OILFIELD RESEARCH LABORATORIES
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March 1, 1979

Somerset Energy, Inc.
P.O. Box 449
Moran, Kansas 66755

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Young Lease, Well No. 100, Miami County, Kansas, and submitted to our laboratory on February 22, 1979.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman

Benjamin R. Pearman

SAM:km
5 c to Moran, Kansas

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Somerset Energy, Inc. Lease Young Well No. 100

Location NE SW SW NW

Section 20 Twp. 16S Rge. 24E County Miami State Kansas

Name of Sand	Big Lake (Peru)
Top of Core	392.0
Bottom of Core	431.7
Top of Sand	392.0
Bottom of Sand	431.3
Total Feet of Permeable Sand	27.5
Total Feet of Floodable Sand	21.0

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 100	5.8	5.8
100 - 200	2.2	8.0
200 - 400	3.2	11.2
400 - 600	8.3	19.5
600 - 900	8.0	27.5

Average Permeability Millidarcys	368.7
Average Percent Porosity	18.2
Average Percent Oil Saturation	33.4
Average Percent Water Saturation	45.7
Average Oil Content, Bbls./A. Ft.	484.
Total Oil Content, Bbls./Acre	13,301.
Average Percent Oil Recovery by Laboratory Flooding Tests	10.7
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	172.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	3,610.
Total Calculated Oil Recovery, Bbls./Acre (Primary & Waterflooding)	7,560.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

The core was sampled and the samples sealed in plastic bags by an agent of the client. The drilling fluid consisted of salt water mud. The core was reported to be from non-virgin territory.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
392.0 - 393.0	Brown slightly calcareous laminated slightly shaly sandstone.
393.0 - 394.0	Gray limestone.
394.0 - 394.8	Brown slightly calcareous sandstone.
394.8 - 398.3	White limestone.
398.3 - 399.1	Brown calcareous sandstone.
399.1 - 399.8	White and brown limestone and sandstone.
399.8 - 404.8	Brown slightly calcareous sandstone.
404.8 - 407.0	White limestone.
407.0 - 407.5	Brown slightly calcareous sandstone.
407.5 - 409.3	White and brown limestone.
409.3 - 419.7	Brown calcareous sandstone.
419.7 - 421.0	White limestone.
421.0 - 422.7	Brown calcareous sandstone.
422.7 - 423.1	White limestone.
423.1 - 427.8	Brown slightly calcareous sandstone.
427.8 - 428.7	White limestone.
428.7 - 429.1	Brown slightly calcareous sandstone.
429.1 - 431.3	Brown sandstone with limestone breaks.
431.3 - 431.7	Gray conglomeratic limestone.

SUMMARY

From a study of the data, it would appear that efficient primary and waterflood operations in the vicinity of this well should recover approximately 7,560 barrels of oil per acre. This is an average recovery of 360 barrels per acre foot from 21.0 acre feet of floodable sand analyzed in this core.

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

Original formation volume factor	1.03
Reservoir water saturation, percent	25.
Average porosity, percent	19.4
Oil saturation after flooding, percent	24.7
Performance factor, percent	50.0
Net floodable pay sand, feet	21.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Somerset Energy, Inc. Lease Young Well No. 100

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	392.9	16.9	34	32	66	446	588.	1.0	1.0	446	588.00
2	394.2	16.3	42	38	80	531	509.	0.8	1.8	425	407.20
3	398.5	14.9	39	42	81	451	703.	0.8	2.6	361	562.40
4	400.0	18.0	31	39	70	433	147.	0.7	3.3	303	102.90
5	400.8	20.4	29	49	78	459	296.	0.5	3.8	230	148.00
6	401.5	20.6	37	53	90	591	826.	1.0	4.8	591	826.00
7	402.7	23.4	39	42	81	708	440.	1.5	6.3	1062	660.00
8	404.2	23.3	45	37	82	813	849.	1.3	7.6	1057	1103.70
9	407.3	16.0	45	27	72	559	611.	0.5	8.1	280	305.50
10	409.5	20.8	42	35	77	678	231.	0.7	8.8	475	161.70
11	410.9	19.5	41	43	84	620	377.	1.0	9.8	620	377.00
12	411.9	20.9	35	34	69	568	453.	1.0	10.8	568	453.00
13	412.9	20.5	36	43	79	573	427.	1.5	12.3	860	640.50
14	414.2	19.1	33	40	73	489	437.	1.0	13.3	489	437.00
15	415.4	20.0	26	49	75	403	419.	1.5	14.8	605	628.50
16	416.5	17.2	36	55	91	480	382.	1.0	15.8	480	382.00
17	417.5	20.9	36	53	89	584	611.	1.0	16.8	584	611.00
18	418.5	22.3	24	68	92	415	703.	1.0	17.8	415	703.00
19	419.5	22.2	18	71	89	310	657.	0.7	18.5	217	459.90
20	421.5	19.9	26	62	88	401	899.	1.7	20.2	682	1528.30
21	424.2	12.6	36	53	89	352	60.	1.4	21.6	493	84.00
22	425.9	9.5	42	33	75	310	89.	2.0	23.6	620	178.00
23	427.5	8.9	45	46	91	311	13.	1.3	24.9	404	16.90
24	428.9	10.5	40	43	83	326	38.	0.4	25.3	130	15.20
25	430.3	22.3	28	39	67	484	161.	1.5	26.8	726	241.50
26	431.2	14.9	22	65	87	254	67.	0.7	27.5	178	46.90

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Somerset Energy, Inc. Lease Young Well No. 100

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
392.0 - 422.7	20.2	473.1	9557.30
422.7 - 431.3	7.3	79.8	582.50
392.0 - 431.3	27.5	368.7	10139.80

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
392.0 - 422.7	20.2	20.0	32.3	46.3	532	10,750
422.7 - 431.3	7.3	13.2	36.5	44.0	349	2,551
392.0 - 431.3	27.5	18.2	33.4	45.7	484	13,301

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Somerset Energy, Inc. Lease Young Well No. 100

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	392.9	16.4	34	433	8	102	26	52	331	340	45.92	5
2	394.2	15.8	42	515	14	171	28	56	344	150	32.50	5
3	398.5	14.9	39	451	6	69	33	53	382	180	38.75	5
4	400.0	17.5	31	421	4	54	27	55	367	145	31.49	5
5	400.8	20.8	29	468	9	145	20	69	323	36	0.97	20
6	401.5	21.1	37	606	16	262	21	67	344	54	1.42	15
7	402.7	23.9	39	723	19	352	20	70	371	266	50.00	5
8	404.2	22.8	45	796	21	372	24	67	424	203	16.86	5
9	407.3	16.3	45	569	8	101	37	54	468	357	34.50	5
10	409.5	20.8	42	678	16	258	26	67	420	162	25.30	10
11	410.9	19.0	41	604	21	310	20	54	294	310	44.98	5
12	411.9	20.6	35	559	12	192	23	69	367	174	26.24	5
13	412.9	20.6	36	576	8	128	28	61	448	361	48.92	5
14	414.2	19.6	33	502	7	106	26	62	396	186	17.24	5
15	415.4	19.7	26	397	6	92	20	73	305	189	22.87	5
16	416.5	17.7	36	494	10	137	26	65	357	155	15.59	5
17	417.5	21.4	36	597	16	265	20	67	332	332	35.24	5
18	418.5	22.5	24	419	3	53	21	74	366	334	55.00	5
19	419.5	22.4	18	313	0	0	18	68	513	330	24.74	5
20	421.5	20.4	26	411	3	47	23	64	364	188	21.74	5
21	424.2	12.1	36	338	0	0	36	53	338	50	1.87	20
22	425.9	9.3	42	303	0	0	42	52	303	46	1.20	30
23	427.5	8.5	45	297	0	0	45	48	297	8	0.15	35
24	428.9	10.1	38	298	0	0	38	50	298	0	Imp.	-
25	430.3	21.8	40	676	9	152	31	63	524	372	6.82	30
26	431.2	14.7	22	251	0	0	22	75	251	50	1.42	30

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 Somerset Energy, Inc. Lease Young Well No. 100

Depth Interval, Feet	392.0 - 422.7	422.7 - 431.3	392.0 - 431.3
Feet of Core Analyzed	19.5	1.5	21.0
Average Percent Porosity	19.2	21.8	19.4
Average Percent Original Oil Saturation	35.0	40.0	35.4
Average Percent Oil Recovery	10.8	9.0	10.7
Average Percent Residual Oil Saturation	24.2	31.0	24.7
Average Percent Residual Water Saturation	63.9	63.0	63.8
Average Percent Total Residual Fluid Saturation	88.1	94.0	88.5
Average Original Oil Content, Bbls./A. Ft.	541.	676.	551.
Average Oil Recovery, Bbls./A. Ft.	173.	152.	172.
Average Residual Oil Content, Bbls./A. Ft.	368.	524.	379.
Total Original Oil Content, Bbls./Acre	10,552.	1,014.	11,566.
Total Oil Recovery, Bbls./Acre	3,382.	228.	3,610.
Total Residual Oil Content, Bbls./Acre	7,170.	786.	7,956.
Average Effective Permeability, Millidarcys	30.7	6.8	28.9
Average Initial Fluid Production Pressure, p.s.i.	6.5	30.	7.6

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

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RESULTS OF WATER DIFFERENTIATION TESTS

TABLE VI

Company Sunset Energy, Inc. Lease Young Well No. 100

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation Connate	Drilling & Foreign	Total
1	392.9	26,000			
2	394.2	28,557			
3	398.5	20,731			
4	400.0	26,664			
5	400.8	19,851			
6	401.5	16,720			
7	402.7	19,389			
8	404.2	22,031			
9	407.3	37,288			
10	409.5	22,952			
11	410.9	18,099			
12	411.9	25,363			
13	412.9	22,135			
14	414.2	22,121			
15	415.4	13,767			
16	416.5	21,527			
17	417.5	16,407			
18	418.5	16,448			
19	419.5	15,968			
20	421.5	17,250			
21	424.2	18,927			
22	425.9	54,982			
23	427.5	28,378			
24	428.9	34,381			
25	430.3	25,225			
26	431.2	23,468			

Drilling fluid contained 10,638 ppm Chlorides.

Note: ppm — parts per million