

OILFIELD RESEARCH LABORATORIES

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

April 20, 1982

Inco Resources, Inc.
8100 Marty, Suite 117
Overland Park, Kansas 66204

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Davis Lease, Well No. 13, located in Franklin County, Kansas and submitted to our laboratory on April 13, 1982.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/kas

3 c to Overland Park, Kansas
2 c to Hutchinson, Kansas

Oilfield Research Laboratories
GENERAL INFORMATION & SUMMARY

Company Inco Resources, Inc. Lease Davis Well No. 13
Location 1800' SNL & 660' WEL, NW $\frac{1}{4}$
Section 33 Twp. 17S Rge. 21E County Franklin State Kansas

Elevation, Feet	Brown Limestone	First Squirrel	Second Squirrel
Name of Sand.....			
Top of Core	581.0	597.0	659.0
Bottom of Core	584.0	599.0	661.5
Top of Sand	581.0	597.0	659.6
Bottom of Sand	584.0	599.0	661.5
Total Feet of Permeable Sand	0.7	2.0	1.5
Total Feet of Floodable Sand	0.7	0.0	1.1

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
<u>BROWN LIMESTONE</u>		
0 - 2	0.7	0.7
<u>FIRST SQUIRREL SAND</u>		
0 - 3	2.0	2.0
<u>SECOND SQUIRREL SAND</u>		
31 - 43	1.5	1.5

Average Permeability Millidarcys	1.8	1.2	36.1
Average Percent Porosity	10.4	14.3	16.5
Average Percent Oil Saturation	46.6	42.0	33.9
Average Percent Water Saturation.....	45.1	51.0	23.3
Average Oil Content, Bbls./A. Ft.....	384.	467.	421.
Total Oil Content, Bbls./Acre.....	1,152.	934.	632.
Average Percent Oil Recovery by Laboratory Flooding Tests.....	6.0	0.	6.2
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	67.	0.	73.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	47.	0.	80.
Total Calculated Oil Recovery, Bbls./Acre.....	See "Cal. Rec." Section	0.	See "Cal. Re Section

Oilfield Research Laboratories
GENERAL INFORMATION & SUMMARY

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Company Inco Resources, Inc. Lease Davis Well No. 13
 Location 1800' SNL & 660' WEL, NW¼
 Section 33 Twp. 17S Rge. 21E County Franklin State Kansas

Elevation, Feet

Name of Sand.....	Cattleman	Bartlesville
Top of Core	714.0	773.0
Bottom of Core	719.0	792.2
Top of Sand	714.0	773.0
Bottom of Sand	718.6	792.2
Total Feet of Permeable Sand	4.6	15.8
Total Feet of Floodable Sand	4.6	4.3

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.		
	<u>Cattleman Sand</u>			
10 - 14	1.0	1.0		
38 - 50	2.0	3.0		
60 - 90	1.6	4.6		
	<u>Bartlesville Sand</u>			
4 - 47	2.7	2.7		
147 - 149	0.5	3.2		
230 - 400	3.9	7.1		
556 - 680	3.7	10.8		
728 - 827	3.0	13.8		
986 - 1020	2.0	15.8		
Average Permeability Millidarcys			46.8	518.4
Average Percent Porosity			19.2	21.8
Average Percent Oil Saturation			52.2	25.9
Average Percent Water Saturation			22.8	46.3
Average Oil Content, Bbls./A. Ft.			778.	434.
Total Oil Content, Bbls./Acre			3,580.	7,371.
Average Percent Oil Recovery by Laboratory Flooding Tests			16.7	2.8
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.			252.	51.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre			1,159.	219.
Total Calculated Oil Recovery, Bbls./Acre			See "Calculated Recovery" Section on both sands.	

The core was sampled by a representative of Oilfield Research Laboratories.

All sand, with the exception of the First Squirrel Sand, responded to flooding susceptibility tests. Therefore, a calculated recovery is given for all sands with the exception of the First Squirrel Sand.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
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BROWN LIMESTONE

581.0 - 583.3	Grayish light brown slightly sandy limestone.
583.3 - 584.0	Grayish brown calcareous vuggy shaly sandstone.

FIRST SQUIRREL SAND

597.0 - 599.0	Gray and brown laminated shale and sandstone.
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SECOND SQUIRREL SAND

659.0 - 659.6	Gray slightly sandy shale.
659.6 - 660.4	Brown sandstone.
660.4 - 660.8	Gray shale.
660.8 - 661.5	Brown sandstone.

CATTLEMAN SAND

714.0 - 718.6	Brown sandstone.
718.6 - 719.0	Gray shale.

BARTLESVILLE SAND

773.0 - 773.5	Dark brown sandstone.
773.5 - 774.5	Gray and brown laminated shale and sandstone.
774.5 - 776.0	Dark brown sandstone with scattered gray shale partings.
776.0 - 777.3	Brown sandstone.
777.3 - 777.5	Gray shale.
777.5 - 779.2	Brown sandstone.
779.2 - 779.4	Gray shale.
779.4 - 780.2	Brown sandstone.
780.2 - 780.5	Gray shale.
780.5 - 781.0	Brown sandstone.
781.0 - 782.2	Gray and brown finely laminated shale and sandstone.
782.2 - 782.8	Brown sandstone.
782.8 - 783.3	Gray and brown laminated shale and sandstone.
783.3 - 784.3	Brown sandstone.
784.3 - 785.0	Brown and gray laminated sandstone and shale.
785.0 - 792.2	Light brown sandstone.

LABORATORY FLOODING TESTSBROWN LIMESTONE

The Brown Limestone in this core responded to laboratory flooding tests, as a total recovery of 47 barrels of oil per acre was obtained from 0.7 feet of formation. The weighted average percent oil saturation was reduced from 52.0 to 46.0, or represents an average recovery of 6.0 percent. The weighted average effective permeability of the samples is 0.886 millidarcys, while the average initial fluid production pressure is 15.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 3 samples tested, 1 produced water and oil. This indicates that approximately 33 percent of the formation represented by these samples is floodable pay formation.

SECOND SQUIRREL SAND

The Second Squirrel sand in this core responded to laboratory flooding tests, as a total recovery of 80 barrels of oil per acre was obtained from 1.1 feet of sand. The weighted average percent oil saturation was reduced from 39.3 to 33.1, or represents an average recovery of 6.2 percent. The weighted average effective permeability of the samples is 1.82 millidarcys, while the average initial fluid production pressure is 32.5 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 3 samples tested, 2 produced water and oil. This indicates that approximately 67 percent of the sand represented by these samples is floodable pay sand.

CATTLEMAN SAND

The Cattleman sand in this core responded to laboratory flooding tests, as a total recovery of 1,159 barrels of oil per acre was obtained from 4.6 feet of sand. The weighted average percent oil saturation was reduced from 52.3 to 35.6, or represents an average recovery of 16.7 percent. The weighted average effective permeability of the samples is 4.57 millidarcys, while the average initial fluid production pressure is 20.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 5 samples tested, 5 produced water and oil. This indicates that 100 percent of the sand represented by these samples is floodable pay sand.

BARTLESVILLE SAND

The Bartlesville sand in this core responded to laboratory flooding tests, as a total recovery of 219 barrels of oil per acre was obtained from 4.3 feet of sand. The weighted average percent oil saturation was reduced from 35.8 to 33.0, or represents an average recovery of 2.8 percent. The weighted average effective permeability of the samples is 17.83 millidarcys, while the average initial fluid production pressure is 14.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 19 samples tested, 5 produced water and oil and 14 produced water only. This indicates that approximately 26 percent of the sand represented by these samples is floodable pay sand.

CALCULATED RECOVERY

BROWN LIMESTONE

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 90 barrels of oil per acre. This is an average recovery of 128 barrels per acre foot from 0.7 feet of floodable formation analyzed in this core.

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

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Original formation volume factor, estimated	1.05
Reservoir water saturation, percent, estimated	30.0
Average porosity, percent	14.5
Oil saturation after flooding, percent	46.0
Performance factor, percent, estimated	55.0
Net floodable formation, feet	0.7

SECOND SQUIRREL SAND

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 350 barrels of oil per acre. This is an average recovery of 319 barrels per acre foot from 1.1 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.05
Reservoir water saturation, percent, estimated	15.0
Average porosity, percent	17.2
Oil saturation after flooding, percent	33.1
Performance factor, percent, estimated	50.0
Net floodable sand, feet	1.1

CATTLEMAN SAND

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 1,720 barrels of oil per acre. This is an average recovery of 373 barrels per acre foot from 4.6 feet of floodable sand analyzed in this core.

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

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Original formation volume factor, estimated	1.05
Reservoir water saturation, percent, estimated	15.0
Average porosity, percent	19.3
Oil saturation after flooding, percent	35.6
Performance factor, percent, estimated	55.0
Net floodable sand, feet	4.6

BARTLESVILLE SAND

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 1,610 barrels of oil per acre. This is an average recover of 374 barrels per acre foot from 4.3 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	25.0
Average porosity, percent	23.2
Oil saturation after flooding, percent	33.0
Performance factor, percent, estimated	55.0
Net floodable sand, feet	4.3

Oilfield Research Laboratories

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Inco Resources, Inc. Lease Davis Well No. 13

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 2 3	581.7	10.1	54	36	90	423	Imp.	1.0	1.0	423	0.00
	582.5	8.4	38	58	96	248	Imp.	1.3	2.3	322	0.00
	583.5	14.4	52	34	86	581	1.8	0.7	3.0	407	1.26
<u>FIRST SQUIRREL SAND</u>											
4 5	597.5	13.2	41	57	98	420	0.28	1.0	1.0	420	0.28
	598.6	15.4	43	45	88	514	2.2	1.0	2.0	514	2.20
<u>SECOND SQUIRREL SAND</u>											
6 7 8	659.7	17.0	19	17	36	251	42.	0.4	0.4	100	16.80
	660.3	19.7	31	39	70	474	39.	0.4	0.8	190	15.60
	661.4	14.3	44	18	62	488	31.	0.7	1.5	342	21.70
<u>CATTLEMAN SAND</u>											
9 10 11 12 13	714.6	14.6	53	40	93	600	13.	1.0	1.0	600	13.00
	715.3	21.4	54	23	77	897	49.	1.0	2.0	897	49.00
	716.4	20.0	55	15	70	853	38.	1.0	3.0	853	38.00
	717.7	20.6	53	16	69	847	62.	1.0	4.0	847	62.00
	718.4	19.6	42	18	60	639	89.	0.6	4.6	383	53.40
<u>BARTLESVILLE SAND</u>											
14 15 16 17	773.4	22.7	45	27	72	793	826.	0.5	0.5	397	413.00
	774.7	24.3	33	29	62	622	826.	0.5	1.0	311	413.00
	775.6	17.3	35	34	69	470	46.	1.0	2.0	470	46.00
	776.4	25.6	33	29	62	655	324.	1.3	3.3	852	421.20

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

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Oilfield Research Laboratories
SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Inco Resources, Inc.	Lease	Davis	Well No.	13
	Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.	
			<u>BROWN LIMESTONE</u>		
	581.0 - 584.0	0.7	1.8	1.26	
			<u>FIRST SQUIRREL SAND</u>		
	597.0 - 599.0	2.0	1.2	2.48	
			<u>SECOND SQUIRREL SAND</u>		
	659.6 - 661.5	1.5	36.1	54.10	
	Depth Interval, Feet	Feet of Core Analyzed	Average Percent Oil Saturation	Average Percent Water Saturation	Total Oil Content Bbls./Acre
			<u>BROWN LIMESTONE</u>		
	581.0 - 584.0	3.0	46.6	45.1	1,152
			<u>FIRST SQUIRREL SAND</u>		
	597.0 - 599.0	2.0	42.0	51.0	934
			<u>SECOND SQUIRREL SAND</u>		
	659.6 - 661.5	1.5	33.9	23.3	632

Oilfield Research Laboratories
SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Inco Resources, Inc.	Lease	Davis	Well No.	13		
	Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.			
			<u>CATTLEMAN SAND</u>				
	714.0 - 718.6	4.6	46.8	215.40			
			<u>BARTLESVILLE SAND</u>				
	773.0 - 779.2	5.0	501.7	2,508.40			
	779.4 - 792.2	10.8	526.1	5,682.07			
	773.0 - 792.2	15.8	518.4	8,190.47			
	Depth Interval, Feet	Feet of Core Analyzed	Average Percent Porosity	Average Percent Oil Saturation	Average Percent Water Saturation	Total Oil Content Bbls./Acre	
			<u>CATTLEMAN SAND</u>				
	714.0 - 718.6	4.6	19.2	52.2	22.8	778	3,580
			<u>BARTLESVILLE SAND</u>				
	773.0 - 779.2	5.0	23.2	34.8	31.4	625	3,126
	779.4 - 792.2	12.0	21.2	22.2	52.6	354	4,245
	773.0 - 792.2	17.0	21.8	25.9	46.3	434	7,371

Oilfield Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Inco Resources, Inc.				Lease		Davis		Well No.		13	
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			
1 2 3	581.7	10.2	54	427	0	BROWN LIMESTONE			0	Imp.	-
	582.5	8.7	37	250	0	0	54	37	0	Imp.	-
	583.5	14.5	52	585	6	67	46	41	316	0.89	15
4 5	597.5	13.3	41	423	0	FIRST SQUIRREL SAND			0	Imp.	-
	598.6	15.5	43	517	0	0	41	47	0	Imp.	-
6 7 8	659.7	16.5	20	256	0	SECOND SQUIRREL SAND			0	Imp.	-
	660.3	19.6	31	471	3	46	28	63	12	0.15	50
	661.4	14.4	44	492	8	89	36	56	214	2.77	15
9 10 11 12 13	714.6	14.7	53	604	14	CATTLEMAN SAND			14	0.17	45
	715.3	21.5	54	901	15	160	39	56	224	6.00	5
	716.4	20.1	55	858	18	250	39	46	268	3.15	15
	717.7	20.6	53	847	23	281	37	44	278	11.24	10
	718.4	19.5	42	635	11	368	30	58	54	0.75	25
14 15 16 17 18 19 20						166	31	54			
						BARTLESVILLE SAND					
	773.4	22.8	45	796	7	124	38	52	304	8.66	20
	774.7	24.4	33	625	2	38	31	41	250	36.36	10
	775.6	17.4	35	472	2	27	33	50	156	16.49	15
	776.4	25.5	33	653	2	40	31	57	258	9.74	20
	777.7	23.0	29	517	0	0	29	56	344	37.49	5
	778.5	25.4	37	729	3	59	34	39	174	24.99	5
	779.6	25.0	29	562	0	0	29	46	160	38.98	5

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.

Oilfield Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

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Company			Inco Resources, Inc.			Lease			Davis			Well No.			13		
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.					
			%	Bbbls./A. Ft.	%	Bbbls./A. Ft.	% Oil	% Water	Bbbls./A. Ft.								
21	780.6	20.6	30	479	0	0	30	50	479	404	11.06	10					
22	781.3	19.6	28	426	0	0	28	46	426	198	27.74	5					
23	782.4	24.3	19	358	0	0	19	56	358	202	57.73	5					
24	783.4	23.6	23	421	0	0	23	51	421	178	34.98	10					
25	784.5	13.1	30	305	0	0	30	63	305	43	0.86	25					
26	785.6	14.6	34	385	0	0	34	60	385	302	20.74	10					
27	786.7	23.4	14	254	0	0	14	73	254	162	37.49	5					
28	787.5	23.1	15	269	0	0	15	67	269	270	41.48	5					
29	788.6	19.2	22	328	0	0	22	76	328	198	42.73	5					
30	789.6	21.6	11	184	0	0	11	84	184	288	14.99	5					
31	790.3	22.9	22	391	0	0	22	63	391	278	22.87	5					
32	791.4	24.9	17	328	0	0	17	61	328	256	33.98	5					

Company Inco Resources, Inc. Lease Davis Well No. 13

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.

Oilfield Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Inco Resources, Inc.	Lease	Davis	Well No.
		BROWN LIMESTONE	SECOND SQUIRREL SAND	13
Depth Interval, Feet	581.0 - 584.0	659.6 - 661.5		
Feet of Core Analyzed	0.7	1.1		
Average Percent Porosity	14.5	17.2		
Average Percent Original Oil Saturation	52.0	39.3		
Average Percent Oil Recovery	6.0	6.2		
Average Percent Residual Oil Saturation	46.0	33.1		
Average Percent Residual Water Saturation	41.0	58.5		
Average Percent Total Residual Fluid Saturation	87.0	91.6		
Average Original Oil Content, Bbls./A. Ft.	585.	484.		
Average Oil Recovery, Bbls./A. Ft.	67.	73.		
Average Residual Oil Content, Bbls./A. Ft.	518.	411.		
Total Original Oil Content, Bbls./Acre	410.	532.		
Total Oil Recovery, Bbls./Acre	47.	80.		
Total Residual Oil Content, Bbls./Acre	363.	452.		
Average Effective Permeability, Millidarcys	0.886	1.82		
Average Initial Fluid Production Pressure, p.s.i.	15.0	32.5		

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

Oilfield Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Inco Resources, Inc.	Lease	Davis	Well No.	13
		CATTLEMAN SAND		BARTLESVILLE SAND	
Depth Interval, Feet		714.0 - 718.6		773.0 - 779.2	
Feet of Core Analyzed		4.6		4.3	
Average Percent Porosity		19.3		23.2	
Average Percent Original Oil Saturation		52.3		35.8	
Average Percent Oil Recovery		16.7		2.8	
Average Percent Residual Oil Saturation		35.6		33.0	
Average Percent Residual Water Saturation		51.4		48.7	
Average Percent Total Residual Fluid Saturation		87.0		81.7	
Average Original Oil Content, Bbls./A. Ft.		781.		642.	
Average Oil Recovery, Bbls./A. Ft.		252.		51.	
Average Residual Oil Content, Bbls./A. Ft.		529.		591.	
Total Original Oil Content, Bbls./Acre		3,591.		2,761.	
Total Oil Recovery, Bbls./Acre		1,159.		219.	
Total Residual Oil Content, Bbls./Acre		2,432.		2,542.	
Average Effective Permeability, Millidarcys		4.57		17.83	
Average Initial Fluid Production Pressure, p.s.i.		20.0		14.0	

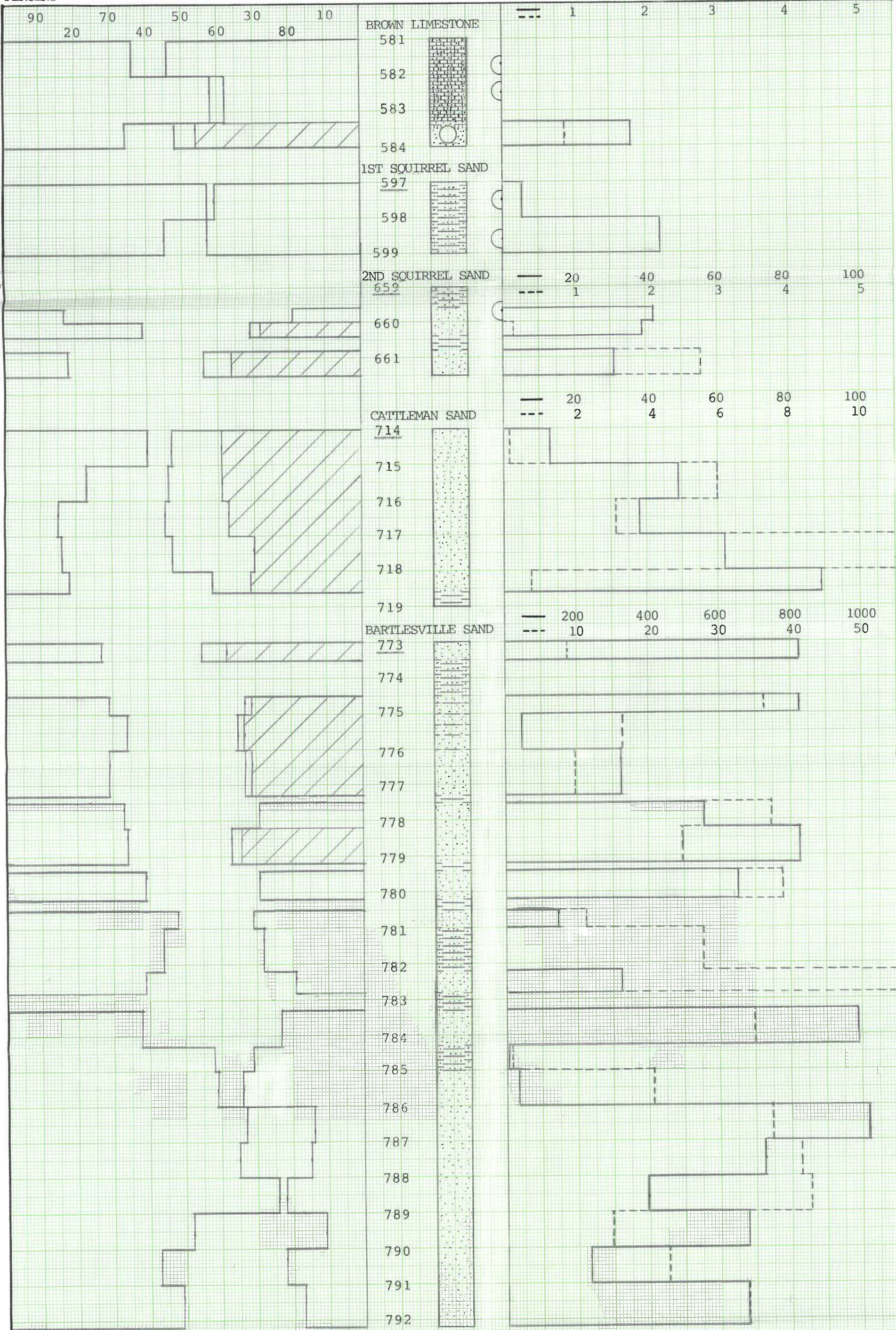
NOTE: Only those samples which recovered oil were used in calculating the above averages.

WATER SAT., PERCENT

OIL SAT., PERCENT

PERMEABILITY, IN MILLIDARCYS

EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCYS



KEY:

SHALE

SANDY LIMESTONE

SANDSTONE

SANDSTONE WITH SHALE PARTINGS

VUGGY SHALY CALCAREOUS SANDSTONE

LAMINATED SANDSTONE AND SHALE

FLOODPOT RESIDUAL OIL SATURATION

KEY:



SHALE



SANDY LIMESTONE



SANDSTONE



IMPERMEABLE TO WATER



SANDSTONE WITH SHALE PARTINGS



VUGGY SHALY CALCAREOUS SANDSTONE



LAMINATED SANDSTONE AND SHALE



FLOODPOT RESIDUAL OIL SATURATION

INCO RESOURCES, INC.

DAVIS LEASE

FRANKLIN COUNTY, KANSAS

WELL NO. 13

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
BROWN LIMESTONE						
581.0 - 584.0	3.0	10.4	46.6	45.1	1.8	90 (PRIMARY AND WATERFLOODING)
1ST SQUIRREL SAND						
597.0 - 599.0	2.0	14.3	42.0	51.0	1.2	-
2ND SQUIRREL SAND						
659.6 - 661.5	1.5	16.5	33.9	23.3	36.1	350 (PRIMARY AND WATERFLOODING)
CATTLEMAN SAND						
714.0 - 718.6	4.6	19.2	52.2	22.8	46.8	1720 (PRIMARY AND WATERFLOODING)
BARTLESVILLE SAND						
773.0 - 779.2	5.0	23.2	34.8	31.4	501.7	1610 (PRIMARY AND WATERFLOODING)
779.4 - 792.2	12.0	21.2	22.2	52.6	526.1	
773.0 - 792.2	17.0	21.8	25.9	46.3	518.4	

OILFIELD RESEARCH LABORATORIES