

# Minimum Radius of Curvature

**API: 42-109-34183**      **Well: Hay Olivia 0013WA**      **Wellhead Location**      **Lat: 31.797156**  
**Operator: Chevron**      **Area: Delaware**      **Long: -104.071119**  
**Rig: Patterson 289**      **Type: U Lateral**      **Magnetic Declination: 8.46**  
**TD: 19,802'**      **Plane of Proposal: 2.20**

Measured Depth Ft	Drift Angle Deg	Azimuth Direction Deg	Course Length Ft	TVD Ft	Vertical Section Ft	COORDINATES		CLOSURE		Dog Leg Severity Deg/100'	Build / Drop Deg/100'	Left / Right Deg/100'
						N-S Ft	E-W Ft	Distance FT	Direction Deg			
0.00	0.00	0.00		0.0	0.00	0.00	0.00	0.00	0.00			
188	1.53	351.46	188	188.0	2.47	2.48	-0.37	2.51	351.46	0.81	0.81	186.95
237	1.68	350.83	49	237.0	3.81	3.84	-0.58	3.88	351.34	0.31	0.31	-1.29
345	1.44	359.41	108	344.9	6.72	6.76	-0.85	6.81	352.83	0.31	-0.22	7.94
443	1.44	9.47	98	442.9	9.17	9.20	-0.66	9.23	355.89	0.26	0.00	-357.08
542	1.25	19.10	99	541.9	11.44	11.45	-0.10	11.45	359.49	0.30	-0.19	9.73
632	0.27	124.58	90	631.9	12.26	12.26	0.39	12.26	1.84	1.50	-1.09	117.20
723	1.01	169.76	91	722.8	11.37	11.35	0.71	11.37	3.59	0.93	0.81	49.65
813	0.98	158.05	90	812.8	9.89	9.85	1.14	9.92	6.61	0.23	-0.03	-13.01
904	0.59	154.77	91	903.8	8.76	8.71	1.63	8.86	10.61	0.43	-0.43	-3.60
994	0.77	104.37	90	993.8	8.23	8.14	2.41	8.49	16.53	0.67	0.20	-56.00
1088	0.72	87.43	94	1087.8	8.14	8.01	3.62	8.79	24.31	0.24	-0.05	-18.02
1182	0.86	87.87	94	1181.8	8.24	8.06	4.91	9.44	31.36	0.15	0.15	0.47
1276	1.45	81.91	94	1275.8	8.51	8.25	6.79	10.69	39.46	0.64	0.63	-6.34
1371	1.04	37.99	95	1370.8	9.42	9.10	8.51	12.46	43.09	1.06	-0.43	-46.23
1465	1.05	37.51	94	1464.7	10.82	10.46	9.56	14.17	42.44	0.01	0.01	-0.51
1559	0.91	61.64	94	1558.7	11.90	11.50	10.75	15.74	43.07	0.46	-0.15	25.67
1653	0.32	18.00	94	1652.7	12.53	12.10	11.48	16.68	43.50	0.76	-0.63	-46.43
1748	0.66	347.61	95	1747.7	13.32	12.89	11.45	17.24	41.62	0.44	0.36	346.96
1842	1.22	257.64	94	1841.7	13.59	13.20	10.35	16.78	38.11	1.48	0.60	-95.71
1936	1.94	256.86	94	1935.7	12.92	12.63	7.83	14.86	31.80	0.77	0.77	-0.83
2030	2.06	264.68	94	2029.6	12.28	12.11	4.60	12.95	20.79	0.32	0.13	8.32
2125	2.48	252.69	95	2124.5	11.37	11.34	0.93	11.38	4.71	0.67	0.44	-12.62
2219	3.95	250.49	94	2218.4	9.49	9.65	-4.06	10.47	337.18	1.57	1.56	-2.34
2282	4.08	253.71	63	2281.2	7.97	8.30	-8.26	11.71	315.14	0.41	0.21	5.11
2364	4.12	255.92	82	2363.0	6.22	6.76	-13.91	15.47	295.92	0.20	0.05	2.70
2458	3.79	259.04	94	2456.8	4.57	5.35	-20.24	20.93	284.81	0.42	-0.35	3.32
2552	5.23	248.14	94	2550.5	2.12	3.16	-27.27	27.45	276.62	1.78	1.53	-11.60
2646	7.79	245.99	94	2643.9	-2.45	-1.02	-37.06	37.08	268.42	2.74	2.72	-2.29
2740	10.35	241.20	94	2736.7	-9.61	-7.68	-50.28	50.87	261.31	2.84	2.72	-5.10
2834	11.46	238.86	94	2829.0	-19.09	-16.58	-65.68	67.74	255.83	1.27	1.18	-2.49
2929	11.83	238.97	95	2922.1	-29.61	-26.48	-82.10	86.26	252.12	0.39	0.39	0.12
3023	11.68	239.80	94	3014.1	-39.99	-36.24	-98.58	105.03	249.82	0.24	-0.16	0.88
3117	11.98	240.22	94	3106.1	-50.26	-45.87	-115.27	124.06	248.30	0.33	0.32	0.45
3211	12.10	239.27	94	3198.0	-60.78	-55.75	-132.21	143.48	247.14	0.25	0.13	-1.01
3305	11.76	240.53	94	3290.0	-71.17	-65.49	-149.01	162.77	246.27	0.46	-0.36	1.34
3399	10.85	240.40	94	3382.2	-80.86	-74.58	-165.05	181.11	245.68	0.97	-0.97	-0.14
3493	11.08	240.02	94	3474.5	-90.33	-83.46	-180.56	198.92	245.19	0.26	0.24	-0.40
3587	11.38	241.04	94	3566.7	-99.94	-92.46	-196.50	217.17	244.80	0.38	0.32	1.09
3682	14.88	244.03	95	3659.2	-110.55	-102.35	-215.67	238.73	244.61	3.75	3.68	3.15
3776	15.40	243.97	94	3749.9	-122.15	-113.11	-237.74	263.28	244.56	0.55	0.55	-0.06
3965	14.85	244.00	189	3932.4	-145.47	-134.74	-282.06	312.59	244.47	0.29	-0.29	0.02
4059	15.71	243.54	94	4023.0	-157.26	-145.69	-304.28	337.36	244.41	0.92	0.91	-0.49
4153	15.35	244.89	94	4113.6	-169.08	-156.64	-326.94	362.53	244.40	0.54	-0.38	1.44
4247	15.33	244.20	94	4204.2	-180.62	-167.33	-349.39	387.39	244.41	0.20	-0.02	-0.73
4342	14.80	244.60	95	4296.0	-192.13	-178.00	-371.66	412.08	244.41	0.57	-0.56	0.42
4436	14.25	244.57	94	4387.0	-203.06	-188.12	-392.95	435.66	244.42	0.59	-0.59	-0.03
4530	14.01	243.33	94	4478.1	-213.92	-198.19	-413.57	458.60	244.40	0.41	-0.26	-1.32
4624	13.17	243.92	94	4569.5	-224.49	-208.01	-433.35	480.69	244.36	0.91	-0.89	0.63
4718	13.09	238.58	94	4661.0	-235.46	-218.26	-452.06	501.99	244.23	1.29	-0.09	-5.68
4813	12.81	232.07	95	4753.6	-248.20	-230.35	-469.55	523.00	243.87	1.56	-0.29	-6.85
4907	12.42	231.56	94	4845.4	-261.50	-243.04	-485.68	543.10	243.42	0.43	-0.41	-0.54
5001	11.43	231.41	94	4937.3	-274.17	-255.13	-500.88	562.11	243.01	1.05	-1.05	-0.16
5095	10.48	230.16	94	5029.6	-285.98	-266.42	-514.73	579.59	242.63	1.04	-1.01	-1.33
5189	9.42	227.84	94	5122.2	-297.08	-277.06	-526.99	595.38	242.27	1.21	-1.13	-2.47
5284	8.70	228.03	95	5216.0	-307.53	-287.08	-538.10	609.89	241.92	0.76	-0.76	0.20
5378	8.63	228.97	94	5309.0	-317.31	-296.46	-548.70	623.67	241.62	0.17	-0.07	1.00
5472	9.80	237.01	94	5401.7	-326.75	-305.45	-560.73	638.53	241.42	1.85	1.24	8.55

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						N-S Ft	E-W Ft	Distance FT	Direction Deg			
5566	9.25	236.08	94	5494.4	-335.81	-314.02	-573.71	654.03	241.31	0.61	-0.59	-0.99
5660	10.55	236.80	94	5587.0	-345.25	-322.95	-587.18	670.14	241.19	1.39	1.38	0.77
5754	10.53	238.36	94	5679.5	-355.02	-332.17	-601.70	687.30	241.10	0.30	-0.02	1.66
5848	10.13	238.76	94	5771.9	-364.36	-340.96	-616.08	704.14	241.04	0.43	-0.43	0.43
5943	8.75	239.04	95	5865.6	-372.92	-349.01	-629.42	719.71	240.99	1.45	-1.45	0.29
6037	7.93	238.27	94	5958.6	-380.45	-356.10	-641.06	733.33	240.95	0.88	-0.87	-0.82
6131	7.03	238.84	94	6051.8	-387.23	-362.49	-651.50	745.55	240.91	0.96	-0.96	0.61
6226	6.18	235.74	95	6146.2	-393.47	-368.37	-660.70	756.46	240.86	0.97	-0.89	-3.26
6320	5.02	232.65	94	6239.8	-399.09	-373.72	-668.15	765.57	240.78	1.27	-1.23	-3.29
6414	4.07	230.66	94	6333.5	-403.92	-378.33	-674.00	772.92	240.69	1.02	-1.01	-2.12
6508	3.19	230.72	94	6427.3	-407.87	-382.10	-678.61	778.79	240.62	0.94	-0.94	0.06
6602	2.73	230.20	94	6521.2	-411.10	-385.19	-682.35	783.56	240.56	0.49	-0.49	-0.55
6696	0.81	181.72	94	6615.1	-413.26	-387.28	-684.09	786.11	240.48	2.42	-2.04	-51.57
6791	0.36	168.54	95	6710.1	-414.22	-388.25	-684.05	786.55	240.42	0.49	-0.47	-13.87
6885	1.15	224.09	94	6804.1	-415.21	-389.22	-684.65	787.55	240.38	1.06	0.84	59.10
6979	0.61	214.48	94	6898.1	-416.34	-390.31	-685.59	788.91	240.35	0.59	-0.57	-10.22
7074	0.50	48.28	95	6993.1	-416.48	-390.45	-685.57	788.96	240.34	1.16	-0.12	-174.95
7168	0.22	57.70	94	7087.1	-416.09	-390.08	-685.11	788.37	240.34	0.30	-0.30	10.02
7262	0.30	327.13	94	7181.1	-415.79	-389.77	-685.09	788.21	240.36	0.40	0.09	286.63
7356	0.60	282.86	94	7275.1	-415.49	-389.46	-685.70	788.58	240.40	0.47	0.32	-47.10
7450	1.29	274.99	94	7369.1	-415.35	-389.26	-687.24	789.82	240.47	0.75	0.73	-8.37
7545	1.95	285.27	95	7464.0	-414.93	-388.74	-689.86	791.85	240.60	0.76	0.69	10.82
7639	2.20	292.41	94	7558.0	-413.95	-387.63	-693.07	794.11	240.78	0.38	0.27	7.60
7733	1.53	261.84	94	7651.9	-413.55	-387.12	-695.98	796.40	240.92	1.25	-0.71	-32.52
7827	1.54	247.82	94	7745.9	-414.30	-387.77	-698.39	798.83	240.96	0.40	0.01	-14.91
7922	1.39	242.94	95	7840.9	-415.39	-388.78	-700.60	801.25	240.97	0.21	-0.16	-5.14
8016	1.31	242.17	94	7934.8	-416.48	-389.80	-702.57	803.46	240.98	0.09	-0.09	-0.82
8110	1.61	222.50	94	8028.8	-418.03	-391.27	-704.41	805.79	240.95	0.62	0.32	-20.93
8204	1.23	225.24	94	8122.8	-419.77	-392.96	-706.02	808.01	240.90	0.41	-0.40	2.91
8299	1.18	235.28	95	8217.7	-421.10	-394.23	-707.55	809.97	240.87	0.23	-0.05	10.57
8393	1.95	338.20	94	8311.7	-420.22	-393.30	-708.94	810.73	240.98	2.65	0.82	109.49
8487	9.42	5.06	94	8405.2	-411.07	-384.14	-708.85	806.25	241.55	8.22	7.95	-354.40
8581	17.15	12.10	94	8496.6	-389.70	-362.89	-705.26	793.15	242.77	8.39	8.22	7.49
8617	20.10	12.87	36	8530.7	-378.39	-351.67	-702.77	785.85	243.42	8.22	8.19	2.14
8707	20.54	14.14	90	8615.1	-347.74	-321.28	-695.47	766.09	245.20	0.69	0.49	1.41
8803	29.60	358.37	96	8702.1	-307.48	-281.12	-692.02	746.94	247.89	11.65	9.44	358.57
8898	37.79	346.16	95	8781.2	-255.95	-229.26	-699.67	736.28	251.86	11.15	8.62	-12.85
8992	47.32	347.89	94	8850.3	-194.65	-167.37	-713.84	733.20	256.80	10.21	10.14	1.84
9087	54.94	353.83	95	8909.9	-122.20	-94.42	-725.37	731.49	262.58	9.38	8.02	6.25
9182	62.01	1.29	95	8959.6	-41.61	-13.65	-728.61	728.74	268.93	10.00	7.44	-371.09
9277	68.09	4.20	95	8999.7	44.47	72.33	-724.44	728.04	275.70	6.98	6.40	3.06
9371	69.08	2.04	94	9034.0	131.96	159.70	-719.68	737.19	282.51	2.38	1.05	-2.30
9466	71.32	2.19	95	9066.2	221.34	249.02	-716.38	758.43	289.17	2.36	2.36	0.16
9561	77.83	5.90	95	9091.5	312.80	340.30	-709.88	787.23	295.61	7.82	6.85	3.91
9655	82.46	7.39	94	9107.5	405.10	432.26	-699.16	821.99	301.73	5.17	4.93	1.59
9751	81.91	4.69	96	9120.6	499.99	526.83	-689.15	867.45	307.40	2.84	-0.57	-2.81
9846	84.91	2.91	95	9131.5	594.31	620.98	-682.90	923.02	312.28	3.67	3.16	-1.87
9940	87.80	4.21	94	9137.5	688.08	714.60	-677.07	984.42	316.54	3.37	3.07	1.38
10035	90.57	3.34	95	9138.8	783.03	809.37	-670.82	1051.23	320.35	3.06	2.92	-0.92
10131	89.85	4.35	96	9138.5	878.98	905.16	-664.38	1122.81	323.72	1.29	-0.75	1.05
10225	90.43	2.10	94	9138.2	972.96	999.00	-659.09	1196.83	326.58	2.47	0.62	-2.39
10320	89.93	5.48	95	9137.9	1067.91	1093.78	-652.82	1273.78	329.17	3.60	-0.53	3.56
10415	89.79	7.99	95	9138.2	1162.61	1188.11	-641.68	1350.32	331.63	2.65	-0.15	2.64
10509	90.43	3.61	94	9138.0	1256.40	1281.61	-632.18	1429.05	333.74	4.71	0.68	-4.66
10604	90.07	5.27	95	9137.6	1351.32	1376.32	-624.82	1511.51	335.58	1.79	-0.38	1.75
10698	90.18	6.22	94	9137.4	1445.14	1469.85	-615.42	1593.48	337.28	1.02	0.12	1.01
10793	90.27	5.17	95	9137.0	1539.96	1564.38	-605.99	1677.65	338.83	1.11	0.09	-1.11
10888	90.41	358.39	95	9136.4	1634.90	1659.27	-603.04	1765.46	340.03	7.14	0.15	371.81

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10983	90.10	351.54	95	9136.0	1729.09	1753.85	-611.37	1857.35	340.78	7.22	-0.33	-7.21
11077	90.10	0.37	94	9135.8	1822.44	1847.52	-618.00	1948.14	341.50	9.39	0.00	-373.59
11172	90.24	1.97	95	9135.6	1917.42	1942.50	-616.06	2037.85	342.40	1.69	0.15	1.68
11267	90.07	0.48	95	9135.3	2012.40	2037.47	-614.03	2127.99	343.23	1.58	-0.18	-1.57
11362	90.10	1.36	95	9135.2	2107.38	2132.46	-612.50	2218.68	343.97	0.93	0.03	0.93
11457	89.48	356.43	95	9135.5	2202.19	2227.41	-614.33	2310.58	344.58	5.23	-0.65	373.76
11552	90.13	1.75	95	9135.8	2297.01	2322.37	-615.84	2402.63	345.15	5.64	0.68	-373.35
11646	90.07	3.05	94	9135.7	2391.01	2416.28	-611.90	2492.56	345.79	1.38	-0.06	1.38
11742	89.85	357.56	96	9135.7	2486.92	2512.24	-611.39	2585.57	346.32	5.72	-0.23	369.28
11836	89.62	0.59	94	9136.2	2580.77	2606.22	-612.91	2677.32	346.77	3.23	-0.24	-379.76
11932	90.29	3.61	96	9136.3	2676.76	2702.14	-609.39	2770.01	347.29	3.22	0.70	3.15
12027	89.96	2.78	95	9136.0	2771.74	2796.99	-604.10	2861.49	347.81	0.94	-0.35	-0.87
12115	90.24	2.27	88	9135.9	2859.74	2884.91	-600.22	2946.69	348.25	0.66	0.32	-0.58
12207	90.29	4.35	92	9135.5	2951.72	2976.75	-594.91	3035.61	348.70	2.26	0.05	2.26
12298	89.34	5.01	91	9135.8	3042.63	3067.44	-587.48	3123.19	349.16	1.27	-1.04	0.73
12390	89.20	6.21	92	9136.9	3134.46	3158.99	-578.49	3211.52	349.62	1.31	-0.15	1.30
12481	89.71	7.31	91	9137.8	3225.16	3249.35	-567.78	3298.59	350.09	1.33	0.56	1.21
12572	89.71	7.21	91	9138.3	3315.81	3339.62	-556.28	3385.64	350.54	0.11	0.00	-0.11
12663	88.84	2.56	91	9139.4	3406.67	3430.26	-548.53	3473.84	350.91	5.20	-0.96	-5.11
12755	89.15	2.12	92	9141.0	3498.66	3522.17	-544.78	3564.05	351.21	0.58	0.34	-0.48
12845	88.84	2.63	90	9142.6	3588.65	3612.08	-541.05	3652.37	351.48	0.66	-0.34	0.57
12936	89.15	0.70	91	9144.2	3679.62	3703.02	-538.41	3741.96	351.73	2.15	0.34	-2.12
13026	89.15	0.58	90	9145.5	3769.58	3793.00	-537.40	3830.89	351.94	0.13	0.00	-0.13
13117	89.20	1.73	91	9146.8	3860.55	3883.98	-535.57	3920.73	352.15	1.26	0.05	1.26
13208	89.51	3.47	91	9147.9	3951.54	3974.87	-531.44	4010.24	352.38	1.94	0.34	1.91
13299	91.44	15.93	91	9147.1	4041.58	4064.39	-516.14	4097.03	352.76	13.85	2.12	13.69
13394	92.70	27.53	95	9143.7	4130.90	4152.43	-481.06	4180.20	353.39	12.27	1.33	12.21
13488	88.05	36.86	94	9143.1	4212.20	4231.86	-431.04	4253.76	354.18	11.09	-4.95	9.93
13584	89.85	44.40	96	9144.8	4287.33	4304.65	-368.58	4320.40	355.11	8.07	1.88	7.85
13679	89.51	45.55	95	9145.3	4357.06	4371.85	-301.44	4382.23	356.06	1.26	-0.36	1.21
13774	89.06	47.20	95	9146.5	4425.19	4437.39	-232.68	4443.49	357.00	1.80	-0.47	1.74
13869	88.75	50.57	95	9148.3	4490.34	4499.84	-161.13	4502.72	357.95	3.56	-0.33	3.55
13964	89.06	56.41	95	9150.2	4549.71	4556.32	-84.82	4557.11	358.93	6.15	0.33	6.15
14059	87.58	64.98	95	9153.0	4599.29	4602.76	-2.10	4602.76	359.97	9.15	-1.56	9.02
14154	90.10	74.96	95	9154.9	4635.17	4635.25	87.02	4636.06	1.08	10.83	2.65	10.51
14248	91.72	86.08	94	9153.4	4654.17	4650.70	179.58	4654.17	2.21	11.95	1.72	11.83
14344	87.21	95.17	96	9154.3	4656.81	4649.66	275.44	4657.81	3.39	10.57	-4.70	9.47
14439	88.67	105.49	95	9157.7	4643.39	4632.66	368.71	4647.30	4.55	10.96	1.54	10.86
14534	87.77	117.31	95	9160.7	4612.23	4598.07	456.96	4620.72	5.68	12.47	-0.95	12.44
14628	87.52	126.01	94	9164.5	4566.08	4548.82	536.83	4580.39	6.73	9.25	-0.27	9.26
14724	82.83	134.01	96	9172.6	4507.52	4487.41	610.03	4528.68	7.74	9.63	-4.89	8.33
14818	83.59	138.99	94	9183.7	4442.35	4419.72	674.26	4470.86	8.67	5.32	0.81	5.30
14913	88.70	144.58	95	9190.1	4370.22	4345.29	732.84	4406.66	9.57	7.96	5.38	5.88
15008	90.60	150.98	95	9190.7	4291.90	4264.97	783.46	4336.33	10.41	7.03	2.00	6.74
15102	88.84	162.49	94	9191.2	4207.18	4178.76	820.53	4258.56	11.11	12.39	-1.87	12.24
15197	88.95	170.86	95	9193.0	4115.75	4086.42	842.40	4172.35	11.65	8.81	0.12	8.81
15291	88.08	180.04	94	9195.5	4022.53	3992.85	849.85	4082.29	12.02	9.81	-0.93	9.77
15386	88.89	174.34	95	9198.0	3927.97	3898.04	854.50	3990.60	12.36	6.06	0.85	-6.00
15481	90.49	181.78	95	9198.5	3833.29	3803.16	857.71	3898.68	12.71	8.01	1.68	7.83
15576	91.50	180.99	95	9196.8	3738.31	3708.21	855.42	3805.59	12.99	1.35	1.06	-0.83
15670	90.99	179.99	94	9194.8	3644.38	3614.23	854.61	3713.90	13.30	1.19	-0.54	-1.06
15765	90.21	181.85	95	9193.8	3549.41	3519.26	853.09	3621.18	13.63	2.12	-0.82	1.96
15860	90.10	184.30	95	9193.5	3454.43	3424.40	847.99	3527.83	13.91	2.58	-0.12	2.58
15955	90.04	180.97	95	9193.4	3359.45	3329.51	843.63	3434.73	14.22	3.51	-0.06	-3.51
16049	90.85	183.89	94	9192.7	3265.46	3235.61	839.64	3342.78	14.55	3.22	0.86	3.11
16143	90.49	182.07	94	9191.6	3171.48	3141.75	834.75	3250.76	14.88	1.97	-0.38	-1.94
16238	90.24	182.15	95	9191.0	3076.48	3046.82	831.26	3158.18	15.26	0.28	-0.26	0.08
16332	88.73	181.44	94	9191.8	2982.49	2952.87	828.31	3066.85	15.67	1.78	-1.61	-0.76

## Minimum Radius of Curvature

**API: 42-109-34183**      **Well: Hay Olivia 0013WA**      **Wellhead Location**      **Lat: 31.797156**  
**Operator: Chevron**      **Area: Delaware**      **Long: -104.071119**  
**Rig: Patterson 289**      **Type: U Lateral**      **Magnetic Declination: 8.46**  
**TD: 19,802'**      **Plane of Proposal: 2.20**

Measured Depth Ft	Drift Angle Deg	Azimuth Direction Deg	Course Length Ft	TVD Ft	Vertical Section Ft	COORDINATES		CLOSURE		Dog Leg Severity Deg/100'	Build / Drop Deg/100'	Left / Right Deg/100'
						N-S Ft	E-W Ft	Distance FT	Direction Deg			
16426	90.63	178.90	94	9192.4	2888.56	2858.88	828.03	2976.38	16.15	3.37	2.02	-2.70
16521	90.57	178.89	95	9191.4	2793.73	2763.91	829.87	2885.80	16.71	0.06	-0.06	-0.01
16710	88.39	184.21	189	9193.1	2604.83	2575.06	824.76	2703.92	17.76	3.04	-1.15	2.81
16804	89.17	184.48	94	9195.1	2510.91	2481.36	817.64	2612.60	18.24	0.88	0.83	0.29
16898	89.45	183.91	94	9196.2	2416.98	2387.61	810.76	2521.51	18.76	0.68	0.30	-0.61