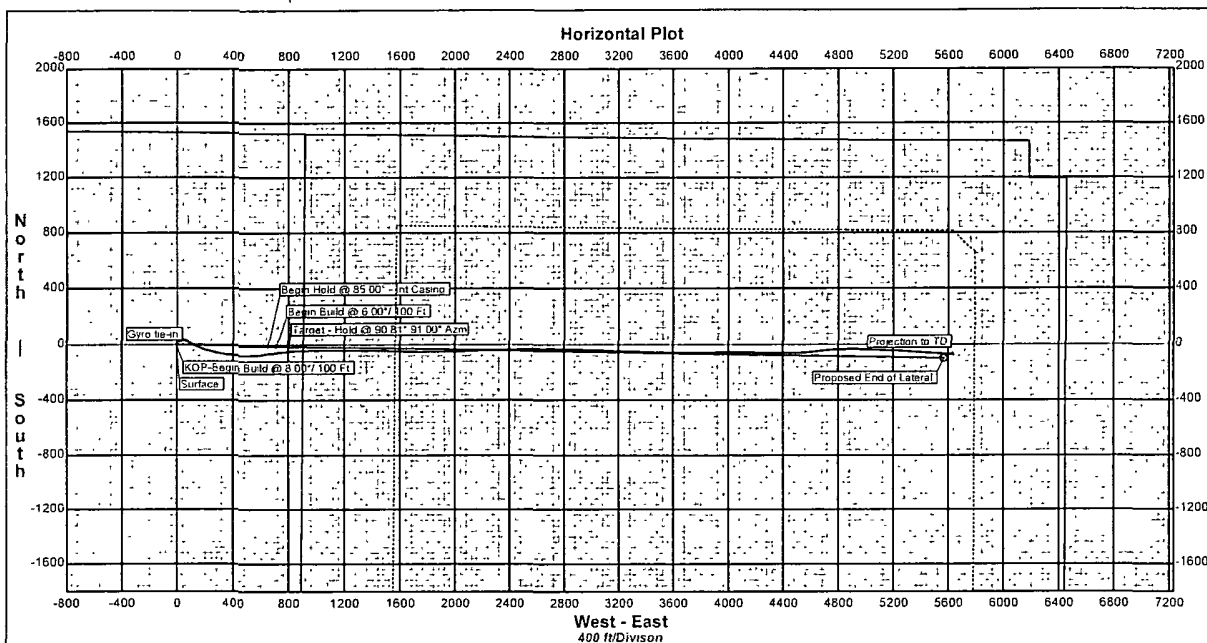
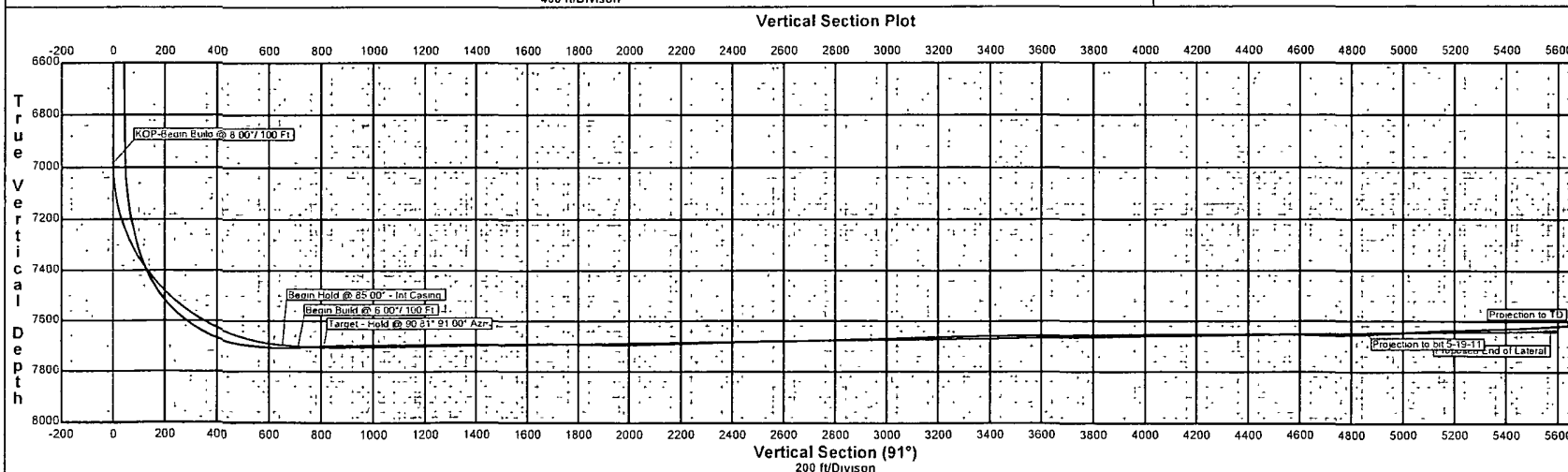
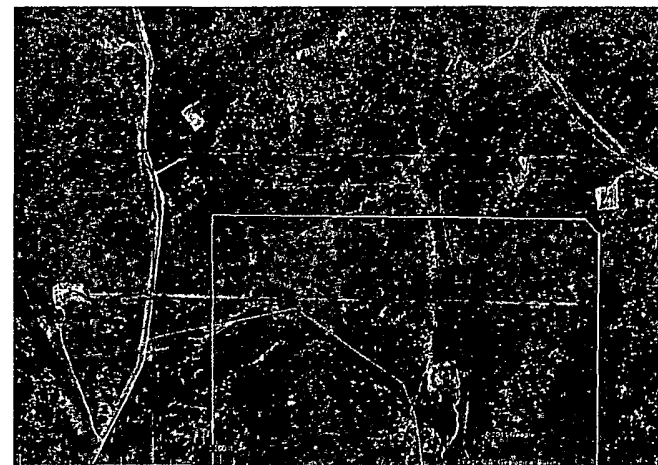




CRITICAL POINTS - JICARILLA 464-30 #724 PROPOSAL										
MD:	Inc	Azm	TVD	EV	NS	VS	Cl	Cldr	DLS	
5981.50	90.00	91.00	6981.50	0.00	0.01	0.00	0.01	0.01	2.86	0.00
3044.00	85.00	91.00	7694.97	553.68	-11.40	653.78	653.78	91.00	8.00	0.00
3104.00	85.00	91.00	7700.20	713.44	-12.45	713.55	713.55	91.00	8.00	0.00
8200.83	90.81	91.00	7703.74	810.15	-14.13	810.27	810.27	91.00	6.01	0.00
12953.00	90.81	91.00	7636.56	5571.12	-87.24	5571.97	5571.97	91.00	0.00	0.00



GEODEIC INFORMATION:
 Lat/Long: 36 47'11, 18-30" N
 Dec. Lat/Long: 36.78643001
 Longitude: -107 11 11.0480" W
 Dec. Longitude: -107.18613008
 Geodetic Group: US State Plane 1983
 Geodetic Zone: New Mexico Central Zone
 Geodetic Datum: NAD83
 Elevation: 1266218.53
 Northing: 2104999.43
 Easting: -0.55

-- MAGNETICS INFORMATION:
 Magnetic Model: G-HawkEye|GRF2010.WPF
 Date for Magnetics: 01/15/2011
 Latitude: 36 47'11" 1643° N
 Longitude: -107°11'11.0400° W
 Magnetic Declination: 9.70
 Total Correction(Mag to Grid): 10.26
 Field Strength (nt): 50937
 B-X Component (nt): 22314
 B-Y Component (nt): 3816
 B-Z Component (nt): 45830
 B-Horz Component (nt): 22638
 Dip Angle: 63.81

METHODS OF CORRECTIONS

- * To correct from Magnetic North to True North use:
 $9.70 \text{ E} \rightarrow \text{TN} = \text{MN} + 9.70$
- * To correct from True North to Grid North use:
 $-0.56^\circ \text{W} \rightarrow \text{GN} = \text{TN} + 0.56 \text{ True to Grid}$
- * To correct from Magnetic North to Grid North use:
 $10.28 \text{ E} \rightarrow \text{GN} = \text{MN} + 10.28 \text{ Magnetic to Grid}$



Job Number: 11011
Company: Black Hills Gas Resources
Lease/Well: Jicarilla 464-30 #724
Location: Rio Arriba County, NM
Rig Name: Frontier Drilling
State/County: NM/ Rio Arriba
Country: USA
API Number: 30-039-30278

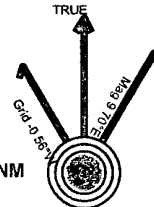
Elevation (To MSL): 7226.00 ft
RKB: 18.00 ft
Projection System: US State Plane 1983
Projection Group: New Mexico Central Zone
Projection Datum: GRS80
Magnetic Declination: 9.70
Grid Convergence: -0.56078 W
Date: Friday, May 20, 2011

Nova Directional, Inc.
Directional Survey Report

Calculated by HawkEye Software
Minimum Curvature Method
Vertical Section Plane 91.00°

Northing: 2106890.49 Easting: 1366218.53
Lat: 36°47'11.1840" N Long: -107°11'11.0400" W

Well Location: 1530.66 FNL, 907.16 FEL, Section 30, T30N, R3W, Meridian 23, Rio Arriba County, NM
Direction Reference: True North



Measured Depth (Ft)	INC Deg	AZM Deg	TVD (Ft)	EW (Ft)	NS (Ft)	VS (Ft)	Closure (Ft)	Closure Dir Deg	DLS °/100Ft
Gyro tie-in									
4233.00	0.58	69.57	4232.50	39.34	31.09	38.79	50.14	51.68	0.00
4453.00	1.60	302.30	4452.47	37.79	33.12	37.20	50.25	48.77	0.91
4578.00	1.00	298.70	4577.44	35.36	34.58	34.75	49.45	45.64	0.48
5081.00	0.50	119.90	5080.42	33.41	35.59	32.78	48.81	43.19	0.30
5584.00	0.40	111.80	5583.41	36.94	33.84	36.34	50.10	47.50	0.02
6089.00	0.40	103.70	6088.39	40.29	32.77	39.71	51.94	50.87	0.01
6595.00	0.50	66.00	6594.38	44.02	33.25	43.44	55.17	52.94	0.06
6909.00	0.80	65.20	6908.36	47.26	34.73	46.65	58.65	53.69	0.10
6940.00	0.90	64.30	6939.36	47.68	34.92	47.06	59.10	53.78	0.33
6972.00	1.20	99.90	6971.35	48.24	34.98	47.62	59.58	54.05	2.20
7003.00	3.00	117.50	7002.33	49.28	34.55	48.67	60.18	54.97	6.10
7035.00	4.60	115.30	7034.26	51.18	33.61	50.58	61.23	56.71	5.02
7066.00	5.80	106.60	7065.13	53.80	32.63	53.23	62.93	58.76	4.62
7097.00	6.90	108.50	7095.94	57.07	31.59	56.51	65.23	61.03	3.61
7128.00	7.30	118.30	7126.70	60.57	30.07	60.04	67.62	63.60	4.11
7160.00	9.00	109.50	7158.38	64.72	28.27	64.22	70.63	66.41	6.57
7192.00	11.90	111.40	7189.85	70.15	26.23	69.69	74.90	69.50	9.13
7223.00	14.10	114.40	7220.05	76.57	23.50	76.15	80.10	72.94	7.42
7254.00	15.50	116.80	7250.02	83.71	20.08	83.34	86.08	76.51	4.93
7285.00	16.20	119.70	7279.84	91.16	16.07	90.87	92.56	80.01	3.41
7317.00	17.80	119.60	7310.44	99.29	11.44	99.08	99.95	83.43	5.00
7348.00	20.60	118.70	7339.72	108.20	6.48	108.07	108.39	86.57	9.08
7379.00	23.10	117.80	7368.49	118.36	1.02	118.32	118.36	89.51	8.14
7411.00	25.60	116.20	7397.64	130.12	-4.96	130.18	130.21	92.18	8.08
7442.00	28.80	114.70	7425.21	142.91	-11.04	143.09	143.34	94.42	10.56
7473.00	32.10	113.50	7451.93	157.26	-17.45	157.54	158.22	96.33	10.82
7504.00	35.20	111.70	7477.73	173.12	-24.04	173.51	174.78	97.90	10.50
7536.00	38.30	110.20	7503.37	191.00	-30.87	191.51	193.47	99.18	10.08
7567.00	41.30	107.90	7527.18	209.75	-37.33	210.37	213.05	100.09	10.78
7598.00	44.60	106.10	7549.87	229.95	-43.50	230.67	234.03	100.71	11.36
7630.00	48.10	104.20	7571.96	252.30	-49.54	253.12	257.11	101.11	11.75
7661.00	51.30	102.90	7592.01	275.28	-55.07	276.20	280.73	101.31	10.81
7692.00	54.40	101.30	7610.72	299.44	-60.24	300.44	305.44	101.38	10.81
7724.00	58.10	99.90	7628.50	325.58	-65.13	326.67	332.03	101.31	12.12
7755.00	61.90	97.20	7644.00	352.13	-69.11	353.28	358.84	101.10	14.39
7787.00	65.40	95.70	7658.20	380.62	-72.32	381.82	387.43	100.76	11.72
7819.00	69.40	94.50	7670.50	410.03	-74.94	411.28	416.83	100.36	12.97
7850.00	73.30	93.40	7680.41	439.33	-76.96	440.61	446.02	99.94	13.02
7881.00	77.30	92.10	7688.27	469.28	-78.40	470.57	475.78	99.48	13.53

Measured Depth (Ft)	INC Deg	AZM Deg	TVD (Ft)	EW (Ft)	NS (Ft)	VS (Ft)	Closure (Ft)	Closure Dir Deg	DLS /100Ft
7913.00	81.00	90.90	7694.30	500.69	-79.22	501.99	506.91	98.99	12.13
7985.00	85.60	84.80	7702.70	572.09	-76.52	573.34	577.18	97.62	10.56
8017.00	84.90	82.80	7705.35	603.79	-73.08	604.97	608.20	96.90	6.60
8049.00	87.70	82.50	7707.42	635.46	-68.99	636.57	639.19	96.20	8.80
8080.00	91.90	82.60	7707.53	666.19	-64.97	667.22	669.35	95.57	13.55
8112.00	93.60	83.40	7705.99	697.91	-61.08	698.87	700.58	95.00	5.87
8143.00	93.80	83.20	7703.99	728.64	-57.47	729.53	730.90	94.51	0.91
8174.00	93.90	83.30	7701.91	759.35	-53.83	760.18	761.26	94.06	0.46
8206.00	92.50	84.40	7700.12	791.12	-50.41	791.88	792.72	93.65	5.56
8237.00	91.70	86.90	7698.99	822.01	-48.06	822.72	823.41	93.35	8.46
8269.00	91.70	87.00	7698.04	853.95	-46.36	854.63	855.20	93.11	0.31
8363.00	90.50	89.30	7696.23	947.87	-43.32	948.48	948.86	92.62	2.76
8457.00	90.60	89.60	7695.33	1041.86	-42.42	1042.44	1042.73	92.33	0.34
8551.00	90.50	90.30	7694.43	1135.86	-42.34	1136.42	1136.65	92.13	0.75
8644.00	90.30	90.20	7693.78	1228.86	-42.75	1229.41	1229.60	91.99	0.24
8739.00	90.30	90.50	7693.28	1323.85	-43.33	1324.41	1324.56	91.87	0.32
8834.00	90.50	90.50	7692.62	1418.85	-44.16	1419.40	1419.53	91.78	0.21
8929.00	90.40	91.30	7691.87	1513.83	-45.65	1514.40	1514.52	91.73	0.85
9024.00	91.10	92.50	7690.63	1608.77	-48.80	1609.37	1609.51	91.74	1.46
9119.00	89.40	90.20	7690.21	1703.73	-51.03	1704.36	1704.49	91.72	3.01
9214.00	89.00	90.60	7691.54	1798.72	-51.70	1799.35	1799.46	91.65	0.60
9308.00	88.50	90.00	7693.59	1892.69	-52.19	1893.32	1893.41	91.58	0.83
9402.00	89.90	87.90	7694.90	1986.66	-50.47	1987.24	1987.30	91.46	2.68
9496.00	92.00	88.50	7693.34	2080.60	-47.52	2081.11	2081.14	91.31	2.32
9591.00	91.80	86.70	7690.19	2175.46	-43.54	2175.89	2175.89	91.15	1.91
9687.00	91.70	89.40	7687.26	2271.35	-40.27	2271.71	2271.71	91.02	2.81
9781.00	91.50	88.70	7684.64	2365.30	-38.72	2365.61	2365.61	90.94	0.77
9875.00	91.30	88.60	7682.34	2459.24	-36.50	2459.51	2459.51	90.85	0.24
9971.00	91.00	89.10	7680.41	2555.20	-34.58	2555.42	2555.44	90.78	0.61
10065.00	90.40	89.00	7679.27	2649.18	-33.02	2649.36	2649.39	90.71	0.65
10160.00	92.10	91.70	7677.19	2744.15	-33.60	2744.32	2744.35	90.70	3.36
10254.00	92.00	91.90	7673.83	2838.04	-36.55	2838.25	2838.28	90.74	0.24
10350.00	91.60	91.00	7670.82	2933.96	-38.98	2934.20	2934.22	90.76	1.03
10387.00	91.80	91.90	7669.72	2970.93	-39.91	2971.18	2971.20	90.77	2.49
10481.00	92.40	92.10	7666.27	3064.81	-43.19	3065.10	3065.12	90.81	0.67
10575.00	91.20	92.00	7663.32	3158.70	-46.55	3159.04	3159.05	90.84	1.28
10670.00	91.50	91.80	7661.08	3253.63	-49.70	3254.00	3254.00	90.88	0.38
10764.00	91.40	91.90	7658.70	3347.55	-52.73	3347.96	3347.96	90.90	0.15
10858.00	89.90	92.10	7657.64	3441.48	-56.01	3441.93	3441.94	90.93	1.61
10953.00	90.90	92.10	7656.97	3536.41	-59.49	3536.91	3536.91	90.96	1.05
11046.00	89.90	89.80	7656.32	3629.39	-61.04	3629.90	3629.90	90.96	2.70
11140.00	90.60	89.90	7655.91	3723.39	-60.79	3723.88	3723.88	90.94	0.75
11234.00	90.50	89.20	7655.01	3817.38	-60.05	3817.85	3817.85	90.90	0.75
11329.00	90.90	88.70	7653.85	3912.36	-58.31	3912.78	3912.79	90.85	0.67
11424.00	90.30	90.10	7652.86	4007.34	-57.32	4007.73	4007.75	90.82	1.60
11519.00	90.60	90.20	7652.11	4102.34	-57.57	4102.72	4102.74	90.80	0.33
11614.00	89.60	91.40	7651.94	4197.33	-58.89	4197.72	4197.74	90.80	1.64
11709.00	90.70	91.80	7651.70	4292.29	-61.54	4292.71	4292.73	90.82	1.23
11804.00	90.40	90.80	7650.78	4387.26	-63.70	4387.70	4387.72	90.83	1.10
11897.00	89.50	88.80	7650.87	4480.25	-63.37	4480.68	4480.70	90.81	2.36
11991.00	89.10	84.10	7652.01	4574.04	-57.56	4574.35	4574.40	90.72	5.02
12090.00	88.20	83.20	7654.35	4672.40	-46.61	4672.50	4672.63	90.57	1.29
12185.00	91.10	86.30	7654.93	4766.98	-37.92	4766.92	4767.13	90.46	4.47
12280.00	92.40	89.70	7652.03	4861.86	-34.61	4861.73	4861.99	90.41	3.83
12374.00	92.80	91.60	7647.76	4955.75	-35.67	4955.62	4955.88	90.41	2.06
12469.00	93.40	91.60	7642.62	5050.58	-38.32	5050.48	5050.72	90.43	0.63

Measured Depth (Ft)	INC Deg	AZM Deg	TVD (Ft)	EW (Ft)	NS (Ft)	VS (Ft)	Closure (Ft)	Closure Dir Deg	DLS °/100Ft
12564.00	92.80	92.30	7637.49	5145.38	-41.55	5145.32	5145.55	90.46	0.97
12659.00	91.90	93.50	7633.59	5240.18	-46.35	5240.19	5240.38	90.51	1.58
12754.00	91.70	93.70	7630.61	5334.94	-52.31	5335.05	5335.20	90.56	0.30
12848.00	92.30	93.80	7627.33	5428.69	-58.46	5428.88	5429.00	90.62	0.65
12943.00	93.30	93.00	7622.68	5523.40	-64.08	5523.68	5523.78	90.66	1.35
Last MWD Survey									
13007.00	94.00	93.40	7618.61	5587.17	-67.65	5587.50	5587.58	90.69	1.26
Projection to TD									
13060.00	94.00	93.40	7614.91	5639.95	-70.78	5640.33	5640.40	90.72	0.00