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Supplemental Material

Table S1. Locality information for each sample.

Table S2. Detailed mineralogical compositions of each sample based on X-ray diffraction measurements.

Table S3. Trace-element concentrations in each sample (in ppm).

Table S4. Trace-element concentration uncertainty (1σ).

Table S5. Calculated dissimilarity values of each sample relative to other samples. Lower values correspond with increasing similarity in rare earth element patterns.

Table S1

Formation	Member	Sample ID	Age	Locality	Coordinates	Basin/Province
Oread	Heebner	9 Heebner	Pennsylvanian	Lawrence, KS	38.956984, -95.319143	Cherokee-Forest City
Oread	Heebner	13 Heebner	Pennsylvanian	Plattsmouth, NE	40.987332, -95.860284	Cherokee-Forest City
Stanton	Eudora	15 Eudora	Pennsylvanian	Gretna, NE	41.020087, -96.249668	Cherokee-Forest City
Stanton	Eudora	21 Eudora	Pennsylvanian	Kansas City, MO	39.243871, -94.495858	Cherokee-Forest City
Vilas	—	15 Vilas	Pennsylvanian	Gretna, NE	41.020087, -96.249668	Cherokee-Forest City
Iola	Muncie Creek	11-1 Muncie Creek	Pennsylvanian	Muncie, KS	39.105029, -94.696840	Cherokee-Forest City
Iola	Muncie Creek	11-2 Muncie Creek	Pennsylvanian	Muncie, KS	39.105029, -94.696840	Cherokee-Forest City
Dennis	Stark	2 Stark	Pennsylvanian	Stark, KS	37.688367, -95.197550	Cherokee-Forest City
Swope	Hushpuckney	5 Hushpuckney	Pennsylvanian	Mound City, KS	38.115926, -94.851675	Cherokee-Forest City
Swope	Hushpuckney	6 Hushpuckney	Pennsylvanian	Lacygne, KS	38.356363, -94.687232	Cherokee-Forest City
Swope	Hushpuckney	8 Hushpuckney	Pennsylvanian	Fontana, KS	38.402554, -94.813937	Cherokee-Forest City
Swope	Hushpuckney	20 Hushpuckney	Pennsylvanian	Kansas City, MO	39.013522, -94.502805	Cherokee-Forest City
Fort Scott	Little Osage	3 Little Osage	Pennsylvanian	Fort Scott, KS	37.873814, -94.704829	Cherokee-Forest City
Stephens Forest	Little Osage	16A Little Osage	Pennsylvanian	Van Meter, IA	41.537628, -93.973555	Cherokee-Forest City
Excello	—	1 Excello	Pennsylvanian	Oswego, KS	37.175243, -95.102767	Cherokee-Forest City
Excello	—	17 Excello	Pennsylvanian	Booneville, IA	41.532000, -93.872849	Cherokee-Forest City
Excello	—	19 Excello	Pennsylvanian	Excello, MO	39.636663, -92.492791	Cherokee-Forest City
Atoka	upper	UA1Sh	Pennsylvanian	Morrilton, AR	35.156467, -92.719217	Arkoma Basin
Atoka	lower	LA1Sh	Pennsylvanian	Perry, AR	35.039533, -92.795967	Arkoma Basin
Atoka	lower	LA2Sh	Pennsylvanian	Mt. Moriah, AR	34.135717, -93.700383	Arkoma Basin
Atoka	—	Atoka 2	Pennsylvanian	Morrilton, AR	35.148467, -92.720383	Arkoma Basin
Jackfork	upper	UJ1Sh	Pennsylvanian	Williams Junction, AR	34.857433, -92.767617	Ouachita Mtns
Jackfork	upper	UJ2Sh	Pennsylvanian	Mt. Moriah, AR	34.147483, -93.715833	Ouachita Mtns
Jackfork	middle	MJ1	Pennsylvanian	Pinnacle, AR	34.843100, -92.462917	Ouachita Mtns
Jackfork	middle	MJ2	Pennsylvanian	Northpoint, AR	34.876500, -92.614400	Ouachita Mtns
Jackfork	lower	LJ1	Pennsylvanian	Williams Junction, AR	34.840783, -92.767917	Ouachita Mtns
Fayetteville	lower	FS1L	Mississippian	Weddington, AR	36.099378, -94.395122	Ozark Dome
Fayetteville	upper	FS2U	Mississippian	Fayetteville, AR	36.042400, -94.191200	Ozark Dome
Fayetteville	—	FS3	Mississippian	Fayetteville, AR	36.045778, -94.180353	Ozark Dome
Fayetteville	—	FS4	Mississippian	Fayetteville, AR	36.040833, -94.174528	Ozark Dome
Fayetteville	lower	FS6L	Mississippian	Fayetteville, AR	36.092586, -94.152103	Ozark Dome
Fayetteville	lower	FS7L	Mississippian	Elkins, AR	36.027800, -94.012700	Ozark Dome
Fayetteville	upper	FS8UU	Mississippian	Huntsville, AR	36.119692, -93.740072	Ozark Dome
Fayetteville	upper	FS9LU	Mississippian	Huntsville, AR	36.119719, -93.739983	Ozark Dome
Fayetteville	lower	FS10L	Mississippian	Huntsville, AR	36.119861, -93.739386	Ozark Dome
Fayetteville	—	FS11	Mississippian	Fayetteville, AR	36.070272, -94.167028	Ozark Dome
Stanley	—	Stanley 1	Mississippian	Hot Springs, AR	34.505850, -92.969133	Ouachita Mtns
Stanley	—	Stanley 2	Mississippian	Hot Springs, AR	34.469300, -93.088067	Ouachita Mtns
Stanley	—	Stanley 3	Mississippian	Hot Springs, AR	34.469300, -93.088067	Ouachita Mtns

Table S1

Stanley	—	Stanley 4	Mississippian	Glenwood, AR	34.375567, -93.566250	Ouachita Mtns
Chattanooga	—	CS1	Devonian	Tahlequah, OK	35.926292, -94.927411	Ozark Dome
Chattanooga	—	CS2	Devonian	Proctor, OK	35.955250, -94.814236	Ozark Dome
Chattanooga	—	CS3	Devonian	Proctor, OK	35.967667, -94.791722	Ozark Dome
Chattanooga	—	CS4	Devonian	Kansas, OK	36.211103, -94.771083	Ozark Dome
Chattanooga	—	CS5	Devonian	Flint Creek, OK	36.190972, -94.721250	Ozark Dome
Chattanooga	—	CS6	Devonian	Siloam Springs, AR	36.112311, -94.533322	Ozark Dome
Chattanooga	—	CS7	Devonian	Savoy, AR	36.106653, -94.339125	Ozark Dome
Chattanooga	—	CS8	Devonian	Jane, MO	36.561322, -94.343603	Ozark Dome
Chattanooga	—	CS9	Devonian	Jane, MO	36.546711, -94.327603	Ozark Dome
Chattanooga	lower	CS10B	Devonian	Pineville, MO	36.504072, -94.258875	Ozark Dome
Chattanooga	—	CS11	Devonian	Bella Vista, AR	36.496800, -94.265400	Ozark Dome
Chattanooga	—	CS12	Devonian	Bella Vista, AR	36.450400, -94.240300	Ozark Dome
Chattanooga	—	CS13	Devonian	Rogers, AR	36.331836, -94.020014	Ozark Dome
New Albany	—	Ceja Corp Morris #1	Devonian	Neoga, IL	39.337800, -88.516500	Illinois Basin
Polk Creek	—	Polk Creek 1	Ordovician	Little Rock, AR	34.715317, -92.401217	Ouachita Mtns
Polk Creek	—	PC1	Ordovician	Washita, AR	34.652783, -93.500333	Ouachita Mtns
Womble	—	Womble 1	Ordovician	Crystal Springs, AR	34.514117, -93.381017	Ouachita Mtns
Womble	—	Womble 2	Ordovician	Norman, AR	34.450400, -93.670417	Ouachita Mtns
Womble	—	Womble 3	Ordovician	Little Rock, AR	34.715317, -92.401217	Ouachita Mtns
Mazarn	—	Mazarn 1	Ordovician	Mt. Ida, AR	34.590150, -93.572117	Ouachita Mtns
Mazarn	—	Mazarn 2	Ordovician	Mt. Ida, AR	34.539200, -93.444950	Ouachita Mtns
Mazarn	—	Mazarn 3	Ordovician	Crystal Springs, AR	34.521867, -93.377283	Ouachita Mtns
Mazarn	—	Mazarn 4	Ordovician	Norman, AR	34.465617, -93.676983	Ouachita Mtns
Collier	—	Collier CS1	Camb.-Ordo.	Mt. Ida, AR	34.523183, -93.395700	Ouachita Mtns
Tunnel City	—	UPH-1-658	Cambrian	Winslow, IL	42.504940, -89.852062	Illinois Basin
Eau Claire	—	HwyA-2-520	Cambrian	Hollandale, WI	42.877445, -89.872223	Illinois Basin
Eau Claire	—	UPH-1-853	Cambrian	Winslow, IL	42.504940, -89.852062	Illinois Basin
Eau Claire	—	UPH-1-977	Cambrian	Winslow, IL	42.504940, -89.852062	Illinois Basin
Mt. Simon	—	UPH-1-1363	Cambrian	Winslow, IL	42.504940, -89.852062	Illinois Basin

Table S2

Age:	Cambrian			Camb. - Ordo.	Ordovician			Devonian - Mississippian			Mississippian		
Shale Unit:	Tunnel City	Mt. Simon	Eau Claire	Collier	Mazarn	Polk Creek	Womble	New Albany	Chattanooga		Fayetteville		Stanley
Sample ID:	UPH 1-658	UPH 1-1363	UPH 1-977	CS1	Mazarn 4	PC1	Womble 1	Ceja Morris #1	CS9	CS10B	FS2U	FS10L	Stanley 4
Fluorapatite	1.29%	0.21%	0.80%	0.76%	0.02%	1.76%	0.88%	0.61%	1.40%	0.74%	0.40%	0.31%	0.98%
Goethite	0.05%	0.18%	0.00%	0.00%	0.03%	0.00%	0.00%	0.23%	0.00%	0.00%	0.00%	0.00%	0.00%
Schorl	2.53%	0.88%	3.20%	0.29%	0.26%	1.57%	0.39%	0.71%	0.88%	1.61%	0.00%	2.26%	1.52%
Pyrite	1.00%	0.20%	0.65%	0.91%	0.08%	0.79%	0.57%	2.08%	1.16%	1.97%	1.50%	0.46%	0.42%
Quartz	0.00%	32.59%	4.62%	58.80%	89.78%	28.94%	27.44%	30.83%	27.99%	23.83%	23.80%	28.47%	34.56%
Rutile	1.09%	0.73%	1.71%	0.94%	0.15%	1.36%	2.17%	0.95%	1.40%	1.09%	2.30%	1.24%	1.21%
Siderite	0.00%	0.32%	0.59%	0.10%	0.12%	1.24%	0.77%	0.09%	0.77%	0.56%	0.84%	0.37%	6.27%
Feldspars	50.35%	14.36%	45.47%	4.38%	3.24%	18.97%	15.95%	15.67%	15.20%	10.21%	13.02%	10.81%	10.95%
Albite	0.00%	4.94%	0.00%	0.00%	0.34%	0.00%	0.00%	2.32%	0.73%	2.65%	0.00%	0.84%	0.52%
Andesine	0.55%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Anorthite	1.93%	0.59%	3.58%	0.95%	1.42%	8.07%	1.37%	4.13%	4.40%	0.71%	6.20%	1.35%	4.66%
Bytownite	0.97%	0.34%	3.86%	0.00%	0.00%	2.07%	5.52%	0.76%	1.00%	0.00%	0.00%	2.33%	1.21%
Labradorite	0.00%	2.66%	0.00%	0.00%	0.00%	3.31%	3.07%	0.00%	0.00%	0.00%	2.50%	0.00%	1.30%
Microcline	23.00%	1.79%	18.30%	0.63%	0.55%	1.90%	4.99%	1.75%	4.03%	4.11%	0.00%	3.66%	1.94%
Oligoclase	2.29%	1.40%	1.54%	0.61%	0.50%	2.05%	0.00%	1.18%	0.00%	0.55%	0.00%	0.92%	0.00%
Orthoclase	18.10%	2.61%	15.10%	2.19%	0.22%	1.57%	1.00%	2.38%	5.04%	1.11%	4.32%	1.71%	1.32%
Sanidine	3.51%	0.03%	3.09%	0.00%	0.21%	0.00%	0.00%	3.15%	0.00%	1.08%	0.00%	0.00%	0.00%
Carbonates	1.67%	1.22%	1.70%	8.62%	0.39%	3.85%	2.24%	7.37%	12.71%	2.44%	2.23%	1.60%	2.61%
Ankerite	0.25%	0.17%	0.14%	0.57%	0.20%	1.97%	0.00%	1.36%	0.51%	0.00%	0.38%	0.22%	0.94%
Calcite	1.42%	0.18%	1.56%	7.67%	0.13%	0.92%	0.94%	1.00%	1.19%	1.22%	1.26%	0.31%	0.83%
Dolomite	0.00%	0.87%	0.00%	0.38%	0.06%	0.96%	1.30%	5.01%	11.01%	1.22%	0.59%	1.07%	0.84%
Phyllosilicates	42.04%	49.35%	41.27%	25.18%	5.93%	41.53%	49.57%	41.48%	38.51%	57.54%	55.94%	54.46%	41.52%
Biotite	5.97%	1.16%	5.73%	6.12%	0.95%	3.86%	1.64%	3.15%	3.83%	7.59%	1.68%	4.08%	1.64%
Chamosite	0.85%	8.48%	0.44%	5.67%	0.00%	14.06%	9.89%	4.89%	7.00%	0.83%	8.82%	2.39%	5.41%
Chlorite	2.20%	4.36%	0.59%	9.57%	0.33%	5.63%	4.06%	0.99%	2.28%	2.56%	2.00%	3.10%	1.38%
Dickite	2.80%	1.14%	0.46%	1.42%	0.00%	2.98%	4.73%	1.64%	1.71%	1.93%	12.94%	2.31%	4.09%
Glauconite	7.66%	7.28%	7.53%	0.77%	1.26%	0.56%	4.88%	5.15%	2.05%	6.51%	5.04%	6.32%	4.17%
Illite	7.18%	2.43%	15.01%	0.00%	0.23%	0.00%	1.15%	2.50%	4.00%	8.18%	2.00%	2.07%	3.12%
Kaolinite	0.00%	1.74%	0.00%	0.78%	0.22%	6.19%	3.75%	1.16%	1.74%	0.35%	1.96%	1.05%	6.31%
Muscovite	15.38%	22.76%	11.51%	0.85%	2.94%	8.25%	19.47%	22.00%	15.90%	29.59%	21.50%	33.14%	15.40%
Total	100.02%	100.04%	100.01%	99.98%	100.00%	100.01%	99.98%	100.02%	100.02%	99.99%	100.03%	99.98%	100.04%

Table S2

Age: Shale Unit: Sample ID:	Pennsylvanian											
	Atoka		Jackfork		Eudora	Excello	Heebner	Hushpuckney	Little Osage		Muncie Creek	Stark
	LA1Sh	UA1Sh	LJ1	UJ1Sh	21 Eudora	17 Excello	9 Heebner	8 Husphuckney	3 Little Osage	16A Little Osage	11-1 Muncie Creek	2 Stark
Fluorapatite	2.45%	2.21%	0.84%	0.70%	0.19%	0.00%	0.19%	0.00%	0.29%	0.26%	0.54%	19.80%
Goethite	1.88%	0.00%	0.16%	0.10%	0.00%	0.00%	0.00%	0.41%	0.00%	0.33%	0.14%	0.14%
Schorl	1.81%	2.96%	1.41%	1.39%	0.33%	2.01%	0.70%	0.52%	0.63%	0.89%	1.31%	1.60%
Pyrite	0.74%	0.72%	0.34%	0.42%	1.40%	0.24%	2.74%	1.76%	0.50%	0.06%	0.65%	1.68%
Quartz	31.62%	32.82%	35.74%	9.13%	26.63%	25.21%	24.79%	29.25%	27.39%	21.59%	32.27%	42.00%
Rutile	2.60%	1.60%	0.25%	1.50%	1.11%	1.13%	1.18%	1.67%	1.70%	0.99%	1.06%	0.20%
Siderite	0.62%	0.49%	0.22%	0.00%	0.29%	0.00%	0.26%	0.36%	0.00%	0.17%	0.47%	0.00%
Feldspars	11.57%	8.90%	18.47%	46.17%	16.94%	14.64%	16.12%	14.73%	24.62%	12.17%	17.39%	9.00%
Albite	0.00%	0.00%	4.29%	0.00%	4.34%	1.32%	0.80%	2.36%	3.80%	1.74%	3.11%	1.00%
Andesine	0.00%	0.00%	0.00%	1.26%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.50%	0.70%
Anorthite	5.96%	5.05%	1.34%	4.31%	1.98%	1.91%	3.42%	1.22%	8.30%	0.00%	2.95%	0.90%
Bytownite	2.24%	2.51%	1.20%	2.90%	0.00%	0.00%	1.88%	2.03%	1.59%	0.86%	1.26%	0.60%
Labradorite	0.00%	0.00%	2.96%	0.00%	4.46%	1.65%	1.23%	2.37%	1.13%	2.28%	3.00%	0.80%
Microcline	0.00%	1.34%	1.98%	16.80%	1.67%	4.60%	2.67%	1.69%	5.00%	1.10%	1.33%	2.60%
Oligoclase	1.76%	0.00%	2.46%	0.00%	0.00%	1.97%	2.61%	0.00%	0.00%	1.37%	1.56%	0.90%
Orthoclase	1.25%	0.00%	2.92%	12.80%	4.49%	3.19%	3.51%	2.56%	4.80%	0.97%	1.68%	1.10%
Sanidine	0.36%	0.00%	1.32%	8.10%	0.00%	0.00%	0.00%	2.50%	0.00%	3.85%	0.00%	0.40%
Carbonates	6.10%	6.08%	12.18%	16.07%	11.56%	1.51%	7.53%	0.50%	0.70%	10.69%	1.80%	0.34%
Ankerite	0.52%	0.69%	0.98%	1.16%	2.11%	0.22%	0.00%	0.00%	0.00%	0.98%	0.82%	0.04%
Calcite	4.22%	4.13%	0.28%	1.20%	6.52%	1.29%	4.52%	0.50%	0.30%	1.14%	0.98%	0.30%
Dolomite	1.36%	1.26%	10.92%	13.71%	2.93%	0.00%	3.01%	0.00%	0.40%	8.57%	0.00%	0.00%
Phyllosilicates	40.62%	44.21%	30.38%	24.49%	41.58%	55.30%	46.46%	50.76%	44.26%	52.87%	44.36%	25.30%
Biotite	3.99%	1.29%	1.92%	2.10%	1.62%	11.20%	0.93%	7.00%	5.38%	8.85%	5.63%	3.50%
Chamosite	4.11%	13.00%	11.84%	0.00%	9.51%	0.00%	4.98%	2.10%	1.00%	2.06%	1.53%	0.30%
Chlorite	1.22%	3.42%	6.27%	0.80%	0.96%	2.55%	3.75%	4.38%	2.09%	2.57%	2.90%	1.50%
Dickite	1.94%	1.80%	1.40%	1.74%	3.09%	2.67%	2.23%	1.30%	0.71%	3.60%	1.39%	0.00%
Glauconite	6.09%	3.82%	1.28%	5.48%	3.63%	6.37%	5.57%	7.51%	5.68%	6.77%	4.98%	5.00%
Illite	4.52%	2.78%	1.47%	5.99%	2.50%	5.41%	2.40%	3.80%	6.40%	7.66%	4.20%	4.90%
Kaolinite	4.05%	3.78%	1.88%	0.92%	1.37%	0.80%	1.10%	1.37%	0.00%	1.32%	0.83%	1.30%
Muscovite	14.70%	14.32%	4.32%	7.46%	18.90%	26.30%	25.50%	23.30%	23.00%	20.04%	22.90%	8.80%
Total	100.01%	99.99%	99.99%	99.97%	100.03%	100.04%	99.97%	99.96%	100.09%	100.02%	99.99%	60.28%

Table S3

Shale Name	Sample ID	Age	P (ppm)	Sc (ppm)	Rb (ppm)	Sr (ppm)	Y (ppm)	La (ppm)	Ce (ppm)	Pr (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)	Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)
Heebner	9 Heebner	Pennsylvanian	1055.12	13.77	93.71	78.73	9.72	16.40	25.59	2.92	0.39	1.56	0.24	1.48	0.33	1.08	0.19	1.44	0.24
Heebner	13 Heebner	Pennsylvanian	664.40	13.29	90.46	142.91	24.99	29.02	53.67	6.30	1.02	4.47	0.67	4.01	0.82	2.43	0.36	2.36	0.35
Heeber	13 Heebner (R)	Pennsylvanian	687.46	14.50	102.70	160.55	28.15	32.53	60.59	7.10	1.14	4.92	0.75	4.48	0.93	2.71	0.38	2.55	0.39
Eudora	15 Eudora	Pennsylvanian	5172.00	12.23	81.60	91.97	35.55	37.25	65.69	8.70	1.41	6.42	0.94	5.32	1.07	2.95	0.39	2.34	0.36
Eudora	21 Eudora	Pennsylvanian	331.10	12.90	78.73	114.87	10.25	21.04	31.76	3.20	0.38	1.58	0.25	1.59	0.36	1.15	0.19	1.39	0.21
Vilas	15 Vilas	Pennsylvanian	1171.33	12.69	104.48	225.85	21.82	30.70	63.46	6.43	0.98	4.33	0.64	3.64	0.71	1.98	0.28	1.73	0.25
Muncie Creek	11-1 Muncie Creek	Pennsylvanian	1050.99	13.19	88.16	59.29	14.14	18.62	36.46	4.23	0.63	2.61	0.41	2.46	0.52	1.64	0.25	1.81	0.27
Muncie Creek	11-2 Muncie Creek	Pennsylvanian	399.29	11.81	79.01	57.88	11.00	14.84	28.05	3.02	0.44	1.81	0.30	1.87	0.43	1.37	0.22	1.62	0.25
Stark	2 Stark	Pennsylvanian	35350.74	9.79	69.88	390.10	106.68	90.69	132.54	19.42	3.11	15.34	2.21	12.76	2.67	7.33	0.92	5.20	0.75
Hushpuckney	5 Hushpuckney	Pennsylvanian	977.36	16.98	123.28	80.32	17.50	27.85	48.85	5.13	0.72	3.14	0.49	2.97	0.65	2.03	0.32	2.18	0.34
Hushpuckney	6 Hushpuckney	Pennsylvanian	14764.55	13.32	91.00	297.09	58.29	49.55	92.36	12.35	2.10	9.76	1.44	8.07	1.61	4.43	0.57	3.56	0.53
Hushpuckney	8 Hushpuckney	Pennsylvanian	981.47	10.69	72.03	61.52	6.39	8.17	13.39	1.50	0.21	0.83	0.13	0.88	0.21	0.74	0.13	1.01	0.16
Hushpuckney	20 Hushpuckney	Pennsylvanian	4068.78	13.89	102.30	104.25	22.01	25.62	44.37	5.37	0.83	3.62	0.53	3.19	0.66	1.96	0.29	1.92	0.30
Hushpuckney	8 Hushpuckney (D)	Pennsylvanian	1699.24	10.67	68.67	68.59	9.04	9.41	16.15	1.87	0.26	1.13	0.18	1.19	0.28	0.93	0.16	1.17	0.19
Little Osage	3 Little Osage	Pennsylvanian	700.49	12.29	90.08	106.86	9.25	18.28	29.63	3.01	0.41	1.62	0.26	1.59	0.34	1.12	0.18	1.35	0.21
Little Osage	16A Little Osage	Pennsylvanian	728.26	16.68	109.10	87.95	14.71	34.24	43.78	4.33	0.55	2.29	0.35	2.18	0.48	1.58	0.26	1.93	0.29
Excello	1 Excello	Pennsylvanian	202.70	16.60	112.86	59.64	6.06	18.37	26.85	2.37	0.22	0.77	0.12	0.87	0.23	0.85	0.17	1.35	0.22
Excello	17 Excello	Pennsylvanian	634.42	15.46	111.24	94.78	7.14	21.25	28.71	2.85	0.32	1.24	0.18	1.08	0.24	0.82	0.15	1.27	0.20
Excello	19 Excello	Pennsylvanian	672.95	13.06	91.45	49.32	7.85	15.42	20.73	2.08	0.26	1.04	0.17	1.09	0.26	0.91	0.16	1.29	0.20
Atoka	UA1Sh	Pennsylvanian	651.92	9.96	60.75	74.87	23.95	25.36	41.70	6.42	1.07	4.81	0.68	3.51	0.71	2.08	0.31	2.11	0.33
Atoka	LA1Sh	Pennsylvanian	504.33	11.10	80.36	57.17	14.72	16.51	34.38	4.94	0.98	3.67	0.50	2.53	0.53	1.65	0.24	1.74	0.27
Atoka	LA2Sh	Pennsylvanian	597.75	14.98	107.45	66.67	27.90	29.40	58.84	7.44	1.40	5.93	0.77	3.48	0.68	2.00	0.28	1.97	0.30
Atoka	LA2Sh (D)	Pennsylvanian	617.23	14.99	106.38	67.01	27.92	30.33	60.82	7.57	1.42	6.16	0.79	3.66	0.71	2.13	0.30	2.06	0.31
Atoka	Atoka 2	Pennsylvanian	570.47	12.92	84.88	66.19	23.24	25.87	51.01	6.53	1.21	5.09	0.67	3.13	0.62	1.83	0.26	1.82	0.27
Jackfork	UJ1Sh	Pennsylvanian	466.57	16.54	85.28	54.55	29.78	33.80	72.44	8.35	1.36	6.41	0.85	4.05	0.80	2.33	0.33	2.26	0.35
Jackfork	UJ2Sh	Pennsylvanian	342.04	9.45	73.53	81.09	24.94	28.47	59.53	7.48	1.31	5.95	0.82	4.03	0.81	2.41	0.34	2.33	0.36
Jackfork	MJ1	Pennsylvanian	449.40	18.59	161.13	64.51	37.07	39.90	84.45	9.74	1.69	7.40	0.98	4.72	0.93	2.80	0.38	2.66	0.40
Jackfork	MJ2	Pennsylvanian	545.31	13.97	101.85	43.47	27.13	30.49	63.67	7.56	1.28	5.80	0.78	3.79	0.75	2.20	0.31	2.13	0.32
Jackfork	LJ1	Pennsylvanian	471.98	4.48	76.06	31.02	17.04	14.24	27.92	3.59	0.72	3.41	0.53	2.90	0.60	1.76	0.25	1.70	0.26
Fayetteville	FS1L	Mississippian	2544.67	17.28	146.50	109.59	54.85	56.17	67.41	11.66	2.07	9.95	1.44	8.16	1.67	4.67	0.60	3.85	0.56
Fayetteville	FS2U	Mississippian	358.98	20.78	149.39	127.44	25.63	41.94	81.25	8.62	1.05	4.29	0.67	4.20	0.89	2.67	0.39	2.53	0.37
Fayetteville	FS3	Mississippian	2672.07	19.42	116.64	137.74	42.86	47.03	63.70	9.69	1.71	7.41	1.05	6.01	1.23	3.47	0.46	2.94	0.44
Fayetteville	FS4	Mississippian	254.26	16.98	113.34	91.54	17.51	32.56	59.58	7.06	0.81	3.18	0.52	3.24	0.68	2.10	0.31	2.00	0.29
Fayetteville	FS6L	Mississippian	2114.92	17.72	117.47	242.84	42.69	39.60	64.78	8.71	1.50	6.71	0.99	5.99	1.27	3.56	0.49	3.08	0.45
Fayetteville	FS7L	Mississippian	711.62	19.07	147.94	100.48	29.61	52.28	77.16	10.54	1.14	4.77	0.74	4.56	0.98	3.03	0.44	3.01	0.45
Fayetteville	FS8UU	Mississippian	308.51	8.96	21.92	53.09	23.36	17.54	41.73	4.88	1.03	4.50	0.71	4.08	0.83	2.31	0.32	2.08	0.31
Fayetteville	FS9LU	Mississippian	406.28	11.14	46.70	117.31	33.89	29.78	63.65	7.02	1.30	5.84	0.94	5.50	1.13	3.17	0.44	2.74	0.42
Fayetteville	FS10L	Mississippian	592.50	21.05	140.03	120.42	37.05	55.27	113.43	11.84	1.57	6.89	1.07	6.34	1.29	3.81	0.54	3.48	0.52
Fayetteville	FS11	Mississippian	10231.88	15.73	116.00	195.08	192.94	75.66	87.43	14.88	3.28	17.55	2.56	16.50	3.85	10.97	1.33	7.51	1.15
Stanley	Stanley 1	Mississippian	617.98	12.27	99.29	44.03	25.99	27.73	53.71	6.82	1.25	5.62	0.78	3.86	0.73	2.16	0.30	2.06	0.31
Stanley	Stanley 2	Mississippian	359.30	5.70	48.33	38.05	19.23	21.93	45.15	5.45	0.92	4.33	0.63	3.56	0.73	2.14	0.31	2.03	0.31

Table S3

Stanley	Stanley 3	Mississippian	545.46	11.23	74.02	33.96	12.47	18.29	37.83	4.49	0.80	3.26	0.47	2.42	0.49	1.51	0.22	1.55	0.24
Stanley	Stanley 4	Mississippian	891.14	20.00	162.71	111.54	38.01	56.31	117.43	12.27	1.73	7.76	1.19	6.97	1.35	3.79	0.53	3.34	0.49
Stanley	Stanley 4 (D)	Mississippian	646.06	12.33	95.22	70.86	24.19	29.50	57.91	7.41	1.26	5.78	0.80	3.83	0.76	2.17	0.30	2.02	0.30
Chattanooga	CS1 (Chattanooga)	Devonian	398.08	16.03	171.39	45.99	33.80	37.20	71.45	8.19	1.37	5.96	0.90	5.49	1.12	3.17	0.44	2.77	0.41
Chattanooga	CS2	Devonian	419.00	13.86	143.61	43.88	32.26	40.07	80.23	9.16	1.39	6.41	0.99	5.95	1.24	3.59	0.51	3.26	0.48
Chattanooga	CS3	Devonian	206.49	12.68	127.44	43.36	25.36	31.35	64.80	7.01	1.04	4.62	0.73	4.49	0.94	2.78	0.41	2.59	0.39
Chattanooga	CS4	Devonian	364.70	13.82	129.93	39.25	33.17	40.84	83.76	9.06	1.33	5.99	0.95	5.80	1.21	3.50	0.50	3.16	0.47
Chattanooga	CS5	Devonian	341.64	15.33	142.21	42.29	30.93	40.50	83.10	8.95	1.25	5.50	0.87	5.40	1.14	3.41	0.48	3.10	0.46
Chattanooga	CS6	Devonian	2260.37	15.97	147.26	63.77	42.16	45.60	94.83	11.70	1.98	9.21	1.33	7.42	1.45	3.87	0.52	3.24	0.47
Chattanooga	CS7	Devonian	236.90	19.48	189.53	55.52	25.78	35.17	72.97	7.84	1.16	4.85	0.74	4.50	0.93	2.66	0.38	2.49	0.37
Chattanooga	CS7 (R)	Devonian	260.41	19.83	195.75	57.82	26.63	36.87	76.09	8.23	1.21	4.99	0.77	4.58	0.96	2.80	0.40	2.56	0.37
Chattanooga	CS8	Devonian	214.76	20.06	179.92	56.56	27.90	42.33	88.67	9.02	1.22	5.22	0.83	4.98	1.03	3.03	0.44	2.83	0.42
Chattanooga	CS9	Devonian	207.76	18.57	165.85	60.09	30.77	42.72	90.41	9.46	1.27	5.44	0.88	5.31	1.12	3.26	0.47	3.02	0.44
Chattanooga	CS10B	Devonian	163.81	23.19	225.61	58.27	22.22	47.52	95.03	8.98	0.86	3.71	0.63	4.10	0.89	2.76	0.41	2.73	0.40
Chattanooga	CS11	Devonian	206.41	21.44	197.34	58.87	30.32	44.92	97.42	9.95	1.35	5.84	0.92	5.49	1.13	3.30	0.47	3.07	0.46
Chattanooga	CS12	Devonian	206.92	23.01	211.56	63.04	30.37	45.01	96.66	10.10	1.38	5.77	0.91	5.37	1.13	3.29	0.47	3.02	0.47
Chattanooga	CS13	Devonian	122.72	17.74	152.15	55.13	31.45	43.34	93.21	9.69	1.31	5.82	0.92	5.59	1.18	3.45	0.50	3.23	0.48
New Albany	Ceja Corp Morris #1	Devonian	205.28	11.53	78.36	46.64	19.37	21.06	38.25	5.20	0.92	4.12	0.58	2.99	0.61	1.85	0.26	1.76	0.27
New Albany	Ceja Corp Morris #1 (R)	Devonian	199.76	10.94	75.08	44.89	18.71	20.05	36.52	4.82	0.86	3.85	0.55	2.81	0.56	1.69	0.24	1.68	0.25
Polk Creek	Polk Creek 1	Ordovician	17.09	3.29	21.59	3.09	4.94	5.37	10.60	1.39	0.29	1.07	0.16	0.97	0.22	0.70	0.11	0.88	0.14
Polk Creek	Polk Creek 1 (D)	Ordovician	17.17	3.59	24.17	3.28	5.22	5.43	11.15	1.41	0.30	1.12	0.17	1.01	0.22	0.72	0.12	0.92	0.15
Polk Creek	PC1	Ordovician	157.52	2.77	16.54	9.83	8.04	5.55	10.57	1.35	0.27	1.17	0.18	1.10	0.26	0.82	0.13	0.88	0.15
Polk Creek	PC1 (R)	Ordovician	149.64	2.79	16.61	9.83	8.13	5.63	10.66	1.36	0.27	1.18	0.18	1.11	0.26	0.85	0.13	0.91	0.15
Womble	Womble 1	Ordovician	162.23	15.92	161.76	25.70	13.26	35.07	65.77	6.99	0.81	2.75	0.40	2.29	0.47	1.41	0.22	1.44	0.22
Womble	Womble 2	Ordovician	25.22	1.90	15.36	4.15	1.83	5.73	11.09	1.34	0.20	0.75	0.08	0.38	0.08	0.27	0.04	0.33	0.06
Womble	Womble 3	Ordovician	25.12	1.88	15.44	4.04	2.63	6.13	11.77	1.41	0.21	0.79	0.09	0.47	0.10	0.33	0.05	0.38	0.06
Womble	Womble 3 (D)	Ordovician	290.89	11.61	50.69	15.38	31.44	33.39	61.15	7.63	1.47	6.31	0.89	4.44	0.90	2.47	0.32	2.07	0.32
Mazarn	Mazarn 1	Ordovician	142.57	3.26	27.91	28.63	3.97	5.85	12.65	1.41	0.23	1.04	0.15	0.83	0.17	0.51	0.08	0.52	0.08
Mazarn	Mazarn 2	Ordovician	286.23	8.20	66.39	72.36	7.82	8.25	14.99	1.93	0.43	1.53	0.23	1.24	0.26	0.83	0.13	0.89	0.14
Mazarn	Mazarn 3	Ordovician	42.01	2.17	7.05	345.44	2.70	4.33	8.73	0.96	0.18	0.76	0.09	0.36	0.06	0.19	0.02	0.16	0.02
Mazarn	Mazarn 4	Ordovician	359.76	8.34	76.94	39.20	10.55	13.86	28.03	3.15	0.66	2.51	0.35	1.77	0.36	1.07	0.16	1.07	0.17
Collier	Collier CS1	Camb.-Ordo.	570.63	5.99	54.99	54.45	7.35	8.87	18.15	2.10	0.35	1.56	0.22	1.22	0.26	0.80	0.12	0.88	0.13
Collier	Collier CS1 (R)	Camb.-Ordo.	578.91	6.06	56.11	55.57	7.38	8.92	18.30	2.11	0.35	1.56	0.22	1.20	0.26	0.80	0.12	0.88	0.13
Tunnel City	UPH-1-658	Cambrian	184.82	7.35	65.82	36.59	10.45	14.18	30.40	3.07	0.66	2.18	0.25	1.14	0.24	0.78	0.12	0.84	0.14
Eau Claire	HwyA-2-520	Cambrian	536.98	7.80	44.66	47.64	7.36	14.87	26.00	2.60	0.51	1.98	0.23	0.94	0.19	0.58	0.09	0.65	0.11
Eau Claire	UPH-1-853	Cambrian	102.86	6.64	49.37	28.18	4.35	9.67	17.69	2.04	0.29	1.13	0.12	0.52	0.11	0.40	0.06	0.46	0.08
Eau Claire	UPH-1-977	Cambrian	259.88	6.14	67.35	32.47	2.43	7.04	10.10	1.07	0.17	0.57	0.06	0.34	0.08	0.33	0.06	0.49	0.09
Mt. Simon	UPH-1-1363	Cambrian	122.17	10.31	91.26	95.33	5.09	15.29	36.34	4.05	0.54	2.10	0.23	1.03	0.21	0.70	0.10	0.75	0.12

Table S4

Shale Name	Sample ID	Age	Standard Deviation (1σ)																		
			P (ppb)	Sc (ppb)	Rb (ppb)	Sr (ppb)	Y (ppb)	La (ppb)	Ce (ppb)	Pr (ppb)	Nd (ppb)	Sm (ppb)	Eu (ppb)	Gd (ppb)	Tb (ppb)	Dy (ppb)	Ho (ppb)	Er (ppb)	Tm (ppb)	Yb (ppb)	Lu (ppb)
Heebner	9 Heebner	Pennsylvanian	61.187	0.644	1.138	3.442	0.121	0.331	0.490	0.059	0.237	0.043	0.016	0.044	0.011	0.041	0.008	0.039	0.007	0.074	0.012
Heebner	13 Heebner	Pennsylvanian	32.706	0.814	2.160	3.008	0.465	0.912	0.702	0.114	0.612	0.190	0.027	0.166	0.024	0.103	0.030	0.035	0.008	0.034	0.009
Heeber	13 Heebner (R)	Pennsylvanian	124.356	0.278	2.236	3.288	0.599	1.301	1.934	0.111	0.526	0.134	0.030	0.157	0.027	0.069	0.035	0.032	0.006	0.100	0.011
Eudora	15 Eudora	Pennsylvanian	89.727	0.434	2.941	2.832	0.704	1.181	1.202	0.341	0.601	0.108	0.025	0.169	0.015	0.194	0.053	0.150	0.014	0.050	0.012
Eudora	21 Eudora	Pennsylvanian	73.651	0.525	1.579	4.630	0.264	0.538	0.223	0.050	0.353	0.063	0.009	0.038	0.012	0.019	0.011	0.031	0.005	0.034	0.006
Vilas	15 Vilas	Pennsylvanian	72.686	0.836	1.706	6.372	0.609	0.974	2.789	0.120	0.607	0.167	0.023	0.084	0.017	0.080	0.010	0.056	0.012	0.030	0.008
Muncie Creek	11-1 Muncie Creek	Pennsylvanian	50.718	0.321	2.092	2.341	0.327	0.712	1.210	0.096	0.318	0.132	0.022	0.068	0.012	0.102	0.012	0.051	0.007	0.028	0.012
Muncie Creek	11-2 Muncie Creek	Pennsylvanian	40.443	0.503	2.430	0.564	0.269	0.415	0.894	0.081	0.356	0.073	0.023	0.052	0.010	0.041	0.027	0.047	0.005	0.033	0.011
Stark	2 Stark	Pennsylvanian	514.578	0.496	2.021	16.851	2.100	3.513	4.506	0.523	3.567	0.406	0.105	0.325	0.019	0.386	0.103	0.110	0.028	0.236	0.037
Hushpuckney	5 Hushpuckney	Pennsylvanian	129.446	1.036	2.500	1.778	0.404	1.880	1.374	0.107	0.519	0.056	0.035	0.057	0.017	0.074	0.028	0.035	0.024	0.063	0.017
Hushpuckney	6 Hushpuckney	Pennsylvanian	666.148	0.693	1.019	9.253	1.096	1.511	2.581	0.234	1.166	0.346	0.041	0.355	0.024	0.257	0.055	0.158	0.023	0.163	0.017
Hushpuckney	8 Hushpuckney	Pennsylvanian	113.489	0.269	0.895	1.547	0.178	0.303	0.162	0.042	0.085	0.052	0.014	0.018	0.011	0.024	0.010	0.028	0.005	0.034	0.008
Hushpuckney	8 Hushpuckney (D)	Pennsylvanian	190.843	0.549	2.913	1.275	0.113	0.217	1.174	0.042	0.200	0.047	0.006	0.029	0.007	0.039	0.007	0.036	0.002	0.036	0.005
Hushpuckney	20 Hushpuckney	Pennsylvanian	185.027	0.777	1.582	2.634	0.238	0.473	0.544	0.082	0.465	0.108	0.029	0.061	0.020	0.089	0.024	0.056	0.017	0.066	0.016
Little Osage	3 Little Osage	Pennsylvanian	102.437	0.375	1.527	1.623	0.218	0.437	0.892	0.068	0.161	0.062	0.023	0.048	0.004	0.028	0.004	0.042	0.005	0.052	0.010
Little Osage	16A Little Osage	Pennsylvanian	52.340	0.855	1.477	1.785	0.306	1.720	1.019	0.139	0.269	0.066	0.019	0.074	0.010	0.074	0.011	0.033	0.004	0.067	0.012
Excello	1 Excello	Pennsylvanian	36.125	0.604	1.919	1.293	0.077	0.574	0.648	0.055	0.222	0.040	0.013	0.017	0.007	0.066	0.004	0.041	0.006	0.022	0.008
Excello	17 Excello	Pennsylvanian	93.894	0.425	1.100	2.457	0.191	0.742	0.726	0.057	0.135	0.063	0.019	0.015	0.004	0.027	0.012	0.026	0.003	0.034	0.007
Excello	19 Excello	Pennsylvanian	59.612	0.856	1.819	1.474	0.311	0.234	0.586	0.042	0.269	0.051	0.013	0.061	0.004	0.026	0.019	0.021	0.009	0.051	0.008
Atoka	UA1Sh	Pennsylvanian	6.618	0.936	5.414	1.272	0.573	1.157	3.647	0.266	1.135	0.208	0.064	0.223	0.021	0.205	0.016	0.185	0.012	0.081	0.009
Atoka	LA1Sh	Pennsylvanian	9.393	0.324	1.059	1.706	0.400	0.394	0.945	0.232	0.438	0.114	0.038	0.159	0.033	0.063	0.019	0.076	0.008	0.065	0.004
Atoka	LA2Sh	Pennsylvanian	15.571	0.372	3.182	1.663	0.861	0.652	3.119	0.265	1.441	0.142	0.062	0.275	0.054	0.074	0.015	0.049	0.012	0.032	0.015
Atoka	LA2Sh (D)	Pennsylvanian	5.243	0.900	5.027	2.125	0.994	1.910	2.151	0.238	0.840	0.283	0.041	0.182	0.022	0.046	0.011	0.063	0.012	0.060	0.014
Atoka	Atoka 2	Pennsylvanian	7.677	0.856	4.662	1.279	1.217	1.325	2.061	0.281	1.416	0.301	0.047	0.281	0.027	0.108	0.032	0.080	0.018	0.072	0.005
Jackfork	UJ1Sh	Pennsylvanian	6.154	0.730	3.717	1.514	1.009	1.139	3.534	0.324	0.911	0.244	0.033	0.182	0.032	0.192	0.057	0.132	0.008	0.035	0.021
Jackfork	UJ2Sh	Pennsylvanian	4.617	0.915	3.622	3.495	1.015	1.160	3.903	0.169	1.207	0.106	0.051	0.216	0.019	0.060	0.021	0.106	0.011	0.063	0.008
Jackfork	MJ1	Pennsylvanian	5.929	0.784	3.405	1.701	1.084	1.069	2.157	0.287	2.123	0.247	0.028	0.325	0.026	0.229	0.019	0.053	0.005	0.100	0.017
Jackfork	MJ2	Pennsylvanian	8.310	0.496	5.003	1.484	0.384	0.383	1.487	0.239	0.621	0.032	0.051	0.078	0.017	0.086	0.037	0.097	0.009	0.077	0.010
Jackfork	LJ1	Pennsylvanian	11.152	0.672	2.206	3.999	1.180	1.802	3.194	0.380	1.462	0.251	0.052	0.378	0.036	0.125	0.054	0.078	0.012	0.085	0.018
Fayetteville	FS1L	Mississippian	140.242	0.773	3.807	3.940	1.354	1.153	2.036	0.277	0.852	0.305	0.062	0.304	0.033	0.214	0.042	0.086	0.018	0.085	0.027
Fayetteville	FS2U	Mississippian	42.465	0.739	5.708	2.323	0.842	0.448	3.368	0.173	0.939	0.072	0.014	0.089	0.013	0.055	0.012	0.098	0.009	0.115	0.005
Fayetteville	FS3	Mississippian	180.901	0.823	1.666	4.277	0.328	1.092	1.667	0.211	1.015	0.128	0.025	0.218	0.043	0.204	0.039	0.079	0.012	0.055	0.034
Fayetteville	FS4	Mississippian	16.862	0.241	3.848	3.087	0.321	0.698	2.444	0.157	0.646	0.039	0.041	0.051	0.009	0.124	0.018	0.041	0.016	0.063	0.006
Fayetteville	FS6L	Mississippian	159.173	0.411	3.348	4.476	1.069	1.357	1.722	0.214	0.276	0.093	0.029	0.192	0.030	0.108	0.025	0.079	0.018	0.087	0.014
Fayetteville	FS7L	Mississippian	96.300	0.779	3.731	2.475	0.196	0.633	2.720	0.067	1.390	0.128	0.038	0.117	0.007	0.069	0.007	0.141	0.014	0.066	0.012
Fayetteville	FS8UU	Mississippian	65.457	0.603	0.678	1.186	0.658	0.666	0.956	0.052	0.595	0.043	0.025	0.148	0.020	0.123	0.022	0.060	0.010	0.088	0.009
Fayetteville	FS9LU	Mississippian	75.862	0.573	0.926	1.087	0.460	1.093	1.584	0.101	0.606	0.268	0.047	0.218	0.029	0.094	0.034	0.164	0.026	0.088	0.011
Fayetteville	FS10L	Mississippian	29.785	0.583	4.087	3.027	1.184	1.159	2.789	0.286	0.940	0.085	0.014	0.118	0.012	0.208	0.024	0.088	0.010	0.068	0.017
Fayetteville	FS11	Mississippian	471.638	0.916	2.420	5.549	5.281	1.905	1.438	0.628	1.390	0.577	0.122	0.408	0.081	0.763	0.064	0.393	0.030	0.254	0.035

Table S4

Stanley	Stanley 1	Mississippian	7.691	0.481	6.674	1.087	0.756	0.804	2.464	0.296	0.505	0.138	0.041	0.231	0.018	0.133	0.018	0.056	0.011	0.058	0.009
Stanley	Stanley 2	Mississippian	9.253	0.331	5.339	2.470	1.142	1.778	4.317	0.560	1.582	0.200	0.064	0.254	0.032	0.158	0.058	0.164	0.015	0.119	0.014
Stanley	Stanley 3	Mississippian	8.197	0.237	1.172	0.485	0.089	0.431	1.410	0.151	0.298	0.106	0.029	0.088	0.014	0.050	0.012	0.063	0.008	0.019	0.008
Stanley	Stanley 4	Mississippian	40.895	0.505	2.303	1.757	0.378	1.418	3.466	0.325	0.762	0.054	0.028	0.183	0.032	0.102	0.036	0.106	0.016	0.100	0.020
Stanley	Stanley 4 (D)	Mississippian	13.759	0.337	4.336	1.509	0.417	0.724	1.800	0.244	0.920	0.182	0.050	0.226	0.035	0.092	0.019	0.068	0.009	0.060	0.012
Chattanooga	CS1 (Chattanooga)	Devonian	63.461	0.567	2.504	1.117	0.473	0.996	2.227	0.070	0.517	0.254	0.019	0.194	0.010	0.196	0.029	0.072	0.012	0.065	0.019
Chattanooga	CS2	Devonian	43.315	0.391	2.466	0.831	0.202	1.630	2.217	0.222	1.252	0.250	0.054	0.116	0.024	0.182	0.036	0.140	0.009	0.112	0.022
Chattanooga	CS3	Devonian	23.898	0.431	0.936	0.635	0.662	1.222	2.317	0.144	0.423	0.134	0.042	0.098	0.025	0.056	0.038	0.043	0.006	0.104	0.007
Chattanooga	CS4	Devonian	39.532	0.754	2.466	1.066	0.872	1.747	2.038	0.254	1.080	0.136	0.031	0.141	0.020	0.269	0.026	0.168	0.009	0.060	0.009
Chattanooga	CS5	Devonian	85.273	0.287	3.198	0.737	0.531	0.477	1.457	0.074	1.214	0.178	0.029	0.200	0.012	0.182	0.053	0.125	0.012	0.064	0.014
Chattanooga	CS6	Devonian	194.336	0.656	2.989	0.774	0.807	1.025	2.369	0.493	1.772	0.134	0.063	0.218	0.028	0.113	0.047	0.126	0.020	0.103	0.013
Chattanooga	CS7	Devonian	44.830	1.224	4.408	2.732	0.660	0.613	1.687	0.219	1.013	0.154	0.027	0.133	0.012	0.058	0.023	0.065	0.018	0.034	0.005
Chattanooga	CS7 (R)	Devonian	41.008	0.775	2.726	1.492	0.435	1.206	1.957	0.269	0.418	0.129	0.045	0.227	0.027	0.106	0.028	0.090	0.009	0.154	0.019
Chattanooga	CS8	Devonian	16.717	0.965	4.150	1.757	0.349	0.724	0.958	0.289	0.442	0.183	0.009	0.191	0.030	0.155	0.048	0.061	0.007	0.114	0.011
Chattanooga	CS9	Devonian	31.871	0.609	3.061	1.446	0.785	0.408	2.356	0.284	0.870	0.258	0.034	0.123	0.017	0.134	0.028	0.095	0.016	0.097	0.015
Chattanooga	CS10B	Devonian	34.046	0.881	5.511	0.702	0.483	1.034	2.665	0.267	0.900	0.171	0.020	0.050	0.008	0.070	0.020	0.049	0.010	0.052	0.009
Chattanooga	CS11	Devonian	60.073	1.107	1.835	1.329	0.563	1.231	1.603	0.184	0.980	0.132	0.057	0.113	0.037	0.099	0.039	0.067	0.012	0.099	0.012
Chattanooga	CS12	Devonian	54.827	1.154	5.217	1.367	0.441	1.381	1.199	0.116	1.389	0.218	0.045	0.117	0.031	0.069	0.044	0.079	0.011	0.055	0.019
Chattanooga	CS13	Devonian	26.409	0.419	3.325	0.907	0.580	0.646	1.612	0.207	1.370	0.201	0.053	0.287	0.027	0.083	0.026	0.117	0.010	0.161	0.019
New Albany	Ceja Corp Morris #1	Devonian	1.370	0.194	1.439	0.711	0.255	0.249	0.319	0.276	0.412	0.065	0.042	0.157	0.012	0.051	0.022	0.055	0.013	0.053	0.012
New Albany	Ceja Corp Morris #1 (R)	Devonian	0.566	0.164	1.135	0.375	0.255	0.350	0.533	0.084	0.251	0.175	0.018	0.180	0.012	0.076	0.020	0.069	0.006	0.056	0.008
Polk Creek	Polk Creek 1	Ordovician	9.520	0.047	0.364	0.061	0.048	0.071	0.184	0.028	0.198	0.038	0.004	0.055	0.007	0.045	0.013	0.019	0.005	0.036	0.004
Polk Creek	Polk Creek 1 (D)	Ordovician	1.806	0.067	0.337	0.037	0.052	0.091	0.223	0.008	0.146	0.058	0.017	0.049	0.005	0.040	0.004	0.022	0.006	0.079	0.002
Polk Creek	PC1	Ordovician	17.154	0.041	0.206	0.145	0.141	0.148	0.216	0.022	0.138	0.031	0.012	0.026	0.003	0.045	0.008	0.020	0.003	0.032	0.006
Polk Creek	PC1 (R)	Ordovician	1.708	0.027	0.199	0.163	0.179	0.120	0.308	0.018	0.131	0.030	0.011	0.063	0.008	0.017	0.013	0.035	0.005	0.041	0.003
Womble	Womble 1	Ordovician	29.371	0.567	3.607	1.019	0.329	0.349	2.142	0.146	0.451	0.064	0.006	0.081	0.009	0.086	0.010	0.029	0.008	0.066	0.006
Womble	Womble 2	Ordovician	1.859	0.029	0.061	0.062	0.051	0.184	0.168	0.017	0.141	0.016	0.005	0.045	0.003	0.010	0.001	0.017	0.003	0.019	0.003
Womble	Womble 3	Ordovician	2.264	0.026	0.172	0.144	0.064	0.092	0.115	0.044	0.159	0.019	0.008	0.014	0.003	0.006	0.001	0.018	0.002	0.027	0.004
Womble	Womble 3 (D)	Ordovician	8.343	0.352	0.854	0.456	0.410	0.864	2.838	0.331	0.624	0.126	0.038	0.214	0.026	0.097	0.038	0.054	0.009	0.065	0.012
Mazarn	Mazarn 1	Ordovician	16.800	0.055	0.762	0.273	0.037	0.062	0.071	0.036	0.139	0.037	0.006	0.037	0.004	0.025	0.007	0.028	0.002	0.031	0.002
Mazarn	Mazarn 2	Ordovician	7.995	0.061	0.893	1.743	0.075	0.150	0.436	0.033	0.074	0.033	0.005	0.030	0.007	0.033	0.006	0.035	0.005	0.034	0.005
Mazarn	Mazarn 3	Ordovician	0.406	0.022	0.158	8.254	0.039	0.094	0.153	0.024	0.035	0.045	0.004	0.023	0.002	0.014	0.003	0.012	0.001	0.006	0.001
Mazarn	Mazarn 4	Ordovician	4.116	0.073	1.326	0.792	0.311	0.237	0.540	0.095	0.268	0.083	0.005	0.074	0.015	0.033	0.015	0.041	0.006	0.033	0.004
Collier	Collier CS1	Camb.-Ordo.	7.052	0.113	0.805	0.878	0.077	0.172	0.343	0.037	0.210	0.043	0.007	0.055	0.006	0.047	0.010	0.033	0.004	0.053	0.004
Collier	Collier CS1 (R)	Camb.-Ordo.	6.405	0.030	0.697	1.054	0.094	0.099	0.375	0.028	0.162	0.056	0.011	0.031	0.010	0.049	0.013	0.035	0.004	0.048	0.005
Tunnel City	UPH-1-658	Cambrian	3.174	0.055	1.242	1.069	0.397	0.518	0.854	0.114	0.294	0.040	0.010	0.067	0.006	0.048	0.011	0.026	0.006	0.037	0.007
Eau Claire	HwyA-2-520	Cambrian	13.623	0.126	1.748	0.431	0.167	0.461	0.522	0.052	0.248	0.064	0.020	0.039	0.007	0.056	0.004	0.035	0.002	0.020	0.002
Eau Claire	UPH-1-853	Cambrian	2.564	0.120	1.996	0.381	0.142	0.575	0.391	0.099	0.143	0.047	0.015	0.053	0.003	0.030	0.003	0.017	0.004	0.024	0.002
Eau Claire	UPH-1-977	Cambrian	27.842	0.066	2.342	0.592	0.026	0.229	0.139	0.034	0.063	0.027	0.004	0.019	0.004	0.026	0.005	0.018	0.002	0.022	0.006
Mt. Simon	UPH-1-1363	Cambrian	2.709	0.117	1.968	2.383	0.096	0.416	1.161	0.078	0.508	0.035	0.016	0.080	0.011	0.039	0.011	0.035	0.006	0.011	0.006