



Energen Resources

Carson Natl Forest: S35, T32N, R5W

Carson Natl Forest: 35A#8

Middle Mesa

Carracas Unit 35 A #8

API 30-039-24411

Survey: Actual

End of Well Survey

07 August, 2007

Surface: 1500/N 1020/E

Start lateral 1676/N 1181/E

BHL 2623/N 1824/E

MA
MD 3785 TVD 3652

4793 3633

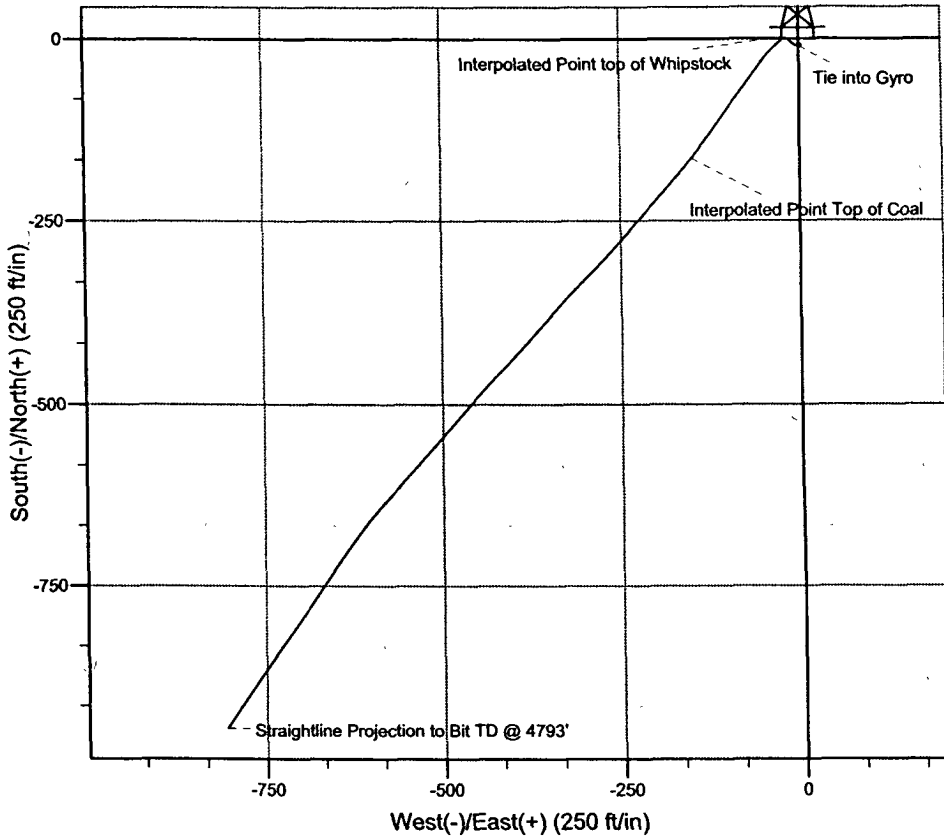
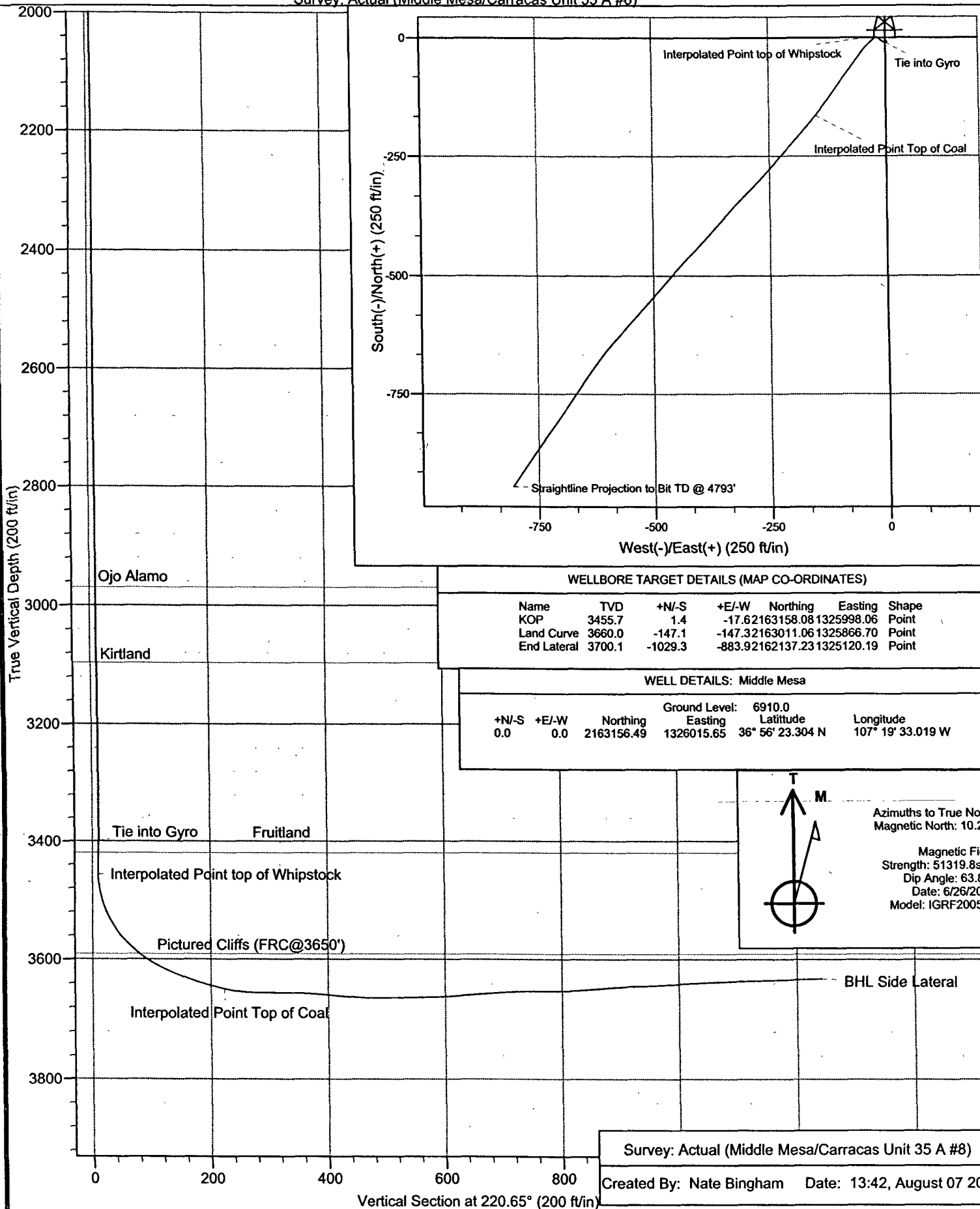
RCVD AUG 13 '07

OIL CONS. DIV.

DIST. 3

PATHFINDER
ENERGY SERVICES

Survey: Actual (Middle Mesa/Carracas Unit 35 A #8)



WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
KOP	3455.7	1.4	-17.6	2163158.08	1325998.06	Point
Land Curve	3660.0	-147.1	-147.3	2163011.06	1325866.70	Point
End Lateral	3700.1	-1029.3	-883.9	2162137.23	1325120.19	Point

WELL DETAILS: Middle Mesa

+N/-S	+E/-W	Northing	Easting	Ground Level:	Latitude	Longitude
0.0	0.0	2163156.49	1326015.65	6910.0	36° 56' 23.304 N	107° 19' 33.019 W



Azimuths to True North
 Magnetic North: 10.20°

Magnetic Field
 Strength: 51319.8snT
 Dip Angle: 63.82°
 Date: 6/26/2007
 Model: IGRF200510

Survey: Actual (Middle Mesa/Carracas Unit 35 A #8)

Created By: Nate Bingham Date: 13:42, August 07 2007

Company: Energen Resources
Project: Carson Natl Forest:S35,T32N,R5W
Site: Carson Natl Forest: 35A#8
Well: Middle Mesa
Wellbore: Carracas Unit 35 A #8
Design: Carracas Unit 35 A #8

Local Co-ordinate Reference: Well Middle Mesa
TVD Reference: WELL @ 6925.0ft (AWS #289)
MD Reference: WELL @ 6925.0ft (AWS #289)
North Reference: True
Survey Calculation Method: Minimum Curvature
Database: EDM 2003.16 Single User Db

Project	Carson Natl Forest:S35,T32N,R5W		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Central Zone		

Site Carson Natl Forest: 35A#8

Site Position:
From: Lat/Long
Position Uncertainty: 0.0 ft
Northing: 2,163,156.49 ft
Easting: 1,326,015.65 ft
Slot Radius: *
Latitude: 36° 56' 23.304 N
Longitude: 107° 19' 33.019 W
Grid Convergence: -0.65

Well Middle Mesa

Well Position +N-S 0.0 ft **Northing:** 2,163,156.49 ft **Latitude:** 36° 56' 23.304 N
 +E-W 0.0 ft **Easting:** 1,326,015.65 ft **Longitude:** 107° 19' 33.019 W
Position Uncertainty 0.0 ft **Wellhead Elevation:** 6,925.0 ft **Ground Level:** 6,910.0 ft

Wellbore Carracas Unit 35 A #8

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	6/26/2007	10.21	63.82	51,320

Design Carracas Unit 35 A #8

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 0.0 220.65

Survey Program		Date 8/7/2007			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
200.0	3,400.0	Survey #1 (Carracas Unit 35 A #8)	NS-GYRO-MS	North sensing gyrocompassing m/s	
3,457.0	4,793.0	Actual (Carracas Unit 35 A #8)	Pathfinder	Pathfinder MWD	

Survey							
MD (ft)	Inc (°)	Azi (°)	TVD (ft)	N/S (ft)	E/W (ft)	DLeg (°/100ft)	V. Sec (ft)
3,400.0	1.34	313.05	3,399.7	0.5	-16.7	0.00	10.5
Tie into Gyro							
3,420.3	1.35	312.17	3,420.0	0.9	-17.0	0.11	10.5
Fruitland							
3,457.0	1.36	310.59	3,456.7	1.4	-17.7	0.11	10.4
Interpolated Point top of Whipstock							
3,494.0	14.07	230.46	3,493.3	-1.2	-21.5	37.58	14.9
3,525.0	24.89	229.85	3,522.5	-7.8	-29.4	34.91	25.1
3,556.0	34.03	223.53	3,549.5	-18.3	-40.4	31.11	40.2
3,588.0	43.97	217.72	3,574.3	-33.6	-53.4	33.07	60.3

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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)
3,614.8	53.20	216.40	3,592.0	-49.7	-65.5	34.68	80.3
Pictured Cliffs (FRC@3650')							
3,628.0	57.77	215.87	3,599.5	-58.4	-71.9	34.68	91.2
3,659.0	64.19	215.87	3,614.5	-80.4	-87.8	20.71	118.2
3,690.0	69.29	216.93	3,626.8	-103.3	-104.7	16.75	146.6
3,722.0	71.84	217.28	3,637.4	-127.4	-122.9	8.04	176.7
3,753.0	75.97	217.46	3,646.0	-151.0	-141.0	13.33	206.4
3,770.0	78.22	218.59	3,649.8	-164.1	-151.2	14.73	223.0
Interpolated Point Top of Coal							
3,785.0	80.20	219.57	3,652.6	-175.5	-160.5	14.68	237.7
3,816.0	87.41	221.50	3,655.9	-198.9	-180.5	24.07	268.5
3,848.0	91.36	222.20	3,656.3	-222.8	-201.8	12.54	300.5
3,879.0	88.64	221.85	3,656.3	-245.8	-222.6	8.85	331.5
3,911.0	87.14	221.68	3,657.5	-269.6	-243.9	4.72	363.4
3,942.0	85.47	223.26	3,659.5	-292.5	-264.8	7.41	394.4
3,974.0	84.77	225.63	3,662.2	-315.2	-287.1	7.70	426.2
4,005.0	87.23	225.01	3,664.4	-337.0	-309.1	8.18	457.0
4,036.0	90.92	223.96	3,664.9	-359.1	-330.8	12.38	487.9
4,068.0	90.66	221.06	3,664.4	-382.7	-352.4	9.10	519.9
4,099.0	90.66	220.97	3,664.1	-406.1	-372.7	0.29	550.9
4,131.0	91.63	222.82	3,663.4	-429.9	-394.1	6.53	582.9
4,162.0	93.91	223.78	3,661.9	-452.4	-415.3	7.98	613.8
4,194.0	94.88	223.61	3,659.5	-475.5	-437.4	3.08	645.7
4,225.0	93.91	222.73	3,657.1	-498.0	-458.5	4.22	676.5
4,256.0	93.47	221.50	3,655.1	-521.0	-479.3	4.21	707.5
4,287.0	91.54	220.80	3,653.7	-544.3	-499.6	6.62	738.4
4,319.0	89.25	221.41	3,653.5	-568.4	-520.7	7.41	770.4
4,349.0	91.36	222.64	3,653.4	-590.7	-540.8	8.14	800.4
4,380.0	94.00	222.20	3,651.9	-613.5	-561.7	8.63	831.4
4,412.0	94.97	221.68	3,649.4	-637.3	-583.0	3.44	863.3
4,444.0	94.18	218.69	3,646.9	-661.6	-603.6	9.64	895.2
4,475.0	91.71	215.43	3,645.3	-686.3	-622.2	13.18	926.0
4,507.0	92.42	215.35	3,644.1	-712.4	-640.7	2.23	957.9
4,538.0	93.65	215.08	3,642.5	-737.7	-658.6	4.06	988.7
4,570.0	93.30	214.73	3,640.5	-763.9	-676.9	1.55	1,020.5
4,601.0	92.42	214.73	3,639.0	-789.3	-694.5	2.84	1,051.3
4,633.0	92.59	215.61	3,637.6	-815.5	-712.9	2.80	1,083.1
4,665.0	91.54	215.79	3,636.4	-841.4	-731.6	3.33	1,115.0
4,696.0	91.36	215.26	3,635.6	-866.6	-749.6	1.81	1,145.8
4,728.0	91.98	214.03	3,634.7	-893.0	-767.8	4.30	1,177.6
4,793.0	91.98	214.03	3,632.5	-946.8	-804.1	0.00	1,242.2



Pathfinder Energy Services
End of Well Survey



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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
KOP - survey hits target - Point	0.00	0.00	3,455.7	1.4	-17.6	2,163,158.08	1,325,998.06	36° 56' 23.318 N	107° 19' 33.236 W
End Lateral - survey misses by 133.2ft at 4793.0ft MD (3632.5 TVD, -946.8 N, -804.1 E) - Point	0.00	0.00	3,700.1	-1,029.3	-883.9	2,162,137.23	1,325,120.19	36° 56' 13.127 N	107° 19' 43.906 W
Land Curve - survey misses by 15.3ft at 3756.9ft MD (3646.9 TVD, -154.1 N, -143.3 E) - Point	0.00	0.00	3,660.0	-147.1	-147.3	2,163,011.06	1,325,866.70	36° 56' 21.850 N	107° 19' 34.833 W

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
3,420.3	3,420.0	Fruitland		0.00	
2,970.1	2,970.0	Ojo Alamo		0.00	
3,097.2	3,097.0	Kirtland		0.00	
3,614.8	3,592.0	Pictured Cliffs (FRC@3650')		0.00	

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	+E/-W (ft)	Comment
3,400.0	3,399.7	0.5	-16.7	Tie into Gyro
3,457.0	3,456.7	1.4	-17.7	Interpolated Point top of Whipstock
3,770.0	3,649.8	-164.1	-151.2	Interpolated Point Top of Coal
4,793.0	3,632.5	-946.8	-804.1	Straightline Projection to Bit TD @ 4793'

Checked By: _____ Approved By: _____ Date: _____