



Job Number: SVGJ-140473  
 Company: PDC  
 Lease/Well: Thoutt 22-1  
 Location: Weld County, CO  
 Rig Name: MS Energy Wireline  
 RKB: 0'  
 G.L. or M.S.L.: GL

State/Country: Colorado/USA  
 Declination: 8.36°  
 Grid: East To True North  
 File name: S:\2014SU~1\PDC\GJ\THOUTT\221.SVY  
 Date/Time: 22-Apr-14 / 09:45  
 Curve Name: Surface - 6772' 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*

<i>Measured Depth FT</i>	<i>Incl Angle Deg</i>	<i>Drift Direction Deg</i>	<i>True Vertical Depth</i>	<i>N-S FT</i>	<i>E-W FT</i>	<i>Vertical Section FT</i>	<i>C L O S U R E</i>		<i>Dogleg Severity Deg/100</i>
							<i>Distance FT</i>	<i>Direction Deg</i>	
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
100.00	.86	222.96	100.00	-.55	-.51	-.55	.75	222.96	.86
200.00	.34	273.04	199.99	-1.08	-1.32	-1.08	1.71	230.62	.69
300.00	.60	205.05	299.99	-1.54	-1.84	-1.54	2.40	230.00	.57
400.00	.05	289.14	399.99	-2.00	-2.10	-2.00	2.90	226.38	.60
500.00	.61	218.82	499.98	-2.40	-2.47	-2.40	3.45	225.86	.60
600.00	.58	268.72	599.98	-2.83	-3.31	-2.83	4.36	229.53	.50
700.00	.27	323.40	699.98	-2.65	-3.96	-2.65	4.77	236.22	.48
800.00	.27	345.90	799.98	-2.23	-4.16	-2.23	4.72	241.78	.11
900.00	.26	359.38	899.97	-1.78	-4.22	-1.78	4.58	247.16	.06

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	.65	284.55	999.97	-1.41	-4.77	-1.41	4.97	253.56	.63
1100.00	.40	339.15	1099.97	-.94	-5.44	-.94	5.52	260.22	.53
1200.00	.26	5.23	1199.97	-.39	-5.55	-.39	5.56	266.01	.20
1300.00	.26	187.11	1299.97	-.39	-5.55	-.39	5.57	266.03	.52
1400.00	.40	193.52	1399.96	-.95	-5.66	-.95	5.74	260.48	.14
1500.00	.41	200.76	1499.96	-1.62	-5.87	-1.62	6.09	254.54	.05
1600.00	.45	248.97	1599.96	-2.10	-6.37	-2.10	6.70	251.75	.35
1700.00	.32	297.47	1699.96	-2.11	-6.98	-2.11	7.29	253.17	.34
1800.00	.33	289.39	1799.96	-1.89	-7.50	-1.89	7.73	255.87	.05
1900.00	.30	58.36	1899.96	-1.65	-7.55	-1.65	7.73	257.64	.57
2000.00	.28	222.31	1999.96	-1.70	-7.49	-1.70	7.68	257.23	.57
2100.00	.30	242.08	2099.95	-2.00	-7.89	-2.00	8.14	255.76	.10
2200.00	.34	312.31	2199.95	-1.92	-8.34	-1.92	8.56	257.00	.37
2300.00	.29	20.84	2299.95	-1.49	-8.47	-1.49	8.60	260.03	.36
2400.00	.30	198.38	2399.95	-1.50	-8.46	-1.50	8.59	259.95	.59
2500.00	.20	226.52	2499.95	-1.87	-8.67	-1.87	8.87	257.84	.16
2600.00	.42	59.41	2599.95	-1.80	-8.48	-1.80	8.67	258.00	.62
2700.00	.66	130.30	2699.95	-1.99	-7.72	-1.99	7.98	255.57	.66
2800.00	.69	104.77	2799.94	-2.51	-6.70	-2.51	7.16	249.44	.30
2900.00	1.28	90.43	2899.92	-2.68	-5.00	-2.68	5.67	241.86	.63
3000.00	1.31	101.76	2999.90	-2.92	-2.77	-2.92	4.02	223.49	.26
3100.00	.86	109.14	3099.88	-3.40	-.94	-3.40	3.52	195.46	.47
3200.00	.95	62.33	3199.87	-3.26	.50	-3.26	3.30	171.21	.72
3300.00	.69	80.97	3299.86	-2.78	1.83	-2.78	3.33	146.59	.37
3400.00	.65	59.58	3399.85	-2.40	2.92	-2.40	3.77	129.41	.25
3500.00	.76	1.05	3499.85	-1.45	3.42	-1.45	3.71	112.93	.70
3600.00	.91	24.85	3599.84	-.06	3.76	-.06	3.76	90.95	.37
3700.00	.39	22.89	3699.83	.97	4.23	.97	4.34	77.06	.52
3800.00	.71	331.51	3799.82	1.83	4.07	1.83	4.46	65.77	.56

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	.84	350.67	3899.82	3.10	3.65	3.10	4.79	49.69	.29
4000.00	.84	358.01	3999.80	4.55	3.51	4.55	5.75	37.61	.11
4100.00	.64	332.92	4099.80	5.78	3.23	5.78	6.62	29.17	.38
4200.00	1.14	306.00	4199.78	6.87	2.17	6.87	7.20	17.53	.64
4300.00	1.39	315.00	4299.76	8.31	.51	8.31	8.32	3.49	.32
4400.00	1.14	307.84	4399.74	9.78	-1.14	9.78	9.84	353.37	.30
4500.00	1.83	313.24	4499.70	11.48	-3.09	11.48	11.89	344.96	.70
4600.00	1.76	318.53	4599.65	13.72	-5.27	13.72	14.70	339.01	.18
4700.00	2.06	301.58	4699.60	15.82	-7.81	15.82	17.64	333.71	.64
4800.00	2.16	308.24	4799.53	17.92	-10.83	17.92	20.94	328.87	.26
4900.00	2.24	308.47	4899.46	20.31	-13.84	20.31	24.57	325.73	.08
5000.00	2.29	323.45	4999.38	23.13	-16.56	23.13	28.44	324.40	.59
5100.00	2.72	322.35	5099.28	26.61	-19.19	26.61	32.81	324.20	.43
5200.00	2.66	309.92	5199.17	29.98	-22.42	29.98	37.44	323.20	.59
5300.00	3.07	323.78	5299.05	33.63	-25.79	33.63	42.38	322.52	.80
5400.00	2.85	323.72	5398.92	37.79	-28.84	37.79	47.54	322.65	.22
5500.00	2.41	323.44	5498.81	41.49	-31.56	41.49	52.13	322.74	.44
5600.00	2.34	329.78	5598.73	44.94	-33.84	44.94	56.26	323.02	.27
5700.00	1.98	319.10	5698.65	48.01	-36.00	48.01	60.01	323.13	.54
5800.00	1.87	315.41	5798.60	50.48	-38.28	50.48	63.35	322.83	.17
5900.00	1.65	313.36	5898.55	52.63	-40.47	52.63	66.39	322.44	.23
6000.00	1.56	324.73	5998.51	54.73	-42.30	54.73	69.17	322.30	.33
6100.00	1.21	345.75	6098.48	56.86	-43.35	56.86	71.50	322.68	.61
6200.00	.99	346.49	6198.46	58.72	-43.81	58.72	73.27	323.28	.22
6300.00	.75	353.10	6298.45	60.21	-44.09	60.21	74.63	323.79	.26
6400.00	1.06	344.58	6398.44	61.76	-44.41	61.76	76.07	324.28	.34
6500.00	.74	26.01	6498.43	63.23	-44.38	63.23	77.25	324.94	.70
6600.00	.44	35.71	6598.42	64.12	-43.87	64.12	77.69	325.62	.32
6700.00	.63	82.76	6698.42	64.50	-43.10	64.50	77.58	326.25	.46

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									
6772.00	1.33	135.34	6770.41	63.96	-42.12	63.96	76.58	326.63	1.49