



Job Number: SVGJ-160276  
Company: PDC  
Lease/Well: Droegemuller 11-15  
Location: Weld County, CO  
Rig Name: MS Slickline 2788  
RKB: 0'  
G.L. or M.S.L.: GL

State/Country: Colorado/USA  
Declination: 8.29°  
Grid: East To True North  
File name: W:\2016\PDC\GJ\DROEGE~1\1115.SVY  
Date/Time: 01-Nov-16 / 14:36  
Curve Name: Surface - 6600' M.D. (Rate Gyro)  
Lat: 40.404691 Long: -104.542533

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	.34	218.41	100.00	-.23	-.18	-.23	.30	218.41	.34
200.00	.25	216.54	200.00	-.64	-.50	-.64	.81	217.91	.09
300.00	.38	217.93	300.00	-1.08	-.83	-1.08	1.36	217.69	.13
400.00	.45	210.97	399.99	-1.68	-1.24	-1.68	2.08	216.47	.09
500.00	.37	200.69	499.99	-2.31	-1.55	-2.31	2.79	213.89	.11
600.00	.43	189.86	599.99	-2.99	-1.73	-2.99	3.45	210.13	.10
700.00	.34	170.84	699.99	-3.65	-1.75	-3.65	4.05	205.62	.16
800.00	.17	174.43	799.99	-4.09	-1.69	-4.09	4.42	202.43	.17
900.00	.25	230.70	899.99	-4.37	-1.84	-4.37	4.75	202.84	.21
1000.00	.47	213.80	999.98	-4.85	-2.24	-4.85	5.35	204.77	.24
1100.00	.54	192.01	1099.98	-5.66	-2.57	-5.66	6.21	204.40	.20
1200.00	.25	196.20	1199.98	-6.33	-2.72	-6.33	6.89	203.30	.29
1300.00	.33	182.65	1299.98	-6.82	-2.80	-6.82	7.38	202.30	.10
1400.00	.14	261.62	1399.97	-7.13	-2.93	-7.13	7.71	202.36	.33

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	
1500.00	.36	215.60	1499.97	-7.40	-3.24	-7.40	8.08	203.62	.28
1600.00	.30	215.09	1599.97	-7.87	-3.57	-7.87	8.64	204.40	.06
1700.00	.27	288.69	1699.97	-8.01	-3.94	-8.01	8.93	206.21	.34
1800.00	.37	265.04	1799.97	-7.96	-4.49	-7.96	9.14	209.41	.16
1900.00	.62	308.49	1899.97	-7.65	-5.23	-7.65	9.27	214.36	.43
2000.00	.73	284.62	1999.96	-7.16	-6.27	-7.16	9.52	221.24	.30
2100.00	.55	307.47	2099.95	-6.70	-7.27	-6.70	9.89	227.33	.31
2200.00	.47	279.38	2199.95	-6.34	-8.06	-6.34	10.26	231.78	.26
2300.00	.36	281.81	2299.95	-6.21	-8.77	-6.21	10.75	234.68	.11
2400.00	.15	34.47	2399.95	-6.04	-9.00	-6.04	10.84	236.13	.44
2500.00	.14	134.99	2499.95	-6.02	-8.84	-6.02	10.70	235.75	.22
2600.00	.40	125.14	2599.94	-6.31	-8.47	-6.31	10.56	233.33	.26
2700.00	.15	149.67	2699.94	-6.62	-8.12	-6.62	10.48	230.80	.27
2800.00	.61	163.88	2799.94	-7.25	-7.90	-7.25	10.72	227.49	.47
2900.00	.43	171.26	2899.94	-8.13	-7.70	-8.13	11.20	223.45	.19
3000.00	.73	179.56	2999.93	-9.14	-7.64	-9.14	11.91	219.90	.31
3100.00	.50	212.61	3099.93	-10.14	-7.87	-10.14	12.83	217.81	.41
3200.00	.22	320.56	3199.92	-10.36	-8.23	-10.36	13.23	218.45	.61
3300.00	.68	297.08	3299.92	-9.94	-8.88	-9.94	13.33	221.76	.49
3400.00	2.58	275.17	3399.88	-9.47	-11.65	-9.47	15.01	230.89	1.97
3500.00	2.68	272.45	3499.77	-9.17	-16.22	-9.17	18.63	240.54	.16
3600.00	2.74	277.95	3599.66	-8.73	-20.93	-8.73	22.68	247.34	.27
3700.00	2.60	277.62	3699.55	-8.10	-25.54	-8.10	26.80	252.40	.14
3800.00	1.98	275.18	3799.47	-7.65	-29.51	-7.65	30.48	255.47	.63
3900.00	1.36	259.25	3899.43	-7.71	-32.40	-7.71	33.30	256.61	.77
4000.00	.82	205.60	3999.41	-8.58	-33.87	-8.58	34.94	255.79	1.10
4100.00	1.17	145.82	4099.40	-10.07	-33.61	-10.07	35.08	253.32	1.04
4200.00	1.84	141.38	4199.36	-12.17	-32.03	-12.17	34.26	249.20	.68
4300.00	2.15	141.26	4299.30	-14.89	-29.86	-14.89	33.36	243.50	.31
4400.00	2.22	141.88	4399.23	-17.87	-27.49	-17.87	32.79	236.97	.07
4500.00	2.31	136.70	4499.15	-20.86	-24.91	-20.86	32.49	230.05	.22
4600.00	2.42	134.96	4599.07	-23.82	-22.03	-23.82	32.45	222.77	.13
4700.00	1.99	140.13	4698.99	-26.65	-19.43	-26.65	32.97	216.09	.47
4800.00	2.00	148.25	4798.93	-29.46	-17.39	-29.46	34.21	210.56	.28
4900.00	1.54	138.43	4898.89	-31.95	-15.58	-31.95	35.55	206.00	.55

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	
5000.00	1.39	145.04	4998.85	-33.95	-14.00	-33.95	36.72	202.41	.23
5100.00	.62	137.31	5098.84	-35.34	-12.94	-35.34	37.63	200.10	.78
5200.00	.82	136.34	5198.83	-36.26	-12.07	-36.26	38.22	198.42	.20
5300.00	1.18	123.14	5298.81	-37.34	-10.72	-37.34	38.85	196.02	.43
5400.00	1.52	139.61	5398.79	-38.91	-9.00	-38.91	39.94	193.02	.51
5500.00	1.69	140.47	5498.75	-41.06	-7.20	-41.06	41.68	189.94	.17
5600.00	1.40	137.02	5598.71	-43.09	-5.43	-43.09	43.43	187.18	.30
5700.00	1.29	134.91	5698.68	-44.78	-3.80	-44.78	44.94	184.85	.12
5800.00	1.11	143.83	5798.66	-46.35	-2.43	-46.35	46.42	183.00	.26
5900.00	.87	145.42	5898.65	-47.76	-1.43	-47.76	47.78	181.71	.24
6000.00	.52	126.73	5998.64	-48.66	-.63	-48.66	48.66	180.74	.41
6100.00	.73	139.67	6098.63	-49.42	.14	-49.42	49.42	179.83	.25
6200.00	.74	111.43	6198.63	-50.14	1.16	-50.14	50.15	178.68	.36
6300.00	.82	112.78	6298.62	-50.65	2.42	-50.65	50.71	177.27	.08
6400.00	.54	106.84	6398.61	-51.06	3.53	-51.06	51.19	176.05	.29
6500.00	.46	120.30	6498.60	-51.40	4.33	-51.40	51.58	175.19	.14
<b>Last Survey Depth Recorded</b>									
6600.00	.78	120.23	6598.60	-51.95	5.26	-51.95	52.21	174.22	.32