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

November 9, 1982

Shasta, Incorporated
105 East Madison
Iola, Kansas 66749

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the McMillan Lease, Well No. 20, located in Neosho County, Kansas, and submitted to our laboratory on November 3, 1982.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/tem

5 c to Iola, Kansas

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Shasta, Incorporated Lease McMillan Well No. 20

Location

Section 14 Twp. 28S Rge. 18E County Neosho State Kansas

Elevation, Feet	
Name of Sand	Bartlesville
Top of Core	780.0
Bottom of Core	800.0
Top of Sand	780.0
Bottom of Sand	800.0
Total Feet of Permeable Sand	18.4
Total Feet of Floodable Sand	2.0

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 1	3.8	3.8
1 - 3	9.1	12.9
3 - 6	5.5	18.4

Average Permeability Millidarcys	2.6
Average Percent Porosity	15.4
Average Percent Oil Saturation	24.7
Average Percent Water Saturation	56.4
Average Oil Content, Bbls./A. Ft.	301.
Total Oil Content, Bbls./Acre	5,835.
Average Percent Oil Recovery by Laboratory Flooding Tests	3.0
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	38.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	76.
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. Salt water mud was used as a drilling fluid.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
780.0 - 784.0	Grayish light brown shaly sandstone.
784.0 - 785.9	Grayish light brown very shaly sandstone.
785.9 - 786.9	Grayish light brown shaly sandstone.
786.9 - 787.8	Grayish light brown very shaly sandstone.
787.8 - 795.0	Grayish light brown shaly sandstone.
795.0 - 797.0	Grayish light brown very shaly sandstone.
797.0 - 799.4	Grayish light brown shaly sandstone.
799.4 - 800.0	Gray shaly sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 76 barrels of oil per acre was obtained from 2.0 feet of sand. The weighted average percent oil saturation was reduced from 33.0 to 30.0, or represents an average recovery of 3.0 percent. The weighted average effective permeability of the samples is 0.45 millidarcys, while the average initial fluid production pressure is 47.5 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 20 samples tested, 2 produced water and oil, and 1 produced water only. This indicates that approximately 10 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 280 barrels of oil per acre. This is an average recovery of 142 barrels per acre foot from 2.0 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	45.0
Average porosity, percent	16.3
Oil saturation after flooding, percent	30.0
Performance factor, percent, estimated	50.0
Net floodable sand, feet	2.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Shasta, Incorporated Lease McMillan Well No. 20

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	780.5	16.1	24	52	76	300	1.4	1.0	1.0	300	1.40
2	781.5	15.9	27	54	81	333	2.1	1.0	2.0	333	2.10
3	782.5	14.4	22	60	82	246	5.2	1.0	3.0	246	5.20
4	783.4	16.5	29	56	85	371	1.7	1.0	4.0	371	1.70
5	784.6	8.6	9	58	67	60	Imp.	1.0	5.0	60	0.00
6	785.5	14.7	21	62	83	240	0.42	0.9	5.9	216	0.38
7	786.5	16.9	30	50	80	393	2.0	1.0	6.9	393	2.00
8	787.6	15.5	27	57	84	325	0.89	0.9	7.8	293	0.80
9	788.6	16.3	27	53	80	341	2.7	1.2	9.0	409	3.24
10	789.4	15.3	24	59	83	285	1.6	1.0	10.0	285	1.60
11	790.5	15.4	36	50	86	430	2.6	1.0	11.0	430	2.60
12	791.5	15.6	27	53	80	327	4.2	1.0	12.0	327	4.20
13	792.5	16.0	34	47	81	422	5.6	1.0	13.0	422	5.60
14	793.5	15.7	29	58	87	353	4.3	1.0	14.0	353	4.30
15	794.4	15.6	29	63	92	351	2.2	1.0	15.0	351	2.20
16	795.7	15.3	14	60	74	166	0.87	1.0	16.0	166	0.87
17	796.3	14.8	12	76	88	138	0.57	1.0	17.0	138	0.57
18	797.5	17.1	23	52	75	305	3.9	0.6	17.6	183	2.34
19	798.4	15.5	29	53	82	349	2.8	0.9	18.5	314	2.52
20	799.3	17.5	20	53	73	272	5.6	0.9	19.4	245	5.04

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Shasta, Incorporated Lease McMillan Well No. 20

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
780.0 - 785.9	4.9	2.2	10.78
785.9 - 795.0	9.1	2.9	26.54
795.0 - 799.4	4.4	2.6	11.34
780.0 - 799.4	18.4	2.6	48.66

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
780.0 - 785.9	5.9	14.4	22.0	56.9	259	1,526
785.9 - 795.0	9.1	15.8	29.2	54.4	359	3,263
795.0 - 799.4	4.4	16.0	19.1	59.7	238	1,046
780.0 - 799.4	19.4	15.4	24.7	56.4	301	5,835

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Shasta, Incorporated Lease McMillan Well No. 20

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	780.5	16.4	24	305	0	0	24	53	305	0	Imp.	-
2	781.5	15.8	27	331	0	0	27	54	331	0	Imp.	-
3	782.5	14.6	22	249	0	0	22	60	249	0	Imp.	-
4	783.4	16.6	29	373	0	0	29	56	373	0	Imp.	-
5	784.6	9.1	9	64	0	0	9	59	64	0	Imp.	-
6	785.5	15.2	20	236	0	0	20	63	236	0	Imp.	-
7	786.5	17.1	30	398	3	40	27	55	358	6	0.30	50
8	787.6	16.0	26	323	0	0	26	58	323	0	Imp.	-
9	788.6	16.2	27	339	0	0	27	59	339	3	0.22	50
10	789.4	15.3	24	285	0	0	24	59	285	0	Imp.	-
11	790.5	15.5	36	433	3	36	33	54	397	8	0.60	45
12	791.5	16.1	26	325	0	0	26	54	325	0	Imp.	-
13	792.5	16.5	33	422	0	0	33	48	422	0	Imp.	-
14	793.5	15.7	29	353	0	0	29	59	353	0	Imp.	50
15	794.4	15.5	29	349	0	0	29	62	349	0	Imp.	-
16	795.7	15.6	14	169	0	0	14	61	169	0	Imp.	-
17	796.3	14.9	12	139	0	0	12	75	139	0	Imp.	-
18	797.5	17.6	22	300	0	0	22	53	300	0	Imp.	50
19	798.4	15.4	29	346	0	0	29	52	346	0	Imp.	-
20	799.3	17.5	20	272	0	0	20	53	272	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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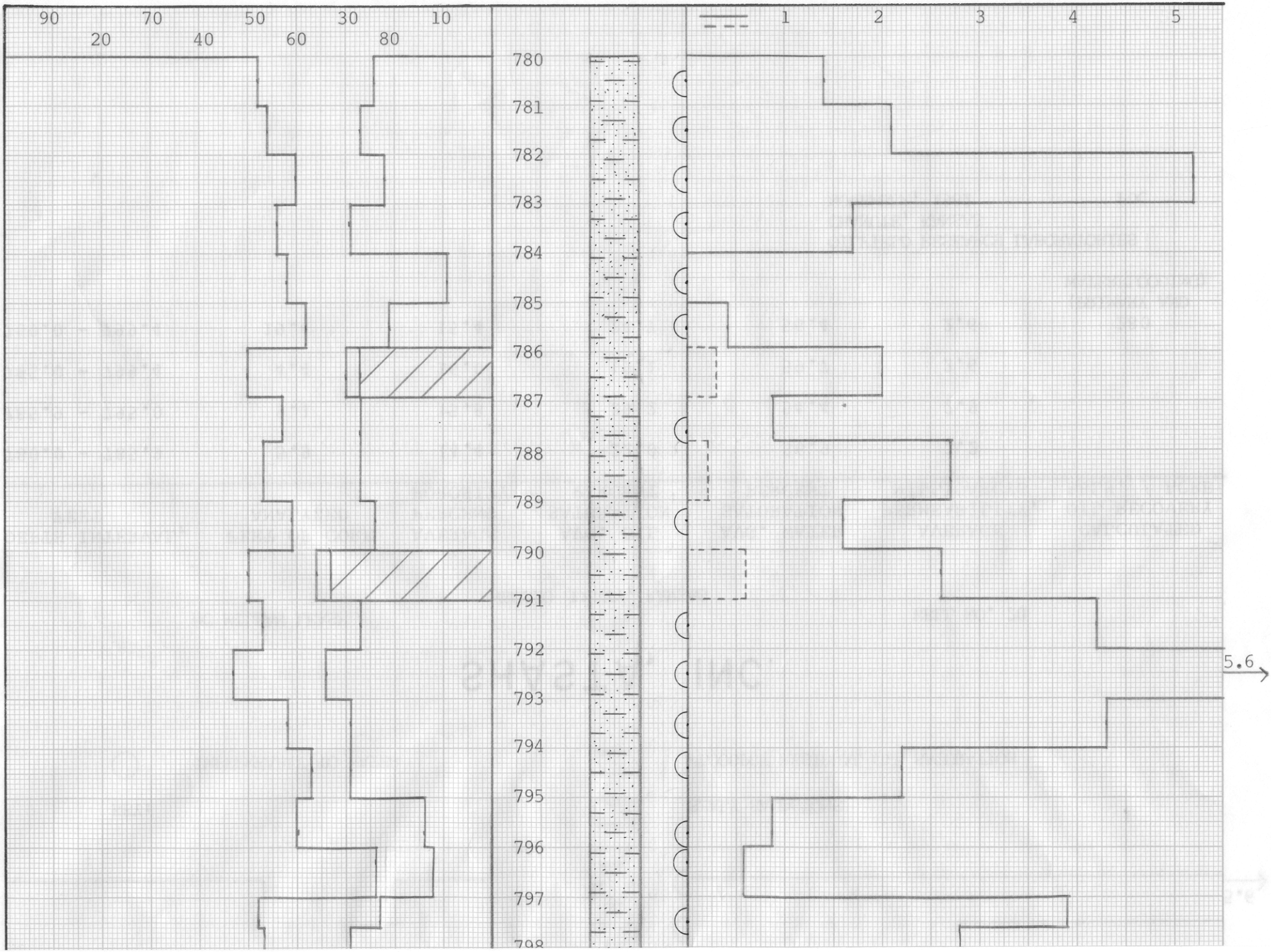
SUMMARY OF LABORATORY FLOODING TESTS

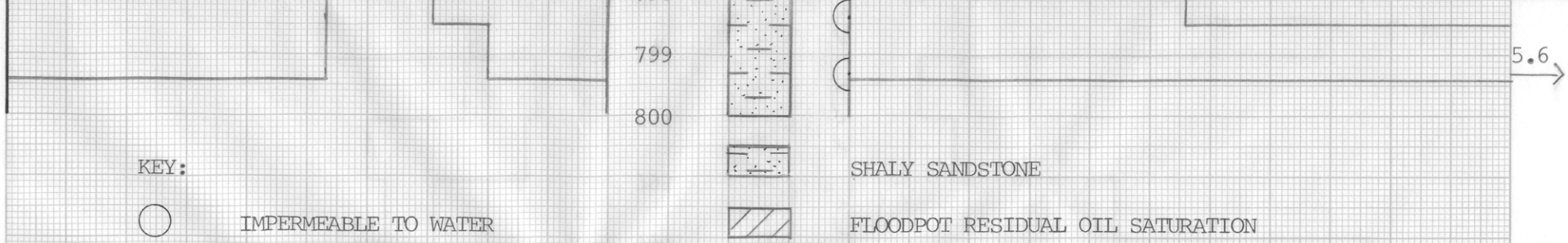
TABLE V

Company Shasta, Incorporated Lease McMillan Well No. 20

Depth Interval, Feet	785.9 - 795.0
Feet of Core Analyzed	2.0
Average Percent Porosity	16.3
Average Percent Original Oil Saturation	33.0
Average Percent Oil Recovery	3.0
Average Percent Residual Oil Saturation	30.0
Average Percent Residual Water Saturation	54.5
Average Percent Total Residual Fluid Saturation	84.5
Average Original Oil Content, Bbls./A. Ft.	416.
Average Oil Recovery, Bbls./A. Ft.	38.
Average Residual Oil Content, Bbls./A. Ft.	378.
Total Original Oil Content, Bbls./Acre	831.
Total Oil Recovery, Bbls./Acre	76.
Total Residual Oil Content, Bbls./Acre	755.
Average Effective Permeability, Millidarcys	0.45
Average Initial Fluid Production Pressure, p.s.i.	47.5

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
90
70
50
30
10
20
40
60
80
1
2
3
4
5
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
5.6



KEY:

IMPERMEABLE TO WATER

SHALY SANDSTONE

FLOODPOT RESIDUAL OIL SATURATION

SHASTA, INC.

MC MILLAN LEASE

WELL NO. 20

NEOSHO 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
780.0 - 785.9	5.9	14.4	22.0	56.9	2.2	
785.9 - 795.0	9.1	15.8	29.2	54.4	2.9	
795.0 - 799.4	4.4	16.0	19.1	59.7	2.6	
780.0 - 799.4	19.4	15.4	24.7	56.4	2.6	280 (PRIMARY AND WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
NOVEMBER, 1982 PDC