



1724-B Townhurst Dr, Houston, Tx 77043
(713) 827-8302
www.nevisenergy.com

Job Number: 71405
Company: Black Hills Gas Resources
Lease/Well: Jicarilla 31-03-32 #31
Location: Rio Arriba County, NM
Rig Name: Patterson 744
RKB: 13'
G.L. or M.S.L.: 7096'

State/Country: NM/USA
Declination: 10.08716
Grid: -0.33
File name: Z:\BLACKH-1\71405J-1\31033231.SVY
Date/Time: 01-Nov-07 / 08:03
Curve Name: Jic. 31-03-32 #31 surveys

30-039-30316

JIC 31-3-32 #31

Jic. 31-03-32 #31 surveys

WINSERVE SURVEY CALCULATIONS

Minimum Curvature Method

Vertical Section Plane 86.49

Vertical Section Referenced to Wellhead

Rectangular Coordinates Referenced to Wellhead

SURF: 1660' FS 805' FW
+166 3554
1826' FS 4359' FW
2545'
2640'
826' FE
origin 1632/5 1510/W
M2 4287 Tvd 3856

11-24-2007

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	Vertical Section FT	N-S FT	E-W FT	CLOSURE Distance FT	Direction Deg	Dogleg Severity Deg/100
Surface									
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
First Nevis MWD Survey									
286.00	1.00	221.00	285.99	-1.75	-1.88	-1.64	2.50	221.00	.35
389.00	1.70	167.70	388.96	-2.15	-4.05	-1.90	4.48	205.13	1.32
569.00	2.70	169.90	568.82	-1.25	-10.84	-5.59	10.85	183.11	.56
749.00	3.40	176.90	748.57	-.80	-20.34	.44	20.35	178.75	.44
929.00	2.10	171.90	928.36	-.58	-28.94	1.20	28.96	177.63	.73
1111.00	1.70	167.20	1110.26	.13	-34.87	2.26	34.94	176.28	.24
1291.00	1.60	164.10	1290.18	1.10	-39.89	3.54	40.05	174.92	.07
1475.00	1.90	169.10	1474.10	2.04	-45.36	4.82	45.61	173.93	.18
1654.00	2.00	175.50	1652.99	2.47	-51.38	5.63	51.69	173.75	.13
1834.00	1.50	176.70	1832.91	2.52	-56.87	6.01	57.18	173.96	.28
2016.00	1.50	186.70	2014.85	2.09	-61.61	5.87	61.89	174.56	.14
2169.00	1.70	178.60	2167.79	1.65	-65.87	5.69	66.11	175.06	.20
2347.00	1.50	182.70	2345.72	1.30	-70.84	5.65	71.06	175.44	.13
2535.00	.90	200.20	2533.68	.44	-74.68	5.02	74.85	176.15	.37
2721.00	.70	239.20	2719.66	-1.16	-76.63	3.54	76.71	177.35	.30
2908.00	.60	234.80	2906.65	-3.00	-77.78	1.76	77.80	178.70	.06
3095.00	1.50	235.90	3093.61	-5.94	-79.72	-1.07	79.73	180.77	.48
3253.00	2.00	226.10	3251.54	-9.82	-82.79	-4.76	82.93	183.29	.37
3301.00	1.70	187.70	3299.52	-10.60	-84.08	-5.46	84.25	183.72	2.60
3332.00	5.00	117.00	3330.47	-9.53	-85.15	-4.32	85.25	182.91	15.22

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	Vertical Section FT	N-S FT	E-W FT	CLOSURE		Dogleg Severity Deg/100
							Distance FT	Direction Deg	
3364.00	9.80	101.00	3362.20	-5.68	-86.30	-4.40	86.30	180.27	16.18
3396.00	14.00	97.50	3393.50	.75	-87.32	6.11	87.54	176.00	13.31
3427.00	17.60	91.90	3423.33	9.10	-87.97	14.52	89.16	170.63	12.60
3458.00	21.20	86.70	3452.57	19.38	-87.80	24.80	91.24	164.23	12.87
3490.00	25.20	84.80	3481.97	31.98	-86.85	37.37	94.55	156.72	12.72
3521.00	29.20	82.90	3509.54	46.13	-85.32	51.45	99.63	148.91	13.20
3553.00	33.20	82.20	3536.91	62.66	-83.16	67.88	107.35	140.78	12.55
3585.00	37.00	83.10	3563.08	81.02	-80.82	86.13	118.11	133.18	11.98
3616.00	40.80	83.70	3587.20	100.45	-78.58	105.46	131.52	126.69	12.32
3647.00	44.80	83.90	3609.94	121.49	-76.31	126.40	147.65	121.12	12.91
3678.00	48.40	83.20	3631.24	143.98	-73.78	148.77	166.06	116.38	11.73
3710.00	52.60	84.00	3651.59	168.63	-71.03	173.31	187.30	112.29	13.27
3742.00	56.00	84.90	3670.26	194.60	-68.52	199.17	210.63	108.99	10.87
3773.00	59.00	85.60	3686.92	220.74	-66.36	225.22	234.79	106.42	9.86
3805.00	62.00	85.00	3702.67	248.58	-64.08	252.98	260.96	104.21	9.52
3836.00	63.90	84.60	3716.77	276.17	-61.57	280.47	287.15	102.38	6.24
3868.00	65.00	85.00	3730.57	305.03	-58.96	309.22	314.79	100.79	3.62
3900.00	67.00	84.00	3743.58	334.24	-56.15	338.32	342.95	99.42	6.87
3932.00	64.00	83.90	3756.85	363.33	-53.08	367.27	371.09	98.22	9.38
3963.00	69.30	85.30	3769.14	391.77	-50.41	395.59	398.79	97.26	17.59
3994.00	69.20	85.90	3780.12	420.75	-48.19	424.50	427.22	96.48	1.84
4025.00	69.70	86.00	3791.00	449.78	-46.14	453.45	455.79	95.81	1.64
4056.00	69.90	86.20	3801.71	478.87	-44.16	482.48	484.50	95.23	.88
4088.00	69.80	86.60	3812.73	508.91	-42.27	512.46	514.20	94.72	1.21
4105.00	69.90	86.60	3818.59	524.87	-41.33	528.39	530.01	94.47	.59
4135.00	70.00	83.60	3828.87	553.04	-38.92	556.47	557.83	94.00	9.40
4166.00	73.00	85.30	3838.71	582.42	-36.08	585.72	586.83	93.53	10.99
4196.00	77.20	86.00	3846.42	611.40	-33.89	614.62	615.56	93.16	14.18
4227.00	82.00	86.40	3852.02	641.88	-31.87	645.04	645.83	92.83	15.54
4257.00	86.60	87.10	3854.99	671.72	-30.17	674.83	675.51	92.56	15.51
4287.00	90.40	86.40	3855.78	701.71	-28.47	704.77	705.35	92.31	12.88
4317.00	90.60	86.70	3855.52	731.70	-26.67	734.72	735.20	92.08	1.20
4347.00	90.60	86.70	3855.20	761.70	-24.94	764.66	765.07	91.87	.00
4409.00	90.40	86.70	3854.66	823.70	-21.37	826.56	826.83	91.48	.32
4473.00	92.00	86.40	3853.32	887.68	-17.52	890.43	890.60	91.13	2.54
4566.00	91.80	86.70	3850.24	980.63	-11.93	983.21	983.28	90.70	.39
4659.00	90.60	85.30	3848.29	1073.60	-5.44	1075.96	1075.97	90.29	1.98
4724.00	92.20	84.60	3846.70	1138.56	.28	1140.68	1140.68	89.99	2.69
4783.00	92.40	84.60	3844.33	1197.48	5.82	1199.37	1199.39	89.72	.34
4852.00	92.20	84.30	3841.57	1266.38	12.49	1267.99	1268.06	89.44	.52
4914.00	91.80	84.30	3839.40	1328.30	18.65	1329.65	1329.78	89.20	.65
4978.00	91.30	83.60	3837.67	1392.21	25.39	1393.27	1393.50	88.96	1.34
5042.00	91.70	83.60	3836.00	1456.11	32.52	1456.85	1457.21	88.72	.63
5105.00	91.50	84.30	3834.24	1519.02	39.16	1519.47	1519.98	88.52	1.16
5168.00	90.60	83.60	3833.08	1581.95	45.80	1582.11	1582.77	88.34	1.81

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	Vertical Section FT	N-S FT	E-W FT	C L O S U R E		Dogleg Severity Deg/100
							Distance FT	Direction Deg	
3364.00	9.80	101.00	3362.20	-5.68	-86.30	-.40	86.30	180.27	16.18
3396.00	14.00	97.50	3393.50	.75	-87.32	6.11	87.54	176.00	13.31
3427.00	17.60	91.90	3423.33	9.10	-87.97	14.52	89.16	170.63	12.60
3458.00	21.20	86.70	3452.57	19.38	-87.80	24.80	91.24	164.23	12.87
3490.00	25.20	84.80	3481.97	31.98	-86.85	37.37	94.55	156.72	12.72
3521.00	29.20	82.90	3509.54	46.13	-85.32	51.45	99.63	148.91	13.20
3553.00	33.20	82.20	3536.91	62.66	-83.16	67.88	107.35	140.78	12.55
3585.00	37.00	83.10	3563.08	81.02	-80.82	86.13	118.11	133.18	11.98
3616.00	40.80	83.70	3587.20	100.45	-78.58	105.46	131.52	126.69	12.32
3647.00	44.80	83.90	3609.94	121.49	-76.31	126.40	147.65	121.12	12.91
3678.00	48.40	83.20	3631.24	143.98	-73.78	148.77	166.06	116.38	11.73
3710.00	52.60	84.00	3651.59	168.63	-71.03	173.31	187.30	112.29	13.27
3742.00	56.00	84.90	3670.26	194.60	-68.52	199.17	210.63	108.99	10.87
3773.00	59.00	85.60	3686.92	220.74	-66.36	225.22	234.79	106.42	9.86
3805.00	62.00	85.00	3702.67	248.58	-64.08	252.98	260.96	104.21	9.52
3836.00	63.90	84.60	3716.77	276.17	-61.57	280.47	287.15	102.38	6.24
3868.00	65.00	85.00	3730.57	305.03	-58.96	309.22	314.79	100.79	3.62
3900.00	67.00	84.00	3743.58	334.24	-56.15	338.32	342.95	99.42	6.87
3932.00	64.00	83.90	3756.85	363.33	-53.08	367.27	371.09	98.22	9.38
3963.00	69.30	85.30	3769.14	391.77	-50.41	395.59	398.79	97.26	17.59
3994.00	69.20	85.90	3780.12	420.75	-48.19	424.50	427.22	96.48	1.84
4025.00	69.70	86.00	3791.00	449.78	-46.14	453.45	455.79	95.81	1.64
4056.00	69.90	86.20	3801.71	478.87	-44.16	482.48	484.50	95.23	.88
4088.00	69.80	86.60	3812.73	508.91	-42.27	512.46	514.20	94.72	1.21
4105.00	69.90	86.60	3818.59	524.87	-41.33	528.39	530.01	94.47	.59
4135.00	70.00	83.60	3828.87	553.04	-38.92	556.47	557.83	94.00	9.40
4166.00	73.00	85.30	3838.71	582.42	-36.08	585.72	586.83	93.53	10.99
4196.00	77.20	86.00	3846.42	611.40	-33.89	614.62	615.56	93.16	14.18
4227.00	82.00	86.40	3852.02	641.88	-31.87	645.04	645.83	92.83	15.54
4257.00	86.60	87.10	3854.99	671.72	-30.17	674.83	675.51	92.56	15.51
4287.00	90.40	86.40	3855.78	701.71	-28.47	704.77	705.35	92.31	12.88
4317.00	90.60	86.70	3855.52	731.70	-26.67	734.72	735.20	92.08	1.20
4347.00	90.60	86.70	3855.20	761.70	-24.94	764.66	765.07	91.87	.00
4409.00	90.40	86.70	3854.66	823.70	-21.37	826.56	826.83	91.48	.32
4473.00	92.00	86.40	3853.32	887.68	-17.52	890.43	890.60	91.13	2.54
4566.00	91.80	86.70	3850.24	980.63	-11.93	983.21	983.28	90.70	.39
4659.00	90.60	85.30	3848.29	1073.60	-5.44	1075.96	1075.97	90.29	1.98
4724.00	92.20	84.60	3846.70	1138.56	.28	1140.68	1140.68	89.99	2.69
4783.00	92.40	84.60	3844.33	1197.48	5.82	1199.37	1199.39	89.72	.34
4852.00	92.20	84.30	3841.57	1266.38	12.49	1267.99	1268.06	89.44	.52
4914.00	91.80	84.30	3839.40	1328.30	18.65	1329.65	1329.78	89.20	.65
4978.00	91.30	83.60	3837.67	1392.21	25.39	1393.27	1393.50	88.96	1.34
5042.00	91.70	83.60	3836.00	1456.11	32.52	1456.85	1457.21	88.72	.63
5105.00	91.50	84.30	3834.24	1519.02	39.16	1519.47	1519.98	88.52	1.16
5168.00	90.60	83.60	3833.08	1581.95	45.80	1582.11	1582.77	88.34	1.81

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	Vertical Section FT	N-S FT	E-W FT	CLOSURE		Dogleg Severity Deg/100
							Distance FT	Direction Deg	
5232.00	90.80	83.20	3832.30	1645.85	53.15	1645.68	1646.54	88.15	.70
5295.00	90.80	83.60	3831.42	1708.75	60.39	1708.26	1709.32	87.98	.63
5357.00	90.80	82.90	3830.55	1770.64	67.68	1769.82	1771.11	87.81	1.13
5420.00	90.80	82.50	3829.68	1833.50	75.68	1832.30	1833.87	87.63	.63
5483.00	90.40	85.30	3829.02	1896.43	82.38	1894.94	1896.73	87.51	4.49
5547.00	90.10	85.30	3828.74	1960.41	87.62	1958.72	1960.68	87.44	.47
5610.00	91.10	86.40	3828.08	2023.40	92.18	2021.55	2023.65	87.39	2.36
5673.00	91.50	87.10	3826.65	2086.39	95.75	2084.43	2086.63	87.37	1.28
5737.00	91.80	86.00	3824.80	2150.36	99.60	2148.29	2150.60	87.35	1.78
5801.00	90.40	86.70	3823.58	2214.34	103.67	2212.15	2214.57	87.32	2.45
5864.00	90.80	86.40	3822.92	2277.34	107.46	2275.03	2277.57	87.30	.79
5928.00	88.50	87.80	3823.31	2341.33	110.70	2338.94	2341.56	87.29	4.21
5990.00	88.30	87.80	3825.04	2403.29	113.08	2400.87	2403.53	87.30	.32
6053.00	88.70	87.80	3826.69	2466.25	115.50	2463.80	2466.51	87.32	.63
6117.00	88.90	87.10	3828.03	2530.23	118.34	2527.72	2530.49	87.32	1.14
6180.00	88.90	87.10	3829.24	2593.21	121.53	2590.63	2593.48	87.31	.00
6243.00	89.20	86.70	3830.28	2656.20	124.94	2653.53	2656.47	87.30	.79
6306.00	89.00	86.00	3831.27	2719.19	128.95	2716.39	2719.45	87.28	1.16
6370.00	89.40	86.00	3832.16	2783.18	133.41	2780.23	2783.43	87.25	.62
6433.00	90.60	87.10	3832.16	2846.18	137.20	2843.12	2846.42	87.24	2.58
6496.00	90.60	86.40	3831.50	2909.18	140.77	2906.01	2909.42	87.23	1.11
6559.00	90.40	86.40	3830.96	2972.18	144.73	2968.88	2972.41	87.21	.32
6623.00	90.30	86.00	3830.56	3036.17	148.97	3032.74	3036.40	87.19	.64
6686.00	90.10	86.70	3830.34	3099.17	152.98	3095.61	3099.39	87.17	1.16
6749.00	89.70	86.70	3830.45	3162.17	156.61	3158.51	3162.39	87.16	.63
6812.00	90.20	86.70	3830.51	3225.17	160.24	3221.40	3225.39	87.15	.79
6876.00	90.60	88.80	3830.06	3289.15	162.75	3285.35	3289.38	87.16	3.34
6939.00	91.00	89.20	3829.18	3352.08	163.85	3348.33	3352.34	87.20	.90
7002.00	91.30	89.20	3827.92	3415.00	164.73	3411.31	3415.29	87.24	.48
7066.00	91.10	89.50	3826.58	3478.91	165.45	3475.30	3479.23	87.27	.56

Last Nevis MWD Survey

7097.00	91.10	89.90	3825.98	3509.85	165.61	3506.29	3510.20	87.30	1.29
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Survey Projection to TD

7145.00	91.10	89.90	3825.06	3557.76	165.70	3554.28	3558.14	87.33	.00
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