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

August 7, 1981

McGown Drilling, Inc.
Box 216
Mound City, Kansas 66056

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Wurtz Lease, Well No. 1, located in Linn County, Kansas and submitted to our laboratory on August 4, 1981.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/kas

5 c to Mound City, Kansas

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GENERAL INFORMATION & SUMMARY

Company McGown Drilling, Inc. Lease Wurtz Well No. 1

Location SE¼

Section 14 Twp. 21S Rge. 22E County Linn State Kansas

Elevation, Feet	
Name of Sand	Squirrel
Top of Core	421.0
Bottom of Core	459.0
Top of Sand (Tested)	422.0
Bottom of Sand (Tested)	458.0
Total Feet of Permeable Sand	16.0
Total Feet of Floodable Sand	6.0

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
1 - 10	7.2	7.2
10 - 20	3.8	11.0
20 - 45	4.0	15.0
65 - Even	1.0	16.0

Average Permeability Millidarcys	18.6
Average Percent Porosity	19.1
Average Percent Oil Saturation	32.1
Average Percent Water Saturation	48.0
Average Oil Content, Bbls./A. Ft.	478.
Total Oil Content, Bbls./Acre	7,649.
Average Percent Oil Recovery by Laboratory Flooding Tests	3.8
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	58.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	348.
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
421.0 - 431.5	Grayish light brown slightly calcareous slightly shaly sandstone.
431.5 - 433.0	Gray calcareous shaly sandstone.
433.0 - 451.2	Grayish light brown slightly calcareous sandstone.
451.2 - 452.4	Grayish light brown slightly calcareous shaly sandstone.
452.4 - 453.0	Light brown slightly calcareous sandstone.
453.0 - 459.0	Grayish light brown slightly calcareous shaly sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 348 barrels of oil per acre was obtained from 6.0 feet of sand. The weighted average percent oil saturation was reduced from 34.4 to 30.6, or represents an average recovery of 3.8 percent. The weighted average effective permeability of the samples is 0.83 millidarcys, while the average initial fluid production pressure is 38.3 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 16 samples tested, 6 produced water and oil, and 6 produced water only. This indicates that approximately 38 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 1,510 barrels of oil per acre. This is an average recovery of 251 barrels per acre foot from 6.0 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.03
Reservoir water saturation, percent, estimated	35.0
Average porosity, percent	19.9
Oil saturation after flooding, percent	30.6
Performance factor, percent, estimated	50.0
Net floodable sand, feet	6.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company McGown Drilling, Inc. Lease Wurtz Well No. 1

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	422.6	19.2	24	49	73	358	6.9	1.0	1.0	358	6.90
2	426.5	17.2	33	47	80	440	2.5	1.0	2.0	440	2.50
3	433.5	14.3	23	51	74	255	32.	1.0	3.0	255	32.00
4	436.6	19.8	22	40	62	338	37.	1.0	4.0	338	37.00
5	440.6	22.0	35	40	75	597	65.	1.0	5.0	597	65.00
6	441.6	18.9	37	46	83	543	19.	1.0	6.0	543	19.00
7	444.5	21.3	30	36	66	496	44.	1.0	7.0	496	44.00
8	445.5	15.4	36	60	96	430	21.	1.0	8.0	430	21.00
9	449.5	18.9	36	48	84	528	12.	1.0	9.0	528	12.00
10	450.5	20.5	36	39	75	573	17.	1.2	10.2	688	17.00
11	451.4	17.5	34	64	98	462	5.8	1.2	11.4	554	6.96
12	452.5	21.6	31	50	81	520	14.	0.6	12.0	312	8.40
13	453.5	20.2	35	53	88	548	8.4	1.0	13.0	548	8.40
14	455.5	20.2	32	47	79	501	8.5	1.0	14.0	501	8.50
15	456.3	20.4	29	48	77	459	8.2	1.0	15.0	459	8.20
16	457.5	19.9	39	49	88	602	1.4	1.0	16.0	602	1.40

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company McGown Drilling, Inc. Lease Wurtz Well No. 1

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
422.0 - 458.0	16.0	18.6	298.26

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
422.0 - 458.0	16.0	19.1	32.1	48.0	478	7,649

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company McGown Drilling, Inc. Lease Wurtz Well No. 1

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	422.6	19.3	24	359	0	0	24	50	359	0	Imp.	-
2	426.5	17.6	32	437	0	0	32	49	437	0	Imp.	-
3	433.5	14.4	23	257	0	0	23	52	257	20	0.37	45
4	436.6	19.7	22	336	0	0	22	41	336	40	0.52	30
5	440.6	21.9	35	595	3	51	32	64	544	18	0.22	35
6	441.6	18.8	37	540	0	0	37	52	540	6	0.45	50
7	444.5	21.2	30	493	0	0	30	63	493	10	0.75	50
8	445.5	15.5	36	433	0	0	36	60	433	10	0.75	50
9	449.5	18.8	36	525	3	44	33	64	481	6	0.45	50
10	450.5	20.4	36	570	4	63	32	65	507	52	0.82	35
11	451.4	17.6	34	464	5	68	29	66	396	148	2.55	25
12	452.5	21.1	32	524	5	82	27	70	442	18	0.22	35
13	453.5	20.7	34	546	0	0	34	55	546	0	Imp.	-
14	455.5	20.1	32	499	3	47	29	68	452	12	0.15	50
15	456.3	20.5	29	461	0	0	29	64	461	12	0.22	45
16	457.5	19.8	39	599	0	0	39	50	599	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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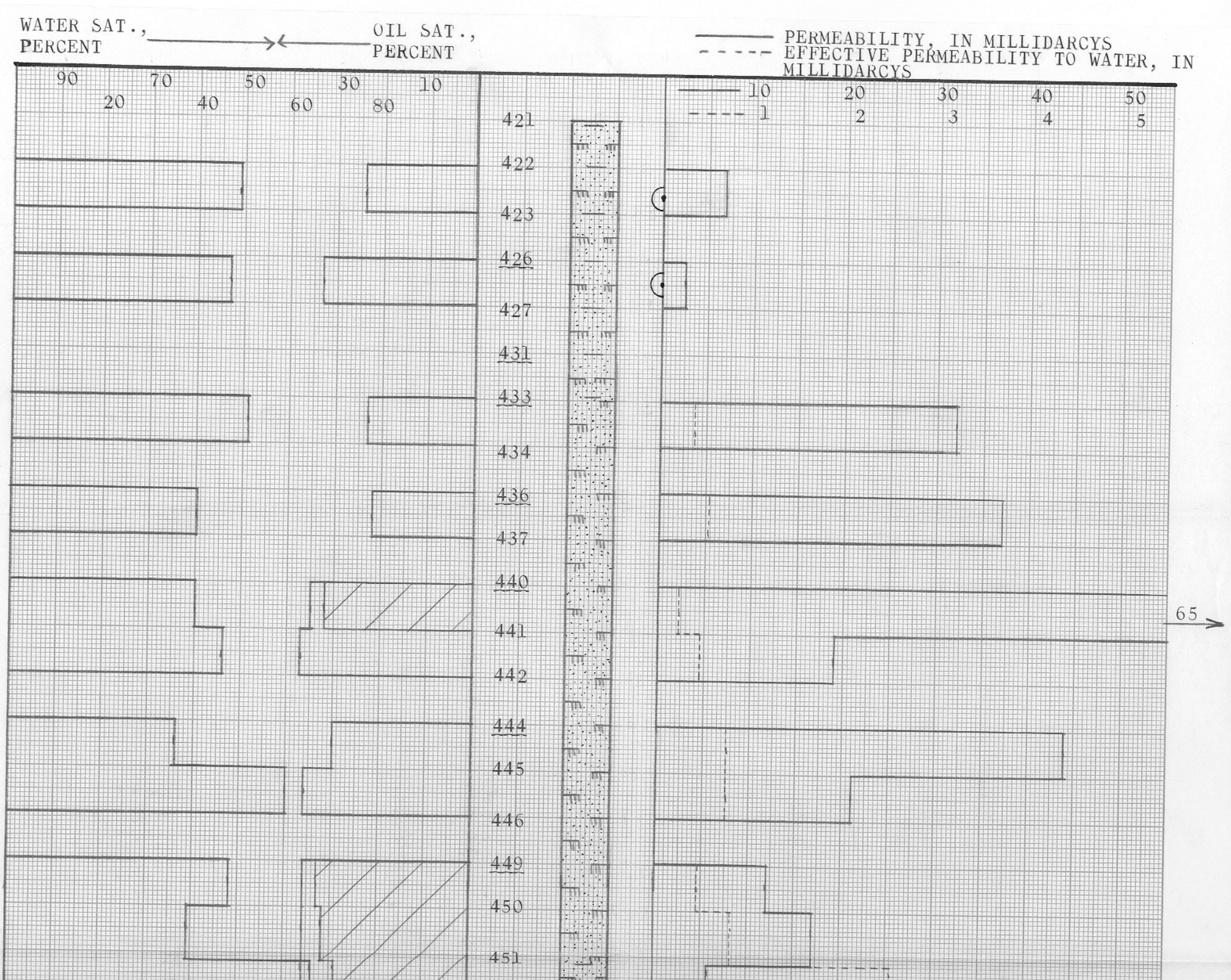
SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company McGown Drilling, Inc. Lease Wurtz Well No. 1

Depth Interval, Feet	422.0 - 458.0
Feet of Core Analyzed	6.0
Average Percent Porosity	19.9
Average Percent Original Oil Saturation	34.4
Average Percent Oil Recovery	3.8
Average Percent Residual Oil Saturation	30.6
Average Percent Residual Water Saturation	65.9
Average Percent Total Residual Fluid Saturation	96.5
Average Original Oil Content, Bbls./A. Ft.	528.
Average Oil Recovery, Bbls./A. Ft.	58.
Average Residual Oil Content, Bbls./A. Ft.	470.
Total Original Oil Content, Bbls./Acre	3,173.
Total Oil Recovery, Bbls./Acre	348.
Total Residual Oil Content, Bbls./Acre	2,825.
Average Effective Permeability, Millidarcys	0.83
Average Initial Fluid Production Pressure, p.s.i.	38.3

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
10
20
30
40
50
1
2
3
4
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421
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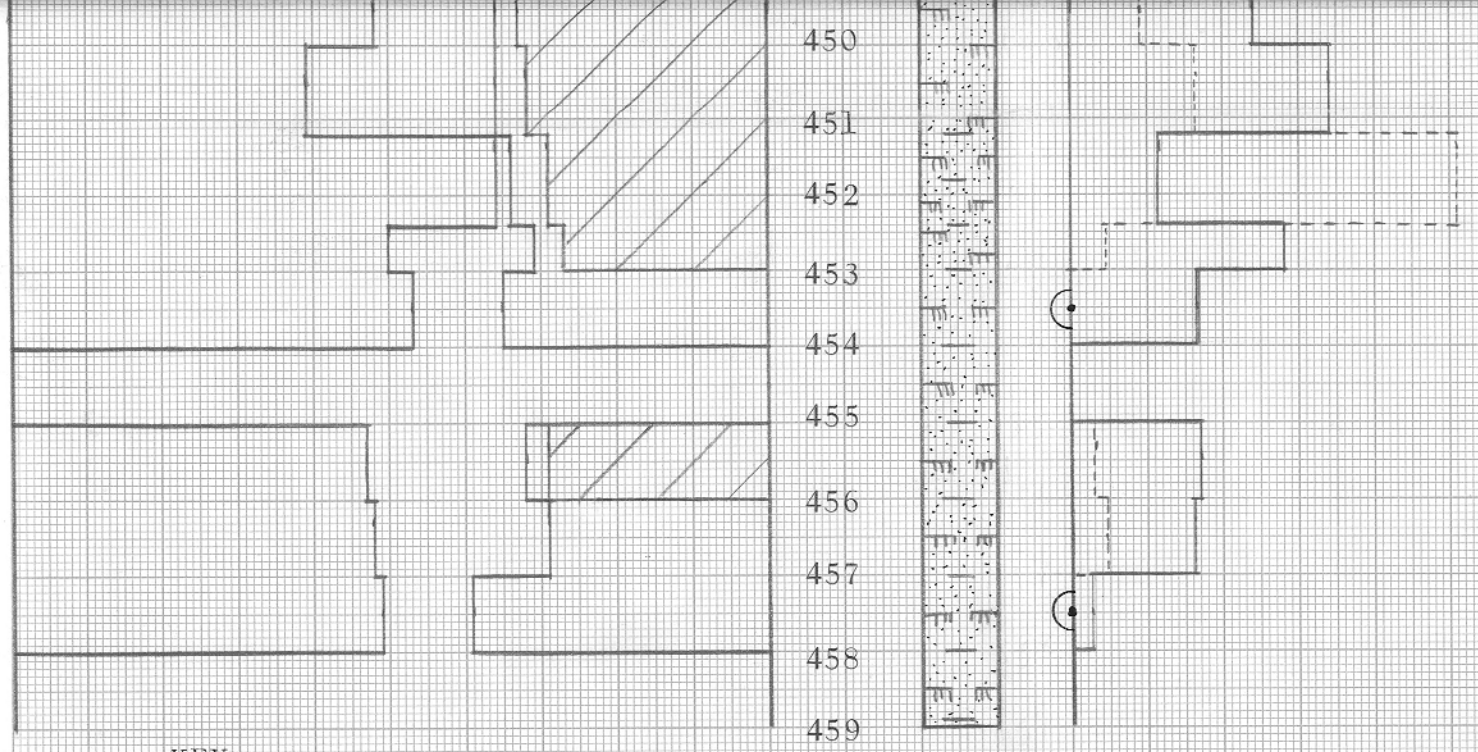

KEY:

CALCAREOUS SANDSTONE

SHALY CALCAREOUS SANDSTONE

FLOODPOT RESIDUAL OIL SATURATION

IMPERMEABLE TO WATER

MC GOWN DRILLING

WURTZ LEASE — WELL NO. 1

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
422.0 - 458.0	16.0	19.1	32.1	48.0	18.6	1510 (PRIMARY AND WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
AUGUST, 1981

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