

# OILFIELD RESEARCH LABORATORIES

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

September 30, 1982

Astro Petroleum Company, Inc.  
103 East Rutledge  
Yates Center, Kansas 66783

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Braman Lease, Well No. 1-A, located in Wilson County, Kansas and submitted to our laboratory on September 24, 1982.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/rmc

5 c to Yates Center, Kansas

- REGISTERED ENGINEERS -

CORE ANALYSIS - WATER ANALYSIS - REPRESSURING ENGINEERING - SURVEYING & MAPPING - PROPERTY EVALUATION & OPERATION

**Oilfield Research Laboratories**  
**GENERAL INFORMATION & SUMMARY**

Company Astro Petroleum Company, Inc. Lease Braman Well No. 1-A  
 Location S $\frac{1}{2}$ , SW $\frac{1}{4}$   
 Section 6 Twp. 27S Rge. 16E County Wilson State Kansas

Elevation, Feet .....

Name of Sand..... Bartlesville

Top of Core ..... 997.0

Bottom of Core ..... 1013.0

Top of Sand ..... 998.2

Bottom of Sand ..... 1012.8

Total Feet of Permeable Sand ..... 9.7

Total Feet of Floodable Sand ..... 4.1

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 3	1.4	1.4
20 - 30	2.6	4.0
35 - 63	4.0	8.0
175 - 416	1.7	9.7

Average Permeability Millidarcys ..... 84.6

Average Percent Porosity ..... 18.6

Average Percent Oil Saturation ..... 33.6

Average Percent Water Saturation..... 46.1

Average Oil Content, Bbls./A. Ft. .... 494.

Total Oil Content, Bbls./Acre..... 4,796.

Average Percent Oil Recovery by Laboratory Flooding Tests..... 6.3

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. .... 100.

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 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:

<u>Depth Interval, Feet</u>	<u>Description</u>
997.0 - 998.2	Grayish brown very shaly sandstone.
998.2 - 998.6	Brown sandstone with scattered shale partings.
998.6 - 999.6	Alternate layers gray shale and brown sandstone.
999.6 - 1001.0	Brown sandstone.
1001.0 - 1003.1	Grayish brown very shaly sandstone.
1003.1 - 1004.6	Brown sandstone with gray shale partings.
1004.6 - 1006.4	Grayish brown slightly sandy shale.
1006.4 - 1007.1	Brown sandstone.
1007.1 - 1008.1	Grayish brown slightly sandy shale.
1008.1 - 1012.8	Dark brown sandstone.
1012.8 - 1013.0	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 4.1 feet of sand. The weighted average percent oil saturation was reduced from 37.9 to 31.6, or represents an average recovery of 6.3 percent. The weighted average effective permeability of the samples is 5.47 millidarcys, while the average initial fluid production pressure is 16.0 pounds per square inch (See Table V).

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By observing the data given in Table IV, you will note that of the 12 samples tested, 5 produced water and oil, and 4 produced water only. This indicates that approximately 42 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 1,220 barrels of oil per acre. This is an average recovery of 299 barrels per acre foot from 4.1 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.07
Reservoir water saturation, percent, estimated	25.0
Average porosity, percent	20.0
Oil saturation after flooding, percent	31.6
Performance factor, percent, estimated	50.0
Net floodable sand, feet	4.1

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Astro Petroleum Company, Inc. Lease Braman Well No. 1-A

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	998.4	15.7	29	56	85	353	2.8	0.4	0.4	141	1.12
2	999.7	19.0	31	42	73	457	47.	0.8	1.2	366	37.60
3	1000.5	19.3	24	54	78	359	39.	0.6	1.8	215	23.40
4	1002.6	15.7	22	73	95	268	0.95	1.0	2.8	268	0.95
5	1003.4	18.5	29	55	84	416	52.	0.8	3.6	333	41.60
6	1004.5	16.7	13	65	78	168	21.	0.7	4.3	118	14.70
7	1006.7	20.1	32	53	85	499	175.	0.7	5.0	349	122.50
8	1008.5	20.3	44	27	71	693	60.	1.0	6.0	693	60.00
9	1009.5	17.6	35	52	87	478	28.	1.0	7.0	478	28.00
10	1010.7	17.5	38	34	72	516	29.	0.9	7.9	464	26.10
11	1011.5	20.0	54	27	81	838	62.	0.8	8.7	670	49.60
12	1012.6	21.5	42	28	70	701	415.	1.0	9.7	701	415.00

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## SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Astro Petroleum Company, Inc.	Lease	Braman	Well No.	I-A	
	<b>Depth Interval, Feet</b>	<b>Feet of Core Analyzed</b>	<b>Average Permeability, Millidarcys</b>	<b>Permeability Capacity Ft. x Md.</b>		
	998.2 - 1007.1	5.0	48.4	241.87		
	1008.1 - 1012.8	4.7	123.1	578.70		
	998.2 - 1012.8	9.7	84.6	820.57		
	<b>Depth Interval, Feet</b>	<b>Feet of Core Analyzed</b>	<b>Average Percent Oil Saturation</b>	<b>Average Percent Water Saturation</b>	<b>Average Oil Content Bbl./A. Ft.</b>	<b>Total Oil Content Bbls./Acre</b>
	998.2 - 1007.1	5.0	25.5	57.6	358	1,790
	1008.1 - 1012.8	4.7	42.2	33.9	640	3,006
	998.2 - 1012.8	9.7	33.6	46.1	494	4,796

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## RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Astro Petroleum Company, Inc. Lease Braman Well No. 1-A

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 Lbs./Sq./In.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	998.4	16.2	28	352	0	0	28	57	352	0	Imp.	-
2	999.7	19.2	31	462	2	30	29	61	432	340	10.65	15
3	1000.5	19.4	24	361	0	0	24	71	361	244	2.70	10
4	1002.6	16.0	22	273	0	0	22	74	273	16	0.10	45
5	1003.4	18.6	29	418	2	29	27	66	389	332	3.97	10
6	1004.5	17.0	13	171	0	0	13	67	171	0	Imp.	-
7	1006.7	20.2	32	501	4	63	28	54	438	400	5.55	10
8	1008.5	20.4	44	696	0	0	44	28	696	0	Imp.	-
9	1009.5	18.1	34	477	0	0	34	55	477	34	0.75	10
10	1010.7	17.4	38	513	0	0	38	34	513	0	Imp.	-
11	1011.5	20.1	54	842	15	234	39	56	608	172	3.22	20
12	1012.6	21.4	42	697	8	133	34	63	564	214	4.27	25

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.

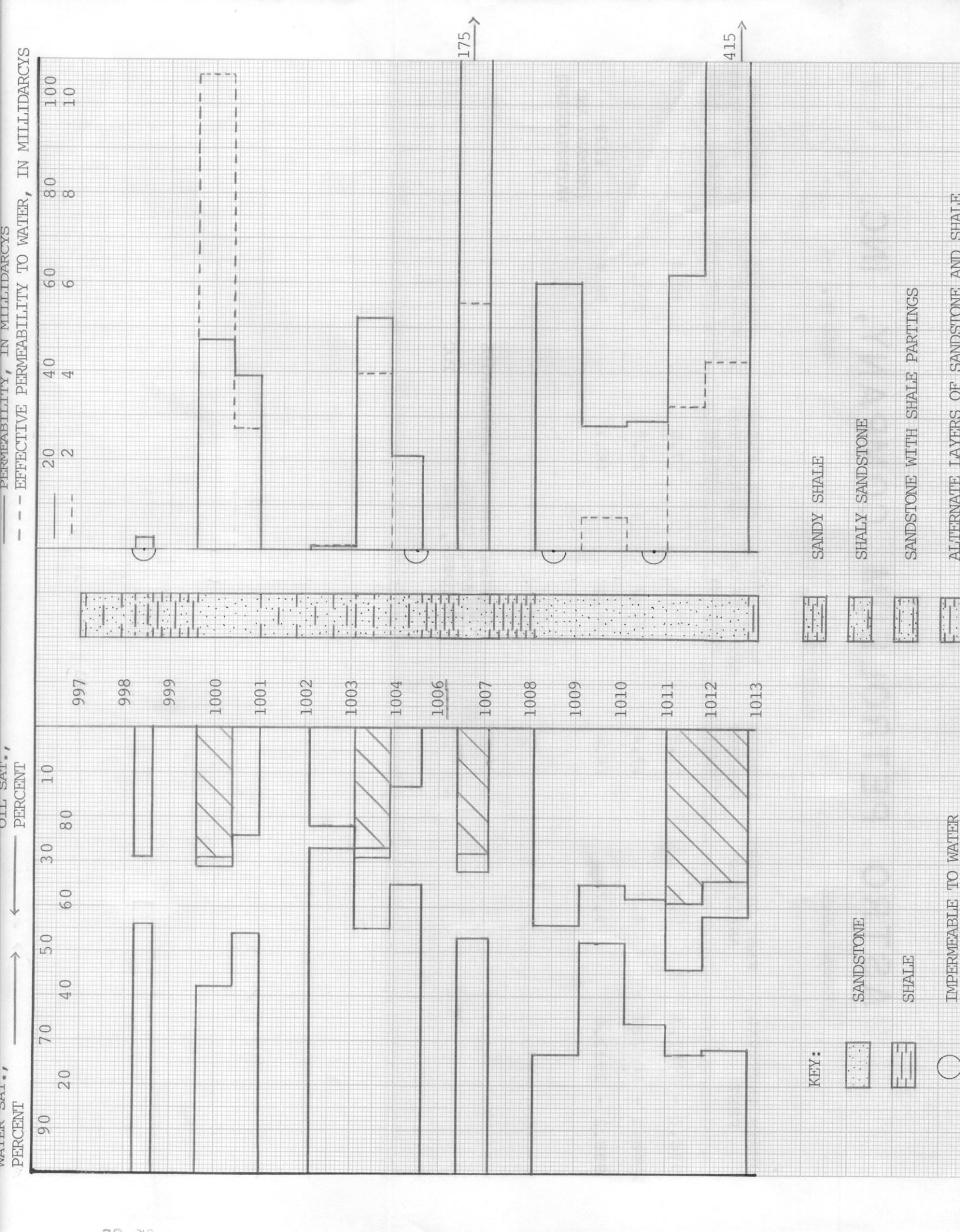
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## SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Astro Petroleum Company, Inc.	Lease	Braman	Well No.	1-A
Depth Interval, Feet	998.2 - 1007.1	1008.1 - 1012.8	998.2 - 1012.8		
Feet of Core Analyzed	2.3	1.8	4.1		
Average Percent Porosity	19.3	20.8	20.0		
Average Percent Original Oil Saturation	30.6	47.3	37.9		
Average Percent Oil Recovery	2.6	11.1	6.3		
Average Percent Residual Oil Saturation	28.0	36.2	31.6		
Average Percent Residual Water Saturation	60.6	59.9	60.3		
Average Percent Total Residual Fluid Saturation	88.6	96.1	91.9		
Average Original Oil Content, Bbls./A. Ft.	459.	761.	591.		
Average Oil Recovery, Bbls./A. Ft.	40.	178.	100.		
Average Residual Oil Content, Bbls./A. Ft.	419.	583.	491.		
Total Original Oil Content, Bbls./Acre	1,055.	1,370.	2,425.		
Total Oil Recovery, Bbls./Acre	91.	320.	411.		
Total Residual Oil Content, Bbls./Acre	964.	1,050.	2,014.		
Average Effective Permeability, Millidarcys	6.78	3.81	5.47		
Average Initial Fluid Production Pressure, p.s.i.	11.7	22.5	16.0		

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



# ASTRO PETROLEUM COMPANY, INC.

BRAMAN LEASE

WELL NO. 1-A

WILSON 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
998.2 - 1007.1	5.0	17.9	25.5	57.6	48.4	
1008.1 - 1012.8	4.7	19.4	42.2	33.9	123.1	
998.2 - 1012.8	9.7	18.6	33.6	46.1	84.6	1220 (PRIMARY AND WATERFLOODING)

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CHANUTE, KANSAS  
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