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

July 20, 1982

Petro-Valley Services Corporation
P.O. Box 449
Moran, Kansas 66755

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the L. Hartman Lease, Well No. 2, located in Bourbon County, Kansas and submitted to our laboratory on July 15, 1982.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/dlb

5 c to Moran, Kansas

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Petro-Valley Services Corp. Lease L. Hartman Well No. 2

Location

Section 19 Twp. 26S Rge. 23E County Bourbon State Kansas

Elevation, Feet	
Name of Sand	Squirrel
Top of Core	191.0
Bottom of Core	209.0
Top of Sand	191.0
Bottom of Sand (Tested)	204.0
Total Feet of Permeable Sand	7.0
Total Feet of Floodable Sand	4.0

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
7 - 10	1.0	1.0
14 - 20	3.0	4.0
20 - 25	3.0	7.0

Average Permeability Millidarcys	16.7
Average Percent Porosity	20.0
Average Percent Oil Saturation	34.3
Average Percent Water Saturation	48.4
Average Oil Content, Bbls./A. Ft.	532.
Total Oil Content, Bbls./Acre	3,726.
Average Percent Oil Recovery by Laboratory Flooding Tests	6.8
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	103.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	411.
Total Calculated Oil Recovery, Bbls./Acre	See "Calculated Recovery" Section

The core was sampled and the samples sealed in plastic and foil 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:

Depth Interval, Feet	Description
191.0 - 201.0	Brown sandstone.
201.0 - 202.0	Brown slightly shaly sandstone.
202.0 - 206.8	Brown sandstone.
206.8 - 209.0	Gray shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 411 barrels of oil per acre was obtained from 4.0 feet of sand. The weighted average percent oil saturation was reduced from 36.6 to 29.8, or represents an average recovery of 6.8 percent. The weighted average effective permeability of the samples is 0.47 millidarcys, while the average initial fluid production pressure is 36.3 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 7 samples tested, 4 produced water and oil, and 3 produced water only. This indicates that approximately 57 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 1,240 barrels of oil per acre. This is an average recovery of 311 barrels per acre foot from 4.0 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.02
Reservoir water saturation, percent, estimated	35.0
Average porosity, percent	19.7
Oil saturation after flooding, percent	29.8
Performance factor, percent, estimated	60.0
Net floodable sand, feet	4.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Petro-Valley Services Corporation Lease L. Hartman 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	191.5	18.7	33	51	84	479	14.	1.0	1.0	479	14.00
2	192.4	19.4	46	39	85	692	18.	1.0	2.0	692	18.00
3	194.4	20.6	35	49	84	559	23.	1.0	3.0	559	23.00
4	196.5	20.1	32	51	83	499	14.	1.0	4.0	499	14.00
5	199.4	20.5	33	44	77	525	20.	1.0	5.0	525	20.00
6	201.6	19.7	29	53	82	443	7.0	1.0	6.0	443	7.00
7	203.5	21.3	32	52	84	529	21.	1.0	7.0	529	21.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Petro-Valley Services Corporation Lease L. Hartman Well No. 2

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
191.0 - 204.0	7.0	16.7	117.00

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
191.0 - 204.0	7.0	20.0	34.3	48.4	532	3,726

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Petro-Valley Services Corporation Lease L. Hartman 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.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	191.5	18.8	33	481	6	88	27	62	393	24	0.83	35
2	192.4	19.3	46	689	10	150	36	52	539	14	0.37	40
3	194.4	20.5	35	557	6	95	29	58	462	18	0.30	35
4	196.5	20.0	32	497	5	78	27	60	419	26	0.37	35
5	199.4	20.4	33	522	0	0	33	46	522	16	0.22	40
6	201.6	20.2	28	439	0	0	28	56	439	12	0.15	45
7	203.5	21.2	32	526	0	0	32	55	526	14	0.15	40

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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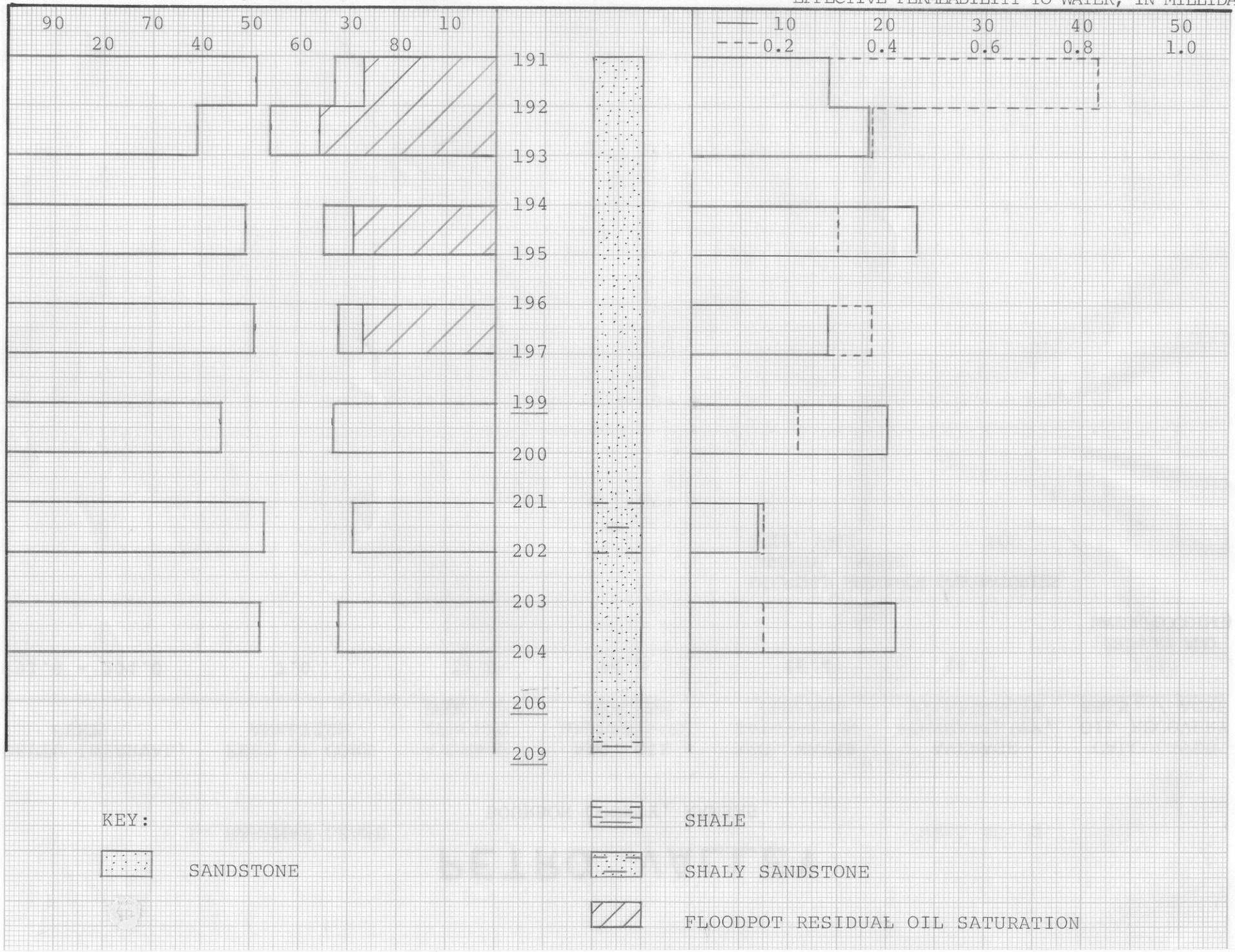
SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Petro-Valley Services Corporation Lease L. Hartman Well No. 2

Depth Interval, Feet	191.0 - 204.0
Feet of Core Analyzed	4.0
Average Percent Porosity	19.7
Average Percent Original Oil Saturation	36.6
Average Percent Oil Recovery	6.8
Average Percent Residual Oil Saturation	29.8
Average Percent Residual Water Saturation	58.0
Average Percent Total Residual Fluid Saturation	87.8
Average Original Oil Content, Bbls./A. Ft.	556.
Average Oil Recovery, Bbls./A. Ft.	103.
Average Residual Oil Content, Bbls./A. Ft.	453.
Total Original Oil Content, Bbls./Acre	2,224.
Total Oil Recovery, Bbls./Acre	411.
Total Residual Oil Content, Bbls./Acre	1,813.
Average Effective Permeability, Millidarcys	0.47
Average Initial Fluid Production Pressure, p.s.i.	36.3

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
0.2 0.4 0.6 0.8 1.0
191
192
193
194
195
196
197
199
200
201
202
203
204
206
209
KEY:
SANDSTONE
SHALE
SHALY SANDSTONE
FLOODPOT RESIDUAL OIL SATURATION

PETRO VALLEY

L. HARTMAN LEASE — WELL NO. 2

BOURBON 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
191.0 - 204.0	7.0	20.0	34.3	48.4	16.7	1240 (PRIMARY AND WATERFLOODING)

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CHANUTE, KANSAS
JULY, 1982 PDC