



Job Number: SVGJ-170088
 Company: PDC
 Lease/Well: Guttersen 21-31
 Location: Weld County, CO
 Rig Name: MS Energy Wireline
 RKB: 0'
 G.L. or M.S.L.: GL

State/Country: Colorado/USA
 Declination: 8.24°
 Grid: East To True North
 File name: C:\WINSER~1\2017\PDC\GJ\GUTTER~1\2131.SVY
 Date/Time: 05-Jun-17 / 11:51
 Curve Name: Surface - 6900' M.D. (Rate Gyro)
 Lat: 40.21631 Long: -104.55378

MS Energy

WINSERVE SURVEY CALCULATIONS
 Minimum Curvature Method
 Vertical Section Plane .00
 Vertical Section Referenced to Wellhead
 Rectangular Coordinates Referenced to Wellhead

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	N-S FT	E-W FT	Vertical Section FT	C L O S U R E		Dogleg Severity Deg/100
							Distance FT	Direction Deg	
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
100.00	.23	230.98	100.00	-.13	-.16	-.13	.20	230.98	.23
200.00	.10	228.12	200.00	-.31	-.38	-.31	.49	230.47	.13
300.00	.31	63.05	300.00	-.25	-.20	-.25	.32	219.13	.41
400.00	.32	61.25	400.00	.01	.29	.01	.29	87.93	.01
500.00	.23	56.51	500.00	.26	.70	.26	.74	69.89	.09
600.00	.25	51.60	600.00	.50	1.04	.50	1.15	64.16	.03
700.00	.28	55.29	699.99	.78	1.41	.78	1.61	61.13	.03
800.00	.25	66.90	799.99	1.00	1.81	1.00	2.07	61.05	.06
900.00	.24	71.88	899.99	1.15	2.21	1.15	2.49	62.46	.02
1000.00	.25	74.27	999.99	1.28	2.62	1.28	2.91	64.02	.01
1100.00	.29	84.01	1099.99	1.36	3.08	1.36	3.37	66.15	.06
1200.00	.32	69.59	1199.99	1.49	3.59	1.49	3.89	67.54	.08

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	N-S FT	E-W FT	Vertical Section FT	C L O S U R E		Dogleg Severity Deg/100
							Distance FT	Direction Deg	
1300.00	.21	60.02	1299.99	1.67	4.01	1.67	4.35	67.36	.12
1400.00	.10	89.62	1399.99	1.77	4.26	1.77	4.61	67.48	.13
1500.00	.06	99.02	1499.99	1.76	4.40	1.76	4.74	68.21	.04
1600.00	.07	74.91	1599.99	1.77	4.51	1.77	4.84	68.61	.03
1700.00	.11	47.04	1699.99	1.85	4.64	1.85	4.99	68.28	.06
1800.00	.06	74.84	1799.99	1.93	4.76	1.93	5.13	67.96	.06
1900.00	.07	56.81	1899.99	1.97	4.86	1.97	5.25	67.90	.02
2000.00	.11	131.84	1999.99	1.94	4.98	1.94	5.35	68.70	.11
2100.00	.17	130.18	2099.99	1.78	5.17	1.78	5.47	70.96	.06
2200.00	.21	63.50	2199.99	1.77	5.45	1.77	5.73	72.00	.21
2300.00	.57	37.77	2299.98	2.24	5.91	2.24	6.33	69.22	.39
2400.00	1.03	32.15	2399.97	3.40	6.70	3.40	7.51	63.09	.47
2500.00	1.19	29.97	2499.95	5.06	7.69	5.06	9.21	56.67	.17
2600.00	1.32	29.23	2599.93	6.96	8.78	6.96	11.20	51.57	.13
2700.00	1.23	33.10	2699.91	8.87	9.92	8.87	13.31	48.22	.12
2800.00	1.07	36.39	2799.89	10.52	11.06	10.52	15.27	46.45	.17
2900.00	.94	36.34	2899.87	11.93	12.10	11.93	17.00	45.41	.13
3000.00	.91	31.41	2999.86	13.27	13.00	13.27	18.58	44.42	.09
3100.00	.96	39.75	3099.84	14.59	13.95	14.59	20.19	43.72	.14
3200.00	1.21	61.66	3199.83	15.74	15.42	15.74	22.03	44.41	.48
3300.00	1.19	55.51	3299.80	16.83	17.20	16.83	24.06	45.64	.13
3400.00	.76	63.40	3399.79	17.71	18.65	17.71	25.72	46.48	.45
3500.00	.64	90.21	3499.78	18.01	19.80	18.01	26.77	47.72	.34
3600.00	.53	106.70	3599.78	17.87	20.81	17.87	27.43	49.34	.20
3700.00	.38	93.22	3699.77	17.72	21.58	17.72	27.92	50.61	.18
3800.00	.13	132.56	3799.77	17.62	21.99	17.62	28.18	51.29	.29
3900.00	.19	175.87	3899.77	17.38	22.09	17.38	28.11	51.80	.13
4000.00	.29	209.08	3999.77	17.00	21.98	17.00	27.78	52.29	.17
4100.00	.58	211.53	4099.77	16.34	21.59	16.34	27.08	52.88	.29
4200.00	.73	211.66	4199.76	15.37	20.99	15.37	26.02	53.79	.15
4300.00	.66	172.89	4299.76	14.26	20.73	14.26	25.16	55.48	.47
4400.00	.58	175.92	4399.75	13.18	20.84	13.18	24.65	57.69	.09
4500.00	1.35	202.34	4499.74	11.58	20.42	11.58	23.48	60.44	.87
4600.00	1.80	212.97	4599.70	9.18	19.12	9.18	21.21	64.36	.53

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	N-S FT	E-W FT	Vertical Section FT	C L O S U R E		Dogleg Severity Deg/100
							Distance FT	Direction Deg	
4700.00	1.96	218.29	4699.64	6.52	17.21	6.52	18.40	69.25	.24
4800.00	2.03	222.13	4799.58	3.86	14.96	3.86	15.45	75.52	.15
4900.00	1.09	231.11	4899.55	1.95	13.03	1.95	13.18	81.48	.97
5000.00	.94	234.83	4999.53	.88	11.62	.88	11.65	85.66	.16
5100.00	.85	233.83	5099.52	-.03	10.35	-.03	10.35	90.16	.09
5200.00	.78	222.99	5199.51	-.96	9.29	-.96	9.34	95.93	.17
5300.00	.54	211.82	5299.50	-1.86	8.58	-1.86	8.78	102.25	.27
5400.00	.40	215.80	5399.50	-2.55	8.12	-2.55	8.51	107.40	.14
5500.00	.22	169.98	5499.50	-3.02	7.95	-3.02	8.51	110.78	.29
5600.00	.22	138.11	5599.50	-3.35	8.11	-3.35	8.78	112.43	.12
5700.00	.20	150.37	5699.49	-3.64	8.33	-3.64	9.09	113.63	.05
5800.00	.26	141.89	5799.49	-3.97	8.55	-3.97	9.43	114.92	.07
5900.00	.27	119.12	5899.49	-4.27	8.90	-4.27	9.87	115.62	.11
6000.00	.28	123.48	5999.49	-4.52	9.31	-4.52	10.35	115.88	.02
6100.00	.20	92.06	6099.49	-4.66	9.69	-4.66	10.75	115.68	.15
6200.00	.24	115.43	6199.49	-4.75	10.05	-4.75	11.12	115.31	.10
6300.00	.37	93.55	6299.49	-4.86	10.56	-4.86	11.63	114.73	.17
6400.00	.30	81.27	6399.49	-4.85	11.14	-4.85	12.15	113.50	.10
6500.00	.20	60.89	6499.49	-4.72	11.56	-4.72	12.48	112.22	.13
6600.00	.37	101.40	6599.48	-4.70	12.02	-4.70	12.91	111.35	.25
6700.00	.35	93.39	6699.48	-4.78	12.65	-4.78	13.52	110.71	.05
6800.00	.53	76.76	6799.48	-4.69	13.40	-4.69	14.20	109.30	.22
Last Survey Depth Recorded									
6900.00	.32	133.07	6899.48	-4.78	14.06	-4.78	14.85	108.78	.44