 samples produced water only. This indicates that approximately 29 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 1340 barrels of oil per acre. This is an average recovery of 227 barrels per acre foot from 5.9 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.03
Reservoir water saturation, percent, estimated	20.0
Average porosity, percent	17.2
Oil saturation after flooding, percent	43.6
Performance factor, percent, estimated	50.0
Net floodable sand, feet	5.9

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company North Slope Properties, Ltd.

Lease Johnson

Well No. 1-A

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	234.5	16.7	34	60	94	441	Imp.	0.9	0.9	397	0.00
2	235.5	16.6	51	45	96	657	4.2	1.0	1.9	657	4.20
3	236.5	16.9	53	37	90	695	8.3	1.0	2.9	695	8.30
4	237.5	15.3	55	24	79	653	4.3	0.8	3.7	522	3.44
5	238.5	15.9	20	61	81	247	13.	1.0	4.7	247	13.00
6	239.5	17.9	48	34	82	667	22.	1.0	5.7	667	22.00
7	240.5	19.0	43	38	81	634	32.	1.0	6.7	634	32.00
8	241.5	20.0	55	30	85	853	40.	1.0	7.7	853	40.00
9	242.5	16.9	69	22	91	905	57.	1.0	8.7	905	57.00
10	243.5	18.4	64	26	90	914	33.	1.0	9.7	914	33.00
11	244.5	18.4	53	35	88	757	37.	1.0	10.7	757	37.00
12	245.5	19.2	60	26	86	894	54.	1.1	11.8	983	59.40
13	246.5	15.2	61	30	91	719	8.7	0.9	12.7	647	7.83
14	247.5	19.1	55	36	91	815	47.	1.0	13.7	815	47.00
15	248.5	15.7	51	40	91	621	57.	1.0	14.7	621	57.00
16	249.5	16.7	53	41	94	687	32.	1.0	15.7	687	32.00
17	250.5	16.2	48	42	90	603	27.	1.0	16.7	603	27.00
18	251.5	15.9	48	47	95	592	28.	1.0	17.7	592	28.00
19	252.5	16.0	60	39	98	745	45.	1.0	18.7	745	45.00
20	253.5	14.3	44	45	89	488	18.	1.1	19.8	537	19.80
21	254.5	14.6	27	67	94	306	Imp.	0.8	20.6	245	0.00

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## SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	North Slope Properties, Ltd.	Lease	Johnson	Well No.	1-A		
	Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.			
	234.0 - 246.7	11.8	26.9	317.17			
	246.7 - 254.6	7.1	36.0	255.80			
	234.0 - 254.6	18.9	30.3	572.97			
	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	
	234.0 - 246.7	12.7	17.5	51.3	36.0	699	8,878
	246.7 - 254.6	7.9	16.1	48.7	44.1	613	4,845
	234.0 - 254.6	20.6	16.9	50.3	39.1	666	13,723

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company		Well No. 1-A										
North Slope Properties, Ltd.		Lease Johnson										
Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation		Volume of Water Recovered cc <sup>e</sup>	Effective Permeability Millidarcys**	Initial Fluid Production Pressure Lbs./Sq./In.	
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water				Bbls./A. Ft.
1	234.5	17.1	33	438	0	0	33	61	438	0	Imp.	-
2	235.5	16.1	52	649	0	0	52	44	649	0	Imp.	-
3	236.5	16.8	53	691	0	0	53	39	691	0	Imp.	-
4	237.5	15.3	55	653	7	83	48	38	570	12	0.30	50
5	238.5	16.0	20	248	0	0	20	73	248	20	0.37	50
6	239.5	17.4	49	661	0	0	49	35	661	0	Imp.	-
7	240.5	19.2	43	641	10	149	33	58	492	6	0.15	40
8	241.5	20.0	55	853	0	0	55	32	853	0	Imp.	-
9	242.5	16.8	69	899	14	182	55	38	717	12	0.22	45
10	243.5	18.3	64	909	0	0	64	27	909	0	Imp.	-
11	244.5	18.9	52	762	0	0	52	37	762	0	Imp.	-
12	245.5	19.1	60	889	11	163	49	42	726	20	0.37	50
13	246.5	15.4	61	729	0	0	61	30	729	13	0.22	45
14	247.5	19.1	55	815	0	0	55	39	815	0	Imp.	-
15	248.5	15.8	51	625	11	135	40	54	490	6	0.15	50
16	249.5	16.5	53	678	4	51	49	41	627	6	0.15	45
17	250.5	15.8	49	601	0	0	49	44	601	0	Imp.	-
18	251.5	16.4	47	598	0	0	47	48	598	0	Imp.	-
19	252.5	16.0	60	745	0	0	60	38	745	0	Imp.	-
20	253.5	14.4	44	492	0	0	44	47	492	0	Imp.	-
21	254.5	14.1	28	306	0	0	28	66	306	0	Imp.	-

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	North Slope Properties, Ltd.	Lease	Johnson	Well No.	1-A
Depth Interval, Feet	234.0 - 246.7	246.7 - 254.6	234.0 - 254.6		
Feet of Core Analyzed	3.9	2.0	5.9		
Average Percent Porosity	17.7	16.2	17.2		
Average Percent Original Oil Saturation	56.9	52.0	55.2		
Average Percent Oil Recovery	10.7	7.5	9.6		
Average Percent Residual Oil Saturation	46.2	44.5	45.6		
Average Percent Residual Water Saturation	44.3	47.5	45.4		
Average Percent Total Residual Fluid Saturation	90.5	92.0	91.0		
Average Original Oil Content, Bbls./A. Ft.	780.	652.	736.		
Average Oil Recovery, Bbls./A. Ft.	148.	93.	129.		
Average Residual Oil Content, Bbls./A. Ft.	632.	559.	607.		
Total Original Oil Content, Bbls./Acre	3,040.	1,303.	4,343.		
Total Oil Recovery, Bbls./Acre	576.	186.	762.		
Total Residual Oil Content, Bbls./Acre	2,464.	1,117.	3,581.		
Average Effective Permeability, Millidarcys	0.26	0.15	0.22		
Average Initial Fluid Production Pressure, p.s.i.	46.3	47.5	46.7		

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