

OILFIELD RESEARCH LABORATORIES

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

November 22, 1982

McGown Drilling
Box 216
Mound City, Kansas 66056

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Harold Lease, Well No. 2, located in Linn County, Kansas and submitted to our laboratory on November 16, 1982.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/rmc

5 c to Mound City, Kansas

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company McGown Drilling Lease Harold Well No. 2
 Location _____
 Section 28 Twp. 19S Rge. 23E County Linn State Kansas

Elevation, Feet

Name of Sand	Peru
Top of Core	274.5
Bottom of Core	294.4
Top of Sand	274.5
Bottom of Sand	294.4
Total Feet of Permeable Sand	19.4
Total Feet of Floodable Sand	5.8

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 4	4.7	4.7
4 - 8	5.7	10.4
8 - 12	4.6	15.0
12 - 24	2.9	17.9
55 - 57	1.5	19.4

Average Permeability Millidarcys	12.2
Average Percent Porosity	19.3
Average Percent Oil Saturation	41.9
Average Percent Water Saturation	44.5
Average Oil Content, Bbls./A. Ft.	624.
Total Oil Content, Bbls./Acre	12,112.
Average Percent Oil Recovery by Laboratory Flooding Tests	5.8
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	95.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	551.
Total Calculated Oil Recovery, Bbls./Acre	

See "Calculated Recovery"
Section

-2-

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 virgin area.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
274.5 - 276.0	Brown sandstone.
276.0 - 277.0	Grayish brown shaly sandstone.
277.0 - 278.0	Brown slightly shaly sandstone.
278.0 - 279.4	Grayish brown shaly sandstone.
279.4 - 280.0	Brown sandstone.
280.0 - 282.7	Brown slightly shaly sandstone with scattered gray shale partings.
282.7 - 284.2	Brown sandstone with scattered gray shale partings.
284.2 - 285.5	Grayish brown shaly sandstone.
285.5 - 285.8	Brown sandstone.
285.8 - 286.3	Grayish brown very shaly sandstone.
286.3 - 286.6	Brown sandstone.
286.6 - 289.0	Brown shaly sandstone.
289.0 - 290.7	Brown sandstone.
290.7 - 291.7	Brown shaly sandstone with scattered gray shale partings.
291.7 - 293.0	Brown slightly shaly sandstone with scattered gray shale partings.
293.0 - 294.4	Brown sandstone with scattered gray shale partings.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 551 barrels of oil per acre was obtained from 5.8 feet of sand. The weighted average percent oil saturation was reduced from 40.0 to 34.2, or represents an average recovery of 5.8 percent. The weighted average effective permeability of the samples is 0.21 millidarcys, while the average initial fluid production pressure is 37.5 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 19 samples tested, 6 produced water and oil. This indicates that approximately 32 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 1,330 barrels of oil per acre. This is an average recovery of 229 barrels per acre foot from 5.8 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	35.0
Average porosity, percent	20.4
Oil saturation after flooding, percent	34.2
Performance factor, percent, estimated	50.0
Net floodable sand, feet	5.8

Oilfield Research Laboratories

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company McGown Drilling Lease Harold Well No. 2

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	275.7	23.5	42	38	80	766	56.	1.5	1.5	1149	84.00
2	276.8	18.1	26	40	66	365	2.7	1.0	2.5	365	2.70
3	277.7	20.0	45	42	87	698	8.7	1.0	3.5	698	8.70
4	278.7	18.1	44	50	94	618	3.9	1.4	4.9	865	5.46
5	279.5	21.8	41	38	79	693	23.	0.6	5.5	416	13.80
6	280.4	16.3	44	41	85	556	7.7	1.0	6.5	556	7.70
7	281.4	18.3	51	41	92	724	7.8	1.0	7.5	724	7.80
8	282.6	16.1	54	35	89	675	8.7	0.7	8.2	473	6.09
9	283.4	19.2	46	50	96	685	11.	1.5	9.7	1028	16.50
10	284.5	15.9	44	54	98	543	2.4	1.3	11.0	706	3.12
11	285.7	22.6	33	44	77	579	15.	0.3	11.3	174	4.50
12	286.4	22.1	38	39	77	652	13.	0.3	11.6	196	3.90
13	287.5	18.7	40	51	91	580	5.0	1.4	13.0	812	7.00
14	288.8	16.9	48	42	90	629	5.6	1.0	14.0	629	5.60
15	289.5	20.6	46	46	92	735	19.	1.0	15.0	735	19.00
16	290.5	20.0	34	44	78	528	17.	0.7	15.7	370	11.90
17	291.5	21.2	43	40	83	707	3.5	1.0	16.7	707	3.50
18	292.6	20.5	33	51	84	525	7.5	1.3	18.0	683	9.75
19	293.5	20.0	38	42	80	590	11.	1.4	19.4	826	15.40

Oilfield Research Laboratories

SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	McGown Drilling	Lease	Harold	Well No.	2
Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.		
274.5 - 294.4	19.4	12.2	236.42		
Depth Interval, Feet	Feet of Core Analyzed	Average Percent Porosity	Average Percent Oil Saturation	Average Percent Water Saturation	Total Oil Content Bbls./Acre
274.5 - 294.4	19.4	19.3	41.9	44.5	12,112

Oilfield Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company			McGown Drilling			Lease			Harold			Well No.			2		
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.								
1	275.7	23.5	42	766	10	182	32	54	584	32	0.45	20					
2	276.8	18.2	26	367	3	42	23	70	325	8	0.15	40					
3	277.7	19.9	45	695	5	77	40	56	618	9	0.15	40					
4	278.7	18.0	44	614	4	56	40	57	558	6	0.08	45					
5	279.5	21.8	41	693	7	118	34	59	575	3	0.08	40					
6	280.4	16.6	43	554	0	0	43	44	554	0	Imp.	-					
7	281.4	18.0	52	726	0	0	52	41	726	0	Imp.	-					
8	282.6	16.2	54	679	0	0	54	37	679	0	Imp.	-					
9	283.4	19.6	45	684	0	0	45	51	684	0	Imp.	-					
10	284.5	15.8	44	539	0	0	44	54	539	0	Imp.	-					
11	285.7	22.4	34	591	0	0	34	45	591	0	Imp.	-					
12	286.4	22.1	38	652	2	34	36	60	618	11	0.22	40					
13	287.5	18.2	41	579	0	0	41	51	579	0	Imp.	-					
14	288.8	17.2	47	627	0	0	47	43	627	0	Imp.	-					
15	289.5	20.2	47	737	0	0	47	46	737	0	Imp.	-					
16	290.5	20.1	34	530	0	0	34	45	530	0	Imp.	-					
17	291.5	21.7	42	707	0	0	42	43	707	0	Imp.	-					
18	292.6	20.7	33	530	0	0	33	52	530	0	Imp.	-					
19	293.5	20.5	37	588	0	0	37	44	588	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

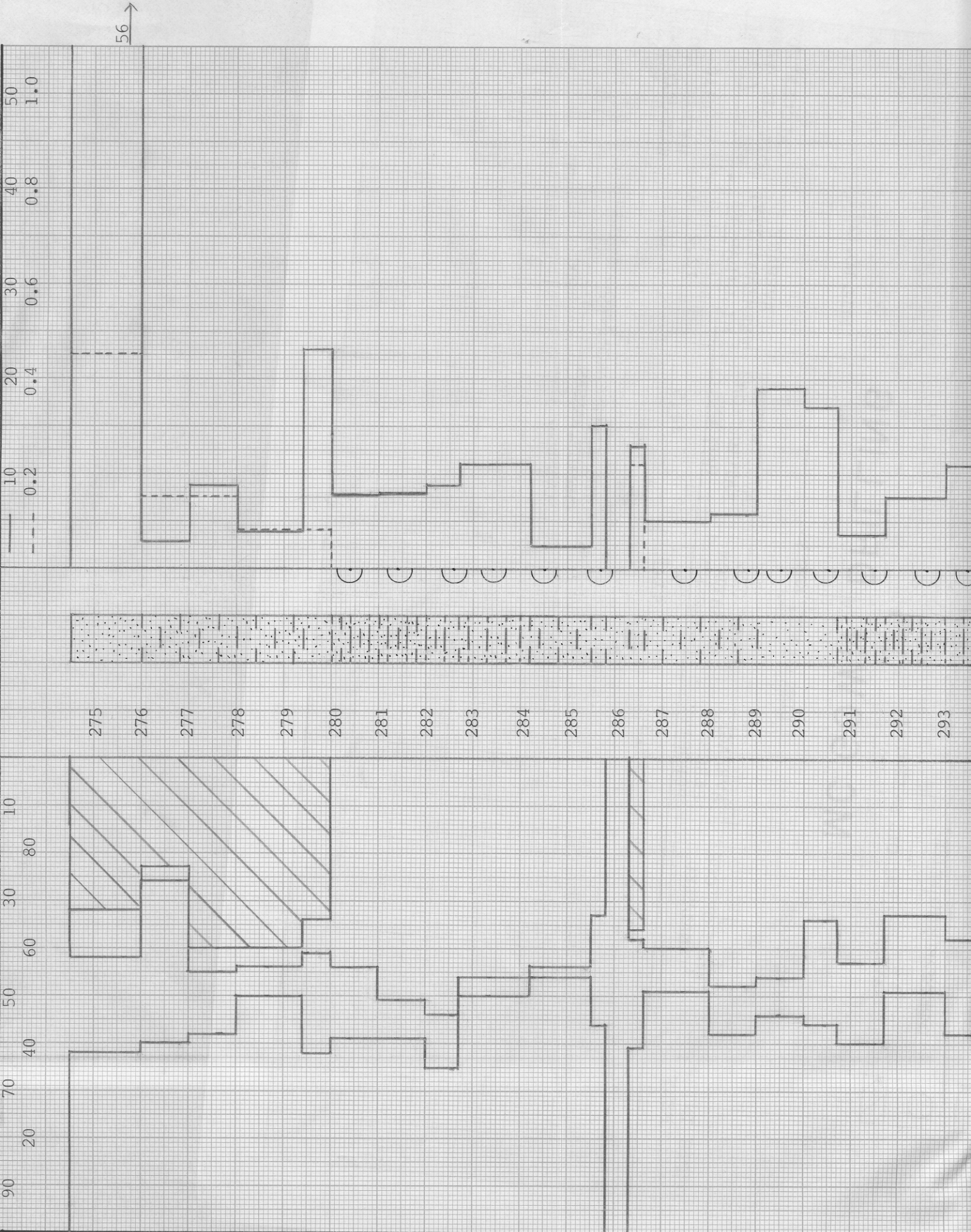
SUMMARY OF LABORATORY FLOODING TESTS

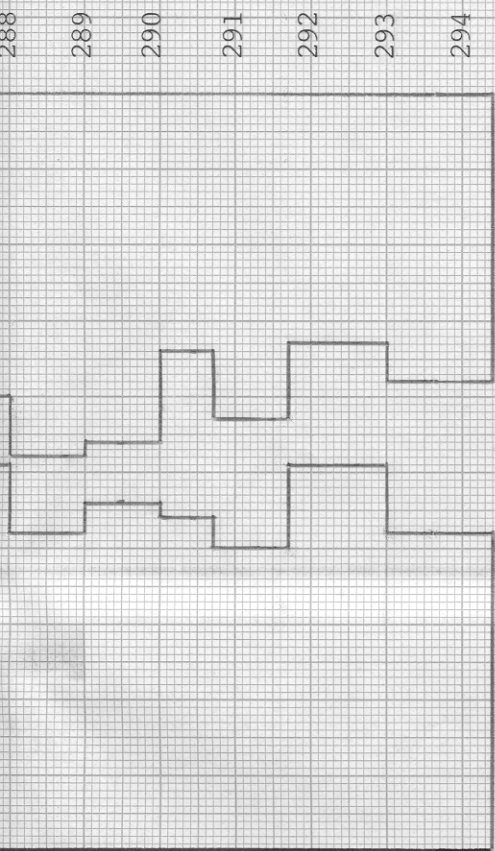
TABLE V

Company	McGown Drilling	Lease	Harold	Well No.	2
Depth Interval, Feet	274.5 - 294.4				
Feet of Core Analyzed	5.8				
Average Percent Porosity	20.4				
Average Percent Original Oil Saturation	40.0				
Average Percent Oil Recovery	5.8				
Average Percent Residual Oil Saturation	34.2				
Average Percent Residual Water Saturation	58.7				
Average Percent Total Residual Fluid Saturation	92.9				
Average Original Oil Content, Bbls./A. Ft.	635.				
Average Oil Recovery, Bbls./A. Ft.	95.				
Average Residual Oil Content, Bbls./A. Ft.	540.				
Total Original Oil Content, Bbls./Acre	3,681.				
Total Oil Recovery, Bbls./Acre	551.				
Total Residual Oil Content, Bbls./Acre	3,130.				
Average Effective Permeability, Millidarcys	0.21				
Average Initial Fluid Production Pressure, p.s.i.	37.5				

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 ———>





KEY:



SANDSTONE



IMPERMEABLE TO WATER



FLOODPOT RESIDUAL OIL SATURATION

SHALY SANDSTONE

SANDSTONE WITH SHALE PARTINGS

SHALY SANDSTONE WITH SHALE PARTINGS

MC GOWN DRILLING

HAROLD LEASE

WELL NO. 2

LINN 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
274.5 - 294.4	19.4	19.3	41.9	44.5	12.2	1330 (PRIMARY AND WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
NOVEMBER, 1982
PDC