OILFIELD RESEARCH LABORATORIES

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

August 23, 1982

Sterling Oil & Exploration, Inc.
8080 Ward Parkway
Kansas City, Missouri 64114

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Clayton Lease, Well No. 12-82, located in Franklin County, Kansas and submitted to our laboratory on August 18, 1982.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/rmc

5 c to Kansas City, Missouri

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Sterling Oil & Exploration, Inc. Lease Clayton Well No. 12-82

Location

Section 29 Twp. 15S Rge. 21E County Franklin State Kansas

Elevation, Feet	
Name of Sand	Squirrel
Top of Core	772.0
Bottom of Core	782.6
Top of Sand	772.0
Bottom of Sand	782.6
Total Feet of Permeable Sand	5.4
Total Feet of Floodable Sand	4.6

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
2 - 9	2.1	2.1
11 - 15	1.4	3.5
50 - 85	1.9	5.4

Average Permeability Millidarcys	30.7
Average Percent Porosity	18.2
Average Percent Oil Saturation	34.1
Average Percent Water Saturation	51.3
Average Oil Content, Bbls./A. Ft.	494.
Total Oil Content, Bbls./Acre	4,005.
Average Percent Oil Recovery by Laboratory Flooding Tests	9.4
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	148.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	681.
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. 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:

Depth Interval, Feet	Description
772.0 - 772.5	Brown sandstone.
772.5 - 773.5	Grayish brown shaly sandstone.
773.5 - 774.4	Brown sandstone with scattered gray shale partings.
774.4 - 775.4	Brown sandstone.
775.4 - 776.2	Brown sandstone with gray shale partings.
776.2 - 777.1	Brown sandstone.
777.1 - 777.6	Brown shaly sandstone.
777.6 - 778.3	Brown sandstone.
778.3 - 779.6	Brown slightly shaly sandstone.
779.6 - 779.9	Grayish brown shaly sandstone.
779.9 - 782.6	Grayish brown very shaly sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 681 barrels of oil per acre was obtained from 4.6 feet of sand. The weighted average percent oil saturation was reduced from 39.7 to 30.3, or represents an average recovery of 9.4 percent. The weighted average effective permeability of the samples is 1.14 millidarcys, while the average initial fluid production pressure is 36.7 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 11 samples tested, 6 produced water and oil. This indicates that approximately 55 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 1,350 barrels of oil per acre. This is an average recovery of 293 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:

Original formation volume factor, estimated	1.05
Reservoir water saturation, percent, estimated	30.0
Average porosity, percent	20.8
Oil saturation after flooding, percent	30.3
Performance factor, percent, estimated	50.0
Net floodable sand, feet	4.6

Oilfield Research Laboratories

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Sterling Oil & Exploration, Inc. Lease Clayton Well No. 12-82

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	772.4	20.7	24	65	89	385	11.	0.5	0.5	193	5.50
2	773.6	19.6	39	49	88	593	12.	0.9	1.4	534	10.80
3	774.5	23.0	31	39	70	553	84.	0.6	2.0	332	50.40
4	775.3	23.6	42	33	75	769	53.	0.4	2.4	308	21.20
5	776.5	21.1	40	36	76	655	70.	0.9	3.3	590	63.00
6	777.5	17.8	53	41	94	732	5.5	0.5	3.8	366	2.75
7	778.5	20.4	38	39	77	601	8.7	1.3	5.1	781	11.31
8	779.7	18.0	39	49	88	545	2.1	0.3	5.4	164	0.63
9	780.5	15.6	25	71	96	303	Imp.	1.0	6.4	303	0.00
10	781.5	14.6	29	63	92	328	Imp.	1.0	7.4	328	0.00
11	782.3	8.5	23	71	94	152	Imp.	0.7	8.1	106	0.00

Oilfield Research Laboratories

SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Sterling Oil & Exploration, Inc. Lease Clayton Well No. 12-82

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
772.0 - 779.6	5.1	32.3	164.96
779.6 - 782.6	0.3	2.1	0.63
772.0 - 782.6	5.4	30.7	165.59

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
772.0 - 779.6	5.1	20.7	38.1	42.5	609.	3,104
779.6 - 782.6	3.0	13.9	27.3	66.1	300.	901
772.0 - 782.6	8.1	18.2	34.1	51.3	494.	4,005

Oilfield Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Sterling Oil & Exploration, Inc. Lease Clayton Well No. 12-82

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	Bbls./A. Ft.			
1	772.4	20.1	25	390	0	0	25	64	390	0	Imp.	-
2	773.6	19.7	39	596	8	122	31	61	474	18	0.33	40
3	774.5	23.1	31	556	3	54	28	65	502	94	1.57	35
4	775.3	23.5	42	766	8	146	34	55	620	27	0.90	40
5	776.5	21.2	40	658	11	181	29	59	477	18	0.30	35
6	777.5	17.9	53	736	16	222	37	60	514	20	0.30	40
7	778.5	20.5	38	604	10	159	28	59	445	122	2.47	30
8	779.7	17.9	39	542	0	0	39	50	542	0	Imp.	-
9	780.5	15.1	26	305	0	0	26	70	305	0	Imp.	-
10	781.5	14.7	29	331	0	0	29	63	331	0	Imp.	-
11	782.3	9.0	22	154	0	0	22	72	154	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.

Oilfield Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Sterling Oil & Exploration, Inc. Lease Clayton Well No. 12-82

Depth Interval, Feet	772.0 - 779.6
Feet of Core Analyzed	4.6
Average Percent Porosity	20.8
Average Percent Original Oil Saturation	39.7
Average Percent Oil Recovery	9.4
Average Percent Residual Oil Saturation	30.3
Average Percent Residual Water Saturation	59.9
Average Percent Total Residual Fluid Saturation	90.2
Average Original Oil Content, Bbls./A. Ft.	635.
Average Oil Recovery, Bbls./A. Ft.	148.
Average Residual Oil Content, Bbls./A. Ft.	487.
Total Original Oil Content, Bbls./Acre	2,922.
Total Oil Recovery, Bbls./Acre	681.
Total Residual Oil Content, Bbls./Acre	2,241.
Average Effective Permeability, Millidarcys	1.14
Average Initial Fluid Production Pressure, p.s.i.	36.7

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

WATER SAT., PERCENT → 90 70 50 30 10

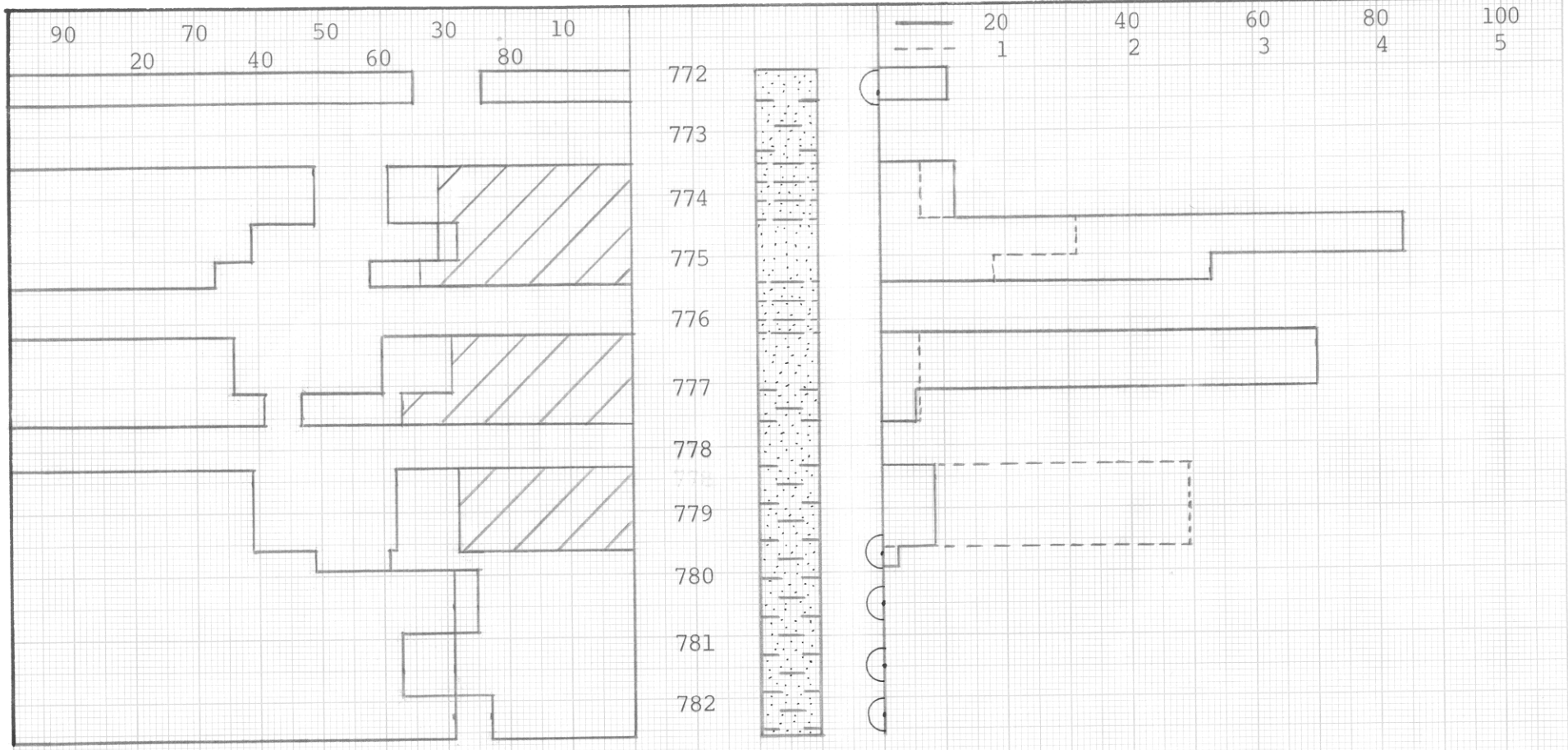
← OIL SAT., PERCENT 20 40 60 80

PERMEABILITY, IN MILLIDARCYS

EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCYS

20 40 60 80 100

1 2 3 4 5



KEY:

SANDSTONE

IMPERMEABLE TO WATER

SHALY SANDSTONE

SANDSTONE WITH SHALE PARTINGS

FLOODPOT RESIDUAL OIL SATURATION

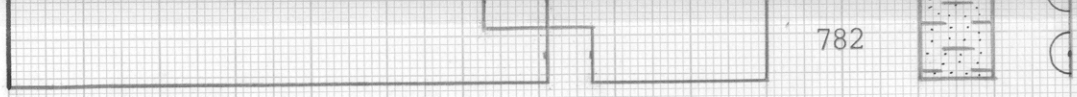
STERLING OIL & EXPLORATION, INC.

CLAYTON LEASE

WELL NO. 12-82

FRANKLIN 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



KEY:

SANDSTONE

IMPERMEABLE TO WATER

SHALY SANDSTONE

SANDSTONE WITH SHALE PARTINGS

FLOODPOT RESIDUAL OIL SATURATION

STERLING OIL & EXPLORATION, INC.

CLAYTON LEASE

WELL NO. 12-82

FRANKLIN 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
772.0 - 779.6	5.1	20.7	38.1	42.5	32.3	
779.6 - 782.6	3.0	13.9	27.3	66.1	2.1	
772.0 - 782.6	8.1	18.2	34.1	51.3	30.7	1350 (PRIMARY AND WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
AUGUST, 1982 PDC