



**Shale Core Analysis**

Sample	Depth (ft)	As Received			Dry & Dean Stark Extracted Conditions <sup>(2)</sup>			
		Bulk Density (g/cc)	Gas-filled Porosity (%)	Gas Saturation (%)	Grain Density (g/cc)	Porosity (%)	Oil Saturation <sup>(3)</sup> (%)	Water Saturation <sup>(4)</sup> (%)
28GA	7170.00 - 7170.35	2.515	3.41	46.0	2.677	7.41	29.9	24.1
31GA	7173.40 - 7173.75	2.461	6.50	66.4	2.695	9.78	20.7	12.9
32GA	7176.10 - 7176.40	2.432	6.27	59.1	2.679	10.61	31.6	9.3
34GA	7180.50 - 7180.85	2.423	7.55	68.6	2.690	11.00	24.2	7.1
39GA	7183.35 - 7183.70	2.428	7.44	67.8	2.693	10.98	23.1	9.1
40GA	7185.65 - 7186.00	2.448	6.43	61.2	2.696	10.50	27.0	11.8
44GA	7189.35 - 7189.70	2.460	6.00	60.2	2.694	9.96	24.8	14.9
46GA	7192.40 - 7192.75	2.458	7.25	70.4	2.709	10.29	12.8	16.7
49GA	7195.20 - 7195.55	2.466	7.12	70.7	2.711	10.07	8.9	20.5
56GA	7202.65 - 7203.00	2.453	5.27	55.4	2.671	9.52	33.7	10.9
57GA	7203.10 - 7203.45	2.457	5.46	57.2	2.678	9.55	32.2	10.7
60GA	7206.10 - 7206.45	2.513	4.56	55.7	2.702	8.19	24.7	19.7
62GA	7209.05 - 7209.40	2.482	4.66	52.4	2.683	8.90	30.8	16.8
64GA	7212.10 - 7212.45	2.484	5.19	55.7	2.701	9.33	34.9	9.4
67GA	7215.35 - 7215.70	2.497	4.16	49.4	2.686	8.42	32.4	18.2
70GA	7221.40 - 7221.75	2.520	3.21	40.8	2.692	7.87	43.2	16.1
71GA	7222.60 - 7222.95	2.510	4.26	49.7	2.703	8.56	30.2	20.1
75GA	7225.90 - 7226.25	2.468	5.33	53.0	2.699	10.06	38.0	9.1
76GA	7227.00 - 7227.35	2.465	5.27	53.2	2.691	9.91	32.4	14.4
78GA	7230.20 - 7230.55	2.561	0.57	9.2	2.677	6.17	61.5	29.3
79GA	7233.10 - 7233.45	2.589	0.49	8.6	2.695	5.69	48.2	43.2
80GA	7236.15 - 7236.50	2.575	0.59	11.1	2.674	5.28	51.7	37.3
83GA	7239.65 - 7240.00	2.560	0.64	10.1	2.681	6.30	69.3	20.6



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85GA	7243.20 - 7243.55	2.511	2.43	30.9	2.675	7.87	54.1	15.0
87GA	7245.55 - 7245.90	2.482	2.88	31.9	2.673	9.02	62.2	5.9
89GA	7248.10 - 7248.45	2.474	3.74	41.7	2.671	8.97	51.6	6.6
91GA	7251.80 - 7252.15	2.517	2.14	31.1	2.658	6.90	37.8	31.1
93GA	7254.05 - 7254.40	2.479	2.64	31.1	2.655	8.49	58.3	10.5
95GA	7255.05 - 7255.40	2.485	2.59	30.7	2.661	8.46	55.2	14.1
97GA	7257.65 - 7258.00	2.504	2.64	32.5	2.676	8.12	56.8	10.7
99GA	7259.15 - 7259.50	2.529	3.29	40.3	2.708	8.16	41.7	17.9
100GA	7260.50 - 7260.85	2.506	2.86	37.4	2.667	7.63	36.2	26.3
103GA	7262.55 - 7262.90	2.504	3.99	45.6	2.698	8.74	35.8	18.6
105GA	7264.00 - 7264.35	2.545	0.94	16.7	2.653	5.65	46.2	37.1
107GA	7265.30 - 7265.65	2.457	4.18	42.2	2.675	9.91	52.5	5.3
112GA	7268.30 - 7268.65	2.485	2.86	37.0	2.649	7.75	50.2	12.9
116GA	7270.40 - 7270.75	2.503	2.30	30.7	2.657	7.48	52.5	16.8
119GA	7271.65 - 7272.00	2.483	3.20	36.7	2.670	8.72	53.7	9.6
120GA	7272.05 - 7272.40	2.517	2.25	32.0	2.664	7.05	49.1	19.0
123GA	7274.30 - 7274.65	2.489	3.06	35.8	2.671	8.57	48.4	15.9
125GA	7275.75 - 7276.10	2.500	2.79	36.2	2.663	7.70	45.8	18.1
126GA	7276.60 - 7276.95	2.508	2.53	33.6	2.666	7.52	49.5	16.8
128GA	7278.05 - 7278.40	2.502	3.17	42.3	2.663	7.50	34.6	23.1
131GA	7279.60 - 7279.95	2.512	2.99	40.6	2.669	7.38	31.6	27.8
133GA	7281.00 - 7281.35	2.499	3.02	39.4	2.663	7.65	40.0	20.6
136GA	7282.05 - 7282.40	2.494	3.89	47.3	2.675	8.22	24.9	27.8



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		Bulk Density (g/cc)	Gas-filled Porosity (%)	Gas Saturation (%)	Grain Density (g/cc)	Porosity (%)	Oil Saturation <sup>(3)</sup> (%)	Water Saturation <sup>(4)</sup> (%)
138GA	7283.65 - 7284.00	2.448	4.91	51.4	2.661	9.57	30.5	18.2
139GA	7284.00 - 7284.35	2.504	2.91	40.4	2.657	7.21	32.0	27.6
142GA	7286.20 - 7286.55	2.534	2.20	33.7	2.669	6.54	31.6	34.7
145GA	7287.55 - 7287.90	2.516	2.25	30.0	2.671	7.50	53.6	16.4
148GA	7289.05 - 7289.40	2.533	1.95	29.9	2.665	6.52	33.2	36.8
150GA	7290.60 - 7290.95	2.512	3.45	41.7	2.692	8.27	32.5	25.8
153GA	7292.65 - 7293.00	2.510	2.48	35.2	2.656	7.06	35.5	29.3
155GA	7293.75 - 7294.10	2.515	2.72	37.0	2.669	7.34	31.9	31.1
158GA	7296.10 - 7296.45	2.524	2.01	33.1	2.648	6.07	29.4	37.5
160GA	7297.35 - 7297.70	2.510	2.79	39.8	2.658	7.01	31.4	28.7
164GA	7299.00 - 7299.35	2.531	2.01	32.8	2.656	6.12	30.0	37.2
167GA	7301.00 - 7301.35	2.525	2.47	37.1	2.665	6.66	34.2	28.7
170GA	7302.55 - 7302.90	2.533	2.71	43.9	2.664	6.17	14.8	41.3
172GA	7304.30 - 7304.65	2.448	5.72	58.0	2.678	9.86	34.2	7.7
174GA	7306.10 - 7306.45	2.448	4.69	55.0	2.639	8.53	30.5	14.5
176GA	7306.70 - 7307.05	2.461	5.21	56.6	2.673	9.21	33.5	9.9
179GA	7308.00 - 7308.35	2.460	3.58	49.5	2.618	7.24	36.1	14.4
182GA	7309.50 - 7309.85	2.439	5.84	57.7	2.675	10.13	37.4	4.9
184GA	7311.05 - 7311.40	2.431	5.17	57.9	2.634	8.93	30.4	11.7
186GA	7312.20 - 7312.55	2.468	4.30	52.8	2.652	8.14	38.0	9.2
189GA	7315.10 - 7315.45	2.444	6.07	60.7	2.678	10.00	29.4	9.8
192GA	7318.10 - 7318.45	2.446	6.29	64.9	2.677	9.70	27.2	7.9
194GA	7319.00 - 7319.35	2.458	6.41	69.6	2.682	9.20	24.8	5.6



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195GA	7319.40 - 7319.75	2.383	8.00	72.3	2.649	11.07	16.9	10.8
199GA	7321.35 - 7321.70	2.439	5.26	58.7	2.645	8.97	33.8	7.5
202GA	7323.00 - 7323.35	2.596	2.11	45.5	2.699	4.64	36.2	18.4
206GA	7324.75 - 7325.10	2.594	2.23	47.1	2.698	4.73	20.1	32.9
209GA	7326.45 - 7326.80	2.483	2.84	39.7	2.634	7.15	42.9	17.4
210GA	7327.50 - 7327.85	2.502	2.33	37.8	2.632	6.17	48.8	13.3
212GA	7328.60 - 7328.95	2.492	1.98	29.0	2.631	6.82	60.0	11.0
216GA	7331.60 - 7331.95	2.493	2.05	32.1	2.622	6.38	47.2	20.6
217GA	7332.00 - 7332.35	2.503	1.99	34.4	2.622	5.79	45.0	20.6
220GA	7334.00 - 7334.35	2.490	2.06	35.5	2.608	5.80	37.6	26.9
225GA	7335.00 - 7335.35	2.497	1.88	30.0	2.625	6.26	61.9	8.1
227GA	7336.00 - 7336.35	2.499	1.93	32.5	2.620	5.94	42.1	25.4
230GA	7337.65 - 7338.00	2.485	2.10	29.5	2.629	7.12	51.3	19.2
232GA	7339.20 - 7339.55	2.509	1.55	29.6	2.612	5.23	29.0	41.4
235GA	7340.65 - 7341.00	2.528	1.49	27.4	2.634	5.45	29.2	43.4
238GA	7342.00 - 7342.35	2.514	2.57	36.2	2.666	7.12	55.0	8.8
240GA	7343.10 - 7343.45	2.525	1.82	30.0	2.648	6.07	38.7	31.3
244GA	7344.95 - 7345.30	2.501	1.71	29.7	2.616	5.76	42.0	28.3
249GA	7348.15 - 7348.50	2.512	2.54	33.6	2.670	7.56	49.6	16.8
251GA	7349.00 - 7349.35	2.503	1.92	34.1	2.617	5.62	40.3	25.5
253GA	7349.70 - 7350.05	2.501	2.98	38.6	2.668	7.71	54.8	6.5
254GA	7350.05 - 7350.40	2.535	1.41	27.1	2.638	5.19	32.7	40.2
256GA	7351.60 - 7351.95	2.505	3.76	48.0	2.677	7.84	24.7	27.3



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257GA	7352.50 - 7352.85	2.501	2.43	35.9	2.643	6.76	50.6	13.5
261GA	7355.15 - 7355.50	2.544	1.47	33.4	2.632	4.41	18.8	47.8
263GA	7356.00 - 7356.35	2.508	3.86	53.1	2.670	7.27	16.0	30.9
265GA	7357.40 - 7357.75	2.466	4.65	59.9	2.644	7.76	24.1	16.0
269GA	7359.75 - 7360.10	2.500	4.98	62.7	2.689	7.95	32.7	4.7
272GA	7360.90 - 7361.25	2.469	6.13	70.6	2.679	8.69	18.9	10.6
276GA	7363.00 - 7363.35	2.485	4.83	61.1	2.670	7.90	30.5	8.3
278GA	7364.40 - 7364.75	2.479	5.59	60.4	2.698	9.25	34.2	5.4
281GA	7365.90 - 7366.25	2.496	4.17	54.2	2.673	7.68	39.3	6.5
284GA	7367.50 - 7367.85	2.464	1.88	34.7	2.573	5.41	55.0	10.3
287GA	7368.90 - 7369.25	2.448	5.18	59.1	2.650	8.76	30.6	10.3
290GA	7370.65 - 7371.00	2.504	2.43	46.8	2.615	5.20	34.0	19.2
293GA	7372.20 - 7372.55	2.409	6.75	60.6	2.670	11.14	33.0	6.4
297GA	7373.65 - 7374.00	2.518	3.57	51.0	2.674	7.00	27.2	21.8
300GA	7374.85 - 7375.20	2.481	5.12	58.8	2.685	8.70	35.3	6.0
304GA	7376.65 - 7377.00	2.476	3.71	50.5	2.636	7.34	24.0	25.5
307GA	7378.15 - 7378.50	2.513	1.84	33.8	2.622	5.44	27.0	39.2
311GA	7379.85 - 7380.15	2.501	2.36	42.1	2.617	5.60	22.2	35.8
314GA	7381.35 - 7381.70	2.472	1.50	32.3	2.562	4.64	31.1	36.7
316GA	7382.55 - 7382.90	2.475	2.82	35.7	2.642	7.90	55.6	8.7
322GA	7385.65 - 7386.00	2.413	4.28	49.3	2.600	8.68	33.1	17.6
324GA	7387.30 - 7387.65	2.468	1.99	32.9	2.589	6.04	44.9	22.2
326GA	7388.60 - 7388.95	2.491	0.80	16.3	2.579	4.88	33.8	49.8



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327GA	7389.10 - 7389.45	2.471	0.72	13.5	2.565	5.33	39.0	47.5
330GA	7391.40 - 7391.75	2.544	1.37	22.4	2.661	6.12	22.8	54.8
332GA	7392.80 - 7393.15	2.535	2.10	33.1	2.666	6.33	41.2	25.6
334GA	7395.30 - 7395.65	2.535	1.92	32.9	2.654	5.84	30.7	36.4
336GA	7397.55 - 7397.90	2.585	1.42	27.6	2.686	5.14	12.0	60.4
337GA	7398.30 - 7398.65	2.571	2.07	33.1	2.697	6.24	7.0	59.9
338GA	7400.60 - 7400.95	2.587	1.09	19.8	2.694	5.50	30.6	49.6
341GA	7403.65 - 7404.00	2.574	2.62	45.0	2.701	5.82	13.7	41.3
343GA	7406.10 - 7406.45	2.593	3.34	57.3	2.727	5.83	2.6	40.1
344GA	7407.65 - 7408.00	2.592	3.08	52.6	2.724	5.86	4.7	42.7
346GA	7411.60 - 7411.95	2.613	2.48	47.8	2.728	5.20	2.6	49.6
348GA	7415.00 - 7415.35	2.625	1.47	28.4	2.729	5.16	13.2	58.4
349GA	7417.95 - 7418.30	2.621	1.69	31.3	2.732	5.39	9.6	59.1
352GA	7427.45 - 7427.80	2.636	1.47	30.7	2.735	4.78	17.7	51.6
354GA	7430.10 - 7430.45	2.594	1.67	26.8	2.718	6.23	10.0	63.2
355GA	7440.80 - 7441.15	2.616	1.57	28.2	2.728	5.58	7.4	64.4
358GA	7447.00 - 7447.35	2.625	2.11	46.6	2.725	4.54	4.3	49.1
360GA	7455.20 - 7455.55	2.625	1.82	37.8	2.726	4.81	6.0	56.2
362GA	7458.60 - 7458.95	2.630	1.53	33.9	2.723	4.52	9.2	56.9
364GA	7471.70 - 7472.05	2.612	1.72	31.8	2.723	5.40	7.4	60.8
366GA	7479.10 - 7479.45	2.613	2.04	38.0	2.727	5.35	13.8	48.2
368GA	7483.55 - 7483.90	2.605	2.56	51.3	2.717	5.00	3.0	45.7
371GA	7490.20 - 7490.55	2.585	3.88	74.0	2.714	5.24	2.6	23.4



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372GA	7491.70 - 7492.05	2.550	4.53	64.9	2.718	6.98	22.0	13.1
373GA	7495.40 - 7495.75	2.594	3.35	66.5	2.715	5.03	16.0	17.4
374GA	7497.10 - 7497.45	2.555	4.29	65.4	2.713	6.56	22.4	12.2
376GA	7501.60 - 7501.95	2.560	4.44	71.4	2.714	6.23	23.4	5.2
378GA	7503.20 - 7503.45	2.569	3.88	63.8	2.716	6.08	29.8	6.4
379GA	7506.25 - 7506.60	2.577	3.95	67.0	2.719	5.90	9.1	24.0
381GA	7508.40 - 7508.75	2.565	4.74	77.4	2.718	6.12	7.9	14.7
383GA	7516.60 - 7516.95	2.532	2.72	33.7	2.697	8.07	8.5	57.8
384GA	7517.20 - 7517.55	2.516	3.92	47.9	2.694	8.18	5.3	46.7
386GA	7518.60 - 7518.95	2.520	3.39	40.0	2.699	8.49	7.6	52.4
387GA	7520.10 - 7520.45	2.529	2.90	30.7	2.720	9.44	4.3	65.0
388GA	7521.00 - 7521.35	2.554	2.19	24.5	2.730	8.94	1.4	74.1
390GA	7524.40 - 7524.75	2.538	2.44	29.6	2.705	8.25	16.1	54.3
392GA	7526.80 - 7527.15	2.536	1.80	21.5	2.698	8.37	18.3	60.1
394GA	7532.50 - 7532.85	2.521	1.75	19.6	2.690	8.95	6.4	74.0
397GA	7537.30 - 7537.65	2.541	1.78	21.4	2.701	8.31	9.6	69.0
399GA	7565.80 - 7566.15	2.545	2.19	28.5	2.697	7.68	6.4	65.1
401GA	7595.30 - 7595.65	2.526	2.20	28.4	2.678	7.73	12.1	59.5
403GA	7597.00 - 7597.35	2.575	1.52	26.4	2.688	5.75	19.3	54.3
405GA	7598.75 - 7599.10	2.577	2.15	39.4	2.692	5.46	18.8	41.7
406GA	7600.10 - 7600.45	2.563	1.81	29.6	2.686	6.13	19.2	51.2
407GA	7601.60 - 7601.95	2.546	1.43	23.5	2.666	6.09	37.4	39.0
408GA	7603.15 - 7603.50	2.543	1.50	23.3	2.667	6.42	16.8	59.9



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409GA	7606.15 - 7606.50	2.541	1.39	22.7	2.658	6.11	19.9	57.4
410GA	7608.00 - 7608.35	2.510	1.77	23.5	2.654	7.52	17.9	58.6
411GA	7609.00 - 7609.35	2.583	1.70	34.5	2.685	4.93	20.0	45.5
413GA	7614.55 - 7614.90	2.581	1.42	32.3	2.671	4.40	34.0	33.7
415GA	7618.00 - 7618.35	2.590	1.64	36.5	2.684	4.51	20.9	42.6
416GA	7619.50 - 7619.85	2.552	2.54	44.6	2.676	5.69	23.5	31.9

**Footnotes:**

(2) Dean Stark extracted sample (20/35 mesh size) dried at 110 °C. Porosity and saturations are relative to total interconnected pore space.

(3) Oil volume computed assuming an oil density of 0.8 g/cc

(4) Water volume corrected assuming a brine concentration of 30,000 ppm NaCl with an ambient density of 1.018 g/cc

Reference: "Development of Laboratory and Petrophysical Techniques for Evaluating Shale Reservoirs", GRI-95/0496, Gas Research Institute, April 1996