



Energen Resources

Rio Arriba County, NM

S-22, T-32N, R-4W (PC #201)

Carracas Unit PC #201

Horizontal Sidetrack Recompletion

30-039-24719

Survey: EOW Survey Upper Lat

NS

End of Well Survey

05 September, 2007

Surface 1660/N 1715/E
Lateral Origin 1544/N 1477/E MD 3800 Tvd 3614
B.H.L. 801/N 660/E MD 4443 Tvd 3627

RCVD OCT 2 '07

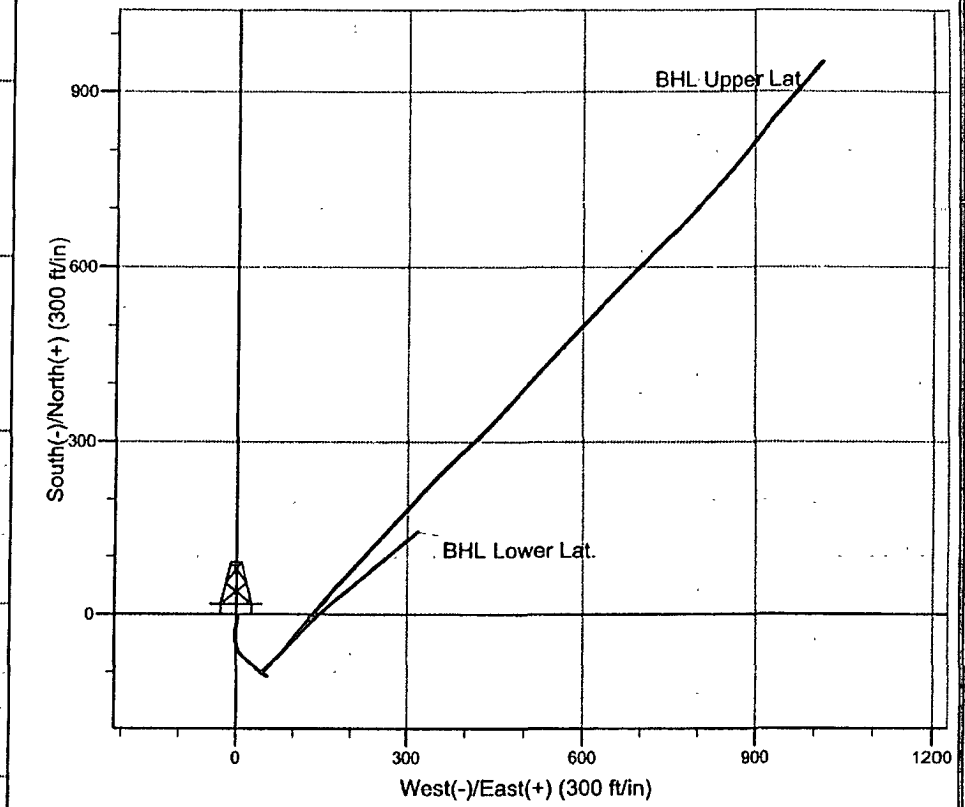
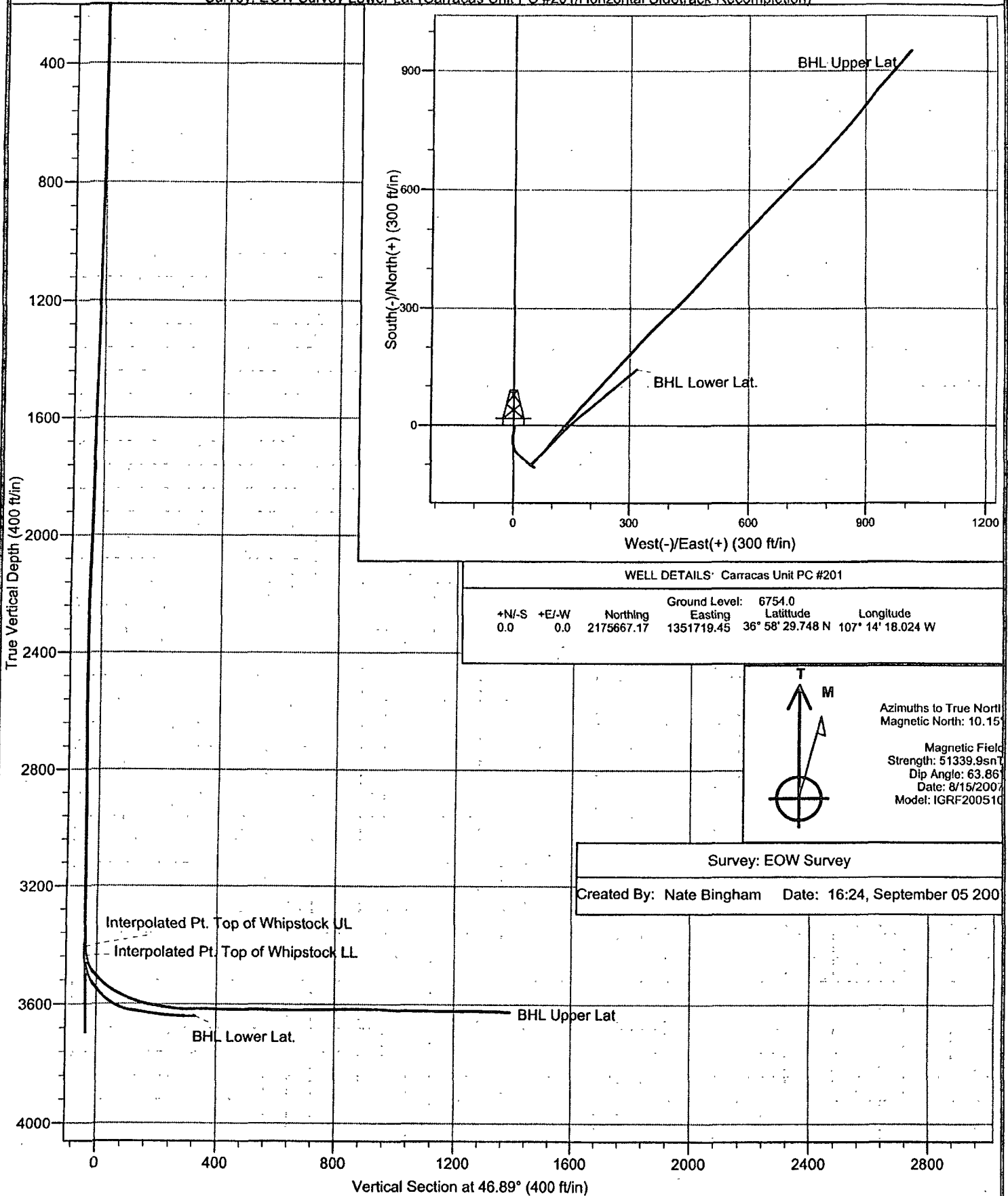
OIL CONS. DIV.

DIST. 3

PATHFINDER
ENERGY SERVICES

08

Survey: EOW Survey Lower Lat (Carracas Unit PC #201/Horizontal Sidetrack Recompletion)



WELL DETAILS: Carracas Unit PC #201

+N/-S	+E/-W	Northing	Ground Level: Easting	Latitude	Longitude
0.0	0.0	2175667.17	1351719.45	36° 58' 29.748 N	107° 14' 18.024 W



Azimuths to True North
Magnetic North: 10.15°

Magnetic Field
Strength: 51339.9 nT
Dip Angle: 63.86°
Date: 8/15/2007
Model: IGRF200510

Survey: EOW Survey

Created By: Nate Bingham Date: 16:24, September 05 2007

Company:	Energen Resources	Local Co-ordinate Reference:	Well Carracas Unit PC #201
Project:	Rio Arriba County, NM	TVD Reference:	13' RKB @ 6767.0ft (Aws #580)
Site:	S-22, T-32N, R-4W (PC #201)	MD Reference:	13' RKB @ 6767.0ft (Aws #580)
Well:	Carracas Unit PC #201	North Reference:	True
Wellbore:	Horizontal Sidetrack Recompletion	Survey Calculation Method:	Minimum Curvature
Design:	Horizontal Sidetrack Recompletion	Database:	EDM 2003.16 Single User Db

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

Site S-22, T-32N, R-4W (PC #201)

Site Position:		Northing:	2,175,667.17	ft	Latitude:	36° 58' 29.748 N
From:	Lat/Long	Easting:	1,351,719.45	ft	Longitude:	107° 14' 18.024 W
Position Uncertainty:	0.0 ft	Slot Radius:	"		Grid Convergence:	-0.59

Well Carracas Unit PC #201

Well Position	+N-S	0.0	ft	Northing:	2,175,667.17	ft	Latitude:	36° 58' 29.748 N
	+E-W	0.0	ft	Easting:	1,351,719.45	ft	Longitude:	107° 14' 18.024 W
Position Uncertainty	0.0	ft		Wellhead Elevation:	6,767.0	ft	Ground Level:	6,754.0 ft

Wellbore Horizontal Sidetrack Recompletion

Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
	IGRF200510	8/15/2007	(°)	(°)	(nT)
			10.16	63.86	51,340

Design Horizontal Sidetrack Recompletion

Audit Notes:

Version:	1.0	Phase:	ACTUAL	Tie On Depth:	3,400.0
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Vertical Section:	Depth From (TVD)	+N-S	+E-W	Direction
	(ft)	(ft)	(ft)	(°)
	0.0	0.0	0.0	46.89

Survey Program Date 9/5/2007

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
213.0	3,400.0	Gyrodata GMS (OH)	Pathfinder	Pathfinder MWD
3,441.0	3,916.0	EOW Survey Lower Lat (Horizontal Sidetra	Pathfinder	Pathfinder MWD

Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	N/S (ft)	E/W (ft)	DLeg (°/100ft)	V. Sec (ft)
3,400.0	2.52	128.66	3,397.5	-101.6	41.9	0.00	-38.8
3,410.0	2.53	128.25	3,407.5	-101.8	42.2	0.21	-38.8
Interpolated Pt. Top of Whipstock							
3,459.5	20.31	47.43	3,455.9	-96.7	49.5	40.55	-29.9
3,489.3	29.90	47.55	3,482.9	-88.1	58.8	32.16	-17.3
3,521.5	40.19	44.78	3,509.2	-75.3	72.1	32.29	1.2
3,546.1	47.66	39.54	3,526.9	-62.6	83.5	33.78	18.1
3,576.7	56.28	38.81	3,545.7	-44.0	98.7	28.28	42.0
3,607.0	60.94	38.86	3,561.5	-23.8	114.9	15.34	67.6
3,638.0	65.42	40.30	3,575.5	-2.5	132.5	15.03	95.1
3,669.2	70.08	41.09	3,587.3	19.4	151.3	15.14	123.7



Pathfinder Energy Services
End of Well Survey



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Project: Rio Arriba County, NM
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Well: Carracas Unit PC #201
Wellbore: Horizontal Sidetrack Recompletion
Design: Horizontal Sidetrack Recompletion

Local Co-ordinate Reference: Well Carracas Unit PC #201
TVD Reference: 13' RKB @ 6767.0ft (Aws #580)
MD Reference: 13' RKB @ 6767.0ft (Aws #580)
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)
3,699.4	75.45	41.82	3,596.3	41.0	170.4	17.94	152.4
3,730.0	80.46	42.13	3,602.6	63.2	190.4	16.41	182.2
3,760.5	81.34	42.55	3,607.5	85.5	210.7	3.19	212.2
3,790.9	80.55	41.95	3,612.3	107.7	230.9	3.25	242.2
3,821.5	85.56	42.80	3,616.0	130.1	251.4	16.59	272.5
3,851.0	89.43	43.22	3,617.2	151.7	271.5	13.20	301.9
3,882.0	91.80	43.85	3,616.9	174.2	292.8	7.91	332.8
3,912.0	89.87	42.88	3,616.5	196.0	313.4	7.20	362.7
3,943.0	88.90	42.18	3,616.8	218.8	334.4	3.86	393.7
3,973.0	88.02	42.93	3,617.6	240.9	354.7	3.85	423.6
4,004.0	88.55	45.89	3,618.5	263.0	376.3	9.70	454.5
4,036.0	90.57	46.52	3,618.8	285.2	399.4	6.61	486.5
4,067.0	91.54	45.65	3,618.2	306.7	421.8	4.20	517.5
4,099.0	88.81	43.46	3,618.1	329.5	444.2	10.94	549.5
4,131.0	86.44	41.72	3,619.4	353.0	465.8	9.19	581.3
4,162.0	89.08	42.09	3,620.7	376.1	486.5	8.60	612.2
4,194.0	91.19	42.16	3,620.6	399.8	508.0	6.60	644.1
4,224.0	91.36	42.17	3,619.9	422.0	528.1	0.57	674.0
4,255.0	90.40	43.45	3,619.4	444.8	549.2	5.16	704.9
4,287.0	90.75	42.94	3,619.1	468.1	571.1	1.93	736.8
4,318.0	91.89	44.08	3,618.4	490.6	592.4	5.20	767.8
4,349.0	91.54	43.66	3,617.5	512.9	613.9	1.76	798.7
4,381.0	90.57	44.36	3,616.9	535.9	636.1	3.74	830.7
4,413.0	89.87	44.28	3,616.8	558.8	658.5	2.20	862.6
4,444.0	90.22	44.34	3,616.7	581.0	680.1	1.15	893.6
4,475.0	88.46	44.64	3,617.1	603.1	701.9	5.76	924.6
4,507.0	87.32	46.71	3,618.3	625.5	724.7	7.38	956.5
4,538.0	86.70	47.08	3,619.9	646.6	747.3	2.33	987.5
4,570.0	88.11	45.50	3,621.3	668.7	770.5	6.61	1,019.5
4,601.0	89.69	43.17	3,621.9	690.9	792.1	9.08	1,050.4
4,632.0	90.22	42.22	3,622.0	713.6	813.1	3.51	1,081.3
4,663.0	89.16	41.55	3,622.1	736.7	833.8	4.05	1,112.2
4,695.0	89.43	41.79	3,622.5	760.6	855.1	1.13	1,144.1
4,727.0	88.81	40.54	3,623.0	784.7	876.2	4.36	1,175.9
4,758.0	90.40	39.45	3,623.2	808.5	896.1	6.22	1,206.7
4,790.0	90.84	38.64	3,622.9	833.3	916.2	2.88	1,238.4
4,821.0	89.87	38.74	3,622.7	857.5	935.6	3.15	1,269.1
4,853.0	88.29	39.72	3,623.2	882.3	955.9	5.81	1,300.8
4,885.0	87.85	39.86	3,624.3	906.9	976.3	1.44	1,332.5
4,943.0	87.85	39.86	3,626.5	951.4	1,013.5	0.00	1,390.0



Pathfinder Energy Services
End of Well Survey



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Wellbore: Horizontal Sidetrack Recompletion
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Local Co-ordinate Reference: Well Carracas Unit PC #201
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North Reference: True
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Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
PC #201 ST: Land - survey misses by 33.2ft at 3700.0ft MD (3596.4 TVD, 41.5 N, 170.8 E) - Point	0.00		3,626.0	27.6	176.8	2,175,692.92	1,351,896.55	36° 58' 30.021 N	107° 14' 15.845 W
PC #201 ST: KOP - survey misses by 3.8ft at 3442.6ft MD (3439.8 TVD, -99.9 N, 45.8 E) - Point	0.00		3,440.5	-102.7	43.3	2,175,563.99	1,351,761.72	36° 58' 28.732 N	107° 14' 17.490 W
TD Lateral - survey misses by 2.1ft at 4942.9ft MD (3626.5 TVD, 951.3 N, 1013.4 E) - Point	0.00	0.00	3,626.0	950.0	1,015.0	2,176,606.59	1,352,744.25	36° 58' 39.141 N	107° 14' 5.515 W

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	+E/-W (ft)	Comment
3,410.0	3,407.5	-101.1	42.8	Interpolated Pt. Top of Whipstock
4,943.0	3,626.5	952.1	1,014.1	BHL Upper Lat

Checked By: _____ Approved By: _____ Date: _____