



02358089

WELL DATA

LOCATION: NW NW (660 feet south of north line and 660 feet east of west line) Section 4,
Township 17 South, Range 45 West, Kiowa County, Colorado.

ELEVATION: 4144 feet ground; 4154 feet Kelly bushing

CONTRACTOR: Davis Drilling, Inc.

SPUD DATE: June 15, 1966

COMPLETED: July 17, 1966

TOTAL DEPTH: 5520 feet (driller's measurement); 5521 feet (Schlumberger)

STATUS: Dry hole. Plugged and abandoned.

CASING

Ran 6 joins 8-5/8" O D. 24# surface casing (205.67 feet) set at 215 feet K.B. cemented with 175 sacks common cement 3% HA5. Plug down at 11:15 P.M. June 16, 1966.

MEASUREMENTS

All measurements were taken from the Kelly bushing 10 feet above the ground elevation.

PLUGGING RECORD

The well was plugged and abandoned on July 17, 1966, by filling it with heavy mud to the bottom of the surface pipe. A 15-sack cement plug was placed from 215' to 170', then the casing was filled with mud to within 20 feet of the top where a 10-sack cement plug was placed.

GEOLOGIC REMARKS

GENERAL: The numerous oil shows, the thinning of the normal Cherokee Morrow section, and porosity development throughout the lower Mississippian made this well an encouraging test. An abnormally long time was spent in the drilling of the well because of several equipment failures.

RECOMMENDATIONS: Continual re-evaluation of this well should be made in the light of future development in this area, as only by running casing can a conclusive evaluation be made of the Mississippian Spergen shows and porosity (5226 to 5312). See supporting data below.

Sufficient shows, porosity, and reservoir indications were encountered in the Virgil (3790 to 3819) to justify a test for this zone at a structurally higher position in the immediate area.

SUPPORTING DATA FOR RE-EVALUATION OF THE SPERGEN

Using normal parameters for well evaluation, the Spergen would be noncommercial; but because of the fractured reservoir, the subnormal pressure, and the extreme contrasting resistivities in this area, the normal parameters may not have been conclusive.

SHOWS: Although not good, the shows in the Spergen (5255 to 5300) were better than any shows in the Huber Bertha #1 (SW SW 10-19S-45W) and better than any shows in the Fremont Harrison (NE SE 9-19S-45W), except those immediately above and below the shaly dolomite in the Harrison well (4764 to 75).

POROSITY: Porosity development in the samples was poor to fair; however, there were many indications of fracturing in which porosity is difficult to evaluate. This porosity development is fair on the porosity log and is not found in the structurally higher wells in the Brandon area.

DRILL-STEM TESTS: The immediate failure of the packers in DST #4 gives credence to the theory of a fractured reservoir. Lack of free oil in DST #4A is not surprising because approximately 2.5 barrels of mud were in the rat hole between the tool and the shows, and only 1.05 barrels of fluid were recovered in the drill collars. It is felt that had this zone been a water zone, more fluid would have been recovered, as experienced in the water zones of the Mississippian in the Brandon area. After DST #4A, the light plant broke down, thus preventing a hydrocarbon analysis of the mud in the rat hole.

Halliburton's calculations show a potential of 29 barrels per day with no damage indicated. The lack of reservoir damage does not conform with damage calculations on the productive wells in the Brandon area. Also, the potentiometric surface from the final shut-in is abnormally high, thus indicating that the zone was still supercharged after the two-hour final-flow period.

PRESSURES: Because of the extremely subnormal pressure of the Mississippian in this area, DST data will always be pessimistic. During the drilling of the Mississippian Spergen, the hydrostatic pressure was approximately 2660 psi, and the formation pressure was 1060 psi (may be supercharged), which means that 1600 psi entered the formation. During

drill-stem testing, the formation pressure was 1060 or 540 less than the pressure (1600 psi) which entered the formation during and after it was drilled.

LOG ANALYSIS: Less reliance should be placed on the water saturations from log analysis than normal because of the extreme difference of the resistivities of the invading fluid, the formation fluid, the formation itself, and log calculations in the Brandon area. The Fremont Harrison well calculated 80 and 95 per-cent water saturation (S_w) in its water-free producing zone. The lower part of the Osage in the Harrison well calculated from 50 to 75 per-cent water saturation (S_w) and was proved water productive by a drill-stem test.

POTENTIAL RESERVES: A recovery of 100 barrels per acre foot would seem reasonable in the type of carbonate reservoir present in this well. This is a conservative figure when compared to the recovery presently indicated from the Fremont Harrison decline curve. Using the porosity from 5256 to 92 as potential, this would give estimated reserves of 288,000 barrels on 80-acre spacing.

TABLE I
HYDROCARBON EVIDENCE AND EVALUATION

<u>Formation</u>	<u>Depth</u>	<u>Source of Evidence</u>	<u>Log Calculations</u>		<u>Evaluation</u>
			<u>Por.</u>	<u>Sw</u>	
<u>PERMIAN</u> Red Cave	2803 to 16	Mud log (25-unit increase)	10	80	Not tested because it is correlate-able with a WIT in the Kerr-McGee well which indicated no reservoir. Also, no porosity was evident in the samples.
<u>PENNSYLVANIAN</u> Virgil	3790-3819	Oil stain in samples	11-14	87-100	DST #1 proved this zone to be water bearing although potential because of the free oil and good reservoir indications from samples and the DST.
Missouri	4012 to 17 and 4030 to 46	oil stain in samples	8 9	100 100	Oil shows were not of sufficient magnitude to warrant testing as drilled. Log calculations supported original conclusions.
	4150 to 58	trace stain in samples	23	49	Not tested because it is correlate-able with an equivalent zone in Fremont Dawson #1 which was higher had better shows, calculated 27% porosity, 38% Sw, and recovered water on DST.
Des Moines	4423 to 27	Oil stain in samples	11	95	Not tested because the show was in a small percentage of the porosity and without fracturing or dolomitization, chaetetes porosity has questionable permeability.
	4490 to 97	veryslight trace stain			
Cherokee	4554-4704	Oil shows in samples	4574 to 77 6½ 10 (rest of zone too tight to calculate)		DST #2: some free oil recovered, but shut-in pressures indicated no reservoir present.
<u>MISSISSIPPIAN</u> St. Louis	5084-5182	Oil stain and shows in samples	5086 to 91 6 70 (rest of zone too tight to calculate)		DST #3: no free oil recovered, and shut-in pressures indicated no reservoir present.

<u>Formation</u>	<u>Depth</u>	<u>Source of Evidence</u>	<u>Log Calculations</u>		<u>Evaluation</u>
			<u>Por.</u>	<u>Sv</u>	
Spergen	5224-5310	Oil stain and shows in samples			DST #4 and #4A: no free oil was recovered, but the shut-in pressures indicated a good reservoir. Lack of free oil may have been a result of packer placement. (See discussion under "Geologic Remarks.")
	5238-46		9½	100	
	5256-60		8	56	
	5260-67		10	88	
	5267-70		5½	100	
	5270-80		7	100	
	5280-84		9½	79	
	5284-92		6½	100	
	5296-5305		7-10	100	
	5305-11		5	--	
<u>ORDOVICIAN</u>					
Arbuckle	5490-5521	Gas kick on mud logger and log calculations			DST #5 proved this zone to be water bearing. Lack of shows in samples and DST would lead to the conclusion that there was an error in the Rv in the log calculations.
	5492-96		27	56	
	5496-5510		14-19	29-32	

FORMATION TOPS

<u>Formation</u>	<u>Sample Tops</u>	<u>Log Tops</u>	<u>Datums (4154 K.B.)</u>
CRETACEOUS			
Timpas	780	767	/3387
Greenhorn	935	950	/3204
"D" Sand	1280	1263	/2891
JURASSIC			
Morrison	1675	1679	/2475
PERMIAN			
Stone Corral	2628	2633	/1521
Neva	3326	3329	/ 825
Foraker	3400	3403	/ 751
PENNSYLVANIAN			
Virgil	3582	3562	/ 592
Missouri	4004	4000	/ 154
DesMoines (Ls)	4458	4402	- 248
Cherokee	4550	4552	- 398
Atoka	4686	4716	- 562
Morrow	4864	4867	- 713
MISSISSIPPIAN			
St. Louis	5072	5068	- 914
Spergen Warsaw	5194	5226	-1072
Osage	5326	5392	-1238
ORDOVICIAN			
Arbuckle	5490	5492	-1338
 Driller's T.D.	 5520		
Logger's T.D.	5521		

DRILL-STEM-TEST SUMMARY

DRILL-STEM TEST No. 1: 3759 to 3853 (94-ft. interval--Pennsylvanian Virgil formation)
Test Date: June 26, 1966

TIME ELEMENT: I.F., 15 min.; I.S.I., 1 hr.; F.F., 1 hr. 45 min.; F.S.I., 1 hr.

SURFACE OBSERVATIONS: The tool opened with a weak blow that increased to a good blow at the end of the 15-minute initial open. Reopened with a weak blow that increased to good blow then remained steady throughout final open.

RECOVERY: Recovered 1050 feet of total fluid: 540 ft. muddy sulphurous salt water; 510 ft. sulphurous salt water (live oil droplets in top of fluid and a few dissipated throughout fluid).

TOP RECORDER at 3639 feet

FP 180 - 492
SIP 900 - 884
HP 1962 - 1881
BHT 120°

WATER SAMPLES

<u>Feet off tool</u>	<u>Rw</u>	<u>SpGr</u>	<u>Chl.</u>
480	.145 @ 86°	1.035	
120	.19 @ 86°		
60	.20 @ 86°		11,500

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DRILL-STEM TEST NO. 2: 4562 to 4741 (179-ft. interval--Pennsylvanian Cherokee and Atoka formation). Test date: July 5, 1966.

TIME ELEMENT: I.F., 15 min.; I.S.I., 1 hr.; F.F., 2 hr.; F.S.I., 1 hr.

SURFACE OBSERVATIONS: The tool opened with a weak blow that increased to a good blow in 4 minutes and built to 23 inches of water at the end of initial flow. Tool reopened with a good blow that remained steady throughout test.

RECOVERY: Recovered 1470 feet of gas and 90 feet of total fluid: 80 ft. slightly gas-cut mud; 10 ft. slightly gas-and-oil-cut mud right above tool. (Tool chamber had very gassy oil-cut mud).

TOP RECORDER at 4542 feet

FP 33 - 49
SIP 393 - 98
HP 2453 - 2453
BHT 140°

DRILL-STEM-TEST SUMMARY (Continued)

DRILL-STEM TEST No. 3: 5079 to 5192 (113-foot interval--Mississippian St. Louis formation)
Test date: July 9, 1966

TIME ELEMENT: I.F., 15 min.; I.S.I., 1 hr.; F.F., 2 hrs.; F.S.I., 1 hr.

SURFACE OBSERVATION: Tool opened with a weak blow that decreased to slightly bubbling at end of initial open. Reopened with no blow and remained dead throughout final flow.

RECOVERY: Recovered 67 feet of very slightly gas-cut mud.

TOP RECORDER at 5059 feet

FP	16	-	16
SIP	410	-	98
HP	2616	-	2616
BHT	144°		

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DRILL-STEM TEST No. 4: 5227 to 5320 (93-foot interval--Mississippian Spergen Warsaw formations.)
Test date: July 11, 1966.

Packers failed immediately, possibly due to vertical fracturing.

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DRILL-STEM TEST No. 4A: 5195 to 5320 (125-foot interval--Mississippian Spergen Warsaw formations.)
Test date: July 11, 1966.

TIME ELEMENT: I.F., 15 min.; I.S.I., 1 hr.; F.F., 2 hrs.; F.S.I., 1 hr.

SURFACE OBSERVATION: Tool opened with a very weak blow that remained steady throughout initial open period. Reopened with no blow and was dead throughout final flow period.

RECOVERY: Recovered 210 feet of mud.

TOP RECORDER at 5175 feet

FP	33	-	115
SIP	1129	-	949
HP	2779	-	2779
BHT	145°		

DRILL-STEM-TEST SUMMARY (Continued)

DRILL-STEM TEST No. 5: 5487 to 5521 (34-foot interval--Ordovician Arbuckle formations)
Test date: July 16, 1966

TIME ELEMENT: I.F., 15 min.; I.S.I., 45 min.; F.F., 30 min., F.S.I., 45 min.

SURFACE OBSERVATION: Tool opened with a weak blow that increased to a fair blow at the end of the 15-minute initial open. Reopened with no blow. Weak blow in 4 minutes increasing to fair blow at end of test.

RECOVERY: Recovered 530 feet of fluid: 180 ft. muddy water; 350 ft. water. (Sample on top of tool had a resistivity of .160 at 84° and titrated 24,000 ppm chlorides.)

TOP RECORDER at 5467 feet

FP 131 - 262
SIP 1113 - 1064
RF 2943 - 2943
BHT 1440

<u>Feet off tool</u>	<u>WATER SAMPLES</u>		
	<u>Rw</u>	<u>SpGr</u>	<u>Chl.</u>
150	.155 @ 82°		
50	.155 @ 80°		
0	.160 @ 84°		24,000

SAMPLE DESCRIPTION

(Samples start at 215 feet in Niobrara)

215 to 780	Shale, gray to dark gray, mottled, white, calcareous.
TIMPAS	<u>780 sample; 767 log</u>
780 to 890	Limestone, white, very fine xylm, dense, chalky.
890 to 950	Shale, gray to dark gray, soft.
GREENHORN	<u>935 sample; 950 log</u>
950 to 965	Sandstone, light gray, fine grained, calcareous cemented.
965 to 1280	shale, gray to dark gray, soft.
"D" SAND	<u>1280 sample; 1263 log</u>
1280 to 1300	Sandstone, white, fine grained, subrounded, some porous, some tite, NS.
1300 to 1675	Sandstone, white, very fine to fine grained, porous, reworked and silty NS; siltstone gray and shale, gray, soft.
MORRISON	<u>1675 sample; 1679 log</u>
1675 to 1995	shales, vari colored, very soft; and sandstone, clear, med. grained, subrounded, poorly cemented, NS.
PERMIAN	<u>1995 sample</u>
1995 to 2175	Shales, red, dark red, some silty; sandstones fine to medium grained, poorly cemented; anhydrite, white to pink.
2175 to 2505	Salt with anhydrite, white, dense.
2505 to 2628	Shale, red, soft; anhydrite; silt; and sandstone, fine to medium grained, subround to round, free grains.
STONE CORRAL	<u>2628 sample; 2633 log</u>
2628 to 2670	Anhydrite, white to cream.
2670 to 2770	Shale, red, dark red, soft to silty; sandstone, clear, very fine to fine grained, free grains; anhydrite, white to cream.
2770 to 2910	Shale, red, dark red, soft to silty with sandstone stringers, fine grained, clear, tite (No porosity or shows were found in samples at or near the gas kick at 2800 to 2810.)
2910 to 3105	Shale, red, dark red, silty; sandstone, very fine to medium grained, subrounded to round, free grains.
3105 to 3120	Dolomite, pink, finely xylm, dense.
3120 to 3326	Shale, red, dark red, silty; sandstone, gray to clear, very fine to fine grained.
NEVA	<u>3326 sample; 3329 log</u>
3326 to 3340	Limestone, white, sandy, slightly oolitic and fossiliferous.
3340 to 3400	Shale, gray; sandstone, gray, fine grained, argillaceous.
FORAKER	<u>3400 sample; 3403 log</u>
3400 to 3458	Limestone, white and gray, chalky, dense, oolitic; shale green, silty.
3458 to 3482	Shale, red, dark red, silty.
3482-3508	Limestone, white, fairly xylm, slight glaucautic, some chalky.
3508 to 3578	Limestones, as above, with some argillaceous; shale red, dark red, some silty.
3578 to 3582	Shale, green, sandy, soft.

VIRGIL

3582 to 3600	<u>3582 sample; 3562 log</u> Limestone, white, very finely xylm with green mica and glauc.; limestone, white finely xylm, fragmental, fossiliferous, sandy.
3600 to 3620	Shale, dark red, silty.
3620 to 3636	Limestone, very light tan, finely xylm, fossiliferous, oolitic.
3636 to 3660	Shale, red, silty; Limestone, tan to pink, very finely xylm, fragmental, fossiliferous.
3660 to 3694	Limestone, gray to light gray, very finely xylm, dense, soft.
3694 to 3718	Shale, dark gray, silty, calcareous, light gray to light tan, dense.
3718 to 3726	Dolomite, tan, very fine grain.
3726 to 3732	Shale, gray, silty, calcareous.
3732 to 3760	Limestone, gray, finely xylm, some fragmental and oolitic.
3760 to 3770	Shale, gray, green, waxy.
3770 to 3788	Limestone, tan to light gray, finely xylm, dense, some chalky, trace oomoldic porosity and trace pin-point porosity with stain and cut.
3788 to 3822	Limestone, light gray to light tan, finely xylm, some chalky with some vuggy porosity, poor stain, spotty, yellow fluorescence, fair cut with tan ring; dolomite, tan to gray, very finely xylm, good stain and fluor., streaming cut with good ring.
3822 to 3840	Limestone, white, chalky; limestone, gray to tan, finely xylm, fragmental NS.
3840 to 3848	Limestone a/a with chert, white, opaque, fossiliferous with some oolitic shadows.
3848 to 3854	Limestone, white to buff, finely xylm and chalky; limestone, tan, micro xylm, very dense.
3854 to 3864	Dolomite, gray to brown, very finely xylm, NS. Chert, very light tan, opaque.
3864 to 3874	Limestone, gray, very finely xylm, some fragmental, NS; trace shale black.
3874 to 3884	Limestone a/a with trace pinpoint porosity in chalky.
3884 to 3912	Sandstone, white to light gray, very fine grain, silty, calcareous, NS.
3912 to 3918	Limestone, cream to light buff, micro xylm.
3918 to 3924	Shale, black, silty.
3922 to 3934	Limestone, cream to buff, fine xylm, dense, trace vuggy porosity; trace chert, white opaque.
3934 to 3960	Limestone, light tan, finely xylm, fossiliferous, oolitic, trace vuggy porosity. NS.
3960 to 3970	Limestone, buff, medium xylm, oolitic, with calcite inclusions, fair to good vuggy porosity. NS.

HEBNER SHALE

3970 to 3980	<u>3970 sample; 3975 log</u> Shale, black, silty, carbonaceous.
3980 to 4004	Sandstone, light gray/green to green, very fine grain, calcareous, tite.

MISSOURI

4004 to 4014	<u>4004 sample; 4000 log</u> Limestone, cream to gray, very fine xylm, dense.
4014 to 4022	Limestone, white, chalky; limestone gray, fine grained, silty, slightly dolomitic.
4022 to 4046	Limestone, white, chalky; limestone, tan micro xylm, dense, trace limestone, white, coarse xylm, some inter xylm and vuggy porosity, fair stain, spotty yellow fluorescence with good cut.
4046 to 4056	Sandstone, gray, very fine grain, calcareous, tite.
4056 to 4074	Limestone, cream to buff, micro xylm, some oolitic and fossiliferous; trace pinpoint porosity. NS.
4074 to 4082	Limestone, buff to gray, very oolitic and fossiliferous.
4082 to 4146	Limestone, cream to buff, very fine xylm, dense, some chalky; trace limestone, tan, sublitographic, hard.
4146 to 4156	Limestone, tan, with good oomoldic porosity (no free oolites); trace stain, fluor. and cut. Rest of porosity NS.

MISSOURI (Cont'd)

- 4156 to 4184 Limestone, buff to tan, micro to very fine xylm; limestone gray, very fine xylm with tan oolites. No porosity.
- 4184 to 4192 Limestone, white matrix and dark tan oolites, dense.
- 4192 to 4244 Limestone, tan to brown, micro xylm, dense; sandstone, gray, very fine grain, very calcareous and dirty.
- 4244 to 4256 Shale, black, silty, carbonaceous; limestone tan, fine xylm, fragmental with some oolitic.
- 4256 to 4262 Limestone, tan, finely xylm, fragmental, oolitic, some oomoldic porosity and vugular porosity. NS
- 4262 to 4272 Limestone, tan, finely xylm, fragmental, oolitic, some becoming chalky.
- 4272 to 4300 Shale, gray, silty, carbonaceous; sandstone, gray, very silty and calcareous.
- 4300 to 4322 Limestone, gray to dark brown, micro xylm, some fragmental and oolitic.
- 4322 to 4358 Limestone a/a with some lithographic. Chert, gray to dark brown, translucent.
- 4358 to 4392 Limestone, white and tan mottled, very finely xylm, dense, very fossiliferous and oolitic; Limestone, light brown, very finely xylm, dense.
- 4392 to 4404 Cavings (from log, should be a shale).
- 4404 to 4420 Dolo, gray to brown, fine grained. NS Limestone, tan to brown, micro xylm, dense.
- 4422 to 4426 Chaetetes, about 25% stained with good fluor. and cut.
- 4426 to 4444 Dolomite, gray, very fine grain, very sandy; limestone, cream to gray, dense, some chalky.
- 4444 to 4466 Limestone, cream to tan, very finely xylm, dense; limestone, dark gray, very shaly,
- 4466 to 4478 Limestone, brown, finely xylm, fragmental, oolitic, some chalky.
- 4478 to 4488 Shale, green to black, silty, calcareous; limestone a/a.
- 4488 to 4496 Chaetetes, one piece stained with fair fluor. and cut, rest looked stained but no fluor. or cut.
- 4496 to 4450 Limestone, brown, lithographic; limestone, white to brown, very finely xylm; trace chert, very dark brown to black, opaque.

CHEROKEE

4550 sample; 4552 log

- 4550 to 4554 Shale, black, hard, slightly calcareous.
- 4554 to 4566 Limestone, brown to tan, bioclastic, oolitic, slightly dolomitic, very slight trace pinpoint porosity, yellow fluor. and poor cut in wet samples; no fluor. in dry samples.
- 4566 to 4570 Shale, black, calcareous.
- 4570 to 4610 Limestone, light gray to tan, finely xylm, some oolitic, some dolomitic, no visible porosity but good fluor. in wet and dry samples with a poor cut.
- 4610 to 4620 Shale, black.
- 4620 to 4642 Limestone, gray to light tan, very oolitic, no visible porosity but good fluor. with a poor cut.
- 4642 to 4666 Limestone, gray to light tan, finely xylm, some oolitic and fossiliferous, some with fluor. and poor cut; shale, black; trace chert, tan pyritic.
- 4666 to 4704 Limestone a/a; limestone, tan and gray, very fine grain, dense; trace chert, black and tan; trace fluor. and poor cut.
- 4704 to 4714 Shale, black.

ATOKA

4686 sample; 4716 log

- 4714 to 4734 Limestone, gray and brown, finely xylm, fossiliferous, siliceous.
- 4734 to 4740 Shale, black.
- 4740 to 4766 Limestone, tan, gray, brown, very finely xylm, dense, siliceous; shale, black.
- 4766 to 4792 Limestone, black, very finely xylm, very siliceous.
- 4792 to 4812 Shale, black, trace green.

ATOKA (Cont'd)

4812 to 4864 Limestones, dark gray, brown and black, very finely xylm, dense, siliceous; shales, black and dark gray; trace chert black.

MORROW

4864 sample; 4867 log

4864 to 4904 Shale, gray, green, black, waxy; trace pyrite.
 4904 to 4910 Sandstone, fine grained, very slightly glauconitic, dirty, tite.
 4910 to 4972 Shale, gray, black, fissile, some green, waxy; trace pyrite.
 4972 to 4976 Sandstone, white to cream, med. to coarse grained, sub angular, very slightly glauconitic, calcareous and argillaceous, cemented, tite. NS.
 4976 to 4990 Shale, black, gray, soft.
 4990 to 5003 Sandstone, white to clear, fine to med. grained, sub angular, glauconitic, some porous. NS.
 5003 to 5018 Shale, black, gray, soft.
 5018 to 5038 Limestone, tan, fragmental, fossiliferous, some oolitic, trace glauconite; trace free pyrite.
 5038 to 5052 Limestone a/a becoming chalky, some chalk balls; trace free pyrite.
 5052 to 5058 Shale, gray, brown, black, fissile, firm.
 5058 to 5072 Limestone, cream, tan, brown, finely xylm, very fossiliferous, slightly oolitic and pelletal, trace chalky; trace pyrite.

MISSISSIPPIAN (St. Louis) 5072 sample; 5068 log

5072 to 5084 Limestone, tan, fine to coarsely xylm, oolitic, with some calcite xls.
 5084 to 5092 Limestone a/a, some with stain, fluor., and streaming cut, some pinpoint porosity between exls.
 5092 to 5102 Limestone, tan, very fine to coarsely xylm, some oolitic and some chalky; trace chert, red orange.
 5102-5110 Limestone, very fine to coarsely xylm, chalky.
 5110 to 5122 Limestone, tan, micro xylm, dense.
 5122 to 5136 Limestone, white, very fine to finely xylm, chalky. NS.
 5136 to 5148 Limestone, tan, micro xylm, dense, trace sandy, trace chalky; trace limestone, tan to brown, very finely xylm; trace pinpoint porosity, questionable stain, yellow fluor., fair cut.
 5148 to 5160 Limestone, tan, very fine to micro xylm, chalky, trace show a/a.
 5160 to 5182 Limestone, tan a/a, chalky; some limestone, tan with fine to med. tan oolites, trace show a/a; trace chert gray, opaque.
 5182 to 5208 Limestone, tan to brown, sublithographic.
 5208 to 5224 Shale, gray, black; chert, smoky gray, translucent; pyrite.

MISSISSIPPIAN SPERGEN WARSAW 5194 sample; 5226 log and corrected sample

5224 to 5236 Dolomite, gray to brown, very fine grain to fine, tite, some fluor. and poor cut in wet samples, no cut in dry.
 5236 to 5242 Limestone, tan and white mottled, med. to coarsely xylm, bioclastic, argillaceous; trace limestone has spotty fluor with fair cut, some open fractures, partially recemented, stained, some calcite growths indicating fracturing.
 5242 to 5254 Limestone, gray-white mottled, fine to med. xylm, fragmental, oolitic NS.
 5254 to 5260 Dolomite, brown, finely xylm, good brown stain, yellow fluor., good streaming cut (10 to 15% of samples with show) some pinpoint to vuggy porosity with some indications of fracturing.
 5260 to 5270 Limestone, light gray and tan mottled, fine to med. xylm, very dolomitic; dolomite, fine to med. xylm (looks like limestone dolomitized), some vuggy porosity with spotty yellow fluor. and good streaming cut.

MISSISSIPPIAN SPERGEN WARSAW (Cont'd)

- 5270 to 5284 Dolomite and limestone a/a with few pieces good brown stain, fluor., and cut with some pinpoint porosity, some vugs following a fracture.
- 5284 to 5294 Dolomite and limestone a/a; trace of show a/a.
- 5294 to 5304 Dolomite, tan, very fine grain, sucrosic, soft. NS.
- 5304 to 5310 Dolomite a/a; trace dolomite, brown, very fine to med. xyn, vuggy porosity, stain, fluor. and cut.
- 5310 to 5324 Dolomite, tan, very fine grain. NS. chert clear to smoky.
- 5324 to 5334 Dolomite, brown, fine to med. xyn, limey. NS. chert a/a.
- 5334 to 5344 Dolomitic limestone, gray to black, vitreous rough texture, chert, light gray to light brown, mottled, fossiliferous, weathered.

Lost circulation at 5346, possibly in a fractured cherty section.

- 5346 to 5362 Very poor samples. Dolomite, cream to light tan, very fine xyn; chert, white to very light gray, fossiliferous, weathered. NS.
- 5362 to 5378 Dolomite a/a becoming slightly glauconitic; chert a/a (about 30% chert).
- 5378 to 5390 Abundant cavings (should be a shaly dolomite)

MISSISSIPPIAN OSAGE 5326 sample; 5392 log and corrected sample

- 5390 to 5398 Dolomite, tan, very fine grain, glauconitic; chert, white to gray, weathered with some vuggy porosity. NS.
- 5398 to 5422 Dolomite a/a; chert a/a with some fossiliferous, some highly weathered with pinpoint to vuggy porosity. NS.
- 5422 to 5442 Dolomite a/a; limestone, tan, sublithographic, fossiliferous, slightly oolitic trace chert a/a.
- 5442 to 5460 Limestone, tan to brown, sublithographic.
- 5460 to 5476 Limestone, buff to tan, med. xyn, very oolitic, fossiliferous, some chalky, some pinpoint porosity; trace chert, blue, white.
- 5476 to 5490 Limestone a/a.

ARBUCKLE 5490 sample; 5492 log

- 5490 to T.D. Dolomite, tan to light brown, very fine to fine xyn, slightly glauconitic with good vuggy porosity, dull gold fluor. NS.

MUD REPORTS
June and July, 1966

DATE - Time Depth	Vis.	Weight	pH	Water Loss	Cake Thickness	Lost Cir. Mat #/bbl	Sand Content	Oil % by vol	Salt Cont.	Gel. Str.
6/22 4:00 PM (fishing) 3204	54	9.0	6.8	9.2	2/32	5#	1%	10%	91,000	6
6/23 2:15 PM 3274	46	9.1	6.8	12.1	2/32	6#	1%	10%	80,000	5
6/24 7:30 PM 3607	45	9.4	6.4	16.0	2/32	6#	1%	9%	73,200	6
6/25 1:45 PM 3758	43	9.5	6.4	12.1	2/32	7#	3/4%	8%	71,000	5
6/28 1:45 PM 4072	43	9.4	6.4	8.4	2/32	7#	3/4%	4%	75,000	6
6/30 5:30 PM 4372	46	9.6	6.4	6.4	2/32	8#	3/4%	2%	71,000	6
7/4 11:00 AM 4662	43	9.3	6.4	22.9	2/32	10#	1/2%	trace	58,000	6
7/4 11:30 PM 4741	51	9.4	6.4	11.9	2/32	8#				
7/5	51	9.4	6.4	11.4	2/32	8#				
7/6	52	9.4	6.4	14.4	2/32	8#				
7/7 7:45 AM 4899	46	9.5	6.4	12.2	2/32	10#	3/4%	trace	49,000	6
7/8 1:00 PM 5100	47	9.6	6.4	11.6	2/32	10#	3/4%	trace	42,000	6
7/9 9:00 PM 5192	53	9.5	6.4	8.8	2/32	8#				
7/10	45	9.5	6.4	11.6	2/32	8#				
7/11	46	9.5	6.4	14.6	2/32	8#				
7/12--Lost Cir.; lost all mud.										
7/13 8:00 AM 5360	43	9.4	--	44.	2/32	12#				
7/13 10:30 AM 5374	45	9.3	6.4	48.1	3/32	12#	1%	none	28,000	Bad, due to lost ch
7/13 9:30 PM 5406	49	9.3	6.4	8.4	2/32	12#				
7/14	48	9.3	6.4	10.1	2/32	12#	1%	--	26,000	6
7/14 9:00 5520 T.D. (Just prior to coming out to log.)	52	9.3	6.4	8.2	2/32	12#			26,000	
7/15 12:00 PM 5520 (Just after condition hole)	55	9.4	6.4	8.2	2/32	8#				

BIT RECORD

<u>Bit No.</u>	<u>Bit Size</u>	<u>Manufacturer</u>	<u>Type</u>	<u>Depth Out</u>	<u>Footage</u>	<u>Hours Run</u>
Surface	12-1/4	Smith	DT	215	215	
1	7-7/8		BT-J	1700	1485	11-1/2
2			BT-2GJ	2500	800	14-1/4
3			BT2T	2798	298	11-1/4
4			K2P	3043	245	8-1/2
5			K2P	3204	164	9-3/4
6			K2P	3414	210	15
7			BT2T	3620	206	16-1/4
8			SV1	3785	165	16-3/4
9			SV1	3853	68	9-1/4
10			SV2	3941	88	13-1/4
11				4034	93	14-1/4
12				4135	101	16-1/4
13				4271	136	18-3/4
14				4392	121	16-1/4
15				4525	133	16-1/4
16				4532	7	
17				4644	112	18-1/4
18			SV2	4741	97	12-1/4
19			SV1	4834	93	11-3/4
20			SV1	5004	170	20
21			SV2	5125	121	15-3/4
22				5192	67	10-1/4
23				5224	32	6-1/4
24				5320	96	11-3/4
25				5347	27	5
26			L-4	5381	34	7-1/2
27			L-4	5422	41	9-1/2
28			L-4	5520	98	11