

Musgrove
PETROLEUM CORPORATION

801 Union Center
Wichita, Kansas

November 20, 1959

Musgrove Petroleum Corporation
801 Union Center
Wichita, Kansas

Re: Geological Report
Musgrove's #1 BROWN A
C SW NE Sec. 12-6S-35W
Thomas County, Kansas

Commenced: October 19, 1959
Completed: November 5, 1959

Set 8-5/8" surface at 208' w/150 sx
Contractor: John O. Farmer, Inc.

Gentlemen:

Joint samples were saved on the subject test from under surface casing to 3000 feet. Ten-foot samples were saved from 3000 feet to 3980 feet. Five-foot samples were saved from 3980 feet to the total depth. Ten-foot drilling time was kept from under surface casing to 3000 feet. One-foot drilling time was kept from 3000 feet to the total depth.

Four drill stem tests were taken and a Schlumberger Gamma Ray-Laterolog MicroLaterolog survey was run upon completion of the test.

Drilling was witnessed by the undersigned from 3300 feet to the total depth, and samples were examined from under surface to the total depth. Listed below are sample and Schlumberger tops, along with a sample description of the more interesting zones (all datum being measured from the Kelly Bushing):

ELEVATIONS:	Ground Level	3172
	Derrick Floor	3176
	Kelly Bushing	3178

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HORIZON	Sample Top	Schlumberger Top
Anhydrite		2820' (/ 358)
Council Grove Group		3313' (- 135)
Wabaunsee Group		3638' (- 460)
Tarkio		3728' (-550)
Topeka	3898'	3851' (- 673)
Heebner	4032'	4030' (- 852)
Toronto	4063'	4062' (- 884)
Lansing	4079'	4077' (- 899)
Base/ Kansas City	4342'	4351' (-1173)
Marmaton	4364'	4368' (-1190)
Cherokee	4520'	4520' (-1342)
Mississippian	4696'	4696' (-1518)
Total Depth	4805'	4805' (-1627)

WABAUNSEE GROUP - 3638' (-460)

<u>3670 to 3675</u>	Dolomite, buff-white, fine crystalline, weathered appearance, poor to fair vugular and pin point porosity. No shows.
<u>3732 to 3736</u>	Limestone, dolomitic, gray, fine crystalline, poor vugular porosity. No shows.
<u>3739 to 3744</u>	Limestone, dolomitic, gray-buff, fine crystalline, fair intercrystalline & vugular porosity, good show free oil, brown stain, good even saturation .
<u>3750 to 3754</u>	Limestone, gray, fine crystalline to dense. Still carrying much stain, probably from zone above.
<u>3758 to 3764</u>	Limestone, gray-buff, fine crystalline, fossiliferous, poor porosity. No shows.

DRILL STEM TEST #1 from 3734 to 3770'. Open 1 hour, shut in 20 minutes. Weak blow throughout. Recovered 300' fluid (150' gassy oil and 150' muddy oil). IFP 0#, FFP 90#, IBHP 1180#, FBHP 960#, HH 1930#.

TOPEKA - 3851' (-673)

<u>3851 to 3859</u>	Limestone, buff-white, fine crystalline, poor porosity, slightly oolitic or sandy, few gilsonite spots.
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<u>3902 to 3913</u>	Limestone, buff-white, fine crystalline, poor pin point porosity, black stain in pin points, very scattered.
<u>3916 to 3940</u>	Limestone, white, partly chalky, trace pin point porosity. Dead black stain in part of pin points, again staining in very minute amounts.
<u>3951 to 3958</u>	Limestone, white, fine crystalline, poor to fair inter crystalline and pinpoint porosity. No shows.
<u>3982 to 3992</u>	Limestone, gray, dense. No shows.
<u>3997 to 4001</u>	Limestone, dolomitic, buff, fine crystalline, fair intercrystalline and vugular porosity, show free oil, good even stain.
<u>4006 to 4029</u>	Limestone, white, chalky, with scattered sandy textured zones having fair inter granular porosity, no show.

DRILL STEM TEST #2 from 3990 to 4041' Open 1 hour, shut in 20 minutes. Strong blow throughout. Recovered 1503' muddy salt water. IFP 150#, FFP 750#, IBHP 1260#, FBHP 1190#.

TORONTO - 4062' (-884)

<u>4062 to 4069</u>	Limestone, buff-white, fine crystalline to dense, slightly cherty, trace fair pin point porosity.
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LANSING - 4077' (-899)

<u>4077 to 4082</u>	Limestone, buff-white, fine crystalline, poor scattered vugular porosity, scattered dark stain, no free oil in wet samples.
<u>4085 to 4090</u>	Limestone, buff-white, fine crystalline, fair pinpoint porosity, dark tarry pinpoint staining.
<u>4109 to 4114</u>	Limestone, buff-white, fine crystalline, fair pinpoint & vugular porosity, spotted black tarry stain, trace free oil in wet samples.

DRILL STEM TEST #4 (Straddle Test) from 4063 to 4124' Open 1 hour, shut in 20 minutes. Strong blow throughout test. Recovered 785' muddy salt water. IFP 50#, FFP 400#, IBHP 1310#, FBHP 1250#, IHH 2200#, FHH 2150#.

- 4171 to 4192 Limestone, gray to white, fine crystalline to chalky, very cherty in lower part, chert - white opaque.
- 4210 to 4224 Limestone, buff, fine to medium crystalline, fair intercrystalline and pinpoint porosity, cherty. No shows.
- 4257 to 4269 Limestone, buff-white, fine crystalline to chalky. Trace intercrystalline porosity. No shows.
- 4314 to 4318 Limestone, brown to buff, medium crystalline, fair intercrystalline and pin point porosity. No shows.

MARMATON - 4368 (-1190)

- 4374 to 4384 Limestone, buff fine crystalline, few pieces had poor pin point porosity and dark pin point staining. No free oil. (very poor samples).
- 4400 to 4404 Limestone, white, fine crystalline to partly chalky. Few pieces had spotted staining in pin point porosity. (very poor samples).
- 4430 to 4438 Limestone, buff-white, fine crystalline to chalky poor pinpoint porosity, trace spotted stain. (very poor samples).
- 4443 to 4455 Limestone, buff, fine crystalline, trace fair vugular porosity, one piece had good show of free oil in wet samples. (Very poor samples).
- 4465 to 4487 Limestone, white, dense, very cherty, chert and limestone oolitic. No shows.

DRILL STEM TEST #3 from 4402 to 4479' Open 1 hour, shut in 20 minutes, weak blow throughout. Recovered 40' rotary mud. BHP 590#.

CHEROKEE - 4520' (-1342)

- 4632 to 4649 Sandstone, white, fine grained, well rounded. No shows.
- 4682 to 4687 Sandstone, white, fine grained, also much cherty limestone and multi colored shale in samples. No Shows

MISSISSIPPIAN - 4696' (-1518)

<u>4696 to 4703</u>	Limestone and chert, buff-white. Limestone fairly dense, chert was slightly weathered. Fair vugular porosity in chert. Also a trace of white fine crystalline dolomite. No shows.
<u>4711 to 4762</u>	Dolomite, tan, fine crystalline, slightly sucrosic. Fair to good pin point and vugular porosity. Very cherty in lower part. No shows.
<u>4762 to 4805</u>	Limestone, buff, fine crystalline, oolitic, blue vitreous chert in upper portion, tan dolomitic stringers throughout section. No shows.

STRUCTURAL COMPARISON WITH NEARBY TESTS

	Musgrove & Farmer's Brown A #1 12-6S-35W C SW NE	Farmer & Texas Crude Everiss #1 35-5W-35W C NE SE	Derby & Van Grisso Nickel #1 16-6S-35W SE SE SE	J. S. Carter T. T. Henry 27-5S-34W SE SW NW
FORMATION				
Anhydrite	‡ 358	‡ 344	‡ 384	‡ 277
Wabaunsee	- 460		- 439	- 505
Heebner	- 852	- 848	- 837	- 884
Toronto	- 884	- 882	- 869	- 915
Lansing	- 899	- 897	- 882	- 927
Marmaton	-1190	-1187	-1159	-1187
Mississippian	-1518	-1557	-1537	-1520

RECOMMENDATIONS

A fair show of oil was recovered on Drill Stem Test #1 from a member of the Wabaunsee group. The results of this Drill Stem Test (3734 to 3770) were given above. Sample analysis, drill stem tests, and Schlumberger log analysis failed to show any zones of commercial value below this datum. Therefore, it was recommended that 5-1/2" pipe be set at 3840' and the Wabaunsee zone (3739 to 3744) be tested further through perforations.

Very truly yours,

Jerry A. Langrehr
Jerry A. Langrehr, Geologist.

DRILLING TIME LOG

Musgrove's BROWN A #1
C SW NE Sec. 12-6S-35W
Thomas County, Kansas

Depth		Drilling Time	Remarks
From	To		
200 to	300	2-2-4-4-3-4-3-3-1-3	
300 to	400	5-5-3-3-3-2-4-2-2-3	
400 to	500	3-2-3-2-2-2-2-2-4-4	
500 to	600	3-3-3-2-2-1-1-1-2-2	
600 to	700	2-3-2-3-5-3-3-3-2-3	
700 to	800	2-2-2-2-2-2-2-2-2-2	
800 to	900	2-2-2-2-2-3-3-3-3-3	
900 to	1000	3-3-3-4-3-2-3-4-3-3	
1000 to	1100	4-3-3-4-5-4-3-4-3-3	
1100 to	1200	3-3-5-7-4-5-3-4-4-4	
1200 to	1300	4-3-3-2-2-2-3-2-4-4	
1300 to	1400	3-4-5-4-4-4-5-6-5-6	
1400 to	1500	4-4-4-5-5-4-4-5-5-5	
1500 to	1600	6-4-4-6-6-6-8-7-7-6	
1600 to	1700	6-6-6-6-6-5-6-6-6-6	
1700 to	1800	6-6-6-6-6-6-5-6-8-8	
1800 to	1900	8-7-7-7-5-15-8-15-14-13	
1900 to	2000	11-17-15-15-13-8-8-12-14-10	
2000 to	2100	15-20-15-20-20-20-15-17-11	Trip @ 2060'
2100 to	2200	10-9-12-10-11-12-13-13-10-8	
2200 to	2300	9-7-9-8-28-13-15-27-50-80	Trip @ 2290'
2300 to	2400	18-22-22-15-16-20-20-20-25-55	
2400 to	2500	35-50-24-36-38-46-25-19-12-12	Trip @ 2460'
2500 to	2600	14-15-24-39-31-31-31-30-30-27	
2600 to	2700	13-17-17-27-12-17-18-20-20-13	
2700 to	2800	24-15-17-20-13-14-15-13-10-15	
2800 to	2900	12-14-39-53-71-64-12-31-32-27	
2900 to	3000	51-13-15-15-20-19-21-23-17-24	Trip @ 2910'
3000 to	3010	3-2-3-2-2-2-3-3-3-3	
	3020	3-3-2-2-2-3-2-2-2-2	
	3030	2-2-2-2-2-2-2-2-1-1	
	3040	2-2-2-3-2-2-3-2-3-2	
	3050	3-3-3-4-3-3-2-3-2-2	
	3060	2-3-2-2-2-2-2-1-1-2	
	3070	1-2-2-2-3-2-3-3-4-4	
	3080	3-3-3-3-3-3-2-3-2-2	
	3090	2-3-3-1-2-2-1-1-2-2	
	3100	2-3-2-3-3-2-3-3-3-3	

Drilling Time Log
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Depth		Drilling Time	Remarks
From	To		
3100 to	3110	2-3-3-2-2-1-2-2-2-1	
	3120	3-2-2-2-1-1-1-1-1-1	
	3130	1-2-1-1-1-2-4-3-2-3	
	3140	3-2-2-2-3-1-2-1-1-1	
	3150	1-1-1-1-1-1-1-1-1/2-1/2	
	3160	1-1-1/2-1/2-1-1-1-1-1-2	
	3170	3-3-2-3-3-3-3-3-3-3	
	3180	4-3-3-3-3-3-2-2-3-3	
	3190	4-3-6-5-2-2-2-1-1-2	
	3200	2-3-5-3-4-4-5-3-3-3	
3200 to	3210	3-2-3-3-3-3-4-4-3-3	
	3220	5-5-4-3-3-4-4-4-4-5	
	3230	4-3-3-3-5-4-4-4-4-3	
	3240	3-3-3-2-2-3-5-5-6-4	
	3250	4-3-5-6-5-3-5-5-4-5	
	3260	4-5-6-5-6-5-5-7-6-7	
	3270	5-6-6-6-5-4-5-6-6-6	
	3280	5-5-4-4-6-6-6-5-4-4	
	3290	5-4-3-3-4-6-7-5-7-6	
	3300	6-4-4-4-4-5-7-4-6-6	
3300 to	3310	6-4-4-4-6-6-5-5-5-5	
	3320	7-5-4-2-2-7-7-8-7-7	Trip @ 3320'
	3330	5-3-3-4-3-3-3-3-2-3	
	3340	3-4-2-3-2-3-4-4-4-3	
	3350	3-2-3-4-2-2-1-1-1-1	
	3360	3-2-1-2-2-2-2-3-3-3	
	3370	3-3-3-2-2-3-3-3-2-3	
	3380	5-4-4-3-3-4-3-4-3-4	
	3390	4-4-4-4-4-4-4-5-5-5	
	3400	5-5-5-4-4-4-4-4-4-4	
3400 to	3410	4-4-4-5-5-4-4-4-4-4	
	3420	4-5-4-6-7-9-9-9-6-7	Vis. 35, Wt. 9.8# @ 3413'
	3430	4-5-3-2-4-3-4-4-2-4	
	3440	4-4-4-3-3-3-3-4-4-4	
	3450	4-4-5-4-4-4-4-4-5-5	
	3460	4-2-2-1-1-1-1-2-1-1	
	3470	1-2-1-2-2-1-2-2-1-2	
	3480	1-4-4-3-3-4-4-4-4-2	
	3490	3-5-5-6-5-7-6-7-7-7	
	3500	5-5-5-5-8-10-10-12-14-10	Vis. 37, Wt. 9.8# @ 3499'
3500 to	3510	8-6-4-4-2-2-2-2-2-2	
	3520	2-2-6-7-9-12-13-12-11-15	
	3530	13-12-10-11-14-14-14-12-10-14	
	3540	15-18-15-17-3-2-2-4-5-3	Trip @ 3534'
	3550	3-4-3-2-1-1-1-2-3-4	

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Depth		Drilling Time	Remarks
From	To		
	3560	4-5-3-5-6-6-6-7-6-5	Vis. 37, Wt. 9.8# @ 3555'
	3570	4-4-6-6-3-2-1-1-2-6	
	3580	7-7-8-4-2-2-3-2-3-3	
	3590	3-4-2-4-3-4-5-4-4-4	
	3600	4-4-5-4-3-6-8-6-5-5	
3600 to	3610	6-6-6-5-4-5-4-4-3-3	
	3620	2-4-4-4-4-3-4-5-3-3	
	3630	2-3-3-4-2-3-3-2-2-2	
	3640	2-1-2-2-1-3-4-3-1-2	
	3650	3-4-6-5-4-3-3-5-6-5	
	3660	5-4-4-3-2-3-4-8-6-3	
	3670	4-3-2-4-4-5-4-4-3-3	
	3680	3-5-7-7-8-8-2-3-3-4	Vis. 40, Wt. 9.9# @ 3675'
	3690	2-4-4-3-7-4-3-3-4-5	
	3700	5-3-3-3-5-2-7-8-8-7	Vis. 42, Wt. 9.8# @ 3698'
3700 to	3710	5-4-3-5-6-5-4-3-3-3	
	3720	2-4-4-4-3-3-3-2-5-4	
	3730	4-4-3-4-3-3-2-1-5-5	Vis. 43, Wt. 10# @ 3729'
	3740	2-2-7-5-5-7-3-3-5-5	
	3750	5-5-4-6-6-6-3-6-7-8	
	3760	9-9-8-9-6-5-4-5-7-8	
	3770	10-11-10-9-9-8-5-7-6-4	Circ. for DST #1 @ 3769'
	3780	4-3-4-6-6-6-6-4-5-6	Vis. 41, Wt. 9.7# @ 3774'
	3790	5-4-5-4-4-2-1-2-3-3	
	3800	5-4-2-3-4-3-2-2-3-2	Vis. 41, Wt. 9.9# @ 3796'
3800 to	3810	3-4-3-5-3-3-4-4-1-3	
	3820	3-5-4-4-5-5-3-4-5-4	
	3830	4-5-5-3-4-5-4-6-4-4	
	3840	6-6-7-5-4-3-4-2-3-4	
	3850	4-5-3-3-4-3-3-2-2-3	
	3860	3-4-4-4-3-3-4-4-7-5	
	3870	3-4-4-3-1-1-5-3-4-4	
	3880	3-2-2-1-1-3-4-5-2-2	
	3890	2-3-3-2-1-2-1-1-2-1	
	3900	1-1-1-2-1-2-3-3-6-3	
3900 to	3910	5-4-6-5-5-6-6-6-4-6	Vis. 45, Wt. 10.1# @ 3906'
	3920	5-6-6-6-5-6-5-6-5-5	Vis. 45, Wt. 10.1# @ 3915'
	3930	6-5-4-4-4-4-5-6-3-3	Vis. 44, Wt. 10.1# @ 3924'
	3940	4-6-5-5-4-7-6-5-5-6	Vis. 43, Wt. 10.2# @ 3937'
	3950	7-7-9-6-5-8-6-6-7-7	Vis. 43, Wt. 10.2# @ 3946'
	3960	7-7-6-3-4-5-4-4-4-6	
	3970	5-5-4-5-5-5-6-5-6-6	
	3980	6-5-5-6-5-6-6-7-5-5	Vis. 42, Wt. 10.3@ 3978'
	3990	5-5-5-6-6-8-8-7-8-8	
	4000	9-5-8-6-5-5-4-5-5-5	

Drilling Time Log
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Depth			
From	To	Drilling Time	Remarks
4000 to	4010	6-8-6-6-5-5-4-5-4-5	
	4020	4-4-4-4-3-5-3-3-3-3	
	4030	4-3-5-5-6-5-5-5-6-8	
	4040	8-6-5-5-5-4-6-8-6-4	Vis. 40, Wt. 10.3# @ 4038'
	4050	6-5-3-4-5-4-4-3-3-4	Circ. for DST #2 @ 4040
	4060	5-4-3-3-4-4-4-4-4-4	
	4070	5-4-4-3-3-3-4-4-4-5	Vis. 53, Wt. 10.3# @ 4062'
	4080	4-4-4-4-4-4-3-2-2-2	
	4090	4-4-3-3-4-4-4-4-5-4	
	4100	4-5-7-6-5-6-5-4-5-4	
4100 to	4110	5-5-4-5-5-4-5-4-6-5	
	4120	5-4-4-5-6-6-5-5-6-6	
	4130	7-6-6-6-4-7-6-7-7-6	Vis. 40, Wt. 10.2# @ 4125'
	4140	6-7-8-8-9-9-10-10-9-11	Vis. 40, Wt. 10.2# @ 4138'
	4150	10-10-10-9-10-11-8-10-9-8	
	4160	8-8-10-9-10-9-11-7-8-10	
	4170	7-7-8-7-8-8-8-9-8-6	
	4180	5-6-8-8-8-7-6-5-7-7	
	4190	8-7-9-8-8-10-8-7-8-5	
	4200	10-12-11-14-14-7-10-13-13-16	Vis. 39, Wt. 10.1# @ 4191'
4200 to	4210	16-13-13-13-15-14-15-13-13-13	Vis. 55, Wt. 10.2# @ 4207'
	4220	10-12-12-12-16-6-7-7-7-7	Trip @ 4216'
	4230	5-4-5-5-6-5-5-8-7-7	
	4240	8-3-8-5-7-6-6-6-8-4	
	4250	7-8-9-8-6-7-6-9-8-7	
	4260	8-7-8-7-7-7-7-7-6-4	
	4270	5-5-5-6-4-4-5-5-6-8	Vis. 45, Wt. 10.3# @ 4267'
	4280	7-7-6-7-7-6-6-6-7-8	
	4290	6-4-5-8-9-8-8-8-7-7	
	4300	8-7-7-8-7-10-8-9-8-8	
4300 to	4310	10-11-8-7-10-11-10-9-9-9	
	4320	9-9-8-6-8-8-8-9-8-10	
	4330	10-10-7-6-9-9-9-11-8-7	
	4340	8-7-8-8-9-8-9-11-7-7	Vis. 40, Wt. 10.1# @ 4338'
	4350	4-6-6-7-9-11-10-10-10-9	
	4360	9-9-9-8-7-8-9-8-9-8	
	4370	8-7-8-7-7-7-8-10-8-9	Vis. 43, Wt. 10.2# @ 4367'
	4380	6-7-6-7-10-10-11-12-5-7	Trip @ 4378'
	4390	6-7-7-7-6-6-6-5-6-6	
	4400	5-5-7-7-6-6-6-6-5-6	

Drilling Time Log
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Depth		Drilling Time	Remarks
From	To		
4400 to 4410		6-9-7-6-4-5-4-5-5-6	
	4420	4-5-4-6-6-5-5-5-6-5	Vis. 47, Wt. 10.2# @ 4419'
	4430	6-8-7-8-5-8-6-7-5-4	
	4440	4-5-6-7-8-7-6-6-4-5	
	4450	6-5-6-7-6-6-7-6-7-7	
	4460	6-7-8-7-7-5-5-6-6-6	
	4470	7-5-5-6-8-8-5-7-7-7	
	4480	7-7-8-7-6-6-8-10-7-6	Circ. for DST #3 @ 4478'
	4490	7-8-9-11-10-10-6-9-3-4	
	4500	9-7-6-8-9-9-11-8-6-6	
4500 to 4510		6-6-8-7-6-3-6-10-10-13	
	4520	(12-10-10-8-10-9-8-9-10-12)	Vis. 44, Wt. 10.1# @ 4511'
	4530	12-9-4-4-7-8-9-10-11-12	
	4540	13-15-8-6-7-13-12-13-12-13	
	4550	15-9-11-11-12-13-11-10-13-10	
	4560	12-11-15-14-4-4-8-11-14-14	
	4570	9-10-12-13-12-14-13-15-12-12	
	4580	14-13-8-9-10-12-10-7-5-7	
	4590	6-9-10-13-7-12-11-10-10-14	
	4600	8-11-20-10-8-9-9-8-8-8	Vis. 45, Wt. 10# @ 4593'
4600 to 4610		11-14-10-9-8-8-9-10-11-5	Trip @ 4609'
	4620	5-6-5-3-2-2-5-8-8-8	
	4630	7-5-5-8-7-8-8-7-4-4	
	4640	5-8-7-10-4-5-6-5-6-8	
	4650	11-9-6-10-9-8-9-9-8-8	
	4660	9-11-9-9-10-10-10-12-13-11	Vis. 51, Wt. 9.8# @ 4655'
	4670	10-9-8-11-10-10-11-11-11-9	
	4680	10-10-9-10-11-13-10-10-10-12	
	4690	10-9-19-27-14-12-7-5-4-7	Trip @ 4684'
	4700	13-12-12-8-9-5-6-5-4-2	Vis. 59, Wt. 10# @ 4695'
4700 to 4710		7-5-6-5-8-8-9-9-8-7-	
	4720	8-8-7-8-5-12-15-14-18-20	Circ. 1 hour for samples Trip @ 4720'
	4730	8-9-4-4-4-6-8-7-5-7	
	4740	8-7-7-7-6-5-6-5-7-11	
	4750	8-5-5-5-5-12-6-8-6-6	
	4760	6-6-10-10-8-8-10-10-12-10	
	4770	13-14-15-7-12-15-14-15-11-11-	
	4780	12-11-13-13-12-14-12-10-17-11	Vis. 44, Wt. 9.9# @ 4776'
	4790	9-7-8-7-8-7-8-8-9-8	
	4800	9-6-8-17-14-15-8-12-10-10	
4800 to 4810		11-9-22-27-28	Vis. 49, Wt. 10# @ 4802'
4805'	Rotary Total Depth		