



OILFIELD RESEARCH LABORATORIES

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February 12, 1981

Aegean Petroleum, Inc.
P. O. Box 24
Osawatomie, Kansas 66064

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary cores taken from the Obermeier Lease, Well No. A-3, located in Miami County, Kansas and submitted to our laboratory on October 29, 1980.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/kas

3 c to Osawatomie, Kansas
3 c to Paola, Kansas 66071
Attn: Jim Stegeman, Scimitar Resources, Ltd.
7 Lewis Drive

The core was sampled and the samples sealed in plastic bags by a representative of the client.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
	<u>PERU SAND</u>
494.5 - 498.0	Gray laminated slightly calcareous sandstone and shale.
498.0 - 503.7	Light brown and gray laminated slightly calcareous sandstone and shale.
503.7 - 505.1	Gray laminated slightly calcareous sandstone and shale.
505.1 - 506.7	Brown calcareous sandstone.
506.7 - 507.0	Hard gray limestone.
507.0 - 507.7	Brown calcareous sandstone.
507.7 - 508.4	Hard grayish brown limestone.
508.4 - 508.9	Hard brown calcareous sandstone.
508.9 - 511.9	Dark brown calcareous sandstone.
511.9 - 513.0	Hard brown very calcareous sandstone.
	<u>SQUIRREL SAND</u>
653.0 - 655.6	Brown slightly calcareous shaly sandstone.
655.6 - 656.0	Gray sandy shale.
656.0 - 659.7	Brown and gray laminated slightly calcareous sandstone and shale.
659.7 - 661.2	Gray sandy shale.
661.2 - 662.7	Brown and gray laminated sandstone and shale.

662.7 - 664.0	Gray sandy shale.
664.0 - 664.9	Grayish light brown shaly sandstone.
664.9 - 666.2	Brown and gray laminated sandstone and shale.
666.2 - 670.3	Gray sandy shale.
670.3 - 671.0	Brown and gray laminated sandstone and shale.

LABORATORY FLOODING TESTS

PERU SAND

The sand in this core responded to laboratory flooding tests, as a total recovery of 790 barrels of oil per acre was obtained from 4.0 feet of sand. The weighted average percent oil saturation was reduced from 56.5 to 43.5, or represents an average recovery of 13.0 percent. The weighted average effective permeability of the samples is 8.76 millidarcys, while the average initial fluid production pressure is 26.3 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 13 samples tested, 4 produced water and oil, and 2 samples produced water only. This indicates that approximately 31 percent of the sand represented by these samples is floodable pay sand.

SQUIRREL SAND

The sand in this core responded to laboratory flooding tests, as a total recovery of 714 barrels of oil per acre was obtained from 3.4 feet of sand. The weighted average percent oil saturation was reduced from 51.6 to 37.4, or represents an average recovery of 14.2 percent. The weighted average effective permeability of the samples is 1.05 millidarcys, while the average initial fluid production pressure is 36.7 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 12 samples tested, 3 produced water and oil. This indicates that approximately 25 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 960 barrels of oil per acre from the Peru Sand, and approximately 870 barrels of oil per acre from the Squirrel Sand. This is an average recovery of 241 barrels per acre foot from the 4.0 feet of floodable sand from the Peru Sand, and an average recovery of 257 barrels per acre foot from 3.4 feet of floodable sand from the Squirrel Sand.

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

	<u>Peru Sand</u>	<u>Squirrel Sd.</u>
Original formation volume factor, estimated	1.04	1.04
Reservoir water saturation, percent, estimated	20.0	25.0
Average porosity, percent	18.6	19.1
Oil saturation after flooding, percent	43.5	37.4
Performance factor, percent, estimated	50.0	50.0
Net floodable sand, feet	4.0	3.4

RESULTS OF SPECIAL PERMEABILITY TESTS
USING INERT GAS
(90% N₂, 10% CO₂)

<u>SAMPLE</u>	<u>DEPTH FEET</u>	<u>PERMEABILITY (MIL.)</u>
14-----	653.5	----- 18.6
15-----	654.5	----- 77.0
16-----	655.5	----- Imp.
17-----	656.5	----- 3.1
18-----	657.5	----- 1.8
19-----	658.5	----- 1.95
23-----	664.2	----- 0.04
24-----	665.5	----- 0.37

(Insufficient sample to obtain permeability samples
on #20, #21, and #22)

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Agean Petroleum, Inc.

Lease Obermeier

Well No. A-3

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			Ft.	Cum. Ft.		
1	498.5	14.3	23	75	PERU SAND	2.0	1.0	255	2.00	
2	500.5	20.9	50	36	255	42.	1.0	811	42.00	
3	501.5	15.0	29	68	811	84.	1.0	338	84.00	
4	502.5	15.8	38	60	338	2.1	1.0	466	2.10	
5	503.5	16.0	26	72	466	5.2	0.7	226	3.64	
6	505.5	14.0	46	35	323	13.	1.0	500	13.00	
7	506.5	16.3	41	55	500	346.	0.6	311	207.60	
8	507.5	23.2	52	45	519	179.	1.0	936	179.00	
9	508.5	8.3	35	50	225	1.0	0.5	113	0.50	
10	509.5	11.9	64	26	591	31.	1.0	591	31.00	
11	510.5	10.2	58	24	459	92.	1.0	459	92.00	
12	511.5	18.5	60	31	861	44.	1.0	861	44.00	
13	512.5	13.8	65	23	696	73.	1.1	766	80.30	
14	653.5	17.6	47	32	SQUIRRELL SAND	9.1	1.0	642	9.10	
15	654.5	18.3	50	41	642	6.9	1.0	710	6.90	
16	655.5	18.5	43	40	710	6.8	0.6	370	4.08	
17	656.5	20.4	51	29	617	25.	1.4	1130	35.00	
18	657.5	16.7	47	44	807	2.2	1.0	609	2.20	
19	658.5	18.4	57	29	609	4.6	1.0	814	4.60	
20	659.5	13.1	30	68	814	Imp.	0.7	214	0.00	
21	661.5	13.1	21	70	305	3.1	0.8	170	2.48	
22	662.5	15.2	29	68	213	0.25	0.7	239	0.18	
23	664.2	14.6	52	46	342	Imp.	0.9	530	0.00	
24	665.5	16.9	56	41	589	14.	1.3	954	18.20	
25	670.5	13.3	26	71	734	5.4	0.7	188	3.78	

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Aegean Petroleum, Inc.	Lease	Obermeier	Well No.	A-3
	Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.	
		<u>PERU SAND</u>			
	498.0 - 513.0	11.9	65.6	781.14	
		<u>SQUIRREL SAND</u>			
	653.0 - 671.0	9.5	9.1	86.52	

Depth Interval, Feet	Feet of Core Analyzed	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbl./A. Ft.	Total Oil Content Bbls./Acre
		<u>PERU SAND</u>			
498.0 - 513.0	11.9	46.4	44.9	557	6,633
		<u>SQUIRREL SAND</u>			
653.0 - 671.0	11.1	44.5	45.6	592	6,570

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

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			
1	498.5	14.8	22	253	PERU SAND	0	0	22	76	253	-
2	500.5	21.0	50	815	17	277	33	59	288	538	20
3	501.5	15.1	29	340	0	0	29	68	0	340	-
4	502.5	15.6	38	460	0	0	38	60	0	460	-
5	503.5	16.4	25	318	0	0	25	73	0	318	-
6	505.5	14.1	46	503	0	0	46	37	0	503	-
7	506.5	16.8	40	521	0	0	40	56	0	521	-
8	507.5	23.2	52	936	16	288	36	62	245	648	25
9	508.5	8.0	36	223	0	0	36	51	9	223	50
10	509.5	11.8	64	586	9	82	55	43	119	504	35
11	510.5	10.5	57	464	0	0	57	40	6	464	50
12	511.5	18.4	60	856	10	143	50	48	338	713	25
13	512.5	14.2	64	705	0	0	64	25	0	705	-
14	653.5	17.7	47	645	SQUIRREL SAND	10	137	37	59	508	45
15	654.5	18.1	50	702	0	0	50	43	0	702	-
16	655.5	18.6	43	620	0	0	43	40	0	620	-
17	656.5	20.4	51	807	13	206	38	60	90	601	25
18	657.5	16.8	47	613	0	0	47	50	0	613	-
19	658.5	18.6	57	823	20	289	37	53	7	534	40
20	659.5	13.4	29	301	0	0	29	69	0	301	-
21	661.5	13.0	21	212	0	0	21	70	0	212	-
22	662.5	15.1	29	340	0	0	29	68	0	340	-
23	664.2	15.1	51	597	0	0	51	47	0	597	-
24	665.5	16.4	57	725	0	0	57	40	0	725	-
25	670.5	13.2	26	266	0	0	26	71	0	266	-

Company Agean Petroleum, Inc. Lease Obermeier Well No. A-3

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	Lease	Obermeier	Well No.
	PERU SAND	SQUIRREL SAND	A-3
Depth Interval, Feet	498.0 - 513.0	653.0 - 671.0	
Feet of Core Analyzed	4.0	3.4	
Average Percent Porosity	18.6	19.1	
Average Percent Original Oil Saturation	56.5	51.6	
Average Percent Oil Recovery	13.0	14.2	
Average Percent Residual Oil Saturation	43.5	37.4	
Average Percent Residual Water Saturation	53.0	57.7	
Average Percent Total Residual Fluid Saturation	96.5	95.1	
Average Original Oil Content, Bbls./A. Ft.	799.	764.	
Average Oil Recovery, Bbls./A. Ft.	198.	210.	
Average Residual Oil Content, Bbls./A. Ft.	601.	554.	
Total Original Oil Content, Bbls./Acre	3,193.	2,597.	
Total Oil Recovery, Bbls./Acre	790.	714.	
Total Residual Oil Content, Bbls./Acre	2,403.	1,883.	
Average Effective Permeability, Millidarcys	8.76	1.05	
Average Initial Fluid Production Pressure, p.s.i.	26.3	36.7	

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