

ROUTINE CORE ANALYSIS

Well: Miller 9-1
Formation: Cherokee 4465, Atoka 4538, and Morrow 4614
Field: Millrich
Location: Scott County, KS

FINAL REPORT

Prepared for

Wood Energy

By

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Summary

Routine core analysis was conducted on 15 horizontal and 1 vertical plug samples obtained from a full diameter core of the Cherokee 4465, Atoka 4538, and Morrow 4614 Formations from well: Miller 9-1 in the Millrich Field near Scott County County, KS. The horizontal plugs were taken at a fixed sample spacing of two feet.

The plug samples were obtained by drilling with a 1.5 inch diameter diamond bit using liquid nitrogen as the bit lubricant. The samples were then trimmed to right cylinders and end trims were used for lithologic descriptions.

The properties of residual fluid saturation, porosity and permeability of the core samples were obtained through basic core analysis procedures specified in API RP40 method, Recommended Practices for Core Analysis (1998).

Water saturations were calculated with the Dean-Stark Distillation and Extraction Method using toluene. Then an azeotrope of 65% chloroform/ 35% methanol was used to clean any remaining reservoir and drilling fluids from the samples. Finally, residual salts were cleaned from the samples using a methanol saturation and cleaning procedure prior to standard measurements of porosity and permeability.

Air permeability and porosity were measured using a Coretest Systems, Inc. AP-608 Automated Permeameter/ Porosimeter, which allows core samples to be measured under realistic reservoir conditions. Permeability was measured using an unsteady-state pulse decay technique at a minimum confining stress of 800 psi. Porosity and pore volume were measured using helium expansion based on Boyle's Law. Helium grain volumes were also measured at ambient conditions.

The sample inventory and assigned analyses are provided in Table 1. The routine core properties are summarized in Table 2.

The permeability-porosity relationship is shown in Figure 1 and the permeability, porosity, and water and oil saturation profiles with depth are shown in Figures 2 through 5.

Sample Collection and Inventory

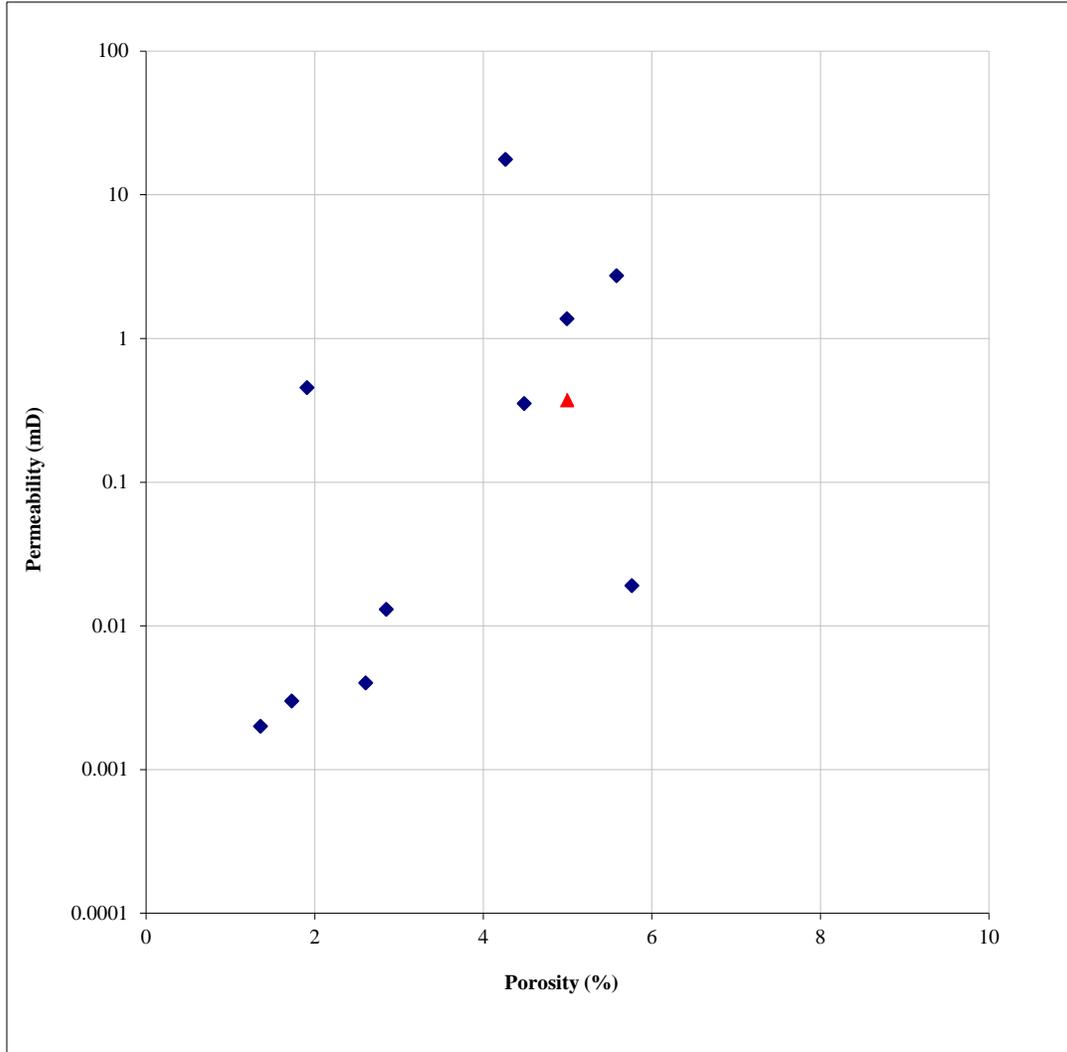
Project No.:	WTC-12-003051
Company	Wood Energy
Formation:	Cherokee 4465, Atoka 4538, and Morrow 4614
Field or Area:	Millrich
Well Location:	Miller 9-1

Sample ID	Depth (ft)	Routine Core Properties			
		Dean Stark	Grain Volume/ Density	Pore Volume/ Porosity	Air Permeability
1	4473.00	X	X	X	X
2	4474.10	X	X	X	X
3	4485.70	X	X	X	X
4	4508.80	X	X	X	X
5	4510.40	X	X	X	X
6	4516.90	X	X	X	X
7	4548.50	X	X	X	X
8	4550.80	X	X	X	X
9	4570.00	X	X	X	X
10	4574.20	X	X	X	X
11	4581.70	X	X	X	X
12	4582.45	X	X	X	X
13	4593.80	X	X	X	X
14	4596.90	X	X	X	X
15	4600.80	X	X	X	X
16	4611.90	X	X	X	X

Routine Core Properties

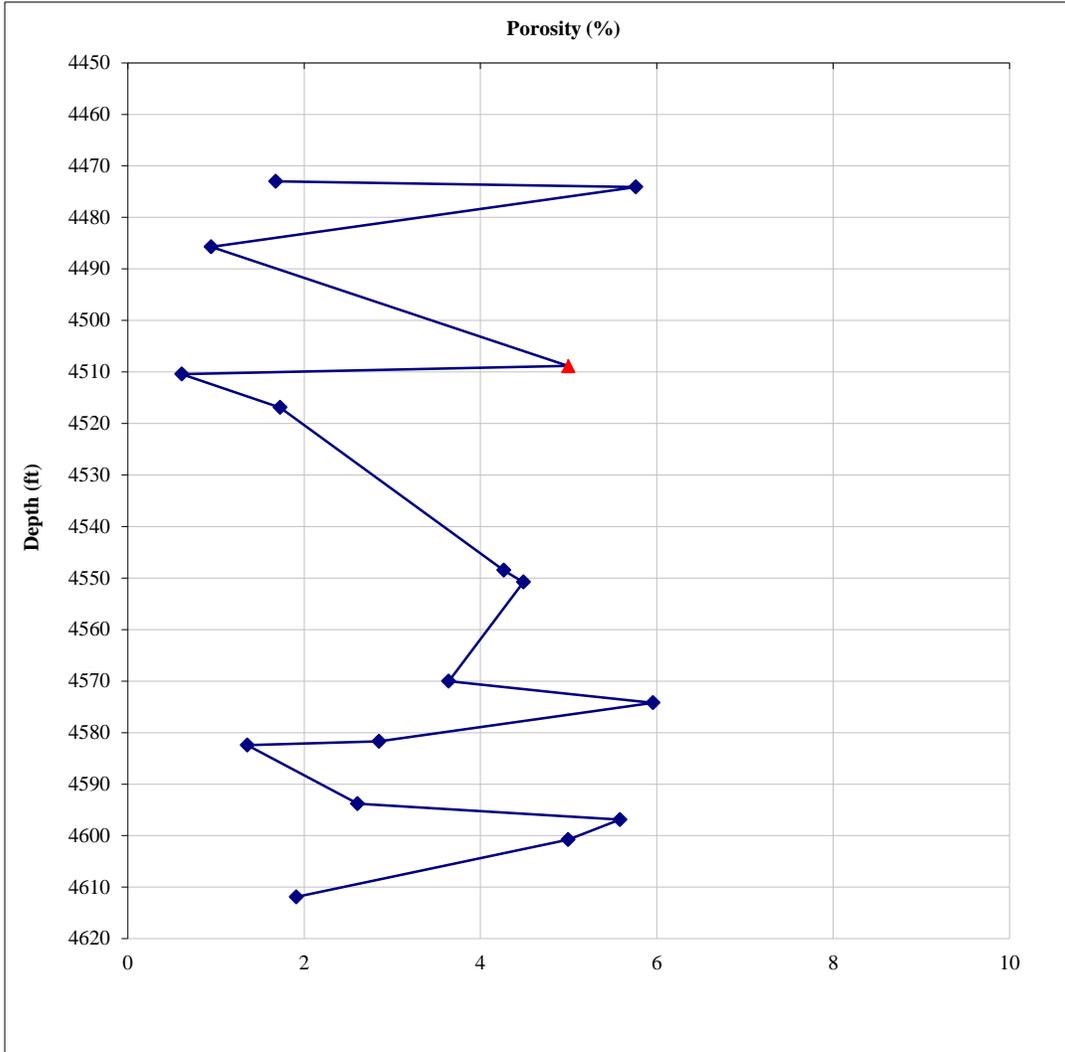
Sample ID	Depth (ft)	Direction	Sample		Sample Porosity (%)	Permeability		Saturation		Grain Density (g/cc)	Lithologic Description
			Length (cm)	Diameter (cm)		Air (mD)	Klinkenberg (mD)	Water (%)	Oil (%)		
1	4473.0	Kh	5.82	3.81	1.7	<0.001	<0.001	44.6	52.4	2.63	LS- Gry, vugs, foss, organics, oolitic
2	4474.1	Kh	3.13	3.81	5.8	0.019	0.007	87.8	10.0	2.60	Foss DS- Gry, foss, calc, broken
3	4485.7	Kh	4.64	3.81	0.9	<0.001	<0.001	60.0	7.5	2.68	LS- Wht, foss, oolitic
4	4508.8	Kv	5.08	3.81	5.0	0.374	0.318	78.0	20.4	2.71	LS- Gry, sid, oolitic, frac
5	4510.4	Kh	5.19	3.81	0.6	<0.001	<0.001	83.3	1.0	2.69	LS- Gry, foss, frac
6	4516.9	Kh	5.56	3.81	1.7	0.003	0.001	27.5	68.4	2.63	LS- Gry, foss, frac, dolo
7	4548.5	Kh	5.71	3.80	4.3	17.606	16.876	83.3	15.8	2.69	LS- Gry, brwn, foss, broken, dolo, sid
8	4550.8	Kh	4.51	3.80	4.5	0.351	0.305	74.2	23.8	2.69	LS- Dk gry, brwn, shaley, sid, frac
9	4570.0	Kh	5.32	3.81	3.6	<0.001	<0.001	57.8	41.0	2.70	DS- Gry, foss, calc
10	4574.2	Kh	5.56	3.80	6.0	<0.001	<0.001	74.4	25.0	2.69	LS- Wht, foss, dolo, sid
11	4581.7	Kh	5.33	3.82	2.9	0.013	0.006	75.6	1.9	2.69	DS- Gry, foss, frac, sid, calc
12	4582.5	Kh	5.55	3.80	1.4	0.002	0.001	81.4	12.9	2.68	DS- Gry, foss, vugs, sid, calc
13	4593.8	Kh	5.43	3.80	2.6	0.004	0.002	81.3	9.0	2.68	DS- Gry, foss, sid, calc, frac
14	4596.9	Kh	4.27	3.80	5.6	2.725	2.503	44.6	13.2	2.70	DS- Gry, vugs, frac, calc
15	4600.8	Kh	2.78	3.81	5.0	1.371	1.230	38.2	6.7	2.69	LS- Gry, vugs, foss, broken
16	4611.9	Kh	4.84	3.81	1.9	0.454	0.398	28.8	14.7	2.71	LS- Gry, vugs, frac

Permeability Vs. Porosity



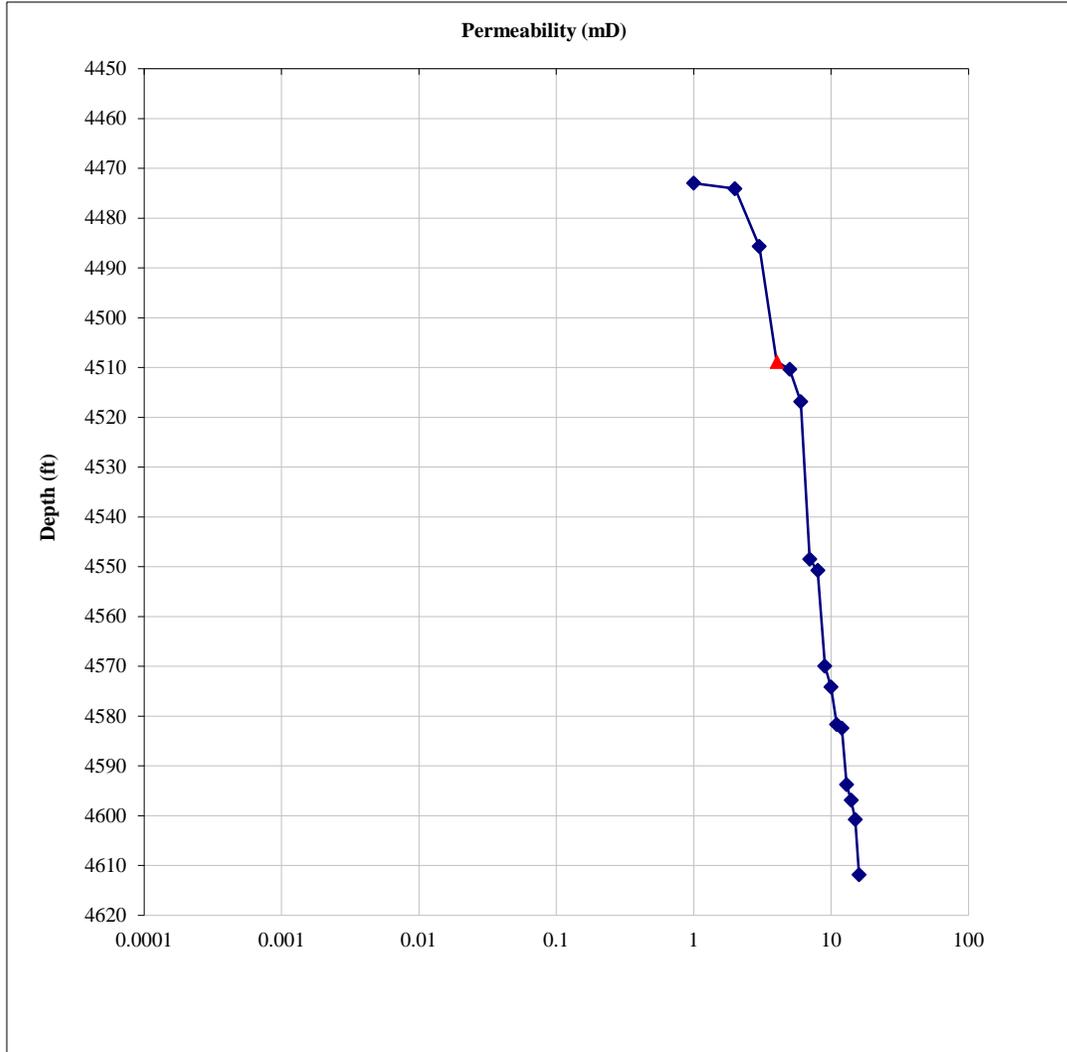
**Vertical sample is red triangle.*

Porosity Profile with Depth



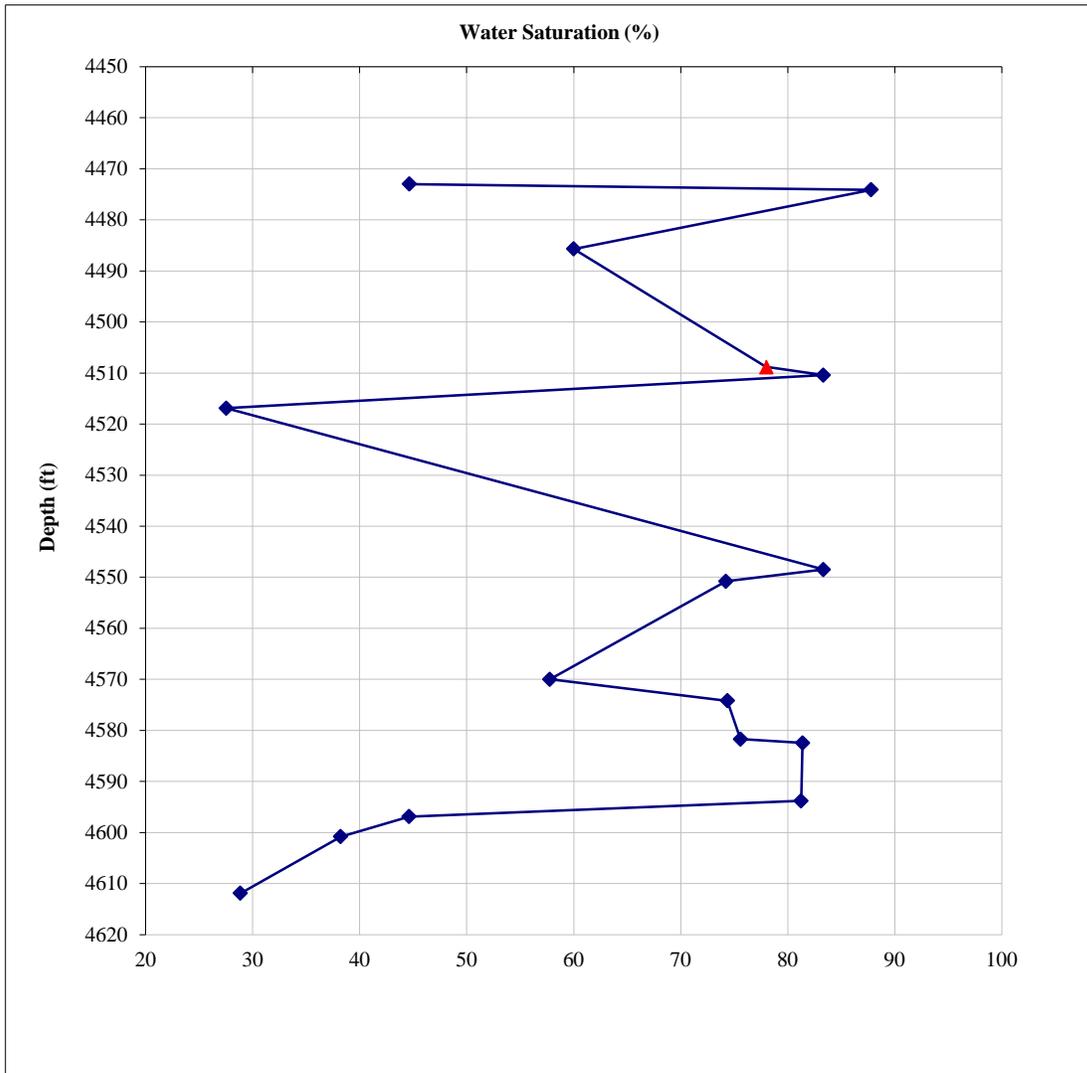
**Vertical sample is red triangle.*

Permeability Profile with Depth



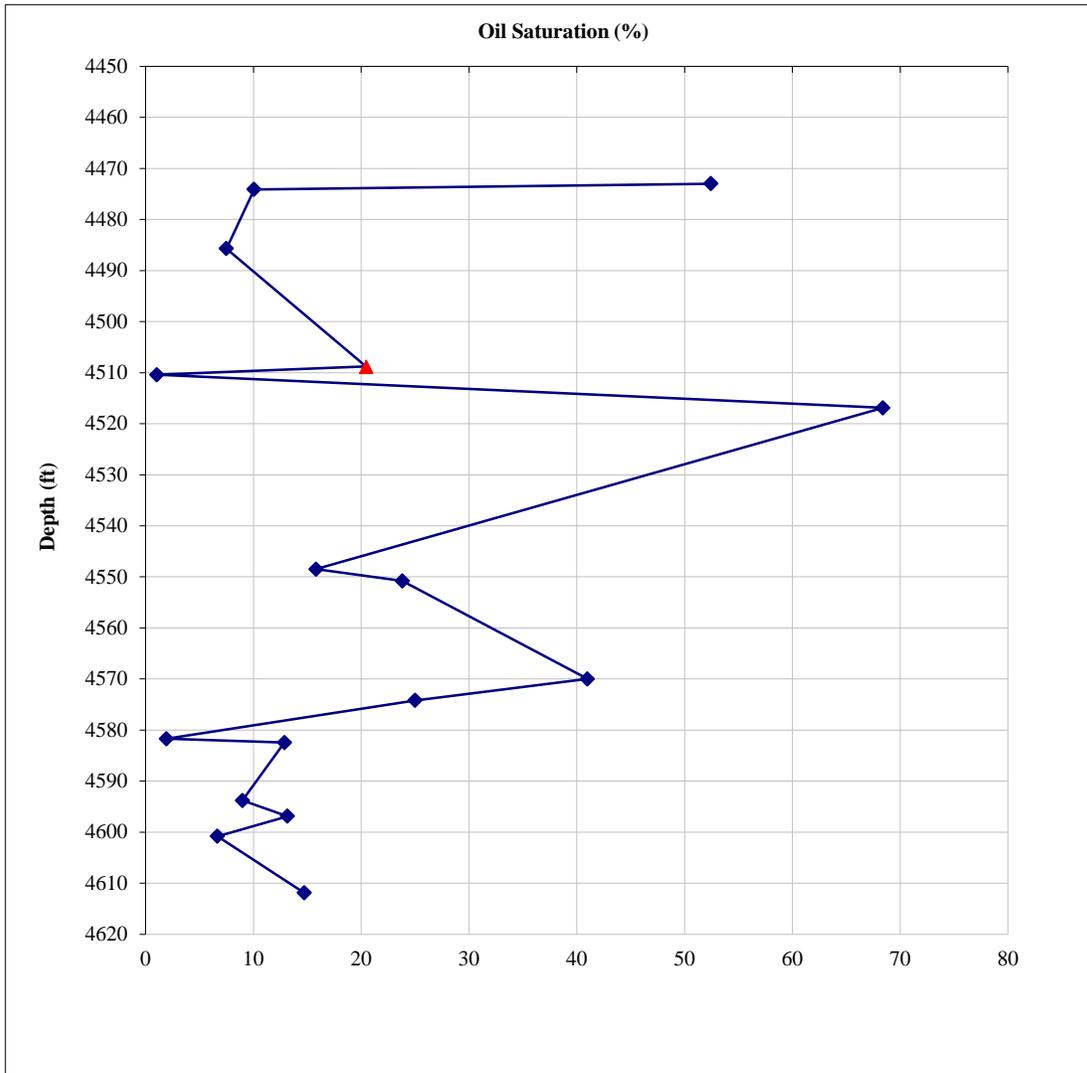
**Vertical sample is red triangle.*

Water Saturation Profile with Depth



*Vertical sample is red triangle.

Oil Saturation Profile with Depth



*Vertical sample is red triangle.