

ENERGEN

RESOURCES

30-039-27457

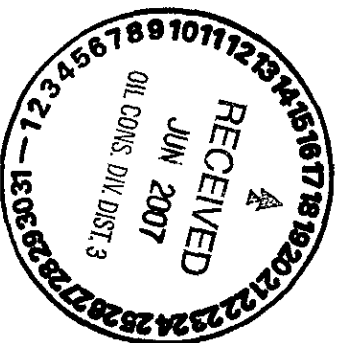
Energen Resources

Rio Arriba County, NM
Carracas Mesa (Carracas B #1R)
Carracas 19 B #1R
Carracas 19 B #1R ST

Survey: Survey #1

PathFinder Standard X&Y Report

06 June, 2007



2007 JUN -7 PM 10: 56

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210 PM

PATHFINDER
ENERGY SERVICES

Engen Resources

Project: Rio Arriba County, NM
Site: Carracas Mesa (Carracas B #1R)
Well: Carracas 19 B #1R ST
Wellbore: Carracas 19 B #1R ST

Design: Carracas 19 B #1R ST (Carracas 19 B #1R/Carracas 19 B #1R ST)

WELL DETAILS: Carracas 19 B #1R

Ground Elevation: 7443.0
RIG Elevation: RIG @ 7375.0m (AMS 2228)
Rig Name: AMS 2228

	+N/S	+E/W	North	East	Latitude	Longitude	Slot
	0.0	0.0	2178735.52	1339122.04	39° 58' 39.000 N	107° 16' 53.400 W	

SECTION DETAILS

No plan data is available

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/S	+E/W	North	East	Shape
PBHL (1931R)	4112.0	-1758.7	-1635.0	2174958.41	1337463.08	Point

COMPANY DETAILS: Engen Resources

Farmington Field Office
Drilling and Operations
Calculation Method: Minimum Curvature
Error System: ISCRTSA
Scan Method: Closest Approach 3D
Error Curves: Elliptical Conic
Warning Method: Error Ratio

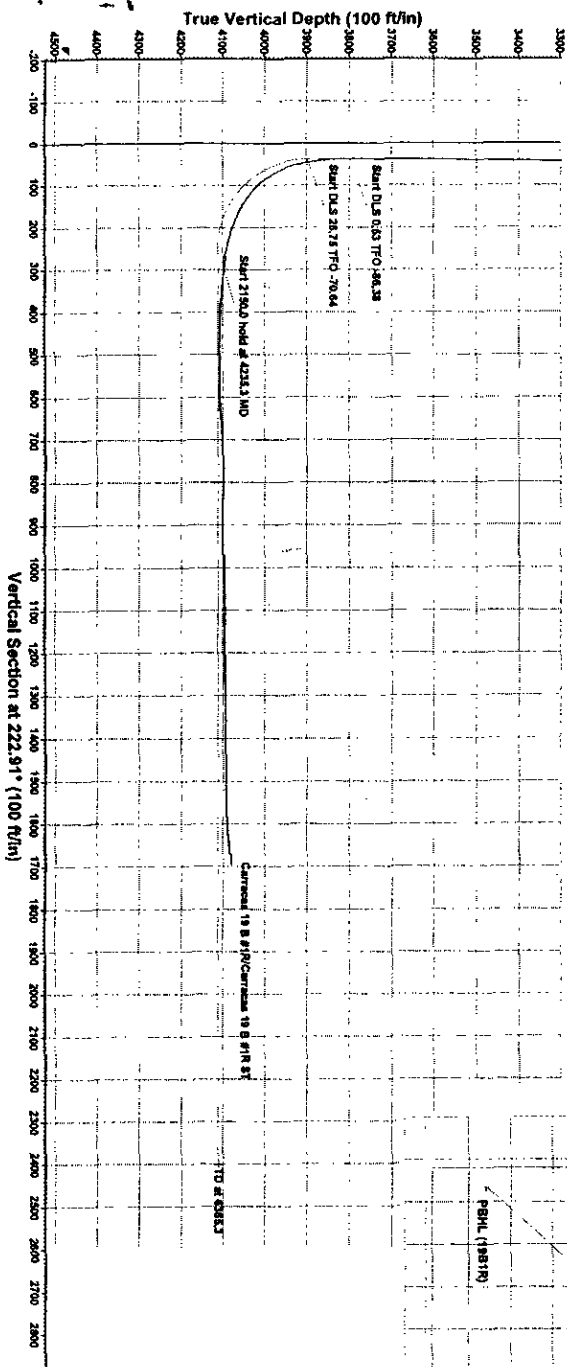
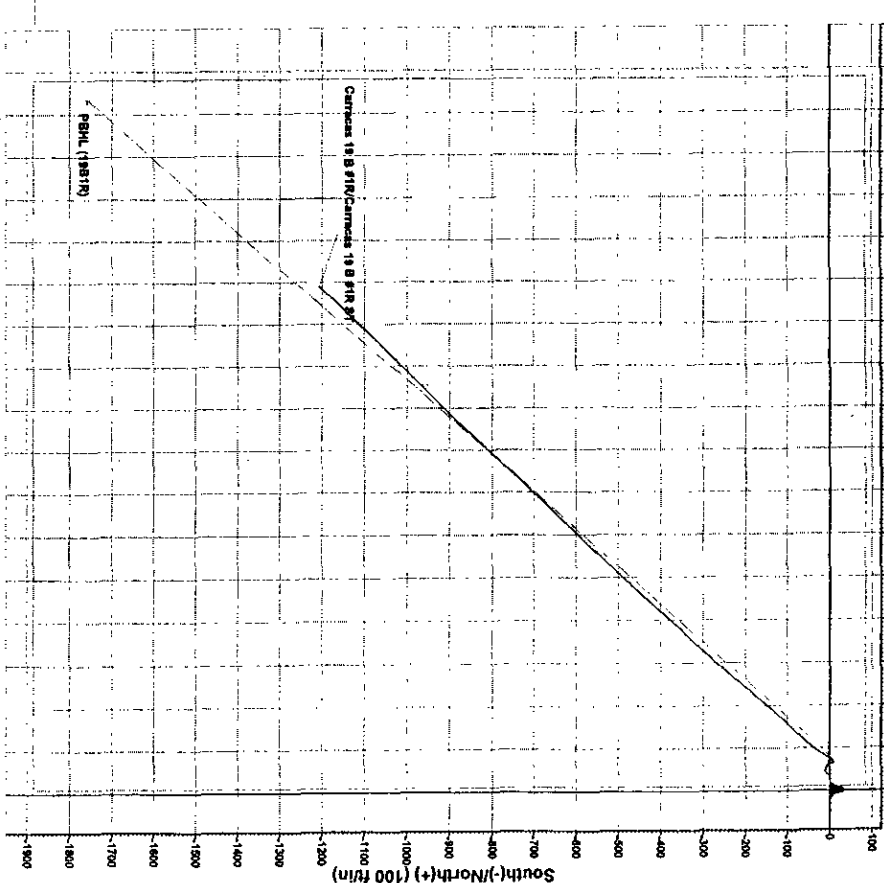
PROJECT DETAILS: Rio Arriba County, NM

Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: New Mexico Central Zone
System Datum: Mean Sea Level

Asimuth to True North
Magnetic North: 10.2°
Magnetic Field
Strength: 51360.24T
Dip Angle: 63.8°
Date: 4/25/2007
Model: IGRF200510

West(-)/East(+) (100 ft/m)

PATHFINDER ENERGY SERVICES ECOW Comparison



Design: Carracas 19 B #1R ST (Carracas 19 B #1R/Carracas 19 B #1R ST)
Created By: Derek Stephens Date: 14:00, June 06 2007

Company: Energen Resources
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 Site: Carracas Mesa (Carracas B #1R)
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 Design: Carracas 19 B #1R ST

Local Co-ordinate Reference: Well Carracas 19 B #1R
 TVD Reference: RKB @ 7378.0ft (AWS #289)
 MD Reference: RKB @ 7378.0ft (AWS #289)
 North Reference: True
 Survey Calculation Method: Minimum Curvature
 Database: 2003.16 NWDB

Project: Rio Arriba County, NM
 Map System: US State Plane 1983
 Geo Datum: North American Datum 1983
 Map Zone: New Mexico Central Zone

System Datum:

Mean Sea Level

Site: Carracas Mesa (Carracas B #1R)

Site Position: Map
 From: Map
 Position Uncertainty: 0.0 ft

Northing: 2,176,736.52 ft
 Easting: 1,339,122.04 ft
 Slot Radius: "

Latitude: 36° 58' 39.000 N
 Longitude: 107° 16' 53.400 W
 Grid Convergence: -0.62°

Well: Carracas 19 B #1R
 Well Position: +N/S 0.0 ft
 +E/W 0.0 ft
 Position Uncertainty: 0.0 ft

Northing: 2,176,736.52 ft
 Easting: 1,339,122.04 ft
 Wellhead Elevation: ft

Latitude: 36° 58' 39.000 N
 Longitude: 107° 16' 53.400 W
 Ground Level: 7,363.0 ft

Wellbore: Carracas 19 B #1R ST

Magnetics Model Name Sample Date Declination (°) Dip Angle (°) Field Strength (nT)
 IGRF200510 4/25/2007 10.21 63.87 51,360

Design: Carracas 19 B #1R ST

Audit Notes: Version: 1.0 Phase: ACTUAL Tie On Depth: 0.0
 Vertical Section: Depth From (TVD) +N/S +E/W Direction
 (ft) (ft) (ft) (°)
 0.0 0.0 0.0 222.91

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Survey Program: Date: 6/6/2007

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
200.0	3,800.0	Survey #1 (Gyro) (Carracas 19 B #1R ST)	GG	Good Gyro
3,928.5	5,649.0	Survey #1 (Carracas 19 B #1R ST)	Pathfinder	Pathfinder MWD

Survey	MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	V. Sec (ft)	NS (ft)	EW (ft)	D. Leg (°/100ft)
	3,800.0	1.59	310.28	3,799.1	3,578.9	37.2	9.5	-64.9	0.00
	3,928.5	13.19	220.88	3,926.5	3,451.5	52.0	-0.4	-75.9	10.32
	3,959.9	22.77	211.83	3,956.3	3,421.7	61.6	-8.3	-81.5	31.71
	3,991.9	32.62	208.99	3,984.6	3,393.4	76.1	-21.1	-89.1	30.91
	4,023.2	40.98	218.16	4,009.6	3,368.4	94.6	-36.5	-99.6	30.91
	4,054.8	49.59	222.29	4,031.8	3,346.2	117.0	-53.6	-114.2	28.80
	4,087.0	59.09	224.11	4,050.6	3,327.4	143.1	-72.6	-132.1	29.82
	4,118.1	66.21	223.17	4,064.9	3,313.1	170.8	-92.6	-151.2	23.02
	4,149.6	71.40	221.24	4,076.3	3,301.7	200.1	-114.4	-170.9	17.45
	4,181.0	74.22	220.01	4,085.5	3,292.5	230.0	-137.1	-190.4	9.74
	4,212.0	79.05	219.74	4,092.7	3,285.3	260.1	-160.2	-209.7	15.60
	4,243.0	83.36	219.21	4,097.4	3,280.6	290.7	-183.9	-229.2	14.01
	4,275.0	84.77	218.86	4,100.7	3,277.3	322.5	-208.6	-249.2	4.54
	4,306.0	84.94	219.83	4,103.5	3,274.5	353.3	-232.5	-268.8	3.16
	4,338.0	87.93	221.15	4,105.5	3,272.5	385.2	-256.8	-289.5	10.21
	4,369.0	88.64	221.94	4,106.4	3,271.6	416.2	-280.0	-310.1	3.43
	4,400.0	89.52	223.26	4,108.9	3,271.1	447.2	-302.8	-331.1	5.12
	4,432.0	89.52	224.66	4,107.2	3,270.8	479.2	-325.8	-353.3	4.37
	4,463.0	89.08	223.35	4,107.6	3,270.4	510.1	-348.1	-374.8	4.46
	4,494.0	89.52	220.36	4,108.0	3,270.0	541.1	-371.2	-395.5	9.75
	4,527.0	89.08	220.62	4,108.4	3,269.6	574.1	-396.3	-416.9	1.55



R E S O U R C E S

PathFinder Energy Services

PathFinder Standard X&Y Report



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North Reference: True
Survey Calculation Method: Minimum Curvature
Database: 2003.16 NWDB

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	V. Sec (ft)	N/S (ft)	EW (ft)	DLeg (°/100ft)
4,558.0	93.03	221.68	4,107.8	3,270.2	605.1	-419.6	-437.3	13.19
4,589.0	95.76	221.15	4,105.4	3,272.6	636.0	-442.8	-457.7	8.97
4,621.0	94.79	222.11	4,102.5	3,275.5	667.8	-466.6	-478.9	4.26
4,652.0	91.71	222.64	4,100.7	3,277.3	698.8	-489.5	-499.8	10.08
4,683.0	92.51	223.70	4,099.6	3,278.4	729.7	-512.1	-521.0	4.28
4,714.0	90.84	223.43	4,098.7	3,279.3	760.7	-534.5	-542.3	5.46
4,746.0	88.81	222.82	4,098.8	3,279.2	792.7	-557.9	-564.2	6.62
4,778.0	88.81	223.61	4,099.4	3,278.6	824.7	-581.2	-586.1	2.47
4,809.0	90.22	222.73	4,099.7	3,278.3	855.7	-603.8	-607.3	5.36
4,841.0	89.96	223.43	4,099.6	3,278.4	887.7	-627.2	-629.2	2.33
4,872.0	90.22	222.99	4,099.6	3,278.4	918.7	-649.8	-650.4	1.65
4,904.0	92.51	223.08	4,098.8	3,279.2	950.7	-673.1	-672.2	7.16
4,936.0	92.59	223.61	4,097.4	3,280.6	982.7	-696.4	-694.2	1.67
4,967.0	90.31	221.94	4,096.6	3,281.4	1,013.7	-719.1	-715.2	9.12
4,998.0	90.48	222.90	4,096.4	3,281.6	1,044.7	-742.0	-736.1	3.14
5,030.0	91.98	224.05	4,095.7	3,282.3	1,076.6	-765.2	-758.1	5.91
5,061.0	92.24	223.61	4,094.6	3,283.4	1,107.6	-787.6	-779.6	1.65
5,093.0	88.55	223.08	4,094.4	3,283.6	1,139.6	-810.9	-801.5	11.65
5,124.0	89.16	223.96	4,095.0	3,283.0	1,170.6	-833.3	-822.9	3.45
5,156.0	89.78	223.17	4,095.3	3,282.7	1,202.6	-856.5	-844.9	3.14
5,187.0	89.87	223.96	4,095.4	3,282.6	1,233.6	-879.0	-866.3	2.56
5,219.0	91.54	224.22	4,095.0	3,283.0	1,265.6	-902.0	-888.6	5.28
5,251.0	92.07	225.37	4,094.0	3,284.0	1,297.6	-924.7	-911.1	3.96
5,283.0	90.22	223.96	4,093.3	3,284.7	1,329.5	-947.4	-933.6	7.27
5,313.0	89.87	224.66	4,093.3	3,284.7	1,359.5	-968.9	-954.5	2.61
5,345.0	89.96	226.42	4,093.4	3,284.6	1,391.5	-991.3	-977.4	5.51
5,376.0	90.13	227.21	4,093.3	3,284.7	1,422.4	-1,012.5	-1,000.0	2.61

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MD	Inc	Azi	TVD	TVDSS	V. Sec	N/S	E/W	Dleg
(ft)	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)	(°/100ft)
5,408.0	90.22	225.37	4,093.2	3,284.8	1,454.4	-1,034.6	-1,023.1	5.76
5,440.0	89.52	225.98	4,093.3	3,284.7	1,486.3	-1,057.0	-1,046.0	2.90
5,471.0	90.84	224.40	4,093.2	3,284.8	1,517.3	-1,078.8	-1,068.0	6.64
5,502.0	91.71	224.31	4,092.5	3,285.5	1,548.3	-1,101.0	-1,089.7	2.82
5,534.0	93.56	223.87	4,091.0	3,287.0	1,580.2	-1,123.9	-1,111.9	5.94
5,565.0	95.50	223.17	4,088.6	3,289.4	1,611.1	-1,146.3	-1,133.2	6.65
5,649.0	95.50	223.17	4,080.5	3,297.5	1,694.7	-1,207.3	-1,190.4	0.00

PBHL (19B1R)

Target Name	Dip Angle	Dip Dir.	TVD	+N/S	+E/W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
- Shape	0.00	0.00	4,112.0	-1,758.7	-1,635.0	2,174,995.61	1,337,468.08	36° 58' 21.610 N	107° 17' 13.548 W
PBHL (19B1R)									
- survey misses by 709.0ft at 5649.0ft MD (4080.5 TVD, -1207.3 N, -1190.4 E)									
- Point									

Checked By: *[Signature]*

Approved By: *[Signature]*

Date: 6-6-07