



Gyroscopic Survey Report
for
K.P. KAUFFMAN
1675 BROADWAY SUITE 2800
DENVER, CO 80202

Well Location	WELD COUNTY, CO
Well Name	SACK #44-31
Rig Number	FMC 134
Survey Date	7/23/2014
Latitude	40.0024500°N
Longitude	104.9258300°W
North Reference	True North
Grid Correction	None
Depth Reference	GROUND LEVEL (5053.00 ft)
Calculation Method	Minimum Curvature
Section (VS) Ref	0.00N (ft), 0.00E (ft), 217.62Azim (deg)
Definitive Survey	SACK #44-31
Operator(s)	C JAQUES, C KIRBY

Well Notes

Survey Report

Well Name: SACK #44-31
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Survey Date: 7/23/2014

MD ft	Inc deg	Azim deg	TVD ft	VS ft	+N/-S ft	+E/-W ft	DLS 7100ft	Closure Distance ft	Closure Direction deg
0.00	0.00	0.00	0.00	0.00	0.00	0.00	Invalid	0.00	0.00
101.00	0.91	151.17	101.00	0.32	-0.71	0.39	0.90	0.81	151.17
125.25	0.80	146.45	125.24	0.45	-1.02	0.58	0.54	1.17	150.48
150.28	0.75	137.42	150.27	0.54	-1.28	0.78	0.54	1.50	148.60
175.20	0.80	136.40	175.19	0.59	-1.53	1.01	0.22	1.84	146.46
200.70	0.75	137.84	200.69	0.65	-1.78	1.25	0.20	2.18	144.98
225.20	0.89	132.76	225.19	0.70	-2.03	1.50	0.61	2.52	143.62
250.86	0.82	134.37	250.84	0.74	-2.30	1.77	0.28	2.90	142.30
275.63	0.86	131.33	275.61	0.77	-2.54	2.04	0.24	3.26	141.25
300.05	0.85	129.77	300.03	0.79	-2.78	2.32	0.10	3.62	140.18
325.94	0.76	131.60	325.91	0.81	-3.02	2.59	0.36	3.98	139.31
350.29	0.81	127.97	350.26	0.82	-3.23	2.85	0.27	4.31	138.57
375.14	0.91	129.62	375.11	0.83	-3.46	3.14	0.44	4.67	137.80
400.00	0.86	128.70	399.97	0.84	-3.71	3.44	0.20	5.05	137.14
426.19	0.85	127.96	426.15	0.84	-3.95	3.74	0.08	5.44	136.51
450.66	0.75	118.22	450.62	0.82	-4.13	4.03	0.68	5.77	135.75
475.71	0.77	125.32	475.66	0.78	-4.31	4.31	0.39	6.09	135.00
500.46	0.75	125.07	500.41	0.77	-4.50	4.58	0.07	6.42	134.50
526.64	0.64	119.85	526.59	0.74	-4.67	4.85	0.49	6.73	133.94
551.14	0.75	122.72	551.09	0.71	-4.83	5.10	0.47	7.02	133.42
576.10	0.51	123.63	576.05	0.69	-4.98	5.33	0.97	7.29	133.03
601.01	0.64	125.69	600.96	0.67	-5.12	5.54	0.55	7.54	132.76
625.50	0.39	136.92	625.45	0.68	-5.26	5.71	1.12	7.76	132.68
650.16	0.46	132.93	650.11	0.71	-5.39	5.84	0.31	7.94	132.72
675.98	0.51	124.76	675.93	0.71	-5.53	6.01	0.34	8.16	132.61
700.60	0.37	158.17	700.54	0.75	-5.66	6.13	1.16	8.34	132.75
726.47	0.28	139.81	726.41	0.80	-5.79	6.20	0.54	8.48	133.05
750.80	0.28	169.12	750.75	0.85	-5.89	6.25	0.58	8.59	133.32
775.39	0.29	166.62	775.33	0.93	-6.01	6.27	0.07	8.69	133.77
800.03	0.34	158.17	799.98	1.01	-6.14	6.31	0.27	8.80	134.18
826.00	0.35	175.11	825.95	1.10	-6.29	6.35	0.39	8.93	134.72
851.01	0.31	190.20	850.95	1.22	-6.43	6.34	0.39	9.03	135.38
875.66	0.29	186.94	875.61	1.33	-6.56	6.32	0.10	9.11	136.03
900.42	0.29	185.45	900.36	1.44	-6.68	6.31	0.03	9.19	136.64
925.86	0.33	181.93	925.80	1.56	-6.82	6.30	0.18	9.29	137.26
950.56	0.32	179.12	950.50	1.67	-6.96	6.30	0.09	9.39	137.85

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MD ft	Inc deg	Azim deg	TVD ft	VS ft	+N/-S ft	+E/-W ft	DLS 7100ft	Closure Distance ft	Closure Direction deg
975.31	0.30	166.97	975.26	1.76	-7.09	6.32	0.28	9.50	138.31
1000.01	0.31	167.32	999.95	1.84	-7.22	6.35	0.07	9.61	138.69
1025.52	0.28	166.18	1025.46	1.93	-7.35	6.38	0.13	9.73	139.05
1050.62	0.28	166.25	1050.56	2.00	-7.47	6.40	0.03	9.84	139.38
1075.41	0.13	105.68	1075.35	2.03	-7.53	6.45	1.00	9.92	139.45
1100.21	0.14	53.83	1100.15	1.99	-7.52	6.50	0.48	9.94	139.18
1126.10	0.16	86.09	1126.04	1.94	-7.50	6.56	0.33	9.97	138.83
1150.48	0.24	49.39	1150.42	1.86	-7.47	6.63	0.61	9.99	138.38
1175.15	0.18	50.97	1175.08	1.77	-7.41	6.70	0.24	9.99	137.86
1201.23	0.13	53.45	1201.17	1.71	-7.36	6.76	0.20	10.00	137.44
1225.59	0.21	32.55	1225.53	1.63	-7.31	6.81	0.40	9.99	137.04
1251.28	0.22	47.58	1251.22	1.54	-7.24	6.87	0.23	9.98	136.48
1275.13	0.15	36.61	1275.06	1.46	-7.18	6.92	0.33	9.97	136.03
1300.90	0.22	31.38	1300.84	1.38	-7.11	6.97	0.26	9.95	135.56
1326.12	0.23	358.56	1326.06	1.29	-7.02	6.99	0.51	9.91	135.09
1350.13	0.20	56.83	1350.07	1.21	-6.94	7.03	0.90	9.88	134.65
1375.80	0.23	4.51	1375.74	1.12	-6.87	7.07	0.76	9.86	134.16
1400.24	0.24	350.63	1400.18	1.05	-6.77	7.07	0.23	9.78	133.76
1425.55	0.27	356.25	1425.49	0.97	-6.66	7.05	0.18	9.70	133.34
1450.82	0.08	288.75	1450.76	0.93	-6.59	7.03	1.01	9.64	133.13
1475.17	0.06	278.87	1475.11	0.94	-6.58	7.00	0.08	9.61	133.22
1500.49	0.23	304.94	1500.43	0.95	-6.55	6.95	0.69	9.55	133.31
1526.08	0.17	298.09	1526.02	0.96	-6.50	6.87	0.23	9.46	133.42
1550.59	0.12	256.49	1550.53	0.98	-6.49	6.81	0.47	9.41	133.61
1575.03	0.16	260.42	1574.97	1.03	-6.50	6.75	0.16	9.38	133.91
1600.85	0.25	287.28	1600.79	1.07	-6.49	6.66	0.52	9.30	134.25
1625.98	0.22	278.22	1625.91	1.12	-6.47	6.56	0.21	9.22	134.58
1650.61	0.21	274.21	1650.55	1.16	-6.46	6.47	0.07	9.14	134.94
1675.01	0.29	268.78	1674.95	1.23	-6.46	6.37	0.35	9.07	135.41
1700.72	0.41	285.51	1700.65	1.30	-6.43	6.21	0.61	8.94	136.01
1725.25	0.39	280.00	1725.19	1.38	-6.40	6.05	0.19	8.80	136.61
1750.46	0.32	262.90	1750.40	1.46	-6.39	5.89	0.49	8.69	137.32
1775.03	0.35	270.01	1774.97	1.56	-6.40	5.75	0.21	8.60	138.06
1800.74	0.30	271.25	1800.67	1.65	-6.40	5.60	0.21	8.50	138.78
1825.19	0.29	251.49	1825.13	1.73	-6.41	5.48	0.41	8.44	139.48
1850.08	0.34	270.87	1850.01	1.83	-6.43	5.35	0.47	8.37	140.26

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MD ft	Inc deg	Azim deg	TVD ft	VS ft	+N/-S ft	+E/-W ft	DLS 7100ft	Closure Distance ft	Closure Direction deg
1875.52	0.30	254.73	1875.46	1.93	-6.45	5.21	0.38	8.29	141.08
1900.88	0.27	256.95	1900.82	2.03	-6.48	5.09	0.15	8.24	141.88
1925.08	0.34	278.89	1925.01	2.11	-6.48	4.96	0.57	8.16	142.58
1950.46	0.23	255.60	1950.40	2.18	-6.48	4.84	0.64	8.09	143.28
1975.99	0.29	274.27	1975.92	2.26	-6.49	4.72	0.42	8.03	143.97
2000.82	0.38	290.85	2000.75	2.32	-6.46	4.58	0.52	7.92	144.65
2025.12	0.28	285.00	2025.05	2.36	-6.41	4.45	0.42	7.80	145.26
2050.46	0.28	271.76	2050.39	2.42	-6.40	4.33	0.26	7.72	145.92
2075.86	0.47	305.04	2075.79	2.47	-6.33	4.18	1.11	7.59	146.58
2100.05	0.39	297.65	2099.98	2.48	-6.24	4.03	0.41	7.43	147.17
2125.04	0.34	287.60	2124.97	2.52	-6.18	3.88	0.30	7.29	147.87
2150.44	0.43	293.64	2150.37	2.57	-6.12	3.72	0.39	7.16	148.69
2175.83	0.52	291.86	2175.76	2.63	-6.03	3.52	0.34	6.99	149.71
2200.10	0.44	300.90	2200.02	2.67	-5.95	3.34	0.44	6.82	150.65
2225.67	0.38	294.06	2225.60	2.70	-5.86	3.18	0.30	6.67	151.51
2250.25	0.49	293.27	2250.17	2.75	-5.79	3.01	0.44	6.52	152.52
2275.25	0.41	292.33	2275.18	2.80	-5.71	2.83	0.31	6.37	153.66
2300.33	0.45	298.97	2300.26	2.83	-5.63	2.66	0.26	6.22	154.73
2325.36	0.51	283.18	2325.28	2.90	-5.55	2.46	0.58	6.07	156.10
2350.07	0.47	275.68	2349.99	3.00	-5.52	2.25	0.31	5.96	157.80
2375.05	0.54	286.49	2374.97	3.09	-5.47	2.03	0.48	5.84	159.61
2400.11	0.64	292.94	2400.03	3.17	-5.39	1.79	0.46	5.68	161.59
2426.47	0.56	262.23	2426.39	3.30	-5.35	1.53	1.24	5.56	164.03
2450.85	0.48	263.87	2450.76	3.45	-5.37	1.31	0.33	5.53	166.29
2475.59	0.49	267.87	2475.50	3.59	-5.39	1.10	0.14	5.50	168.43
2500.29	0.52	260.93	2500.21	3.74	-5.41	0.89	0.28	5.48	170.69
2526.27	0.43	264.27	2526.18	3.89	-5.44	0.67	0.38	5.48	172.93
2550.58	0.42	261.07	2550.49	4.02	-5.46	0.50	0.10	5.48	174.81
2575.44	0.29	267.33	2575.36	4.13	-5.48	0.34	0.58	5.49	176.42
2600.04	0.39	258.34	2599.95	4.23	-5.50	0.20	0.49	5.50	177.92
2626.17	0.43	274.04	2626.09	4.35	-5.51	0.01	0.46	5.51	179.86
2650.50	0.46	272.71	2650.41	4.46	-5.50	-0.17	0.12	5.50	181.82
2675.24	0.43	267.65	2675.15	4.58	-5.50	-0.37	0.21	5.51	183.81
2701.31	0.56	257.48	2701.22	4.74	-5.53	-0.59	0.61	5.56	186.06
2726.04	0.46	267.89	2725.95	4.89	-5.56	-0.80	0.55	5.62	188.23
2750.39	0.51	276.20	2750.30	5.01	-5.55	-1.01	0.36	5.64	190.31

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MD ft	Inc deg	Azim deg	TVD ft	VS ft	+N/-S ft	+E/-W ft	DLS 7100ft	Closure Distance ft	Closure Direction deg
2775.14	0.61	273.23	2775.04	5.14	-5.53	-1.25	0.42	5.67	192.74
2801.11	0.58	273.30	2801.02	5.30	-5.51	-1.52	0.12	5.72	195.41
2825.87	0.63	274.63	2825.78	5.44	-5.50	-1.78	0.22	5.78	197.95
2850.32	0.63	268.38	2850.22	5.60	-5.49	-2.05	0.28	5.86	200.48
2875.10	0.58	264.02	2875.00	5.77	-5.51	-2.31	0.27	5.97	202.78
2900.70	0.57	259.75	2900.60	5.96	-5.54	-2.57	0.17	6.11	204.86
2926.30	0.74	265.90	2926.20	6.16	-5.58	-2.86	0.72	6.27	207.14
2951.09	0.67	259.88	2950.99	6.38	-5.61	-3.16	0.40	6.44	209.39
2975.91	0.69	252.15	2975.80	6.61	-5.69	-3.45	0.38	6.65	211.24
3000.77	0.64	252.46	3000.66	6.85	-5.77	-3.72	0.22	6.87	212.82
3025.91	0.63	247.37	3025.80	7.08	-5.87	-3.98	0.23	7.09	214.17
3050.26	0.65	252.90	3050.15	7.31	-5.96	-4.24	0.28	7.31	215.42
3075.93	0.56	239.50	3075.82	7.54	-6.07	-4.49	0.65	7.55	216.48
3100.37	0.63	239.94	3100.25	7.78	-6.20	-4.71	0.27	7.78	217.22
3126.05	0.56	251.53	3125.93	8.02	-6.31	-4.95	0.54	8.02	218.12
3150.08	0.51	248.29	3149.97	8.21	-6.38	-5.16	0.24	8.21	218.95
3175.79	0.53	249.84	3175.67	8.41	-6.47	-5.38	0.09	8.41	219.75
3200.32	0.43	246.96	3200.20	8.58	-6.54	-5.57	0.44	8.59	220.41
3226.01	0.39	244.30	3225.89	8.74	-6.62	-5.73	0.17	8.76	220.92
3250.45	0.41	253.22	3250.33	8.89	-6.68	-5.89	0.27	8.91	221.43
3275.76	0.47	254.43	3275.65	9.04	-6.73	-6.08	0.25	9.07	222.08
3300.35	0.49	247.09	3300.23	9.21	-6.80	-6.27	0.26	9.25	222.69
3325.76	0.47	231.08	3325.64	9.41	-6.91	-6.45	0.53	9.45	223.05
3350.46	0.56	235.22	3350.34	9.62	-7.04	-6.63	0.38	9.67	223.29
3375.21	0.47	235.55	3375.09	9.83	-7.16	-6.81	0.34	9.89	223.56
3400.06	0.59	236.62	3399.94	10.05	-7.29	-7.00	0.48	10.11	223.84
3425.86	0.59	228.10	3425.74	10.31	-7.45	-7.21	0.34	10.37	224.06
3450.80	0.58	228.99	3450.67	10.56	-7.62	-7.40	0.07	10.63	224.16
3475.49	0.68	220.94	3475.36	10.83	-7.82	-7.59	0.56	10.90	224.18
3500.31	0.53	224.87	3500.18	11.09	-8.01	-7.77	0.62	11.16	224.14
3525.15	0.48	220.65	3525.02	11.31	-8.17	-7.92	0.28	11.38	224.12
3551.19	0.48	216.98	3551.05	11.52	-8.34	-8.06	0.12	11.60	224.02
3575.66	0.42	228.37	3575.53	11.72	-8.48	-8.19	0.45	11.79	223.99
3600.68	0.42	233.92	3600.55	11.89	-8.60	-8.33	0.16	11.97	224.10
3625.12	0.28	229.51	3624.99	12.04	-8.69	-8.45	0.57	12.12	224.19
3650.98	0.44	248.02	3650.85	12.18	-8.77	-8.59	0.75	12.27	224.41

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3675.47	0.48	259.23	3675.33	12.34	-8.82	-8.77	0.40	12.44	224.85
3700.66	0.38	254.37	3700.53	12.49	-8.86	-8.96	0.39	12.60	225.31
3725.97	0.33	248.48	3725.83	12.62	-8.91	-9.11	0.25	12.74	225.62
3750.54	0.35	243.07	3750.40	12.75	-8.97	-9.24	0.15	12.88	225.85
3776.26	0.31	236.17	3776.13	12.89	-9.05	-9.37	0.22	13.03	226.01
3800.29	0.12	227.93	3800.15	12.97	-9.10	-9.44	0.81	13.11	226.06
3826.11	0.16	178.16	3825.97	13.03	-9.15	-9.46	0.47	13.17	225.95
3850.78	0.43	129.09	3850.64	13.05	-9.25	-9.39	1.40	13.18	225.45
3875.26	0.56	126.27	3875.12	13.05	-9.37	-9.22	0.53	13.15	224.54
3900.72	0.55	130.96	3900.58	13.06	-9.53	-9.03	0.18	13.13	223.47
3925.24	0.63	129.29	3925.10	13.07	-9.69	-8.84	0.32	13.11	222.37
3951.06	0.54	145.84	3950.92	13.11	-9.88	-8.66	0.74	13.14	221.24
3976.14	0.43	156.08	3976.00	13.19	-10.06	-8.56	0.54	13.21	220.37
4000.70	0.46	152.75	4000.55	13.28	-10.24	-8.47	0.17	13.29	219.62
4025.83	0.60	171.77	4025.68	13.41	-10.46	-8.41	0.89	13.42	218.80
4050.53	0.71	185.27	4050.39	13.63	-10.74	-8.40	0.77	13.64	218.04
4075.28	0.77	178.88	4075.13	13.90	-11.06	-8.41	0.41	13.90	217.26
4100.45	1.00	172.28	4100.30	14.18	-11.45	-8.38	0.98	14.19	216.21
4126.46	0.98	172.85	4126.30	14.50	-11.89	-8.32	0.07	14.51	214.99
4150.82	1.02	165.55	4150.67	14.78	-12.31	-8.24	0.54	14.81	213.81
4175.92	0.92	179.02	4175.76	15.08	-12.73	-8.18	0.98	15.13	212.74
4200.59	1.07	163.42	4200.43	15.37	-13.15	-8.11	1.24	15.45	211.68
4226.51	0.85	165.21	4226.34	15.62	-13.56	-8.00	0.85	15.74	210.52
4250.49	0.79	159.30	4250.32	15.82	-13.89	-7.89	0.42	15.98	209.61
4275.62	0.65	164.29	4275.45	16.00	-14.19	-7.79	0.64	16.19	208.78
4300.46	0.52	189.63	4300.28	16.18	-14.44	-7.77	1.14	16.40	208.30
4325.46	0.81	185.93	4325.28	16.43	-14.72	-7.81	1.15	16.67	207.95
4350.61	0.81	185.15	4350.43	16.73	-15.08	-7.85	0.05	17.00	207.49
4375.94	0.78	190.22	4375.75	17.04	-15.43	-7.89	0.30	17.33	207.09
4400.13	0.61	172.87	4399.94	17.27	-15.72	-7.91	1.12	17.59	206.70
4425.47	0.47	190.46	4425.28	17.46	-15.95	-7.91	0.84	17.81	206.37
4450.92	0.55	235.56	4450.74	17.67	-16.13	-8.03	1.57	18.01	206.47
4475.86	0.48	238.46	4475.67	17.88	-16.25	-8.22	0.30	18.21	206.82
4500.39	0.45	235.15	4500.20	18.07	-16.36	-8.38	0.16	18.38	207.13
4525.89	0.74	234.07	4525.70	18.33	-16.51	-8.60	1.16	18.62	207.51
4550.08	0.52	238.96	4549.89	18.58	-16.66	-8.82	0.96	18.85	207.90

Well Name: SACK #44-31
Survey: SACK #44-31
Survey Date: 7/23/2014

MD ft	Inc deg	Azim deg	TVD ft	VS ft	+N/-S ft	+E/-W ft	DLS 7100ft	Closure Distance ft	Closure Direction deg
4575.51	0.05	118.20	4575.32	18.68	-16.72	-8.91	2.13	18.95	208.04
4600.98	0.69	292.25	4600.79	18.72	-16.67	-9.04	2.88	18.96	208.47
4626.47	0.96	291.11	4626.28	18.82	-16.54	-9.38	1.09	19.01	209.57
4650.36	0.75	270.41	4650.16	18.98	-16.46	-9.72	1.56	19.12	210.57
4675.88	0.55	294.11	4675.68	19.11	-16.41	-10.00	1.29	19.22	211.37
4700.26	0.35	317.33	4700.06	19.12	-16.31	-10.16	1.11	19.21	211.93
4725.88	0.98	321.07	4725.68	19.06	-16.08	-10.35	2.47	19.12	212.77
4751.21	0.95	319.78	4751.01	18.96	-15.75	-10.62	0.15	19.00	214.00
4775.31	0.78	315.29	4775.10	18.90	-15.48	-10.87	0.76	18.92	215.07
4800.04	0.51	332.31	4799.83	18.83	-15.27	-11.04	1.33	18.84	215.87
4825.30	0.63	352.84	4825.09	18.68	-15.03	-11.11	0.93	18.69	216.46
4850.39	0.79	6.51	4850.18	18.44	-14.72	-11.10	0.94	18.44	217.03
4877.64	0.82	8.63	4877.42	18.11	-14.34	-11.05	0.14	18.11	217.62