



Job Number: SVGJ-141348  
 Company: PDC  
 Lease/Well: National Hog Farm 14-9  
 Location: Weld County, CO  
 Rig Name: MS Energy Wireline  
 RKB: 0'  
 G.L. or M.S.L.: GL

State/Country: Colorado/USA  
 Declination: 8.23°  
 Grid: East To True North  
 File name: S:\2014SU~1\PDC\GJ\NATION~1\149.SVY  
 Date/Time: 21-Nov-14 / 13:00  
 Curve Name: Surface - 6784' M.D. (Rate Gyro)

### MS SURVEY

#### 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	1.03	179.85	99.99	-.90	.00	-.90	.90	179.85	1.03
200.00	2.06	191.34	199.96	-3.56	-.35	-3.56	3.58	185.59	1.07
300.00	5.16	204.92	299.75	-9.40	-2.60	-9.40	9.75	195.44	3.19
400.00	6.04	221.56	399.28	-17.42	-7.98	-17.42	19.16	204.62	1.84
500.00	6.13	223.55	498.71	-25.22	-15.15	-25.22	29.42	210.99	.23
600.00	5.54	226.12	598.19	-32.44	-22.31	-32.44	39.37	214.52	.65
700.00	5.50	225.19	697.73	-39.16	-29.19	-39.16	48.84	216.70	.10
800.00	5.00	227.24	797.31	-45.50	-35.79	-45.50	57.89	218.19	.53
900.00	5.06	226.19	896.93	-51.51	-42.17	-51.51	66.57	219.31	.11

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	
1000.00	4.72	228.70	996.56	-57.28	-48.44	-57.28	75.02	220.22	.40
1100.00	4.60	225.36	1096.23	-62.81	-54.39	-62.81	83.09	220.89	.30
1200.00	4.48	227.19	1195.92	-68.28	-60.11	-68.28	90.97	221.36	.19
1300.00	4.33	223.20	1295.62	-73.69	-65.56	-73.69	98.63	221.66	.34
1400.00	3.92	225.89	1395.36	-78.82	-70.59	-78.82	105.81	221.85	.45
1500.00	3.92	224.35	1495.13	-83.64	-75.44	-83.64	112.64	222.05	.11
1600.00	3.31	226.14	1594.93	-88.09	-79.91	-88.09	118.93	222.21	.62
1700.00	3.04	223.47	1694.78	-92.01	-83.81	-92.01	124.46	222.33	.31
1800.00	2.46	226.89	1794.66	-95.40	-87.21	-95.40	129.26	222.43	.60
1900.00	2.33	236.06	1894.57	-98.01	-90.46	-98.01	133.37	222.71	.40
2000.00	2.00	234.01	1994.50	-100.17	-93.56	-100.17	137.06	223.05	.34
2100.00	1.91	243.02	2094.44	-101.95	-96.45	-101.95	140.35	223.41	.32
2200.00	1.78	235.25	2194.39	-103.59	-99.22	-103.59	143.44	223.76	.28
2300.00	1.27	233.35	2294.36	-105.14	-101.38	-105.14	146.05	223.96	.51
2400.00	.92	242.46	2394.34	-106.17	-102.98	-106.17	147.91	224.13	.39
2500.00	1.08	242.02	2494.32	-106.98	-104.53	-106.98	149.57	224.33	.16
2600.00	1.00	245.79	2594.31	-107.78	-106.15	-107.78	151.28	224.56	.11
2700.00	.94	243.47	2694.29	-108.51	-107.68	-108.51	152.87	224.78	.07
2800.00	.72	239.77	2794.28	-109.19	-108.96	-109.19	154.26	224.94	.23
2900.00	.56	251.82	2894.28	-109.66	-109.97	-109.66	155.30	225.08	.21
3000.00	.64	267.17	2994.27	-109.84	-110.99	-109.84	156.15	225.30	.18
3100.00	.71	270.80	3094.26	-109.86	-112.17	-109.86	157.00	225.60	.08
3200.00	.37	300.71	3194.26	-109.68	-113.06	-109.68	157.52	225.87	.43
3300.00	.96	37.75	3294.25	-108.86	-112.83	-108.86	156.78	226.03	1.07
3400.00	2.25	42.01	3394.21	-106.73	-111.00	-106.73	153.99	226.12	1.29
3500.00	2.66	36.85	3494.12	-103.42	-108.30	-103.42	149.75	226.32	.47
3600.00	2.53	36.65	3594.02	-99.79	-105.59	-99.79	145.28	226.62	.13
3700.00	2.48	40.34	3693.92	-96.37	-102.87	-96.37	140.96	226.87	.17
3800.00	2.46	42.05	3793.83	-93.13	-100.03	-93.13	136.67	227.05	.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	
3900.00	2.34	35.88	3893.74	-89.88	-97.40	-89.88	132.53	227.30	.28
4000.00	1.87	21.69	3993.68	-86.71	-95.60	-86.71	129.07	227.79	.70
4100.00	1.46	11.34	4093.63	-83.95	-94.74	-83.95	126.58	228.46	.51
4200.00	1.31	8.01	4193.60	-81.57	-94.34	-81.57	124.71	229.15	.17
4300.00	1.16	.93	4293.58	-79.42	-94.16	-79.42	123.18	229.85	.21
4400.00	.96	344.86	4393.56	-77.60	-94.36	-77.60	122.17	230.57	.36
4500.00	.76	329.90	4493.55	-76.22	-94.91	-76.22	121.73	231.23	.30
4600.00	.45	325.12	4593.55	-75.32	-95.47	-75.32	121.61	231.73	.31
4700.00	.37	6.16	4693.54	-74.68	-95.66	-74.68	121.36	232.02	.30
4800.00	.38	10.53	4793.54	-74.03	-95.56	-74.03	120.89	232.24	.03
4900.00	.44	348.62	4893.54	-73.33	-95.58	-73.33	120.47	232.50	.17
5000.00	.23	305.84	4993.54	-72.84	-95.82	-72.84	120.36	232.76	.31
5100.00	.08	14.03	5093.54	-72.65	-95.96	-72.65	120.36	232.87	.21
5200.00	.32	330.22	5193.54	-72.34	-96.09	-72.34	120.27	233.03	.27
5300.00	.57	256.56	5293.53	-72.21	-96.71	-72.21	120.70	233.25	.57
5400.00	.96	222.81	5393.53	-72.94	-97.76	-72.94	121.98	233.27	.58
5500.00	1.04	186.75	5493.51	-74.46	-98.44	-74.46	123.43	232.90	.62
5600.00	.95	193.23	5593.50	-76.17	-98.73	-76.17	124.70	232.35	.14
5700.00	.84	190.84	5693.48	-77.69	-99.06	-77.69	125.90	231.89	.12
5800.00	1.03	186.93	5793.47	-79.31	-99.31	-79.31	127.09	231.39	.20
5900.00	.83	174.97	5893.46	-80.92	-99.35	-80.92	128.14	230.84	.28
6000.00	.76	181.75	5993.45	-82.30	-99.31	-82.30	128.98	230.35	.12
6100.00	1.13	185.41	6093.43	-83.95	-99.42	-83.95	130.12	229.82	.37
6200.00	1.40	171.44	6193.41	-86.14	-99.33	-86.14	131.48	229.07	.41
6300.00	1.52	164.88	6293.38	-88.63	-98.81	-88.63	132.73	228.11	.21
6400.00	2.32	164.43	6393.32	-91.86	-97.92	-91.86	134.26	226.83	.80
6500.00	3.88	158.85	6493.17	-96.96	-96.15	-96.96	136.55	224.76	1.59
6600.00	2.49	149.53	6593.02	-101.99	-93.83	-101.99	138.59	222.61	1.48
6700.00	.74	141.85	6692.97	-104.37	-92.33	-104.37	139.35	221.50	1.76

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	
Last Survey Depth Recorded									
6784.00	.24	196.07	6776.97	-104.97	-92.04	-104.97	139.61	221.25	.75