

Computer Inventoried

**ORIGINAL**

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OCT 17  
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API # 15-175-21320

**GEOLOGIC REPORT  
ENSIGN OPERATING COMPANY  
#1-5 Liberal  
(SESENE) SECTION 6-T35S-R33W  
SEWARD COUNTY, KANSAS**

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OPERATOR: Ensign Operating Company

WELL NAME: #1-5 Liberal

SURFACE LOCATION: 1990' FNL, 330' FEL  
(SESENE) Section 6-T35S-R33W  
Seward County, Kansas

BOTTOM HOLE LOCATION: 2043' FNL, 3705' FWL  
(SESWNE) Section 5, T35S, R33W  
Seward County, Kansas

FIELD: Salley SW

TOTAL DEPTH: 8416' Driller, 8397' Logger, 8399' Strap

SPUD DATE: June 17, 1993

COMPLETION DATE: July 17, 1993

ELEVATION: 2852' G.L., 2864' K.B.

SURFACE CASING: Set 36 joints 8 5/8" 32# casing at 1599' K.B. with  
650 sacks HLC, 2% cc, 1/4# Flocele + 150 sacks Class  
C, 3% cc. Plug down 5:45 a.m., June 18, 1993

CONTRACTOR: Gabbert & Jones, Rig 3

DRILLING SUPERVISION: Dave Reid, Las Vegas, Nevada

DIRECTIONAL DRILLING: Scientific Drilling, Casper, Wyoming;  
Lauren Holdren, Engineer

WELLSITE GEOLOGIST: John D. Pruitt 4900'-7778'  
Duane E. Moredock 7778'-8416'

MUD: Cimarron Drilling Fluids, Liberal, Kansas  
Jim Reid, Engineer

GAS DETECTION: Holmes Gas Detectors, Inc.  
Liberal, Kansas

LOGS: Halliburton Logging Services: Dual Induction  
Lateral Log, Compensated Sonic Log, both with true  
vertical depth

RESULT: Ran casing to production test Lower Chester and  
Morrow

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WELL HISTORY:

<u>Date</u>	<u>Depth</u>	<u>Formation</u>	<u>Operation</u>
6-17-93	0'	Surface	Spud 9:00 a.m.
6-18-93	1600'	---	Wait on Cement. Made 1600' in 24½ hrs. VIS 31, MW 9.6, LCM 4# WOB 25, RPM 140, PP 1200, SPM 60
6-19-93	1800'	---	Pick up Directional Tools. Made 200' in 24 hrs. VIS 31, MW 8.7, CI 6100, pH 8.5 WL 24, FC 3, LCM 0, CA 280 WOB 25, RPM 70, PP 900, SPM 60
6-20-93	2381'	---	Drilling. Made 581' in 24 hrs. VIS 31, MW 8.7, CI 6100, pH 8.5 WL 24, FC 3, LCM 0, CA 280 WOB 25, RPM 130, PP 850-1000, SPM 60
6-21-93	2770'	---	Survey. Made 389' in 24 hrs. VIS 32, MW 8.9, CI 20,000, pH 7.5 WL 38, FC 2, LCM 2#, CA 1200 WOB 45, RPM 60, PP 800, SPM 60
6-22-93	3197'	---	Drilling. Made 427' in 24 hrs. VIS 32, MW 8.6, CI 12,000, pH 8.0 WL 36, FC 2, LCM 2#, CA 80 WOB 25-38, RPM 130, PP 1100, SPM 60
6-23-93	3406'	---	Drilling. Made 209' in 24 hrs. VIS 34, MW 9.0, CI 7100, pH 8.0 WL 24, FC 2, LCM 1#, CA 400 WOB 25-38, RPM 125, PP 900-1050, SPM 60
6-24-93	3595'	---	Trip. Made 189' in 24 hrs. VIS 36, MW 9.0, CI 3900, pH 10.0 WL 8.8, FC 2, LCM 2#, CA 40 WOB 35-38, RPM 125, PP 1050-1200, SPM 53-56
6-25-93	3820'	---	Drilling. Made 225' in 24 hrs. VIS 42, MW 8.9, CI 2900, pH 9.5 WL 8.6, FC 2, LCM 3#, CA 40 WOB 35-42, RPM 125, PP 1050-1200, SPM 54
6-26-93	3981'	---	Drilling. Made 161' in 24 hrs. VIS 38, MW 8.7, CI 2800, pH 8.5 WL 9.2, FC 2, LCM 3#, CA 40 WOB 40, RPM 50, PP 1000, SPM 54

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WELL HISTORY: (continued)

<u>Date</u>	<u>Depth</u>	<u>Formation</u>	<u>Operation</u>
6-27-93	4313'	---	Drilling. Made 336' in 24 hrs. VIS 37, MW 8.7, CI 2500, pH 9.0 WL 8.4, FC 2, LCM 3#, CA 40 WOB 42, RPM 55, PP 1150, SPM 55
6-28-93	4730'	---	Survey. Made 417' in 24 hrs. VIS 41, MW 8.8, CI 1800, pH 9.0 WL 8.8, FC 2, LCM 2#, CA 40 WOB 42, RPM 55, PP 1550, SPM 55
6-29-93	4730'	---	Trip. Made 0' in 24 hrs. VIS 45, MW 8.7, CI 1900, pH 9.5 WL 7.8, FC 2, LCM 1#, CA 60 WOB 42, RPM 55, PP 1150, SPM 55
6-30-93	5041'	Toronto	Drilling. Made 311' in 24 hrs. VIS 45, MW 8.8, CI 1900, pH 9.5 WL 8.4, FC 2, LCM 3#, CA 80, Oil 3%
7-01-93	5287'	Lansing	Drilling. Made 246' in 24 hrs. VIS 45, MW 8.9, CI 1800, pH 10.0 WL 8.8, FC 2, LCM NA, CA 40, Oil 1% WOB 38, RPM 55, PP 1200, SPM 58
7-02-93	5568'	Lansing	Drilling. Made 281' in 24 hrs. VIS 42, MW 8.9, CI 1800, pH 9.5 WL 7.8, FC 2, LCM NA, CA 40, Oil Trace WOB 44-36, RM 55-80, PP 1200, SPM 58
7-03-93	5720'	Lansing	Drilling. Made 152' in 24 hrs. VIS 43, MW 8.9, CI 2100, pH 9.5 WL 8.0, FC 2, LCM 2#, CA 40, Oil Trace WOB 20-36, RPM 80, PP 1200, SPM 55
7-04-93	5965'	Lansing	Drilling. Made 245' in 24 hrs. VIS 45, MW 8.8, CI 2000, pH 9.0 WL 8.0, FC 2, LCM 3#, CA 40, Oil Trace WOB 10-30, RPM 55, PP 1250, SPM 55
7-05-93	6276'	Lansing	Drilling. Made 311' in 24 hrs. VIS 47, MW 8.8, CI 2000, pH 10.0 WL 10.0, FC 2, LCM 3#, CA 40 WOB 10-34, RPM 80-90, PP 1250, SPM 55

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WELL HISTORY: (continued)

<u>Date</u>	<u>Depth</u>	<u>Formation</u>	<u>Operation</u>
7-06-93	6505'	Lansing	Drilling. Made 229' in 24 hrs. VIS 47, MW 8.7, CI 2100, pH 9.5 WL 7.8, FC 2, LCM 3#, CA 40, Oil 5% WOB 34-38, RPM 80-90, PP 1250, SPM 55
7-07-93	6680'	Marmaton	Drilling. Made 175' in 24 hrs. VIS 48, MW 8.7, CI 2000, pH 9.0 WL 8.0, FC 2#, LCM 4#, CA 40, Oil 6% WOB 34-38, RPM 80-90, PP 1250, SPM 58
7-08-93	6965'	Marmaton	Stuck in hole. Made 285' in 24 hrs. VIS 41, MW 9.0, CI 2100, pH 9.0 WL 8.0, FC 2, LCM 3#, CA 40, Oil 4% WOB 36-38, RPM 80-90, PP 1250, SPM 55
7-09-93	7211'	Cher	Drilling. Made 246' in 24 hrs. VIS 46, MW 9.0, CI 2100, pH 9.0 WL 8.0, FC 2, LCM 3#, CA 40, Oil 4% WOB 38-40, RPM 85-90, PP 1250, SPM 55
7-10-93	7466'	Atoka	Drilling. Made 255' in 24 hrs. VIS 46, MW 9.0, CI 2150, pH 8.5 WL 8.0, FC 2, LCM 3#, Oil 6% WOB 38-40, RPM 85-90, PP 1250, SPM 55
7-11-93	7703'	Morrow	Trip. Made 237' in 24 hrs. VIS 41, MW 9.0, CI 2300, pH 9.5 WL 7.8, FC 2, LCM 2, CA 40, Oil 4% WOB 40-38, RPM 85-90, PP 1300, SPM 55
7-12-93	7703'	Morrow	Wait on orders. Made 0' in 24 hrs. VIS 43, MW 8.9, CI 2400, pH 9.0 WL 8.4, FC 2, LCM 2#, CA 80, Oil 4%
7-13-93	7736'	Morrow	Trip. Made 33' in 24 hrs. VIS 49, MW 9.0, CI 2600, pH 9.5 WL 8.0, FC 2, LCM 2#, CA 100, Oil 3% WOB 38, RPM 85, PP 130, SPM 55
7-14-93	7850'	Morrow	Drilling. Made 114' in 24 hrs. VIS 49, MW 9.0, CI 2600, pH 9.5 WL 8.0, FC 2, LCM 2#, CA 100, Oil 3% WOB 39, RPM 85, PP 1200, SPM 55

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WELL HISTORY: (continued)

<u>Date</u>	<u>Depth</u>	<u>Formation</u>	<u>Operation</u>
7-15-93	8280'	Chester	Drilling. Made 430' in 24 hrs. VIS 43, MW 9.0, Cl 2400, pH 10.0 WL 8.0, FC 2, LCM 2#, CA 80, Oil 4% WOB 39-40, RPM 85, PP 1200, SPM 55
7-16-93	8416 LTD 8397 STD 8399 STD	Meramec	Logging. Made 119' in 24 hrs. VIS 46, MW 9.1, Cl 2800, pH 9.5 WL 7.2, FC 2, LCM 2, CA 40, Oil 3% WOB 39-40, RPM 85, PP 1200, SPM 55

FORMATION TOPS:

<u>Formation</u>	<u>Sample</u>	<u>TVD</u>	<u>Datum</u>	<u>Log</u>	<u>TVD</u>	<u>Datum</u>	<u>Log</u>
Heebner	4982'	4382'	(-1518')	4960'	4352'	(-1488')	(-1479')
Toronto	5030'	4409'	(-1545')	4997'	4390'	(-1526')	(-1491')
Lansing	5261'	4550'	(-1686')	5228'	4530'	(-1666')	(-1627')
Marmaton	6507'	5251'	(-2387')	6484'	5235'	(-2371')	(-2327')
Cherokee	6991'	5560'	(-2696')	6976'	5543'	(-2679')	(-2653')
Atoka	7248'	5737'	(-2873')	7222'	5719'	(-2855')	(-2833')
Morrow	7503'	5921'	(-3057')	7472'	5900'	(-3036')	(-3012')
Upper Morrow Sand		not picked		7484'	5907'	(-3043')	absent
			from Duane E. Moredock				
Lower Morrow	7870'		( 78')	7800'	6148'	(-3284')	(-3274')
Lower Morrow Sand		not picked		7842'	6182'	(-3318')	absent
Chester	7892'			7870'	6208'	(-3344')	(-3311')
Orange Marker	8152'			8132'	6426'	(-3562')	(-3538')
Basal Chester		not picked		8215'	6506'	(-3642')	(-3625')
Meramec	8366'			8340'	6606'	(-3942')	(-3832')

SHOW DESCRIPTION:

<u>Formation</u>	<u>Interval</u>	<u>Description</u>
Marmaton	6678'-6684'	Limestone, light brown-dark brown, mudstone-wackestone, micritic, dolomitic in part, shell fragments in part, tight, trace pinpoint gold fluorescence, pale streaming cut, very pale ring. POOR SHOW.

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SHOW DESCRIPTION: (continued)

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<u>Formation</u>	<u>Interval</u>	<u>Description</u>
Atoka	7248'-7260'	Limestone, light brown-grayish brown, mudstone, micritic, dolomitic in part, shell fragments in part, tight, trace dull yellow fluorescence, instant streaming cut, fair ring. POOR SHOW.

DEVIATION RECORD:

Radius of Curvature TVD Depth Calculation  
 Magnetic Declination of 8°

<u>Depth</u>	<u>Direction</u>	<u>Drift</u>	<u>True Vertical Depth</u>	<u>Departure</u>	<u>North</u>	<u>East</u>
0.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	12.00	0.25	500.00	1.09	1.08	0.11
1000.00	12.00	0.25	999.99	3.27	3.22	0.57
1500.00	12.00	0.50	1499.98	6.54	6.42	1.25
1839.00	75.00	1.90	1838.90	12.76	11.31	5.89
1900.00	86.60	3.70	1899.82	14.73	11.79	8.83
1994.00	88.60	6.20	1993.47	20.83	12.13	16.93
2088.00	95.70	8.40	2086.70	31.13	11.68	28.86
2182.00	97.00	8.80	2179.64	44.01	10.13	42.83
2246.00	96.00	10.00	2242.78	53.96	8.94	53.21
2308.00	94.10	12.10	2303.63	65.53	7.90	65.05
2370.00	89.30	12.10	2364.25	78.40	7.51	78.04
2432.00	86.20	12.70	2424.80	91.69	8.03	91.34
2494.00	86.90	13.80	2485.15	105.90	8.89	105.52
2556.00	85.50	14.80	2545.23	121.21	9.90	120.80
2671.00	85.00	17.00	2655.82	152.71	12.51	152.20
2770.00	85.00	17.75	2750.31	182.27	15.09	181.65
2811.00	83.00	18.70	2789.25	195.09	16.43	194.40
2874.00	79.00	21.40	2848.43	216.63	19.81	215.73
2935.00	74.60	24.10	2904.67	240.01	25.19	238.69
2998.00	69.70	26.20	2961.70	266.26	33.40	264.16
3061.00	69.70	28.70	3017.60	294.62	43.47	291.40
3124.00	69.10	30.60	3072.35	325.16	54.44	320.57
3183.00	69.70	31.90	3122.79	355.25	65.20	349.22
3269.00	71.00	33.50	3195.16	401.20	80.83	392.97

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DEVIATION RECORD: (continued)

<u>Depth</u>	<u>Direction</u>	<u>Drift</u>	<u>True Vertical Depth</u>	<u>Departure</u>	<u>North</u>	<u>East</u>
3333.00	69.00	34.50	3248.21	436.63	93.07	426.60
3397.00	71.00	35.80	3300.54	473.17	105.67	461.22
3461.00	73.50	37.10	3352.02	511.06	117.26	497.43
3523.00	74.80	38.60	3400.98	549.07	127.65	534.03
3553.00	75.20	38.20	3424.49	567.70	132.47	552.03
3616.00	77.00	40.00	3473.38	607.43	142.02	590.59
3679.00	79.30	41.80	3520.99	648.65	150.49	630.96
3739.00	79.50	44.30	3564.84	689.56	158.02	671.21
3770.00	79.80	45.80	3586.74	711.47	161.96	692.79
3801.00	80.40	47.20	3608.07	733.92	165.83	714.95
3833.00	80.60	49.00	3629.44	757.70	169.76	738.44
3927.00	84.00	49.50	3690.80	828.62	179.30	808.99
4016.00	82.00	49.50	3748.60	896.01	187.54	876.16
4109.00	84.00	48.75	3809.46	966.07	196.11	945.95
4201.00	84.00	48.00	3870.57	1034.52	203.30	1014.35
4289.00	82.00	48.50	3929.17	1099.99	211.30	1079.51
4381.00	83.00	48.50	3990.13	1168.77	220.30	1147.82
4475.00	83.00	49.00	4052.11	1239.29	228.91	1217.97
4568.00	83.00	49.00	4113.13	1309.35	237.46	1287.63
4692.00	83.00	48.75	4194.68	1402.59	248.85	1380.34
4781.00	84.00	49.00	4253.22	1469.50	256.44	1446.95
4905.00	86.00	51.00	4332.92	1564.13	264.71	1541.57
4997.00	87.00	52.00	4390.19	1635.72	269.11	1613.43
5123.00	88.00	53.00	4466.89	1734.99	273.47	1713.30
5245.00	88.00	53.50	4539.89	1832.04	276.88	1810.99
5400.00	91.00	56.00	4629.34	1957.38	277.99	1937.54
5526.00	91.00	56.00	4699.80	2060.58	276.16	2041.99
5623.00	91.00	58.00	4752.62	2141.02	274.74	2123.32
5714.00	92.00	57.50	4801.18	2217.09	272.73	2200.25
5776.00	92.00	57.50	4834.49	2268.74	270.90	2252.51
5838.00	92.00	57.00	4868.03	2320.28	269.08	2304.63
5932.00	91.00	56.75	4919.40	2398.23	267.02	2383.32
6054.00	91.00	56.50	4986.52	2499.30	265.24	2485.19
6147.00	92.00	55.75	5038.35	2575.86	263.22	2562.37
6271.00	92.00	54.50	5109.25	2676.66	259.67	2664.04
6363.00	92.00	54.00	5163.00	2750.69	257.07	2738.66

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DEVIATION RECORD: (continued)

<u>Depth</u>	<u>Direction</u>	<u>Drift</u>	<u>True Vertical Depth</u>	<u>Departure</u>	<u>North</u>	<u>East</u>
6486.00	93.00	53.00	5236.17	2848.67	252.75	2837.43
6612.00	93.00	51.00	5313.74	2947.00	247.56	2936.58
6705.00	94.00	50.00	5372.89	3018.02	243.18	3008.21
6798.00	94.00	49.50	5432.98	3088.22	238.23	3079.01
6921.00	95.00	49.00	5513.27	3180.30	230.92	3171.91
7046.00	97.00	47.50	5596.50	3272.13	221.17	3264.65
7233.00	97.00	44.50	5726.39	3404.31	204.78	3398.14
7507.00	108.00	44.00	5922.65	3588.24	163.46	3584.52
7663.00	109.00	40.00	6038.56	3685.79	130.34	3683.49
7733.00	113.00	37.00	6093.34	3725.92	114.73	3724.16
8010.00	118.00	33.00	6320.19	3867.76	46.37	3867.48
8355.00	123.00	28.00	6617.36	4018.49	-42.45	4018.26
8414.00	123.00	28.00	6669.46	4041.90	-57.53	4041.49

Final Departure: 4041.90      Direction of Departure: 90.82

BIT RECORD:

<u>No.</u>	<u>Size</u>	<u>Make</u>	<u>Type</u>	<u>Depth Out</u>	<u>Feet</u>	<u>Hours</u>
1	12 1/4	RTC	HP11	1600'	1600	14 1/4
2	7 7/8	HTC	ATJ22	1800'	200	5 1/2
3	7 7/8	SEC	S84F	2594'	794	30 1/2
4	7 7/8	RTC	HP51A	3325	831	31 1/4
5	7 7/8	RTC	HP52	3865	540	45
3RR	7 7/8	SEC	S84F	4730	865	NA
6	7 7/8	SEC	S85CF	6656	1926	131 3/4
7	7 7/8	SEC	S86CF	7703	1047	60 3/4
8	7 7/8	RTC	J33	7735	32	3
9	7 7/8	SEC	S86OF	7777	42	3 1/2
10	7 7/8	RTC	HP52	8414	637	36 1/2

SAMPLE DESCRIPTION:

10 foot samples were caught from 4900' to total depth at 8416'. 1 foot drill time was saved from 4900' to total depth. Sample examination commenced at 4900' and continued to total depth. Sample examination from 4900'-7778' was conducted by John D. Pruitt, and from 7778'-8416' by Duane E. Moredock. One dry cut was prepared and shipped to Kansas Geological Survey, Wichita,

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Kansas for storage. Samples were caught by crews and lagged by geologist. Sample depths reported herein are lagged depths.

- 4900'-4910' Shale, dark gray-black, splintery-platy, micaceous in part. Limestone, gray-light brown, mudstone-trace wackestone, micritic, microfossils, shell fragments, very argillaceous in part, pyritic in part, tight, no stain, fluorescence, or cut.
- 4910'-4920' Limestone, gray-light brown, mudstone-trace wackestone, micritic, microfossils, shell fragments, very argillaceous in part, pyritic in part, tight, no stain, fluorescence, or cut. Shale, dark gray, splintery-platy, white microfossils in part.
- 4920'-4930' Shale, dark gray, splintery-platy, white microfossils in part. Limestone, brownish gray, mudstone, micritic, argillaceous, microfossils, tight, no stain, fluorescence, or cut.
- 4930'-4940' Limestone, grayish brown-brownish gray, mudstone, micritic, argillaceous, microfossils, trace oolites, tight, no stain, fluorescence, or cut.
- 4940'-4950' Limestone, grayish brown-brownish gray, mudstone, micritic, argillaceous, microfossils, tight, no stain, fluorescence, or cut.
- 4950'-4960' Limestone, grayish brown-dark gray, mudstone, micritic, argillaceous, microfossils, very argillaceous in part, tight, no stain, fluorescence, or cut.
- 4960'-4970' Shale, black, splintery-blocky. Limestone, brown-gray, mudstone, micritic, microcrystalline, tight, no stain, fluorescence, or cut.
- 4970'-4980' Limestone, brown-gray, trace chert, light gray, opaque, mudstone, micritic, microcrystalline, tight, no stain, fluorescence, or cut.

Top Heebner 4982' TVD 4382' (-1518')

- 4980'-4990' Limestone, brown-gray, trace chert, light gray, opaque, mudstone, micritic, microcrystalline, tight, no stain, fluorescence, or cut. Shale, gray-dark gray, black, splintery-blocky, very calcareous in part.
- 4990'-5000' Shale, gray-dark gray, black, splintery-blocky, very calcareous in part. Limestone, brown-grayish brown, mudstone, micritic matrix, microfossils, tight, no stain, fluorescence, or cut.

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5000'-5010' Limestone, brown-grayish brown, mudstone, micritic matrix, microfossils, tight, no stain, fluorescence, or cut.  
Limestone, buff-brown, mudstone, micritic, microfossils, slightly-very sandy, no visible porosity.

5020'-5030' Limestone, gray-grayish brown, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.

Top Toronto 5030' TVD 4409' (-1545')

5030'-5040' Limestone, brown, mudstone, micritic, fractured in part, vitreous lustre, tight, no stain, fluorescence, or cut.  
Trace dolomite, light gray, microcrystalline, limy, fair vuggy porosity, no stain, fluorescence, or cut.

5040'-5050' Limestone, buff-light gray, mudstone, micritic-microcrystalline, dolomitic in part, trace oolites, shell fragments in part, tight, no stain, fluorescence, or cut.

5050'-5060' Limestone, buff-light gray, mudstone, micritic-microcrystalline, dolomitic in part, trace oolites, shell fragments in part, tight, no stain, fluorescence, or cut.

5060'-5070' Limestone, buff-light gray, mudstone, micritic-microcrystalline, dolomitic in part, trace oolites, shell fragments in part, tight, no stain, fluorescence, or cut.  
Trace chert, light gray, milky.

5070'-5080' Limestone, buff, very dolomitic in part, mudstone, micritic-microcrystalline, dolomitic in part, oolites, shell fragments, tight-poor vuggy porosity, no stain, fluorescence, or cut.

5080'-5090' Limestone, buff, slightly dolomitic in part, mudstone, micritic-microcrystalline, dolomitic in part, oolites, shell fragments, tight, no stain, fluorescence, or cut.

5090'-5100' Limestone, light brown, wackestone, micritic, shell fragments, fine grain-coarse grain, tight, no stain, fluorescence, or cut.  
Limestone, buff-light brown, mudstone, micritic, fractured in part, tight, no stain, fluorescence, or cut.

5100'-5110' Limestone, buff-light brown, mudstone, micritic, fractured in part, tight-poor vuggy porosity, no stain, fluorescence, or cut.

5110'-5120' Limestone, buff-light gray, mudstone, micritic, slightly dolomitic in part, tight, no stain, fluorescence, or cut.

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- 5120'-5130' Limestone, buff-~~FROM CONFIDENTIAL~~ limestone, micritic, slightly dolomitic in part, shell fragments, tight, no stain, fluorescence, or cut.
- 5130'-5140' Limestone, buff-light brown, mudstone, micritic, slightly dolomitic in part, shell fragments, tight, no stain, fluorescence, or cut.  
Limestone, buff-light brown, mudstone-trace wackestone, micritic, slightly dolomitic in part, shell fragments, no visible porosity, no stain, fluorescence, or cut.
- 5140'-5150' Limestone, buff-light brown, mudstone-wackestone, micritic, slightly dolomitic in part, shell fragments, no visible porosity, no stain, fluorescence, or cut.
- 5150'-5160' Limestone, buff-light brown, mudstone-wackestone, micritic, slightly dolomitic in part, shell fragments, no visible porosity, no stain, fluorescence, or cut.
- 5160'-5170' Limestone, buff-light brown, mudstone-wackestone, micritic, slightly dolomitic in part, shell fragments, no visible porosity, no stain, fluorescence, or cut.  
Limestone, light brown-grayish brown, mudstone, micritic, argillaceous in part, tight, no stain, fluorescence, or cut.  
Shale, gray, blocky, very calcareous.
- 5170'-5180' Shale, gray, blocky, very calcareous.
- 5180'-5190' Shale, gray, blocky, very calcareous.  
Limestone, light brown, mudstone, micritic, trace pyrite, tight, no stain, fluorescence, or cut.
- 5190'-5200' Limestone, light brown, mudstone, micritic, trace pyrite, tight, no stain, fluorescence, or cut.  
Shale, gray, splintery-platy, waxy in part, micaceous in part.
- 5200'-5210' Shale, gray, splintery-platy, waxy in part, micaceous in part.
- 5210'-5220' Dolomite, light gray-gray, microcrystalline, slightly-very argillaceous, blotchy gray shale blebs in part, tight, no stain, fluorescence, or cut.
- 5220'-5230' Dolomite, light gray-gray, microcrystalline, slightly-very argillaceous, blotchy gray shale blebs in part, tight, no stain, fluorescence, or cut.  
Siltstone, light gray-gray-dark gray, platy-blocky, very argillaceous, very calcareous.

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- 5230'-5240' Siltstone, light gray-gray-dark gray, platy-blocky, very argillaceous, very calcareous.  
Limestone, gray-brownish gray, mudstone, micritic, mottled, thin gray shale laminae, tight, no stain, fluorescence, or cut.  
Limestone, light brown, mudstone-wackestone, micritic, oolites, shell fragments, tight, no stain, fluorescence, or cut.
- 5240'-5250' Limestone, light brown, mudstone-wackestone, micritic, oolites, shell fragments, tight, no stain, fluorescence, or cut.  
Shale, gray-light gray, splintery, micaceous in part.
- 5250'-5260' Limestone, gray-brownish gray, mudstone, micritic, argillaceous in part, tight, no stain, fluorescence, or cut.  
Shale, gray, splintery-platy, micaceous.

Top Lansing 5261' TVD 4550' (-1686')

- 5260'-5270' Shale, gray, splintery-platy, micaceous.  
Dolomite, buff, microcrystalline, limy in part, microfossils, tight-poor vuggy porosity, no stain, fluorescence, or cut.
- 5270'-5280' Dolomite, buff, microcrystalline, limy in part, microfossils, tight, no stain, fluorescence, or cut.  
Limestone, light brown, mudstone, micritic, shell fragments in part, tight, no stain, fluorescence, or cut.  
Chert, tan, opaque.
- 5280'-5290' Limestone, light brown, mudstone, micritic, shell fragments in part, tight, no stain, fluorescence, or cut.  
Chert, light brown, translucent.  
Limestone, buff-white, wackestone-packstone, very fine grain-fine grain, dolomitic matrix, microfossils, oolites, no visible porosity, no stain, fluorescence, or cut.
- 5290'-5300' Limestone, light brown, mudstone-wackestone, micritic, shell fragments, tight, no stain, fluorescence, or cut.  
Chert, light brown, translucent-milky.
- 5300'-5310' Limestone, gray-dark brownish gray, mudstone, micritic matrix, very argillaceous in part, tight, no stain, fluorescence, or cut.
- 5310'-5320' Limestone, light brown-brown, wackestone, micritic matrix, oolites, shell fragments, tight, no stain, fluorescence, or cut.  
Chert, tan-gray-light brown, translucent-milky.

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- 5320'-5330' Limestone, light brown-brown, wackestone, micritic matrix, oolites, shell fragments, tight, no stain, fluorescence, or cut.  
Limestone, gray-dark gray, very argillaceous, mudstone, micritic matrix, tight, no stain, fluorescence, or cut.
- 5330'-5340' Limestone, gray-dark gray, very argillaceous, mudstone, micritic matrix, tight, no stain, fluorescence, or cut.  
Chert, milky tan.
- 5340'-5350' Limestone, gray-dark gray, silty in part, trace pyrite, very argillaceous, mudstone, micritic matrix, tight, no stain, fluorescence, or cut.  
Limestone, brownish gray-gray, mudstone, micritic matrix, very argillaceous, tight, no stain, fluorescence, or cut.
- 5350'-5360' Shale, gray-dark gray, blocky, silty, calcareous.  
Limestone, dark brownish gray-dark gray, mudstone, micritic matrix, very argillaceous, tight, no stain, fluorescence, or cut.
- 5360'-5370' Limestone, dark brownish gray-dark gray, mudstone, micritic matrix, very argillaceous, tight, no stain, fluorescence, or cut.
- 5370'-5380' Limestone, dark brownish gray-dark gray, mudstone, micritic matrix, very argillaceous, tight, no stain, fluorescence, or cut.  
Limestone, gray, mudstone, micritic, very argillaceous, dolomitic in part, silty in part, tight, no stain, fluorescence, or cut.
- 5380'-5390' Limestone, gray, mudstone, micritic, very argillaceous, dolomitic in part, silty in part, tight, no stain, fluorescence, or cut.  
Shale, gray-dark gray, splintery-blocky, silty in part, calcareous.
- 5390'-5400' Limestone, light gray-gray, mudstone, micritic matrix, very argillaceous, microfossils in part, tight, no stain, fluorescence, or cut.
- 5400'-5410' Limestone, gray-dark gray, mudstone, micritic matrix-microcrystalline, very argillaceous, tight, no stain, fluorescence, or cut.  
Limestone, buff, wackestone-packstone, very fine grain-medium grain, micritic matrix, dolomitic in part, microfossils, oolites, no visible porosity, no stain, fluorescence, or cut.

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- 5410'-5420' Limestone, buff, wackestone-packstone, very fine grain-medium grain, micritic matrix, dolomitic in part, microfossils, oolites, no visible porosity, no stain, fluorescence, or cut.
- 5420'-5430' Limestone, gray-dark gray, mudstone, micritic-microcrystalline, very argillaceous, tight, no stain, fluorescence, or cut.
- 5430'-5440' Limestone, buff-light brown, mudstone-wackestone, micritic, fractured in part, microfossils, shell fragments in part, tight, no stain, fluorescence, or cut.  
Limestone, light brown, packstone, very fine grain-medium grain, micritic matrix, oolites, fair-good oomoldic and vuggy porosity, no stain, fluorescence, or cut.
- 5440'-5450' Limestone, light brown, packstone, very fine grain-medium grain, micritic matrix, oolites, fair-good oomoldic and vuggy porosity, no stain, fluorescence, or cut.  
Limestone, buff-light brown, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.
- 5450'-5460' Limestone, dark brownish gray, mudstone, micritic matrix, pyritic, very argillaceous, tight, no stain, fluorescence, or cut.
- 5460'-5470' Limestone, dark brownish gray, mudstone, micritic matrix, pyritic, very argillaceous, tight, no stain, fluorescence, or cut.  
Limestone, light brown-light grayish brown, mudstone, micritic, argillaceous in part, shell fragments in part, tight, no stain, fluorescence, or cut.
- 5470'-5480' Shale, dark gray-gray, blocky, very calcareous.  
Limestone, gray-dark gray, mudstone, micritic matrix, very argillaceous, tight, no stain, fluorescence, or cut.
- 5480'-5490' Limestone, light grayish brown-brownish gray, mudstone, micritic, argillaceous, pyritic in part, tight, no stain, fluorescence, or cut.
- 5490'-5500' Limestone, light grayish brown-brownish gray, mudstone, micritic, microfossils in part, argillaceous, pyritic in part, tight, no stain, fluorescence, or cut.
- 5500'-5510' Limestone, light brown, wackestone-packstone, very fine grain-fine grain, micritic, dolomitic in part, shell fragments, trace oolites, tight-fair visible porosity, no stain, fluorescence, or cut.

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- 5510'-5520' Limestone, light brown, wackestone-packstone, very fine grain-fine grain, micritic, dolomitic in part, shell fragments, trace oolites, tight-fair visible porosity, no stain, fluorescence, or cut.
- 5520'-5530' Limestone, light brown, wackestone-packstone, very fine grain-fine grain, micritic, dolomitic in part, shell fragments, trace oolites, tight-fair visible porosity, no stain, fluorescence, or cut.  
Limestone, gray, mudstone, micritic, very argillaceous, tight, no stain, fluorescence, or cut.
- 5530'-5540' Limestone, brown-gray, mudstone, micritic, very argillaceous in part, tight, no stain, fluorescence, or cut.
- 5540'-5550' Limestone, brown-gray, mudstone, micritic, very argillaceous in part, tight, no stain, fluorescence, or cut.  
Dolomite, buff-light gray, microcrystalline-trace microsucrosic, limy in part, shell fragments, no visible porosity, no stain, fluorescence, or cut.
- 5550'-5560' Limestone, brown, mudstone, micritic matrix, shell fragments, tight, no stain, fluorescence, or cut.
- 5560'-5570' Limestone, light brown-brown, mudstone, micritic, shell fragments in part, tight, no stain, fluorescence, or cut.
- 5570'-5580' Trace sandstone, white, very fine grain-silty, very calcareous, friable, no visible porosity, no stain, fluorescence, or cut.  
Limestone, buff-light brown, mudstone-wackestone, micritic matrix, oolites, shell fragments, tight, no stain, fluorescence, or cut.
- 5580'-5590' Limestone, buff-light brown, mudstone-wackestone, micritic matrix, oolites, shell fragments, tight, no stain, fluorescence, or cut.  
Limestone, light grayish brown, mudstone, micritic matrix, tight, no stain, fluorescence, or cut.
- 5590'-5600' Limestone, light brown-light grayish brown, wackestone-packstone, fine grain, micritic-sparry matrix, shell fragments, tight, no stain, fluorescence, or cut.  
Limestone, light brown-brown, mudstone-wackestone, micritic, shell fragments, tight, no stain, fluorescence, or cut.

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- 5600'-5610' Limestone, light brown-brown, mudstone-wackestone, micritic, shell fragments, tight, no stain, fluorescence, or cut.  
Limestone, light brown, wackestone-packstone, fine grain, micritic matrix, dolomitic in part, oolites, shell fragments, no visible porosity, no stain, fluorescence, or cut.
- 5610'-5620' Limestone, light brown, wackestone-packstone, fine grain, micritic matrix, dolomitic in part, oolites, shell fragments, no visible porosity, no stain, fluorescence, or cut.  
Limestone, light brown-grayish brown, mudstone-wackestone, micritic, shell fragments, tight, no stain, fluorescence, or cut.
- 5620'-5630' Limestone, brown-dark brown-dark grayish brown, mudstone-wackestone, micritic, shell fragments, very argillaceous in part, tight, no stain, fluorescence, or cut.
- 5630'-5640' Shale, dark gray, splintery.  
Limestone, light brown-brown, mudstone-wackestone, micritic, oolites, shell fragments, tight, no stain, fluorescence, or cut.
- 5640'-5650' Limestone, light brown-brown, mudstone-wackestone, micritic, oolites, shell fragments, tight, no stain, fluorescence, or cut.
- 5650'-5660' Limestone, light brown, packstone, very fine grain-medium grain, micritic matrix, shell fragments, oolites, no visible porosity, no stain, fluorescence, or cut.
- 5660'-5670' Limestone, grayish brown, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.
- 5670'-5680' Limestone, light brown-gray, mudstone-wackestone, micritic, argillaceous in part, shell fragments, oolites, tight, no stain, fluorescence, or cut.
- 5680'-5690' Limestone, light brown-brown, wackestone-trace packstone, fine grain, micritic matrix, oolites, tight, no stain, fluorescence, or cut.
- 5690'-5700' Dolomite, buff, microcrystalline-trace microcrystalline, microfossils, oolites, shell fragments, no visible porosity, no stain, fluorescence, or cut.  
Chert, dark brown-gray, banded in part, cross-hatched in part.

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- 5700'-5710' Dolomite, buff, microcrystalline-trace microsucrosic, microfossils, oolites, shell fragments, no visible porosity, no stain, fluorescence, or cut. Chert, dark brown-gray, banded in part, cross-hatched in part.
- 5710'-5720' Dolomite, buff, microcrystalline-trace microsucrosic, microfossils, oolites, shell fragments, no visible porosity, no stain, fluorescence, or cut. Chert, dark brown-gray, banded in part, cross-hatched in part. Limestone, light brown-dark brown, micritic, microcrystalline, tight, no stain, fluorescence, or cut.
- 5720'-5730' Limestone, light brown, micritic, microcrystalline, tight, no stain, fluorescence, or cut. Chert, tan, milky.
- 5730'-5740' Limestone, light brown, micritic, microcrystalline, tight, no stain, fluorescence, or cut. Chert, tan-gray, milky, speckled. Dolomite, buff, microcrystalline-microsucrosic, silty in part, microfossils in part, thin dark gray argillaceous laminae in part, no visible porosity, no stain, fluorescence, or cut.
- 5740'-5750' Dolomite, buff, microcrystalline-microsucrosic, silty in part, microfossils in part, thin dark gray argillaceous laminae in part, no visible porosity, no stain, fluorescence, or cut. Limestone, light brown-light gray, mudstone, micritic, shell fragments in part, tight, no stain, fluorescence, or cut.
- 5750'-5760' Limestone, light brown-light gray, mudstone, micritic, shell fragments in part, tight, no stain, fluorescence, or cut.
- 5760'-5770' Limestone, light brown-light gray, mudstone, micritic, shell fragments in part, tight, no stain, fluorescence, or cut. Limestone, light brown, wackestone-packstone, fine grain-medium grain, micritic matrix, dolomitic in part, oolites, tight-fair with trace good oomoldic and vuggy porosity, no stain, fluorescence, or cut.
- 5770'-5780' Limestone, light brown, wackestone-packstone, fine grain-medium grain, micritic matrix, dolomitic in part, oolites, tight-fair with trace good oomoldic and vuggy porosity, no stain, fluorescence, or cut.
- 5780'-5790' Limestone, light brown, wackestone-packstone, fine grain-medium grain, micritic matrix, dolomitic in part, oolites, tight-fair oomoldic porosity, no stain, fluorescence, or cut. Limestone, light brown-light gray, mudstone-wackestone, micritic, oolites, tight, no stain, fluorescence, or cut.

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- 5790'-5800' Limestone, light brown-light gray, mudstone, micritic, shell fragments, trace pyrite, tight, no stain, fluorescence, or cut.
- 5800'-5810' Limestone, light brown-light gray, mudstone, micritic, shell fragments, trace pyrite, tight, no stain, fluorescence, or cut. Dolomite, buff-light gray, microcrystalline, limy in part, oolites in part, tight, no stain, fluorescence, or cut.
- 5810'-5820' Dolomite, buff-light gray, microcrystalline, limy in part, oolites in part, tight-fair oomoldic porosity, no stain, fluorescence, or cut.
- 5820'-5830' Limestone, light gray, mudstone, micritic, tight, no stain, fluorescence, or cut.  
Chert, light gray, milky.  
Limestone, brown, packstone, very fine grain-fine grain, micritic matrix, dolomitic in part, oolites, tight-fair oomoldic porosity, no stain, fluorescence, or cut.
- 5830'-5840' Limestone, brown, packstone, very fine grain-fine grain, micritic matrix, dolomitic in part, oolites, tight-fair oomoldic porosity, no stain, fluorescence, or cut.  
Chert, light gray, milky.  
Dolomite, buff, microcrystalline-microsucrosic, limy in part, tight-poor intercrystalline and vuggy porosity, no stain, fluorescence, or cut.
- 5840'-5850' Dolomite, buff, microcrystalline-microsucrosic, limy in part, tight-poor intercrystalline and vuggy porosity, no stain, fluorescence, or cut.  
Chert, light gray, milky.  
Limestone, light brown-grayish brown, mottled in part, mudstone, micritic, shell fragments in part, tight, no stain, fluorescence, or cut.
- 5850'-5860' Limestone, light gray-light brown, mudstone, micritic matrix, Limestone in part, shell fragments in part, tight, no stain, fluorescence, or cut.  
Chert, white-buff-dark gray, opaque.
- 5860'-5870' Limestone in part, shell fragments in part, tight, no stain, fluorescence, or cut.  
Chert, pale blue-gray, opaque.

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- 5870'-5880' Limestone, brown, packstone, very fine grain, micritic matrix, oolites, tight-poor oomoldic porosity, no stain, fluorescence, or cut.  
Limestone, light brown-brownish gray, mudstone, micritic, argillaceous in part, shell fragments in part, tight, no stain, fluorescence, or cut.  
Chert, pale blue-gray, opaque.
- 5880'-5890' Limestone, light brown, mudstone, micritic, argillaceous in part, shell fragments in part, tight, no stain, fluorescence, or cut.  
Chert, pale blue-gray, opaque.
- 5890'-5900' Limestone, light grayish brown-brown, mudstone-trace wackestone, micritic, very dolomitic in part, shell fragments, trace oolites, tight, no stain, fluorescence, or cut.
- 5900'-5910' Limestone, brown-gray-trace dark gray, mudstone, micritic matrix, very argillaceous in part, tight, no stain, fluorescence, or cut.
- 5910'-5920' Limestone, brown-gray-trace dark gray, mudstone, micritic matrix, very argillaceous in part, tight, no stain, fluorescence, or cut.
- 5920'-5930' Limestone, brown-gray-trace dark gray, mudstone, micritic matrix, very argillaceous in part, tight, no stain, fluorescence, or cut.  
Dolomite, buff-light gray, microcrystalline-microsugrosic, microfossils, silty in part, tight, no stain, fluorescence, or cut.
- 5930'-5940' Limestone, buff-light brown, mudstone, micritic, shell fragments, tight, no stain, fluorescence, or cut.
- 5940'-5950' Limestone, light brown-gray, mudstone, micritic, shell fragments, argillaceous in part, tight, no stain, fluorescence, or cut.
- 5950'-5960' Limestone, gray, mudstone, micritic, shell fragments, very argillaceous in part, tight, no stain, fluorescence, or cut.  
Limestone, light brown-light gray, mudstone, micritic, shell fragments in part, tight, no stain, fluorescence, or cut.
- 5960'-5970' Limestone, light brown-light gray, mudstone, micritic, shell fragments in part, tight, no stain, fluorescence, or cut.  
Limestone, light brown, wackestone, micritic, oolitic, tight, no stain, fluorescence, or cut.

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- 5970'-5980' Limestone, light brown, wackestone, micritic, oolitic, tight, no stain, fluorescence, or cut.  
Chert, white, milky.  
Limestone, light brown, mudstone, micritic, slightly dolomitic in part, shell fragments, tight, no stain, fluorescence, or cut.
- 5980'-5990' Limestone, light brown, mudstone, micritic, slightly dolomitic in part, shell fragments, tight, no stain, fluorescence, or cut.  
Limestone, light brown, packstone, very fine grain-fine grain, micritic matrix, oolites, tight-fair oomoldic porosity, no stain, fluorescence, or cut.
- 5990'-6000' Limestone, light gray, mudstone, micritic, shell fragments, tight, no stain, fluorescence, or cut.
- 6000'-6010' Limestone, light brown, mudstone, micritic, oolites, tight, no stain, fluorescence, or cut.  
Dolomite, buff-white, microcrystalline, limy in part, shell fragments in part, tight, no stain, fluorescence, or cut.
- 6010'-6020' Dolomite, buff-white, microcrystalline, limy in part, shell fragments in part, tight, no stain, fluorescence, or cut.  
Limestone, brown-gray, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.
- 6020'-6030' Limestone, brown-gray, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.  
Limestone, light brown, packstone, micritic matrix, very fine grain-fine grain, tight-poor oomoldic porosity, no stain, fluorescence, or cut.
- 6030'-6040' Limestone, light brown, packstone, micritic matrix, very fine grain-fine grain, tight, no stain, fluorescence, or cut.  
Limestone, light gray-light brown, banded with dark gray argillaceous laminae, silty, mudstone, micritic, tight, no stain, fluorescence, or cut.
- 6040'-6050' Shale, dark gray, blocky, silty, calcareous.  
Limestone, light grayish brown-light gray, mudstone-wackestone, micritic, dolomitic in part, oolites, tight, no stain, fluorescence, or cut.
- 6050'-6060' Limestone, light grayish brown-light gray, mudstone-wackestone, micritic, dolomitic in part, oolites, tight, no stain, fluorescence, or cut.  
Limestone, light gray-light brown, mudstone, micritic, shell fragments in part, tight, no stain, fluorescence, or cut.

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- 6060'-6070' Limestone, light gray-light brown, mudstone, micritic, shell fragments in part, tight, no stain, fluorescence, or cut. Shale, dark gray, chippy-blocky, silty in part.
- 6070'-6080' Shale, dark gray, chippy-blocky, silty in part. Limestone, light grayish brown-light gray, wackestone, micritic, argillaceous, shell fragments, tight, no stain, fluorescence, or cut.
- 6080'-6090' Limestone, light grayish brown-light gray, mudstone-wackestone, micritic, argillaceous, shell fragments, tight, no stain, fluorescence, or cut.
- 6090'-6100' Limestone, light grayish brown-light gray, mudstone, micritic, argillaceous, shell fragments, tight, no stain, fluorescence, or cut.  
Limestone, light brown, fine grain, micritic, oolites, tight-fair vuggy porosity, no stain, fluorescence, or cut.
- 6100'-6110' Limestone, light brown, fine grain, micritic, oolites, tight-fair vuggy porosity, no stain, fluorescence, or cut.  
Limestone, light brown-light gray, wackestone-packstone, very fine grain, micritic matrix, dolomitic in part, shell fragments, trace oolites, tight-fair intercrystalline and vuggy porosity, no stain, fluorescence, or cut.
- 6110'-6120' Limestone, light brown-light gray, wackestone-packstone, very fine grain, micritic matrix, dolomitic in part, shell fragments, trace oolites, tight-fair intercrystalline and vuggy porosity, no stain, fluorescence, or cut.
- 6120'-6130' Limestone, light brown-light gray, wackestone-packstone, very fine grain, micritic matrix, dolomitic in part, shell fragments, trace oolites, tight-fair intercrystalline and vuggy porosity, no stain, fluorescence, or cut.
- 6130'-6140' Limestone, light brown-light gray, wackestone-packstone, very fine grain, micritic matrix, dolomitic in part, shell fragments, trace oolites, tight-poor vuggy porosity, no stain, fluorescence, or cut.
- 6140'-6150' Limestone, light grayish brown, mudstone-wackestone, micritic, shell fragments, tight, no stain, fluorescence, or cut.
- 6150'-6160' Limestone, light grayish brown-gray, mudstone-wackestone, micritic, shell fragments, very argillaceous in part, tight, no stain, fluorescence, or cut.  
Chert, light gray, translucent.

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- 6160'-6170' Limestone, light grayish brown-gray, mudstone-wackestone, micritic, shell fragments, very argillaceous in part, tight, no stain, fluorescence, or cut.  
Limestone, light brown-light gray, packstone, very fine grain, micritic matrix, argillaceous, microfossils, dolomitic in part, no visible porosity, no stain, fluorescence, or cut.
- 6170'-6180' Limestone, light brown-light gray, packstone, very fine grain, micritic matrix, argillaceous, microfossils, dolomitic in part, tight-poor vuggy porosity, no stain, fluorescence, or cut.  
Limestone, light gray-gray, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.
- 6180'-6190' Limestone, light gray-gray, mudstone-wackestone, micritic, argillaceous, shell fragments, tight, no stain, fluorescence, or cut.
- 6190'-6200' Limestone, light gray-gray, mudstone-wackestone, micritic, argillaceous, shell fragments, tight, no stain, fluorescence, or cut.  
Limestone, grayish brown, packstone, fine grain, micritic matrix, oolites, no visible porosity, no stain, fluorescence, or cut.
- 6200'-6210' Limestone, light gray-gray, mudstone, micritic, shell fragments, silty in part, tight, no stain, fluorescence, or cut.  
Dolomite, light gray, microcrystalline, chalky, tight, no stain, fluorescence, or cut.
- 6210'-6220' Limestone, light brown-light grayish brown, mudstone, micritic, shell fragments, oolites, tight, no stain, fluorescence, or cut.  
Limestone, light brown, packstone, fine grain-medium grain, micritic matrix, dolomitic in part, tight-good oomoldic porosity, no stain, fluorescence, or cut.
- 6220'-6230' Limestone, light brown, packstone, fine grain-medium grain, micritic matrix, dolomitic in part, tight-good oomoldic porosity, no stain, fluorescence, or cut.  
Limestone, light brown-grayish brown, mudstone, micritic, shell fragments, tight, no stain, fluorescence, or cut.
- 6230'-6240' Limestone, light brown-grayish brown, mudstone, micritic, shell fragments, tight, no stain, fluorescence, or cut.  
Limestone, dark brown-dark brownish gray, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.

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- 6240'-6250' Limestone, dark brown-dark brownish gray, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.
- 6250'-6260' Limestone, dark brown-brown, mudstone, micritic, argillaceous, shell fragments in part, tight, no stain, fluorescence, or cut.
- 6260'-6270' Limestone, dark brown-brown, mudstone, micritic, argillaceous, shell fragments in part, tight, no stain, fluorescence, or cut.
- 6270'-6280' Limestone, dark brown-brown, mudstone, micritic, argillaceous, shell fragments in part, tight, no stain, fluorescence, or cut.
- 6280'-6290' Limestone, dark brown-brown, trace thin dark gray argillaceous laminae, mudstone, micritic, argillaceous, shell fragments in part, tight, no stain, fluorescence, or cut.  
Shale, dark gray, black, platy, calcareous in part.
- 6290'-6300' Limestone, dark brown-brown, trace thin dark gray argillaceous laminae, mudstone, micritic, argillaceous, shell fragments in part, tight, no stain, fluorescence, or cut.
- 6300'-6310' Limestone, dark brown-brown, trace thin dark gray argillaceous laminae, mudstone, micritic, argillaceous, shell fragments in part, tight, no stain, fluorescence, or cut.
- 6310'-6320' Limestone, brown-dark brown-gray, mudstone, micritic, very argillaceous in part, tight, no stain, fluorescence, or cut.
- 6320'-6330' Shale, gray-dark gray, platy-blocky, calcareous, micaceous in part, silty in part.
- 6330'-6340' Limestone, brown-dark brown, mudstone-trace wackestone, micritic, oolites, tight, no stain, fluorescence, or cut.
- 6340'-6350' Limestone, light brown-dark brown, mudstone-wackestone, micritic, dolomitic, shell fragments, no visible porosity, no stain, fluorescence, or cut.
- 6350'-6360' Limestone, light brown-dark brown, mudstone-wackestone, micritic, dolomitic, shell fragments, no visible porosity, no stain, fluorescence, or cut.
- 6360'-6370' Shale, gray-dark gray, blocky, silty, calcareous.  
Limestone, dark brown, mudstone, micritic, tight, no stain, fluorescence, or cut.

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- 6370'-6380' Limestone, dark brown, mudstone, micritic, tight, no stain, fluorescence, or cut.  
Limestone, grayish brown, packstone, very fine grain, micritic matrix, argillaceous, oolites, tight, no stain, fluorescence, or cut.
- 6380'-6390' Shale, dark gray, splintery-platy.  
Limestone, dark brown, mudstone, micritic, tight, no stain, fluorescence, or cut.
- 6390'-6400' Limestone, light brown-dark brown, mudstone, micritic, shell fragments in part, tight, no stain, fluorescence, or cut.
- 6400'-6410' Limestone, light brown-dark brown, mudstone, micritic, shell fragments in part, tight, no stain, fluorescence, or cut.  
Shale, black, chippy.
- 6410'-6420' Shale, black, chippy.  
Limestone, grayish brown-brown, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.
- 6420'-6430' Limestone, light brown-grayish brown, mudstone, micritic, very dolomitic in part, tight, no stain, fluorescence, or cut.
- 6430'-6440' Limestone, light brown-grayish brown, mudstone, micritic, very dolomitic in part, tight, no stain, fluorescence, or cut.
- 6440'-6450' Dolomite, buff, microcrystalline-microsugrosic, shell fragments, no visible porosity, no stain, fluorescence, or cut.  
Limestone, grayish brown-brown-trace gray, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.  
Shale, gray-dark gray, blocky, calcareous, silty in part.
- 6450'-6460' Shale, gray-dark gray, blocky, calcareous, silty in part.  
Limestone, light brown-grayish brown, mudstone, micritic, argillaceous in part, shell fragments and oolites in part, tight, no stain, fluorescence, or cut.
- 6460'-6470' Limestone, light brown-brown, mudstone, micritic, tight, no stain, fluorescence, or cut.
- 6470'-6480' Limestone, grayish brown-brown, mudstone, micritic, tight, no stain, fluorescence, or cut.  
Shale, dark gray, platy-blocky.
- 6480'-6490' Limestone, brown-dark brown, mudstone-wackestone, micritic, oolites, tight, no stain, fluorescence, or cut.

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- 6490'-6500' Limestone, grayish brown-dark brown, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.
- 6500'-6510' Limestone, dark grayish brown-dark brown, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.  
Shale, dark gray, blocky, calcareous, silty.

Top Marmaton 6507' TVD 5251' (-2387')

- 6510'-6520' Limestone, dark grayish brown-dark brown, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.  
Shale, dark gray, splintery-blocky, calcareous, micaceous.
- 6520'-6530' Shale, dark gray, splintery-blocky, calcareous, micaceous.  
Limestone, light brown-dark brown-gray, mudstone, micritic, shell fragments, argillaceous in part.
- 6530'-6540' Shale, blocky, splintery.  
Shale, dark gray, blocky, calcareous.  
Limestone, light brown-brown-dark grayish brown, mudstone, micritic, very argillaceous in part, shell fragments in part, tight, no stain, fluorescence, or cut.
- 6540'-6550' Limestone, light brown-brown-dark grayish brown, mudstone, micritic, very argillaceous in part, shell fragments in part, tight, no stain, fluorescence, or cut.
- 6550'-6560' Limestone, light brown-dark brown, mudstone-wackestone, micritic, dolomitic in part, shell fragments, tight, no stain, fluorescence, or cut.
- 6560'-6570' Limestone, light brown-dark brown, mudstone-wackestone, micritic, very dolomitic in part, shell fragments, tight, no stain, fluorescence, or cut.  
Shale, light gray-gray, blocky-platy, waxy in part, very calcareous in part.
- 6570'-6580' Limestone, buff-brown, mudstone, micritic, tight, no stain, fluorescence, or cut.  
Limestone, grayish brown-brown, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.
- 6580'-6590' Limestone, grayish brown-brown, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.  
Limestone, grayish brown-dark gray, mudstone, micritic, very argillaceous, tight, no stain, fluorescence, or cut.  
Shale, dark gray, platy-blocky, very calcareous in part.

- 6590'-6600' Shale, dark gray, platy-blocky, very calcareous in part. Limestone, grayish brown-gray, mudstone, micritic, very argillaceous in part, very dolomitic with shell fragments in part, tight, no stain, fluorescence, or cut.
- 6600'-6610' Limestone, grayish brown-gray, mudstone, micritic, very argillaceous in part, very dolomitic with shell fragments in part, tight, no stain, fluorescence, or cut.
- 6610'-6620' Shale, dark gray, blocky, calcareous. Limestone, light brown-grayish brown, mudstone-wackestone, micritic, dolomitic in part, shell fragments, tight, no stain, fluorescence, or cut.
- 6620'-6630' Limestone, light brown-grayish brown, mudstone-wackestone, micritic, dolomitic in part, shell fragments, tight, no stain, fluorescence, or cut. Dolomite, buff-white, microcrystalline, limy in part, shell fragments, no visible porosity, no stain, fluorescence, or cut.
- 6630'-6640' Limestone, light brown-grayish brown-dark gray, mudstone, micritic, very argillaceous in part, tight, no stain, fluorescence, or cut.
- 6640'-6650' Limestone, light brown-light grayish brown, mudstone, micritic, tight, no stain, fluorescence, or cut. Chert, light brown, translucent.
- 6650'-6660' Limestone, light brown-light grayish brown, mudstone, micritic, tight, no stain, fluorescence, or cut. Limestone, gray-dark gray, mudstone, micritic, very argillaceous, tight, no stain, fluorescence, or cut.
- 6660'-6670' Limestone, gray-dark gray, mudstone, micritic, very argillaceous, tight, no stain, fluorescence, or cut. Limestone, light brown-brown, wackestone, micritic, dolomitic in part, oolites, tight, no stain, fluorescence, or cut. Shale, dark gray, blocky, calcareous, silty. Chert, light brown, translucent.
- 6670'-6680' Limestone, light brown-brown, wackestone, micritic, dolomitic in part, oolites, tight, no stain, fluorescence, or cut. Limestone, light brown-dark brown, mudstone-wackestone, dolomitic in part, micritic, shell fragments, tight-trace pinpoint gold fluorescence, pale streaming cut, very pale ring.

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- 6680'-6690' Limestone, light brown-dark brown, mudstone-wackestone, dolomitic in part, micritic, shell fragments, tight-trace pinpoint gold fluorescence, pale streaming cut, very pale ring. Chert, tan-light brown, translucent. Shale, dark gray-black, splintery-platy.
- 6690'-6700' Limestone, light brown-dark brown, mudstone-wackestone, dolomitic in part, micritic, shell fragments, tight-trace pinpoint gold fluorescence, pale streaming cut, very pale ring. Limestone, light brown-brown, mudstone, micritic, shell fragments in part, tight, no stain, fluorescence, or cut.
- 6700'-6710' Limestone, light brown-brown-trace grayish brown, mudstone, micritic, shell fragments in part, tight, no stain, fluorescence, or cut. Chert, tan, milky.
- 6710'-6720' Limestone, light brown-brown-trace grayish brown, mudstone, micritic, shell fragments in part, tight, no stain, fluorescence, or cut.
- 6720'-6730' Shale, dark gray, splintery. Dolomite, tan, microcrystalline, limy, microfossils, tight, no stain, fluorescence, or cut.
- 6730'-6740' Dolomite, tan, microcrystalline, limy, microfossils, tight, no stain, fluorescence, or cut. Limestone, brown-dark brown-dark gray, mudstone, microcrystalline-micritic, dolomitic in part, very argillaceous in part, tight, no stain, fluorescence, or cut.
- 6740'-6750' Limestone, brown-dark brown-dark gray, mudstone, microcrystalline-micritic, dolomitic in part, very argillaceous in part, tight, no stain, fluorescence, or cut.
- 6750'-6760' Dolomite, buff, microcrystalline, limy in part, chalky in part, no visible porosity, no stain, fluorescence, or cut.
- 6760'-6770' Limestone, brown-grayish brown, mudstone, micritic, argillaceous in part, tight, no stain, fluorescence, or cut. Limestone, buff-brown, mudstone-wackestone, micritic, dolomitic, shell fragments, tight, no stain, fluorescence, or cut.
- 6770'-6780' Shale, dark gray-gray, blocky, calcareous, microfossils in part. Limestone, brown, mudstone, micritic, tight, no stain, fluorescence, or cut.

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- 6780'-6790' Dolomite, buff, microcrystalline, very limy in part, chalky in part, shell fragments in part, no visible porosity, no stain, fluorescence, or cut.  
Chert, white-gray, milky.
- 6790'-6800' Dolomite, buff, microcrystalline-trace microsucrosic, very limy in part, chalky in part, shell fragments in part, no visible porosity, no stain, fluorescence, or cut.  
Chert, white-gray, milky.
- 6800'-6810' Dolomite, buff, microcrystalline-trace microsucrosic, very limy in part, chalky in part, shell fragments in part, no visible porosity, no stain, fluorescence, or cut.
- 6810'-6820' Dolomite, buff, microcrystalline-trace microsucrosic, very limy in part, chalky in part, shell fragments in part, no visible porosity, no stain, fluorescence, or cut.  
Limestone, brownish gray-dark brown, mudstone, micritic-microcrystalline, argillaceous in part, tight, no stain, fluorescence, or cut.
- 6820'-6830' Limestone, light gray-buff-brown, mudstone-wackestone, micritic, shell fragments, argillaceous in part, dolomitic in part, tight, no stain, fluorescence, or cut.
- 6830'-6840' Limestone, light gray-buff-brown, mudstone-wackestone, micritic, shell fragments, argillaceous in part, dolomitic in part, tight, no stain, fluorescence, or cut.
- 6840'-6850' Dolomite, buff-white, microcrystalline-microsucrosic, chalky in part, very limy in part, tight-fair with trace good vuggy porosity, no stain, fluorescence, or cut.  
Chert, light gray, milky.
- 6850'-6860' Limestone, buff-light brown-brown, mudstone, micritic, dolomitic in part, shell fragments in part, tight, no stain, fluorescence, or cut.  
Chert, dark brown, opaque.
- 6860'-6870' Limestone, buff-light brown-brown, mudstone, micritic, dolomitic in part, shell fragments in part, tight, no stain, fluorescence, or cut.  
Shale, dark gray, chippy-blocky.  
Chert, dark brown, opaque.
- 6870'-6880' Limestone, buff-light brown-brown, mudstone, micritic, dolomitic in part, shell fragments in part, tight, no stain, fluorescence, or cut.  
Chert, light gray, milky; dark brown-dark gray, opaque.

- 6880'-6890' Shale, dark gray, blocky.  
Limestone, buff-brown-dark brown, mudstone, micritic,  
argillaceous, tight, no stain, fluorescence, or cut.
- 6890'-6800' Limestone, light brown-brown, mudstone, micritic, shell  
fragments, tight, no stain, fluorescence, or cut.
- 6900'-6910' Limestone, light grayish brown-light brown, mudstone, micritic,  
argillaceous, silty tight, no stain, fluorescence, or cut.  
Siltstone, light gray, speckled, calcareous, tight, no stain,  
fluorescence, or cut.  
Shale, gray-dark gray, silty, calcareous, blocky.
- 6910'-6920' Limestone, buff-light brown, mudstone-wackestone, micritic,  
chalky in part, dolomitic in part, oolites, tight, no stain,  
fluorescence, or cut.  
Dolomite, buff, microcrystalline, chalky, tight, no stain,  
fluorescence, or cut.  
Chert, light bluish gray, opaque.
- 6920'-6930' Limestone, light brown-brown-gray, mudstone, micritic,  
argillaceous in part, shell fragments in part, tight, no stain,  
fluorescence, or cut.  
Dolomite, buff, microcrystalline, chalky, tight, no stain,  
fluorescence, or cut.
- 6930'-6940' Limestone, light brown-brown-gray, mudstone, micritic,  
argillaceous in part, shell fragments in part, tight, no stain,  
fluorescence, or cut.  
Shale, dark gray, blocky.
- 6940'-6950' No samples 6939-6965 lag depths.  
No circulating samples caught at 6965, stuck in hole  
approximately 72 hours.
- 6950'-6960' No samples 6939-6965 lag depths.  
No circulating samples caught at 6965, stuck in hole  
approximately 72 hours.
- 6960'-6970' No samples 6939-6965 lag depths.  
No circulating samples caught at 6965, stuck in hole  
approximately 72 hours.  
Dolomite, buff-light gray, microsucrosic-microcrystalline, limy  
in part, shell fragments, chalky in part, no visible porosity,  
no stain, fluorescence, or cut.
- 6970'-6980' Limestone, light brown-grayish brown-dark grayish brown,  
mudstone, micritic-microcrystalline, very argillaceous in part,  
tight, no stain, fluorescence, or cut.

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6980'-6990' Limestone, light brown-grayish brown-dark grayish brown, mudstone, micritic-microcrystalline, very argillaceous in part, tight, no stain, fluorescence, or cut.  
Shale, dark gray-black, platy-blocky, very carbonaceous in part, calcareous in part.

Top Cherokee 6991' TVD 5560' (-2696')

6990'-7000' Shale, dark gray-black, platy-blocky, very carbonaceous in part, calcareous in part.  
Limestone, brown-gray-dark gray, mudstone, micritic, very argillaceous in part, shell fragments in part, tight, no stain, fluorescence, or cut.  
Chert, light brown-light gray, translucent.  
Shale, dark gray, blocky, calcareous.

7000'-7010' Limestone, brown-gray-dark gray, mudstone, micritic, very argillaceous in part, shell fragments in part, tight, no stain, fluorescence, or cut.  
Chert, light brown-dark brown, translucent.  
Shale, dark gray-black, splintery-platy.

7010'-7020' Limestone, light brown, mudstone, micritic, shell fragments, tight, no stain, fluorescence, or cut.  
Limestone, gray-dark gray, mudstone, micritic, very argillaceous, tight, no stain, fluorescence, or cut.

7020'-7030' Limestone, brownish gray-gray-dark gray, mudstone, micritic, very argillaceous, tight, no stain, fluorescence, or cut.  
Shale, dark gray-black, splintery-platy.

7030'-7040' Limestone, brownish gray-gray-dark gray, mudstone, micritic, very argillaceous, tight, no stain, fluorescence, or cut.

7040'-7050' Limestone, brown-gray-dark gray, mudstone, micritic, very argillaceous, tight, no stain, fluorescence, or cut.

7050'-7060' Limestone, brown-gray-dark gray, mudstone, micritic, very argillaceous, tight, no stain, fluorescence, or cut.  
Shale, dark gray, platy, micaceous in part.

7060'-7070' Shale, dark gray, platy, micaceous in part.  
Limestone, brown-gray-dark gray, mudstone, micritic, very argillaceous in part, tight, no stain, fluorescence, or cut.

7070'-7080' Limestone, brown-gray-dark gray, mudstone, micritic, very argillaceous in part, tight, no stain, fluorescence, or cut.

- 7080'-7090' Limestone, gray-dark gray, very argillaceous, mudstone, micritic, dolomitic in part, tight, no stain, fluorescence, or cut.
- 7090'-7100' Limestone, gray-dark gray, very argillaceous, mudstone, micritic, dolomitic in part, tight, no stain, fluorescence, or cut.  
Limestone, brown, packstone, fine grain, micritic matrix, oolites, tight, no stain, fluorescence, or cut.
- 7100'-7110' Limestone, gray-dark brownish gray, mudstone, micritic, very argillaceous, tight, no stain, fluorescence, or cut.  
Shale, dark gray, platy, very calcareous.
- 7110'-7120' Limestone, brown-gray, mudstone, micritic, very argillaceous in part, tight, no stain, fluorescence, or cut.  
Dolomite, light brown-gray-dark gray, microcrystalline, very argillaceous in part, limy in part, no visible porosity, no stain, fluorescence, or cut.
- 7120'-7130' Dolomite, light brown-gray-dark gray, microcrystalline, very argillaceous in part, limy in part, no visible porosity, no stain, fluorescence, or cut.  
Limestone, brownish gray-dark gray, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.
- 7130'-7140' Limestone, brownish gray-dark gray, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.  
Shale, dark gray, splintery.  
Limestone, gray-dark gray, mudstone, micritic-microcrystalline, very argillaceous, tight, no stain, fluorescence, or cut.
- 7140'-7150' Limestone, gray-dark gray, mudstone, micritic-microcrystalline, very argillaceous, tight, no stain, fluorescence, or cut.  
Chert, light brown, opaque.
- 7150'-7160' Limestone, light brown-light gray-gray, mudstone, micritic, argillaceous in part, shell fragments, tight, no stain, fluorescence, or cut.  
Chert, light brown, opaque.  
Shale, dark gray-black, chippy-platy.
- 7160'-7170' Limestone, light brown-light gray-gray, mudstone, micritic, argillaceous in part, shell fragments, tight, no stain, fluorescence, or cut.  
Shale, dark gray, chippy-blocky.  
Chert, gray, milky.  
Limestone, light gray-gray, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.

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- 7170'-7180' Limestone, light gray-gray, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.  
Chert, gray, milky.  
Limestone, light brown-brown, mudstone, micritic, tight, no stain, fluorescence, or cut.  
Limestone, gray-dark gray, mudstone, micritic, dolomitic in part, very argillaceous, tight, no stain, fluorescence, or cut.
- 7180'-7190' Limestone, gray-dark gray, mudstone, micritic, dolomitic in part, very argillaceous, tight, no stain, fluorescence, or cut.  
Dolomite, light gray-light brown, microcrystalline, limy in part, very silty in part, shell fragments in part, tight, no stain, fluorescence, or cut.
- 7190'-7200' Limestone, brownish gray-dark gray, mudstone, micritic, slightly-very argillaceous, tight, no stain, fluorescence, or cut.  
Shale, dark gray, platy-blocky, micaceous in part.
- 7200'-7210' Limestone, brownish gray-dark gray, mudstone, micritic, slightly-very argillaceous, tight, no stain, fluorescence, or cut.  
Shale, dark gray, platy-blocky, micaceous in part.  
Limestone, gray-dark gray, mudstone, micritic, very argillaceous, tight, no stain, fluorescence, or cut.
- 7210'-7220' Limestone, gray-dark gray, mudstone, micritic, very argillaceous, tight, no stain, fluorescence, or cut.  
Shale, dark gray, platy-blocky, micaceous in part.
- 7220'-7230' Limestone, gray-dark gray, mudstone, micritic, very argillaceous, tight, no stain, fluorescence, or cut.  
Shale, dark gray-black, platy-blocky, calcareous in part.
- 7230'-7240' Limestone, gray, mudstone, micritic, very argillaceous, tight, no stain, fluorescence, or cut.  
Shale, dark gray, splintery-platy.
- 7240'-7250' Limestone, light grayish brown-gray-dark gray, mudstone, micritic, very argillaceous in part, tight, no stain, fluorescence, or cut.  
Shale, dark gray, splintery-platy.  
Limestone, light brown-grayish brown, mudstone, micritic, shell fragments in part, dolomitic in part, tight, no stain, fluorescence, or cut.

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Top Atoka 7248' TVD 5737' (-2873')  
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- 7250'-7260' Limestone, light brown-grayish brown, mudstone, micritic, shell fragments in part, dolomitic in part, tight, trace dull yellow fluorescence, instant streaming cut, fair ring.
- 7260'-7270' Shale, dark gray, splintery-blocky, calcareous in part. Limestone, gray-dark gray, mudstone, micritic, shell fragments, tight, no stain, fluorescence, or cut.
- 7270'-7280' Shale, dark gray, splintery-blocky, calcareous in part.
- 7280'-7290' Shale, dark gray, splintery-blocky, calcareous in part. Limestone, brown-gray-dark gray, mudstone, micritic, very argillaceous in part, tight, no stain, fluorescence, or cut.
- 7290'-7300' Limestone, brown-gray-dark gray, mudstone, micritic, very argillaceous in part, tight, no stain, fluorescence, or cut. Shale, dark gray, splintery-blocky, calcareous in part.
- 7300'-7310' Shale, dark gray, splintery-blocky, calcareous in part. Limestone, light brown, mudstone, micritic matrix, very dolomitic in part, very sandy in part, no visible porosity, no stain, fluorescence, or cut.
- 7310'-7320' Limestone, light brown, mudstone, micritic matrix, very dolomitic in part, very sandy in part, no visible porosity, no stain, fluorescence, or cut. Shale, dark gray, microfossils in part, micaceous in part, splintery-blocky, calcareous in part.
- 7320'-7330' Shale, dark gray, microfossils in part, micaceous in part, splintery-blocky, calcareous in part. Limestone, light brown-light gray, mudstone, micritic, dolomitic in part, tight, no stain, fluorescence, or cut.
- 7330'-7340' Siltstone, gray, soft, very argillaceous, tight, no stain, fluorescence, or cut. Limestone, light brown-light gray, mudstone, micritic, dolomitic in part, tight, no stain, fluorescence, or cut.
- 7340'-7350' Dolomite, buff-white, microsugrosic-microcrystalline, limy in part, oolites, shell fragments, no visible porosity, no stain, fluorescence, or cut.
- 7350'-7360' Limestone, light grayish brown-light brown, mudstone-wackestone, micritic matrix, shell fragments, tight, no stain, fluorescence, or cut.

- 7360'-7370' Shale, gray-dark gray, splintery-blocky, calcareous in part.
- 7370'-7380' Limestone, gray, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.  
Shale, gray-dark gray, splintery-blocky, calcareous in part.  
Limestone, light brown, wackestone, micritic, oolites, no visible porosity, no stain, fluorescence, or cut.
- 7380'-7390' Shale, dark gray-black, splintery-blocky, waxy in part, micaceous in part.
- 7390'-7400' Shale, dark gray-black, splintery-blocky, waxy in part, micaceous in part.  
Limestone, brown-gray, mudstone, micritic, shell fragments, argillaceous in part, tight, no stain, fluorescence, or cut.
- 7400'-7410' Limestone, brown-gray, mudstone, micritic, shell fragments, argillaceous in part, tight, no stain, fluorescence, or cut.  
Shale, dark gray, splintery-blocky.
- 7410'-7420' Shale, dark gray, splintery-blocky.  
Limestone, dark brown-dark gray, mudstone, micritic, argillaceous, tight, no stain, fluorescence, or cut.
- 7420'-7430' Shale, dark gray, splintery-blocky, calcareous in part.  
Limestone, dark gray, mudstone, micritic-microcrystalline, very argillaceous, micaceous in part, tight, no stain, fluorescence, or cut.
- 7430'-7440' Shale, dark gray, splintery-blocky, calcareous in part.  
Limestone, dark gray, mudstone, micritic-microcrystalline, very argillaceous, micaceous in part, tight, no stain, fluorescence, or cut.
- 7440'-7450' Limestone, light gray-brown, mudstone, micritic, argillaceous in part, silty in part, shell fragments in part, tight, no stain, fluorescence, or cut.
- 7450'-7460' Limestone, light gray-light brown, mudstone-wackestone, micritic, argillaceous in part, dolomitic in part, oolites, shell fragments, no visible porosity, no stain, fluorescence, or cut.  
Shale, dark gray, splintery-blocky, calcareous.
- 7460'-7470' Limestone, light brown-gray-dark gray, mudstone-wackestone, micritic, very argillaceous in part, shell fragments, tight, no stain, fluorescence, or cut.

- 7470'-7480' Limestone, light brown-gray-dark gray, mudstone-wackestone, micritic, very argillaceous in part, shell fragments, tight, no stain, fluorescence, or cut.
- 7480'-7490' Limestone, light brown-gray-dark gray, mudstone-wackestone, micritic, very argillaceous in part, shell fragments, tight, no stain, fluorescence, or cut.  
Shale, dark gray, splintery-blocky, micaceous in part.
- 7490'-7500' Limestone, brown-dark gray, mudstone, micritic, very argillaceous in part, silty in part, shell fragments in part, tight, no stain, fluorescence, or cut.

Top Morrow 7503' TVD 5921' (-3057')

- 7500'-7510' Limestone, brown-dark gray, mudstone, micritic, very argillaceous in part, silty in part, shell fragments in part, tight, no stain, fluorescence, or cut.  
Shale, dark gray-black, splintery-blocky, calcareous in part, silty in part, pyritic in part.
- 7510'-7520' Shale, dark gray-black, splintery-blocky, calcareous in part, silty in part, pyritic in part.
- 7520'-7530' Shale, dark gray-black, splintery-blocky, calcareous in part, silty in part, pyritic in part.  
Sandstone, white, very fine grain-fine grain, clay filled, no visible porosity, no stain, fluorescence, or cut.
- 7530'-7540' Shale, dark gray-black, splintery-blocky, calcareous in part, silty in part, pyritic in part.
- 7540'-7550' Shale, dark gray-black, splintery-blocky, calcareous in part, silty in part, pyritic in part.  
Sandstone, white-clear, very fine grain-fine grain, white clay filling, siliceous in part, no visible porosity, no stain, fluorescence, or cut.
- 7550'-7560' Sandstone, white-clear, very fine grain-fine grain, white clay filling, siliceous in part, no visible porosity, no stain, fluorescence, or cut.  
Shale, dark gray-black, splintery-blocky, micaceous in part, waxy in part, calcareous in part.
- 7560'-7570' Shale, dark gray-black, splintery-blocky, micaceous in part, waxy in part, calcareous in part.  
Sandstone, clear-white, very fine grain-fine grain, white clay filling in part, calcareous in part, 2-5% dark lithic grains in part, no visible porosity, no stain, fluorescence, or cut.

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- 7570'-7580' Shale, dark gray, splintery, micaceous, very calcareous in part.
- 7580'-7590' Shale, dark gray, splintery, micaceous, very calcareous in part.
- 7590'-7600' Shale, dark gray, splintery, micaceous, very calcareous in part.  
Siltstone, white, glauconitic, calcareous, tight, no stain, fluorescence, or cut.
- 7600'-7610' Shale, dark gray, splintery, micaceous, very calcareous in part.
- 7610'-7620' Limestone, dark gray, mudstone, micritic, very argillaceous, tight, no stain, fluorescence, or cut.  
Shale, dark gray, splintery-blocky, very calcareous in part, micaceous in part.
- 7620'-7630' Shale, dark gray, splintery-blocky, very calcareous in part, micaceous in part.  
Siltstone, tan-light gray, sandy in part, calcareous, argillaceous in part, fine grain brown limestone grains in part, tight, no stain, fluorescence, or cut.
- 7630'-7640' Siltstone, tan-light gray, sandy in part, calcareous, argillaceous in part, fine grain brown limestone grains in part, tight, no stain, fluorescence, or cut.  
Shale, dark gray, splintery, micaceous in part, slightly calcareous in part.
- 7640'-7650' Siltstone, tan-light gray, sandy in part, calcareous, argillaceous in part, fine grain brown limestone grains in part, tight, no stain, fluorescence, or cut.  
Shale, dark gray, splintery, micaceous in part, slightly calcareous in part.
- 7650'-7660' Shale, dark gray, splintery, micaceous in part, slightly calcareous in part.
- 7660'-7670' Shale, dark gray, splintery, micaceous in part, slightly calcareous in part.
- 7670'-7680' Shale, dark gray, splintery, micaceous in part, slightly calcareous in part.
- 7680'-7690' Shale, dark gray, splintery, micaceous in part, slightly calcareous in part.

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- 7690'-7700' Shale, dark gray, splintery, micaceous in part, slightly calcareous in part, trace pyrite.
- 7700'-7710' Shale, dark gray, splintery, micaceous in part, slightly calcareous in part, trace pyrite.
- 7710'-7720' Shale, dark gray, splintery-blocky, micaceous in part.
- 7720'-7730' Sandstone, light gray-tan, very fine grain, silty, dark gray lithic grains in part, very calcareous, argillaceous in part, trace pyrite, no visible porosity, no stain, fluorescence, or cut.  
Shale, dark gray, splintery-blocky, micaceous in part.
- 7730'-7740' Shale, dark gray, splintery-blocky, micaceous in part.
- 7740'-7750' Shale, dark gray, splintery-blocky, micaceous in part.
- 7750'-7760' Shale, dark gray, splintery-blocky, micaceous in part.
- 7760'-7770' Shale, dark gray, splintery-blocky, micaceous in part.  
No samples 7768-7777; no circulating samples caught before trip at 7777.
- 7770'-7778' No samples 7768-7777; no circulating samples caught before trip at 7777.  
Shale, dark gray, splintery-blocky, micaceous in part.

Samples from 7778-8416 were examined and described by Duane E. Moredock.

Sample examination commenced at 7778 feet and continued to a total depth at 8416 feet. Samples were caught by crews on depth intervals and lagged by geologist. All depths reported herein are lagged depths. A 10 foot sample interval was used from 7778 feet to 8416 feet. At total depth, 8416 feet, the pipe was strapped and the total depth of the well corrected to 8399 feet. The drill time log correlates with the wire line geophysical logs. e.g., 7830 feet on the lithology log correlates with 7810 feet on the well bore logs. This correlation should be used to fit the lithologic sample descriptions with the wire line geophysical logs.

- 7778 - 7788 Shale (95%), black, gray. Limestone (5%), gray, mudstone, wackestone, trace vuggy porosity. Cuttings are very small in size.
- 7788 - 7808 Shale (95%), black, gray. Limestone (5%-trace), gray, mudstone, wackestone. No drill time estimated depth.
- 7808 - 7816 Shale (100%), black, gray. Limestone (trace), gray, mudstone.

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Lower Morrow 7870', Log 7800', TVD 6148' (-3284')

- 7816 - 7823 Shale (100%), black, gray. Limestone (trace), gray, mudstone.
- 7823 - 7830 Shale (100%), black, gray. Limestone (trace), gray, mudstone.
- 7830 - 7841 Shale (100%), black, gray. Limestone (trace), gray, mudstone, wackestone.
- 7841 - 7851 Shale (85%), black, gray. Limestone (15%), gray, grayish brown, mudstone, wackestone, trace sandy limestone.
- 7851 - 7858 Shale (85%), black, gray. Limestone (15%), gray, grayish brown, mudstone, some wackestone, chloritic, sandy. Sandstone (trace), gray, white, coarse grained granule, unconsolidated.
- 7858 - 7868 Shale (85%), black, gray. Limestone (15%), gray, grayish brown, mudstone, wackestone, sandy glauconitic. Sandstone (trace), coarse grained-granule, rounded, etched, unconsolidated.
- 7868 - 7876 Shale (90%), gray, black (color change). Limestone (10%), gray, grayish brown, mudstone, wackestone, some sandy limestone. Mud Gas 5 Units, 7872'-7874'
- 7876 - 7882 Shale (70%), gray, black, pyritic. Limestone (30%), grayish tan, grayish brown, glauconitic, chloritic, sandy. Sandstone (trace), gray, medium-coarse, granule, rounded, unconsolidated. Mud Gas 5 Units, 7876'-7878'.

Chester 7892', Log 7870', TVD 6208' (-3344')

- 7882 - 7894 Shale (65%), gray, black. Limestone (30%), gray, grayish brown, wackestone, some mudstone, chloritic, glauconitic, sandy, fossiliferous. Sandstone (5%), gray, medium-coarse grained, granule, unconsolidated.
- 7894 - 7901 Shale (65%), gray, black. Limestone (30%), gray, grayish brown, wackestone, chloritic, glauconitic, sandy. Sandstone (5%), medium-coarse grained, granule, unconsolidated.
- 7901 - 7913 Shale (60%), gray, black. Limestone (30%), gray, grayish brown, wackestone, chloritic, sandy. Sandstone (10%), gray, fine-coarse grained, granule, some clusters, glauconitic, chloritic, most sandstone is unconsolidated. Mud Gas 9 Units, 7902'-7905'

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- 7913 - 7920 Shale (65%), gray, black. Limestone (30%), gray, grayish brown, wackestone, glauconitic, chloritic, sandy. Sandstone (5%), gray, fine-coarse grained, granule, trace clusters, most sandstone is unconsolidated.
- 7920 - 7934 No Sample. Mud Gas 30 Units, 7920'-7934'
- 7934 - 7942 Shale (70%), gray, black, pyritic. Limestone (15%), tan, grayish tan, grayish brown, wackestone, trace oolitic packstone, chloritic, sandy. Sandstone (15%), gray, fine-coarse grained, granule, unconsolidated, few clusters.
- 7942 - 7954 Shale (70%), gray, black, pyritic. Limestone (20%), tan, grayish tan, grayish brown, trace brown oolitic packstone, trace chloritic and sandy limestone. Sandstone (10%), gray, fine-coarse grained, granule, unconsolidated with few clusters, chloritic.
- 7954 - 7962 Shale (65%), gray, black, pyritic. Limestone (25%), tan, grayish tan, wackestone, packstone, some sandy limestone. Sandstone (10%), gray, fine grained-granule, unconsolidated with few clusters.
- 7962 - 7972 Shale (75%), gray, black, pyritic. Limestone (20%), tan, grayish tan, wackestone, packstone, trace tan oolitic packstone. Sandstone (5%), fine grained-granule, unconsolidated with few clusters.
- 7972 - 7984 Shale (70%), gray, black. Limestone (25%), tan, grayish tan, wackestone, packstone, fossiliferous, sandy. Sandstone (5%), gray, fine grained, granule, unconsolidated, few clusters, chloritic.
- 7984 - 7994 Shale (70%), gray, black. Limestone (30%), tan, grayish tan packstone, wackestone, some medium coarse gained packstone with dark gray-black pellets and fragments, fossiliferous, sandy. Sandstone (trace), fine grained-granule with few clusters.
- 7994 - 8002 Shale (55%), gray, black. Limestone (40%), tan, grayish tan, wackestone, packstone. Sandstone (5%), gray, fine grained-granule, unconsolidated.
- 8002 - 8016 Limestone (50%), tan, grayish tan, wackestone, packstone. Shale (45%), gray, black, light gray. Sandstone (5%), gray, coarse grained-granule, unconsolidated.
- 8016 - 8026 Limestone (55%), tan, grayish tan, packstone, wackestone. Shale (40%), gray, black. Sandstone (5%), coarse grained-granule, unconsolidated, rounded.

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- 8026 - 8040 Limestone (50%), tan, grayish tan, wackestone, some packstone. Shale (45%), gray, black. Sandstone (5%), gray, fine grained-granule, unconsolidated. Mud Gas 7 Units, 8040'-8041'.
- 8040- 8049' Limestone (55%), tan, grayish tan, wackestone, packstone, chloritic, fossiliferous. Shale (45%), gray, black. Sandstone (trace), fine grained-granule, unconsolidated. Mud Gas 5 Units, 8049'-8050'
- 8049 - 8060 Shale (60%), gray, black. Limestone (40%), tan, grayish tan, wackestone, packstone, fossiliferous. Sandstone (trace), gray, white, fine grained-granule, unconsolidated.
- 8060 - 8070 Shale (50%), gray, black. Limestone (50%), tan, grayish tan, wackestone, packstone. Sandstone (trace), gray, coarse grained-granule, rounded, unconsolidated.
- 8070 - 8084 Shale (55%), gray, black. Limestone (45%), tan, grayish tan, wackestone, packstone, fossiliferous. Sandstone (trace-5%), gray, coarse grained-granule, unconsolidated, rounded, etched.
- 8084 - 8092 Shale (55%), gray, black. Limestone (45%), tan, grayish tan, wackestone, packstone. Sandstone (trace), gray, coarse grained-granule, unconsolidated.
- 8092 - 8102 Limestone (50%), tan, grayish tan, wackestone, packstone, fossiliferous. Shale (50%), black, gray, light gray. Sandstone (trace), gray, coarse grained-granule, rounded, etched, unconsolidated.
- 8102 - 8110 Shale (65%), gray, black, light gray. Limestone (35%), tan, grayish tan, wackestone, packstone. Sandstone (trace), gray, clusters of fine grained, glauconitic sandstone, unconsolidated granules.
- 8110 - 8116 Shale (75%), gray, black, light gray. Limestone (25%), tan, grayish tan, wackestone, packstone. Sandstone (trace), unconsolidated granules.
- 8116 - 8126 Shale (80%), gray, black, light gray, trace light gray bentonite. Limestone (20%), tan, grayish tan, wackestone, packstone. Sandstone (trace), coarse grained granule, unconsolidated.
- 8126 - 8140 Shale (50%), gray, black, light gray. Limestone (50%), tan, grayish tan, wackestone, packstone, fossiliferous. Sandstone (trace), granule, unconsolidated.

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8140 - 8146 Shale (60%), gray, black, light gray. Limestone (40%), tan, grayish tan, wackestone, some packstone. Sandstone (trace), unconsolidated granules.

Orange Marker 8152', Log 8132', TVD 6426' (-3562')

- 8146 - 8158 Shale (60%), gray, black, light gray. Limestone, (40%), tan, grayish tan, wackestone, some packstone. Sandstone (trace), unconsolidated granules.
- 8158 - 8170 Shale (65%), gray, black, light gray. Limestone (30%), tan, grayish tan, wackestone, some packstone. Sandstone (5%), gray, fine grained clusters, unconsolidated granules.
- 8170 - 8178 Shale (75%), gray, black, light gray. Limestone (25%), tan, grayish tan, wackestone, some packstone. Sandstone (10%), coarse grained-granule, unconsolidated.
- 8178 - 8190 Shale (70%), gray, black, light gray, pyritic. Limestone (30%), tan, grayish tan, wackestone, packstone. Sandstone (5%), white, fine grained, clusters, unconsolidated granules.
- 8190 - 8198 Shale (55%), gray, black, light gray. Limestone (40%), tan, grayish tan, wackestone, packstone. Sandstone (trace-5%), white, gray, fine grained unconsolidated granules.
- 8198 - 8204 Shale (70%), gray, black, light gray. Limestone (30%), tan, grayish tan, wackestone, some packstone. Sandstone (trace), white, gray, fine grained, unconsolidated granules.
- 8204 - 8212 Shale (70%), gray, black, light gray. Limestone (25%), tan, grayish tan, wackestone. Sandstone (5%), gray, white, fine grained-unconsolidated granules
- 8212 - 8222 Shale (60%), gray, black, light gray. Limestone (35%), tan, grayish tan, wackestone. Sandstone (5%), gray, white, fine grained-unconsolidated granules.
- 8222 - 8232 Shale (65%), gray, black, light gray. Limestone (30%), tan, grayish tan, wackestone. Sandstone (5%), gray, white, fine grained clusters, unconsolidated granules.
- 8232 - 8242 Shale (65%), gray, black, light gray. Limestone (35%), tan, grayish tan, wackestone, mudstone. Sandstone (trace), white, gray, fine grained clusters, unconsolidated granules. Mud Gas 10 Units, 8240'-8242'.

- 8242 - 8252 Shale (55%), gray, light gray, black. Limestone (45%), tan, grayish tan, wackestone, mudstone. Sandstone (trace), unconsolidated granules.
- 8252 - 8260 Limestone (55%), grayish tan, tan, mudstone, wackestone. Shale (45%), gray, black, light gray. Sandstone (trace-5%), white, fine grained-unconsolidated granules.
- 8260 - 8268 Shale (60%), gray, black, light gray. Limestone (40%), grayish tan, gray, tan, mudstone, wackestone. Sandstone (trace), white, gray, unconsolidated granules.
- 8268 - 8280 Shale (80%), gray, light gray, black. Limestone (20%), grayish tan, tan, mudstone, some wackestone. Sandstone (trace), gray, white, fine-coarse grained granule. Mud Gas 12 Units, 8275'-8278'.
- 8280 - 8294 Shale (80%), gray, light gray, black. Limestone (20%), tan, grayish tan, wackestone, packstone, mudstone. Sandstone (trace-5%), white, gray, fine-coarse grained-unconsolidated granules, trace fine grained sandstone with brown oil stain, yellow fluorescence, fair-good cut, good residual ring. Mud Gas 5 Units, 8282'-8288'.
- 8294 - 8300 Shale (75%), gray, light gray, black. Limestone (25%), tan, grayish tan, wackestone, packstone, mudstone. Sandstone (trace-5%), white, gray, fine-coarse grained-unconsolidated granules, trace fine grained sandstone with brown oil stain, yellow fluorescence, fair-good cut, good residual ring. Mud Gas 7 Units, 8299'-8303'.
- 8300 - 8312 Shale (70%), gray, light gray, black. Limestone (20%), tan, grayish tan, wackestone, packstone, mudstone. Sandstone (10%), white, gray, fine-coarse grained-unconsolidated granules, trace fine grained sandstone with brown oil stain, yellow fluorescence, fair-good cut, good residual ring. Mud Gas 5 Units, 8282'-8228'.
- 8312 - 8324 Shale (60%), gray, light gray, black. Limestone (35%), tan, grayish tan, wackestone, packstone, mudstone. Sandstone (trace-5%), white, gray, fine-coarse grained-unconsolidated granules, some fine grained sandstone with brown oil stain, yellow fluorescence, good cut, good residual ring. Mud Gas 6 Units, 8305'-8313'.

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- 8324 - 8334 Shale (55%), gray, light gray, black. Limestone (35%), tan, grayish tan, wackestone, packstone, mudstone. Sandstone (10%), white, gray, fine-coarse grained-unconsolidated granules, trace fine grained sandstone with brown oil stain, yellow fluorescence, fair-good cut, good residual ring.
- 8334 - 8345 Shale (60%), gray, light gray, black. Limestone (25%), tan, grayish tan, mudstone, wackestone, some fossiliferous limestone. Sandstone (15%), white, gray, fine-coarse grained-unconsolidated granules, trace fine grained sandstone with brown oil stain, yellow fluorescence, fair-good cut, good residual ring. Mud Gas 16 Units, 8340'-8344'.
- 8345 - 8352 Shale (65%), gray, light gray, black. Limestone (30%), tan, grayish tan, wackestone, some packstone. Sandstone (trace-5%), white, gray, fine-coarse grained-unconsolidated granules, trace fine grained sandstone with brown oil stain, yellow fluorescence, fair-good cut, good residual ring.
- 8352 -8356 Shale (65%), gray, light gray, black. Limestone (25%), tan, grayish tan, wackestone, packstone, mudstone. Sandstone (10%), white, gray, fine-coarse grained-unconsolidated granules, trace fine grained sandstone with brown oil stain, yellow fluorescence, fair cut, good residual ring.

Meramec 8366', Log 8340', TVD 6606' (-3942')

- 8356 - 8368 Shale (45%), gray, light gray, black. Limestone (35%), tan, grayish tan, gray, mudstone, wackestone. Sandstone (20%), white, gray, fine-coarse grained unconsolidated granules, trace fine grained sandstone with brown and spotted brown oil stain, yellow fluorescence, fair cut, good residual ring.
- 8368 - 8380 Shale (55%), gray, light gray, black. Limestone (35%), tan, grayish tan, gray, wackestone, mudstone, trace white fine grained packstone, looks like Mississippian Ste. Genevieve. Sandstone (10%), white, gray, fine-coarse grained - unconsolidated granules, few pieces fine grained sandstone with brown and spotted brown oil stain, yellow fluorescence, good cut, good residual ring.
- 8380 - 8386 Shale (60%), gray, light gray, black. Limestone (30%), tan, grayish tan, gray, wackestone, mudstone, some white, fine grained packstone (Ste. Genevieve) Sandstone (10%), white, gray, fine-coarse grained-unconsolidated granules, few pieces fine grained sandstone with brown and spotted brown oil stain, yellow fluorescence, good cut, good residual ring.

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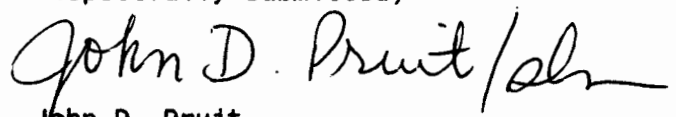
8386 - 8394 Shale (70%), gray, light gray, black. Limestone (25%), tan, grayish tan, buff, wackestone, mudstone, fine grained packstone. Sandstone (trace-5%), white, gray, fine-coarse grained-unconsolidated granules, trace fine grained sandstone with brown and spotted brown oil stain, yellow fluorescence, fair cut, good residual ring.

8394 -8404 Limestone (65%), white, buff, tan, grayish tan, gray, fine grained packstone, wackestone, mudstone Shale (35%), gray, light gray, black. Sandstone (trace), white, gray, fine-coarse grained-unconsolidated granules, trace fine grained sandstone with brown oil stain, yellow fluorescence, fair-good cut, good residual ring. Chert (trace), white, light gray.

8404 -8416 Limestone (70%), white, buff, tan, fine grained packstone, wackestone. Shale (30%), gray, black, light gray. Sandstone (trace), unconsolidated granules. Chert (trace), light gray, white.

Total Depth Driller 8416 Feet.  
Total Depth Driller After Pipe Strap 8399 Feet.

Respectfully submitted,



John D. Pruitt

JDP:sln

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