Supporting Information

Methane occurrences in aquifers in the Barnett Shale area with a focus on Parker County, Texas

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Abstract:

Clusters of elevated methane concentrations in aquifers overlying the Barnett Shale play have been the focus of recent national attention as they relate to impacts of hydraulic fracturing. The objective of this study was to assess the spatial extent of high dissolved methane previously observed on the western edge of the play (Parker County) and to evaluate its most likely source. A total of 509 well-water samples from 12 counties (14,500 km^2) were analyzed for methane, major ions and carbon isotopes. Most samples were collected from the regional Trinity Aquifer and show only low levels of dissolved methane (85% of 457 unique locations <0.1 mg/L). Methane, when present is primarily thermogenic ($\delta^{13}C$ 10th and 90th percentiles of -57.54‰ and -39.00‰ and C1/C2+C3 ratio 10th, 50th, and 90th percentiles of 5, 15, and 42). High methane concentrations (>20 mg/L) are limited to a few spatial clusters. The Parker County cluster area includes historical vertical oil and gas wells producing from relatively shallow formations and recent horizontal wells producing from the Barnett Shale (depth of ~1500 m). Lack of correlation with distance to Barnett Shale horizontal wells, with distance to conventional wells and with well density suggests a natural origin of the dissolved methane. Known commercial very shallow gas accumulations (<200 m in places) and historical instances of water wells reaching gas pockets point to the underlying Strawn Group of Paleozoic age as the main natural source of the dissolved gas.

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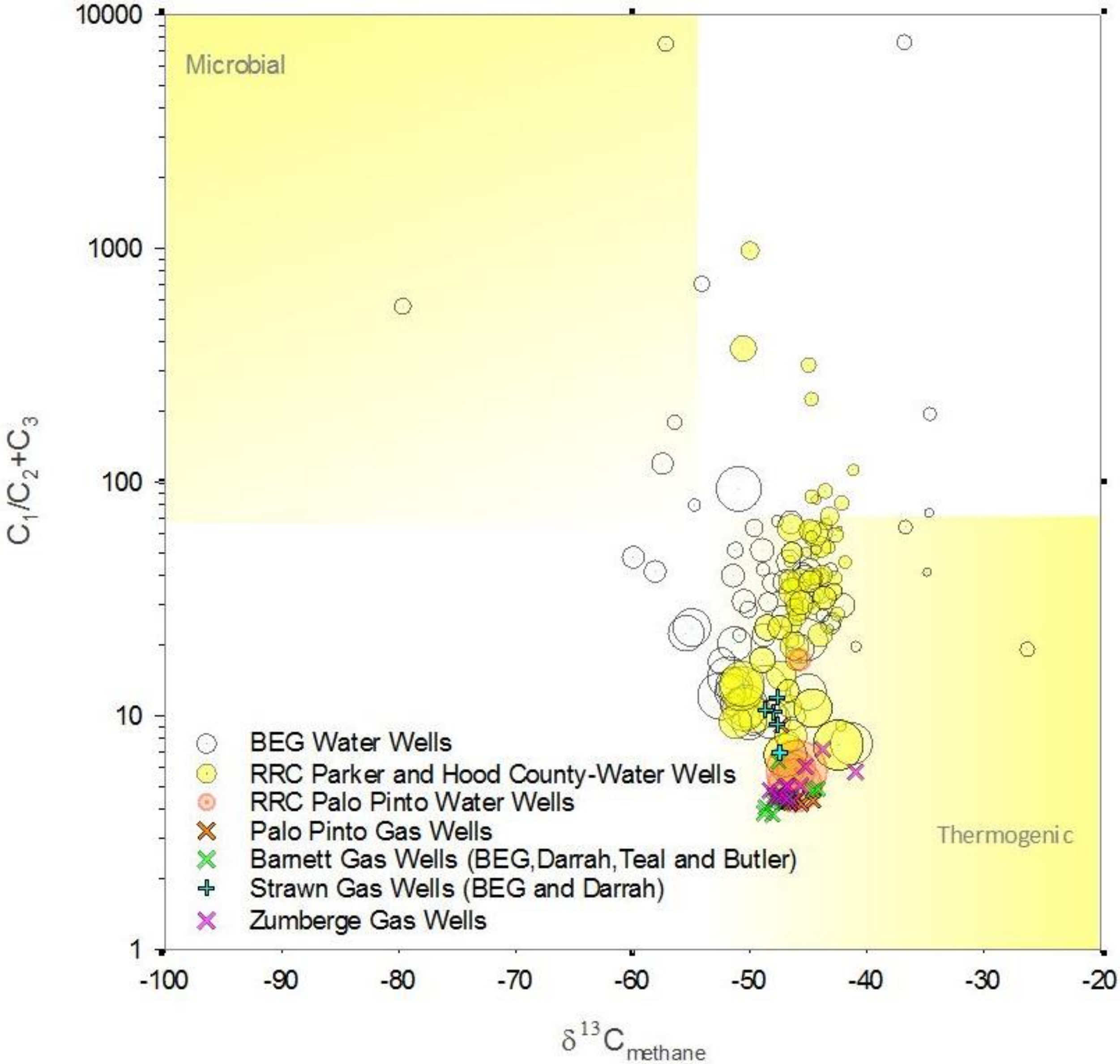
Plots Auxiliary to Main Text Plots



Note: this plot complements Figure 3 by adding water samples and gas well analysis from RRC (RRC, 2014, 2015 and unpublished), Darrah et al. (2014), and Zumberge et al. (2012). Only Parker and Hood county wells are used from the latter reference.

Figure S1. Bernard plot displaying water and gas samples in the Parker–Hood cluster and elsewhere taken from various sources.

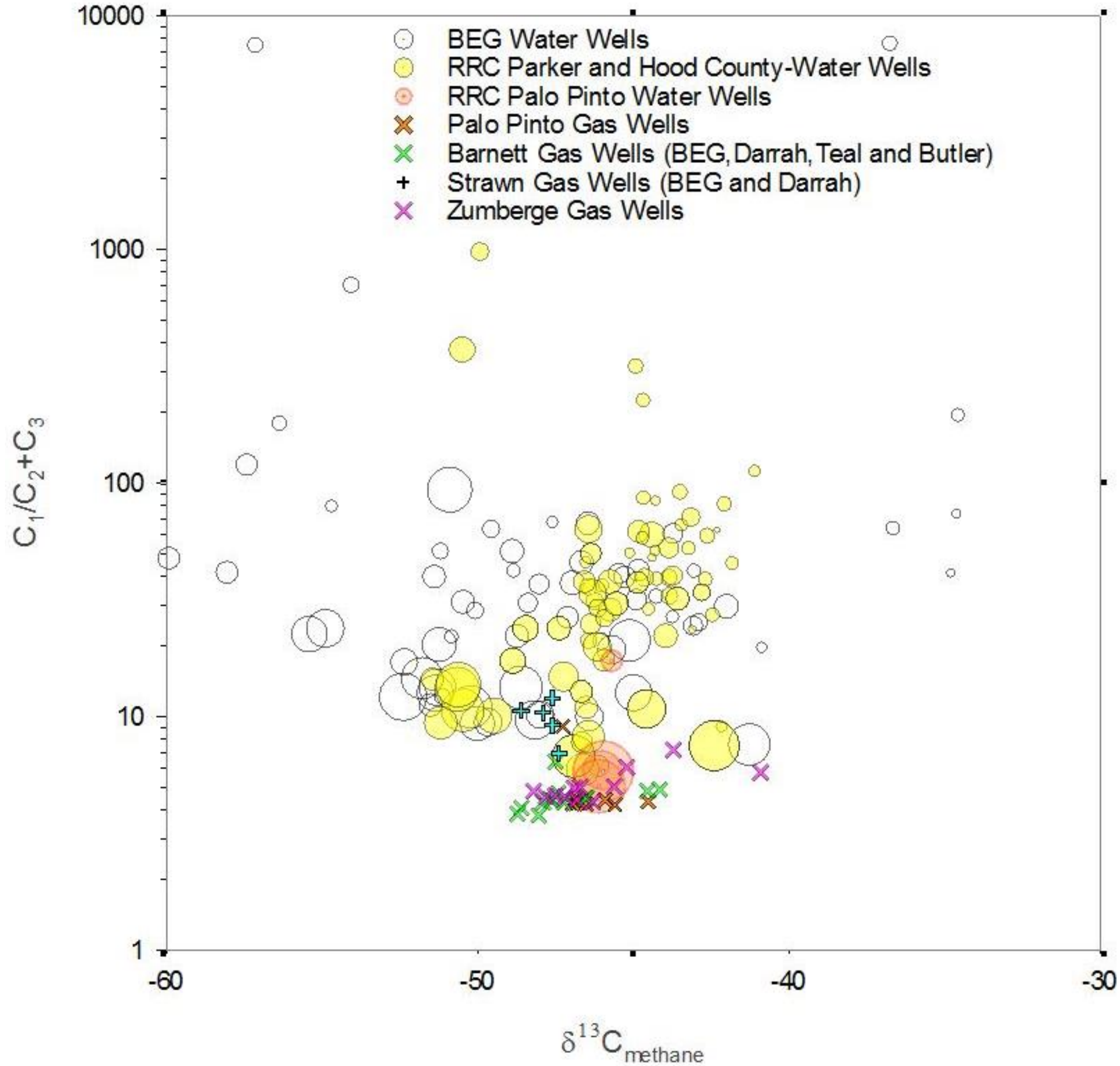


Figure S2. Bernard plot focusing on the thermogenic field.

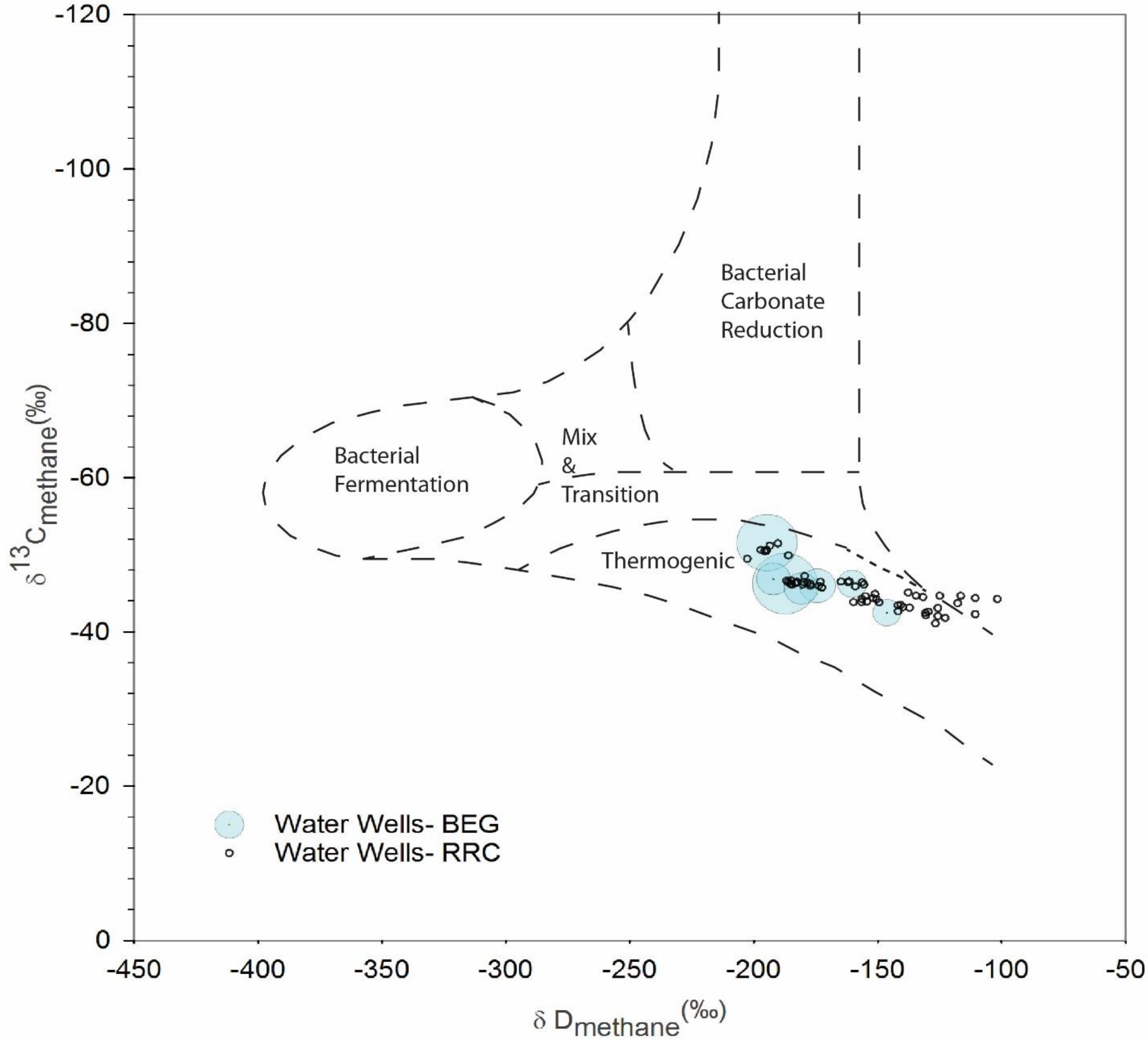


Figure S3. δD-δC plot with data taken from earlier RRC-ordered studies in the Parker-Hood cluster as well as data from BEG duplicates analyzed by Isotech (Table S2).

References

Darrah, T. H., A. Vengosh, R. B. Jackson, N. R. Warner, and R. J. Poreda, 2014, Noble gases identify the mechanisms of fugitive gas contamination in drinking-water wells overlying the Marcellus and Barnett Shales, PNAS, 111(39), p.14076–14081. doi: 10.1073/pnas.1322107111.

RRC, 2014, Water well complaint investigation report, Silverado on the Brazos neighborhood, Parker County, Texas, May 23, 2014, 19p.

RRC, 2015, Review of analytical data – Murray Complaint (7B-10736) and Singleton Complaint (7B-10612), April 28, 2015, 13p. [Palo Pinto County]

Zumberge, J., K. Ferworn, and S. Brown, 2012, Isotopic reversal ('rollover') in shale gases produced from the Mississippian Barnett and Fayetteville formations, Marine and Petroleum Geology, 31, p.43-52.

Tables of Results

Table S1 displays major ion and environmental condition results whereas Table S2 shows dissolved gas information. Table S3 presents results from the duplicate samples sent to Isotech, results also include isotope results not routinely analyzed. Table S4 provides gas composition from sampled gas wells.

Table S1. Sample locations and water quality results

Sam. ID	County	Lat.	Long.	Depth (ft)	Water Temp (°C)	Specific Cond. (mS/cm)	pH	Water Use	Na	K	Mg	Ca	F	Cl	NO_3	SO_4	HCO_3
1	Johnson	32.27	-97.41	520	19.8	1.0	9.07	R	244.4	1.0	0.5	1.2	1.8	12.9	0.3	44.9	
2	Johnson	32.36	-97.16	200	20.4	0.9	7.99	R	164.2	3.4	6.8	18.5	0.7	26.7	0.1	135.1	
3	Johnson	32.48	-97.31	30	19.3	0.8	5.78	R	64.0	1.7	20.5	45.7	0.1	91.8	67.1	153.4	
4	Johnson	32.48	-97.31	100	20.6	0.5	6.31	R	41.3	2.4	6.5	51.3	0.2	47.2	2.6	60.1	
5	Tarrant	32.62	-97.50	340	20.1	0.7	8.32	R	145.8	2.2	2.8	5.0	0.1	8.5	0.3	49.0	
6	Parker	32.58	-97.57	280	16.9	0.7	7.50	R	34.2	3.0	18.6	63.7	0.3	16.0	0.1	66.2	
7	Parker	32.58	-97.56	225	20.3	0.6	7.66	Ag	30.7	2.8	19.7	64.3	0.3	10.5	0.0	39.7	
8	Parker	32.58	-97.56	265	19.2	0.6	7.53	Ag	31.9	2.9	19.6	64.2	0.3	10.5	0.3	45.3	
9	Parker	32.58	-97.57	265	19.1	0.6	7.55	R	34.1	3.4	18.1	60.9	0.3	10.9	0.0	36.0	
10	Parker	32.78	-97.62	170**	15.9	0.6	7.39	R	14.2	1.7	15.6	94.3	0.2	6.0	0.0	66.6	
11	Parker	32.78	-97.62	1700	19.2	0.6	7.51	R	14.1	1.7	14.6	89.1	0.2	5.7	0.0	55.9	
12	Parker	32.78	-97.62	370**	18.0	0.6	7.28	R	9.6	1.3	7.5	98.3	0.3	8.0	0.0	53.5	
13	Parker	32.78	-97.62	380	18.9	0.6	7.37	R	11.6	1.5	10.0	99.7	0.3	6.1	0.0	49.0	
14	Parker	32.79	-97.69	265	17.2	1.2	7.12	R	8.8	1.2	8.9	131.2	0.2	17.9	3.8	56.0	
15	Parker	32.79	-97.70	165	15.5	0.6	7.32	R	27.5	1.6	11.5	94.6	0.2	9.8	0.0	36.1	
16	Parker	32.57	-97.80	150	18.1	1.1	8.66	R	244.0	1.7	4.1	8.1	0.4	121.1	0.0	52.8	
16B	Parker	32.57	-97.80	150	19.0	1.2	8.59	R	247.0	1.5	4.2	7.7	0.4	128.8	0.0	63.7	280.34
16C	Parker	32.57	-97.80	150	20.5	0.6	7.98	R	178.5	0.9	2.1	4.0	0.3	91.7	0.0	44.6	
17	Parker	32.57	-97.79	175	18.1	2.9	8.11	R	605.5	3.7	11.6	26.1	0.1	633.9	0.0	197.4	
17B	Parker	32.57	-97.79	175	19.8	3.0	7.95	R	612.0	3.7	11.5	25.8	0.1	657.5	0.0	204.2	312.07
17C	Parker	32.57	-97.79	175	20.5	3.2	8.10	R	605.6	3.4	12.8	29.5	0.1	662.2	0.0	168.1	
18	Hood	32.51	-97.84	300**	17.7	0.7	7.32	R	38.1	3.5	21.1	79.2	0.2	10.4	0.0	39.2	
19	Hood	32.52	-97.84	300	15.3	0.6	7.31	R	34.5	3.6	21.8	72.5	0.1	6.1	0.0	25.3	
20	Hood	32.52	-97.84	200	18.3	0.6	7.39	R	30.7	3.8	23.3	75.7	0.1	7.1	0.0	26.5	
21	Parker	32.69	-97.64	300	17.6	0.8	7.14	R	23.7	1.2	9.3	129.6	0.2	28.8	0.6	55.6	
22	Parker	32.70	-97.67	140	17.5	0.7	7.02	R	7.9	0.8	3.8	133.4	0.1	14.4	6.2	48.2	
23	Parker	32.70	-97.66	170	17.2	0.6	7.65	R	93.4	2.1	10.5	30.8	0.2	4.4	0.0	38.1	
24	Parker	32.71	-97.74	560**	17.5	0.7	7.26	R	14.8	1.5	12.7	112.7	0.2	8.9	0.5	50.8	
25	Parker	32.71	-97.75	560	17.5	0.6	7.63	R	11.7	1.1	3.0	106.1	0.1	12.1	1.6	41.1	
26	Parker	32.77	-97.59	260	13.4	0.6	7.23	R	15.7	2.0	20.6	97.1	0.2	7.3	0.0	98.8	
27	Parker	32.65	-97.89	40	16.8	0.7	7.23	Ag	7.6	1.5	9.7	82.3	0.2	7.1	7.5	18.3	
28	Parker	32.79	-97.84	160	16.7	0.5	7.24	R	10.7	1.0	10.9	97.6	0.2	6.2	0.0	20.0	
29	Parker	32.87	-97.89	180	17.7	0.8	7.27	R	201.6	0.0	0.0	0.2	0.3	47.7	0.0	31.9	
29B	Parker	32.87	-97.89	180	17.5	0.8	7.21	R	198.5	0.7	1.0	1.0	0.3	48.3	0.0	32.0	303.00
30	Parker	32.91	-97.84	220	18.0	0.8	7.17	R	38.8	1.7	32.2	77.4	0.2	39.5	1.4	35.5	
30A	Parker	32.91	-97.84	220	19.8	1.1	6.61	R	38.2	1.7	33.0	80.5	0.0	34.4	1.2	32.4	

Sam. ID	County	Lat.	Long.	Depth (ft)	Water Temp (°C)	Specific Cond. (mS/cm)	pH	Water Use	Na	K	Mg	Ca	F	Cl	NO_3	SO_4	HCO_3
31	Parker	32.91	-97.84	170	18.6	0.8	7.21	R	38.3	1.8	28.3	93.1	0.2	45.1	0.0	17.0	
31B	Parker	32.91	-97.84	170	19.1	0.8	7.19	R	37.7	1.8	28.5	94.4	0.2	47.0	0.0	16.5	305.54
31C	Parker	32.91	-97.84	170	18.8	1.1	6.80	R	34.4	1.7	26.9	89.7	0.0	27.7	0.0	17.3	
32	Parker	32.91	-97.83	180	19.3	0.7	7.24	R	21.3	1.7	23.4	88.6	0.1	26.2	0.7	26.1	
33	Parker	32.98	-97.85	160	19.6	1.7	7.07	R	83.0	4.8	114.2	122.1	0.1	277.5	0.0	186.6	
33A	Parker	32.98	-97.85	160	19.0	2.1	6.73	R	85.1	4.7	115.5	124.1	0.0	242.6	0.0	149.6	
34	Tarrant	32.78	-97.18	400**	22.2	1.0	9.09	Ag	252.5	0.8	0.4	1.5	1.1	11.9	0.0	141.8	
35	Parker	32.67	-97.66	210	19.1	0.7	6.99	R	9.8	1.6	9.5	101.4	0.2	7.0	0.0	64.6	
36	Parker	32.71	-97.68	180	20.1	1.0	7.11	R	29.9	2.4	3.9	177.4	0.2	83.2	68.9	70.3	
37	Parker	32.78	-97.58	380	20.8	0.7	7.190	R	15.3	2.0	20.3	98.1	0.2	7.6	0.1	93.2	
38	Parker	32.78	-97.58	380**	20.3	0.6	7.13	R	14.7	1.9	18.5	97.9	0.2	7.0	0.0	78.3	
39	Tarrant	32.65	-97.47	380	21.2	0.7	8.61	R	156.7	1.5	0.7	2.5	0.2	7.6	0.0	41.4	
40	Tarrant	32.58	-97.47	497	18.8	0.6	7.74	R	88.2	5.2	11.5	19.8	0.2	11.1	0.0	30.7	
41	Tarrant	32.98	-97.45	367	19.4	0.8	8.84	R	156.0	0.8	1.4	3.3	0.2	6.4	0.2	42.9	
42	Wise	32.99	-97.45	268	17.3	0.6	7.32	R	63.1	2.6	9.8	54.8	0.1	5.3	0.6	46.3	
43	Tarrant	32.96	-97.43	280	17.5	0.7	7.70	R	133.3	2.5	5.1	26.4	0.1	8.7	0.5	35.4	
44	Tarrant	32.96	-97.43	340	19.4	0.6	7.31	R	58.1	2.0	10.9	60.0	0.1	5.8	0.5	31.4	
45	Tarrant	32.74	-97.13	45	18.3	0.3	5.69	R	17.8	1.6	8.1	29.5	0.0	28.0	39.2	43.8	
46	Montague	33.50	-97.79	100	17.8	1.8	7.28	R	91.7	2.9	33.2	197.4	0.2	401.4	4.3	38.6	
47	Montague	33.59	-97.84	400	18.0	0.8	7.17	R	61.0	1.9	9.3	94.5	0.4	56.6	13.1	26.9	
48	Montague	33.60	-97.77	340	18.4	0.6	8.51	R	125.6	1.1	1.5	3.7	0.4	5.8	0.5	15.4	
49	Montague	33.60	-97.77	220	20.1	0.6	7.06	Ag	58.6	0.9	5.6	66.6	0.2	39.3	2.8	30.4	
50	Montague	33.66	-97.82	320	18.6	1.2	7.31	R	72.7	3.5	42.2	99.7	0.1	195.3	0.0	80.1	
51	Montague	33.66	-97.82	250	8.0	0.7	7.55	R	49.3	3.5	25.9	56.8	0.2	19.4	1.1	23.7	
52	Montague	33.66	-97.82	360	16.6	0.6	7.56	R	54.7	3.5	22.5	52.1	0.2	20.9	1.2	18.4	
53	Montague	33.66	-97.82	465	19.5	0.6	8.71	R	143.2	0.9	0.8	2.4	1.5	9.4	0.6	24.9	
54	Montague	33.55	-97.89	400	20.4	1.4	8.78	R	315.2	1.1	0.7	2.4	1.4	237.5	0.0	36.2	
55	Montague	33.54	-97.88	310	13.2	0.8	8.45	R	178.3	1.2	1.4	5.0	0.6	38.7	1.0	63.7	
56	Montague	33.63	-97.72	460	13.0	0.6	9.00	R	144.3	0.5	0.3	1.5	0.4	13.4	0.8	26.3	
57	Montague	33.63	-97.72	450	14.9	0.6	8.66	R	131.7	0.8	0.6	2.5	0.3	15.5	0.6	26.1	
58	Montague	33.66	-97.77	260	15.4	0.7	7.49	R	19.3	3.3	30.2	88.8	0.1	55.5	0.6	42.4	
59	Montague	33.65	-97.76	160	15.7	2.0	6.88	R	63.0	1.7	31.7	296.6	0.2	457.9	15.3	95.5	
60	Montague	33.66	-97.69	260	16.5	0.5	5.89	R	25.3	2.3	14.8	57.7	0.0	16.0	0.0	189.7	
61	Montague	33.79	-97.67	300	15.8	0.9	8.99	R	215.3	0.8	0.2	0.9	0.7	8.0	0.1	46.4	
62	Montague	33.78	-97.66	290	14.9	0.9	9.14	R	228.4	0.6	0.2	1.0	1.4	9.2	0.3	30.2	
63	Montague	33.66	-97.65	240	17.2	1.0	6.82	R	27.9	2.1	27.3	145.6	0.2	25.1	1.3	275.6	
64	Montague	33.58	-97.71	276	13.6	1.0	7.38	Ag	78.2	3.6	29.9	92.3	0.1	59.0	0.7	163.5	
65	Montague	33.58	-97.72	350	14.4	0.6	7.57	R	40.1	2.8	21.8	50.7	0.2	16.2	0.5	17.1	
67	Montague	33.71	-97.54	420	18.8	0.8	7.18	Ag	25.5	1.7	26.7	120.3	0.3	24.9	0.0	63.6	
68	Montague	33.72	-97.54	560	15.7	0.9	7.07	Ag	17.3	1.1	18.5	149.1	0.3	32.9	0.5	75.8	
69	Montague	33.63	-97.56	340	17.6	0.8	7.38	R	47.5	6.1	28.5	79.2	0.1	9.7	0.1	62.2	
70	Montague	33.60	-97.56	490	6.2	0.8	7.31	Ag	33.4	4.4	31.8	98.0	0.1	24.6	0.0	82.7	
71	Montague	33.61	-97.52	200	18.0	0.8	7.34	R	49.3	3.9	25.5	90.7	0.1	9.0	0.0	66.5	
72	Montague	33.66	-97.55	150	16.5	0.6	7.26	R	23.7	2.6	13.6	80.9	0.1	4.1	0.1	26.2	
73	Montague	33.63	-97.59	230	16.8	0.8	7.24	R	22.8	4.4	34.8	98.0	0.2	12.3	0.0	42.6	

Sam. ID	County	Lat.	Long.	Depth (ft)	Water Temp (°C)	Specific Cond. (mS/cm)	pH	Water Use	Na	K	Mg	Ca	F	Cl	NO_3	SO_4	HCO_3
74	Montague	33.46	-97.55	260	15.0	0.9	7.01	R	12.4	0.7	3.8	125.2	0.2	10.3	0.9	29.1	
75	Montague	33.45	-97.55	175	16.9	0.7	7.18	R	12.2	1.0	9.8	119.6	0.2	8.4	0.3	30.8	
76	Montague	33.51	-97.58	225	16.7	0.7	7.42	Ag	32.2	3.7	30.5	82.8	0.2	20.2	0.0	49.9	
77	Montague	33.50	-97.60	380	17.8	0.8	7.40	R	53.9	4.1	30.8	67.2	0.2	41.7	0.0	73.3	
78	Montague	33.52	-97.57	360	19.1	0.7	7.39	R	30.1	3.9	27.5	78.8	0.2	17.1	0.0	45.2	
79	Montague	33.53	-97.62	140	18.0	0.9	7.20	R	34.1	2.5	39.8	103.3	0.3	35.7	0.0	68.8	
80	Montague	33.49	-97.54	260	18.9	0.6	7.19	R	9.1	1.2	6.8	106.2	0.2	4.8	0.0	51.0	
81	Montague	33.48	-97.51	650	17.8	0.6	7.54	R	49.3	4.2	22.4	47.9	0.1	9.1	0.0	42.0	
82	Montague	33.48	-97.52	565	12.3	0.6	7.24	Ag	8.5	1.2	8.4	101.1	0.2	4.5	0.0	35.0	
83	Montague	33.51	-97.54	430	16.1	0.7	7.31	Ag	21.8	3.4	24.5	83.8	0.2	9.9	0.0	65.9	
84	Montague	33.53	-97.68	200**	19.0	1.0	7.07	R	47.4	3.7	29.3	111.6	0.2	141.9	6.1	34.2	
85	Montague	33.53	-97.72	250	18.3	2.1	6.89	R	193.0	3.1	45.7	163.6	0.2	480.2	2.6	28.4	
86	Montague	33.52	-97.76	150	16.9	0.7	7.24	R	43.9	0.9	3.4	88.9	0.1	17.8	19.3	22.6	
87	Montague	33.50	-97.69	360	17.9	0.6	7.50	R	31.5	3.3	27.1	51.2	0.1	20.5	0.2	15.9	
88	Montague	33.50	-97.69	190**	16.9	0.5	8.68	R	125.9	1.0	1.1	3.2	0.4	5.6	1.0	21.3	
89	Montague	33.49	-97.69	350	16.6	0.6	7.34	R	28.9	3.0	26.7	57.6	0.1	30.0	0.2	32.0	
90	Montague	33.47	-97.62	150	16.4	1.4	6.68	R	39.2	4.1	64.8	172.1	0.3	33.4	0.0	474.9	
91	Montague	33.44	-97.63	350	17.4	1.0	7.18	Ag	22.7	3.2	55.0	121.2	0.1	31.3	0.0	239.0	
92	Parker	32.71	-97.74	200**	19.8	0.9	6.96	R	5.0	1.4	3.9	115.3	0.2	4.9	0.1	40.5	
93	Parker	32.71	-97.74	220	20.0	0.8	7.19	R	14.0	2.1	25.5	109.0	0.2	15.5	0.1	76.6	
94	Parker	32.68	-97.64	350**	19.1	0.7	7.85	R	121.1	2.5	10.7	21.5	0.2	6.1	0.0	52.3	
95	Parker	32.69	-97.64	180	16.0	1.0	7.55	R	170.9	3.4	17.5	35.8	0.2	32.8	0.0	118.3	
96	Denton	33.12	-97.24	300	19.3	1.0	9.12	R	228.4	0.4	0.4	1.2	0.6	6.8	0.0	80.8	
97	Denton	33.09	-97.15	780	23.5	0.9	9.34	R	204.5	0.4	0.2	0.9	0.3	10.2	0.0	60.9	
98	Denton	33.09	-97.13	850	16.6	0.9	9.22	R	221.9	0.5	0.2	1.0	0.6	9.8	0.0	72.1	
99	Denton	33.09	-97.14	860	12.1	0.9	9.19	R	227.6	0.7	0.3	1.1	0.6	10.5	1.8	79.3	
100	Denton	33.06	-97.13	1400	22.4	1.3	8.80	R	305.4	0.9	0.7	2.0	1.6	139.3	0.0	77.0	
101	Wise	33.19	-97.49	180	19.7	0.5	7.08	R	13.5	1.1	6.1	94.1	0.2	6.2	0.0	20.2	
102	Wise	33.19	-97.49	160**	19.0	0.5	7.09	R	12.5	1.0	6.1	91.4	0.2	5.2	0.0	23.0	
103	Wise	33.19	-97.49	160**	13.6	0.5	7.11	R	13.0	1.0	5.9	92.7	0.2	5.7	0.0	22.5	
104	Wise	33.19	-97.49	160**	18.5	0.5	7.10	R	13.4	1.1	6.4	92.7	0.2	5.8	0.1	21.4	
105	Wise	33.38	-97.75	100**	10.0	0.8	7.06	R	45.3	1.3	13.5	100.4	0.3	57.7	0.4	15.6	
106	Wise	33.39	-97.75	120**	11.7	0.8	7.30	Ag	81.1	0.9	20.5	74.6	0.6	30.7	0.0	29.9	
107	Wise	33.38	-97.74	100**	9.1	0.8	7.08	R	35.4	0.9	21.7	108.1	0.4	15.5	0.1	27.7	
108	Wise	33.21	-97.55	300	16.6	0.6	7.25	R	13.6	1.6	14.9	103.2	0.2	5.1	0.3	97.8	
109	Parker	32.58	-97.60	240	20.9	0.7	7.34	R	30.8	2.4	17.7	66.6	0.3	9.7	0.0	32.9	
110	Tarrant	32.62	-97.50	400	19.3	0.6	7.81	R	109.5	4.0	10.8	18.6	0.2	9.2	0.2	51.1	
111	Tarrant	32.62	-97.50	280**	18.6	0.6	7.96	R	154.7	0.9	0.0	0.1	0.1	9.1	0.0	50.9	
112	Parker	32.57	-97.80	300**	17.9	2.9	7.86	R	576.1	3.1	9.3	27.6	0.2	624.3	0.0	163.6	316.95
112A	Parker	32.57	-97.80	300**	20.9	2.8	7.42	R	572.3	2.1	4.5	11.8	0.1	579.3	0.0	130.1	
113	Montague	33.43	-97.56	110	17.5	0.8	7.13	R	78.8	1.4	14.2	62.9	0.6	21.7	0.0	43.2	
114	Montague	33.59	-97.60	440	18.9	1.0	7.07	R	28.3	3.5	39.7	122.6	0.1	25.8	0.0	219.6	
115	Montague	33.76	-97.53	250	10.0	1.1	7.82	R	210.6	2.9	5.1	16.9	0.6	117.0	0.2	51.0	
116	Montague	33.67	-97.53	120	17.9	0.3	7.46	R	58.8	3.7	11.3	50.4	0.1	11.6	1.2	26.5	
117	Montague	33.68	-97.57	285	10.6	0.9	7.20	Ag	23.4	5.7	34.8	119.4	0.1	5.3	3.5	224.9	

Sam. ID	County	Lat.	Long.	Depth (ft)	Water Temp (°C)	Specific Cond. (mS/cm)	pH	Water Use	Na	K	Mg	Ca	F	Cl	NO_3	SO_4	HCO_3
118	Montague	33.71	-97.64	180	18.8	0.6	6.99	R	20.1	2.1	21.1	91.2	0.2	13.6	1.4	27.9	
119	Montague	33.72	-97.64	480	19.1	0.8	7.31	R	56.1	3.2	25.8	79.9	0.2	21.4	0.3	92.1	
120	Montague	33.66	-97.60	320	17.2	0.8	7.12	R	21.9	4.2	29.1	114.1	0.2	9.3	0.0	60.3	311.01
121	Montague	33.60	-97.78	120	19.1	0.8	7.00	Ag	47.5	1.4	11.6	115.1	0.4	67.1	3.9	26.8	
122	Montague	33.58	-97.84	400	18.4	0.6	8.12	R	114.3	1.6	4.9	15.7	0.7	19.2	0.2	16.8	
123	Tarrant	32.88	-97.46	286	18.8	0.9	7.59	R	156.8	1.6	7.2	35.9	0.7	20.9	0.0	63.0	
124	Tarrant	32.88	-97.46	260**	18.3	1.0	8.02	R	207.7	1.5	5.9	16.9	1.1	25.8	0.0	69.0	
125	Tarrant	32.88	-97.46	260	18.6	0.9	7.43	R	128.1	2.6	19.5	57.7	0.4	32.1	0.0	11.0	
126	Tarrant	32.89	-97.46	180	19.6	1.2	8.75	R	273.5	1.0	0.8	1.8	4.2	28.2	0.0	61.0	
127	Wise	32.98	-97.45	380	18.5	0.7	8.93	R	155.7	0.8	0.8	2.3	0.1	6.0	0.4	40.1	
128	Tarrant	32.62	-97.50	350	20.0	0.8	7.94	R	132.9	3.0	5.3	9.3	0.1	8.3	0.1	46.6	
129	Tarrant	32.63	-97.50	375	16.5	0.7	8.52	R	159.0	1.8	1.1	3.2	0.2	8.4	0.8	51.2	
130	Tarrant	32.63	-97.49	350	15.2	0.6	7.02	R	8.4	0.4	3.1	120.4	0.3	11.3	19.7	28.5	
132	Tarrant	32.63	-97.49	366	20.9	0.8	8.28	R	177.0	2.7	3.0	8.0	0.2	8.6	0.0	120.7	
134	Tarrant	32.62	-97.48	240	21.7	0.7	8.91	R	170.8	0.9	0.4	1.6	0.2	7.5	0.0	43.7	
135	Tarrant	32.62	-97.49	372	22.0	0.7	8.54	R	155.1	2.0	1.2	3.2	0.2	8.5	0.3	48.2	
136	Cooke	33.48	-97.42	160	17.3	0.7	7.43	R	62.9	2.6	12.7	50.6	0.1	4.8	0.0	34.4	
137	Cooke	33.48	-97.42	110	18.6	0.7	7.28	Ag	49.3	2.1	9.3	85.8	0.1	4.3	0.0	56.0	
138	Cooke	33.49	-97.42	195	15.9	0.8	7.00	R	11.8	1.1	7.7	152.5	0.2	8.8	0.0	77.4	
139	Cooke	33.50	-97.47	300	17.0	0.8	7.46	R	177.3	16.7	0.0	0.1	0.1	16.5	1.2	45.6	
140	Cooke	33.49	-97.45	250	18.0	0.6	8.17	R	130.4	1.4	3.8	12.5	0.0	7.8	0.1	57.3	
141	Cooke	33.51	-97.44	615	17.3	0.7	9.03	R	163.9	0.8	0.6	2.0	0.2	4.9	0.0	61.3	
142	Parker	32.76	-97.74	200**	16.5	1.0	6.86	R	8.3	0.6	3.4	124.1	0.1	10.3	4.6	23.7	
143	Parker	32.81	-97.75	180	13.1	0.6	7.06	R	6.2	0.7	2.7	114.0	0.2	8.7	2.2	29.8	
144	Denton	33.12	-97.24	450	20.1	0.9	9.32	R	193.6	0.4	0.2	0.9	0.3	3.5	0.0	28.5	
145	Denton	33.12	-97.24	550	18.8	0.8	9.41	R	198.0	0.4	0.2	0.9	0.3	4.1	0.0	33.2	
146	Denton	33.12	-97.25	637	20.2	0.9	9.21	R	227.4	0.4	0.4	1.2	0.6	6.5	0.1	77.9	
147	Denton	33.12	-97.25	630	20.6	0.9	9.24	R	219.4	0.4	0.3	1.1	0.5	5.7	0.0	66.0	
148	Cooke	33.45	-97.40	140	13.9	0.6	6.96	R	11.1	1.7	7.1	107.8	0.2	5.3	0.0	51.0	
149	Cooke	33.45	-97.39	180	17.5	0.7	9.34	R	175.1	0.4	0.3	1.1	0.1	1.5	0.0	29.0	
150	Cooke	33.46	-97.39	320	17.9	0.7	9.42	Ag	169.5	0.5	0.3	1.0	0.2	2.6	0.0	18.7	
152	Cooke	33.48	-97.43	170**	17.4	0.6	8.58	R	137.2	0.7	1.2	6.0	0.1	7.0	0.2	40.9	
153	Johnson	32.36	-97.16	170	16.6	1.1	7.37	R	152.7	4.4	19.4	69.5	0.5	46.4	4.4	273.6	
154	Johnson	32.37	-97.17	250	9.5	1.1	7.88	R	242.1	3.3	3.4	9.4	0.4	49.3	7.8	209.6	
155	Johnson	32.53	-97.58	450	8.6	0.6	7.79	R	82.2	3.4	13.8	34.4	0.6	9.1	2.7	35.4	
156	Johnson	32.52	-97.58	415	8.4	0.5	7.70	R	38.9	3.5	18.0	57.1	0.2	9.5	1.3	35.9	
157	Johnson	32.53	-97.58	385	19.4	0.6	7.53	R	37.7	3.6	17.9	57.5	0.3	10.8	0.0	34.6	
158	Johnson	32.52	-97.59	425	19.5	0.6	7.52	R	49.3	4.4	17.7	52.0	0.2	11.3	0.0	40.7	
159	Johnson	32.53	-97.60	420	6.1	0.5	7.72	R	38.4	3.4	20.0	52.6	0.2	9.4	2.7	32.0	
160	Wise	32.99	-97.64	500**	17.8	1.5	8.55	R	327.4	1.2	1.9	3.5	1.4	124.5	0.0	145.6	
161	Wise	32.99	-97.62	200**	15.6	1.4	7.26	R	101.9	4.4	65.6	96.3	0.2	198.7	11.5	55.7	
162	Tarrant	32.87	-97.48	550	20.1	1.3	8.81	R	329.2	1.3	1.3	4.1	1.9	41.8	0.1	158.6	
163	Parker	32.77	-97.93	220	14.9	0.7	7.00	R	7.3	0.7	4.9	127.4	0.1	10.6	8.3	24.1	
164	Parker	32.75	-97.76	60	17.4	0.7	7.39	R	48.5	2.6	29.2	76.2	0.1	46.0	0.0	47.2	
165	Parker	32.87	-97.77	140	18.8	0.6	7.28	R	11.7	1.2	18.2	87.8	0.1	4.6	0.0	12.9	

Sam. ID	County	Lat.	Long.	Depth (ft)	Water Temp (°C)	Specific Cond. (mS/cm)	pH	Water Use	Na	K	Mg	Ca	F	Cl	NO_3	SO_4	HCO_3
166	Parker	32.63	-97.76	425	19.9	0.7	7.83	R	114.0	2.4	14.6	34.3	0.7	14.8	0.0	57.6	
167	Parker	32.63	-97.75	160**	20.2	0.7	6.99	Ag	8.8	1.3	3.7	127.6	0.2	25.3	18.9	28.9	
168	Parker	32.63	-97.75	400	17.3	0.9	9.00	R	218.1	1.1	0.4	1.5	0.3	49.4	0.0	47.9	
169	Parker	32.71	-97.75	300	19.9	0.5	7.35	R	6.1	1.0	9.7	90.9	0.2	3.7	0.1	25.4	
170	Parker	32.72	-97.75	220	15.3	0.6	7.14	R	7.8	1.0	7.5	106.3	0.2	13.4	0.2	35.3	
171	Parker	32.71	-97.75	200	16.9	0.5	7.30	Ag	114.2	0.6	0.1	0.3	0.2	2.9	0.0	16.0	
172	Parker	32.88	-97.64	300**	18.4	0.6	7.15	R	4.4	0.3	3.3	135.3	0.1	8.7	2.0	27.0	
173	Parker	32.84	-97.64	300**	18.4	0.6	7.20	R	13.7	1.7	17.0	103.2	0.2	5.7	0.2	67.0	
174	Parker	32.62	-97.77	330	19.7	0.8	8.28	Ag	187.1	3.0	2.3	6.9	1.0	24.3	0.0	65.1	
175	Parker	32.65	-97.79	285	16.5	0.7	7.36	R	66.9	4.4	29.5	52.2	0.3	12.4	0.0	35.2	
176	Parker	32.65	-97.79	220**	18.7	0.7	7.79	R	128.9	2.9	11.3	23.2	0.6	12.3	3.8	82.1	
177	Parker	32.65	-97.79	400	18.8	0.7	7.34	R	66.2	4.1	28.7	51.3	0.3	12.5	0.0	36.7	
178	Parker	32.58	-97.82	110	18.5	1.5	7.34	R	187.8	2.9	28.6	106.3	0.3	229.4	0.0	130.3	
178A	Parker	32.58	-97.82	110	20.0	1.5	7.17	R	186.5	2.3	28.0	104.2	0.3	191.1	0.0	107.3	
179	Parker	32.58	-97.83	80	16.7	2.7	7.05	R	289.0	3.4	64.6	221.8	0.3	516.4	0.0	348.3	
179A	Parker	32.58	-97.83	80	20.0	2.8	6.85	R	282.1	2.6	68.8	216.6	0.3	501.8	0.6	304.6	
180	Parker	32.58	-97.82	320	15.7	2.2	7.35	R	238.6	4.0	45.6	185.9	0.2	427.2	0.3	259.8	
180A	Parker	32.58	-97.82	320	19.5	2.4	7.19	R	242.9	3.4	48.4	190.1	0.2	425.8	0.0	234.2	
181	Parker	32.63	-97.55	280**	18.1	0.8	7.78	R	127.5	6.1	11.7	25.2	0.1	19.5	0.0	64.5	
182	Wise	33.43	-97.59	100	14.5	1.4	6.79	R	53.9	4.9	89.6	159.5	0.2	56.0	0.3	404.4	
183	Wise	33.42	-97.63	100	18.1	0.6	7.03	R	20.5	3.0	36.2	61.7	0.4	13.0	0.6	50.5	
184	Wise	33.38	-97.73	100	15.5	0.7	7.06	R	18.0	2.3	18.5	106.5	0.1	44.5	5.9	16.9	
185	Wise	33.39	-97.74	340	19.3	0.6	7.33	R	64.0	1.5	20.5	60.7	0.3	15.4	7.5	18.8	
186	Wise	33.40	-97.74	100	19.7	0.8	7.33	R	82.0	1.7	14.0	74.6	0.2	89.1	5.3	19.6	
187	Wise	33.06	-97.50	380	20.7	0.5	7.67	R	76.8	2.0	11.6	36.1	0.1	5.3	1.1	39.8	
188	Wise	33.02	-97.63	400	18.7	1.5	8.35	R	336.6	1.1	2.1	4.7	1.0	176.4	0.0	107.1	
189	Wise	33.02	-97.63	280	18.1	0.7	7.72	R	126.0	2.2	13.7	32.6	0.4	32.6	1.2	25.2	
190	Wise	33.02	-97.63	100	16.5	1.0	7.08	R	259.0	0.1	0.0	0.1	0.3	110.8	7.7	52.5	
191	Wise	33.02	-97.66	200**	19.3	1.0	8.29	R	236.4	1.5	3.4	6.8	0.6	87.6	0.6	96.0	
192	Wise	33.02	-97.66	280	16.8	1.5	8.29	R	374.4	1.5	2.9	6.1	1.0	217.0	0.9	145.2	
193	Parker	32.98	-97.56	200	20.4	0.9	7.36	R	41.6	2.0	26.2	132.4	0.1	62.6	0.0	150.3	
194	Wise	33.06	-97.50	320	15.4	0.5	7.06	R	10.9	1.2	6.9	106.0	0.1	5.6	0.3	49.8	
195	Wise	33.13	-97.44	250	18.9	0.5	7.30	R	17.8	2.2	15.8	76.6	0.2	5.2	0.2	24.7	
196	Wise	33.10	-97.44	350**	18.1	0.5	7.74	R	71.9	3.2	14.0	32.4	0.0	10.2	0.0	34.5	
197	Wise	33.06	-97.60	390	19.8	1.9	8.47	R	444.8	1.5	2.9	4.7	1.2	316.0	0.0	170.7	
198	Wise	33.12	-97.55	403	19.1	0.6	7.48	R	64.0	1.6	14.3	55.1	0.1	6.3	0.0	27.7	
199	Parker	32.56	-97.79	180	18.3	0.9	8.79	R	247.5	1.0	0.5	1.2	0.8	23.2	0.0	9.9	418.27
199B	Parker	32.56	-97.79	180	19.3	1.0	8.79	R	248.5	1.0	0.5	1.2	0.8	21.3	0.0	4.3	434.99
200	Hood	32.55	-97.78	368	21.2	1.3	8.85	R	314.8	1.2	0.8	1.9	1.4	145.4	0.0	21.0	395.88
200B	Hood	32.55	-97.78	368	21.6	1.4	8.82	R	295.4	1.2	0.7	1.7	1.2	108.2	0.0	42.5	386.9
201	Hood	32.56	-97.77	470	12.7	0.9	8.10	R	235.2	0.9	0.4	1.1	0.5	51.0	0.2	31.0	342.5
201B	Hood	32.56	-97.77	470		1.0	8.08	R	235.3	0.9	0.5	1.2	0.5	50.9	0.2	32.4	367.05
201C	Hood	32.56	-97.77	470	17.3	1.3	7.86	R									
202	Parker	32.56	-97.78	186	19.8	1.0	9.02	R	260.5	1.0	0.6	1.4	0.5	79.2	0.1	44.3	363.59
202B	Parker	32.56	-97.78	186	20.6	1.3	8.82	R									

Sam. ID	County	Lat.	Long.	Depth (ft)	Water Temp (°C)	Specific Cond. (mS/cm)	pH	Water Use	Na	K	Mg	Ca	F	Cl	NO_3	SO_4	HCO_3
203	Hood	32.53	-97.63	380	21.2	1.0	9.08	M	296.7	1.3	0.7	2.0	2.8	28.5	0.0	142.6	
204	Parker	32.56	-97.79	200	20.4	1.7	8.78	Ag	396.1	1.8	1.8	3.6	0.3	281.8	0.0	115.9	331.77
204B	Parker	32.56	-97.79	200	21.1	1.9	8.74	Ag	394.9	1.7	1.7	3.5	0.3	284.0	0.0	110.6	340.38
204C	Parker	32.56	-97.79	200	21.3	1.9	8.62	Ag									
205	Parker	32.56	-97.79	200	20.0	1.8	8.66	R	442.3	2.4	6.5	18.9	0.2	403.4	0.0	111.8	
205B	Parker	32.56	-97.79	200	20.4	2.3	8.32	R									
206	Parker	32.58	-97.77	330**	21.1	0.9	9.10	R	225.7	0.9	0.5	1.1	0.4	36.7	0.0	46.7	338.3
207	Parker	32.57	-97.77	322	21.1	0.9	9.07	R	229.0	0.9	0.4	1.2	0.4	28.7	0.0	48.3	
207A	Parker	32.57	-97.77	322	21.4	0.9	8.72	R	228.9	0.8	0.4	0.9	0.3	24.8	0.0	42.7	
208	Parker	32.56	-97.79	210	18.6	1.0	8.91	R	267.1	1.1	0.7	1.6	0.3	92.2	1.2	41.6	
208B	Parker	32.56	-97.79	210	21.0	1.1	8.94	R	247.5	1.1	0.5	1.3	0.3	55.0	0.0	19.0	354.68
209	Parker	32.56	-97.78	285	20.2	1.3	8.90	R	307.9	1.3	0.8	1.8	0.3	155.7	0.7	64.8	341.27
209B	Parker	32.56	-97.78	285	23.0	1.4	8.85	R	306.5	1.3	0.8	1.8	0.3	153.7	0.0	61.4	354.61
210	Parker	32.56	-97.79	130	19.6	1.6	6.95	R	108.6	3.1	40.1	179.8	0.3	216.7	4.4	173.3	
211	Parker	32.57	-97.78	350	20.0	0.9	9.05	R	228.0	0.9	0.4	1.1	0.4	35.9	0.0	44.9	
211B	Parker	32.57	-97.78	350	22.4	1.0	8.94	R									
211C	Parker	32.57	-97.78	350	20.9	0.6	8.79	R	227.6	0.8	0.4	1.1	0.3	32.6	0.0	35.7	
212	Hood	32.51	-97.74	340	19.1	0.8	6.68	R	72.0	3.8	17.2	75.9	0.2	113.6	0.6	107.8	
213	Hood	32.51	-97.74	400	21.5	0.9	8.95	R	232.2	1.0	0.5	1.4	1.1	29.8	0.0	83.5	
214	Hood	32.52	-97.81	180	21.0	0.9	8.42	R	219.8	1.3	1.9	11.2	0.6	46.7	0.6	46.5	
215	Hood	32.33	-97.71	483	23.2	0.7	8.66	Ag	183.6	2.1	1.0	2.8	0.4	34.1	0.8	19.9	
216	Tarrant	32.84	-97.57	200**	17.0	0.6	7.18	R	82.7	2.1	13.3	32.7	0.1	4.3	0.0	22.7	
217	Tarrant	32.69	-97.15	80**	20.4	0.4	6.45	R	19.3	1.9	7.6	29.3	0.2	18.1	0.0	40.5	
218	Tarrant	32.68	-97.15	80**	20.9	0.5	6.04	R	38.3	1.4	9.8	42.7	0.2	39.1	43.5	47.8	
219	Tarrant	32.71	-97.14	80	21.1	0.3	5.48	R	43.0	1.9	3.4	9.8	0.0	31.6	3.0	51.5	
220	Tarrant	32.69	-97.13	180	22.2	1.8	6.18	R	66.8	3.0	34.4	232.9	0.4	177.0	0.0	549.2	
221	Parker	32.56	-97.79	120	20.0	1.5	8.82	R	329.0	1.4	0.9	2.1	0.3	180.1	0.0	85.4	330.01
222	Parker	32.56	-97.78	183	21.5	1.0	8.98	R	229.6	0.9	0.4	1.1	0.3	31.2	0.5	27.6	356.12
223	Wise	33.08	-97.42	750	13.4	0.6	7.08	R	36.5	5.5	18.9	58.3	0.2	6.2	2.0	49.7	
224	Wise	33.09	-97.42	500	18.2	0.6	7.66	R	93.4	4.2	9.9	29.2	0.1	7.8	0.0	51.8	
225	Wise	33.09	-97.42	160	19.2	0.6	7.62	R	50.3	3.7	17.3	49.1	0.1	8.3	0.0	44.0	
226	Wise	33.04	-97.50	70	18.8	0.5	7.97	R	97.7	1.7	8.1	17.7	0.1	4.2	0.3	29.5	
227	Wise	33.00	-97.67	66	19.3	0.8	7.60	R	124.2	1.8	19.0	30.9	0.1	64.0	1.5	22.4	
228	Wise	33.00	-97.66	100**	19.5	1.5	7.35	R	222.3	3.2	39.7	56.5	0.1	170.1	2.6	79.6	
229	Somervell	32.26	-97.73	400**	21.0	0.7	7.98	R	140.0	3.7	4.7	9.2	0.3	13.1	0.0	25.1	
230	Somervell	32.14	-97.80	400	19.4	0.6	7.36	R	20.5	4.9	26.5	69.0	0.2	7.5	2.2	33.0	
231	Somervell	32.15	-97.80	775	19.3	0.7	7.66	R	55.0	5.2	31.2	40.2	0.4	17.6	1.4	54.3	
232	Somervell	32.14	-97.81	400	21.3	0.7	7.29	R	24.2	3.6	22.5	78.4	0.2	9.7	0.0	41.8	
233	Somervell	32.14	-97.80	400	18.4	0.7	7.67	R	30.0	4.6	26.3	69.5	0.2	12.2	2.1	48.9	
234	Somervell	32.16	-97.78	220	21.3	0.5	7.20	R	7.4	1.2	9.8	92.0	0.2	7.0	0.0	15.5	
235	Somervell	32.18	-97.80	400	23.0	0.7	7.45	R	34.6	4.9	38.5	49.5	0.3	21.4	0.1	32.5	
236	Somervell	32.16	-97.78	140	21.7	0.7	7.21	R	18.4	4.0	26.3	83.7	0.2	8.1	0.0	57.2	
237	Hood	32.31	-97.73	1350	22.8	0.7	8.30	Ag	160.3	2.5	1.9	4.5	0.4	18.2	0.0	10.4	
238	Hood	32.31	-97.72	200	19.6	0.7	8.09	R	139.4	4.1	4.7	9.9	0.4	9.6	0.0	32.6	
239	Hood	32.39	-97.89	375	21.5	0.7	7.45	R	54.2	4.9	31.5	50.7	0.3	24.1	0.0	43.1	

Sam. ID	County	Lat.	Long.	Depth (ft)	Water Temp (°C)	Specific Cond. (mS/cm)	pH	Water Use	Na	K	Mg	Ca	F	Cl	NO_3	SO_4	HCO_3
240	Hood	32.41	-97.63	120	19.7	0.6	7.09	R	19.7	1.4	10.3	93.3	0.3	13.3	0.0	17.8	
241	Hood	32.41	-97.63	580	19.0	0.9	8.86	R	206.8	1.0	0.5	1.6	0.5	25.7	0.0	83.3	
242	Hood	32.42	-97.64	660	21.6	0.9	8.95	R	214.1	1.0	0.5	1.5	0.5	37.6	0.0	51.9	
243	Hood	32.45	-97.84	250	18.5	0.7	7.04	R	12.7	1.6	13.7	110.0	0.2	16.1	6.6	19.7	
244	Hood	32.45	-97.84	185**	19.9	0.7	7.29	R	48.4	5.0	25.9	57.3	0.2	10.6	0.0	14.9	292.16
245	Ellis	32.48	-97.05	240	21.2	1.6	8.47	R	378.7	1.2	0.7	2.5	1.3	47.1	0.0	426.4	
246	Johnson	32.48	-97.24	220	21.3	1.6	7.04	R	191.4	5.4	25.8	105.7	0.3	181.1	2.0	297.7	
247	Johnson	32.29	-97.13	335	22.4	1.7	8.69	R	372.9	1.3	0.7	1.8	2.6	48.7	0.9	277.2	
248	Johnson	32.29	-97.13	330	23.8	1.7	8.73	R	371.6	1.3	0.7	1.8	2.7	48.9	0.3	277.2	
249	Hood	32.37	-97.73	400	22.0	1.3	7.97	R	213.8	4.6	8.9	22.9	0.4	16.4	0.2	200.6	
250	Hood	32.31	-97.84	380	24.4	0.7	7.52	R	57.5	5.6	24.3	36.5	0.3	9.5	0.0	32.1	
251	Hood	32.31	-97.84	500	23.0	0.9	7.46	R	95.1	5.0	29.7	52.7	0.3	47.1	0.0	99.7	
252	Hood	32.38	-97.88	435	23.1	0.9	7.73	R	141.8	4.0	12.3	21.1	0.4	48.0	0.0	46.3	
253	Hood	32.96	-97.85	350	16.6	0.7	7.08	R	37.5	1.9	29.8	74.5	0.2	34.9	0.0	28.3	
253A	Hood	32.96	-97.85	350	18.9	1.0	6.70	R	37.5	1.8	30.4	77.3	0.2	33.1	0.0	26.7	
254	Hood	32.97	-97.85	180	16.3	0.8	7.59	R	108.1	2.3	18.9	38.6	0.2	61.4	0.0	29.9	
254A	Hood	32.97	-97.85	180	19.3	1.1	6.94	R	108.9	2.3	19.3	40.6	0.1	54.4	0.0	28.3	
255	Hood	32.96	-97.87	360	15.3	0.8	7.41	R	59.6	2.2	31.0	74.0	0.5	35.9	4.5	24.4	
255A	Hood	32.96	-97.87	360	17.7	1.1	6.91	R	61.3	2.2	31.0	73.5	0.3	32.4	4.1	24.2	
256	Hood	32.88	-97.86	200	15.7	1.1	7.02	Ag	48.9	1.6	26.0	147.9	0.1	114.3	27.1	37.1	
257	Hood	32.76	-97.90	325	17.6	0.9	7.15	R	38.9	2.3	26.3	104.5	0.2	32.2	0.0	85.1	
258	Hood	32.76	-97.90	100	16.0	0.8	7.38	R	73.9	1.0	25.1	58.2	1.4	27.5	3.5	37.6	
259	Hood	32.79	-97.82	180	17.2	0.6	7.43	R	34.3	1.7	17.1	65.8	0.2	11.5	0.0	30.5	
260	Hood	32.84	-97.70	300	15.7	0.6	7.23	Ag	8.8	1.1	8.4	98.8	0.2	5.6	5.3	32.1	
261	Ellis	32.51	-97.38	580	22.4	0.8	9.20	Ag	180.4	0.7	0.3	0.9	0.4	6.4	0.0	28.7	
264	Somervell	32.18	-97.71	425	22.0	0.7	7.66	R	108.2	4.7	13.9	20.8	0.3	6.8	0.0	41.3	
265	Somervell	32.27	-97.63	600	20.9	0.8	8.54	R	183.8	2.0	1.0	2.7	0.3	18.3	0.0	42.7	
266	Somervell	32.16	-97.73	450	20.2	0.7	7.75	R	81.6	5.1	23.0	26.9	0.3	7.6	0.0	32.3	
267	Somervell	32.15	-97.88	200	20.0	0.7	7.31	R	26.5	4.6	29.6	72.2	0.3	13.7	0.0	52.0	
268	Somervell	32.13	-97.86	200	20.4	0.6	7.60	R	44.7	3.9	24.3	48.8	0.4	8.8	0.0	36.2	
269	Somervell	32.21	-97.91	480	20.9	0.7	7.50	R	35.0	3.8	37.2	44.8	0.4	26.4	0.0	25.1	
270	Somervell	32.18	-97.79	282	22.5	0.7	7.46	Ag	42.5	4.9	36.9	47.4	0.3	19.4	0.0	32.2	
271	Somervell	32.16	-97.77	>500	21.9	0.7	7.80	R	90.8	4.8	24.9	27.0	0.3	15.0	0.0	26.5	
272	Montague	33.46	-97.63	200	17.4	1.6	6.53	R	31.3	3.1	80.2	212.9	0.1	20.2	5.0	571.3	
273	Montague	33.45	-97.70	198	16.8	1.4	6.31	R	40.5	5.2	43.3	188.7	0.0	59.4	0.0	471.4	
274	Montague	33.69	-97.55	200	17.4	0.6	7.08	R	12.1	1.5	11.4	94.1	0.2	5.1	0.0	20.6	
275	Montague	33.69	-97.57	280	18.5	0.7	6.95	R	5.8	1.2	6.8	132.8	0.2	4.7	0.6	75.4	
276	Montague	33.74	-97.56	197	17.4	0.8	7.07	R	28.4	2.1	22.8	115.4	0.2	22.3	0.0	51.6	
277	Montague	33.71	-97.56	340	17.9	0.8	7.19	R	15.9	2.7	29.4	109.1	0.3	9.6	0.1	66.1	
278	Montague	33.79	-97.62	250	18.5	0.7	9.01	R	171.9	0.4	0.3	1.1	0.2	7.3	0.0	24.4	
281	Montague	33.70	-97.78	325	19.3	0.6	8.86	R	126.7	0.4	0.2	0.8	0.3	17.0	0.0	13.8	
282	Montague	33.49	-97.88	280	17.2	2.7	8.00	R	496.0	3.2	10.6	23.0	0.8	0.0	3.8	41.4	
283	Wise	33.36	-97.46	250	16.7	0.6	7.38	R	13.4	1.4	11.7	93.4	0.2	4.0	0.0	31.1	
284	Wise	33.38	-97.46	190	16.8	0.7	7.06	R	9.7	1.2	4.9	136.6	0.2	10.7	0.0	85.3	
285	Wise	33.38	-97.46	85	16.8	0.7	6.95	R	6.3	1.0	5.0	126.4	0.2	8.2	0.5	67.5	

Sam. ID	County	Lat.	Long.	Depth (ft)	Water Temp (°C)	Specific Cond. (mS/cm)	pH	Water Use	Na	K	Mg	Ca	F	Cl	NO_3	SO_4	HCO_3
286	Wise	33.35	-97.48	330	16.6	0.5	8.80	R	110.0	0.9	0.9	2.5	0.0	2.1	0.9	27.2	
287	Wise	33.11	-97.86	65	17.1	1.3	7.08	R	112.8	2.7	35.9	110.6	0.5	103.6	1.1	60.8	
288	Wise	33.11	-97.86	50	15.9	1.0	7.14	R	144.6	2.7	14.4	82.6	0.5	150.3	3.4	87.9	
289	Wise	33.14	-97.42	300	17.4	0.6	7.66	R	62.8	3.2	13.0	41.2	0.1	7.6	0.0	34.4	
290	Dallas	32.77	-97.02	250	19.1	1.2	8.81	R	269.4	0.8	0.3	1.0	2.3	17.2	0.0	102.9	
291	Parker	32.66	-97.66	270	19.2	0.6	7.25	R	12.7	1.6	10.0	97.7	0.2	5.8	0.0	42.3	
292	Parker	32.67	-97.61	150	21.3	0.6	7.21	R	7.7	0.8	4.8	102.9	0.2	5.6	0.0	27.3	
293	Parker	32.75	-97.63	220	19.9	0.6	7.20	R	9.7	1.2	8.5	95.1	0.2	6.7	0.0	28.0	
294	Parker	32.85	-98.01	180	21.1	1.5	7.10	R	87.6	3.0	46.6	179.0	0.2	48.1	0.0	471.8	
295	Parker	32.73	-97.67	550	23.2	0.9	8.23	R	195.8	1.8	4.7	9.9	0.3	29.5	1.5	86.6	
296	Parker	32.73	-97.66	220	20.3	0.7	7.12	R	141.7	16.6	0.0	0.2	0.2	13.5	0.3	32.9	
297	Parker	32.63	-97.57	330	20.5	0.6	7.44	R	38.9	4.5	22.0	53.1	0.2	9.5	0.0	44.8	
298	Parker	32.70	-97.68	161	20.8	0.6	7.10	R	6.6	0.8	2.9	117.2	0.1	10.2	0.7	36.0	
299	Johnson	32.29	-97.34	1126	25.2	1.1	8.65	M	225.9	1.2	0.9	2.2	1.0	29.2	0.0	135.7	
300	Johnson	32.29	-97.34	648	22.7	1.1	8.99	M	246.3	1.0	0.5	1.2	1.4	25.7	0.0	71.8	
301	Johnson	32.28	-97.48	1023	25.0	0.9	8.90	M	205.2	1.0	0.6	1.6	0.3	27.5	0.0	81.3	
302	Johnson	32.50	-97.21	1500	28.7	1.2	8.74	M	255.8	1.2	0.6	1.8	1.2	60.1	0.0	79.5	
303	Johnson	32.50	-97.21	829	24.3	1.0	8.98	M	237.1	0.9	0.5	1.2	1.2	12.2	0.0	82.6	
304	Johnson	32.50	-97.17	1355	29.3	1.2	8.76	M	251.5	1.1	0.5	1.7	0.9	66.4	0.0	70.5	
305	Johnson	32.50	-97.17	861	25.9	1.2	8.92	M	261.9	1.0	0.5	1.4	1.5	14.8	0.0	132.2	
306	Hood	32.30	-97.68	400	20.7	0.8	8.52	Ag	174.1	2.3	1.7	4.0	0.3	13.2	0.0	69.6	
307	Hood	32.32	-97.72	425	19.7	0.8	8.58	R	173.5	2.2	1.2	3.0	0.3	22.5	0.0	0.9	325.06
308	Hood	32.36	-97.83	30	17.0	0.8	8.04	Ag	149.7	3.6	6.3	10.8	0.3	25.2	3.5	37.7	
309	Hood	32.36	-97.83	464	22.6	0.8	8.44	R	174.8	2.7	1.8	4.3	0.3	24.7	0.0	36.2	
310	Hood	32.33	-97.89	370	20.4	0.6	7.52	Ag	38.7	5.2	30.7	47.6	0.2	7.6	0.0	29.2	
311	Hood	32.40	-97.81	357	21.2	0.7	7.72	R	117.6	5.7	11.9	21.6	0.2	21.7	0.2	23.8	
312	Hood	32.40	-97.79	379	21.8	0.8	7.95	R	147.3	4.4	5.5	11.3	0.2	20.7	0.1	36.1	
313	Hood	32.40	-97.78	253	21.4	0.8	7.97	R	143.5	4.6	7.0	13.2	0.3	20.0	0.0	35.4	
314	Hood	32.50	-97.72	500	21.1	1.0	9.04	R	227.6	1.0	0.5	1.4	0.8	36.5	0.0	97.6	
319	Parker	32.57	-97.82	70-90	19.9	2.9	7.17	R	317.9	1.1	0.3	1.0	1.0	106.5	0.0	352.6	
320	Hood	32.52	-97.64	335	22.0	0.6	7.36	Ag	692.0	1.6	0.8	2.7	1.2	736.2	0.0	33.1	
321	Hill	31.94	-97.32	1260	29.1	1.0	8.69	M	8.7	0.6	2.8	6.2	0.1	8.0	1.6	103.9	
322	Hill	31.96	-97.32	1350	28.8	1.0	8.67	M	5.3	1.2	0.5	0.4	0.1	3.1	1.6	106.2	
323	Hill	31.94	-97.32	1280	29.8	1.0	8.69	M	583.6	1.9	0.7	2.4	1.7	569.9	0.0	105.3	
326	Johnson	32.34	-97.21	1655	28.3	1.1	8.82	M	20.9	1.1	2.6	6.2	0.1	5.2	1.7	72.6	
327	Johnson	32.26	-97.39	1205	25.6	1.0	8.94	M	171.1	1.4	0.3	1.8	0.1	11.3	2.8	109.2	
328	Johnson	32.37	-97.54	1061	25.3	1.0	8.95	M	24.8	2.0	2.6	6.8	0.1	11.0	0.0	81.0	
329	Johnson	32.37	-97.54	468	22.4	0.6	7.78	M	98.8	4.9	9.6	21.0	0.2	9.1	0.1	26.4	
330	Johnson	32.19	-97.57	105	21.8	0.7	7.25	R	21.7	1.5	7.2	101.0	0.3	19.6	10.2	19.6	
331	Johnson	32.19	-97.57	84-100	22.3	1.5	6.95	R	93.8	2.3	20.8	173.1	0.2	216.4	4.9	61.7	
332	Johnson	32.17	-97.53	790	24.7	0.8	8.55	R	179.2	1.5	1.1	2.8	0.3	9.8	0.0	67.0	
333	Johnson	32.15	-97.52	200**	23.2	0.8	8.66	R	181.6	1.6	1.1	2.5	0.3	18.9	0.0	59.1	
334	Johnson	32.20	-97.56	50	22.9	0.7	7.22	R	29.5	2.5	13.5	95.6	0.2	11.9	4.4	26.6	
335	Johnson	32.23	-97.55	850	17.5	0.8	8.70	Ag	190.4	1.3	0.8	2.1	0.3	18.5	1.9	65.2	
336	Tarrant	32.78	-97.03	310	19.1	1.2	8.66	R	275.1	0.9	0.3	0.9	1.6	21.8	0.0	160.4	

Sam. ID	County	Lat.	Long.	Depth (ft)	Water Temp (°C)	Specific Cond. (mS/cm)	pH	Water Use	Na	K	Mg	Ca	F	Cl	NO_3	SO_4	HCO_3
337	Hood	32.40	-97.65	596	19.2	0.9	8.90	R	205.2	1.0	0.6	1.6	0.6	25.0	1.6	87.3	
338	Hood	32.54	-97.75	440	20.9	1.1	8.56	R	285.0	1.3	0.8	3.3	2.5	16.2	1.9	127.5	
338A	Hood	32.54	-97.75	440	20.3	1.4	8.07	R	283.2	1.1	0.6	2.1	1.5	15.3	1.4	101.1	
339	Hood	32.54	-97.74	450**	22.4	1.1	8.94	R	248.4	1.0	0.5	1.3	0.9	15.6	0.0	60.7	
340	Hood	32.54	-97.74	>400	21.9	1.0	9.00	R	239.4	1.0	0.4	1.1	0.6	17.5	0.0	42.0	
340A	Hood	32.54	-97.74	>400	21.2	1.2	8.46	R	245.3	0.9	0.3	1.3	0.4	16.8	0.0	37.4	
341	Johnson	32.44	-97.34	130	17.4	1.0	5.69	R	61.8	4.1	24.8	66.6	0.5	61.6	0.0	364.7	
342	Johnson	32.44	-97.34	775	16.6	0.9	8.92	R	202.7	0.9	0.4	1.1	0.7	11.6	2.6	45.2	
343	Johnson	32.44	-97.33	100	17.9	0.8	6.15	R	71.9	2.3	17.8	47.2	0.4	88.6	1.0	127.3	
344	Tarrant	32.88	-97.14	80	20.3	0.5	5.68	R	55.8	1.1	12.2	23.5	0.1	65.3	28.9	75.3	
345	Tarrant	32.88	-97.13	85-100	20.1	0.4	5.34	R	40.0	1.3	4.5	9.8	0.0	55.6	31.4	13.2	
346	Parker	32.56	-97.78	250**	19.8	1.0	8.94	R	233.1	1.0	0.5	1.1	0.4	32.6	0.0	39.0	
347	Parker	32.57	-97.79	240	19.6	2.4	8.12	R	453.3	3.6	13.0	24.6	0.2	465.4	0.0	151.3	268.31
347A	Parker	32.57	-97.79	240	20.2	2.0	8.22	R	392.6	2.8	13.0	26.7	0.3	370.7	0.0	111.6	
348	Parker	32.57	-97.78	180**	21.2	1.0	9.02	Ag	225.4	0.9	0.5	1.2	0.3	31.1	0.0	49.5	452.36
348A	Parker	32.57	-97.78	180**	21.3	0.9	8.82	Ag	225.1	0.7	0.5	1.1	0.3	26.8	0.0	42.2	
349	Hood	32.52	-97.79	199	24.7	1.1	8.91	Ag	243.8	1.1	0.5	1.3	1.0	44.2	0.0	62.8	
350	Hood	32.50	-97.73	380	23.3	1.1	8.94	Ag	227.4	1.0	1.1	2.0	0.8	35.6	0.1	103.0	
351	Parker	32.58	-97.77	345	22.5	1.1	8.97	R	247.6	1.1	0.6	1.4	0.4	24.7	3.5	98.4	
351A	Parker	32.58	-97.77	345	21.7	1.0	8.71	R	246.5	0.8	0.6	1.4	0.3	22.1	5.5	85.8	
352	Parker	32.57	-97.78	280**	21.6	1.0	9.01	R	227.5	0.9	0.5	1.1	0.4	25.1	0.0	38.2	
353	Parker	32.58	-97.79	270	22.3	1.0	8.85	Ag	229.7	1.2	1.0	2.8	0.3	32.5	0.0	68.0	
354	Parker	32.58	-97.77	380	21.4	1.0	9.03	R	225.0	1.0	0.5	1.1	0.3	31.3	0.0	47.8	
354A	Parker	32.58	-97.77	380	21.7	0.9	8.85	R	224.7	0.8	0.5	1.0	0.3	26.8	0.0	43.5	
355	Parker	32.57	-97.78	225	20.1	1.0	9.08	R	229.0	1.0	0.5	1.1	0.4	26.1	0.0	18.8	351.41
355A	Parker	32.57	-97.78	225	21.4	0.9	8.85	R	231.7	0.8	0.5	1.1	0.3	22.3	0.0	35.2	
356	Parker	32.56	-97.79	220**	20.3	1.9	8.82	R	383.0	1.6	1.3	2.8	0.2	290.1	0.0	107.6	
356A	Parker	32.56	-97.79	220**	20.1	1.8	7.78	R	387.1	1.3	1.3	3.0	0.2	280.9	0.0	97.7	
357	Parker	32.57	-97.79	240	22.6	1.1	9.01	R	245.3	1.1	0.8	1.6	0.5	52.6	0.0	56.0	338.94
357A	Parker	32.57	-97.79	240	20.6	1.0	7.97	R	240.9	0.9	0.9	1.7	0.5	25.1	0.0	59.8	
358	Parker	32.57	-97.78	360	21.8	1.0	9.04	R	233.7	1.0	0.6	1.3	0.5	24.6	0.0	38.5	349.61
358A	Parker	32.57	-97.78	360	21.1	1.0	8.75	R	243.9	0.9	0.8	1.6	0.7	18.5	0.0	62.2	
359	Parker	32.58	-97.77	300	22.8	1.3	8.80	Ag	273.6	1.5	2.7	9.7	0.3	34.8	0.0	214.0	
360	Parker	32.58	-97.78	322	24.5	1.0	9.07	Ag	218.8	0.9	0.4	1.1	0.4	29.7	0.0	44.6	312.22
361	Parker	32.57	-97.79	210	23.2	1.1	8.94	R	251.9	1.1	0.7	1.5	0.3	66.9	0.0	45.9	339.94
362	Parker	32.56	-97.79	180	22.5	1.2	8.95	Ag	274.9	1.2	0.7	1.5	0.3	90.3	0.0	29.2	356.11
363	Parker	32.56	-97.79	120	22.6	2.3	8.55	Ag	478.3	2.2	3.4	7.2	0.1	414.6	0.0	119.5	318.40
364	Parker	32.59	-97.76	325	22.0	1.3	8.46	Ag	296.7	1.6	1.6	4.7	1.1	27.0	0.0	169.4	
364A	Parker	32.59	-97.76	325	22.7	0.9	7.95	Ag	298.5	1.3	1.6	5.1	0.9	23.5	0.0	153.6	
365	Parker	32.59	-97.76	375	22.7	1.1	8.93	R	246.9	1.1	0.6	1.5	1.7	28.8	0.0	74.3	
365A	Parker	32.59	-97.76	375	21.4	0.8	8.30	R	244.8	0.8	0.5	1.4	1.4	25.0	0.0	65.3	
366	Parker	32.59	-97.75	376	21.4	1.1	8.95	R	252.2	1.1	0.6	1.4	1.8	24.1	0.0	88.7	
367	Parker	32.60	-97.76	400+	21.4	1.0	8.97	Ag	215.5	1.0	0.5	1.5	0.4	42.7	1.7	55.5	
367A	Parker	32.60	-97.76	400+	21.8	0.9	8.40	Ag	218.3	0.8	0.4	1.1	0.3	36.3	0.0	50.5	
368	Parker	32.59	-97.77	160	23.3	1.0	8.92	R	220.5	1.0	0.5	1.4	0.6	53.1	0.0	52.5	

Sam. ID	County	Lat.	Long.	Depth (ft)	Water Temp (°C)	Specific Cond. (mS/cm)	pH	Water Use	Na	K	Mg	Ca	F	Cl	NO_3	SO_4	HCO_3
369	Parker	32.57	-97.79	300	22.3	1.0	8.98	R	221.9	0.8	0.4	1.1	0.4	35.3	0.0	41.6	
369A	Parker	32.57	-97.79	300	21.3	0.9	8.82	R	229.0	0.6	0.4	0.9	0.3	29.5	0.0	34.4	
370	Hood	32.52	-97.80	220	19.1	1.3	8.73	R	248.7	1.2	0.7	1.8	1.0	39.0	0.0	90.4	
371	Somervell	32.22	-97.66	60	18.0	0.7	7.08	R	39.6	0.7	10.1	101.3	0.7	13.6	2.5	19.2	
372	Somervell	32.16	-97.89	850	18.3	0.6	7.18	R	16.2	2.6	23.1	80.7	0.2	8.5	0.0	35.6	
374	Denton	33.15	-97.34	380	18.3	0.8	9.27	Ag	182.6	0.4	0.2	0.9	0.2	6.4	0.0	28.0	
375	Denton	33.15	-97.35	350	17.6	0.8	9.34	Ag	178.7	0.4	0.2	0.8	0.2	7.3	0.0	28.9	
376	Tarrant	32.92	-97.40	470	19.4	0.8	9.21	R	190.0	0.5	0.3	1.0	0.2	8.1	0.0	77.0	
377	Hill	32.17	-97.25	1580	30.1	1.1	8.58	M	229.8	1.2	0.6	2.0	0.5	63.8	0.0	89.9	
378	Hill	32.18	-97.25	1590	30.4	1.0	8.58	M	226.0	1.1	0.7	2.2	0.5	61.0	0.0	86.0	
399	Denton	33.23	-97.33	360	22.5	1.0	9.25	R	229.2	0.5	0.2	0.9	0.5	26.0	0.3	71.1	
400	Denton	33.08	-97.16	800	23.6	1.0	9.09	R	228.7	0.5	0.3	1.0	0.6	9.6	0.0	76.1	
401	Denton	33.11	-97.04	168	21.1	1.0	6.87	R	79.8	4.1	24.5	88.3	0.3	95.2	0.0	175.8	
402	Hood	32.32	-97.72	186	18.6	0.8	8.41	R	162.1	3.3	1.9	5.1	0.4	14.3	0.0	6.9	
403	Hood	32.33	-97.72	380	20.9	0.7	8.40	R	160.6	2.8	1.8	4.2	0.3	16.3	0.0	1.0	
404	Hood	32.32	-97.72	370	20.9	0.7	8.60	R	166.0	2.2	1.2	2.7	0.4	15.6	0.0	1.6	
405	Hood	32.33	-97.72	500	23.9	0.7	8.36	R	155.4	3.3	2.6	6.4	0.4	20.1	0.0	0.5	
406	Hood	32.32	-97.72	395	25.1	0.7	8.47	R	164.7	2.3	1.3	3.3	0.3	12.9	0.0	13.5	
407	Tarrant	32.63	-97.23	1490	28.6	1.4	8.49	M	307.8	1.3	0.8	2.3	1.8	61.6	0.4	188.0	
408	Tarrant	32.64	-97.22	721	25.3	1.0	8.95	M	231.6	0.8	0.4	1.2	1.1	14.4	0.3	85.5	
409	Tarrant	32.64	-97.22	1450	30.1	1.3	8.65	M	307.0	1.2	0.6	2.0	1.7	68.9	0.2	150.9	
410	Tarrant	32.65	-97.20	1500	31.6	1.3	8.62	M	306.3	1.2	0.6	2.0	1.8	75.4	0.1	142.4	
411	Tarrant	32.63	-97.20	1539	31.2	1.5	8.38	M	343.3	1.7	2.2	5.0	2.1	56.2	0.1	316.8	
412	Parker	32.56	-97.75	330	24.5	0.9	7.61	R	156.4	1.5	8.4	50.9	0.4	31.1	4.8	60.0	
413	Parker	32.58	-97.76	320	23.8	1.1	8.88	R	208.5	1.1	0.4	1.0	0.4	35.6	6.8	97.8	
414	Parker	32.58	-97.76	330	24.1	1.0	8.71	R	218.2	1.1	6.4	7.3	0.7	46.7	0.2	53.7	
415	Tarrant	32.60	-97.23	1551	29.3	1.4	8.63	M	314.7	1.4	1.1	2.6	2.0	51.5	0.0	223.3	
416	Tarrant	32.60	-97.23	771	26.2	1.0	8.95	M	229.8	0.8	0.4	1.3	1.2	11.6	0.0	74.5	
417	Tarrant	32.59	-97.25	720**	25.9	0.9	9.03	M	211.1	0.7	0.4	1.1	0.9	9.6	0.0	49.3	
418	Tarrant	32.58	-97.25	717	25.9	0.9	9.00	M	220.1	0.8	0.4	1.1	1.1	10.9	0.0	57.6	
419	Tarrant	32.58	-97.24	720**	26.9	0.9	8.95	M	227.8	0.8	0.3	1.2	1.2	11.4	1.3	68.0	
420	Tarrant	32.58	-97.24	720**	27.0	0.9	9.01	M	221.3	0.8	0.3	1.1	1.1	10.1	0.0	59.9	
421	Tarrant	32.57	-97.25	720**	26.7	1.0	8.93	M	233.4	0.9	0.5	1.2	1.3	11.4	0.2	83.6	
422	Johnson	32.54	-97.26	1562	30.6	1.6	8.49	M	291.4	1.5	1.8	3.1	2.3	30.2	0.0	418.8	
423	Johnson	32.54	-97.26	818	28.3	0.9	8.97	M	215.9	0.8	0.4	1.1	1.0	8.7	0.3	53.6	
424	Tarrant	32.56	-97.25	1526	31.8	1.3	8.64	M	288.6	1.3	1.3	2.1	1.7	56.1	0.1	143.4	
425	Tarrant	32.56	-97.25	770	27.3	1.0	8.88	M	229.3	0.9	0.5	1.3	1.2	10.3	1.1	78.7	
426	Johnson	32.54	-97.27	1400	28.5	1.3	8.66	M	287.5	1.3	0.9	2.2	1.8	43.0	0.0	186.2	
427	Tarrant	32.55	-97.22	1589	29.7	1.3	8.64	M	285.2	1.4	0.8	2.3	1.7	53.7	0.0	149.5	
428	Johnson	32.52	-97.23	1557	29.2	1.2	8.64	M	268.7	1.3	0.7	2.1	1.4	55.0	0.0	109.2	
429	Johnson	32.48	-97.24	1570	29.0	1.3	8.59	M	436.6	2.4	7.7	8.1	2.6	50.3	0.0	583.9	
430	Johnson	32.49	-97.28	1490	29.2	1.2	8.57	M	273.9	1.6	1.4	3.2	1.6	34.9	0.0	198.6	
431	Johnson	32.45	-97.29	1494	29.8	1.1	8.51	M	242.3	1.4	1.4	2.9	1.6	25.1	0.0	153.3	
432	Johnson	32.49	-97.31	1460	29.9	1.1	8.69	M	252.6	1.2	0.7	1.9	1.6	31.1	0.0	119.8	
433	Parker	32.68	-97.82	600	19.7	0.6	7.45	R	56.5	3.5	25.9	46.5	0.4	9.6	0.0	37.7	

Sam. ID	County	Lat.	Long.	Depth (ft)	Water Temp (°C)	Specific Cond. (mS/cm)	pH	Water Use	Na	K	Mg	Ca	F	Cl	NO_3	SO_4	HCO_3
434	Parker	32.57	-97.79	180**	20.5	0.9	9.04	Ag	222.6	0.9	0.4	0.9	0.4	34.1	0.0	34.6	
434A	Parker	32.57	-97.79	180**	20.1	0.9	8.79	Ag	222.4	0.7	0.4	0.8	0.3	29.2	0.0	31.2	
435	Hood	32.52	-97.80	180	22.0	1.0	8.47	R	220.7	1.9	2.9	5.7	0.5	47.6	0.0	46.2	
436	Hood	32.52	-97.76	320	23.0	1.1	8.93	Ag	268.1	1.3	0.7	1.7	1.6	31.4	0.0	104.2	
443	Hood	32.53	-97.76	420	22.5	1.1	8.81	R	248.7	1.1	0.5	1.3	1.0	23.7	0.0	22.2	
444	Hood	32.53	-97.76	220	23.9	1.1	8.86	R	247.8	1.1	0.5	1.2	1.0	24.5	0.0	6.4	
445	Hood	32.55	-97.76	400	23.6	1.2	8.80	R	270.7	1.2	0.8	1.7	2.2	19.9	1.6	99.4	
446	Parker	32.58	-97.77	100	24.2	1.0	8.85	R	229.3	1.0	0.5	1.3	0.5	34.9	0.0	55.6	
446A	Parker	32.58	-97.77	100	22.0	0.8	8.34	R	225.8	0.8	0.5	1.2	0.4	30.3	0.0	50.2	
447	Parker	32.58	-97.77	100**	24.0	1.0	8.97	R	227.3	0.9	0.4	1.0	0.4	32.3	0.0	39.1	
447A	Parker	32.58	-97.77	100**	22.1	9.2	8.83	R	227.6	0.7	0.4	0.9	0.3	27.1	0.0	35.4	
448	Parker	32.58	-97.77	100**	25.1	1.0	8.94	R	228.1	0.9	0.4	1.0	0.4	32.5	0.0	32.8	
449	Denton	32.99	-97.18	800	26.2	1.0	8.95	M	240.5	0.7	0.4	1.2	1.1	7.3	0.9	70.6	
450	Denton	32.99	-97.18	1200	29.1	2.3	8.29	M	453.4	1.6	2.6	5.7	0.5	460.3	0.0	83.5	
451	Denton	32.99	-97.20	618	25.9	1.0	9.02	M	221.3	0.6	0.3	1.0	0.8	6.4	1.1	55.2	
452	Denton	32.99	-97.20	720	26.5	0.9	9.08	M	218.7	0.5	0.4	1.1	0.7	5.7	0.3	55.1	
455	Denton	33.07	-97.05	1763	30.0	1.9	8.42	M	349.6	1.1	1.1	3.2	0.4	265.4	0.0	107.3	
456	Denton	33.08	-97.04	922	30.4	1.4	8.71	M	300.0	0.8	0.4	1.9	0.3	179.6	0.0	91.8	
457	Denton	33.09	-97.03	1770	30.0	1.6	8.61	M	337.9	1.0	1.7	4.2	0.5	166.4	0.0	203.0	
458	Denton	33.08	-97.05	1784	30.8	1.5	8.63	M	311.9	0.9	0.5	2.1	0.5	194.9	0.0	90.5	
459	Denton	33.08	-97.07	1708	30.3	1.4	8.77	M	300.3	0.8	0.4	1.7	0.3	177.9	0.0	88.2	
477	Denton	33.25	-97.22	125	23.2	0.8	9.09	R	201.0	0.4	0.1	0.8	0.2	5.2	0.0	34.3	
479	Denton	33.06	-97.13	125	25.7	0.2	6.12	Ag	24.0	1.0	4.2	12.5	0.1	22.2	6.7	13.2	
480	Denton	33.09	-97.21	1390	28.5	1.3	8.66	M	276.2	0.6	0.4	1.4	0.2	164.6	0.0	57.7	
481	Denton	33.12	-97.20	1390	28.1	1.3	8.66	M	287.9	0.6	0.4	1.6	0.6	164.7	0.0	65.3	
482	Denton	33.12	-97.17	1138	27.6	1.0	8.87	M	219.2	0.5	0.3	1.0	0.5	22.8	0.0	79.1	
483	Denton	33.12	-97.15	1406	28.6	1.4	8.70	M	308.0	0.7	0.4	1.6	0.2	238.0	0.0	59.7	
502	Denton	33.07	-96.89	2332	30.6	2.1	8.33	M	429.6	1.5	1.6	5.5	0.8	364.6	0.1	136.5	
503	Denton	33.08	-96.88	1432	29.0	1.1	8.69	M	257.5	0.8	0.3	1.5	1.1	12.3	0.0	91.1	
504	Denton	33.08	-96.88	2409	32.3	1.9	8.29	M	385.9	1.3	1.1	4.3	0.5	351.4	0.0	81.8	
508	Denton	33.27	-97.23	1150	24.7	1.7	8.17	M	338.6	1.7	5.7	13.2	0.2	370.0	0.0	32.7	
509	Denton	33.26	-97.23	1050	24.6	0.8	9.29	M	176.7	0.4	0.4	1.1	0.1	7.8	0.0	54.8	
510	Denton	33.26	-97.23	850	24.3	0.8	9.27	M	176.8	0.5	0.4	1.0	0.1	7.5	0.0	57.2	
511	Denton	33.26	-97.23	1100	23.8	0.8	9.33	M	176.5	0.5	0.4	1.0	0.1	6.5	0.0	54.9	
512	Denton	33.26	-97.23	1100	23.1	0.9	9.39	M	205.1	0.4	0.2	0.9	0.3	4.8	0.0	41.0	
513	Denton	33.24	-97.25	250	22.3	0.8	9.43	R	192.0	0.4	0.2	0.8	0.2	3.1	0.0	29.1	
519	Denton	33.11	-97.05	800	27.1	1.0	9.19	M	235.3	0.5	0.3	1.0	0.6	11.1	0.0	75.5	
523	Denton	33.34	-97.35	400	22.4	0.8	9.39	R	184.9	0.3	0.2	0.9	0.1	5.2	0.7	60.8	
524	Denton	33.06	-97.35	550	22.9	0.7	9.38	R	176.4	0.4	0.2	0.8	0.3	3.3	0.0	24.2	
525	Denton	32.98	-97.27	400	23.6	0.9	9.34	R	200.3	0.5	0.8	2.4	0.2	4.2	0.0	48.9	
526	Denton	33.09	-97.14	735	25.8	0.9	9.42	R	206.4	0.4	0.2	0.8	0.3	8.5	0.0	52.9	
528	Denton	33.20	-97.21	730**	24.0	0.9	9.24	Ag	211.3	0.5	0.4	1.2	0.4	22.8	0.0	98.9	
530	Cooke	33.44	-97.46	700	22.0	0.6	7.73	Ag	71.4	4.0	19.9	35.9	0.1	8.6	0.0	40.5	
531	Denton	33.10	-97.14	650	25.5	0.9	9.25	M	210.5	0.4	0.2	0.8	0.4	8.6	0.0	56.4	
532	Johnson	32.33	-97.33	693	25.4	0.9	9.13	R	218.6	0.9	0.4	1.1	0.8	17.5	0.0	57.0	

Sam. ID	County	Lat.	Long.	Depth (ft)	Water Temp (°C)	Specific Cond. (mS/cm)	pH	Water Use	Na	K	Mg	Ca	F	Cl	NO_3	SO_4	HCO_3
533	Hood	32.54	-97.73	500	23.0	1.2	8.82	R	287.8	1.2	0.7	1.8	2.4	17.0	0.0	96.7	
533B	Hood	32.54	-97.73	500	23.5	1.1	8.94	R	249.1	1.0	0.5	1.3	1.1	19.6	0.2	19.4	
533C	Hood	32.54	-97.73	500	21.9	1.2	8.69	R	302.2	1.2	0.6	2.1	2.9	15.6	0.0	95.6	
534	Hood	32.46	-97.77	275	23.2	0.7	7.43	R	92.5	3.0	13.4	54.5	0.2	28.5	0.7	36.7	
534B	Hood	32.46	-97.77	275	23.0	0.8	7.42	R	91.1	2.8	13.2	53.8	0.2	27.0	0.8	34.1	
534C	Hood	32.46	-97.77	275	21.9	0.7	7.31	R	93.3	2.6	13.2	54.0	0.2	24.4	0.9	34.2	
535	Denton	33.08	-97.14	1500	30.0	1.3	8.97	M	250.4	0.6	0.3	1.0	0.5	106.7	0.1	80.4	
537	Denton	33.09	-97.11	1575	30.1	1.3	8.98	M	275.9	0.6	0.3	1.4	0.2	142.7	0.0	67.1	
538	Denton	33.11	-97.10	1364	29.3	1.2	8.93	M	264.5	0.7	0.4	1.2	1.3	23.1	0.0	93.2	
539	Denton	33.08	-97.08	1380	30.3	1.2	8.79	M	267.3	0.8	0.6	1.5	1.5	17.3	0.0	88.5	
540	Denton	33.07	-97.09	1656	31.5	1.5	8.76	M	303.0	0.8	0.5	1.9	0.4	189.4	0.0	84.7	
541	Denton	33.17	-97.11	750	26.0	1.0	9.11	R	236.6	0.6	0.6	1.9	0.6	13.4	0.1	88.4	
542	Denton	33.18	-97.24	440	23.5	0.9	9.32	R	202.6	0.4	0.2	0.8	0.3	8.4	0.1	46.6	
544	Hood	32.49	-97.76	420	23.1	1.0	8.93	Ag	223.8	1.0	0.5	1.9	0.6	34.3	0.0	89.4	
544A	Hood	32.49	-97.76	420	21.7	1.0	9.03	Ag	223.2	0.9	0.5	1.3	0.6	30.1	0.0	81.6	
548	Denton	33.28	-97.30	1010	25.4	0.8	9.25	M	272.4	1.8	5.0	12.8	0.2	3.5	0.3	28.3	
549	Denton	33.27	-97.34	970	25.3	1.4	8.39	M	245.7	1.7	0.6	1.9	0.1	249.0	0.4	30.2	
551	Parker	32.56	-97.76	363	22.6		8.93	M	235.9	0.9	0.4	1.0	0.7	22.9	0.1	11.6	
552	Parker	32.56	-97.76	385	23.7		8.63	M	231.9	0.9	0.4	1.1	0.4	27.6	0.0	33.1	
553	Parker	32.56	-97.76	360**	22.4		8.97	M	232.7	0.9	0.4	1.1	0.4	23.9	0.0	35.6	
554	Parker	32.56	-97.77	320	22.7		8.90	M	231.4	0.9	0.4	1.1	0.4	24.1	0.0	32.8	
555	Hood	32.49	-97.76	310	20.7	1.1	9.01	R	240.3	0.9	0.4	1.0	0.7	52.5	0.0	71.2	

**: Depth estimated from temperature

Note: Latitude and longitude truncated to only 4 significant digits

Table S2. Dissolved gas characterization results

Sample ID	County	Lat.	Long.	Depth (ft)	TDS	Dissolved Methane (mg/L)	Dissolved Ethane (mg/L)	Dissolved Propane (mg/L)$^{++}$	$\delta^{13}C$ methane	C1/C2+	$\delta^{13}C$ DIC	δD methane	Aquifer
1	Johnson	32.27	-97.41	520	880.5	BDL	BDL	BDL	n.a.		n.a.		Trinity
2	Johnson	32.36	-97.16	200	676.1	BDL	BDL	BDL	n.a.		n.a.		Woodbine
3	Johnson	32.48	-97.31	30	449.2	BDL	BDL	BDL	n.a.		n.a.		Trinity
4	Johnson	32.48	-97.31	100	353.6	BDL	BDL	BDL	n.a.		n.a.		Woodbine
5	Tarrant	32.62	-97.50	340	561.9	BDL	BDL	BDL	n.a.		n.a.		Trinity
6	Parker	32.58	-97.57	280	475.6	BDL	BDL	BDL	n.a.		n.a.		Trinity
7	Parker	32.58	-97.56	225	482.9	BDL	BDL	BDL	n.a.		n.a.		Trinity
8	Parker	32.58	-97.56	265	485.2	BDL	BDL	BDL	n.a.		n.a.		Trinity
9	Parker	32.58	-97.57	265	476.5	BDL	BDL	BDL	n.a.		n.a.		Trinity
10	Parker	32.78	-97.62	170**	509.7	BDL	BDL	BDL	n.a.		n.a.		Woodbine
11	Parker	32.78	-97.62	1700	484.9	BDL	BDL	BDL	n.a.		n.a.		Strawn
12	Parker	32.78	-97.62	370**	460.5	BDL	BDL	BDL	n.a.		n.a.		Trinity
13	Parker	32.78	-97.62	380	491.2	0.002	BDL	BDL	n.a.		n.a.		Trinity
14	Parker	32.79	-97.69	265	591.1	BDL	BDL	BDL	n.a.		n.a.		Trinity
15	Parker	32.79	-97.70	165	542.3	0.003	BDL	BDL	n.a.		n.a.		Trinity

Sample ID	County	Lat.	Long.	Depth (ft)	TDS	Dissolved Methane (mg/L)	Dissolved Ethane (mg/L)	Dissolved Propane (mg/L)++	δ13C methane	C1/C2+	δ13C DIC	δD methane	Aquifer
16	Parker	32.57	-97.80	150	853.5	0.457	BDL	BDL	n.a.		n.a.		Trinity
16B	Parker	32.57	-97.80	150	734.4	0.738	0.042	BDL	-44.26	32.72	-6.15		Trinity
16C	Parker	32.57	-97.80	150	605.4	0.605	0.027	BDL	-48.85	42.18	n.a.		Trinity
17	Parker	32.57	-97.79	175	1889.5	0.190	BDL	BDL	n.a.		n.a.		Strawn
17B	Parker	32.57	-97.79	175	1828.4	0.189	0.004	BDL	-34.61	73.90	-11.33		Strawn
17C	Parker	32.57	-97.79	175	1900.9	0.184	BDL	BDL	n.a.		n.a.		Strawn
18	Hood	32.51	-97.84	300**	579.7	0.008	BDL	BDL	n.a.		n.a.		Trinity
19	Hood	32.52	-97.84	300	550.7	0.007	BDL	BDL	n.a.		n.a.		Strawn
20	Hood	32.52	-97.84	200	558.7	0.005	BDL	BDL	n.a.		n.a.		Strawn
21	Parker	32.69	-97.64	300	634	BDL	BDL	BDL	n.a.		n.a.		Trinity
22	Parker	32.70	-97.67	140	570	BDL	BDL	BDL	n.a.		n.a.		Trinity
23	Parker	32.70	-97.66	170	525.5	BDL	BDL	BDL	n.a.		n.a.		Trinity
24	Parker	32.71	-97.74	560**	570.1	BDL	BDL	BDL	n.a.		n.a.		Trinity
25	Parker	32.71	-97.75	560	472.7	BDL	BDL	BDL	n.a.		n.a.		Trinity
26	Parker	32.77	-97.59	260	548.2	BDL	BDL	BDL	n.a.		n.a.		Trinity
27	Parker	32.65	-97.89	40	412.6	BDL	BDL	BDL	n.a.		n.a.		Trinity
28	Parker	32.79	-97.84	160	491.4	0.002	BDL	BDL	n.a.		n.a.		Trinity
29	Parker	32.87	-97.89	180	693.9	0.999	BDL	BDL	n.a.		n.a.		Trinity
29B	Parker	32.87	-97.89	180	585.1	0.705	BDL	BDL	-57.81		-5.48		Trinity
30	Parker	32.91	-97.84	220	615.3	BDL	BDL	BDL	n.a.		n.a.		Trinity
30A	Parker	32.91	-97.84	220	635.3	0.005	BDL	BDL	n.a.		n.a.		Trinity
31	Parker	32.91	-97.84	170	654	3.356	BDL	BDL	-66.63		n.a.		Trinity
31B	Parker	32.91	-97.84	170	531.9	1.993	BDL	BDL	-67.20		-5.75		Trinity
31C	Parker	32.91	-97.84	170	632	2.085	BDL	BDL	-62.10		n.a.		Trinity
32	Parker	32.91	-97.83	180	555	0.006	BDL	BDL	n.a.		n.a.		Trinity
33	Parker	32.98	-97.85	160	1247.1	BDL	BDL	BDL	n.a.		n.a.		Trinity
33A	Parker	32.98	-97.85	160	1305.6	0.005	BDL	BDL	n.a.		n.a.		Trinity
34	Tarrant	32.78	-97.18	400**	886.1	0.017	BDL	BDL	n.a.		n.a.		Woodbine
35	Parker	32.67	-97.66	210	484.5	0.006	BDL	BDL	n.a.		n.a.		Trinity
36	Parker	32.71	-97.68	180	778.5	0.002	BDL	BDL	n.a.		n.a.		Trinity
37	Parker	32.78	-97.58	380	550.2	0.003	BDL	BDL	n.a.		n.a.		Trinity
38	Parker	32.78	-97.58	380**	540.5	BDL	BDL	BDL	n.a.		n.a.		Trinity
39	Tarrant	32.65	-97.47	380	578.5	BDL	BDL	BDL	n.a.		n.a.		Trinity
40	Tarrant	32.58	-97.47	497	479.5	0.008	BDL	BDL	n.a.		n.a.		Trinity
41	Tarrant	32.98	-97.45	367	579.7	BDL	BDL	BDL	n.a.		n.a.		Trinity
42	Wise	32.99	-97.45	268	506.6	BDL	BDL	BDL	n.a.		n.a.		Trinity
43	Tarrant	32.96	-97.43	280	620.6	BDL	BDL	BDL	n.a.		n.a.		Trinity
44	Tarrant	32.96	-97.43	340	517.3	BDL	BDL	BDL	n.a.		n.a.		Trinity
45	Tarrant	32.74	-97.13	45	205.7	BDL	BDL	BDL	n.a.		n.a.		Trinity
46	Montague	33.50	-97.79	100	1042.2	0.004	BDL	BDL	n.a.		n.a.		Trinity
47	Montague	33.59	-97.84	400	617.5	0.004	BDL	BDL	n.a.		n.a.		Strawn
48	Montague	33.60	-97.77	340	477.9	0.004	BDL	BDL	n.a.		n.a.		Strawn
49	Montague	33.60	-97.77	220	482.8	0.003	BDL	BDL	n.a.		n.a.		Strawn
50	Montague	33.66	-97.82	320	775.7	0.003	BDL	BDL	n.a.		n.a.		Strawn
51	Montague	33.66	-97.82	250	555.8	0.004	BDL	BDL	n.a.		n.a.		Strawn

Sample ID	County	Lat.	Long.	Depth (ft)	TDS	Dissolved Methane (mg/L)	Dissolved Ethane (mg/L)	Dissolved Propane (mg/L)$^{++}$	$\delta^{13}C$ methane	C1/C2+	$\delta^{13}C$ DIC	δD methane	Aquifer
52	Montague	33.66	-97.82	360	537.3	0.003	BDL	BDL	n.a.		n.a.		Strawn
53	Montague	33.66	-97.82	465	525	0.005	BDL	BDL	n.a.		n.a.		Strawn
54	Montague	33.55	-97.89	400	986.1	0.007	BDL	BDL	n.a.		n.a.		Strawn
55	Montague	33.54	-97.88	310	637.4	0.005	BDL	BDL	n.a.		n.a.		Strawn
56	Montague	33.63	-97.72	460	519.3	0.004	BDL	BDL	n.a.		n.a.		Strawn
57	Montague	33.63	-97.72	450	479.1	0.004	BDL	BDL	n.a.		n.a.		Strawn
58	Montague	33.66	-97.77	260	569.8	0.004	BDL	BDL	n.a.		n.a.		Strawn
59	Montague	33.65	-97.76	160	1269.3	0.002	BDL	BDL	n.a.		n.a.		Strawn
60	Montague	33.66	-97.69	260	359	0.004	BDL	BDL	n.a.		n.a.		Strawn
61	Montague	33.79	-97.67	300	780.8	0.007	BDL	BDL	n.a.		n.a.		Strawn
62	Montague	33.78	-97.66	290	830.4	0.003	BDL	BDL	n.a.		n.a.		Strawn
63	Montague	33.66	-97.65	240	768.1	0.003	BDL	BDL	n.a.		n.a.		Trinity
64	Montague	33.58	-97.71	276	763.6	0.004	BDL	BDL	n.a.		n.a.		Strawn
65	Montague	33.58	-97.72	350	475.6	0.003	BDL	BDL	n.a.		n.a.		Strawn
67	Montague	33.71	-97.54	420	710.9	0.004	BDL	BDL	n.a.		n.a.		Trinity
68	Montague	33.72	-97.54	560	736.2	0.004	BDL	BDL	n.a.		n.a.		Trinity
69	Montague	33.63	-97.56	340	674.8	0.003	BDL	BDL	n.a.		n.a.		Trinity
70	Montague	33.60	-97.56	490	690	0.005	BDL	BDL	n.a.		n.a.		Trinity
71	Montague	33.61	-97.52	200	697.4	0.002	BDL	BDL	n.a.		n.a.		Trinity
72	Montague	33.66	-97.55	150	497.4	0.009	BDL	BDL	n.a.		n.a.		Trinity
73	Montague	33.63	-97.59	230	686.4	0.004	BDL	BDL	n.a.		n.a.		Trinity
74	Montague	33.46	-97.55	260	560.8	0.003	BDL	BDL	n.a.		n.a.		Trinity
75	Montague	33.45	-97.55	175	575.7	0.004	BDL	BDL	n.a.		n.a.		Trinity
76	Montague	33.51	-97.58	225	622.8	0.003	BDL	BDL	n.a.		n.a.		Trinity
77	Montague	33.50	-97.60	380	620.9	0.004	BDL	BDL	n.a.		n.a.		Trinity
78	Montague	33.52	-97.57	360	586.5	0.008	BDL	BDL	n.a.		n.a.		Trinity
79	Montague	33.53	-97.62	140	745	0.008	BDL	BDL	n.a.		n.a.		Trinity
80	Montague	33.49	-97.54	260	489.1	0.005	BDL	BDL	n.a.		n.a.		Trinity
81	Montague	33.48	-97.51	650	512.6	0.017	BDL	BDL	n.a.		n.a.		Trinity
82	Montague	33.48	-97.52	565	481.2	0.005	BDL	BDL	n.a.		n.a.		Trinity
83	Montague	33.51	-97.54	430	556.2	0.004	BDL	BDL	n.a.		n.a.		Trinity
84	Montague	33.53	-97.68	200**	699	BDL	BDL	BDL	n.a.		n.a.		Trinity
85	Montague	33.53	-97.72	250	1296.9	0.004	BDL	BDL	n.a.		n.a.		Strawn
86	Montague	33.52	-97.76	150	524.1	0.003	BDL	BDL	n.a.		n.a.		Strawn
87	Montague	33.50	-97.69	360	475	0.005	BDL	BDL	n.a.		n.a.		Strawn
88	Montague	33.50	-97.69	190**	472.4	0.004	BDL	BDL	n.a.		n.a.		Trinity
89	Montague	33.49	-97.69	350	476.8	0.004	BDL	BDL	n.a.		n.a.		Strawn
90	Montague	33.47	-97.62	150	1087.5	0.088	BDL	BDL	n.a.		n.a.		Trinity
91	Montague	33.44	-97.63	350	825.7	0.007	BDL	BDL	n.a.		n.a.		Trinity
92	Parker	32.71	-97.74	200**	496.7	0.002	BDL	BDL	n.a.		n.a.		Trinity
93	Parker	32.71	-97.74	220	621.2	0.002	BDL	BDL	n.a.		n.a.		Trinity
94	Parker	32.68	-97.64	350**	588.4	0.006	BDL	BDL	n.a.		n.a.		Trinity
95	Parker	32.69	-97.64	180	834.7	BDL	BDL	BDL	n.a.		n.a.		Trinity
96	Denton	33.12	-97.24	300	816.7	0.005	BDL	BDL	n.a.		n.a.		Woodbine
97	Denton	33.09	-97.15	780	731	0.007	BDL	BDL	n.a.		n.a.		Trinity

Sample ID	County	Lat.	Long.	Depth (ft)	TDS	Dissolved Methane (mg/L)	Dissolved Ethane (mg/L)	Dissolved Propane (mg/L)[++]	$\delta^{13}C$ methane	C1/C2+	$\delta^{13}C$ DIC	δD methane	Aquifer
98	Denton	33.09	-97.13	850	792.1	0.008	BDL	BDL	n.a.		n.a.		Trinity
99	Denton	33.09	-97.14	860	809.6	0.005	BDL	BDL	n.a.		n.a.		Trinity
100	Denton	33.06	-97.13	1400	1007.8	0.033	BDL	BDL	n.a.		n.a.		Trinity
101	Wise	33.19	-97.49	180	459.9	0.002	BDL	BDL	n.a.		n.a.		Trinity
102	Wise	33.19	-97.49	160**	445	0.004	BDL	BDL	n.a.		n.a.		Trinity
103	Wise	33.19	-97.49	160**	450.4	0.003	BDL	BDL	n.a.		n.a.		Trinity
104	Wise	33.19	-97.49	160**	455	0.004	BDL	BDL	n.a.		n.a.		Trinity
105	Wise	33.38	-97.75	100**	609.7	0.003	BDL	BDL	n.a.		n.a.		Trinity
106	Wise	33.39	-97.75	120**	692.5	0.003	BDL	BDL	n.a.		n.a.		Trinity
107	Wise	33.38	-97.74	100**	679.7	0.003	BDL	BDL	n.a.		n.a.		Trinity
108	Wise	33.21	-97.55	300	531.3	0.004	BDL	BDL	n.a.		n.a.		Trinity
109	Parker	32.58	-97.60	240	481.6	0.005	BDL	BDL	n.a.		n.a.		Trinity
110	Tarrant	32.62	-97.50	400	539.1	0.007	BDL	BDL	n.a.		n.a.		Trinity
111	Tarrant	32.62	-97.50	280**	548.5	0.005	BDL	BDL	n.a.		n.a.		Trinity
112	Parker	32.57	-97.80	300**	1722.4	0.598	0.009	BDL	-37.54		-11.43		Trinity
112A	Parker	32.57	-97.80	300**	1722.1	0.744	0.073	BDL	-26.22	19.22	-11.43		Trinity
113	Montague	33.43	-97.56	110	602.9	0.002	BDL	BDL	n.a.		n.a.		Trinity
114	Montague	33.59	-97.60	440	772.6	0.003	BDL	BDL	n.a.		n.a.		Trinity
115	Montague	33.76	-97.53	250	780.2	0.004	BDL	BDL	n.a.		n.a.		Trinity
116	Montague	33.67	-97.53	120	481.6	0.003	BDL	BDL	n.a.		n.a.		Trinity
117	Montague	33.68	-97.57	285	730.3	0.001	BDL	BDL	n.a.		n.a.		Trinity
118	Montague	33.71	-97.64	180	557.1	0.004	BDL	BDL	n.a.		n.a.		Trinity
119	Montague	33.72	-97.64	480	654.6	0.003	BDL	BDL	n.a.		n.a.		Strawn
120	Montague	33.66	-97.60	320	551.4	3.186	BDL	BDL	-83.18		-5.38		Trinity
121	Montague	33.60	-97.78	120	656.6	0.006	BDL	BDL	n.a.		n.a.		Strawn
122	Montague	33.58	-97.84	400	495.7	0.004	BDL	BDL	n.a.		n.a.		Strawn
123	Tarrant	32.88	-97.46	286	734.9	0.013	BDL	BDL	n.a.		n.a.		Trinity
124	Tarrant	32.88	-97.46	260**	830.6	0.040	BDL	BDL	n.a.		n.a.		Trinity
125	Tarrant	32.88	-97.46	260	804.7	0.060	BDL	BDL	n.a.		n.a.		Trinity
126	Tarrant	32.89	-97.46	180	970.1	0.011	BDL	BDL	n.a.		n.a.		Trinity
127	Wise	32.98	-97.45	380	571.9	0.002	BDL	BDL	n.a.		n.a.		Trinity
128	Tarrant	32.62	-97.50	350	550.5	0.003	BDL	BDL	n.a.		n.a.		Trinity
129	Tarrant	32.63	-97.50	375	586.8	0.003	BDL	BDL	n.a.		n.a.		Trinity
130	Tarrant	32.63	-97.49	350	521.5	0.002	BDL	BDL	n.a.		n.a.		Trinity
132	Tarrant	32.63	-97.49	366	672	0.004	BDL	BDL	n.a.		n.a.		Trinity
134	Tarrant	32.62	-97.48	240	620.3	0.003	BDL	BDL	n.a.		n.a.		Trinity
135	Tarrant	32.62	-97.49	372	577.4	0.003	BDL	BDL	n.a.		n.a.		Trinity
136	Cooke	33.48	-97.42	160	509.6	0.002	BDL	BDL	n.a.		n.a.		Trinity
137	Cooke	33.48	-97.42	110	572.8	0.004	BDL	BDL	n.a.		n.a.		Trinity
138	Cooke	33.49	-97.42	195	681.5	0.008	BDL	BDL	n.a.		n.a.		Trinity
139	Cooke	33.50	-97.47	300	666.8	0.003	BDL	BDL	n.a.		n.a.		Trinity
140	Cooke	33.49	-97.45	250	535.7	0.004	BDL	BDL	n.a.		n.a.		Trinity
141	Cooke	33.51	-97.44	615	594.7	0.010	BDL	BDL	n.a.		n.a.		Trinity
142	Parker	32.76	-97.74	200**	540	0.002	BDL	BDL	n.a.		n.a.		Trinity
143	Parker	32.81	-97.75	180	487.1	0.002	BDL	BDL	n.a.		n.a.		Trinity

Sample ID	County	Lat.	Long.	Depth (ft)	TDS	Dissolved Methane (mg/L)	Dissolved Ethane (mg/L)	Dissolved Propane (mg/L)++	δ^{13}C methane	C1/C2+	δ^{13}C DIC	δD methane	Aquifer
144	Denton	33.12	-97.24	450	704.4	0.003	BDL	BDL	n.a.		n.a.		Trinity
145	Denton	33.12	-97.24	550	718.8	0.007	BDL	BDL	n.a.		n.a.		Trinity
146	Denton	33.12	-97.25	637	813.1	0.005	BDL	BDL	n.a.		n.a.		Trinity
147	Denton	33.12	-97.25	630	787.7	0.004	BDL	BDL	n.a.		n.a.		Trinity
148	Cooke	33.45	-97.40	140	506.7	0.004	BDL	BDL	n.a.		n.a.		Woodbine
149	Cooke	33.45	-97.39	180	639.1	0.002	BDL	BDL	n.a.		n.a.		Trinity
150	Cooke	33.46	-97.39	320	620.3	0.005	BDL	BDL	n.a.		n.a.		Trinity
152	Cooke	33.48	-97.43	170**	520.1	0.002	BDL	BDL	n.a.		n.a.		Trinity
153	Johnson	32.36	-97.16	170	860.1	0.005	BDL	BDL	n.a.		n.a.		Woodbine
154	Johnson	32.37	-97.17	250	859.4	0.001	BDL	BDL	n.a.		n.a.		Woodbine
155	Johnson	32.53	-97.58	450	514	0.008	BDL	BDL	n.a.		n.a.		Trinity
156	Johnson	32.52	-97.58	415	475.1	0.001	BDL	BDL	n.a.		n.a.		Trinity
157	Johnson	32.53	-97.58	385	474.1	0.021	BDL	BDL	n.a.		n.a.		Trinity
158	Johnson	32.52	-97.59	425	494.9	0.009	BDL	BDL	n.a.		n.a.		Trinity
159	Johnson	32.53	-97.60	420	466.7	0.001	BDL	BDL	n.a.		n.a.		Trinity
160	Wise	32.99	-97.64	500**	1094.5	0.095	BDL	BDL	n.a.		n.a.		Trinity
161	Wise	32.99	-97.62	200**	1009.9	0.006	BDL	BDL	n.a.		n.a.		Trinity
162	Tarrant	32.87	-97.48	550	1155.2	0.015	BDL	BDL	n.a.		n.a.		Trinity
163	Parker	32.77	-97.93	220	559	BDL	BDL	BDL	n.a.		n.a.		Trinity
164	Parker	32.75	-97.76	60	626.2	0.004	BDL	BDL	n.a.		n.a.		Trinity
165	Parker	32.87	-97.77	140	504.1	0.010	BDL	BDL	n.a.		n.a.		Trinity
166	Parker	32.63	-97.76	425	625.3	0.003	BDL	BDL	n.a.		n.a.		Trinity
167	Parker	32.63	-97.75	160**	547.3	0.001	BDL	BDL	n.a.		n.a.		Trinity
168	Parker	32.63	-97.75	400	761.2	0.150	0.004	BDL	n.a.		n.a.		Trinity
169	Parker	32.71	-97.75	300	441	0.001	BDL	BDL	n.a.		n.a.		Trinity
170	Parker	32.72	-97.75	220	486.1	0.002	BDL	BDL	n.a.		n.a.		Trinity
171	Parker	32.71	-97.75	200	413.7	0.002	BDL	BDL	n.a.		n.a.		Trinity
172	Parker	32.88	-97.64	300**	570.1	0.008	BDL	BDL	n.a.		n.a.		Trinity
173	Parker	32.84	-97.64	300**	552.5	0.001	BDL	BDL	n.a.		n.a.		Trinity
174	Parker	32.62	-97.77	330	700.6	0.002	BDL	BDL	n.a.		n.a.		Trinity
175	Parker	32.65	-97.79	285	633	0.424	0.010	BDL	-54.70	79.64	n.a.		Trinity
176	Parker	32.65	-97.79	220**	608.7	0.005	BDL	BDL	n.a.		n.a.		Trinity
177	Parker	32.65	-97.79	400	620.2	0.015	BDL	BDL	n.a.		n.a.		Strawn
178	Parker	32.58	-97.82	110	1096	0.066	BDL	BDL	n.a.		n.a.		Trinity
178A	Parker	32.58	-97.82	110	1111.3	0.070	0.002	BDL	n.a.		n.a.		Trinity
179	Parker	32.58	-97.83	80	1884.5	0.011	BDL	BDL	n.a.		n.a.		Trinity
179A	Parker	32.58	-97.83	80	1883.4	0.003	BDL	BDL	n.a.		n.a.		Trinity
180	Parker	32.58	-97.82	320	1530.7	0.012	BDL	BDL	n.a.		n.a.		Strawn
180A	Parker	32.58	-97.82	320	1586.5	0.011	BDL	BDL	-39.96		n.a.		Strawn
181	Parker	32.63	-97.55	280**	634.7	0.003	BDL	BDL	n.a.		n.a.		Trinity
182	Wise	33.43	-97.59	100	1245.6	0.016	BDL	BDL	n.a.		n.a.		Trinity
183	Wise	33.42	-97.63	100	526.6	0.010	BDL	BDL	n.a.		n.a.		Trinity
184	Wise	33.38	-97.73	100	577	0.003	BDL	BDL	n.a.		n.a.		Trinity
185	Wise	33.39	-97.74	340	590	BDL	BDL	BDL	n.a.		n.a.		Strawn
186	Wise	33.40	-97.74	100	620.4	0.034	BDL	BDL	n.a.		n.a.		Trinity

Sample ID	County	Lat.	Long.	Depth (ft)	TDS	Dissolved Methane (mg/L)	Dissolved Ethane (mg/L)	Dissolved Propane $(mg/L)^{++}$	$\delta^{13}C$ methane	C1/C2+	$\delta^{13}C$ DIC	δD methane	Aquifer
187	Wise	33.06	-97.50	380	491.3	0.003	BDL	BDL	n.a.		n.a.		Trinity
188	Wise	33.02	-97.63	400	1108	0.146	BDL	BDL	n.a.		n.a.		Strawn
189	Wise	33.02	-97.63	280	650.6	0.008	BDL	BDL	n.a.		n.a.		Trinity
190	Wise	33.02	-97.63	100	853.3	0.004	BDL	BDL	n.a.		n.a.		Trinity
191	Wise	33.02	-97.66	200**	827.5	0.005	BDL	BDL	n.a.		n.a.		Trinity
192	Wise	33.02	-97.66	280	1218	0.019	BDL	BDL	n.a.		n.a.		Trinity
193	Parker	32.98	-97.56	200	766.4	0.015	BDL	BDL	n.a.		n.a.		Trinity
194	Wise	33.06	-97.50	320	495.6	0.009	BDL	BDL	n.a.		n.a.		Trinity
195	Wise	33.13	-97.44	250	467.4	0.003	BDL	BDL	n.a.		n.a.		Trinity
196	Wise	33.10	-97.44	350**	478.5	0.032	BDL	BDL	n.a.		n.a.		Trinity
197	Wise	33.06	-97.60	390	1391	0.183	0.019	BDL	n.a.		n.a.		Strawn
198	Wise	33.12	-97.55	403	537	0.006	BDL	BDL	n.a.		n.a.		Trinity
199	Parker	32.56	-97.79	180	702.6	30.967	6.246	2.196	-42.39	7.50	-6.55		Trinity
199B	Parker	32.56	-97.79	180	712.9	19.211	4.259	1.566	-46.92	6.76	-6.46		Trinity
199B	Duplicate (Isotech)					57.00	12.00	4.85	-46.26	6.98	n.a.	-188.50	
200	Hood	32.55	-97.78	368	882.9	26.714	4.092	0.042	-52.39	12.16	-0.11		Strawn
200B	Hood	32.55	-97.78	368	838.5	18.313	2.335	0.031	-51.78	14.57	-2.21		Strawn
200B	Duplicate (Isotech)					46.00	6.50	0.08	-51.57	13.16	n.a.	-195.70	
201	Hood	32.56	-97.77	470	662.8	5.410	0.878	0.206	-46.40	9.96	-6.36		Strawn
201B	Hood	32.56	-97.77	470	688.9	5.392	0.851	0.209	-47.99	10.18	-6.46		Strawn
201C	Hood	32.56	-97.77	470		5.114	0.874	0.205	-49.67	9.46	n.a.		Strawn
201C	Duplicate (Isotech)					8.00	1.30	0.34	-46.85	9.79	n.a.	-193.20	
202	Parker	32.56	-97.78	186	751.6	14.142	2.078	0.563	-44.57	10.77	-7.42		Trinity
202B	Parker	32.56	-97.78	186		3.405	0.227	0.060	-47.39	23.87	n.a.		Trinity
202B	Duplicate (Isotech)					10.00	1.20	0.36	-45.97	12.97	n.a.	-175.40	
203	Hood	32.53	-97.63	380	1036	0.144	BDL	BDL	n.a.		n.a.		Trinity
204	Parker	32.56	-97.79	200	1133.8	3.549	0.222	0.004	-42.00	29.62	-8.91		Trinity
204B	Parker	32.56	-97.79	200	1137.7	3.214	0.187	BDL	-43.58	31.92	-8.93		Trinity
204C	Parker	32.56	-97.79	200		3.506	0.216	BDL	-45.54	30.44	n.a.		Trinity
204C	Duplicate (Isotech)					4.90	0.28	BDL	-42.50	32.81	n.a.	-147.50	
205	Parker	32.56	-97.79	200	1418.3	4.335	0.468	BDL	-48.87	17.34	n.a.		Trinity
205B	Parker	32.56	-97.79	200		5.209	0.593	0.006	-47.80		-10.00		Trinity
205B	Duplicate (Isotech)					7.80	0.84		-45.62	17.41	n.a.	-182.00	
206	Parker	32.58	-97.77	330**	650.7	0.615	0.048	0.006	-50.84	22.04	-6.37		Trinity
207	Parker	32.57	-97.77	322	813.7	0.082	BDL	BDL	n.a.		n.a.		Trinity
207A	Parker	32.57	-97.77	322	815.5	0.069	BDL	BDL	n.a.		n.a.		Trinity
208	Parker	32.56	-97.79	210	912.3	2.132	0.098	BDL	-45.47	40.88	n.a.		Trinity
208B	Parker	32.56	-97.79	210	679.9	2.706	0.127	BDL	-45.27	39.57	-8.29		Trinity
209	Parker	32.56	-97.78	285	875.1	2.648	0.117	BDL	-44.83	42.30	-8.53		Trinity
209B	Parker	32.56	-97.78	285	881	2.677	0.133	BDL	-44.85	37.44	-8.56		Trinity
210	Parker	32.56	-97.79	130	1167.8	0.402	0.011	BDL	-47.60	68.05	n.a.		Trinity
211	Parker	32.57	-97.78	350	805.1	3.454	0.022	0.153	-48.90	51.07	n.a.		Strawn
211B	Parker	32.57	-97.78	350		3.552	0.161	0.026	-46.96	37.35	n.a.		Strawn
211B	Duplicate (Isotech)					5.30	0.22	BDL	-46.24	45.17	n.a.	-161.40	
211C	Parker	32.57	-97.78	350	806.9	3.435	0.129	0.018	-46.66	45.59	n.a.		Strawn

Sample ID	County	Lat.	Long.	Depth (ft)	TDS	Dissolved Methane (mg/L)	Dissolved Ethane (mg/L)	Dissolved Propane (mg/L)++	δ^{13}C methane	C1/C2+	δ^{13}C DIC	δD methane	Aquifer
212	Hood	32.51	-97.74	340	571.8	0.016	BDL	BDL	n.a.		n.a.		Trinity
213	Hood	32.51	-97.74	400	815.6	0.037	BDL	BDL	n.a.		n.a.		Trinity
214	Hood	32.52	-97.81	180	817	0.068	BDL	BDL	n.a.		n.a.		Trinity
215	Hood	32.33	-97.71	483	666.4	0.033	BDL	BDL	n.a.		n.a.		Trinity
216	Tarrant	32.84	-97.57	200**	514.8	0.015	BDL	BDL	n.a.		n.a.		Trinity
217	Tarrant	32.69	-97.15	80**	217.6	0.017	BDL	BDL	n.a.		n.a.		Woodbine
218	Tarrant	32.68	-97.15	80**	334.3	0.002	BDL	BDL	n.a.		n.a.		Trinity
219	Tarrant	32.71	-97.14	80	185.6	0.015	BDL	BDL	n.a.		n.a.		Woodbine
220	Tarrant	32.69	-97.13	180	1126.6	0.004	BDL	BDL	n.a.		n.a.		Woodbine
221	Parker	32.56	-97.79	120	929.8	2.843	0.392	0.037	-46.67	12.78	-8.48		Trinity
222	Parker	32.56	-97.78	183	648.3	2.273	0.085	BDL	-46.36	49.93	-7.63		Trinity
223	Wise	33.08	-97.42	750	486.4	0.009	BDL	BDL	n.a.		n.a.		Trinity
224	Wise	33.09	-97.42	500	522.4	0.004	BDL	BDL	n.a.		n.a.		Trinity
225	Wise	33.09	-97.42	160	486.4	0.006	BDL	BDL	n.a.		n.a.		Woodbine
226	Wise	33.04	-97.50	70	474.8	0.015	BDL	BDL	n.a.		n.a.		Trinity
227	Wise	33.00	-97.67	66	646.1	0.003	BDL	BDL	n.a.		n.a.		Trinity
228	Wise	33.00	-97.66	100**	1146	0.003	BDL	BDL	n.a.		n.a.		Trinity
229	Somervell	32.26	-97.73	400**	573.4	0.231	BDL	BDL	n.a.		n.a.		Trinity
230	Somervell	32.14	-97.80	400	511.1	0.003	BDL	BDL	n.a.		n.a.		Trinity
231	Somervell	32.15	-97.80	775	536.8	0.003	BDL	BDL	n.a.		n.a.		Trinity
232	Somervell	32.14	-97.81	400	534.5	0.139	BDL	BDL	n.a.		n.a.		Trinity
233	Somervell	32.14	-97.80	400	538.2	0.004	BDL	BDL	n.a.		n.a.		Trinity
234	Somervell	32.16	-97.78	220	451.6	0.011	BDL	BDL	n.a.		n.a.		Trinity
235	Somervell	32.18	-97.80	400	546.7	0.008	BDL	BDL	n.a.		n.a.		Trinity
236	Somervell	32.16	-97.78	140	555.2	0.015	BDL	BDL	n.a.		n.a.		Trinity
237	Hood	32.31	-97.73	1350	608.1	0.645	BDL	BDL	-50.10		n.a.		Strawn
238	Hood	32.31	-97.72	200	575.5	0.011	BDL	BDL	n.a.		n.a.		Trinity
239	Hood	32.39	-97.89	375	579.8	0.008	BDL	BDL	n.a.		n.a.		Trinity
240	Hood	32.41	-97.63	120	500.1	0.004	BDL	BDL	n.a.		n.a.		Trinity
241	Hood	32.41	-97.63	580	727.3	0.017	BDL	BDL	n.a.		n.a.		Trinity
242	Hood	32.42	-97.64	660	753.3	0.017	BDL	BDL	n.a.		n.a.		Trinity
243	Hood	32.45	-97.84	250	560.7	0.003	BDL	BDL	n.a.		n.a.		Trinity
244	Hood	32.45	-97.84	185**	455.6	0.963	0.148	BDL	-51.13	12.18	n.a.		Trinity
245	Ellis	32.48	-97.05	240	1251.8	0.014	BDL	BDL	n.a.		n.a.		Woodbine
246	Johnson	32.48	-97.24	220	1089.6	0.010	BDL	BDL	n.a.		n.a.		Woodbine
247	Johnson	32.29	-97.13	335	1263.3	0.020	BDL	BDL	n.a.		n.a.		Woodbine
248	Johnson	32.29	-97.13	330	1258.8	0.029	BDL	BDL	n.a.		n.a.		Woodbine
249	Hood	32.37	-97.73	400	875.8	0.013	BDL	BDL	n.a.		n.a.		Trinity
250	Hood	32.31	-97.84	380	506.1	0.009	BDL	BDL	n.a.		n.a.		Trinity
251	Hood	32.31	-97.84	500	693.2	0.028	BDL	BDL	n.a.		n.a.		Trinity
252	Hood	32.38	-97.88	435	643	0.016	BDL	BDL	n.a.		n.a.		Strawn
253	Hood	32.96	-97.85	350	591	0.010	BDL	BDL	n.a.		n.a.		Trinity
253A	Hood	32.96	-97.85	350	607.4	0.005	BDL	BDL	n.a.		n.a.		Trinity
254	Hood	32.97	-97.85	180	621.8	0.008	BDL	BDL	n.a.		n.a.		Trinity
254A	Hood	32.97	-97.85	180	641.1	0.005	BDL	BDL	n.a.		n.a.		Trinity

Sample ID	County	Lat.	Long.	Depth (ft)	TDS	Dissolved Methane (mg/L)	Dissolved Ethane (mg/L)	Dissolved Propane (mg/L)[++]	δ13C methane	C1/C2+	δ13C DIC	δD methane	Aquifer
255	Hood	32.96	-97.87	360	675.9	0.008	BDL	BDL	n.a.		n.a.		Trinity
255A	Hood	32.96	-97.87	360	682.6	0.005	BDL	BDL	-33.40		n.a.		Trinity
256	Hood	32.88	-97.86	200	845.4	0.008	BDL	BDL	n.a.		n.a.		Trinity
257	Hood	32.76	-97.90	325	682.7	0.008	BDL	BDL	n.a.		n.a.		Trinity
258	Hood	32.76	-97.90	100	626.4	0.048	BDL	BDL	n.a.		n.a.		Trinity
259	Hood	32.79	-97.82	180	483.8	0.009	BDL	BDL	n.a.		n.a.		Trinity
260	Hood	32.84	-97.70	300	471.9	0.008	BDL	BDL	n.a.		n.a.		Trinity
261	Ellis	32.51	-97.38	580	655.2	0.010	BDL	BDL	n.a.		n.a.		Trinity
264	Somervell	32.18	-97.71	425	561.3	0.012	BDL	BDL	n.a.		n.a.		Trinity
265	Somervell	32.27	-97.63	600	670.7	0.031	BDL	BDL	n.a.		n.a.		Trinity
266	Somervell	32.16	-97.73	450	545.7	0.013	BDL	BDL	n.a.		n.a.		Trinity
267	Somervell	32.15	-97.88	200	557.2	0.012	BDL	BDL	n.a.		n.a.		Trinity
268	Somervell	32.13	-97.86	200	502.7	0.011	BDL	BDL	n.a.		n.a.		Trinity
269	Somervell	32.21	-97.91	480	516.1	0.009	BDL	BDL	n.a.		n.a.		Trinity
270	Somervell	32.18	-97.79	282	559.2	0.019	BDL	BDL	n.a.		n.a.		Trinity
271	Somervell	32.16	-97.77	>500	585.5	0.097	BDL	BDL	n.a.		n.a.		Trinity
272	Montague	33.46	-97.63	200	1298	0.010	BDL	BDL	n.a.		n.a.		Trinity
273	Montague	33.45	-97.70	198	1015.4	0.009	BDL	BDL	n.a.		n.a.		Trinity
274	Montague	33.69	-97.55	200	488.8	0.009	BDL	BDL	n.a.		n.a.		Trinity
275	Montague	33.69	-97.57	280	578.2	0.009	BDL	BDL	n.a.		n.a.		Trinity
276	Montague	33.74	-97.56	197	684.2	0.010	BDL	BDL	n.a.		n.a.		Trinity
277	Montague	33.71	-97.56	340	659.8	0.003	BDL	BDL	n.a.		n.a.		Trinity
278	Montague	33.79	-97.62	250	623.8	0.010	BDL	BDL	n.a.		n.a.		Strawn
281	Montague	33.70	-97.78	325	453.4	0.010	BDL	BDL	n.a.		n.a.		Strawn
282	Montague	33.49	-97.88	280	1966.6	0.016	BDL	BDL	n.a.		n.a.		Strawn
283	Wise	33.36	-97.46	250	490.1	0.003	BDL	BDL	n.a.		n.a.		Trinity
284	Wise	33.38	-97.46	190	589.6	0.003	BDL	BDL	n.a.		n.a.		Trinity
285	Wise	33.38	-97.46	85	542.7	0.003	BDL	BDL	n.a.		n.a.		Trinity
286	Wise	33.35	-97.48	330	413.3	0.003	BDL	BDL	n.a.		n.a.		Trinity
287	Wise	33.11	-97.86	65	991.3	0.003	BDL	BDL	n.a.		n.a.		Strawn
288	Wise	33.11	-97.86	50	823.4	0.010	BDL	BDL	n.a.		n.a.		Strawn
289	Wise	33.14	-97.42	300	475.9	0.010	BDL	BDL	n.a.		n.a.		Trinity
290	Dallas	32.77	-97.02	250	948.5	0.020	BDL	BDL	n.a.		n.a.		Woodbine
291	Parker	32.66	-97.66	270	491.2	0.025	BDL	BDL	n.a.		n.a.		Trinity
292	Parker	32.67	-97.61	150	463.5	0.004	BDL	BDL	n.a.		n.a.		Trinity
293	Parker	32.75	-97.63	220	461.5	0.009	BDL	BDL	n.a.		n.a.		Trinity
294	Parker	32.85	-98.01	180	1174.4	0.012	BDL	BDL	n.a.		n.a.		Strawn
295	Parker	32.73	-97.67	550	744	0.009	BDL	BDL	n.a.		n.a.		Strawn
296	Parker	32.73	-97.66	220	542	0.003	BDL	BDL	n.a.		n.a.		Trinity
297	Parker	32.63	-97.57	330	487.3	0.010	BDL	BDL	n.a.		n.a.		Trinity
298	Parker	32.70	-97.68	161	500.9	0.009	BDL	BDL	n.a.		n.a.		Trinity
299	Johnson	32.29	-97.34	1126	785	0.011	BDL	BDL	n.a.		n.a.		Trinity
300	Johnson	32.29	-97.34	648	871.9	0.007	BDL	BDL	n.a.		n.a.		Trinity
301	Johnson	32.28	-97.48	1023	721.8	0.020	BDL	BDL	n.a.		n.a.		Trinity
302	Johnson	32.50	-97.21	1500	882.8	0.014	BDL	BDL	n.a.		n.a.		Trinity

Sample ID	County	Lat.	Long.	Depth (ft)	TDS	Dissolved Methane (mg/L)	Dissolved Ethane (mg/L)	Dissolved Propane (mg/L)[++]	δ[13]C methane	C1/C2+	δ[13]C DIC	δD methane	Aquifer
303	Johnson	32.50	-97.21	829	845.2	0.012	BDL	BDL	n.a.		n.a.		Trinity
304	Johnson	32.50	-97.17	1355	864.8	0.017	BDL	BDL	n.a.		n.a.		Trinity
305	Johnson	32.50	-97.17	861	920.7	0.015	BDL	BDL	n.a.		n.a.		Trinity
306	Hood	32.30	-97.68	400	642.6	0.013	BDL	BDL	n.a.		n.a.		Trinity
307	Hood	32.32	-97.72	425	529.4	11.329	0.785	0.232	-55.41	22.52	-6.77		Trinity
308	Hood	32.36	-97.83	30	609.5	0.021	BDL	BDL	n.a.		n.a.		Trinity
309	Hood	32.36	-97.83	464	648.8	0.049	BDL	BDL	n.a.		n.a.		Trinity
310	Hood	32.33	-97.89	370	522	0.014	BDL	BDL	n.a.		n.a.		Trinity
311	Hood	32.40	-97.81	357	586.9	0.308	0.022	BDL	n.a.		n.a.		Trinity
312	Hood	32.40	-97.79	379	608.3	0.015	BDL	BDL	n.a.		n.a.		Trinity
313	Hood	32.40	-97.78	253	611.9	0.024	BDL	BDL	n.a.		n.a.		Trinity
314	Hood	32.50	-97.72	500	790.2	0.013	BDL	BDL	n.a.		n.a.		Strawn
319	Parker	32.57	-97.82	80	997.2	0.006	BDL	BDL	n.a.		n.a.		Trinity
320	Hood	32.52	-97.64	335	2012.5	0.016	BDL	BDL	n.a.		n.a.		Trinity
321	Hill	31.94	-97.32	1260	222.3	0.016	BDL	BDL	n.a.		n.a.		Trinity
322	Hill	31.96	-97.32	1350	240.3	0.016	BDL	BDL	n.a.		n.a.		Trinity
323	Hill	31.94	-97.32	1280	1716.1	0.023	BDL	BDL	n.a.		n.a.		Trinity
326	Johnson	32.34	-97.21	1655	125.7	0.022	BDL	BDL	n.a.		n.a.		Trinity
327	Johnson	32.26	-97.39	1205	602.6	0.022	BDL	BDL	n.a.		n.a.		Trinity
328	Johnson	32.37	-97.54	1061	150.2	0.018	BDL	BDL	n.a.		n.a.		Trinity
329	Johnson	32.37	-97.54	468	511.9	0.031	BDL	BDL	n.a.		n.a.		Trinity
330	Johnson	32.19	-97.57	105	515.2	0.002	BDL	BDL	n.a.		n.a.		Trinity
331	Johnson	32.19	-97.57	92	1001.6	0.008	BDL	BDL	n.a.		n.a.		Trinity
332	Johnson	32.17	-97.53	790	653.4	0.013	BDL	BDL	n.a.		n.a.		Trinity
333	Johnson	32.15	-97.52	200**	656.6	0.018	BDL	BDL	n.a.		n.a.		Trinity
334	Johnson	32.20	-97.56	50	566.4	0.006	BDL	BDL	n.a.		n.a.		Trinity
335	Johnson	32.23	-97.55	850	681.7	BDL	BDL	BDL	n.a.		n.a.		Strawn
336	Tarrant	32.78	-97.03	310	952.8	0.011	BDL	BDL	n.a.		n.a.		Woodbine
337	Hood	32.40	-97.65	596	720.1	0.004	BDL	BDL	n.a.		n.a.		Strawn
338	Hood	32.54	-97.75	440	1011.9	0.121	BDL	BDL	n.a.		n.a.		Strawn
338A	Hood	32.54	-97.75	440	1008.9	BDL	BDL	BDL	n.a.		n.a.		Strawn
339	Hood	32.54	-97.74	450**	890.3	0.367	BDL	BDL	n.a.		n.a.		Strawn
340	Hood	32.54	-97.74	>400	860.6	1.335	0.039	BDL	-49.57	63.45	-5.78		Strawn
340A	Hood	32.54	-97.74	>400	884	1.029	0.028	0.014	-51.20	51.08	n.a.		Strawn
341	Johnson	32.44	-97.34	130	656.7	0.010	BDL	BDL	n.a.		n.a.		Woodbine
342	Johnson	32.44	-97.34	775	727.9	0.004	BDL	BDL	n.a.		n.a.		Trinity
343	Johnson	32.44	-97.33	100	468.4	0.191	BDL	BDL	n.a.		n.a.		Woodbine
344	Tarrant	32.88	-97.14	80	308.5	0.007	BDL	BDL	n.a.		n.a.		Woodbine
345	Tarrant	32.88	-97.13	92	173.3	0.005	BDL	BDL	n.a.		n.a.		Woodbine
346	Parker	32.56	-97.78	250**	828.5	1.646	BDL	BDL	n.a.		n.a.		Trinity
347	Parker	32.57	-97.79	240	1380.9	2.252	0.133	BDL	-44.90	31.70	-11.45		Trinity
347A	Parker	32.57	-97.79	240	1335.3	2.739	0.193	BDL	-47.11	26.61	n.a.		Trinity
348	Parker	32.57	-97.78	180**	761.8	2.011	0.102	BDL	-48.03	36.93	-3.28		Trinity
348A	Parker	32.57	-97.78	180**	801.9	1.761	0.107	BDL	-48.39	30.68	n.a.		Trinity
349	Hood	32.52	-97.79	199	852.8	0.553	0.039	BDL	-43.74	26.75	n.a.		Trinity

Sample ID	County	Lat.	Long.	Depth (ft)	TDS	Dissolved Methane (mg/L)	Dissolved Ethane (mg/L)	Dissolved Propane (mg/L)[++]	$\delta^{13}C$ methane	C1/C2+	$\delta^{13}C$ DIC	δD methane	Aquifer
350	Hood	32.50	-97.73	380	795	0.009	BDL	BDL	n.a.		n.a.		Trinity
351	Parker	32.58	-97.77	345	872.9	0.023	BDL	BDL	n.a.		n.a.		Trinity
351A	Parker	32.58	-97.77	345	872.6	0.053	0.018	BDL	n.a.		n.a.		Trinity
352	Parker	32.57	-97.78	280**	814	0.302	BDL	BDL	n.a.		n.a.		Trinity
353	Parker	32.58	-97.79	270	819.1	0.611	0.027	BDL	-43.05	42.14	n.a.		Trinity
354	Parker	32.58	-97.77	380	797.9	0.603	BDL	BDL	n.a.		n.a.		Strawn
354A	Parker	32.58	-97.77	380	799.2	0.166	0.008	BDL	-34.79	41.19	n.a.		Strawn
355	Parker	32.57	-97.78	225	628.6	20.086	2.745	0.123	-48.61	13.31	-7.67		Trinity
355A	Parker	32.57	-97.78	225	830.6	12.662	1.776	BDL	-51.30	13.37	n.a.		Trinity
356	Parker	32.56	-97.79	225**	1185.9	1.752	0.111	0.035	-43.07	24.46	-9.41		Trinity
356A	Parker	32.56	-97.79	220**	1210.8	1.386	0.082	0.031	-42.89	25.32	n.a.		Trinity
357	Parker	32.57	-97.79	240	697.4	3.059	0.084	BDL	-46.45	67.22	-6.98		Trinity
357A	Parker	32.57	-97.79	240	861	2.064	0.064	BDL	-43.72	60.76	n.a.		Trinity
358	Parker	32.57	-97.78	360	650.3	14.572	2.195	0.930	-48.17	9.66	-6.50		Strawn
358A	Parker	32.57	-97.78	360	874.5	18.366	3.393	1.688	-41.27	7.58	n.a.		Strawn
359	Parker	32.58	-97.77	300	977.2	0.076	BDL	BDL	n.a.		n.a.		Trinity
360	Parker	32.58	-97.78	322	608.8	1.212	0.104	0.007	-46.03	21.03	-6.53		Trinity
361	Parker	32.57	-97.79	210	708.7	3.331	0.281	BDL	-48.74	22.13	-6.24		Trinity
362	Parker	32.56	-97.79	180	754.7	4.397	0.345	BDL	-48.46	23.85	-8.00		Trinity
363	Parker	32.56	-97.79	120	1344.7	1.298	0.071	BDL	-42.80	34.02	-10.70		Trinity
364	Parker	32.59	-97.76	325	1051.1	0.009	BDL	BDL	n.a.		n.a.		Trinity
364A	Parker	32.59	-97.76	325	1066.1	0.017	BDL	BDL	n.a.		n.a.		Trinity
365	Parker	32.59	-97.76	375	871.5	0.002	BDL	BDL	n.a.		n.a.		Trinity
365A	Parker	32.59	-97.76	375	868.2	0.001	BDL	BDL	n.a.		n.a.		Trinity
366	Parker	32.59	-97.75	376	890	BDL	BDL	BDL	n.a.		n.a.		Trinity
367	Parker	32.60	-97.76	>400	752.4	0.003	BDL	BDL	n.a.		n.a.		Trinity
367A	Parker	32.60	-97.76	>400	767.3	0.032	BDL	BDL	n.a.		n.a.		Trinity
368	Parker	32.59	-97.77	160	764.8	0.008	BDL	BDL	n.a.		n.a.		Trinity
369	Parker	32.57	-97.79	300	783.8	12.114	1.69	0.156	-44.98	12.65	n.a.		Strawn
369A	Parker	32.57	-97.79	300	814.1	11.902	1.66	0.166	-51.36	12.58	n.a.		Strawn
370	Hood	32.52	-97.80	220	870.8	0.156	BDL	BDL	n.a.		n.a.		Trinity
371	Somervell	32.22	-97.66	60	600.4	0.050	BDL	BDL	n.a.		n.a.		Trinity
372	Somervell	32.16	-97.89	850	516	BDL	BDL	BDL	n.a.		n.a.		Strawn
374	Denton	33.15	-97.34	380	662.7	BDL	BDL	BDL	n.a.		n.a.		Trinity
375	Denton	33.15	-97.35	350	646.9	BDL	BDL	BDL	n.a.		n.a.		Trinity
376	Tarrant	32.92	-97.40	470	676.3	BDL	BDL	BDL	n.a.		n.a.		Trinity
377	Hill	32.17	-97.25	1580	785.1	0.020	BDL	BDL	n.a.		n.a.		Trinity
378	Hill	32.18	-97.25	1590	775.3	0.020	BDL	BDL	n.a.		n.a.		Trinity
399	Denton	33.23	-97.33	360	806.9	0.003	BDL	BDL	n.a.		n.a.		Trinity
400	Denton	33.08	-97.16	800	816.3	0.027	BDL	BDL	n.a.		n.a.		Trinity
401	Denton	33.11	-97.04	168	695.8	0.042	BDL	BDL	n.a.		n.a.		Woodbine
402	Hood	32.32	-97.72	186	623.2	1.077	0.004	BDL	-79.63	565.26	n.a.		Trinity
403	Hood	32.33	-97.72	380	613	2.720	0.116	0.010	-58.06	41.40	n.a.		Trinity
404	Hood	32.32	-97.72	370	621.3	0.777	0.008	BDL	-56.38	180.31	n.a.		Trinity
405	Hood	32.33	-97.72	500	606.1	2.676	0.105	BDL	-59.93	47.66	n.a.		Trinity

Sample ID	County	Lat.	Long.	Depth (ft)	TDS	Dissolved Methane (mg/L)	Dissolved Ethane (mg/L)	Dissolved Propane (mg/L)++	δ13C methane	C1/C2+	δ13C DIC	δD methane	Aquifer
406	Hood	32.32	-97.72	395	618.8	0.927	BDL	BDL	-57.15	7515.6	n.a.		Trinity
407	Tarrant	32.63	-97.23	1490	1044.4	0.026	BDL	BDL	n.a.		n.a.		Trinity
408	Tarrant	32.64	-97.22	721	822	0.022	BDL	BDL	n.a.		n.a.		Trinity
409	Tarrant	32.64	-97.22	1450	1044.2	0.017	BDL	BDL	n.a.		n.a.		Trinity
410	Tarrant	32.65	-97.20	1500	1039.3	0.019	BDL	BDL	n.a.		n.a.		Trinity
411	Tarrant	32.63	-97.20	1539	1163.4	0.016	BDL	BDL	n.a.		n.a.		Trinity
412	Parker	32.56	-97.75	330	792.5	BDL	BDL	BDL	n.a.		n.a.		Trinity
413	Parker	32.58	-97.76	320	718.3	0.001	BDL	BDL	n.a.		n.a.		Trinity
414	Parker	32.58	-97.76	330	819.7	0.011	BDL	BDL	n.a.		n.a.		Trinity
415	Tarrant	32.60	-97.23	1551	1070.8	0.021	BDL	BDL	n.a.		n.a.		Trinity
416	Tarrant	32.60	-97.23	771	820.2	0.016	BDL	BDL	n.a.		n.a.		Trinity
417	Tarrant	32.59	-97.25	720**	759.5	0.017	BDL	BDL	n.a.		n.a.		Trinity
418	Tarrant	32.58	-97.25	717	789.2	0.015	BDL	BDL	n.a.		n.a.		Trinity
419	Tarrant	32.58	-97.24	720**	812.3	0.005	BDL	BDL	n.a.		n.a.		Trinity
420	Tarrant	32.58	-97.24	720**	793.7	0.005	BDL	BDL	n.a.		n.a.		Trinity
421	Tarrant	32.57	-97.25	720**	831.2	0.004	BDL	BDL	n.a.		n.a.		Trinity
422	Johnson	32.54	-97.26	1562	954	0.016	BDL	BDL	n.a.		n.a.		Trinity
423	Johnson	32.54	-97.26	818	776.9	0.003	BDL	BDL	n.a.		n.a.		Trinity
424	Tarrant	32.56	-97.25	1526	992.8	0.022	BDL	BDL	n.a.		n.a.		Trinity
425	Tarrant	32.56	-97.25	770	817.4	0.004	BDL	BDL	n.a.		n.a.		Trinity
426	Johnson	32.54	-97.27	1400	984.9	0.034	BDL	BDL	n.a.		n.a.		Trinity
427	Tarrant	32.55	-97.22	1589	979.1	0.003	BDL	BDL	n.a.		n.a.		Trinity
428	Johnson	32.52	-97.23	1557	928.2	0.016	BDL	BDL	n.a.		n.a.		Trinity
429	Johnson	32.48	-97.24	1570	1483.1	0.025	BDL	BDL	n.a.		n.a.		Trinity
430	Johnson	32.49	-97.28	1490	945.8	0.017	BDL	BDL	n.a.		n.a.		Trinity
431	Johnson	32.45	-97.29	1494	848.1	0.013	BDL	BDL	n.a.		n.a.		Trinity
432	Johnson	32.49	-97.31	1460	881.2	0.010	BDL	BDL	n.a.		n.a.		Trinity
433	Parker	32.68	-97.82	600	549.1	0.005	BDL	BDL	n.a.		n.a.		Strawn
434	Parker	32.57	-97.79	180**	788.5	6.024	0.584	BDL	-45.69	19.33	n.a.		Trinity
434A	Parker	32.57	-97.79	180**	791.1	4.832	0.494	0.053	-52.36	17.11	n.a.		Trinity
435	Hood	32.52	-97.80	180	806.2	0.274	0.026	BDL	-40.88	19.79	n.a.		Trinity
436	Hood	32.52	-97.76	320	941.6	1.146	0.076	BDL	-50.09	28.46	n.a.		Trinity
443	Hood	32.53	-97.76	420	896.2	3.317	0.201	BDL	-50.47	30.94	n.a.		Strawn
444	Hood	32.53	-97.76	220	895.8	3.061	0.145	BDL	-51.40	39.70	n.a.		Trinity
445	Hood	32.55	-97.76	400	958.2	0.045	BDL	BDL	n.a.		n.a.		Trinity
446	Parker	32.58	-97.77	100	809.7	0.002	BDL	BDL	n.a.		n.a.		Trinity
446A	Parker	32.58	-97.77	100	800.2	0.019	BDL	BDL	n.a.		n.a.		Trinity
447	Parker	32.58	-97.77	100**	806.6	0.527	0.005	BDL	-34.57	195.86	n.a.		Trinity
447A	Parker	32.58	-97.77	100**	810.4	0.674	0.015	0.006	-36.65	64.06	n.a.		Trinity
448	Parker	32.58	-97.77	100**	810.8	0.814	BDL	BDL	-36.75	7628.6	n.a.		Trinity
449	Denton	32.99	-97.18	800	861.2	0.007	BDL	BDL	n.a.		n.a.		Trinity
450	Denton	32.99	-97.18	1200	1346.2	0.005	BDL	BDL	n.a.		n.a.		Trinity
451	Denton	32.99	-97.20	618	794.1	0.010	BDL	BDL	n.a.		n.a.		Trinity
452	Denton	32.99	-97.20	720	788.3	0.002	BDL	BDL	n.a.		n.a.		Trinity
455	Denton	33.07	-97.05	1763	1080.3	0.033	BDL	BDL	n.a.		n.a.		Trinity

Sample ID	County	Lat.	Long.	Depth (ft)	TDS	Dissolved Methane (mg/L)	Dissolved Ethane (mg/L)	Dissolved Propane (mg/L)++	δ^{13}C methane	C1/C2+	δ^{13}C DIC	δD methane	Aquifer
456	Denton	33.08	-97.04	922	955.1	0.033	BDL	BDL	n.a.		n.a.		Trinity
457	Denton	33.09	-97.03	1770	1090.2	0.035	BDL	BDL	n.a.		n.a.		Trinity
458	Denton	33.08	-97.05	1784	989.5	0.038	BDL	BDL	n.a.		n.a.		Trinity
459	Denton	33.08	-97.07	1708	957.2	0.051	BDL	BDL	n.a.		n.a.		Trinity
477	Denton	33.25	-97.22	125	728.2	0.004	BDL	BDL	n.a.		n.a.		Woodbine
479	Denton	33.06	-97.13	125	146.3	0.002	BDL	BDL	n.a.		n.a.		Woodbine
480	Denton	33.09	-97.21	1390	885.5	0.035	BDL	BDL	n.a.		n.a.		Trinity
481	Denton	33.12	-97.20	1390	926.9	0.035	BDL	BDL	n.a.		n.a.		Trinity
482	Denton	33.12	-97.17	1138	771	0.005	BDL	BDL	n.a.		n.a.		Trinity
483	Denton	33.12	-97.15	1406	949.6	0.041	BDL	BDL	n.a.		n.a.		Trinity
502	Denton	33.07	-96.89	2332	1307.6	0.014	BDL	BDL	n.a.		n.a.		Trinity
503	Denton	33.08	-96.88	1432	918.3	0.015	BDL	BDL	n.a.		n.a.		Trinity
504	Denton	33.08	-96.88	2409	1164.9	0.014	BDL	BDL	n.a.		n.a.		Trinity
508	Denton	33.27	-97.23	1150	1058.1	0.085	BDL	BDL	n.a.		n.a.		Trinity
509	Denton	33.26	-97.23	1050	635.6	0.003	BDL	BDL	n.a.		n.a.		Trinity
510	Denton	33.26	-97.23	850	634.6	0.019	BDL	BDL	n.a.		n.a.		Trinity
511	Denton	33.26	-97.23	1100	634.4	0.003	BDL	BDL	n.a.		n.a.		Trinity
512	Denton	33.26	-97.23	1100	742.4	0.003	BDL	BDL	n.a.		n.a.		Trinity
513	Denton	33.24	-97.25	250	699.2	0.003	BDL	BDL	n.a.		n.a.		Woodbine
519	Denton	33.11	-97.05	800	839.8	0.006	BDL	BDL	n.a.		n.a.		Trinity
523	Denton	33.34	-97.35	400	661.8	0.075	BDL	BDL	n.a.		n.a.		Trinity
524	Denton	33.06	-97.35	550	642.9	0.002	BDL	BDL	n.a.		n.a.		Trinity
525	Denton	32.98	-97.27	400	733.8	0.009	BDL	BDL	n.a.		n.a.		Trinity
526	Denton	33.09	-97.14	735	741.2	0.006	BDL	BDL	n.a.		n.a.		Trinity
528	Denton	33.20	-97.21	730**	738.2	0.014	BDL	BDL	n.a.		n.a.		Trinity
530	Cooke	33.44	-97.46	700	526.1	0.006	BDL	BDL	n.a.		n.a.		Trinity
531	Denton	33.10	-97.14	650	754.7	0.011	BDL	BDL	n.a.		n.a.		Trinity
532	Johnson	32.33	-97.33	693	780.4	0.012	BDL	BDL	n.a.		n.a.		Trinity
533	Hood	32.54	-97.73	500	1024.1	10.337	0.907	0.070	-51.24	20.30	n.a.		Strawn
533B	Hood	32.54	-97.73	500	901	13.442	1.027	0.046	-54.90	23.82	n.a.		Strawn
533C	Hood	32.54	-97.73	500	1077.8	18.119	1.555	0.075	-45.12	21.15	n.a.		Strawn
534	Hood	32.46	-97.77	265	616.4	0.004	BDL	BDL	n.a.		n.a.		Trinity
534B	Hood	32.46	-97.77	265	608.4	0.004	BDL	BDL	n.a.		n.a.		Trinity
534C	Hood	32.46	-97.77	265	618.1	0.027	BDL	BDL	n.a.		n.a.		Trinity
535	Denton	33.08	-97.14	1500	824	0.017	BDL	BDL	n.a.		n.a.		Trinity
537	Denton	33.09	-97.11	1575	897.2	0.006	BDL	BDL	n.a.		n.a.		Trinity
538	Denton	33.11	-97.10	1364	932.4	0.008	BDL	BDL	n.a.		n.a.		Trinity
539	Denton	33.08	-97.08	1380	950.6	0.007	BDL	BDL	n.a.		n.a.		Trinity
540	Denton	33.07	-97.09	1656	961.5	0.009	BDL	BDL	n.a.		n.a.		Trinity
541	Denton	33.17	-97.11	750	844.9	0.004	BDL	BDL	n.a.		n.a.		Trinity
542	Denton	33.18	-97.24	440	728.4	0.004	BDL	BDL	n.a.		n.a.		Trinity
544	Hood	32.49	-97.76	420	782.5	2.613	0.032	0.013	-57.42	119.88	n.a.		Strawn
544A	Hood	32.49	-97.76	420	782.5	0.960	0.003	BDL	-54.07	705.15	n.a.		Strawn
548	Denton	33.28	-97.30	1010	1076.4	BDL	BDL	BDL	n.a.		n.a.		Trinity
549	Denton	33.27	-97.34	970	729.6	0.032	BDL	BDL	n.a.		n.a.		Trinity

Sample ID	County	Lat.	Long.	Depth (ft)	TDS	Dissolved Methane (mg/L)	Dissolved Ethane (mg/L)	Dissolved Propane (mg/L)++	$\delta^{13}C$ methane	C1/C2+	$\delta^{13}C$ DIC	δD methane	Aquifer
551	Parker	32.56	-97.76	363	848.2	10.305	1.836	0.343	-50.01	9.34	n.a.		Trinity
552	Parker	32.56	-97.76	385	826.7	3.025	0.434	0.106	-51.51	11.21	n.a.		Trinity
553	Parker	32.56	-97.76	360**	832.1	19.377	2.816	0.718	-50.22	10.99	n.a.		Trinity
554	Parker	32.56	-97.77	320	827.9	0.757	0.131	0.039	n.a.		n.a.		Trinity
555	Hood	32.49	-97.76	310	829.3	22.712	0.386	0.102	-50.90	93.42	n.a.		Trinity

**: Depth estimated from temperature; BDL: below detection limits; n.a.: not analyzed
Note: Latitude and longitude truncated to only 4 significant digits

Table S3. Dissolved gas isotope characterization results from Isotech®

Sample ID	County	Lat.	Long.	Depth (ft)	Dissolved CH_4 (C1) (mg/L)	Dissolved C_2H_6 (C2) mg/L)	Dissolved C_3H_8 (C3) (mg/L)	C1/C2+	$\delta^{13}C1$ (‰)	$\delta^{13}C2$ (‰)	$\delta^{13}C3$ (‰)	δDC1 (‰)	δDC2 (‰)	δDC3 (‰)
199B	Parker	32.56	-97.79	180	57.0	12.00	4.85	7.0	-46.26	-34.03	-30.30	-188.50	-164.50	-139.90
200B	Hood	32.55	-97.78	368	46.0	6.50	0.08	13.2	-51.57	-33.05	-26.40	-195.70	-155.60	n.a.
201C	Hood	32.56	-97.77	470	8.0	1.30	0.34	9.8	-46.85	-33.30	-28.20	-193.20	n.a.	n.a.
202B	Parker	32.56	-97.78	186	10.0	1.20	0.36	13.0	-45.97	-33.70	-29.90	-175.40	n.a.	n.a.
204C	Parker	32.56	-97.79	200	4.9	0.28	<0.0003	32.8	**-42.50**	**-18.90**	n.a.	**-147.50**	n.a.	n.a.
205B	Parker	32.56	-97.79	200	7.8	0.84	<0.0003	17.4	-45.62	-31.50	n.a.	-182.00	n.a.	n.a.
211B	Parker	32.57	-97.78	350	5.3	0.22	0.04	40.2	-46.24	**-28.20**	n.a.	**-161.40**	n.a.	n.a.

n.a.: not analyzed
Note: Latitude and longitude truncated to only 4 significant digits

Table S4. Selected gas analytical results from gas wells.

Sample	Source.	Date	County	Lat.	Long.	C1 (%)	C2 (%)	C3 (%)	C_1/C_2+C_3	$\delta^{13}C_1$ (‰)	δDC_1 (‰)	$\delta^{13}C_2$ (‰)	$\delta^{1}D_2$ (‰)	$\delta^{13}C_3$ (‰)
Gas wells sampled by BEG – Approximate location, last digits deleted														
BG-1	Barnett	14-Jan-2015	Parker	32.70	-97.79	77.45	13.26	4.75	4.30	-47.89	-197.0	-35.63	n.a.	-31.89
BG-2	Barnett	14-Jan-2015	Parker	32.70	-97.79	77.62	13.03	4.71	4.38	-47.60	-196.0	-35.55	n.a.	-31.86
BG-3	**Strawn**	14-Jan-2015	Parker	32.67	-97.80	82.08	7.96	3.86	6.94	-47.38	-180.1	-34.49	n.a.	-31.10
BG-4	Barnett	14-Jan-2015	Parker	32.67	-97.80	76.52	13.82	5.02	4.06	-48.59	-196.1	-35.80	n.a.	-31.94
BG-5	Barnett	22-Apr-2015	Hood	32.51	-97.84	75.1	14.44	5.43	3.78	-48.03	-198.1	-37.35	n.a.	-33.21
BG-6	Barnett	22-Apr-2015	Parker	32.66	-97.81	75.31	14.37	5.27	3.83	-48.72	-191.8	-36.29	n.a.	-32.16
BG-7	Barnett	22-Apr-2015	Parker	32.72	-97.63	79.4	12.58	4	4.79	-44.54	-168.0	-32.96	n.a.	-28.40
BG-8	Barnett	22-Apr-2015	Parker	32.72	-97.63	79.69	12.42	3.93	4.87	-44.14	-169.4	-32.75	n.a.	-28.27
BG-9	Barnett	22-Apr-2015	Parker	32.58	-97.72	77.16	13.47	4.57	4.28	-47.22	-183.8	-35.25	n.a.	-30.83
Water wells with flowing gas sampled by the BEG – Approximate location, last digits deleted														
BS#555	**Strawn**	3-Nov-2014	Hood	32.49	-97.76	91.49	4.90	2.11	13.04	n.a.	n.a.	n.a.	n.a.	n.a.
BS#556	**Strawn**	3-Nov-2014	Hood	32.46	-97.77	49.72	0.33	0.08	121.35	n.a.	n.a.	n.a.	n.a.	n.a.
Water wells with flowing gas sampled by RRC – Location estimated, GPS portable device														
Lake Country Acres	Strawn		Parker			86.32	5.32	1.32	13.0	-47.51	n.a.	n.a.	n.a.	n.a.
Gas wells from the Parker-Hood cluster (RRC, 2014) – Locations from IHS														
Mund-Lipscomb 1-H	Barnett	3-Mar-2011	Parker	32.560278	-97.804399	78.22	12.88	4.24	4.57	-47.51	-194.5	-36.83	n.a.	-32.50
Teal PNG	Barnett	4-Jan-2011	Parker	32.557710	-97.787390	77.33	13.08	4.6	4.41	-46.53	-184.1	-35.15	n.a.	-31.03
Teal INJ	Barnett	4-Jan-2011	Parker	32.557710	-97.787390	78.22	12.99	4.41	4.50	-46.53	-182.9	-35.19	n.a.	-31.02
Butler PNG	Barnett	4-Jan-2011	Parker	32.557695	-97.787684	77.60	13	4.5	4.43	-46.52	-184.4	-35.26	n.a.	-31.20
Butler INJ	Barnett	4-Jan-2011	Parker	32.557695	-97.787684	78.19	13	4.42	4.49	-46.50	-182.4	-35.15	n.a.	-31.02
Palo Pinto County case gas wells (RRC, 2015) – Locations from IHS														
Singleton#1H	Barnett	5-Sep-2014	Palo Pinto	32.9955444	-98.1447389	76.78	12.87	5.18	4.25	-46.79	-207.90	-37.91	n.a.	-33.09
Singleton#3H	Barnett	5-Sep-2014	Palo Pinto	32.9969722	-98.1430889	75.89	12.48	5.05	4.33	-44.51	-202.50	-37.51	n.a.	-33.21
Singleton#4H	Barnett	5-Sep-2014	Palo Pinto	32.9905389	-98.1486139	76.83	12.71	5.12	4.31	-46.69	-207.00	-37.93	n.a.	-33.16
Singleton B Unit#1H	Barnett	5-Sep-2014	Palo Pinto	32.9981361	-98.1408417	77.22	12.41	4.98	4.44	-46.86	-205.50	-38.36	n.a.	-33.66
Singleton B Unit#2H	Barnett	5-Sep-2014	Palo Pinto	32.9967083	-98.1369194	77.08	12.45	4.95	4.43	-46.86	-207.00	-38.39	n.a.	-33.83
Singleton B Unit#3RH	Barnett	5-Sep-2014	Palo Pinto	32.9965758	-98.1369108	76.06	12.37	4.92	4.40	-45.89	-202.70	-38.04	n.a.	-33.60
Singleton B Unit#4H	Barnett	5-Sep-2014	Palo Pinto	32.9931206	-98.1320800	75.78	12.81	5.30	4.18	-45.58	-204.90	-37.79	n.a.	-33.18
Singleton B Unit#5H	Barnett	5-Sep-2014	Palo Pinto	32.9950288	-98.1263057	76.43	12.80	5.23	4.24	-46.94	-202.20	-38.70	n.a.	-34.06
JT Cook2	Barnett	5-Sep-2014	Palo Pinto	32.9929460	-98.1529080	76.62	12.70	5.46	4.22	-46.51	-204.80	-36.23	n.a.	-30.54
JT cook A-1	Barnett	5-Sep-2014	Palo Pinto	33.0009598	-98.1481719	83.36	5.34	3.85	9.07	-47.26	-187.70	-35.27	n.a.	-31.88

n.a.: not analyzed

References:

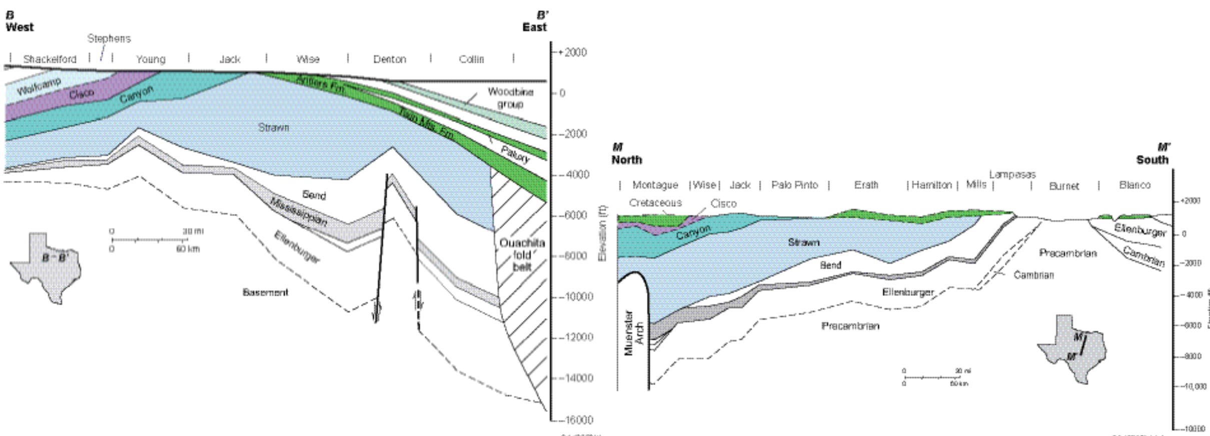
RRC, 2014, Water well complaint investigation report: Silverado on the Brazos neighborhood, Parker County, Texas. p. 19.

RRC, 2015, Review of analytical data – Murray Complaint (7B-10736) and Singleton Complaint (7B-10612). p. 13.

SI-1 General Geology and Hydrogeology

Regional Geology in the Barnett Shale Footprint

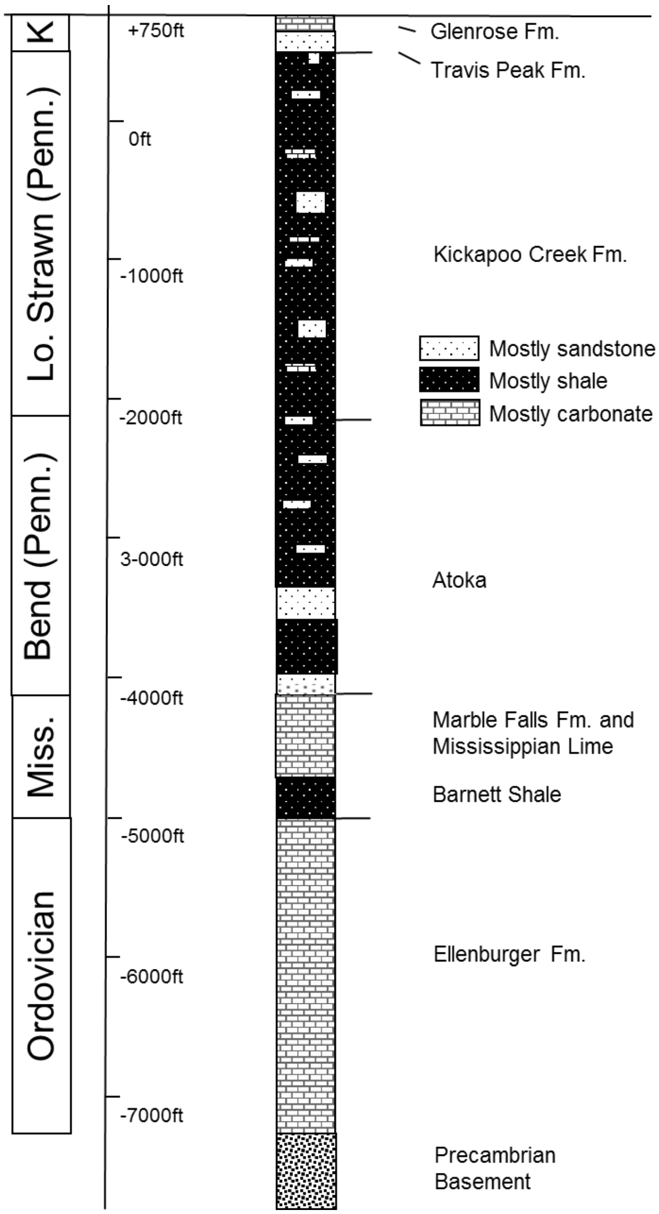
Paleozoic Rocks: The Barnett Shale is a siliceous mudrock composed mostly of quartz and clay minerals with some minor calcite (Loucks and Ruppel, 2007) and deposited in what is now the Fort Worth Basin (Figure S4). The Barnett Shale Fm. exists under wide areas in Texas and crops out on the flanks of the Llano Uplift 150 miles to the south of the core area (Tarrant, Denton and Johnson counties). Most current boundaries of the formation are erosional but it is bounded by tectonic features to the east by the Ouachita thrust foldbelt (old, eroded, and buried mountain range) and to the north by uplifted material (Muenster and Red River arches). The Barnett Shale gets thicker and deeper toward the NE close to the core area and dips gently toward the core area and the Muenster Arch from the south and west where it thins considerably. Its base reaches a maximum depth of ~9,000 ft in the NE confines of its extent. The depth to the top of the Barnett ranges from about ~4,500 ft in northwestern Jack County to about ~2,500 ft in southwest Palo Pinto County to about ~3,500 ft in northern Hamilton County to about ~6,000 ft in western McLennan County to about 7,000 to 8,000 ft in the Dallas-Fort Worth area. Further west in Throckmorton, Shackelford, and Callahan Counties where it is not an exploration target, the depth to the Barnett varies between ~4,000 and 2,000 ft.



Source: Nicot et al. (2013)

Figure S4. EW and NS Generalized ross-sections through the Fort Worth Basin

The Mississippian Barnett Shale was deposited in a calm anoxic environment at the edge a large continental mass and where it collected and preserved significant amounts of organic matter. It overlies the Ellenburger dolomite of Ordovician age, itself resting on a Precambrian basement with an intervening Cambrian sandstone. Uneventful mostly carbonate sedimentation continues with breaks during the Mississippian period until early in the Pennsylvanian period (Figure S5) when sedimentation nature and amount changed due to an approaching continent. Sedimentation increased substantially, progressively lost its marine origin, and became more siliciclastic with sediments coming from the north and east. The continental collision created the now buried (in Texas) Ouichita Mountains and drove some of the Barnett rocks into the pressure and temperature zone favorable for oil and gas production. The Barnett Shale became thermogenetically mature during the Permian and Mesozoic periods during which time most of the migration and trapping occurred (Montgomery et al., 2005; Pollastro et al., 2007).



Note: Miss. = Mississippian; Penn. = Pennsylvanian; Lo. Strawn = Lower Strawn; K = Cretaceous
Note: 1000 ft = 305 m

Figure S5. Simplified stratigraphic column taken in the middle of Hood and Parker county line.

The Pennsylvanian rocks include the Bend conglomerate that contains important gas reservoirs produced mostly in the 1950's through the 1970's and other formations from the Bend Group of Atokan age. They underlie the Strawn Fm. (Brown et al., 1973; Cleaves, 1975) of direct interest to this study. The Atoka-Strawn sediments can reach 5000+ ft close to the Ouachita thrust belt but their thickness decreases considerably on the Bend Arch, 100 miles to the west. Younger Pennsylvanian formations such as those in the Canyon and Cisco Groups crop out further to the west (Nicot et al., 2014) and are not of concern to this study (Figure S6).

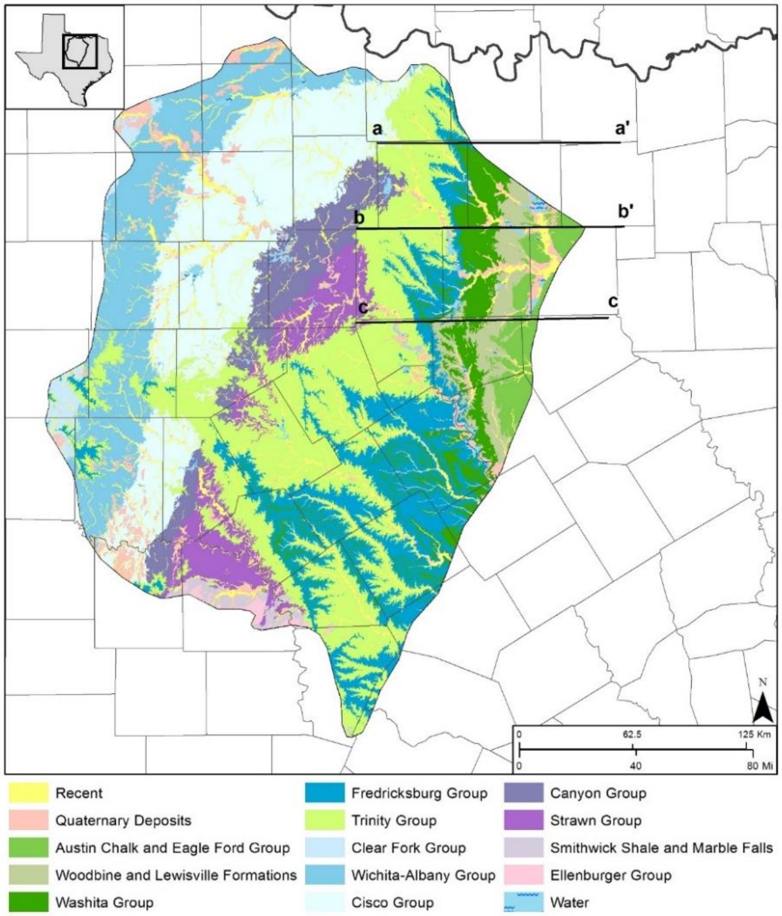


Figure S6. Geologic map of the Barnett Shale footprint.

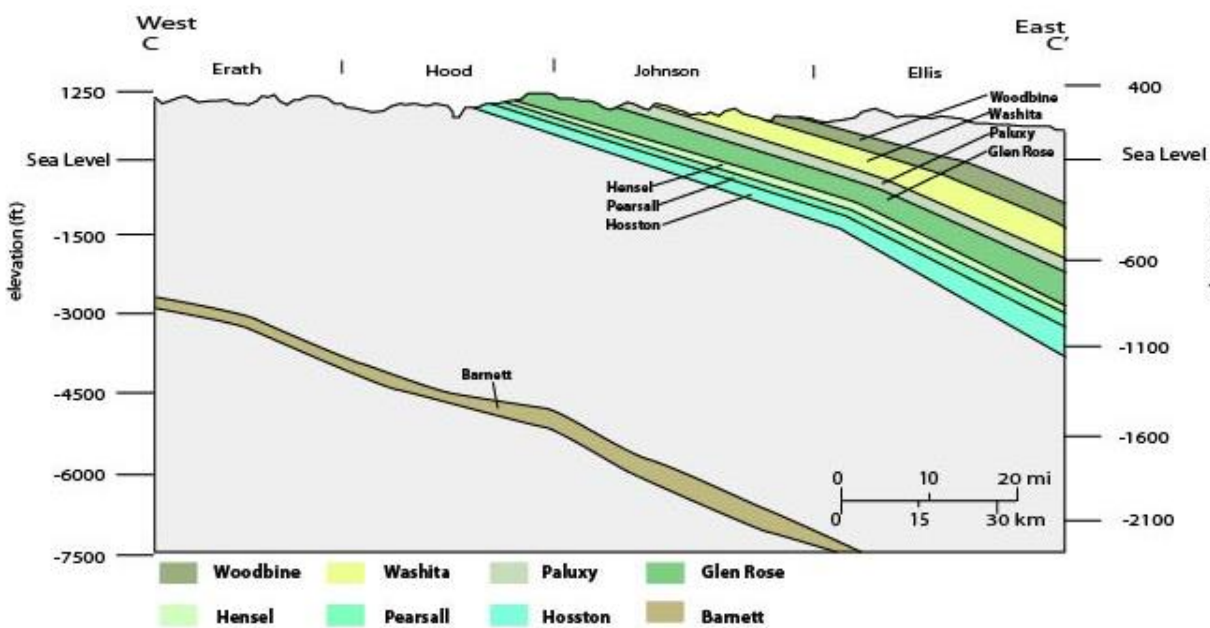
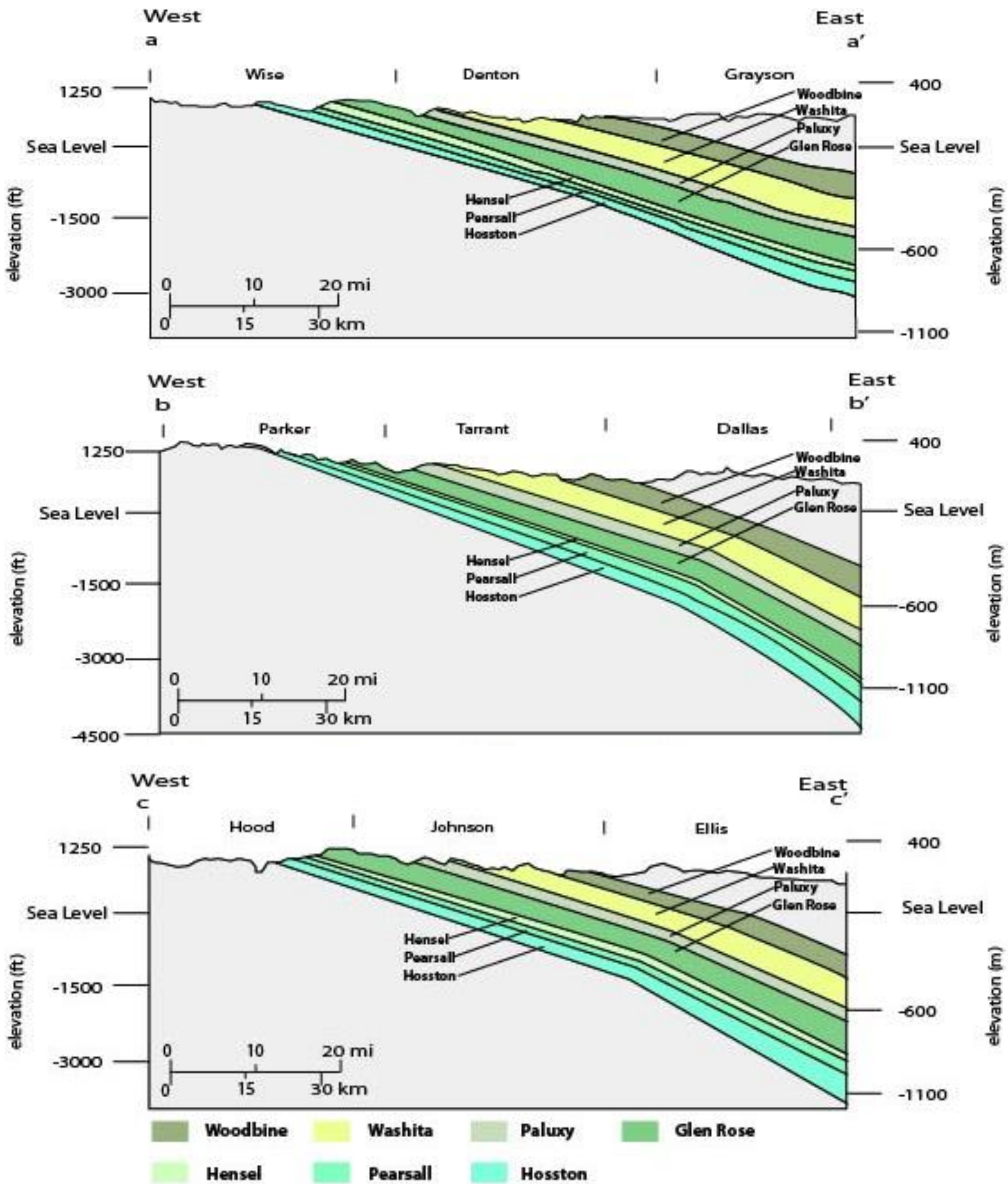


Figure S7. EW cross-section of the Barnett Shale footprint along the Parker–Hood county line.

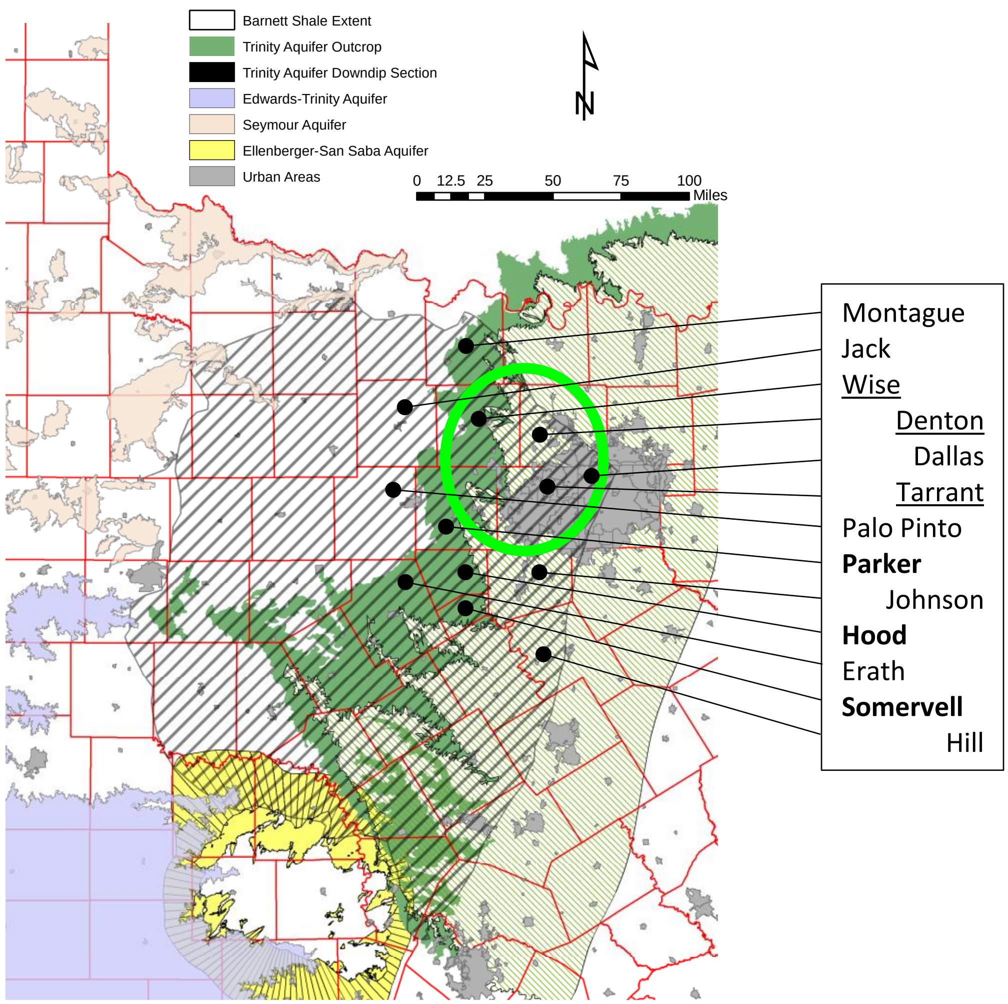


Note: See Figure S6 for cross-section locations

Figure S8. EW cross-sections of the shallow vertical section of the Barnett Shale footprint.

The Strawn Group is divided into the upper and lower Strawn and their boundary, striking EEW and dipping north, is located just north of the Parker–Hood cluster (Herkommer and Denke, 1982). The Upper Strawn has been academically studied because of the reasonable numbers of outcrops (e.g., Cleaves, 1975; Erxleben and Cleaves, 1985; and Cleaves and Erxleben, 1985).

Erxleben and Cleaves (1985, Fig.5) and Cleaves and Erxleben (1985, Figs.5 and 8) give an overview the paleogeography of the Upper Strawn: elongate fluvio-deltaic centers ("sand") with strandplain-embayment areas in between (mud or "shales"). Cleaves and Erxleben (1985, Fig.13) show 8 separate cycles in Palo Pinto and Wise counties as well as other counties to the west and north deposited during the Upper Strawn. Their work suggests that the neighboring Parker County contains, in the Upper Strawn, similar depositional history with EW to NW-SE trending fluvial channels embedded in a shale matrix. On the other hand, the Lower Strawn Group (mostly the Kickapoo Creek Fm.) is not well exposed and outcrops are relatively small. It is mostly known through well logs. Overall the Lower Strawn is more shaley, particularly at its base and transitions to the fluvio-deltaic environments of the upper Strawn at its top. Local studies such as in southeast Parker County prompted by oil and gas exploration show deltaic environments at the top of the Lower Strawn (Herkommer and Denke, 1982;Ehlmann and Ehlmann, 1985) with sand bodies embedded into a shale matrix and that act as reservoirs. Oil and gas traps may be generated by transitioning to a finer material or by a reduction in permeability of the reservoir sandstone / siltstone.



Note: Barnett Shale extent is approximate. Llano uplift where the Barnett Shale crops out is outlined by the Ellenburger Aquifer in yellow. The lower downdip limit of the aquifers is set when salinity reaches 3,000 ppm. Green circle represents the core area (Wise, Denton, and Tarrant counties). Source: TWDB.

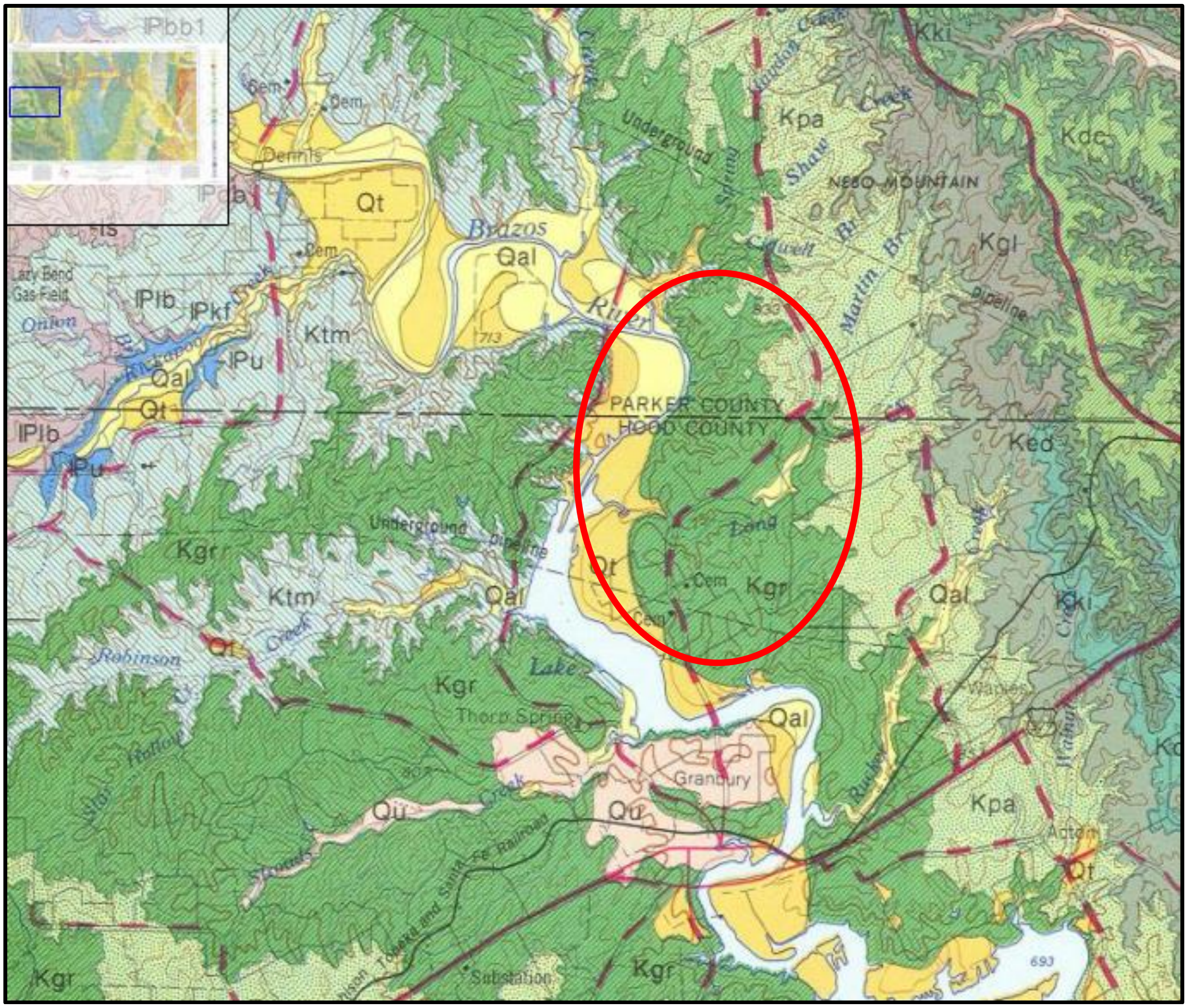
Figure S9. Barnett Shale extent, major aquifers, and cited counties.

Shallow Geology: The main aquifer in the area is the Trinity aquifer system of Cretaceous age (Harden et al, 2004; Bené et al., 2007; Intera, 2014; EPA. 2015; and references therein) and on the western edge of the study area small aquifers of Paleozoic age (Nicot et al., 2013). The Trinity aquifer dips towards the west. Finer stratigraphy can sometimes be established at the base of the Trinity Aquifer in the Travis Peak / Twin Mountains Fm. (that is, below the Glen Rose Fm.): Hosston Sands and Hensell Sands separated by the Pearsall Shale (which, incidentally, has been hydraulically fractured in South Texas) (Figure S8). Figure S9 shows a large area for the Trinity Aquifer outcrop but it should be noted that the aquifer is made up of several sandy strata that quickly become confined by interspersed aquitards. The various water bearing strata progressively dip to the east and are productive beyond the Barnett Shale boundary to the east.

Presence of Faults: In addition to the Ouichita thrust belt on the eastern edge of the Barnett, a major fault, “the Mineral Wells fault”, trending SW-NE has been described in southern Denton and northern Parker counties. It is visible on Figure 1 in the core area outlined by the lack of gas wells. It seems to be a fault rooted in the basement and that has been active to the end of the Paleozoic (Pollastro et al., 2007, p.412). Several minor normal faults parallel to it are present in the basin including in southern Parker County (see map by Ewing, 1991). There is not fault at the surface in the Parker County area of interest but several exist at depth impacting at least some of the Paleozoic section and they do not seem to impact the Cretaceous section. Flippin (1982, p.142) commenting on Erath County suggests that faults could impact the Strawn Group. However it is not clear how high these faults penetrate into the Paleozoic section. We attempted unsuccessfully to find public domain seismic coverage of the area.

Geology of the Parker–Hood County Area

The geology of the Parker County area is similar to the rest of the Barnett footprint: a Cretaceous veneer on top of a thick Pennsylvanian sedimentary package that crops out farther to the west. Some of the easternmost outcrops in the region are exposed on the left-hand side of Figure S10 (Plb, Pkf, Pdb, and Pu, representing the base of the Upper Strawn, i.e., Lazy Bend and other formations). Then starting from the left-hand side and from the oldest Cretaceous formation in the area: Twin Mountains Fm. (Ktm), Glen Rose limestone (Kgr), Paluxy Fm. (Kpa), together forming the Trinity Group partially covered by Quaternary alluvium (Qal) and terrace deposits (Qt), especially in the Brazos River floodplain, and other Quaternary sediments (Qu) and then to the east the base of the Fredericksburg Group (Kgl, Ked, Kdc). Cretaceous layers dip slightly to the east and create small escarpments, bluffs, and mesas. Note that the only aquifer in the area of interest is hosted by the Twin Mountains Fm. (sometimes called Travis Peak Fm.), the Paluxy aquifer is too far to the east and the Glen Rose Limestone is an aquitard if not unconfined and part of the vadose zone. Note too that the Twin Mountains aquifer is at least partially confined in the area by the Glen Rose and that it can exchange water with the Brazos River (gaining / losing depending on Lake Granbury levels).



Source: Dallas GAT Sheet 1/25,000 (Geological Atlas of Texas),
Note: red circle encloses the Parker–Hood cluster. Continuous and dotted red lines represent major roads

Figure S10. Surface geology in the vicinity of the Parker–Hood cluster

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SI-2 Sampling and Chemical Analyses

Before sampling of a domestic well, the well was continuously pumped until the temperature, pH, and ORP stabilized to insure a representative aquifer sample was obtained, approximately 15-30 min (measured with a YSI Pro Plus or Hanna HI9828 probe). If possible, the pump was turned on by the well owner before arrival of the sampling crew. Public water supply wells, generally turned on, were sampled after making sure the same parameters had stabilized. During sampling, the rate was throttled at approximately 5 gallons per minute. Water samples were collected for dissolved methane, ethane, and stable isotope measurements using a flow-through serum bottle sampling technique with 70 mL glass serum vials capped with 20mm blue chlorobutyl septa (Bellco part number 2048-11800) and crimped with an aluminum seal. The vials are septa sealed prior to filling with water and two syringes (one fill and one back-vent syringe) are used to fill the vial with groundwater from the well using a small length of clear tubing directly connected to the well valve. The samples were collected by diverting a small portion of the well outflow through tubing ending in the syringe needle (Figure S11a). A BD 1 inch, 23 gauge hypodermic needle (Fisher # 14-836-A) was pushed through the rubber septa. At least five vial volumes of water were flushed through the vial (Figure S11b). The outflow needle was then removed followed immediately by the inflow needle leaving the vial filled with groundwater that had no contact with the atmosphere during sampling. This procedure of pre-capping, filling and flushing the vials is essential to ensure that no dissolved gas is lost during sampling, no residual gas bubbles remain, and to minimize the potential for atmospheric contamination. The flow-through sampling technique also has the added benefit that excess dissolved gas (i.e., gas bubbles formed in the well) is not collected. In this way, the serum bottle technique is similar to the copper-tube sample collection technique commonly used for noble gas samples. It should be noted that, short of using a back-pressure regulator with the copper tube approach or taking a sample directly downhole, samples with methane concentrations close to or higher than the dissolved methane saturation level at atmospheric pressure (25-30 mg/l) will only be qualitative. Water samples collected in the serum bottles are immediately stored on ice in the


(a)

(b)

Note: (a) hose is hooked to the groundwater well outlet (often a faucet, outside of the picture at the bottom). After a valve controlling the flow from the well, the flow is split into a section ending with an open hose and a much shorter section controlled by another valve. This shorter section is fitted with a Luer lock syringe body to which a 1-inch 23-gauge hypodermic needle is attached; (b) vial with thick blue chlorobutyl septum and crimped with an aluminum seal, a needle is connected to the sampling hose whereas the other needle is open to the atmosphere. Water can be seen squirting out of the vial (upper left corner).

Figure S11. Illustration of the sampling approach.

field, acidified with 0.1ml of 12N hydrochloric acid upon arrival in the laboratory (within less than 3 days of sampling) and stored in a refrigerator until analysis, which is accomplished within two weeks of sampling.

Sampling Teams.

BEG specialists trained Inform Environmental LLC personnel to sample water wells following the procedure outlined above. Inform Environmental LLC performed the comprehensive initial sampling whereas the BEG team focused, in a second time, on the Parker–Hood cluster where they took duplicates and triplicates as well as samples from additional wells. The consistency in results where sampling by the 2 teams overlap validates their respective results.

Chemical Analyses

Dissolved gas concentrations were calculated using measured headspace gas concentrations and Henry's law relationships (Kampbell and Vandegrift, 1998). A headspace of pure helium is created in the serum vial by simultaneously injecting 5ml of pure helium while removing 5ml of water using two Hamilton Gastight series 1000 headspace syringes. C1-C3 alkane concentrations were measured with an Agilent 7890 gas chromatograph using a flame ionization detector. Detection limits of 0.001, 0.002, and 0.003 mg/L for methane, ethane and propane were achieved. All gas chromatographic analyses were calibrated with Sigma Aldrich Scott Gas natural gas analytical standard (Product # 30301) and internally calibrated methane standards. Less than 0.5% analytical error was routinely achieved on standard reference gases. Replicate analyses of dissolved gas samples, which combines errors associated with sample preparation and analysis were lower than 4%. In terms of error of dissolved methane concentration, a 4% total error correlates to an uncertainty of +/- 0.5mg/L for a sample with 8.0 mg/L dissolved methane and +/- 0.05 mg/L for a sample with a 1.0 mg/L concentration of dissolved methane. Samples with sufficiently high dissolved methane concentrations (>~0.3 mg/L) were analyzed for stable carbon isotope composition of methane. For carbon isotope measurements, methane was combusted to CO_2 and analyzed for its $\delta^{13}C$ value using a Delta Plus Thermo Fisher Scientific Isotope Ratio Mass Spectrometer directly coupled to the GC (GC-IRMS). Carbon isotopes were calibrated with respect to NBS-19 having a $\delta^{13}C_{V\,PDB}$ equal to +1.95‰. Replicate analyses of dissolved methane samples resulted in a standard deviation of +/- 0.35‰ for $\delta^{13}C$. DIC $\delta^{13}C$ values and concentrations were measured using a Thermo Electron Gas Bench II coupled to a Thermo Electron MAT 253 Isotope Ratio Mass Spectrometer (IRMS). All DIC $\delta^{13}C$ values are reported relative to NBS-19 having a $\delta^{13}C_{V\,PDB}$ equal to +1.95‰ with a standard deviation of +/- 0.15‰. Major cations and anions of water samples were analyzed on two Dionex ICS-1100 Ion Chromatography systems. Samples were diluted with de-ionized water so no component was over 100 ppm. DIC concentrations were obtained while measuring carbon isotope composition on most samples and estimated from charge balance for the remaining samples.

SI-3 Summary of Previous Studies

All previous studies related to dissolved methane in the Barnett Shale footprint stemmed from lawsuits. Lawsuits can sometimes bring to light many technical details or, on the other hand, sequester them from the public domain. There are three major lawsuits and they labelled after the county in which the events occurred: Wise, Parker (the Parker–Hood cluster), and Palo Pinto. From a legal standpoint, each of these cases included several lawsuits and counter-lawsuits, details of which are not discussed here. Of the three lawsuits, only the latter is still active. See Table S5 for a summary timeline of events and sampling campaigns.

The oldest major case dates back from 1977 in Wise County after methane was found bubbling in a few water wells tapping the Trinity aquifer in the south of the county. The case was closed more than 20 years later. A large number of conventional gas wells producing from the Boonsville Gas Field (Atoka Bend Conglomerate) were found to have short surface casing that let stray gas into the aquifer. The source of the stray gas is not described but likely from the Paleozoic layers below the Trinity. Some interpreted a TDS somewhat higher regionally as a natural plume due to upward flow that would also bring in methane (RRC, 1979, p.102; Mitchell Energy Corporation v. Bartlett, 1997). Parallels with the Parker County case, either natural (somewhat higher TDS plume) or anthropogenic (surface casings too short) origin for headspace methane, are striking. We did not find information concerning the Wise County case about dissolved gas concentration or isotope composition, only references about gas bubbling (headspace was likely analyzed though). Our own sampling in the same area did find some low level dissolved methane. Similarly, EPA retrospective study sampled 23 wells in Wise County up to 3 times between September 2011 and May 2013 (EPA, 2015). Most samples display little methane, most <0.01 mg/l with a maximum of 0.132 mg/L (no methane carbon isotope work done, concentrations are too low).

The second major lawsuit, the Parker County case, in particular when related to the presence of dissolved methane in the Silverado neighborhood, has generated a lot of attention nationally and has led to several major sampling campaigns in the Parker–Hood cluster area. The first sampling event in the area occurred in 2006 in a site just west of the Silverado neighborhood across the Brazos River (Mund-Lipscomb #1H gas well) and is related to the Parker County case only spatially as a part of the Parker–Hood cluster. Bubbles were observed in water wells but no documentation of dissolved gas analysis was found in the course of this research. Nearby water wells were resampled in 2011. The “Silverado” subset (although some water wells are outside of the Silverado neighborhood) has been sampled multiple times since 2010 by various industry-supporting consultants, by EPA consultants, and by academics. RRC (2014) summarizes data collected in the context of the Parker County lawsuit. Data were first collected in December 2010 then quarterly (Aug. 2011, May 2012, Aug. 2012, Nov.-Dec. 2012, Feb. 2013). Observed methane concentrations from the Parker County sampling are in general relatively low. In particular, the sampling after the initial complaint with a maximum value of 2.8 mg/L (Purdue well) is puzzling especially <u>when some wells are described as bubbling</u>. Sampling events by other groups (EPA, Duke University, this research) show higher concentrations compatible with historical field observations such as bubbling wells and methane fluxes high enough to keep a flame steady which are more compatible with the general narrative by the Range Resources team. We are inclined to think that procedures for dissolved gas sampling were not fully followed. A correlative conclusion is that there would be no actual overall increase in dissolved methane concentration through time as asserted in RRC (2014).

More recently (in 2013), and generally less well-known, a water well blowout occurred in Palo Pinto County near the town of Oran at the eastern edge of the economically viable Barnett Shale but still clearly within its overall footprint and produced the third lawsuit. It seems that methane gas accumulated within a well house, reaching the explosive limit. The RRC is still investigating as of September 2016 after releasing preliminary information (RRC, 2015). Five ~220 ft-dep water wells were sampled and four of them show methane concentrations at 55, 38, 14, 2.4 mg/L with significant ethane (thermogenic origin corroborated by C isotope signature). The water well dissolved gas shows some sign of biodegradation, which suggests, as it did in the Parker–Hood cluster, that microbes are acclimated to the presence of natural gas and therefore that it is not a recent incursion. Other elements are similar to the Parker–Hood cluster: Barnett Shale gas is wet, dissolved gas exists at high concentrations with a similar thermogenic imprint, and previous observations of several methane seeps exist not far from the site.

Sampling methodology in previous studies

Accurate measurement of volatile dissolved gas concentrations rely on abiding by the procedures set for the main two steps that are field sampling and laboratory measurement. In the Parker County case, dissolved gas concentration measurements seem to have been tasked to various accredited laboratories (apparently following the EPA method RSK 175) whereas Isotech did the various isotope analyses. Field sampling was also performed by different consultants raising the issue of consistency between the several sampling campaigns. Some (December 2010 early January 2011 sampling) seems to have used the direct fill method (see Molofsky et al., 2016 for details) combined with low-flow sampling whereas consultants who did the RRC-mandated quarterly sampling followed the inverted bottle method.

Samples taken late December 2010 early January 2011 are not consistent with the rest of the sampling campaign for high dissolved methane concentration wells, either taken before that period by EPA or after that period by RRC. They show a maximum of 2.8 ppm. The fizzy water allegedly due to cavitation is more likely due to methane exsolving as we observed subsequently in many wells. A possible explanation for the relatively low concentrations is some gas loss occurring either during sampling or maybe in the laboratory; Molofsky et al. (2016) have shown that, for relatively low dissolved methane concentrations, say <15 mg/L, the sampling method has little effect on the final result.

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Table S5. Timeline of dissolved methane-related events in Parker and Hood counties

Date	Event	Comments
1984-1986	Gas wells of Center Mills field spudded and P&A.	The field is very shallow just below the unconformity and very close to the Parker–Hood cluster. Well depth was ~400 ft
11/1985	Water well located next to BS#533 drilled and abandoned (collapse related to abundant flowing gas)	From TDLR database.
1986	Lake Country Acres well#2 (LCA#2) drilled (LCA#1 was drilled earlier at an unknown date	
1988	Sampling of LCA#2	C3+ detected in 1988 (RRC routinely analyses for VOC's whose sampling and analytical methods do not capture methane and ethane)
2002	Mr. Hayley's well drilled (Silverado)	No methane problems described in the drilling record
2002	Mesa Grande PWS (Granbury, Hood County) sampling	Sampling detect C3+ in water. Same report mentioned unidentified properties in the vicinity with earlier complaints (1990's) of dissolved natural gas
2003	LCA#4 drilled and immediately P&A LCA#5 drilled	Gas production of 122,000 cf gas/day (Kreitler 2014) at a depth of ~400 ft
2005	One of Mr. Lipsky's wells drilled (Silverado)	No methane problems described in the drilling record
2005	Mr. Hurst well drilled (Silverado)	Abundant methane detected which led to the highly publicized photo of the gas being flared (well depth is 180 ft). It is also noted in the driller log.
2006	Mund-Lipscomb #1H well hydraulically fractured	Located on the western shore of the Brazos river
10/2006	Water well #BS556 drilled and abandoned (but not plugged)	From TDLR database. Sampled for flowing gas.
2009	Butler #1H and Teal #1H wells HF'ed; production started	These are the 2 horizontal gas wells cited in the various lawsuits
08/2010	Complaint by Mr. Lipsky to EPA about presence of natural gas in the water well	
	RRC sampled headspace and water	
10/2010	EPA involved and sampled Mr. Lipsky and Mr. Hayley water well	
12/7/2010	Emergency order by EPA to operator of Teal and Butler wells (Range Resources) to conduct research on the source and extent of contamination, provide drinking water to affected residents, and develop a plan to mitigate contamination in the aquifer (EPA, 2013).	High methane concentration found in Mr. Lipsky's well seemingly matching Barnett Shale gas as well as presence of benzene above the MCL (5 μg/L) at 6.84 μg/L.

Date	Event	Comments
12/2010-01/2011	Sampling of several water wells by EPA and Range Resources Consultant #1 (headspace and dissolved gas)	
01/19-20/2011	RRC hearing – Range Resources and their experts present – EPA and well owners not present	
03/2011	RRC ruled that Range Resources is not responsible for presence of dissolved methane.	
08/2011	Sampling of water wells in the vicinity of Mund-Lipscomb #1H well	
03/2012	EPA retracted its emergency order	
12/2012	Water well #BS555 drilled and abandoned (but not plugged). Another well drilled in 5/2012 located less than a mile north was plugged and abandoned because of excessive natural gas flow.	From TDLR database. Sampled for flowing gas.
05/2012-02/2013	Quarterly sampling by Range Resources Consultant #2 under RRC supervision	
2012-2013	Duke University sampling (Darrah et al., 2014's Barnett data)	Dissolved methane concentrations in general much higher than EPA's or RRC-related sampling
09/2013	RRC sampling by Consultant #3 following new complaints by Silverado well owners	
02/2014	Sampling by some Silverado well owners	
05/2014	RRC closed case open in 2013	
12/2013-01/2015	University of Texas sampling	Sampling of the Parker–Hood cluster but also much broader sampling of the entire Barnett Shale play

Dissolved light alkane data collected by other entities

Here we reproduced data from non-peer reviewed documents. Table S6 includes most results from the EPA and RRC sampling related to the Parker County case. Data is found in the lawsuit hearing documents and in RRC (2014). Table S7 reproduces data from the recent EPA sampling in Wise County (EPA, 2015) whereas Table S8 shows preliminary results from the still active Palo Pinto case (RRC, 2015).

Table S6. Non-BEG Parker–Hood cluster dissolved methane data collected by RRC, EPA and other parties

Well No.	Date	Lat.	Long.	Methane C(1) (mg/L)	Ethane (C2) (mg/L)	Propane (C3) (mg/L)	C1/C2+C3	δ13C C1 $(^0/_{00})$	δD C1 $(^0/_{00})$	δ13C C2 $(^0/_{00})$	δ13C C3 $(^0/_{00})$
WW01-GW	24-Aug-2011	32.56118	-97.81202	0.2500	0.0004	n.d.	1171.88	n.a.	n.a.		
WW02-GW	24-Aug-2011	32.56051	-97.81234	0.0020	0.0000	n.d.	101.35	n.a.	n.a.		
WW03-GW	24-Aug-2011	32.56056	-97.81222	11.0000	2.0000	0.0670	10.08	-49.47	-203.70		
WW04-GW	25-Aug-2011	32.56413	-97.80663	5.7000	0.7300	0.0006	14.63	n.a.	n.a.		
WW05-GW	25-Aug-2011	32.56310	-97.80530	6.4000	0.8100	0.0005	14.81	-47.24	-180.60		
WW06-GW	25-Aug-2011	32.56291	-97.81202	0.0063	0.0002	n.d.	65.63	n.a.	n.a.		
WW07-GW	24-Aug-2011	32.56781	-97.81236	0.0052	0.0002	n.d.	51.32	n.a.	n.a.		
WW08-GW	24-Aug-2011	32.56807	-97.81303	0.0001	0.0000	n.d.	8.41	n.a.	n.a.		
WW09-GW	25-Aug-2011	32.56667	-97.82264	0.0570	0.0007	n.d.	144.43	n.a.	n.a.		
WWW01-WEL	**27-Dec-2010**	32.55833	-97.79361	**0.4000**	0.0240	n.d.	31.25	-46.53	-166.00		
WWW01-WEL	14-May-2012	32.55833	-97.79361	1.3600	0.1200	n.d.	21.25	-46.24	-178.20		
WWW01-WEL	17-Aug-2012	32.55833	-97.79361	0.5500	0.0416	n.d.	24.79	-46.00	-174.90		
WWW01-WEL	30-Nov-2012	32.55833	-97.79361	2.1200	0.2340	n.d.	16.99	-46.36	-179.50		
WWW01-WEL	15-Feb-2013	32.55833	-97.79361	1.3200	0.1010	n.d.	24.50	-46.44	-180.90		
WWW02-PER	**28-Dec-2010**	32.55917	-97.78806	**2.8000**	0.3600	0.0041	14.47	-51.46	-191.30	-32.26	n.a.
WWW02-PER	11-May-2012	32.55917	-97.78806	1.4100	n.d.	0.0027	1436.11	-49.93	-187.20	-32.03	n.a.
WWW02-PER	17-Aug-2012	32.55917	-97.78806	4.2400	n.d.	0.0213	547.42	-50.50	-196.00	-32.50	-26.2
WWW02-PER	30-Nov-2012	32.55917	-97.78806	20.1000	3.5000	0.0668	10.63	-50.48	-196.80	-32.80	-28.1
WWW02-PER	18-Feb-2013	32.55917	-97.78806	8.8000	1.7400	0.0242	9.39	-51.19	-194.60	-32.97	-25.6
WWW02-PER	27-Sep-2013	32.55917	-97.78806	21.9000	3.0400	0.1450	13.08	-50.66	-195.90	-32.91	-27.1
WWW02-PER	27-Sep-2013	32.55917	-97.78806	22.9000	3.0400	0.1450	13.68	-50.62	-198.20	-32.91	-27.1
WWW02-PER	15-Feb-2014	32.55917	-97.78806	42.0000	6.0000		13.13	n.a.	n.a.		
WWW04-ABB	**29-Dec-2010**	32.56028	-97.78556	**0.2600**	0.0120	n.d.	40.63	n.a.	n.a.		
WWW04-ABB	12-May-2012	32.56028	-97.78556	0.1400	0.0080	n.d.	32.65	-44.40	-112.00		
WWW05-MAU	**29-Dec-2010**	32.56083	-97.78583	**0.2700**	0.0087	n.d.	58.19	n.a.	n.a.		
WWW05-WEL	12-May-2012	32.56083	-97.78583	0.2000	0.0066	n.d.	57.25	-44.28	-103.10		
WWW06-THO	**28-Dec-2010**	32.56	-97.78944	**0.1900**	0.0074	n.d.	48.14	n.a.	n.a.		
WWW06-THO	13-May-2012	32.56	-97.78944	0.2930	0.0889	n.d.	6.18	-42.16	-131.80		
WWW06-THO	17-Aug-2012	32.56	-97.78944	0.7710	0.0261	n.d.	55.39	-42.07	-127.00		
WWW06-THO	1-Dec-2012	32.56	-97.78944	0.5770	0.0350	n.d.	30.91	-41.82	-124.00		
WWW06-THO	15-Feb-2013	32.56	-97.78944	0.3910	0.0095	n.d.	76.85	-41.09	-128.00		

Well No.	Date	Lat.	Long.	Methane C(1) (mg/L)	Ethane (C2) (mg/L)	Propane (C3) (mg/L)	C1/C2+C3	δ13C C1 ($^0/_{00}$)	δD C1 ($^0/_{00}$)	δ13C C2 ($^0/_{00}$)	δ13C C3 ($^0/_{00}$)
WWW07-MER	**29-Dec-2010**	32.56	-97.79	**0.4900**	0.0170	n.d.	54.04	n.a.	n.a.		
WWW07-MER	11-May-2012	32.56	-97.79	0.4910	0.0204	n.d.	45.13	-43.45	-143.00		
WWW07-MER	18-Aug-2012	32.56	-97.79	0.5960	0.0311	n.d.	35.93	-43.22	-140.90		
WWW07-MER	30-Nov-2012	32.56	-97.79	1.6300	0.0629	n.d.	48.59	-43.15	-138.40		
WWW07-MER	18-Feb-2013	32.56	-97.79	0.8340	0.0251	n.d.	62.30	-43.50	-141.90		
DOM#1	26-Oct-2010			20.1000	5.2700	2.8200	5.24	n.a.	n.a.		
DOM#1	21-Dec-2010			15.2000	n.d.	n.d.		n.d.	n.d.		
WWW08-LIP	**6-Jan-2011**	32.56306	-97.79111	**2.3000**	0.6000	0.1500	6.14	-46.11	-185.60	-34.07	-30.29
WWW08-LIP	6-Jul-2011	32.56306	-97.79111					-46.25	-186.30	-33.98	-30.12
WWW08-LIP	27-Sep-2013	32.56306	-97.79111	8.6000	1.8500	1.2800	5.92	-46.63	-187.90	-34.15	-30.36
DOM#2	26-Oct-2010			0.6270	0.0385	0.0021	29.47	n.d.	n.d.		
WWW08A-LIP	6-Jul-2011	32.56306	-97.79111					-46.50	-183.60	-33.93	n.a.
WWW08A-LIP	27-Sep-2013	32.56306	-97.79111	2.9800	0.4490	0.0912	10.93	-46.51	-174.20	-33.34	-27.0
WWW08A-LIP	15-Feb-2014	32.56306	-97.79111	76.0000	15.0000		9.50	n.a.	n.a.		
WWW08A-LIP	16-Jul-2014	32.56306	-97.79111	51.0000	11.0000	4.4000	6.83	n.a.	n.a.		
WWW09-STI	**30-Dec-2010**	32.56389	-97.78861	**0.6700**	0.0750	0.0160	14.62	NA	NA		
WWW09-STI	4-Jan-2011	32.56389	-97.78861					-46.45	-163.20	-32.35	-29.19
WWW09-STI	11-May-2012	32.56389	-97.78861	2.4400	0.4630	0.1860	7.76	-46.65	-186.00	-33.51	-29.71
WWW10-HAY	**29-Dec-2010**	32.56472	-97.79	**0.1200**	0.0081	n.d.	40.74	n.a.	n.a.		
WWW10-HAY	12-May-2012	32.56472	-97.79	0.4860	0.0938	0.0340	7.79	n.a.	n.a.		
WWW10-HAY	28-Aug-2012	32.56472	-97.79	0.3090	0.0413	0.0110	11.87	n.a.	n.a.		
WWW10-HAY	2-Dec-2012	32.56472	-97.79	0.3340	0.0590	0.0113	9.39	n.a.	n.a.		
WWW10-HAY	17-Feb-2013	32.56472	-97.79	0.1950	0.0153	n.d.	35.05	n.a.	n.a.		
WWW11-SAN	**30-Dec-2010**	32.56333	-97.78528	**n.d**.	n.d.	n.d.		n.a	n.a		
WWW11-And	11-May-2012	32.56333	-97.78528	0.0019	n.d.	n.d.		n.a	n.a		
WWW11-And	17-Aug-2012	32.56333	-97.78528	0.0504	0.0022	n.d.	63.00	-42.30	-112.00	n.a.	n.a.
WWW11-And	1-Dec-2012	32.56333	-97.78528	0.0109	n.d.	n.d.		n.a	n.a		
WWW11-And	16-Feb-2013	32.56333	-97.78528	0.0057	n.d.	n.d.		n.a	n.a		
WWW13-STR	**30-Dec-2010**	32.56111	-97.795	**1.0000**	0.1300	n.d.	21.15	-46.43	-187.20	-32.22	n.a.
WWW13-STR	12-May-2012	32.56111	-97.795	2.6500	0.4190	n.d.	17.39	-45.94	-178.30	-32.04	n.a.
WWW13-STR	18-Aug-2012	32.56111	-97.795	3.4800	0.3340	n.d.	28.65	-45.74	-173.60	-31.15	n.a.
DUP	18-Aug-2012	32.56111	-97.795	3.7100	0.2700	n.d.	37.79	-45.74	-173.60		
WWW13-STR	2-Dec-2012	32.56111	-97.795	5.6400	0.7790	n.d.	19.91	-46.16	-181.30	-31.8	n.a.
WWW13-STR	17-Feb-2013	32.56111	-97.795	5.4300	0.4420	n.d.	33.78	-46.30	-184.40	-31.8	n.a.
WWW13-STR	26-Feb-2013	32.56111	-97.795					n.a	n.a		
WWW13-STR	15-Aug-2013	32.56111	-97.795					n.a	n.a		
WWW14A-HUR	**28-Dec-2010**	32.56250	-97.79528	**0.4500**	0.0190	n.d.	65.13	n.a	n.a		
WWW14A-HUR	13-May-2012	32.56250	-97.79528	1.1500	0.0963	n.d.	32.84	-43.84	-150.60		
WWW14A-HUR	18-Aug-2012	32.56250	-97.79528	0.9140	0.0423	n.d.	59.42	-42.62	-130.80		
WWW14A-HUR	2-Dec-2012	32.56250	-97.79528	0.6990	0.0705	n.d.	27.27	-42.45	-132.00		
WWW14A-HUR	17-Feb-2013	32.56250	-97.79528	0.6850	0.0486	n.d.	38.76	-42.68	-143.00		
DOM#3	21-Dec-2010	32.56275	-97.79448	2.8300	n.d.	n.d.		n.a	n.a		
DOM#4	26-Oct-2010	32.56256	-97.79565	1.5100	n.d.	n.d.		n.a	n.a		
WWW15-HUR	**28-Dec-2010**	32.56278	-97.79417	**0.8300**	0.0560	n.d.	40.76	n.a	n.a		
WWW15-HUR	13-May-2012	32.56278	-97.79417	1.4400	0.1360	n.d.	29.12	-46.14	-156.80		

Well No.	Date	Lat.	Long.	Methane C(1) (mg/L)	Ethane (C2) (mg/L)	Propane (C3) (mg/L)	C1/C2+C3	δ13C C1 ($^0/_{00}$)	δD C1 ($^0/_{00}$)	δ13C C2 ($^0/_{00}$)	δ13C C3 ($^0/_{00}$)
WWW15-HUR	18-Aug-2012	32.56278	-97.79417	1.4800	0.1540	n.d.	26.43	-45.91	-160.20		
WWW15-HUR	2-Dec-2012	32.56278	-97.79417	5.3200	0.2310	n.d.	63.33	-46.43	-157.50		
WWW15-HUR	17-Feb-2013	32.56278	-97.79417	2.6900	0.1960	n.d.	37.74	-46.57	-162.70		
WWW16-MIL	**28-Dec-2010**	32.56306	-97.79444	**n.d.**	n.d.	n.d.		n.a	n.a		
WWW17-DAV	**30-Dec-2010**	32.56417	-97.79306	**0.4000**	0.0210	n.d.	52.38	n.a	n.a		
WWW18-STR	**30-Dec-2010**	32.55972	-97.7925	0.9600	0.0370	n.d.	71.35	n.a	n.a		
WWW18-STR	12-May-2012	32.55972	-97.7925	0.5860	0.0268	n.d.	60.13	n.a	n.a		
WWW18-STR	28-Aug-2012	32.55972	-97.7925	0.9440	0.0512	n.d.	50.70	n.a	n.a		
WWW18-STR	2-Dec-2012	32.55972	-97.7925	1.2600	0.0921	n.d.	37.62	n.a	n.a		
WWW18-STR	17-Feb-2013	32.55972	-97.7925	1.0300	0.0738	n.d.	38.38	n.a	n.a		
WWW19-WIL	**28-Dec-2010**	32.55972	-97.79139	**0.5000**	0.0250	n.d.	55.00	n.a	n.a		
WWW19-WIL	13-May-2012	32.55972	-97.79139	1.0900	0.0762	n.d.	39.34	-43.85	-160.90		
WWW19-WIL	18-Aug-2012	32.55972	-97.79139	1.9800	0.1360	n.d.	40.04	-43.73	-119.00		
WWW19-WIL	1-Dec-2012	32.55972	-97.79139	3.5400	0.4390	n.d.	22.18	-43.95	-155.60		
WWW19-WIL	16-Feb-2013	32.55972	-97.79139	2.1300	0.1110	n.d.	52.77	-43.86	-157.70		
DUP	16-Feb-2013	32.55972	-97.79139	1.6100	0.1170	n.d.	37.84	n.a	n.a		
WWW20-HUF	**31-Dec-2010**	32.56361	-97.78611	**0.1600**	n.d.	n.d.		n.a	n.a		
WWW20-HUF	12-May-2012	32.56361	-97.78611	0.3570	0.0033	n.d.	300.23	n.a	n.a		
WWW20-HUF	19-Aug-2012	32.56361	-97.78611	0.8480	0.0074	n.d.	316.85	-44.92	-152.30		
WWW20-HUF	1-Dec-2012	32.56361	-97.78611	0.6690	0.0213	n.d.	86.37	-44.67	-117.80		
Dup	1-Dec-2012	32.56361	-97.78611	0.6470	0.0249	n.d.	71.46	n.a	n.a		
WWW20-HUF	16-Feb-2013	32.56361	-97.78611	0.6540	0.0079	n.d.	226.80	-44.68	-126.30		
WWW21-VAN	**27-Dec-2010**	32.56056	-97.79056	**n.d.**	n.d.	n.d.		n.a	n.a		
WWW21-VAN	13-May-2012	32.56056	-97.79056	0.0796	0.0036	n.d.	60.64	-17.40	90 (?)		
WWW21-VAN	30-Nov-2012	32.56056	-97.79056	0.0041	n.d.	n.d.		n.a	n.a		
WWW21-VAN	15-Feb-2013	32.56056	-97.79056	0.0008	n.d.	n.d.		n.a	n.a		
WWW22-SIM	**31-Dec-2010**	32.56028	-97.78833	**0.4900**	0.0260	n.d.	51.83	n.a	n.a		
WWW22-SIM	12-May-2012	32.56028	-97.78833	0.6120	0.0433	n.d.	38.87	-44.24	-151.70		
WWW22-SIM	1-Dec-2012	32.56028	-97.78833	4.1900	0.1920	n.d.	60.01	-44.40	-153.10		
WWW22-SIM	15-Feb-2013	32.56028	-97.78833	1.4900	0.1040	n.d.	39.40	-44.63	-156.10		
WWW23-HUS	**7-Jan-2011**	32.56361	-97.78389	**n.d.**	n.d.	n.d.		n.a	n.a		
WWW23-HUS	11-May-2012	32.56361	-97.78389	0.0052	n.d.	n.d.		n.a	n.a		
WWW24-SMI	**30-Dec-2010**	32.56444	-97.78417	**n.d.**	n.d.	n.d.		n.a	n.a		
WWW24-SMI	14-May-2012	32.56444	-97.78417	0.0184	0.0058	n.d.	8.71	n.a	n.a		
WWW24-SMI	17-Aug-2012	32.56444	-97.78417	0.0567	0.0046	n.d.	33.82	n.a	n.a		
WWW24-SMI	30-Nov-2012	32.56444	-97.78417	0.1170	0.0136	n.d.	23.66	-43.10	-127.00	n.a.	n.a.
WWW24-SMI	15-Feb-2013	32.56444	-97.78417	0.0434	0.0032	n.d.	37.53	n.a	n.a		
WWW25-MAT	**4-Jan-2011**	32.565	-97.78444	**0.2000**	0.0066	n.d.	83.33	n.a	n.a		
WWW25-MAT	12-May-2012	32.565	-97.78444	0.4600	0.0273	0.0038	28.89	-44.51	-133.00		
WWW25-MAT	17-Aug-2012	32.565	-97.78444	0.5070	0.0240	n.d.	58.09	-44.70	-135.70		
WWW25-MAT	2-Dec-2012	32.565	-97.78444	0.0068	0.0008	n.d.	22.95	n.a	n.a		
WWW25-MAT	16-Feb-2013	32.565	-97.78444	0.2590	0.0142	n.d.	50.16	-45.11	-138.90		
WWW26-DAW	**29-Dec-2010**	32.56472	-97.78667	**0.2800**	0.0150	n.d.	51.33	-44.28	-157.60	-29.6	-30.12
WWW26-DAW	26-Sep-2013	32.56472	-97.78667	8.0800	1.4500	0.5790	8.21	-46.44	-183.90	-34.05	-29.91
WWW26-DAW	15-Feb-2014	32.56472	-97.78667	24.0000	3.7000	n.d.	17.84	n.a	n.a		

Well No.	Date	Lat.	Long.	Methane C(1) (mg/L)	Ethane (C2) (mg/L)	Propane (C3) (mg/L)	C1/C2+C3	δ13C C1 ($^0/_{00}$)	δD C1 ($^0/_{00}$)	δ13C C2 ($^0/_{00}$)	δ13C C3 ($^0/_{00}$)
WWW28-OUJ	**28-Dec-2010**			**0.3300**	0.0160	n.d.	56.72	n.a	n.a		
WWW29-FOS	**29-Dec-2010**			**3.9000**	0.6600	0.0770	10.26	n.a	n.a		

n.a: not analyzed; n.d.: not detected

Note: most of the analyses come from the initial and quarterly sampling of water wells (see Timeline table). Samples highlighted in bold represent samples taken during a December 2010 to January 2011 single campaign. We believe some of the provided dissolved gas concentrations severely underestimate the actual concentrations, in particular, those described as effervescing water samples in the January 2011 RRC hearing about the Silverado case.

Table S7. Recent dissolved alkane results for Wise County (EPA, 2015)

WELL ID	Lat.	Long.	Sampling Date	Methane (mg/l)	Ethane (mg/l)	Propane (mg/l)	Butane (mg/l)
WISETXGW01	33.1862	-97.62572	1-Sep-2011	0.0093	<0.0029U	<0.0040U	<0.0050U
			1-Mar-2012	0.0195	<0.0027U	<0.0038U	<0.0048U
			1-Dec-2012	0.0224	<0.0028U	<0.0038U	<0.0048U
WISETXGW02	33.18481	-97.62632	1-Sep-2011	<0.0014U	<0.0029U	<0.0040U	<0.0050U
			1-Mar-2012	0.0016	<0.0027U	<0.0038U	<0.0048U
			1-Dec-2012	0.0013J	<0.0028U	<0.0038U	<0.0048U
WISETXGW03	33.18541	-97.62691	1-Sep-2011	0.0023	<0.0029U	<0.0040U	<0.0050U
			1-Mar-2012	0.0018	<0.0027U	<0.0038U	<0.0048U
			1-Dec-2012	0.0014	<0.0028U	<0.0038U	<0.0048
WISETXGW04	33.18884	-97.62665	1-Sep-2011	<0.0014U	0.0017J	0.0034J	0.0015J
			1-Mar-2012	0.0015	<0.0027U	<0.0038U	<0.0048U
			1-Dec-2012	<0.0014U	<0.0028U	<0.0038U	<0.0048U
WISETXGW05	33.19186	-97.63403	1-Sep-2011	<0.0014U	<0.0029U	<0.0040U	<0.0050U
			1-Mar-2012	0.0019	<0.0027U	<0.0038U	<0.0048U
WISETXGW06	33.40958	-97.62195	1-Sep-2011	<0.0014U	<0.0029U	0.0040U	<0.0050U
			1-Mar-2012	<0.0014U	<0.0027U	<0.0038U	<0.0048U
WISETXGW07	33.41591	-97.61593	1-Sep-2011	0.0188	<0.0029U	<0.0040U	<0.0050U
			1-Mar-2012	0.0242	<0.0027U	<0.0038U	<0.0048U
WISETXGW08	33.18418	-97.62372	1-Sep-2011	0.0121	<0.0029U	<0.0040U	<0.0050U
			1-Mar-2012	0.0147	<0.0027U	<0.0038U	<0.0048U
			1-Dec-2012	<0.0014U	<0.0028U	<0.0038U	<0.0048U
WISETXGW09	33.26966	-97.4084	1-Sep-2011	<0.0014	<0.0029U	<0.0040U	<0.0050U
			1-Mar-2012	0.0009J	<0.0027U	<0.0038U	<0.0048U
WISETXGW10	33.26277	-97.41238	1-Sep-2011	<0.0014U	<0.0029U	<0.0040U	<0.0050U
			1-Mar-2012	<0.0014U	<0.0027U	<0.0038U	<0.0048U
WISETXGW11	33.27067	-97.40943	1-Sep-2011	<0.0014U	<0.0029U	<0.0040U	<0.0050U
			1-Mar-2012	0.0007J	<0.0027U	<0.0038U	<0.0048U
WISETXGW12	33.26712	-97.41085	1-Sep-2011	<0.0014U	<0.0029U	<0.0040U	<0.0050
WISETXGW13	33.18448	-97.62603	1-Mar-2012	0.0018	<0.0027U	<0.0038U	<0.0048U
			1-Dec-2012	0.00143	<0.0028U	<0.0038U	<0.0048U
WISETXGW14	33.1844	-97.6273	1-Mar-2012	0.0016	<0.0027U	<0.0038U	<0.0048U
			1-Dec-2012	<0.0014U	<0.0028U	<0.0038U	<0.0048U

WELL ID	Lat.	Long.	Sampling Date	Methane (mg/l)	Ethane (mg/l)	Propane (mg/l)	Butane (mg/l)
WISETXGW15	33.18712	-97.6243	1-Mar-2012	0.0014	<0.0027U	<0.0038U	<0.0048U
			1-Dec-2012	0.0012J	n.a.	<0.0038U	<0.0048U
WISETXGW16	33.18157	-97.61992	1-Mar-2012	0.0013J	<0.0027U	<0.0038U	<0.0048U
			1-Dec-2012	0.0021	<0.0028U	<0.0038U	<0.0048U
WISETXSW01	33.26778	-97.40884	1-Sep-2011	0.0131	<0.0029U	<0.0040U	<0.0050U
			1-Mar-2012	0.0022	<0.0027U	<0.0038	<0.0048U
WISETXSW02	33.26787	-97.4089	1-Sep-2011	0.0096	<0.0029U	<0.0040U	<0.0050U
			1-Mar-2012	0.0082	<0.0027U	<0.0038U	<0.0048U
WISETXSW03	33.26748	-97.40967	1-Sep-2011	0.0124	<0.0029U	<0.0040U	<0.0050U
			1-Mar-2012	0.0063	<0.0027U	<0.0038U	<0.0048U
WISETXSW04	33.18788	-97.62532	1-Dec-2012	0.132	<0.0028U	<0.0038U	<0.0048U

n.a.: not analyzed

Table S8. Recent Palo Pinto County case results (RRC, 2015)

Sample Name	Sample Date	Lat.	Long.	Methane (mg/L)	Ethane (mg/L)	Propane (mg/L)	C_1/C_2+C_3	$d^{13}C_1$ (‰)	dDC_1 (‰)
WWW-HIL	28-Aug-2014	32.99466	-98.149	2.4	0.2400	0.029	17.32	-45.69	-194
WWW-PAR	28-Aug-2014	32.99413	-98.148	0.0014	0.0002	< 0.0002	13.13	n.a.	n.a.
WWW-MUR	21-Aug-2014	32.99324	-98.1466	14	3.3000	1.7	5.89	-45.99	-191.6
WWW-SIN	21-Aug-2014	32.99388	-98.1508	38	10.0000	6.1	5.03	-46.11	-192.9
WWW-MIL	28-Aug-2014	32.98252	-98.1508	55	13.0000	6.9	5.82	-45.96	-194.6

n.a: not analyzed

References:

EPA, 2015, Retrospective Case Study in Wise County, Texas. U.S. Environmental Protection Agency, Washington, DC, EPA 600/R-14/090. p. 171p. + Appendices.

RRC, 2014, Water well complaint investigation report: Silverado on the Brazos neighborhood, Parker County, Texas. p. 19.

RRC, 2015, Review of analytical data – Murray Complaint (7B-10736) and Singleton Complaint (7B-10612). p. 13.

SI-4 Additional Results

Depth and type of sampled water wells

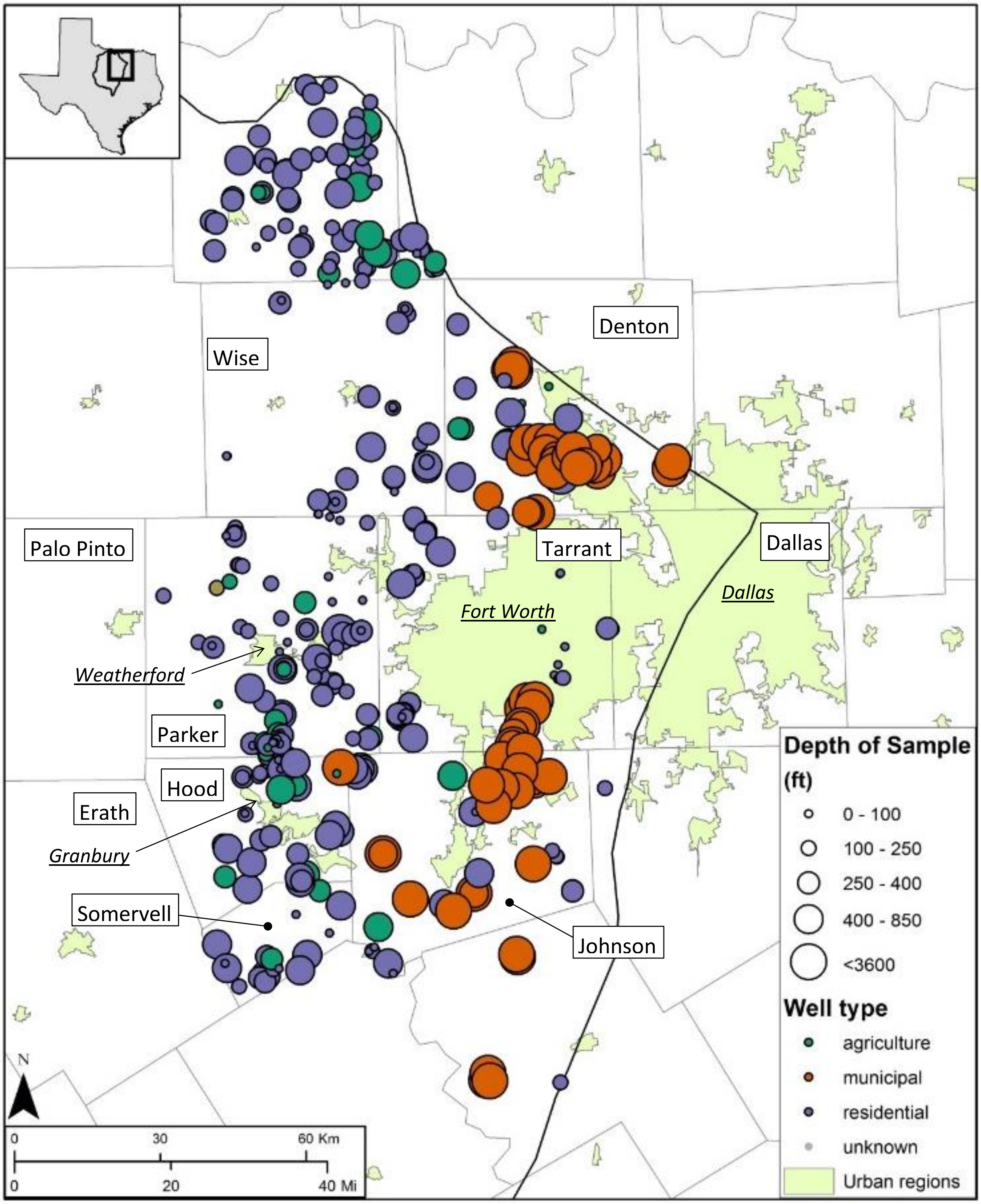
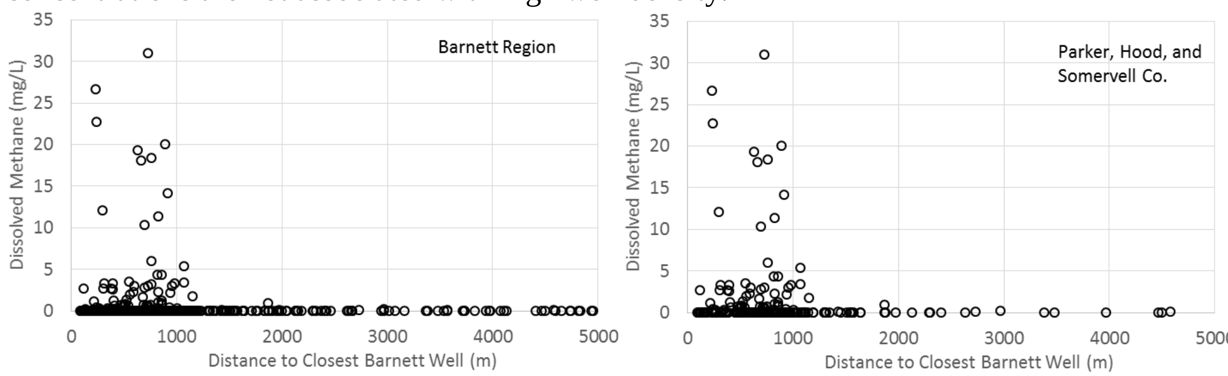


Figure S12. Depth and type of sampled water wells

Dissolved alkane concentration in water wells vs. distance to gas wells

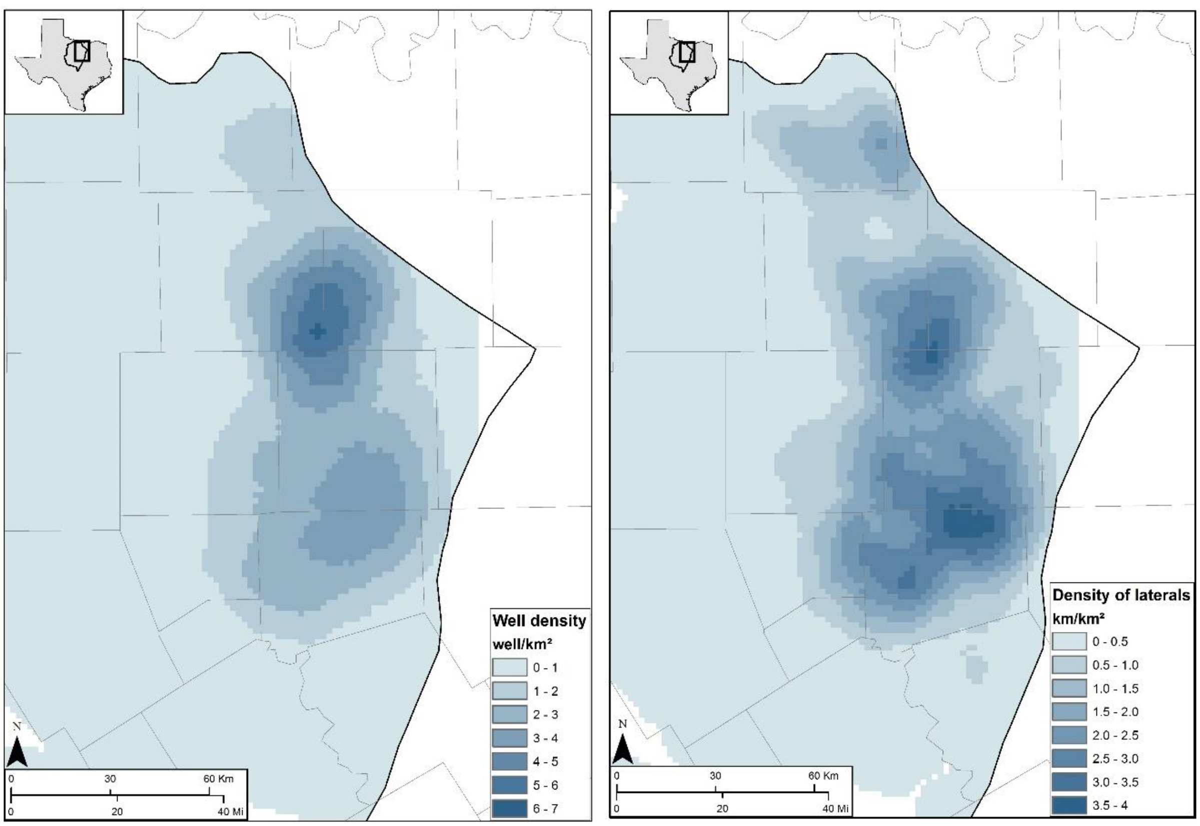
Plotting dissolved methane concentration vs. distance to nearest gas well for the entire play or for the three counties of Parker, Hood, and Somervell (Figures 5 and S13) show almost identical plots because almost all the higher dissolved methane values are in these three counties. As in Figure 5 in the main text, Figure S13 does not show a clear correlation with distance, e.g., a decrease in methane concentration away from the nearest well. Density maps for Figure 5c and Figure 5d are displayed on Figure S14. They clearly show that high dissolved methane concentrations are not associated with high well density.



(a) (b)

Note that the main difference between the 2 plots is the number of points sitting on the x-axis.

Figure S13. Dissolved methane concentration vs. distance to nearest Barnett well in the entire Barnett Shale footprint (a), in Parker, Hood, and Somervell counties (b)



(a) (b)

Figure S14. Well (a) and lateral length (b) density (Barnett)

Ethane and C1/C2+C3 ratios (Figure S15) do not show a strong correlation with distance, e.g., a clear decrease in ethane concentrations and a clear increase in C1/C2+C3 ratios (ethane is typically degraded faster than methane) with distance.

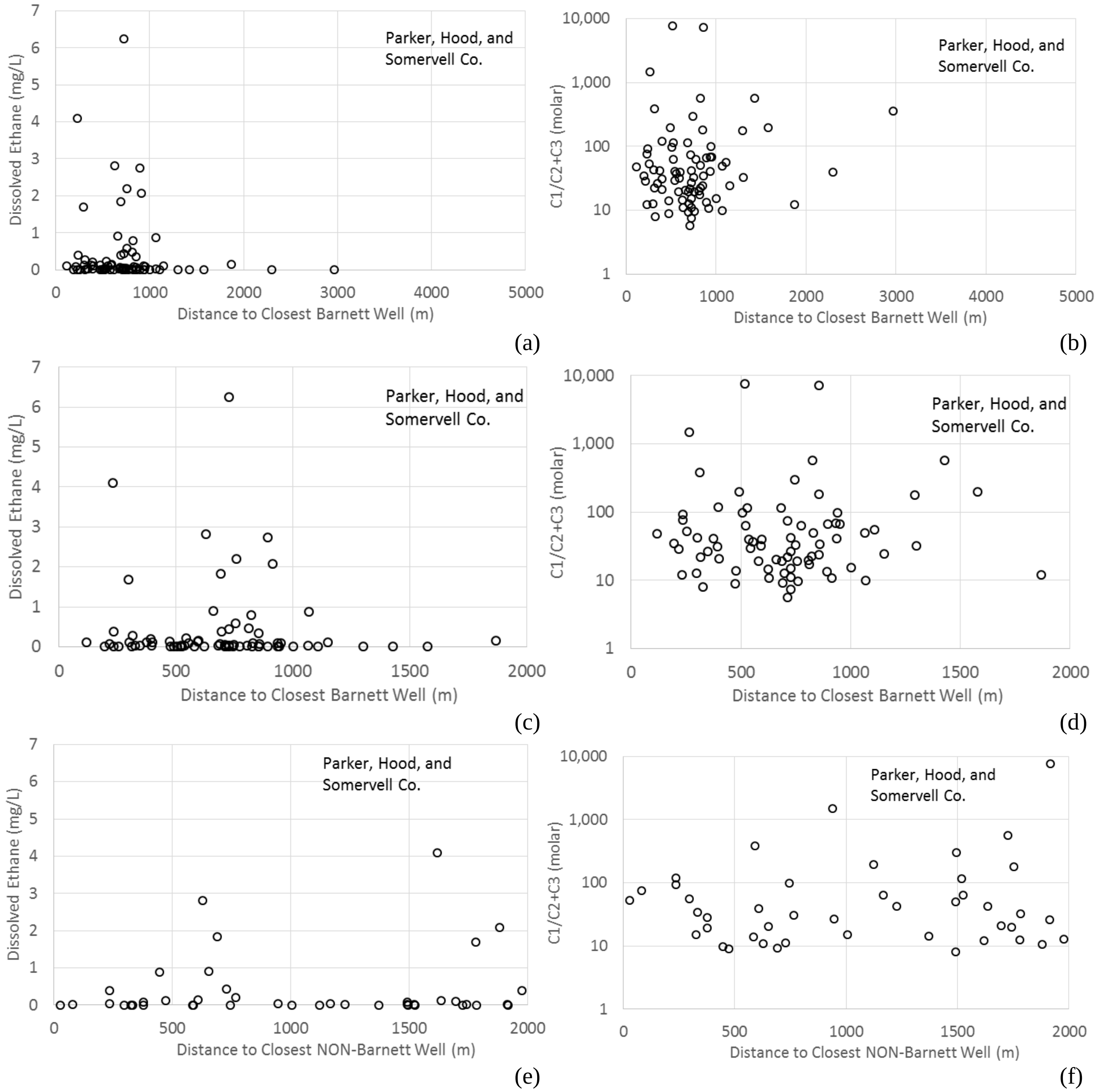


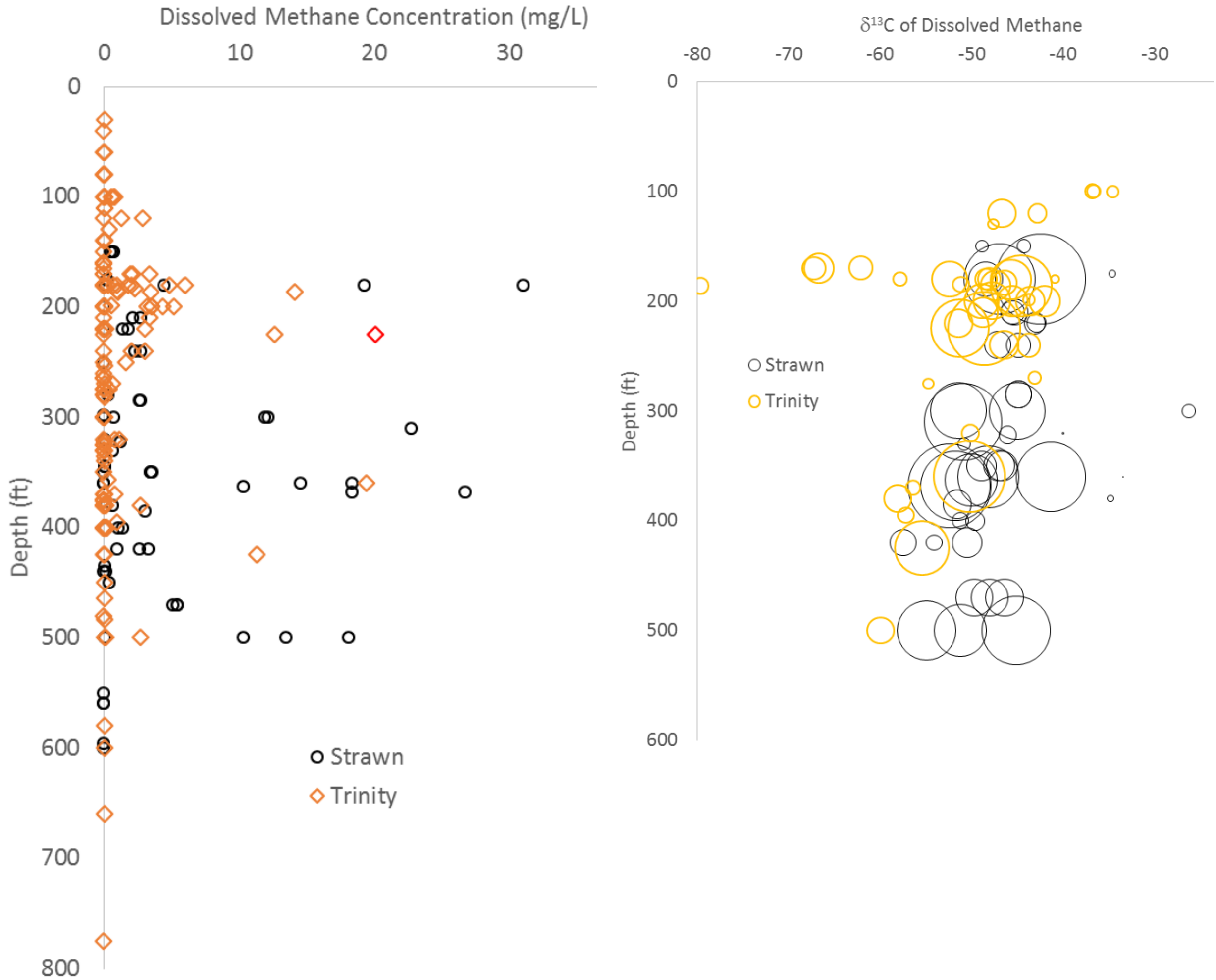
Figure S15. Ethane concentrations (a, c, e) and C1/C2+C3 ratios (b, d, f) vs. distance to the nearest well (a and b: 5000-m radius for Barnett wells; c and d: 2000-m radius for Barnett wells; e and f: 2000-m radius for non-Barnett wells).

Table S9. Regression statistics on dissolved methane concentrations as a function of various distances

Regression	Figure	r parameter	p value	# of pairs	Comments
Dissolved methane vs. distance to nearest HF well (Parker, Hood and Somervell counties)	Figure 5a Figure S13b	-0.096	0.187	193	Include all 193 wells in these counties
		-0.053	0.464	116	Include only 116 wells in these counties with dissolved methane > 0.01 mg/L
Dissolved methane vs. distance to any non-Barnett well (Parker, Hood and Somervell counties)	Figure 5b	-0.134	0.154	193	Include all 193 wells in these counties
		-0.129	0.168	116	Include only 116 wells in these counties with dissolved methane > 0.01 mg/L

Methane concentration and isotopes vs. well depth and vertical distance to unconformity

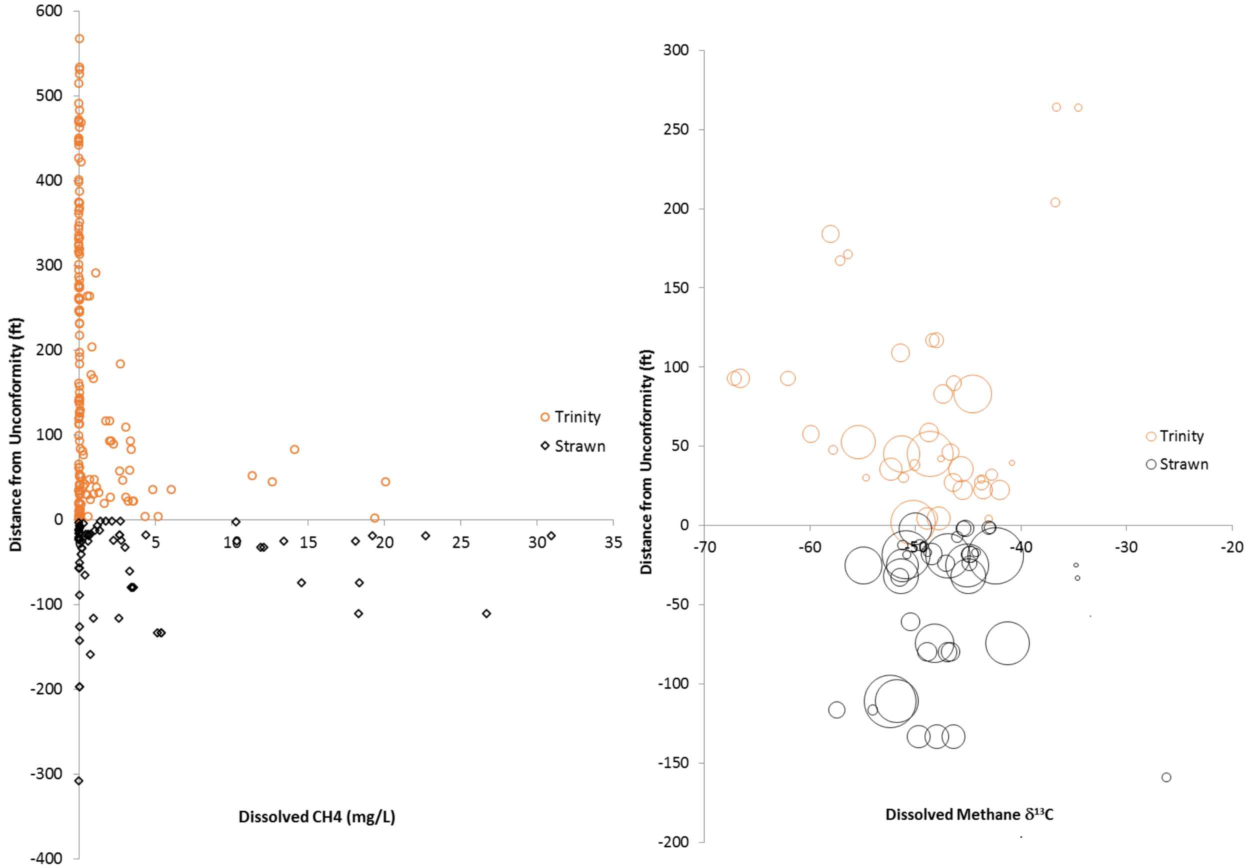
Methane concentration does not seem to be a function of depth (Figure S16) but rather a function of distance to the unconformity (Figures S17 and S18).



(a) (b)

Note: circle size proportional to methane concentrations
(a) 242 water samples in Parker, Hood, and Somervell counties (that is larger than the Parker–Hood cluster); (b) 90 waters in the same counties with isotope analyses.

Figure S16. Dissolved methane concentration and its $\delta^{13}C$ as a function of depth



(a) (b)

Note: circle size proportional to methane concentrations

(a) 242 water samples in Parker, Hood, and Somervell counties (that is larger than the Parker–Hood cluster); (b) 90 waters in the same counties with isotope analyses.

Figure S17. Dissolved methane concentration and its $\delta^{13}C$ as a function of the vertical distance to the Cretaceous unconformity

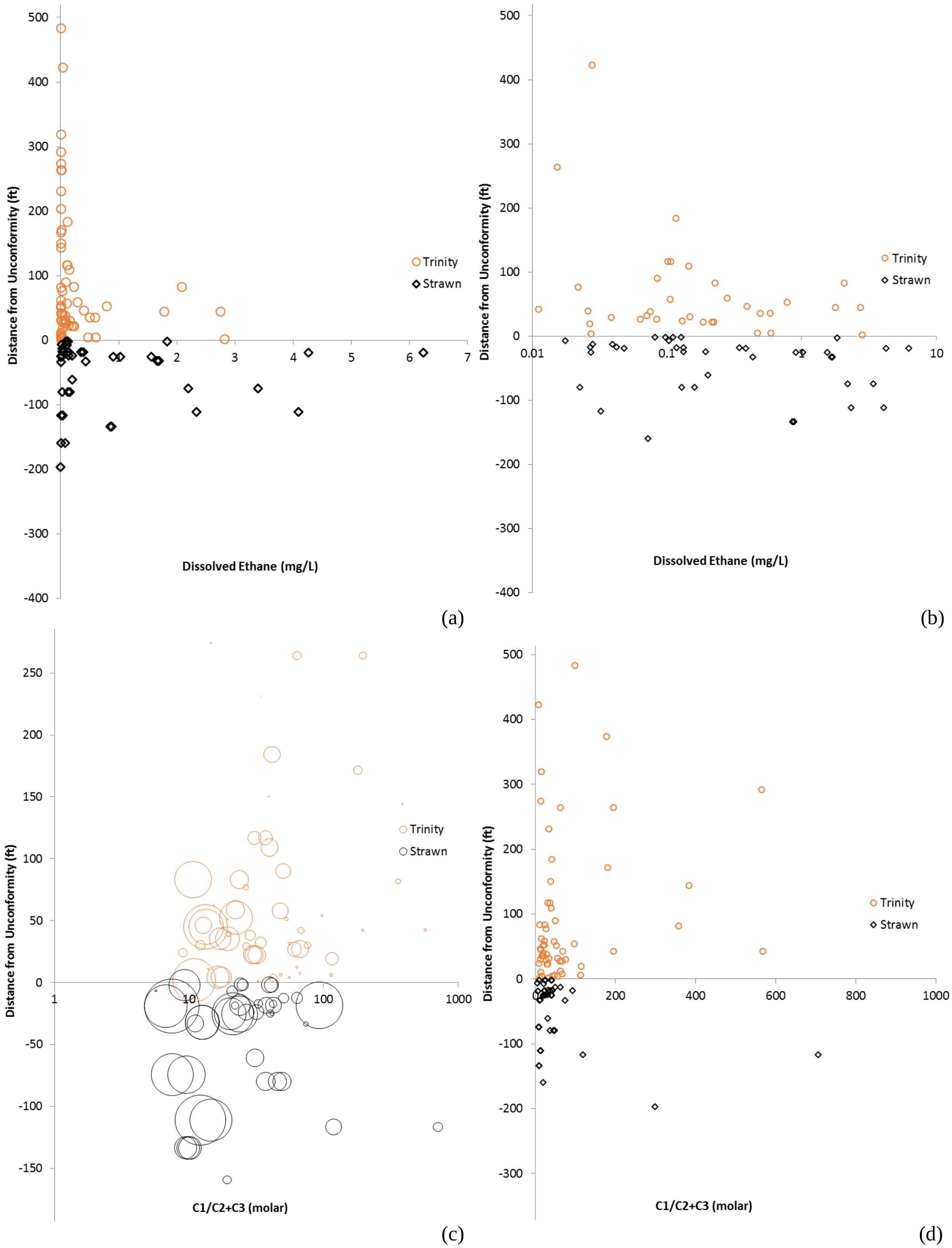
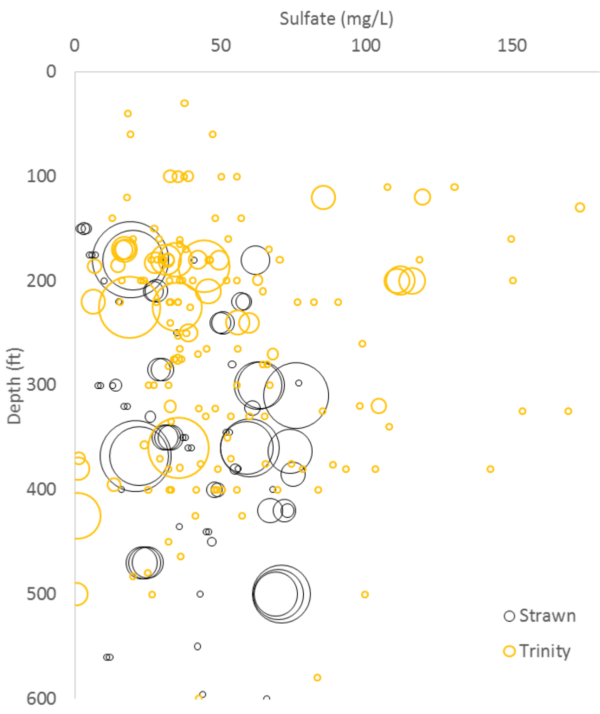


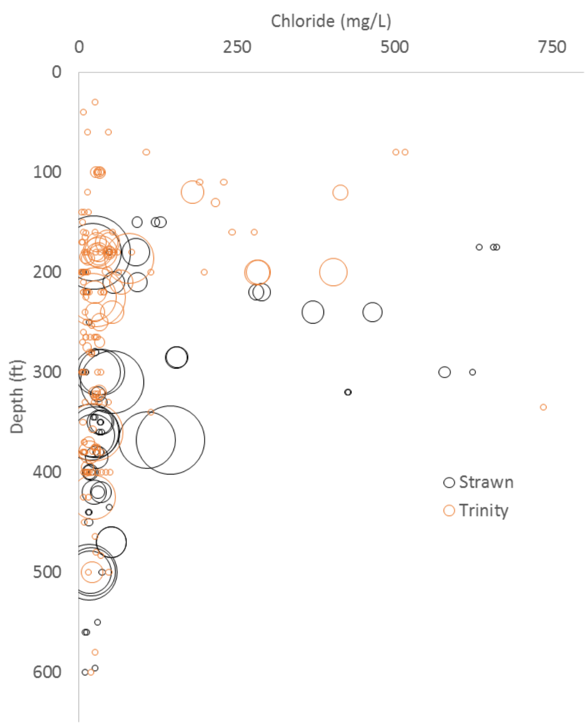
Figure S18. Dissolved ethane concentration (a, b) and C1/C2+C3 ratios (c, d) vs. distance to unconformity in linear (a, d) and log (b, c) scales.

Methane concentration and isotope vs. major and minor anions (chloride, sulfate, bicarbonate, nitrate, iron, manganese)

There is no obvious evidence of sulfate reduction related to consumption of methane (Figures S19a and S20). High methane is not necessarily associated with low sulfate suggesting that if there is biodegradation of methane it is not anaerobic (there is little nitrate in the aquifer when methane is present, Figure S22). Nor is there strong data demonstrating that higher methane concentrations are associated with high chloride (Figures S19b and S21). Note that chloride can be high because of mixing with deeper Strawn water but also mixing with Brazos River water that tends to be slightly saline because of the presence of salt layers and salt springs upstream. Samples with high dissolved methane concentration tend to have heavier DIC carbon (Figure S23).



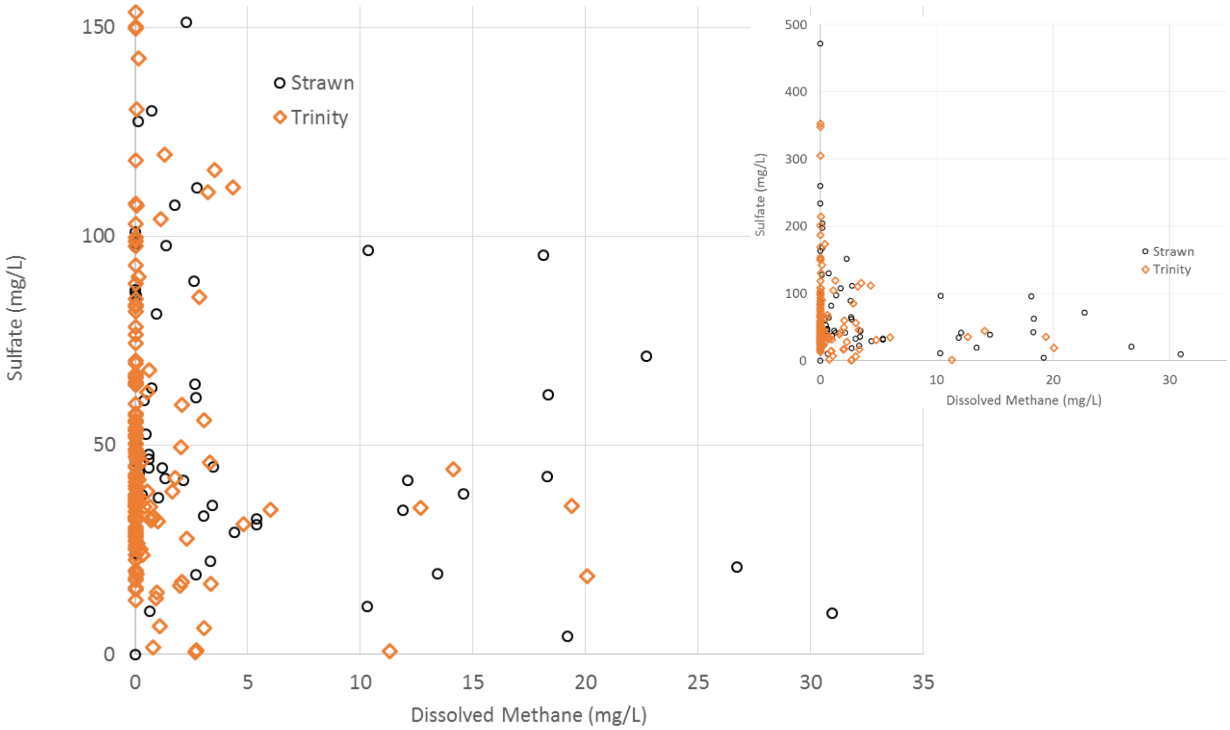
(a)



(b)

Note: circle size proportional to methane concentrations; all data points with CH_4<0.2 mg/L are plotted as 0.2 mg/L to improve visibility. 240 water samples in Parker, Hood, and Somervell counties (that is, slightly larger than the Parker–Hood cluster).

Figure S19. Sulfate and chloride concentration vs. depth vs. dissolved methane



Note: the insert y-axis goes to 500 mg/L

Figure S20. Dissolved methane vs. sulfate concentrations

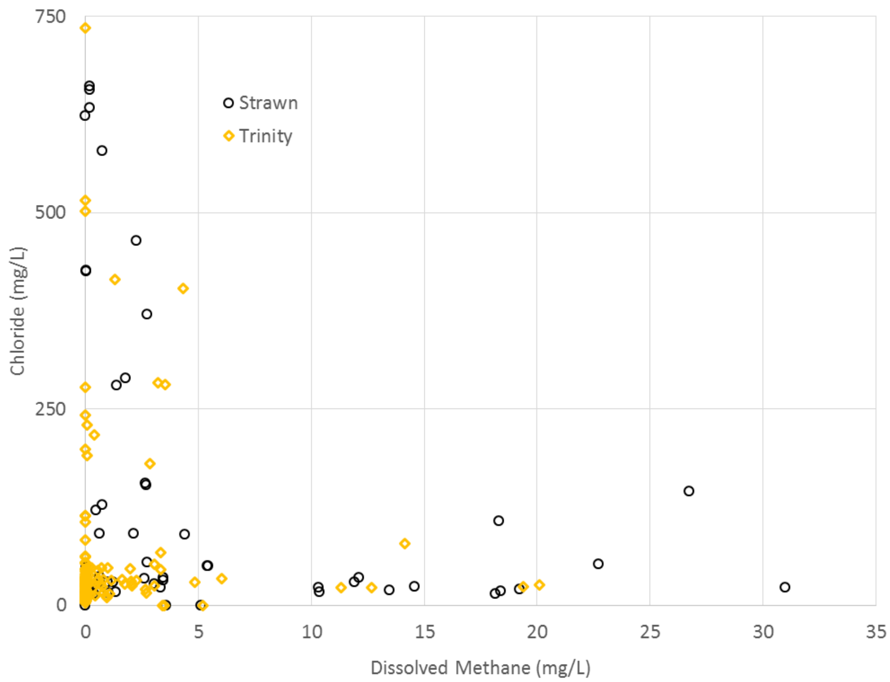
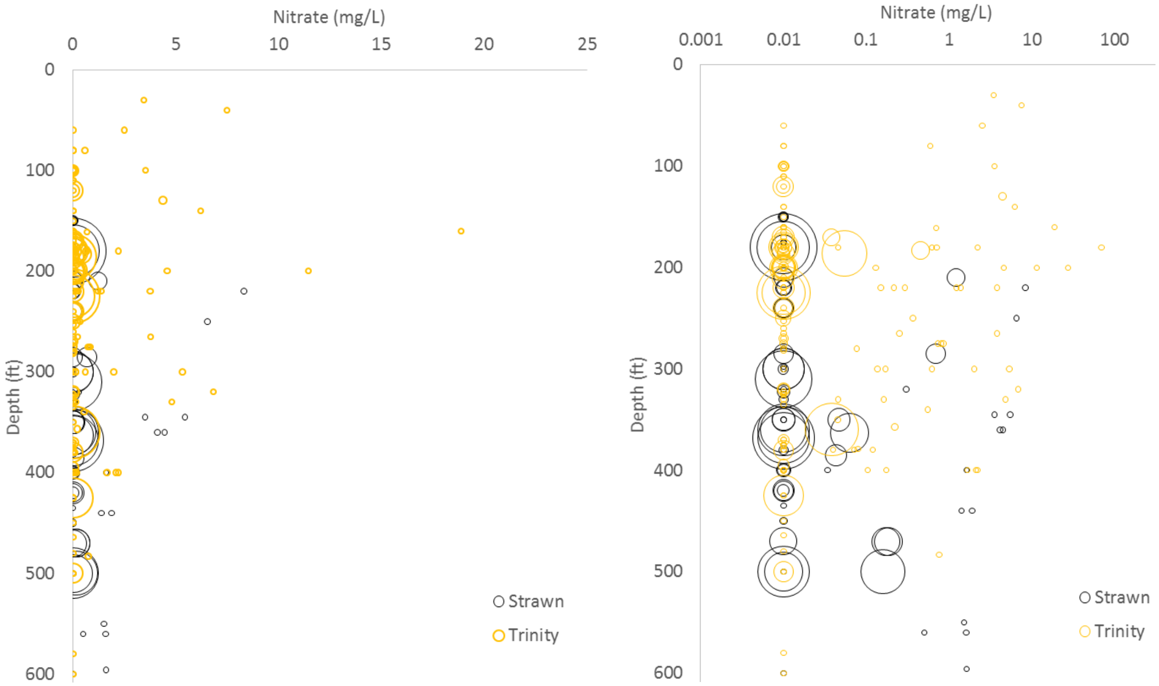
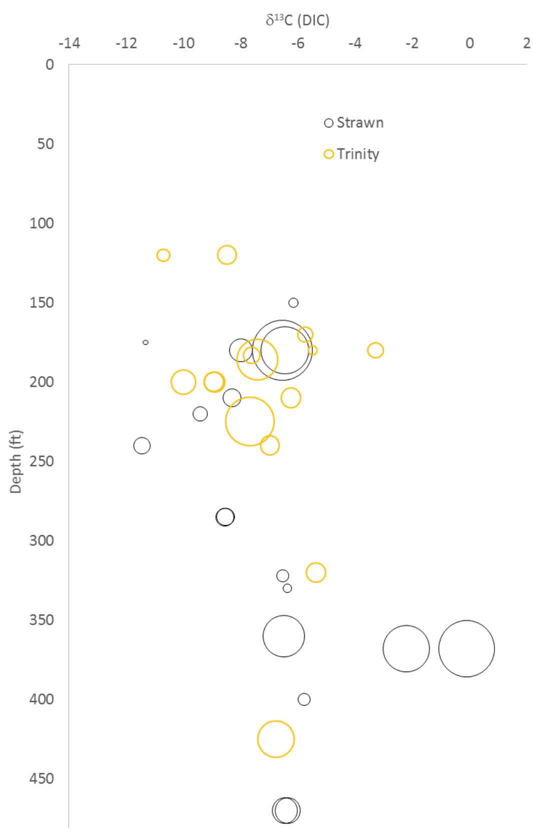


Figure S21. Dissolved methane vs. chloride concentrations



Note: Nitrate non-detect set at 0.01 mg/L for plot clarity. Similarly, all data points with CH_4<0.2 mg/L are plotted as 0.2 mg/L to improve visibility

Figure S22. Dissolved methane vs. nitrate concentrations



Note: circle size proportional to methane concentrations; 30 water samples from the Parker–Hood cluster).

Figure S23. $\delta^{13}C$ DIC vs. depth vs. dissolved methane.

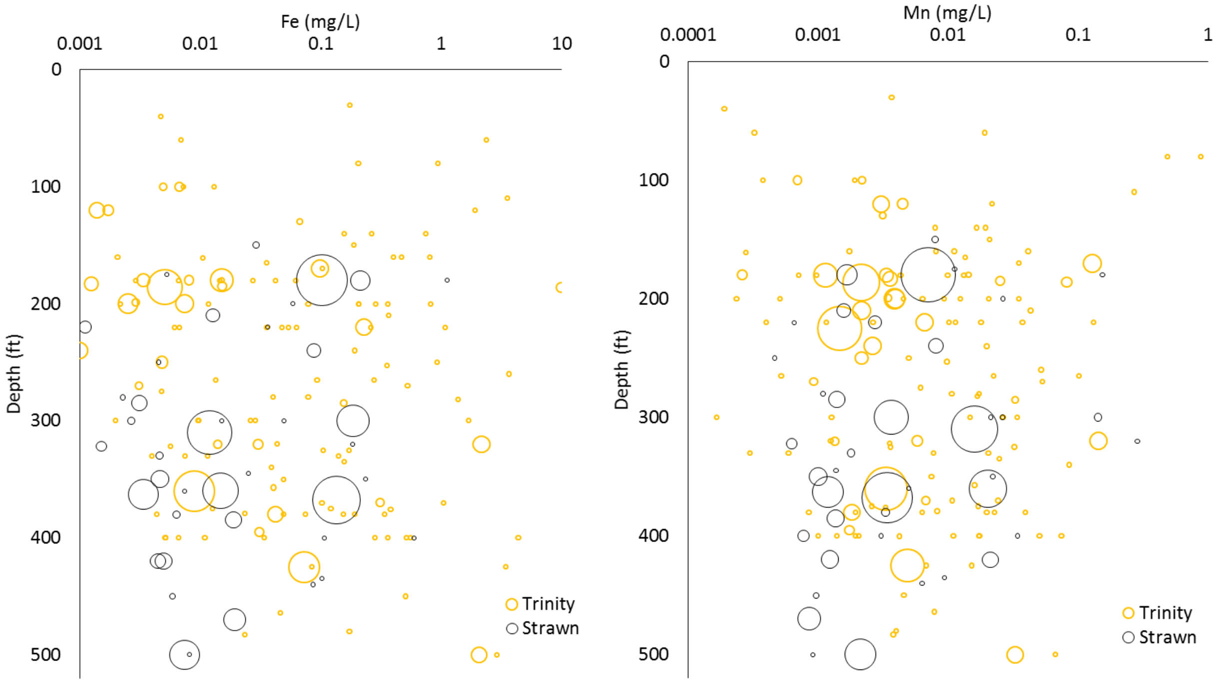


Figure S24. Iron and manganese vs. depth vs. dissolved methane

SI-5 Evidence of Natural Methane in the Barnett Shale Footprint

There are many anecdotal historical evidence of methane in groundwater in the area of study. The oldest mentioned instance is by Link (1952) where three gas seeps are documented in the Barnett Shale footprint, one each in Erath, Palo Pinto and Young counties, counties mostly west of currently active Barnett Shale exploration and production. Link (1952) compiled documented oil and gas seeps across the US including in Texas. Oil and gas companies use to guide oil and gas exploration with the help of seeps but most of the seeps are not active anymore because the drawdown of reservoirs they originated from dried them up the seeps. An older document (Wegemann, 1915) also mentioned oil and gas seeps in north central Palo Pinto County in the context of oil and gas exploration.

After old gas seeps, a second category of documented occurrences of dissolved methane in shallow groundwater are Public Water Supply (PWS) wells. The Parker–Hood cluster area has at least 4 instances of such occurrences listed below by order of reporting to TCEQ (Texas Commission on Environmental Quality, the state agency is charge of PWS well water quality):

- The five Lake Country Acres (LCA) PWS wells in Parker County close to the Hood county line and part of the Parker–Hood cluster were completed to the base of the Trinity (and then for some length into the Strawn) and have had a methane problem for many years (i.e., Collier Consulting, 2003). LCA#2 well was drilled in 1986 and LCA #1 was drilled earlier at an unknown date. C3+ alkanes were detected in the water in 1988. In 2003, a downhole video inspection of 2 of the 4 wells of the well field noted very murky and bubbly water. These two wells also exhibited a faint to strong hydrocarbon smell suggesting that C4+ compounds are present in the wellbore. LCA #4 and LCA #5 were drilled in 2003. LCA #4, at a depth of 400 ft, was immediately plugged and abandoned (P&A) because of the very large amount of gas released at an instantaneous rate of 122 thousand cubic feet per day (Kornacki and McCaffrey, 2014; Kreitler, 2014). Our 2014 sampling shows that methane is still present in these water wells (BS551 =LCA #1, BS552 = LCA #2, BS553 = LCA #3, BS554 = LCA #5).
- Mesa Grande Water Supply Corporation (WSC) supplying water to a subdivision located on the Brazos just north of the City of Granbury in Hood County. A 2004 RRC reports propane concentrations at 0.130 and 0.022 mg/L and the presence of other alkanes up to C6. Note that the VOC method of analysis by TCEQ and RRC, typically used to detect oil contamination, does not report methane and ethane but only C3+ alkanes. The same report mentioned unidentified properties in the vicinity with earlier complaints (1990's) of natural gas in the water.
- On the Hood-Somervell county line on Squaw Creek reservoir, west of the Brazos, another RRC file on potential natural gas contamination with propane at 4.6 ppb (butane not detected) in a water well of the "Greenfields on Squaw Creek" subdivision in Somervell County.
- Bluff Dale WSC in Erath County, midway between Granbury (Hood County) and Stephenville reported in 2005 C3+ alkanes with no oil and gas activity in the vicinity.

There are also occurrences of sampling of methane that turned out to be of microbial origin. Some domestic wells in RRC District 9 (Bowie area in Montague County northwest of Fort Worth) have been described by RRC staff as potentially containing dissolved methane but they have attributed it to shallow coal seams. The City of Bowie PWS is currently provided by surface water, not groundwater. The single sample with dissolved methane in Montague County turned out to be microbial.

A third category of documented occurrences is reports by well drillers and well owners, in particular, drillers' suggestion of installing a venting system on the water well wellhead. Drillers have also long known the presence of methane at shallow depths in the Parker–Hood cluster and the observation is also accepted by many well owners according to our conversations with them. TWDB (2015) described at least 5 water wells with natural gas shows when drilling in the Parker–Hood cluster and not much elsewhere in Parker and Hood counties.

References

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Kornacki, A.S. and M. McCaffrey, 2014, Monitoring the Active Migration and Biodegradation of Natural Gas in the Trinity Group Aquifer at the Silverado Development in Southern Parker County, Texas, in AAPG Annual Convention and Exhibition Search and Discover Article #80395, Houston, Texas, April 6-9, 2014.

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Link, W. K., 1952, Significance of Oil and Gas Seeps in World Oil Exploration in AAPG Bull. 36(8), p.1505–1540

TWDB, 2015, Submitted Drillers Reports Database, Available from: http://www.twdb.texas.gov/groundwater/data/drillersdb.asp.

Wegemann, C.H., 1915, A reconnaissance in Palo Pinto County, Texas, with special reference to oil and gas. U.S. Geological Survey Bull. 621. p.51-59.