



LEAM Drilling Systems, LLC. 2027A Airport Rd., Conroe, TX 77301

Survey Report

MINIMUM CURVATURE CALCULATION

Operator: Felix Energy
 Well Name: UL Yankee Boy 18-17 1H
 Location: Ward County, Texas
 Start Date: 3/11/2017
 End Date: 4/11/2017
 Direction: 163.72°

Survey Number	MD ft	INC °	AZM °	TVD ft	N-S ft	E-W ft	SECT ft	DLS °/100'
TIE IN	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	304	0.70	98.90	303.99	-0.29	1.83	0.79	0.23
2	396	1.10	118.00	395.98	-0.79	3.17	1.65	0.54
3	579	1.50	130.40	578.93	-3.17	6.54	4.87	0.27
4	671	1.90	143.90	670.89	-5.18	8.36	7.31	0.61
5	855	1.80	133.90	854.80	-9.65	12.24	12.69	0.18
6	1161	1.10	168.10	1160.70	-15.85	16.31	19.79	0.35
7	1239	1.00	184.30	1238.69	-17.26	16.41	21.17	0.40
8	1331	0.50	191.50	1330.68	-18.46	16.27	22.28	0.55
9	1426	1.10	324.40	1425.68	-18.12	15.66	21.79	1.56
10	1518	2.10	18.40	1517.64	-15.81	15.68	19.57	1.85
11	1610	3.80	20.00	1609.52	-11.34	17.25	15.72	1.85
12	1702	5.60	15.00	1701.21	-4.14	19.46	9.43	2.00
13	1794	5.80	13.50	1792.75	4.72	21.70	1.56	0.27
14	1886	6.80	18.40	1884.20	14.40	24.51	-6.96	1.23
15	1978	7.40	15.40	1975.49	25.28	27.80	-16.48	0.77
16	2070	7.70	17.00	2066.69	36.89	31.17	-26.67	0.40
17	2165	7.70	18.60	2160.84	49.01	35.07	-37.21	0.23
18	2259	8.20	18.90	2253.93	61.32	39.25	-47.86	0.53
19	2353	8.20	23.80	2346.97	73.80	44.12	-58.47	0.74
20	2448	6.50	30.90	2441.19	84.61	49.62	-67.31	2.03
21	2542	5.80	34.70	2534.65	93.08	55.05	-73.91	0.86
22	2637	5.90	33.00	2629.15	101.12	60.45	-80.12	0.21
23	2732	6.20	33.80	2723.63	109.48	65.96	-86.60	0.33
24	2826	6.80	33.30	2817.02	118.35	71.84	-93.46	0.64
25	2921	6.70	34.20	2911.36	127.63	78.04	-100.64	0.15
26	3016	6.20	37.70	3005.76	136.27	84.29	-107.18	0.67
27	3110	5.10	45.10	3099.30	143.24	90.36	-112.17	1.40
28	3205	4.90	55.30	3193.94	148.53	96.68	-115.47	0.96

29	3300	4.20	70.60	3288.65	152.00	103.30	-116.94	1.47
30	3395	2.60	75.50	3383.48	153.69	108.67	-117.07	1.71
31	3490	1.80	72.50	3478.41	154.68	112.18	-117.03	0.85
32	3585	2.10	65.50	3573.35	155.85	115.19	-117.31	0.40
33	3679	1.80	61.80	3667.30	157.26	118.05	-117.86	0.35
34	3774	1.40	56.00	3762.26	158.62	120.33	-118.52	0.45
33	3868	1.00	47.20	3856.24	159.82	121.88	-119.24	0.47
34	3963	0.90	53.20	3951.23	160.83	123.09	-119.87	0.15
37	4058	0.40	146.90	4046.22	160.99	123.87	-119.82	1.06
38	4153	0.40	187.80	4141.22	160.39	124.00	-119.19	0.29
39	4248	0.80	101.50	4236.22	159.93	124.61	-118.58	0.92
40	4342	1.80	88.70	4330.19	159.83	126.73	-117.90	1.10
41	4436	2.20	80.10	4424.13	160.17	129.98	-117.31	0.53
42	4532	3.30	76.00	4520.02	161.16	134.48	-117.00	1.16
43	4627	2.90	74.80	4614.88	162.45	139.45	-116.84	0.43
44	4721	2.60	75.20	4708.77	163.62	143.81	-116.74	0.32
45	4815	2.20	76.90	4802.69	164.57	147.62	-116.59	0.43
46	4909	2.00	78.30	4896.63	165.31	150.99	-116.36	0.22
47	4967	1.70	81.30	4954.60	165.65	152.83	-116.16	0.54
48	5101	1.90	82.40	5088.53	166.24	157.00	-115.57	0.15
49	5195	0.40	111.50	5182.51	166.33	158.85	-115.13	1.66
50	5290	0.20	113.10	5277.51	166.14	159.31	-114.82	0.21
51	5385	0.20	149.30	5372.51	165.94	159.54	-114.56	0.13
52	5479	0.10	247.80	5466.51	165.76	159.55	-114.39	0.25
53	5574	0.30	271.20	5561.51	165.74	159.23	-114.46	0.22
54	5668	0.40	256.60	5655.51	165.67	158.66	-114.55	0.14
55	5762	0.40	263.80	5749.50	165.55	158.02	-114.62	0.05
56	5857	0.40	255.20	5844.50	165.43	157.37	-114.69	0.06
57	5952	0.60	279.30	5939.50	165.43	156.55	-114.91	0.30
58	6047	1.30	284.30	6034.48	165.78	155.02	-115.67	0.74
59	6142	1.50	281.90	6129.46	166.30	152.76	-116.81	0.22
60	6236	1.50	283.10	6223.42	166.83	150.36	-117.99	0.03
61	6317	4.50	209.60	6304.32	164.31	147.75	-116.30	5.33
62	6334	4.50	208.40	6321.27	163.14	147.11	-115.36	0.55
63	6366	4.70	202.20	6353.17	160.82	146.01	-113.44	1.67
64	6398	4.70	201.20	6385.06	158.39	145.04	-111.38	0.26
65	6430	4.70	199.80	6416.95	155.93	144.13	-109.28	0.36
66	6461	4.80	200.00	6447.85	153.52	143.25	-107.20	0.33
67	6522	4.80	201.40	6508.63	148.74	141.45	-103.13	0.19
68	6617	4.90	202.90	6603.29	141.30	138.42	-96.84	0.17
69	6715	5.20	187.80	6700.92	133.05	136.19	-89.54	1.39
70	6808	5.40	187.10	6793.52	124.53	135.08	-81.67	0.23
71	6903	5.20	187.10	6888.11	115.82	133.99	-73.62	0.21
72	6998	5.20	189.20	6982.72	107.30	132.77	-65.78	0.20
73	7093	4.60	173.80	7077.38	99.26	132.49	-58.14	1.52
74	7189	4.50	170.10	7173.08	91.73	133.56	-50.61	0.32
75	7284	4.00	170.40	7267.81	84.79	134.75	-43.61	0.53

76	7379	3.50	169.20	7362.61	78.67	135.85	-37.44	0.53
77	7473	3.30	171.80	7456.44	73.18	136.77	-31.90	0.27
78	7568	2.90	168.50	7551.31	68.12	137.64	-26.80	0.46
79	7660	2.50	169.90	7643.20	63.86	138.45	-22.49	0.44
80	7755	2.10	168.80	7738.13	60.11	139.16	-18.69	0.42
81	7850	2.10	180.10	7833.06	56.66	139.49	-15.29	0.44
82	7946	1.10	191.70	7929.02	54.00	139.30	-12.79	1.09
83	8040	1.00	81.00	8023.02	53.25	139.93	-11.89	1.84
84	8135	1.00	70.20	8118.00	53.66	141.53	-11.83	0.20
85	8229	0.50	121.70	8211.99	53.72	142.65	-11.58	0.84
86	8324	0.90	172.20	8306.99	52.76	143.10	-10.53	0.73
87	8419	0.50	39.80	8401.98	52.34	143.47	-10.03	1.36
88	8514	0.60	29.80	8496.98	53.09	143.98	-10.60	0.15
89	8609	0.50	91.90	8591.98	53.51	144.64	-10.82	0.60
90	8704	0.60	89.00	8686.97	53.51	145.55	-10.56	0.11
91	8799	0.60	100.80	8781.97	53.42	146.54	-10.20	0.13
92	8894	0.50	114.50	8876.96	53.16	147.41	-9.70	0.17
93	8988	0.40	138.10	8970.96	52.74	148.00	-9.14	0.22
94	9083	0.60	138.60	9065.96	52.12	148.55	-8.39	0.21
95	9178	1.10	185.90	9160.95	50.84	148.78	-7.09	0.86
96	9273	1.10	153.70	9255.93	49.12	149.09	-5.35	0.64
97	9368	1.80	146.50	9350.90	47.06	150.32	-3.03	0.76
98	9463	0.60	35.40	9445.88	46.22	151.43	-1.91	2.20
99	9558	2.10	26.10	9540.85	48.19	152.49	-3.51	1.59
100	9653	1.80	18.20	9635.80	51.17	153.72	-6.02	0.42
101	9748	1.10	39.30	9730.77	53.29	154.76	-7.77	0.91
102	9842	0.40	49.50	9824.76	54.20	155.58	-8.41	0.76
103	9936	0.70	98.00	9918.76	54.33	156.40	-8.31	0.56
104	10032	0.20	275.40	10014.75	54.27	156.82	-8.13	0.94
105	10127	0.80	286.60	10109.75	54.47	156.01	-8.55	0.64
106	10222	1.20	273.30	10204.74	54.72	154.39	-9.25	0.48
107	10316	1.80	249.70	10298.70	54.26	152.02	-9.47	0.90
108	10411	2.80	249.90	10393.63	52.95	148.44	-9.21	1.05
109	10506	2.60	229.10	10488.52	50.74	144.63	-8.16	1.05
110	10563	3.30	221.80	10545.45	48.67	142.56	-6.76	1.39
111	10618	3.10	226.20	10600.36	46.46	140.43	-5.23	0.58
112	10649	3.30	232.00	10631.31	45.33	139.13	-4.51	1.23
113	10680	5.10	190.10	10662.24	43.43	138.18	-2.95	11.10
114	10711	13.50	184.00	10692.80	38.45	137.69	1.69	27.25
115	10743	21.20	180.60	10723.32	28.92	137.36	10.74	24.26
116	10774	29.90	176.40	10751.27	15.58	137.79	23.67	28.65
117	10805	36.40	171.30	10777.21	-1.24	139.67	40.35	22.80
118	10836	40.70	160.80	10801.48	-19.91	144.39	59.59	25.22
119	10867	42.30	157.10	10824.70	-39.07	151.78	80.05	9.44
120	10898	41.90	157.10	10847.70	-58.21	159.86	100.69	1.29
121	10929	41.90	155.80	10870.77	-77.19	168.14	121.23	2.80
122	10960	42.50	154.60	10893.74	-96.09	176.87	141.82	3.24

123	10992	47.10	153.60	10916.44	-116.37	186.72	164.05	14.54
124	11023	55.20	152.30	10935.87	-137.84	197.71	187.74	26.33
125	11054	58.70	151.80	10952.77	-160.79	209.89	213.18	11.37
126	11099	58.20	154.80	10976.32	-195.04	227.12	250.89	5.79
127	11147	57.60	157.20	11001.83	-232.18	243.66	291.18	4.42
128	11194	56.90	160.90	11027.26	-269.09	257.79	330.56	6.79
129	11241	56.40	160.60	11053.10	-306.15	270.73	369.77	1.19
130	11272	55.60	160.20	11070.44	-330.36	279.35	395.43	2.79
131	11303	56.00	159.90	11087.86	-354.46	288.10	421.02	1.52
132	11334	58.60	159.40	11104.61	-378.92	297.18	447.03	8.50
133	11365	61.30	160.10	11120.13	-404.09	306.46	473.80	8.93
134	11428	65.40	160.80	11148.38	-457.14	325.29	530.00	6.58
135	11459	65.80	160.10	11161.19	-483.75	334.74	558.19	2.43
136	11490	66.70	161.30	11173.67	-510.53	344.12	586.52	4.58
137	11521	70.70	162.20	11184.93	-537.95	353.16	615.38	13.18
138	11553	76.60	161.10	11193.94	-567.08	362.82	646.05	18.73
139	11615	82.60	161.10	11205.12	-624.75	382.57	706.94	9.68
140	11625	83.60	160.20	11206.33	-634.12	385.86	716.86	13.41
141	11718	90.10	158.80	11211.43	-721.04	418.36	809.41	7.15
142	11812	91.60	159.20	11210.04	-808.79	452.04	903.08	1.65
143	11905	91.60	160.40	11207.44	-896.03	484.14	995.83	1.29
144	11999	93.80	160.60	11203.01	-984.54	515.48	1089.57	2.35
145	12092	91.90	163.20	11198.39	-1072.81	544.34	1182.39	3.46
146	12186	90.80	165.70	11196.17	-1163.34	569.52	1276.35	2.90
147	12279	92.00	169.20	11193.90	-1254.08	589.72	1369.11	3.98
148	12373	90.30	166.00	11192.01	-1345.85	609.90	1462.86	3.85
149	12466	91.60	160.10	11190.47	-1434.76	637.00	1555.80	6.50
150	12560	88.60	155.80	11190.31	-1521.85	672.28	1649.29	5.58
151	12653	93.40	157.40	11188.68	-1607.16	709.19	1741.53	5.44
152	12747	90.70	157.10	11185.32	-1693.78	745.52	1834.86	2.89
153	12840	95.80	163.70	11180.05	-1781.17	776.65	1927.47	8.96
154	12934	91.70	164.60	11173.90	-1871.38	802.26	2021.25	4.47
155	13027	92.40	165.90	11170.57	-1961.26	825.92	2114.15	1.59
156	13121	88.60	166.40	11169.75	-2052.51	848.42	2208.05	4.08
157	13213	92.90	165.70	11168.55	-2141.76	870.59	2299.94	4.74
158	13306	89.20	163.00	11166.84	-2231.28	895.67	2392.89	4.92
159	13400	88.50	161.60	11168.73	-2320.81	924.24	2486.84	1.66
160	13494	90.50	162.00	11169.55	-2410.09	953.60	2580.78	2.17
161	13587	89.30	162.50	11169.71	-2498.67	981.95	2673.75	1.40
162	13681	92.20	167.30	11168.48	-2589.38	1006.43	2767.68	5.97
163	13775	93.60	168.00	11163.73	-2681.08	1026.51	2861.34	1.66
164	13840	94.80	169.20	11158.97	-2744.62	1039.32	2925.93	2.61
165	13962	88.40	167.10	11155.56	-2863.91	1064.35	3047.45	5.52
166	14055	89.10	169.50	11157.59	-2954.95	1083.20	3140.12	2.69
167	14149	92.50	175.00	11156.28	-3048.03	1095.87	3233.02	6.88
168	14245	90.70	172.90	11153.60	-3143.45	1105.99	3327.45	2.88
169	14338	88.50	171.10	11154.25	-3235.53	1118.93	3419.47	3.06

	170	14432	86.60	166.00	11158.27	-3327.54	1137.56	3513.01	5.78
	171	14525	86.40	162.00	11163.95	-3416.75	1163.14	3605.82	4.30
	172	14619	88.60	162.70	11168.05	-3506.24	1191.61	3699.70	2.46
	173	14713	89.60	160.80	11169.52	-3595.49	1221.05	3793.62	2.28
	174	14807	88.70	161.50	11170.92	-3684.44	1251.41	3887.52	1.21
	175	14900	87.80	156.70	11173.76	-3771.26	1284.56	3980.14	5.25
	176	14994	89.40	156.90	11176.06	-3857.63	1321.58	4073.43	1.72
	177	15083	89.00	161.50	11177.30	-3940.79	1353.17	4162.12	5.19
	178	15176	89.20	162.90	11178.76	-4029.33	1381.60	4255.07	1.52
	179	15274	85.10	161.80	11183.63	-4122.58	1411.27	4352.90	4.33
	180	15367	85.30	162.00	11191.41	-4210.67	1440.06	4445.53	0.30
	181	15461	86.60	162.50	11198.05	-4299.97	1468.65	4539.26	1.48
	182	15554	87.10	163.00	11203.16	-4388.65	1496.18	4632.11	0.76
	183	15648	87.80	162.50	11207.34	-4478.33	1524.03	4726	0.91
	184	15742	87.70	162.30	11211.04	-4567.86	1552.43	4819.90	0.2
	185	15835	90.70	163.90	11212.33	-4656.82	1579.46	4912.87	3.66
	186	15928	87.10	162.50	11214.12	-4745.82	1606.33	5005.83	4.15
	187	16022	89.3	166.6	11217.07	-4836.36	1631.35	5099.75	4.95
	188	16115	86.3	167.6	11220.64	-4926.93	1652.09	5192.51	3.4
	189	16208	86.4	166.6	11226.56	-5017.4	1672.81	5285.16	1.08
	190	16302	88.5	166.9	11230.74	-5108.8	1694.33	5378.93	2.26
	191	16392	90.8	168.5	11231.29	-5196.72	1713.5	5468.7	3.11
PTB		16440	90.8	168.5	11230.62	-5243.76	1723.07	5516.53	0