



30-039-24725

Energen Resources

Fr#105

RIO ARRIBA COUNTY NEW MEXICO

CARRACAS UNIT FR #105

OH

Surface 1830/S 880/E
origin lat: 1640/S 1023/E md 3673 TVd 3607
B.H.L. 764/S 2326/E md 5850 TVd 3602

Survey: Sidetrack #2

End of Well Survey

06 September, 2007

RCVD SEP 10 '07
OIL CONS. DIV.

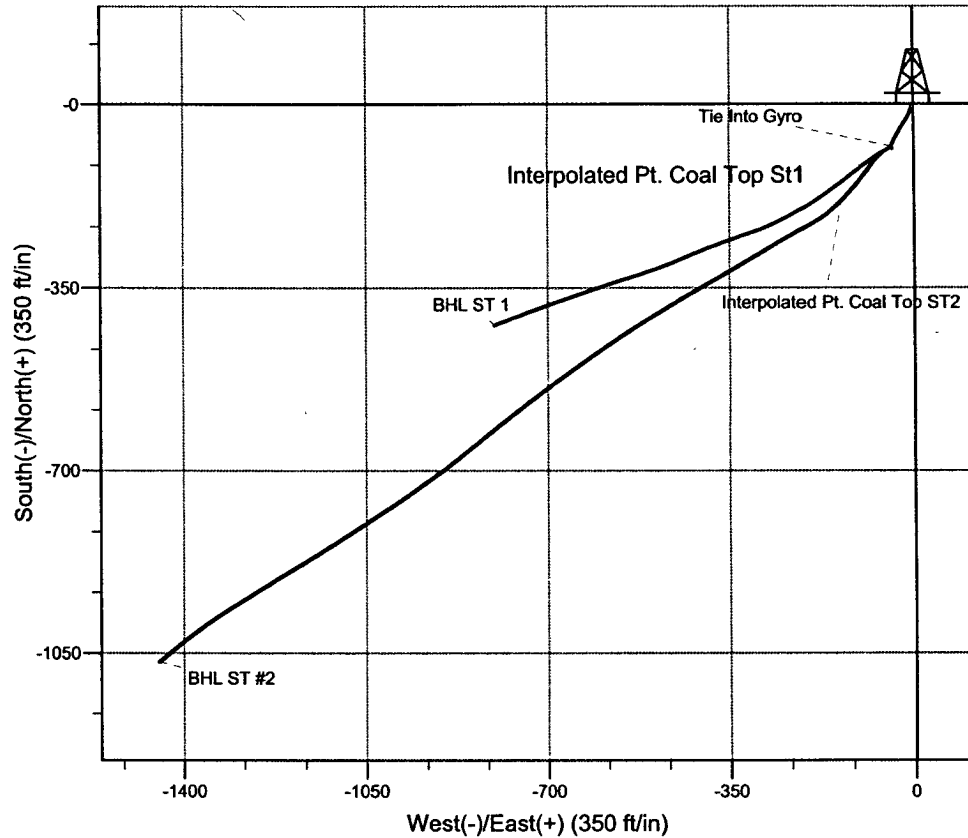
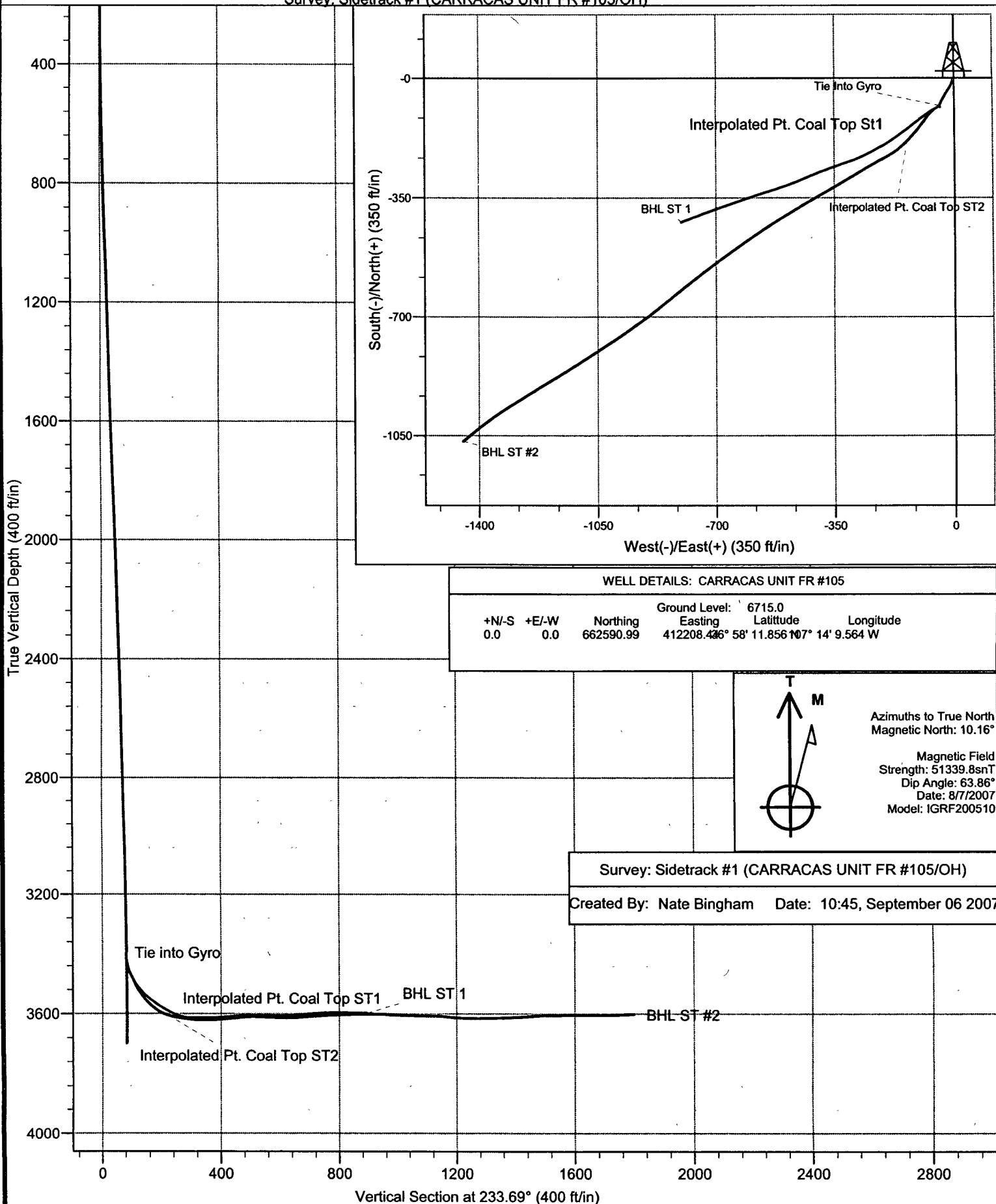
DIST. 3

PATHFINDER
ENERGY SERVICES

File 'As Drilled' plat

8 9/18

Survey: Sidetrack #1 (CARRACAS UNIT FR #105/OH)



WELL DETAILS: CARRACAS UNIT FR #105

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	662590.99	412208.436	58° 11.856' 107" 14' 9.564 W	

Ground Level: 6715.0



Azimuths to True North
Magnetic North: 10.16°

Magnetic Field
Strength: 51339.8nT
Dip Angle: 63.86°
Date: 8/7/2007
Model: IGRF200510

Survey: Sidetrack #1 (CARRACAS UNIT FR #105/OH)

Created By: Nate Bingham Date: 10:45, September 06 2007



Pathfinder Energy Services

End of Well Survey



Company: Energen Resources
 Project: Fr#105
 Site: RIO ARRIBA COUNTY NEW MEXICO
 Well: CARRACAS UNIT FR #105
 Wellbore: OH
 Design: Surveys

Local Co-ordinate Reference: Well CARRACAS UNIT FR #105
 TVD Reference: Well @ 6728.0ft (13 Ft RKB)
 MD Reference: Well @ 6728.0ft (13 Ft RKB)
 North Reference: True
 Survey Calculation Method: Minimum Curvature
 Database: EDM 2003.16 Single User Db

Project:	Fr#105		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Central Zone		

Site:	RIO ARRIBA COUNTY NEW MEXICO		
Site Position:		Northing:	662,590.99 m
From:	Lat/Long	Easting:	412,208.44 m
Position Uncertainty:	0.0 ft	Slot Radius:	in
		Latitude:	36° 58' 11.856 N
		Longitude:	107° 14' 9.564 W
		Grid Convergence:	-0.59

Well:	CARRACAS UNIT FR #105		
Well Position	+N/-S 0.0 ft	Northing:	662,590.99 m
	+E/-W 0.0 ft	Easting:	412,208.44 m
Position Uncertainty	0.0 ft	Wellhead Elevation:	6,728.0 ft
		Ground Level:	6,715.0 ft

Wellbore:	OH		
Magnetics	Model Name	Sample Date	Declination (°)
	IGRF200510	8/7/2007	10.16
			Dip Angle (°)
			63.86
			Field Strength (nT)
			51,340

Design:	Surveys		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S (ft)	+E/-W (ft)
	0.0	0.0	0.0
			Direction (°)
			233.69

Survey Program	Date 9/6/2007		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name
200.0	3,400.0	Gyrodata (OH)	Pathfinder
3,476.0	4,353.0	Sidetrack 1 (OH)	Pathfinder
			Description
			Pathfinder MWD
			Pathfinder MWD

Survey							
MD (ft)	Inc (°)	Azi (°)	TVD (ft)	N/S (ft)	E/W (ft)	DLeg (°/100ft)	V. Sec (ft)
3,400.0	0.96	181.37	3,398.6	-80.8	-42.1	0.00	81.8
3,476.0	24.01	239.47	3,472.4	-89.4	-55.6	30.94	97.8
3,484.0	21.90	228.79	3,479.8	-91.2	-58.2	58.26	100.9
3,515.0	29.02	224.08	3,507.7	-100.5	-67.8	23.86	114.1
3,546.0	36.76	215.40	3,533.8	-113.5	-78.4	29.18	130.4
3,578.0	44.32	216.40	3,558.1	-130.3	-90.6	23.71	150.1
3,610.0	52.41	220.06	3,579.3	-149.0	-105.4	26.68	173.2
3,641.0	62.96	221.57	3,595.9	-168.8	-122.5	34.28	198.7
3,665.0	72.18	225.38	3,605.0	-184.9	-137.8	41.11	220.5
Interpolated Pt. Coal Top ST2							
3,673.0	75.27	226.55	3,607.2	-190.2	-143.3	41.11	228.1



Pathfinder Energy Services

End of Well Survey



Company: Energen Resources
 Project: Fr#105
 Site: RIO ARRIBA COUNTY NEW MEXICO
 Well: CARRACAS UNIT FR #105
 Wellbore: OH
 Design: Surveys

Local Co-ordinate Reference: Well CARRACAS UNIT FR #105
 TVD Reference: Well @ 6728.0ft (13 Ft RKB)
 MD Reference: Well @ 6728.0ft (13 Ft RKB)
 North Reference: True
 Survey Calculation Method: Minimum Curvature
 Database: EDM 2003.16 Single User Db

Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	N/S (ft)	E/W (ft)	DLeg (°/100ft)	V. Sec (ft)
3,689.0	79.67	228.27	3,610.7	-200.8	-154.8	29.43	243.6
3,720.0	82.04	237.86	3,615.7	-219.1	-179.2	31.48	274.2
3,752.0	83.71	239.87	3,619.6	-235.5	-206.4	8.13	305.8
3,783.0	88.55	239.69	3,621.7	-251.1	-233.1	15.62	336.6
3,815.0	93.47	239.79	3,621.1	-267.2	-260.8	15.38	368.4
3,846.0	94.62	240.00	3,619.0	-282.7	-287.5	3.77	399.1
3,878.0	95.67	240.66	3,616.1	-298.5	-315.2	3.87	430.8
3,909.0	96.11	239.93	3,612.9	-313.8	-342.0	2.74	461.4
3,941.0	93.30	239.61	3,610.3	-329.8	-369.5	8.84	493.1
3,972.0	87.67	239.83	3,610.0	-345.5	-396.3	18.18	523.9
4,004.0	86.97	240.81	3,611.5	-361.3	-424.1	3.76	555.7
4,035.0	87.93	239.20	3,612.9	-376.8	-450.9	6.04	586.5
4,067.0	89.78	238.99	3,613.5	-393.2	-478.3	5.82	618.3
4,099.0	91.98	238.28	3,613.0	-409.9	-505.7	7.22	650.2
4,130.0	94.79	238.43	3,611.2	-426.1	-532.0	9.08	681.0
4,162.0	94.53	237.28	3,608.6	-443.1	-559.0	3.67	712.8
4,194.0	93.56	235.52	3,606.4	-460.7	-585.6	6.27	744.7
4,225.0	92.59	234.95	3,604.7	-478.4	-611.0	3.63	775.7
4,256.0	91.80	234.46	3,603.5	-496.3	-636.3	3.00	806.6
4,288.0	91.80	234.57	3,602.5	-514.8	-662.3	0.34	838.6
4,318.0	91.89	233.85	3,601.5	-532.4	-686.7	2.42	868.6
4,350.0	90.13	233.18	3,601.0	-551.4	-712.4	5.88	900.6
4,381.0	88.90	232.18	3,601.2	-570.2	-737.0	5.11	931.6
4,413.0	86.61	232.23	3,602.5	-589.8	-762.3	7.16	963.5
4,444.0	86.70	232.14	3,604.3	-608.8	-786.8	0.41	994.5
4,476.0	88.20	231.84	3,605.7	-628.5	-811.9	4.78	1,026.4
4,507.0	89.08	231.58	3,606.5	-647.7	-836.3	2.96	1,057.4
4,538.0	89.16	231.51	3,606.9	-666.9	-860.5	0.34	1,088.4
4,569.0	89.25	231.89	3,607.4	-686.1	-884.9	1.26	1,119.4
4,600.0	85.82	232.84	3,608.7	-705.1	-909.4	11.48	1,150.3
4,632.0	84.94	234.83	3,611.3	-723.9	-935.1	6.78	1,182.2
4,664.0	86.53	235.78	3,613.7	-742.0	-961.4	5.78	1,214.1
4,696.0	88.72	235.73	3,615.0	-760.0	-987.8	6.85	1,246.1
4,727.0	90.75	236.34	3,615.1	-777.4	-1,013.5	6.84	1,277.0
4,758.0	90.92	236.56	3,614.7	-794.5	-1,039.3	0.90	1,308.0
4,789.0	91.28	237.43	3,614.1	-811.4	-1,065.3	3.04	1,338.9
4,821.0	92.42	237.05	3,613.0	-828.7	-1,092.2	3.75	1,370.9
4,853.0	92.42	237.29	3,611.7	-846.0	-1,119.1	0.75	1,402.8
4,884.0	94.26	238.13	3,609.9	-862.5	-1,145.3	6.52	1,433.6
4,916.0	94.44	238.47	3,607.5	-879.3	-1,172.4	1.20	1,465.4
4,947.0	92.42	238.67	3,605.6	-895.4	-1,198.8	6.55	1,496.3
4,978.0	89.25	238.36	3,605.2	-911.6	-1,225.2	10.27	1,527.2
5,009.0	90.84	237.74	3,605.1	-928.0	-1,251.5	5.51	1,558.1
5,040.0	91.45	237.74	3,604.5	-944.6	-1,277.8	1.97	1,589.0
5,072.0	90.84	237.30	3,603.9	-961.8	-1,304.7	2.35	1,620.9

**Pathfinder Energy Services**

End of Well Survey



Company: Energen Resources
Project: Fr#105
Site: RIO ARRIBA COUNTY NEW MEXICO
Well: CARRACAS UNIT FR #105
Wellbore: OH
Design: Surveys

Local Co-ordinate Reference: Well CARRACAS UNIT FR #105
TVD Reference: Well @ 6728.0ft (13 Ft RKB)
MD Reference: Well @ 6728.0ft (13 Ft RKB)
North Reference: True
Survey Calculation Method: Minimum Curvature
Database: EDM 2003.16 Single User Db

Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	N/S (ft)	E/W (ft)	D.Leg (°/100ft)	V. Sec (ft)
5,103.0	89.08	237.59	3,603.9	-978.4	-1,330.9	5.75	1,651.8
5,134.0	88.81	234.81	3,604.5	-995.7	-1,356.6	9.01	1,682.8
5,165.0	90.66	233.11	3,604.6	-1,013.9	-1,381.7	8.10	1,713.8
5,197.0	92.42	231.07	3,603.7	-1,033.6	-1,406.9	8.42	1,745.8
5,250.0	92.42	231.07	3,601.5	-1,066.8	-1,448.1	0.00	1,798.7

BHL ST #2

Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (m)	Easting (m)	Latitude	Longitude
PBHL ST 2 - survey misses by 8.3ft at 5089.3ft MD (3603.8 TVD, -971.1 N, -1319.3 E) - Point	0.00	0.00	3,612.0	-970.0	-1,320.0	662,299.51	411,803.06	36° 58' 2.265 N	107° 14' 25.829 W

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	+E/-W (ft)	Comment
3,665.0	3,605.0	-184.9	-137.8	Interpolated Pt. Coal Top ST2
5,250.0	3,601.5	-1,066.8	-1,448.1	BHL ST #2

Checked By: _____ Approved By: _____ Date: _____