

AMSTUTZ AND YATES, INC.

November 30, 1950

Mr. Maurice L. Brown
Shallow Water Refining Company
114 West Pine Street
Garden City, Kansas

Subject: Shallow Water - Acilts No. 3,
C SE NW Sec. 34-T21S-R34W,
Finney County, Kansas.

Dear Maurice:

Herein is a geological report of the subject well.

Samples were examined from 2400 to 4727 feet, rotary total depth. Five rotary diamond cores were taken from intervals within the Marmaton and Mississippian formations and a Schlumberger survey was made from 3700 feet to the total depth. The following formation tops were determined from this information:

Elevation: 2955 Ground level
2958 Derrick floor
2961 Rotary bushing

	<u>Samples or core</u>	<u>Schlumberger</u>
Heebner	3762 (-801)	3763 (- 802)
Lansing-Kansas City	3782 (-821)	3781 (- 820)
Marmaton	4261 (-1300)	4360 (-1299)
Mississippian	4623 (-1662)	4625 (-1664)
Mississippian Line	4639 (-1673)	4638 (-1677)
Total Depth	4727 (-1766)	4726 (-1765)

All measurements are from the rotary bushing datum.

The following sample and core descriptions starting with the Lansing-Kansas City are of the more porous and likely fluid bearing intervals:

LANSING-KANSAS CITY FORMATION

3782-3791	fine to medium crystalline with small angular chert, slightly fractured, fair porosity, no stain, probably water bearing.
3795-3801	medium to coarsely crystalline, no staining, probably water bearing.
3813-3842	streaks of slight porosity, no staining.
3859-3867	fossiliferous and finely crystalline, no staining, probably water bearing.
3870-3876	calclitic, fossiliferous marl, no staining.
3880-3890	medium crystalline, poor porosity, no staining.

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3916-3938 marl with some fine to medium crystalline limestone, no staining.

3973-3980 oolitic and oolitic, good porosity, no staining, undoubtedly water bearing.

3984-4002 oolitic, good porosity, water bearing.

4004-4012 impure finely crystalline, poor porosity, no staining, probably water bearing.

4027-4036 finely crystalline, traces pinpoint porosity with indications of sulfur water.

4053-4058 medium crystalline, good crystalline and pinpoint porosity, uniform to slightly spotted medium staining.

4061-4068 medium crystalline, good crystalline porosity, spotted faint staining, appears to carry sulfur water.

4077-4085 oolitic, fair porosity, no staining, probably water bearing.

4088-4100 oolitic, good porosity, definitely water bearing.

4107-4115 oolitic, good porosity, leached, spotted faint staining, water bearing.

4118-4128 oolitic and oolitic, good porosity, traces of dead oil stain, water bearing.

4146-4153 marl, poor porosity, no stain.

4189-4194 oolitic and finely crystalline, fair porosity, no staining, probably water bearing.

MARMATON FORMATION

Core No. 1 4297 to 4327, recovered 30 feet.

4307-4314-3/4 limestone, light tan to buff, finely crystalline and fossiliferous, fair to good crystalline and good vugular porosity, thin streaks of poor porosity, good spotted medium dark live oil staining, bleeding oil showing some gas.

4332-4337 finely crystalline impure shaly, poor porosity, no staining.

4365-4370 oolitic and finely crystalline, fair porosity, spotted medium staining, appears mostly water bearing.

4381-4388 oolitic and finely crystalline, poor porosity, no staining, probably water bearing.

4409-4415 very finely crystalline dolomitic limestone with uniform medium dead staining having all indications of water and fair crystalline porosity.

4416-4422 medium crystalline and oolitic, fair porosity, traces faint flushed staining, water bearing.

4448-4455 oolitic and finely crystalline dolomite appears very tight with possible water in base.

4461-4468 oolitic and finely crystalline limestone, poor porosity, spotted light to medium stain at top, water bearing below.

Core No. 2 4537-4557, recovered 20 feet.

4539-4540 finely crystalline to dense with traces of bleeding oil in very spotty thin fractures.

4540-4542 impure finely crystalline limestone with very thin irregular gray shale partings, having traces of bleeding oil.

4546-4547 1/2 finely crystalline to dense, traces bleeding oil in top

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- thinly fractured zone.
- 4555-4556 very thin fractures in dense lime having traces of bleeding oil.
- 4556-4557 dark gray to gray green dolomite having traces of oil stain in horizontal thin fractures.
- 4578-4590 finely crystalline to dense dolomitic lime, poor porosity, no staining.

MISSISSIPPIAN FORMATION

Core No. 3 4618-4641, recovered 23 feet.

- 4623-4625 very finely crystalline glauconitic and pyritic dolomite, poor crystalline porosity, no staining.
- 4640-4641 stringers limestone and marl with much rose angular chert fragments, faint traces bleeding oil stain in limestone.

Core No. 4 4641-4689, recovered 48 feet.

- 4641-4641½ buff finely crystalline traces of thin horizontal fractures, poor crystalline porosity, traces very faint staining in fractures.
- 4641½-4649-3/4 fossiliferous and slightly oolitic good pin point porosity, in bands, slightly spotted good medium oil staining.
- 4650-4650½ slightly fractured finely crystalline dolomitic limestone, faint light stain in thin fractures.
- 4680-4689 finely crystalline slightly oolitic to dense fossiliferous limestone, poor crystalline porosity, no staining.

Core No. 5 4689-4727

- 4723½-4727 fossiliferous and finely crystalline limestone, good crystalline and small vugular porosity, slightly spotted bleeding oil staining.

Shows of oil in the Lansing-Kansas City formation were considered for drill stem testing, but because of the difficulty with stuck drill pipe while drilling this section, a drill stem test was not advised. The coring of oil bearing intervals of the Maraton and Mississippian formations eliminated the need for drill stem testing of these formations.

A Schlumberger survey made at total depth with fresh Aquagel mud spotted in the hole confirmed the porous lime zones and formation tops picked from sample analysis and drilling time. In addition to the regular service provided by Schlumberger, a microlog and inverted lateral curves were recommended and were run. The microlog is invaluable in evaluating thin porous sections which might otherwise be overlooked in sample determinations. The inverted lateral curve aids in determining the possible fluid content of thin limestone zones especially within the Lansing-Kansas City section. After close study of the electric log and comparison with the Schlumberger log of Asalts No. 1, we have concluded that there are no potentially productive intervals other than those underlined in the sample descriptions listed.

The top of the Mississippian formation, as distinguished from the top of

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the Mississippian limestone, has been picked from core sample. The formation top consists of highly glauconitic and pyritic dolomitic limestone which appears as a very shaly but well developed formation on the Schlumberger log. On a Lane Wells radioactivity log this same interval would appear as a very dense shale because of the glauconite and pyrite. On this account previous correlations and probably many Mississippian formation tops have been picked on top of what should be called the Mississippian limestone. This is purely an academic point and does not affect the productive possibilities or previous work done along this line.

Structurally Asilts No. 3 is one foot higher on the Lansing-Kansas City, four feet lower on the Maraton, and level on the Mississippian limestone as compared with Asilts No. 1. On the basis of structure alone, Asilts No. 3 should result in favorable production from the zones underlined in the sample description. Reservoir conditions as revealed by core analysis, however, are not overly encouraging except in the lower Mississippian and, therefore, production could be equal to or less than that of Asilts No. 1. In view of the more encouraging reservoir encountered at total depth, it was recommended that 5½ inch O.D. casing be cemented about five feet off bottom using a packer type cementing shoe. This was to prevent cement from entering and sealing off the porosity of the lowest productive interval. Subsequent testing of shows higher in the well will be made through perforations and insure more reliable testing results. A temperature survey of the cement behind the casing indicated the top of the cement to be at about 3100 feet which should provide an effective cement bond through the Lansing-Kansas City section.

Satisfactory production will probably require fairly large volumes of acid for each of the zones to be tested. Core analysis indicate average conditions of porosity but comparatively low permeability. This should be improved by acid treatment which should be conducted under pressure for best results. The use of Kone shots should provide maximum penetration and would be recommended for these formations. Although a very good mud was employed throughout the drilling of the productive sections, it may be necessary to swab the well for some time to aid in cleaning up the hole prior to and after acid treatment. The success obtained could be affected materially by the testing procedure.

Very truly yours,

AMSTUTZ AND YATES, INC.

R. A. Aukerman
R. A. Aukerman

RAA:lc

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DRILLING TIME LOG

The Shallow Water Refg. Co. - No. 3 Acilts
 C SE/4 NW/4 Sec. 34-T21S-R34W, Finney Co., Ka.

<u>Depth</u>		<u>Drilling Time</u>	<u>Remarks</u>
<u>From</u>	<u>To</u>		
2400 to	2410	4-5-5-5-2-3-3-3-2-2	Trip 2456.
	2420	3-3-3-2-2-2-2-2-2-2	
	2430	2-3-5-5-4-3-3-4-2-4	
	2440	3-5-4-4-3-4-4-3-5-6	
	2450	5-3-3-3-2-3-2-3-3-3	
	2460	6-6-8-12-12-12-2-3-4-3	
	2470	2-2-3-4-4-5-5-4-3-2	
	2480	2-3-3-2-3-4-4-4-4-3	
	2490	3-3-3-4-2-3-2-2-3-3	
	2500	4-4-4-4-5-6-7-3-3-3	
2500 to	2510	3-4-4-4-3-4-4-4-4-3	Test & Trip 2569.
	2520	3-4-4-4-3-4-4-3-4-4	
	2530	4-4-4-3-4-3-4-4-4-5	
	2540	5-6-6-5-5-4-5-4-4-5	
	2550	5-7-6-6-5-5-6-5-4-6	
	2560	5-7-6-6-6-7-6-6-6-7	
	2570	6-7-5-6-6-7-6-6-7-3	
	2580	4-3-3-2-3-4-3-3-4-3	
	2590	2-5-6-4-4-2-3-4-5-5	
	2600	4-5-4-4-3-3-2-2-1-1	
2600 to	2610	2-4-3-2-3-2-3-4-4-3	Hole taking mud 2733-40.
	2620	3-3-2-2-1-2-2-2-2-2	
	2630	2-1-2-2-2-3-2-2-2-2	
	2640	3-2-3-2-2-3-3-3-3-3	
	2650	2-2-2-2-2-3-3-3-3-4	
	2660	3-3-4-3-3-3-2-4-3-4	
	2670	4-4-2-3-2-2-2-2-3-3	
	2680	3-3-2-2-3-4-2-2-2-2	
	2690	2-2-2-1-1-1-1-2-2-2	
	2700	1-1-2-2-3-3-3-2-3-3	
2700 to	2710	2-2-1-1-1-2-2-2-2-3	Trip 2847.
	2720	4-3-4-4-4-3-3-3-3-3	
	2730	4-3-3-4-4-4-5-3-4-4	
	2740	4-4-3-2-3-2-2-2-2-2	
	2750	2-2-1-2-2-2-2-3-3-4	
	2760	4-4-5-5-4-4-3-3-4-5	
	2770	4-3-3-3-3-3-4-4-4-4	
	2780	4-6-7-5-4-5-4-5-4-5	
	2790	5-5-5-5-5-6-3-4-5-5	
	2800	5-4-4-4-3-1-1-1-1-2	
2800 to	2810	2-2-3-4-4-4-5-4-4-4	
	2820	4-3-3-3-4-4-5-5-5-4	
	2830	4-4-4-4-5-5-5-3-6-6	
	2840	6-9-11-9-8-7-8-6-4-9	
	2850	10-9-11-9-10-13-11-4-4-4	

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Depth		Drilling Time	Remarks
From	To		
2850 to	2860	3-3-3-3-4-3-3-4-5-6	
	2870	4-5-5-5-5-5-6-5-3-4	
	2880	3-3-3-4-5-5-5-4-5-5	
	2890	6-6-3-3-4-6-6-6-6-5	
	2900	5-5-6-6-6-5-5-4-5-4	
2900 to	2910	5-4-5-4-5-4-7-4-3-5	
	2920	4-4-5-4-3-4-3-4-4-4	
	2930	5-3-4-4-4-4-4-4-5-4-3	
	2940	3-4-5-4-4-4-3-4-3-7	
	2950	5-4-4-3-3-3-3-3-3-3	
	2960	2-2-3-4-2-3-5-5-4-4	
	2970	4-5-5-6-4-4-4-5-5-3	
	2980	4-4-5-6-6-6-4-4-5-4	
	2990	4-5-5-6-7-6-7-8-8-7	
	3000 to	8-8-7-8-7-7-7-7-6-6	
	3020	6-6-6-5-6-6-8-11-5-5	Trip 3018.
	3030	4-3-3-3-3-2-2-2-2-3	
	3040	3-3-4-3-2-3-3-3-3-3	
	3050	4-3-3-2-2-3-3-2-3-4	
	3060	4-3-3-3-3-3-4-4-4-4	
	3070	4-4-4-4-5-6-7-6-8-7	
	3080	6-7-6-7-8-7-8-9-7-8	
	3090	9-10-10-9-8-5-8-10-9-8	
	3100	7-9-9-9-9-8-8-8-10-9	
3100 to	3110	9-12-12-9-9-9-14-5-4-3	Trip 3107.
	3120	3-3-3-3-3-4-4-3-3-4	
	3130	4-3-5-4-3-3-3-2-3-4	
	3140	3-2-3-3-3-4-4-5-7-6	
	3150	9-7-7-8-6-6-6-8-8-9	
	3160	11-9-9-10-11-10-14-8-7-7	Trip & plug bit 3157.
	3170	8-6-5-4-4-4-6-6-6-5	
	3180	5-5-6-7-5-5-4-4-3-4	
	3190	5-7-9-11-7-6-7-7-7-6	
	3200	5-5-6-7-7-6-6-7-4-3	
3200 to	3210	6-7-8-9-8-7-7-7-6-5	
	3220	5-5-4-3-3-4-4-5-5-5	
	3230	6-6-5-6-6-6-5-7-7-8	
	3240	3-10-10-10-11-9-5-6-5-4	
	3250	7-8-6-5-5-5-5-5-5-4	
	3260	4-4-4-4-6-4-5-8-9-8	
	3270	7-7-6-6-9-10-9-8-12-12	
	3280	12-13-13-12-7-6-6-8-5-4	Mixing mud 200# pressure
	3290	3-3-7-9-12-8-8-9-15-5	3269-87; Trip 3289.
	3300	6-6-5-2-5-5-4-4-5-4	
3300 to	3310	4-5-5-3-3-3-3-3-4-3	
	3320	3-4-4-3-4-3-4-3-4-3	
	3330	4-4-4-4-4-4-4-4-5-5-4	
	3340	5-4-5-4-4-4-4-4-6-8	
	3350	5-4-5-5-4-5-5-6-6-5	

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Depth		Drilling Time	Remarks
From	To		
3350 to	3360	6-6-6-6-7-7-6-5-5-5	
	3370	6-5-5-5-6-5-4-4-5-5	
	3380	4-5-5-5-5-5-6-5-6-6	
	3390	5-5-6-5-4-2-3-4-3-5	
	3400	4-4-4-3-3-4-4-5-5-6	
3400 to	3410	2-3-4-2-3-4-4-2-2-2	
	3420	2-3-3-2-5-5-6-6-5-3	
	3430	7-5-6-6-6-3-3-4-3-4	
	3440	4-6-6-7-8-5-6-7-6-7	
	3450	6-6-6-6-5-5-6-6-6-8	
	3460	5-6-6-6-7-6-6-4-4-2	
	3470	2-6-7-10-9-11-8-7-8-9	
	3480	11-9-8-12-6-4-7-4-4-4	
	3490	6-6-7-8-9-8-8-9-9-7	
	3500	8-6-5-5-9-8-7-4-2-2	
3500 to	3510	4-2-4-4-5-3-6-5-7-8	
	3520	7-6-10-9-7-3-1-2-3-2	
	3530	6-5-3-3-2-3-2-3-3-5	
	3540	15-10-10-7-3-5-5-5-5-12	
	3550	13-11-9-10-5-4-3-2-3-2	
	3560	2-2-1-1-3-3-3-2-4-4	
	3570	7-9-9-12-13-11-10-10-8-7	
	3580	5-4-4-7-11-12-11-8-5-3	
	3590	3-4-3-3-6-9-7-4-7-8	
	3600	11-11-9-4-5-6-3-3-4-3	
3600 to	3610	5-5-14-17-8-7-5-5-5-3	Trip 3604.
	3620	2-3-3-4-7-6-5-5-4-4	
	3630	4-5-4-6-7-8-5-4-3-3	
	3640	2-2-2-2-3-5-4-2-2-2	
	3650	1-2-3-3-1-2-3-3-3-4	
	3660	6-3-3-3-2-2-2-4-5-6	
	3670	7-5-6-7-7-3-3-4-6-6	
	3680	6-7-9-10-10-11-10-11-10-12	
	3690	11-8-7-8-7-5-6-3-2-3	
	3700	2-3-4-5-5-6-5-3-2-2	
3700 to	3710	2-3-2-3-3-5-3-3-3-6	
	3720	4-4-5-4-9-10-7-3-4-6	
	3730	6-5-6-6-8-7-5-7-6-7	
	3740	7-7-8-7-6-5-4-3-3-4	
	3750	4-4-3-3-3-4-5-6-5-5	
	3760	5-7-7-8-7-5-5-4-4-2	
	3770	8-9-4-4-3-4-4-4-5-6	
	3780	9-4-7-8-6-6-10-9-10-11	
	3790	13-15-11-9-8-9-8-6-7-4	
	3800	5-10-12-10-9-6-7-7-7-7	
3800 to	3810	8-11-10-8-7-6-5-6-8-6	
	3820	7-12-9-6-7-7-8-9-6-6	
	3830	6-6-6-9-7-11-10-8-10-8	

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Depth		DRILLING TIME	REMARKS
From	To		
3830 to	3840	9-15-8-7-5-5-5-5-4-6	Trip 3853.
	3850	6-8-10-9-9-9-10-9-7-7	
	3860	7-10-15-7-6-5-7-7-13-7-6	
	3870	7-6-6-6-6-7-8-14-15-11-12	
	3880	8-9-9-6-10-10-15-14-15-11	
	3890	11-9-7-8-9-7-8-9-9-9	
	3900	11-12-13-11-15-14-13-12-11-11	
	3910	9-9-7-7-6-6-6-7-9-9	
	3920	9-13-12-9-12-5-6-7-8-10	
	3930	7-7-6-6-6-6-6-6-6-6	
3900 to	3940	6-6-6-5-5-6-6-6-9-9	Slight rough 3989; Circ. 1½ hrs. 3990.
	3950	10-10-11-7-6-5-5-6-5-7	
	3960	8-7-8-8-8-8-5-6-8-9	
	3970	10-8-7-6-8-7-9-10-10-10	
	3980	15-11-12-5-5-2-2-2-2-6	
	3990	5-5-6-5-2-2-3-2-½-1½	
	4000	2-6-5-4-4-5-4-6-8-9	
	4010	10-14-15-12-11-9-9-8-10-9	
	4020	9-11-15-22-24-6-7-6-7-8	
	4030	8-6-5-5-5-8-7-5-5-5	
4000 to	4040	4-4-4-5-6-7-7-8-10-12	Trip 4015.
	4050	9-9-8-10-10-14-4-8-15-12	
	4060	17-13-14-7-6-6-6-7-9-9	
	4070	9-5-3-3-5-6-7-8-12-5	
	4080	4-6-9-10-10-11-10-5-2-3	
	4090	5-6-6-5-10-8-9-10-4-1	
	4100	1-1-1-1-1-½-½-3-½-1-5½	
	4110	7-8-6-1-1-5-8-2-2-2	
	4120	1-1-2-1-2-4-5-7-6-5	
	4130	4-3-2-1-1-2-4-6-5-7	
4100 to	4140	9-10-11-12-14-12-9-10-10-10	Circ. 1½ hr. 4070.
	4150	12-11-7-12-10-10-5-6-6-6	
	4160	5-6-9-9-12-15-13-14-10-12	
	4170	10-12-12-10-9-9-9-13-10-11	
	4180	12-12-12-13-12-12-12-9-8-8	
	4190	10-9-10-10-10-11-12-12-14-4	
	4200	3-10-7-10-15-13-7-7-7-8	
	4210	8-10-9-11-11-11-10-12-8-9	
	4220	7-9-9-9-9-8-10-9-10-9	
	4230	8-8-9-10-10-10-11-14-9-11	
4200 to	4240	11-8-9-8-12-7-7-10-8-13	Trip 4202.
	4250	13-9-5-4-3-7-12-14-15-13	
	4260	8-15-8-8-9-11-12-12-7-6	
	4270	8-9-11-15-14-10-11-10-13-16	
	4280	7-8-9-9-12-12-17-10-12-11	
	4290	12-13-13-12-13-13-18-17-12-10	
	4300	11-16-12-14-15-15-17-35-42-52	
			Core 4297-4327.

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Depth		Drilling Time	Remarks
From	To		
4300 to	4310	26-46-47-42-29-46-42-33-24-15	
	4320	11-27-39-51-16-27-34-44-38-42	
	4330	39-48-44-24-31-53-66-7-9-9	
	4340	10-9-4-5-5-7-10-10-11-11	
	4350	12-13-15-10-10-8-6-6-6-7	
	4360	11-11-9-8-12-9-11-15-10-11	Slightly rough 4353.
	4370	9-11-12-12-16-10-10-10-10-10	
	4380	11-11-11-11-10-10-10-10-5-8	Slightly rough 4378-83.
	4390	7-5-5-5-5-5-5-7-7	
	4400	9-12-12-10-15-7-12-10-10-8	Trip OAS 4395.
4400 to	4410	9-11-10-6-3-2-3-10-9-6	
	4420	6-6-7-6-8-9-11-14-11-4	
	4430	3-4-9-12-18-16-11-6-12-13	
	4440	10-9-7-7-13-11-9-7-11-16	
	4450	16-13-13-14-13-15-15-16-16-8	
	4460	5-5-5-4-3-7-8-6-5-6	
	4470	5-8-8-7-8-12-15-15-14-11	
	4480	12-12-9-6-7-6-6-6-6-7	
	4490	7-13-11-8-8-7-8-7-8-8	
	4500	10-12-13-11-10-10-12-11-11-10	
4500 to	4510	12-14-14-15-13-10-9-6-9-5	Trip 4507.
	4520	6-6-7-3-6-12-12-9-11-11	Slightly rough 4511, 12,
	4530	8-8-9-11-14-11-13-10-17-17	and 14, and 4528.
	4540	14-13-10-12-15-10-8-12-15-15	Circ. 2 hrs. to core, SIM
	4550	50-42-61	4540=4537.
4537 to	4550	26-25-46-36-35-65-56-58-47-58	Coring 4537-4557.
	4560	46-25-30-43-35-54-56-7-11-12	
	4570	11-9-8-13-12-13-13-14-14-11	
	4580	17-15-16-13-13-12-13-12-11-14	
	4590	11-8-11-9-8-15-20-11-16-19	Rough 4585.
	4600	16-17-18-18-19-20-14-11-6-10	Trip 4597; Slightly rough
4600 to	4610	8-6-8-4-9-9-8-8-6-6	4599.
	4620	3-3-4-5-3-5-3-3-4-50	Coring 4620-
	4630	72-60-42-66-40-40-72-23-25-24	
	4640	30-52-33-42-48-37-31-28-61-101	
	4650	53-27-27-27-18-33-15-17-35-31	
	4660	35-36-23-14-16-50-36-44-12-12	
	4670	18-14-57-24-31-17-41-26-27-23	
	4680	17-16-15-17-12-14-16-17-14-12	
	4690	18-19-20-25-32-45-20-38-21-14	Core No. 5
	4700	20-31-27-23-20-14-16-20-16-12	
4700 to	4710	12-11-11-11-11-12-13-15-15-34	
	4720	23-19-19-18-17-20-17-19-21-21	
	4727	45-41-60-47-46-33-30	Total Depth 4727.