



Energen Resources

K29 30N 4W

Carson National Forest; S29, T32N, R5W(Car.29B#9)

Carracas Mesa

Carracas 29 B #9

OH Preliminary Design

30-39-30139

Surface 1665/S 1610/W

origin 1779/S 1740/E

BHL

1658/S 820/E

M 5234 TV 4022

6160

4049

Survey: Survey #1

End of Well Survey

20 September, 2007

RCVD SEP 24 2007

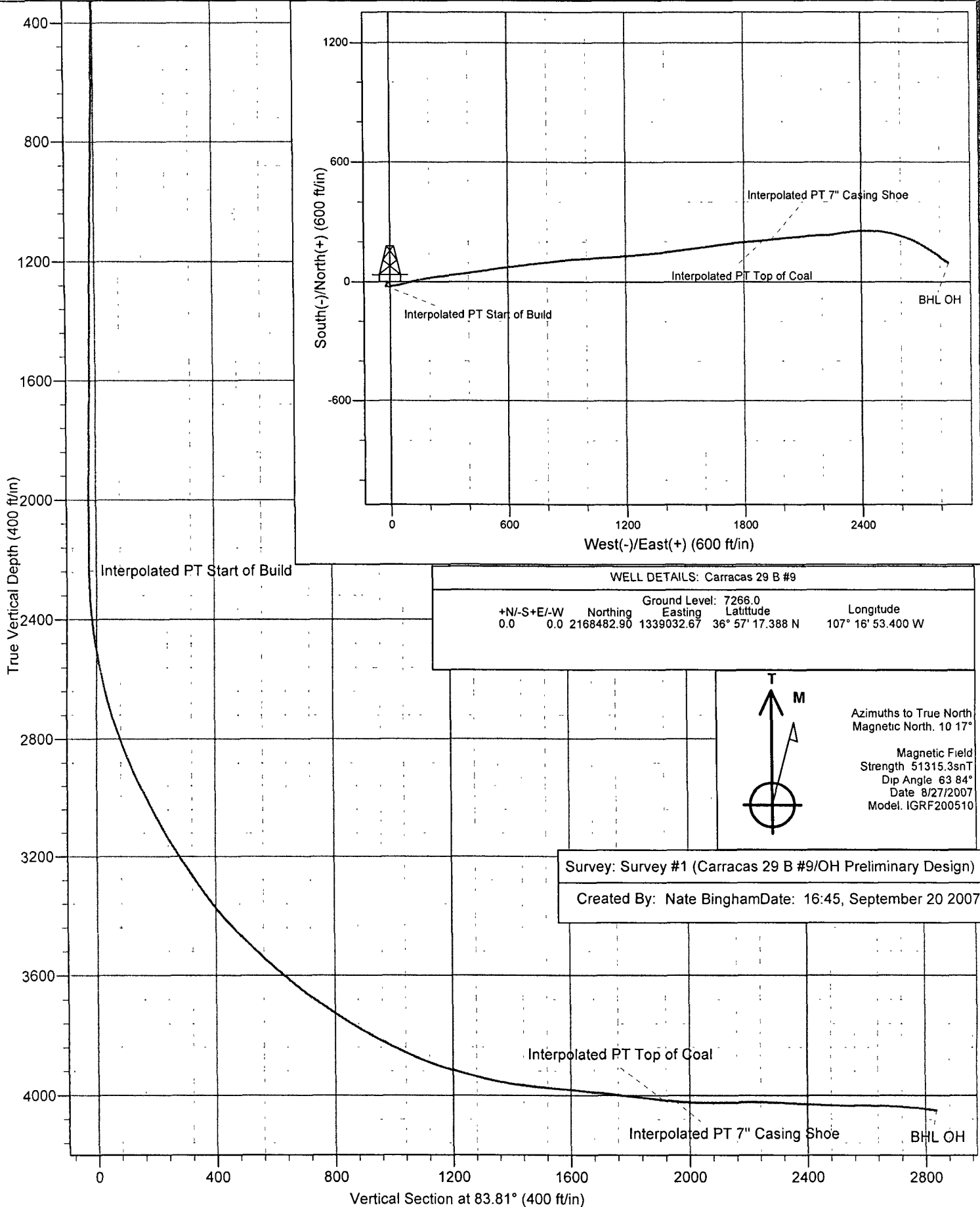
OIL CONS. DIV.

DIST. 3

PATHFINDER
ENERGY SERVICES

8

Survey: Survey #1 (Carracas 29 B #9/OH Preliminary Design)



Company: Energen Resources
 Project: Carson National Forest; S29, T32N,
 Site: Carracas Mesa
 Well: Carracas 29 B #9
 Wellbore: OH Preliminary Design
 Design: OH Preliminary Design

Local Co-ordinate Reference: Well Carracas 29 B #9
 TVD Reference: 15' RKB @ 7281.0ft (Patterson Rig #479)
 MD Reference: 15' RKB @ 7281.0ft (Patterson Rig #479)
 North Reference: True
 Survey Calculation Method: Minimum Curvature
 Database: EDM 2003.16 Single User Db

Project: Carson National Forest; S29, T32N, R5W(Car.29B#9)

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

Site Position: Northing: 2,168,482.90 ft Latitude: 36° 57' 17.388 N
 From: Map Easting: 1,339,032.67 ft Longitude: 107° 16' 53.400 W
 Position Uncertainty: 0 0 ft Slot Radius: " Grid Convergence: -0.62

Well: Carracas 29 B #9

Well Position +N/-S 0.0 ft Northing: 2,168,482.90 ft Latitude: 36° 57' 17.388 N
 +E/-W 0.0 ft Easting: 1,339,032.67 ft Longitude: 107° 16' 53.400 W
 Position Uncertainty 0 0 ft Wellhead Elevation: ft Ground Level: 7,266.0 ft

Wellbore: OH Preliminary Design

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	8/27/2007	10.17	63.84	51,315

Design: OH Preliminary Design

Audit Notes:

Version: 1 0 Phase: ACTUAL Tie On Depth: 0.0

Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.0	0.0	0.0	83.81

Survey Program: Date 9/20/2007

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
254.0	6,160.0	Survey #1 (OH Preliminary Design)	Pathfinder	Pathfinder MWD

Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	N/S (ft)	E/W (ft)	DLeg (°/100ft)	V. Sec (ft)
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.0
254.0	0.88	268.17	254.0	-0.1	-1.9	0.35	-1.9
540.0	0.88	223.52	540.0	-1.7	-5.7	0.23	-5.8
793.0	1.14	231.12	792.9	-4.7	-9.0	0.12	-9.4
1,046.0	1.14	238.57	1,045.9	-7.6	-13.1	0.06	-13.8
1,298.0	0.88	218.36	1,297.8	-10.4	-16.4	0.17	-17.4
1,549.0	0.88	220.27	1,548.8	-13.4	-18.8	0.01	-20.2
1,795.0	0.88	203.98	1,794.8	-16.6	-20.8	0.10	-22.5
2,037.0	0.70	201.18	2,036.7	-19.7	-22.1	0.08	-24.1
2,166.0	0.70	200.80	2,165.7	-21.1	-22.7	0.00	-24.8
2,227.0	0.62	169.47	2,226.7	-21.8	-22.8	0.60	-25.0



Pathfinder Energy Services

End of Well Survey



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Survey							
MD (ft)	Inc. (°)	Azi (°)	TVD (ft)	N/S (ft)	E/W (ft)	DLeg (°/100ft)	V. Sec (ft)
2,237.0	0.75	144.70	2,236.7	-21.9	-22.7	3.18	-24.9
Interpolated PT Start of Build							
2,287.0	2.11	106.72	2,286.7	-22.4	-21.6	3.18	-23.9
2,347.0	4.84	96.36	2,346.6	-23.0	-18.1	4.65	-20.4
2,409.0	6.86	91.05	2,408.3	-23.4	-11.8	3.37	-14.2
2,470.0	9.06	89.70	2,468.7	-23.4	-3.3	3.62	-5.8
2,530.0	10.99	81.36	2,527.8	-22.6	7.1	4.02	4.6
2,591.0	12.57	80.85	2,587.5	-20.6	19.4	2.60	17.0
2,651.0	14.68	77.96	2,645.8	-18.0	33.2	3.69	31.1
2,712.0	16.36	77.60	2,704.6	-14.5	49.2	2.76	47.3
2,772.0	18.64	76.98	2,761.8	-10.6	66.8	3.81	65.3
2,834.0	21.10	75.38	2,820.1	-5.5	87.3	4.06	86.1
2,894.0	23.30	75.09	2,875.6	0.3	109.2	3.67	108.6
2,957.0	25.41	77.17	2,933.0	6.5	134.4	3.61	134.3
3,019.0	26.82	79.27	2,988.7	12.0	161.1	2.72	161.5
3,082.0	27.08	80.68	3,044.9	17.0	189.2	1.10	190.0
3,145.0	28.93	81.25	3,100.5	21.6	218.4	2.97	219.5
3,207.0	30.51	82.01	3,154.3	26.1	248.8	2.62	250.2
3,270.0	32.27	83.29	3,208.1	30.3	281.4	2.99	283.0
3,333.0	34.12	84.13	3,260.8	34.1	315.7	3.03	317.5
3,395.0	35.61	82.94	3,311.7	38.1	350.9	2.64	352.9
3,458.0	38.08	82.90	3,362.1	42.7	388.4	3.92	390.7
3,521.0	41.15	81.94	3,410.6	48.0	428.2	4.97	430.9
3,583.0	44.14	80.92	3,456.2	54.3	469.7	4.95	472.8
3,645.0	46.17	80.58	3,499.9	61.4	513.1	3.30	516.7
3,708.0	47.84	82.73	3,542.9	68.0	558.7	3.64	562.8
3,771.0	49.86	82.88	3,584.4	74.0	605.7	3.21	610.2
3,835.0	51.97	83.07	3,624.7	80.1	655.0	3.30	659.9
3,898.0	53.38	83.09	3,662.9	86.1	704.8	2.24	709.9
3,961.0	55.13	83.21	3,699.7	92.2	755.5	2.78	761.1
4,024.0	57.33	83.04	3,734.7	98.5	807.5	3.50	813.4
4,086.0	59.53	82.87	3,767.2	104.9	860.0	3.56	866.3
4,149.0	61.64	84.11	3,798.1	111.2	914.5	3.76	921.1
4,211.0	63.40	87.33	3,826.7	115.2	969.3	5.41	976.1
4,273.0	64.90	87.32	3,853.8	117.9	1,025.0	2.42	1,031.8
4,336.0	67.53	86.62	3,879.2	120.9	1,082.6	4.30	1,089.3
4,367.0	69.64	86.49	3,890.5	122.6	1,111.4	6.82	1,118.2
4,428.0	73.86	85.80	3,909.6	126.5	1,169.2	7.00	1,176.0
4,490.0	74.83	84.82	3,926.3	131.4	1,228.7	2.18	1,235.7
4,554.0	76.15	84.79	3,942.4	137.0	1,290.4	2.06	1,297.7
4,615.0	79.05	83.69	3,955.5	143.0	1,349.7	5.07	1,357.2
4,678.0	83.19	83.26	3,965.2	150.1	1,411.5	6.61	1,419.5
4,742.0	84.50	82.87	3,972.0	157.8	1,474.7	2.13	1,483.1
4,805.0	84.59	82.68	3,978.0	165.7	1,536.9	0.33	1,545.8
4,867.0	84.42	81.31	3,984.0	174.2	1,598.0	2.22	1,607.5



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Survey							
MD (ft)	Inc (°)	Azi (°)	TVD (ft)	N/S (ft)	E/W (ft)	DLeg (°/100ft)	V. Sec (ft)
4,930.0	84.59	81.44	3,990.0	183.7	1,660.0	0.34	1,670.1
4,993.0	83.80	83.44	3,996.4	191.9	1,722.1	3.40	1,732.8
5,055.0	83.45	85.27	4,003.3	198.0	1,783.4	2.99	1,794.4
5,118.0	84.15	85.25	4,010.1	203.1	1,845.9	1.11	1,857.0
5,149.0	83.45	85.58	4,013.4	205.6	1,876.6	2.49	1,887.8
5,172.0	83.76	85.02	4,016.0	207.5	1,899.4	2.77	1,910.7
Interpolated PT Top of Coal							
5,195.0	84.07	84.46	4,018.4	209.6	1,922.1	2.77	1,933.5
5,212.0	84.29	84.04	4,020.1	211.3	1,939.0	2.78	1,950.4
Interpolated PT 7" Casing Shoe							
5,234.0	84.59	83.51	4,022.3	213.6	1,960.7	2.76	1,972.3
5,266.0	88.55	82.74	4,024.2	217.5	1,992.4	12.61	2,004.3
5,296.0	89.96	84.21	4,024.6	220.9	2,022.2	6.79	2,034.3
5,327.0	90.13	84.84	4,024.5	223.8	2,053.1	2.10	2,065.3
5,357.0	90.22	85.54	4,024.5	226.3	2,083.0	2.35	2,095.2
5,388.0	91.54	85.81	4,024.0	228.7	2,113.9	4.35	2,126.2
5,420.0	91.19	87.12	4,023.2	230.7	2,145.8	4.24	2,158.2
5,450.0	90.40	87.61	4,022.8	232.0	2,175.8	3.10	2,188.1
5,479.0	89.08	87.32	4,022.9	233.3	2,204.8	4.66	2,217.1
5,510.0	88.55	85.05	4,023.6	235.4	2,235.7	7.52	2,248.0
5,541.0	87.93	81.38	4,024.5	239.0	2,266.4	12.00	2,279.0
5,572.0	87.85	79.09	4,025.7	244.3	2,297.0	7.39	2,309.9
5,602.0	87.85	81.79	4,026.8	249.3	2,326.5	8.99	2,339.8
5,634.0	86.97	84.44	4,028.2	253.1	2,358.3	8.72	2,371.8
5,664.0	86.61	87.19	4,029.9	255.3	2,388.1	9.23	2,401.7
5,695.0	86.61	89.39	4,031.7	256.2	2,419.1	7.08	2,432.6
5,726.0	88.46	91.88	4,033.1	255.9	2,450.0	10.00	2,463.3
5,757.0	89.60	95.47	4,033.6	253.9	2,481.0	12.15	2,493.9
5,789.0	89.16	98.40	4,034.0	250.0	2,512.7	9.26	2,525.0
5,821.0	90.48	101.25	4,034.1	244.6	2,544.2	9.81	2,555.8
5,853.0	90.84	105.17	4,033.7	237.2	2,575.4	12.30	2,585.9
5,885.0	88.46	107.38	4,033.9	228.3	2,606.1	10.15	2,615.5
5,917.0	88.02	111.26	4,034.9	217.7	2,636.3	12.20	2,644.4
5,947.0	88.46	114.10	4,035.8	206.1	2,663.9	9.58	2,670.6
5,979.0	85.65	116.44	4,037.4	192.5	2,692.8	11.42	2,697.9
6,010.0	86.35	118.82	4,039.6	178.2	2,720.2	7.98	2,723.6
6,041.0	88.11	121.64	4,041.1	162.6	2,747.0	10.71	2,748.5
6,073.0	86.17	125.46	4,042.7	144.9	2,773.6	13.37	2,773.1
6,084.0	85.21	126.78	4,043.5	138.4	2,782.5	14.81	2,781.2
6,118.0	85.21	126.78	4,046.4	118.2	2,809.6	0.00	2,806.0
6,160.0	85.21	126.78	4,049.9	93.1	2,843.1	0.00	2,836.6



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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
TD Lateral - survey misses by 219 6ft at 6073.5ft MD (4042 7 TVD, 144.6 N, 2774.0 E) - Point	0 00	0 00	3,992 0	314.9	2,903 0	2,168,766.36	1,341,938 91	36° 57' 20.500 N	107° 16' 17 634 W
7" Intermediate Csg - survey misses by 7 5ft at 5002 5ft MD (3997.4 TVD, 193 0 N, 1731.5 E) - Point	0.00	0 00	3,992.0	187.9	1,732.6	2,168,652.03	1,340,767 20	36° 57' 19 245 N	107° 16' 32 054 W
Build Curve - survey misses by 3 3ft at 4640.8ft MD (3960 0 TVD, 145.8 N, 1374 9 E) - Point	0 00	0 00	3,960.0	149 1	1,374 5	2,168,617 11	1,340,408 70	36° 57' 18 862 N	107° 16' 36.466 W
KOP - survey misses by 31 3ft at 2280 5ft MD (2280 2 TVD, -22 4 N, -21 9 E) - Point	0 00	0 00	2,280 0	0 0	0 0	2,168,482.90	1,339,032 67	36° 57' 17.388 N	107° 16' 53 400 W
Land Curve - survey misses by 5 3ft at 4971.7ft MD (3994.1 TVD, 189 4 N, 1701.2 E) - Point	0 00	0 00	3,992.0	184 6	1,702 0	2,168,649 07	1,340,736.57	36° 57' 19.213 N	107° 16' 32 431 W

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	+E/-W (ft)	Comment
2,237 0	2,236.7	-21.9	-22.7	Interpolated PT Start of Build
5,172 0	4,016 0	207.5	1,899.4	Interpolated PT Top of Coal
5,212 0	4,020 1	211 3	1,939 0	Interpolated PT 7" Casing Shoe
6,160 0	4,049 9	118 2	2,809.6	BHL OH

Checked By: _____ Approved By: _____ Date: _____