



Energen Resources

SJ BR-S7,T30N,R4W

La Fragua Canyon

Carson #201S

OH

Survey: Sidetrack

30-039-30239

End of Well Survey

20 October, 2007

VLK surface: 1435/S 835/W
Lateral origin: 1590/S 1482/W md hcn TOL 3795
BHL 1775/S 749/E 5760 3441

RCVD OCT 20 2007

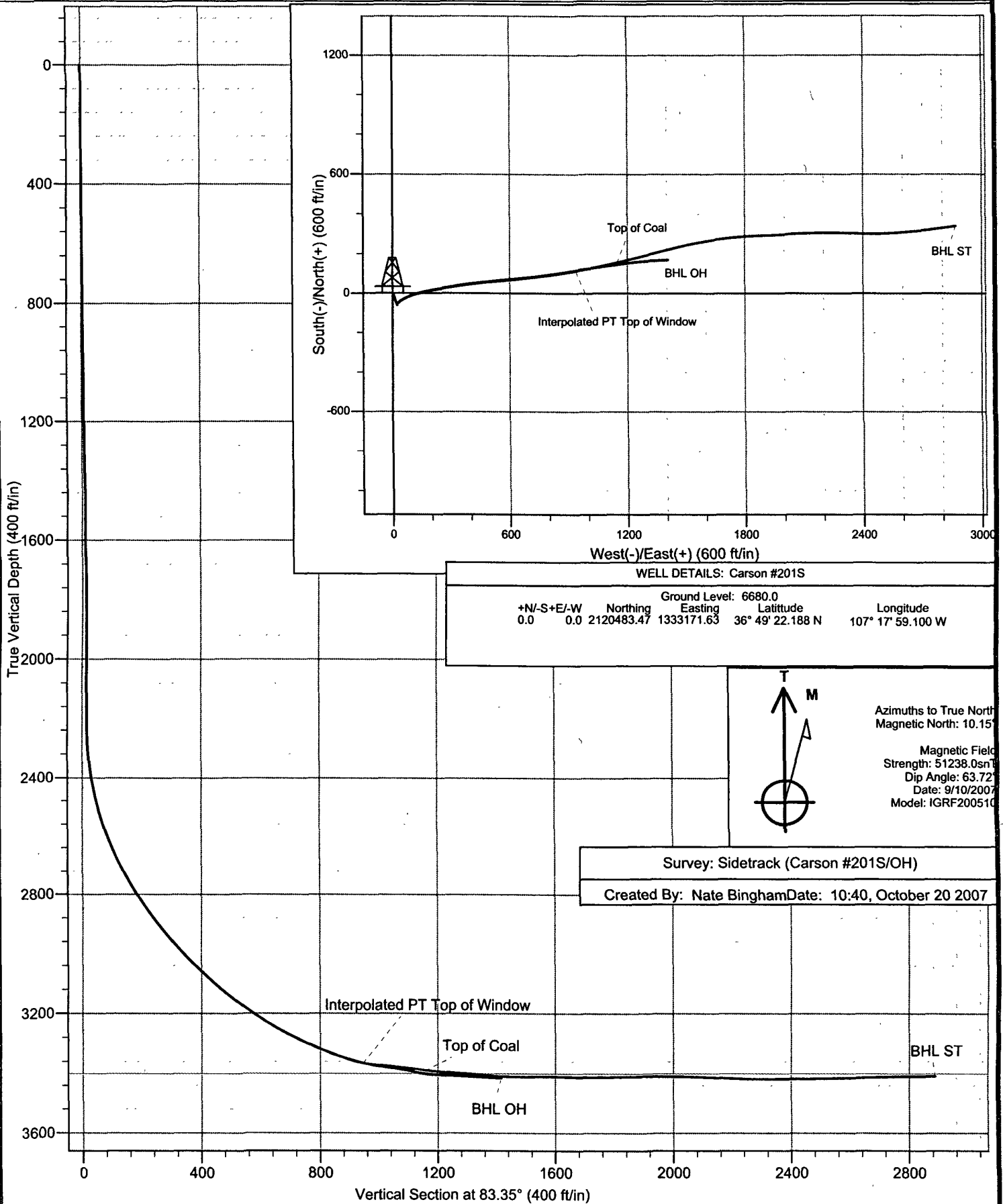
OIL CONS. DIV.

DIST. 3

PATHFINDER
ENERGY SERVICES

88

Survey: Sidetrack (Carson #201S/OH)





Pathfinder Energy Services
End of Well Survey



Company: Energen Resources
Project: SJ BR-S7,T30N,R4W
Site: La Fragua Canyon
Well: Carson #201S
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well Carson #201S
TVD Reference: WELL @ 6693.0ft (AWS #222)
MD Reference: WELL @ 6693.0ft (AWS #222)
North Reference: True
Survey Calculation Method: Minimum Curvature
Database: EDM 2003.16 Single User Db

Project: SJ BR-S7,T30N,R4W

Map System: US State Plane 1983
Geo Datum: North American Datum 1983
Map Zone: New Mexico Central Zone

System Datum: Mean Sea Level

Site: La Fragua Canyon

Site Position: Northing: 2,120,483.47 ft Latitude: 36° 49' 22.188 N
From: Lat/Long Easting: 1,333,171.63 ft Longitude: 107° 17' 59.100 W
Position Uncertainty: 0.0 ft Slot Radius: Grid Convergence: -0.63

Well: Carson #201S

Well Position: +N/-S 0.0 ft Northing: 2,120,483.47 ft Latitude: 36° 49' 22.188 N
+E/-W 0.0 ft Easting: 1,333,171.63 ft Longitude: 107° 17' 59.100 W
Position Uncertainty 0.0 ft Wellhead Elevation: 6,680.0 ft Ground Level: 6,680.0 ft

Wellbore: OH

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	9/10/2007	10.15	63.72	51,238

Design: OH

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	83.35

Survey Program Date: 10/20/2007

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
298.0	3,516.0	Gyro Surveys (OH)	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
298.0	1.06	152.62	298.0	-2.4	1.3	0.36	1.0
550.0	1.76	149.19	549.9	-7.8	4.3	0.28	3.4
805.0	1.67	155.29	804.8	-14.6	7.9	0.08	6.1
1,057.0	2.11	163.39	1,056.7	-22.4	10.7	0.20	8.1
1,311.0	2.29	161.45	1,310.5	-31.7	13.7	0.08	9.9
1,560.0	2.73	160.23	1,559.2	-41.9	17.3	0.18	12.3
1,807.0	2.46	161.24	1,806.0	-52.5	21.0	0.11	14.8
1,901.0	2.29	159.13	1,899.9	-56.2	22.3	0.20	15.6
1,930.0	2.11	156.77	1,928.9	-57.2	22.7	0.69	15.9
1,961.0	1.67	162.78	1,959.9	-58.2	23.1	1.55	16.2
1,992.0	1.32	157.25	1,990.8	-58.9	23.3	1.22	16.4

Company:	Energen Resources	Local Co-ordinate Reference:	Well Carson #201S
Project:	SJ BR-S7,T30N,R4W	TVD Reference:	WELL @ 6693.0ft (AWS #222)
Site:	La Fragua Canyon	MD Reference:	WELL @ 6693.0ft (AWS #222)
Well:	Carson #201S	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	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)
2,022.0	1.32	172.12	2,020.8	-59.6	23.5	1.14	16.5
2,053.0	0.97	165.94	2,051.8	-60.2	23.6	1.20	16.5
2,084.0	0.97	162.28	2,082.8	-60.7	23.8	0.20	16.6
2,114.0	0.53	139.86	2,112.8	-61.0	23.9	1.74	16.7
2,145.0	0.35	352.47	2,143.8	-61.1	24.0	2.73	16.8
2,175.0	1.32	345.48	2,173.8	-60.6	23.9	3.25	16.7
2,206.0	2.02	355.33	2,204.8	-59.7	23.8	2.43	16.7
2,237.0	2.81	10.58	2,235.8	-58.4	23.9	3.26	17.0
2,267.0	4.22	26.09	2,265.7	-56.7	24.5	5.63	17.8
2,298.0	5.28	43.17	2,296.6	-54.7	26.0	5.67	19.5
2,329.0	6.86	44.55	2,327.4	-52.3	28.3	5.12	22.0
2,359.0	8.35	46.54	2,357.2	-49.5	31.1	5.04	25.2
2,389.0	10.02	50.41	2,386.8	-46.4	34.7	5.93	29.1
2,419.0	11.52	54.39	2,416.3	-43.0	39.1	5.58	33.9
2,450.0	13.01	57.56	2,446.6	-39.3	44.6	5.27	39.8
2,480.0	14.33	60.48	2,475.7	-35.6	50.7	4.96	46.2
2,511.0	16.27	60.71	2,505.6	-31.6	57.8	6.26	53.8
2,542.0	17.59	62.88	2,535.3	-27.4	65.8	4.72	62.2
2,573.0	19.43	63.77	2,564.7	-23.0	74.6	6.00	71.4
2,604.0	21.19	66.38	2,593.7	-18.4	84.3	6.38	81.6
2,634.0	22.42	68.60	2,621.6	-14.2	94.6	4.94	92.3
2,665.0	23.48	71.81	2,650.1	-10.1	106.0	5.29	104.1
2,695.0	25.15	73.24	2,677.5	-6.4	117.8	5.90	116.2
2,726.0	26.91	74.95	2,705.3	-2.7	130.9	6.17	129.7
2,756.0	28.84	75.91	2,731.8	0.9	144.4	6.60	143.6
2,788.0	30.42	77.37	2,759.7	4.5	159.8	5.43	159.3
2,819.0	31.83	78.74	2,786.2	7.8	175.5	5.09	175.2
2,849.0	33.59	79.10	2,811.4	10.9	191.4	5.90	191.4
2,881.0	34.91	79.36	2,837.9	14.3	209.1	4.15	209.3
2,913.0	36.05	80.02	2,863.9	17.6	227.4	3.76	227.9
2,944.0	37.55	80.49	2,888.8	20.8	245.7	4.92	246.4
2,976.0	38.51	80.75	2,914.0	24.0	265.1	3.04	266.1
3,009.0	40.19	80.17	2,939.5	27.4	285.8	5.21	287.0
3,040.0	41.33	79.68	2,963.0	31.0	305.7	3.82	307.2
3,072.0	42.82	79.80	2,986.7	34.8	326.8	4.66	328.6
3,104.0	44.23	80.74	3,009.9	38.5	348.5	4.85	350.6
3,135.0	45.29	81.64	3,031.9	41.9	370.1	3.98	372.4
3,168.0	45.99	82.35	3,055.0	45.2	393.4	2.62	396.0
3,199.0	47.40	83.00	3,076.3	48.0	415.8	4.80	418.6
3,231.0	48.63	83.94	3,097.7	50.7	439.4	4.42	442.4
3,264.0	49.86	84.52	3,119.2	53.2	464.3	3.96	467.4
3,295.0	51.35	84.67	3,138.9	55.5	488.2	4.82	491.3
3,327.0	53.11	84.79	3,158.5	57.8	513.3	5.51	516.6
3,359.0	54.34	84.36	3,177.4	60.3	539.0	3.99	542.4

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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)
3,389.0	55.75	84.04	3,194.6	62.8	563.5	4.78	567.0
3,421.0	56.72	83.82	3,212.4	65.6	589.9	3.08	593.6
3,453.0	59.27	83.41	3,229.4	68.6	616.9	8.04	620.7
3,485.0	60.50	83.49	3,245.4	71.7	644.4	3.85	648.4
3,516.0	61.82	83.78	3,260.4	74.8	671.4	4.34	675.5
3,548.0	62.96	83.75	3,275.2	77.8	699.6	3.56	703.9
3,579.0	64.19	83.29	3,289.0	81.0	727.2	4.18	731.7
3,612.0	65.60	82.96	3,303.0	84.5	756.8	4.37	761.5
3,643.0	66.74	82.23	3,315.5	88.2	785.0	4.26	789.9
3,674.0	68.59	81.43	3,327.3	92.3	813.3	6.43	818.5
3,707.0	70.26	81.02	3,338.9	97.0	843.9	5.19	849.4
3,738.0	72.19	80.63	3,348.9	101.7	872.8	6.34	878.7
3,770.0	74.39	80.03	3,358.1	106.8	903.1	7.11	909.3
3,802.0	77.12	80.46	3,365.9	112.1	933.6	8.63	940.3
3,806.0	77.46	80.56	3,366.8	112.7	937.5	8.84	944.2
Interpolated PT Top of Window							
3,837.0	82.57	79.85	3,372.2	117.9	967.5	16.64	974.7
3,868.0	83.98	79.32	3,375.8	123.5	997.8	4.85	1,005.4
3,898.0	84.24	78.81	3,378.9	129.1	1,027.1	1.90	1,035.2
3,928.0	84.42	78.30	3,381.9	135.1	1,056.4	1.79	1,064.9
3,959.0	84.42	77.78	3,384.9	141.4	1,086.6	1.67	1,095.6
3,989.0	84.06	77.27	3,387.9	147.9	1,115.7	2.07	1,125.3
4,019.0	83.10	76.77	3,391.2	154.6	1,144.8	3.60	1,155.0
4,021.0	83.15	76.74	3,391.5	155.0	1,146.7	3.04	1,156.9
Top of Coal							
4,050.0	83.89	76.25	3,394.8	161.8	1,174.7	3.04	1,185.5
4,080.0	84.68	76.09	3,397.7	168.9	1,203.7	2.69	1,215.2
4,111.0	85.65	75.92	3,400.4	176.4	1,233.7	3.18	1,245.8
4,141.0	86.88	75.76	3,402.3	183.7	1,262.7	4.13	1,275.5
4,171.0	86.79	76.00	3,404.0	191.0	1,291.7	0.85	1,305.2
4,202.0	85.47	75.94	3,406.1	198.5	1,321.7	4.26	1,335.8
4,232.0	84.86	75.50	3,408.6	205.9	1,350.7	2.50	1,365.5
4,262.0	86.00	74.79	3,411.0	213.6	1,379.6	4.47	1,395.1
4,293.0	88.37	75.28	3,412.5	221.5	1,409.5	7.81	1,425.7
4,323.0	88.81	76.16	3,413.2	228.9	1,438.6	3.28	1,455.4
4,353.0	90.13	77.15	3,413.5	235.9	1,467.8	5.50	1,485.2
4,384.0	90.75	77.98	3,413.3	242.5	1,498.1	3.34	1,516.1
4,414.0	90.57	78.78	3,412.9	248.6	1,527.4	2.73	1,545.9
4,444.0	90.22	79.23	3,412.7	254.3	1,556.9	1.90	1,575.9
4,476.0	89.16	80.08	3,412.9	260.1	1,588.4	4.25	1,607.8
4,508.0	88.46	80.37	3,413.6	265.5	1,619.9	2.37	1,639.7
4,539.0	88.37	81.53	3,414.4	270.4	1,650.5	3.75	1,670.7
4,571.0	89.60	82.62	3,415.0	274.8	1,682.2	5.14	1,702.7
4,603.0	90.48	83.05	3,415.0	278.8	1,713.9	3.06	1,734.7
4,634.0	91.10	83.84	3,414.5	282.3	1,744.7	3.24	1,765.7



Pathfinder Energy Services
End of Well Survey



Company: Energen Resources
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Site: La Fragua Canyon
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Wellbore: OH
Design: OH

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North Reference: True
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Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	N/S (ft)	E/W (ft)	DLeg (°/100ft)	V. Sec (ft)
4,666.0	91.54	85.31	3,413.8	285.3	1,776.6	4.79	1,797.7
4,697.0	91.19	87.31	3,413.1	287.3	1,807.5	6.55	1,828.6
4,729.0	91.19	86.90	3,412.4	288.9	1,839.4	1.28	1,860.5
4,761.0	91.01	86.99	3,411.8	290.6	1,871.4	0.63	1,892.5
4,792.0	90.04	87.54	3,411.5	292.1	1,902.4	3.60	1,923.4
4,824.0	89.34	87.32	3,411.7	293.6	1,934.3	2.29	1,955.3
4,856.0	89.16	86.76	3,412.1	295.2	1,966.3	1.84	1,987.2
4,888.0	89.16	86.11	3,412.6	297.2	1,998.2	2.03	2,019.2
4,920.0	88.72	85.52	3,413.2	299.5	2,030.1	2.30	2,051.2
4,952.0	88.29	86.63	3,414.0	301.7	2,062.0	3.72	2,083.1
4,984.0	87.67	88.23	3,415.1	303.2	2,094.0	5.36	2,115.0
5,015.0	87.67	88.40	3,416.4	304.1	2,124.9	0.55	2,145.9
5,047.0	87.41	88.33	3,417.8	305.0	2,156.9	0.84	2,177.7
5,079.0	87.93	88.36	3,419.1	305.9	2,188.9	1.63	2,209.6
5,111.0	88.72	89.08	3,420.0	306.6	2,220.8	3.34	2,241.4
5,143.0	89.16	90.53	3,420.6	306.7	2,252.8	4.73	2,273.2
5,175.0	89.87	91.58	3,420.9	306.1	2,284.8	3.96	2,304.9
5,206.0	90.84	92.64	3,420.7	305.0	2,315.8	4.63	2,335.5
5,238.0	90.40	93.42	3,420.3	303.3	2,347.8	2.80	2,367.1
5,269.0	90.31	92.53	3,420.1	301.7	2,378.7	2.89	2,397.6
5,301.0	90.31	90.80	3,419.9	300.8	2,410.7	5.41	2,429.3
5,333.0	90.75	89.96	3,419.7	300.6	2,442.7	2.96	2,461.1
5,365.0	90.84	88.96	3,419.2	300.9	2,474.7	3.14	2,492.9
5,397.0	91.10	87.52	3,418.7	301.8	2,506.7	4.57	2,524.8
5,429.0	91.63	86.34	3,417.9	303.5	2,538.6	4.04	2,556.7
5,460.0	91.54	86.14	3,417.0	305.6	2,569.5	0.71	2,587.6
5,492.0	91.54	84.99	3,416.2	308.1	2,601.4	3.59	2,619.6
5,524.0	91.71	84.19	3,415.3	311.1	2,633.3	2.55	2,651.6
5,555.0	91.71	84.67	3,414.4	314.1	2,664.1	1.55	2,682.6
5,587.0	91.63	84.14	3,413.4	317.2	2,695.9	1.67	2,714.5
5,619.0	91.36	83.54	3,412.6	320.6	2,727.8	2.06	2,746.5
5,651.0	90.92	82.36	3,411.9	324.6	2,759.5	3.93	2,778.5
5,682.0	90.40	81.82	3,411.6	328.8	2,790.2	2.42	2,809.5
5,760.0	90.40	81.82	3,411.0	339.9	2,867.4	0.00	2,887.5

BHL ST



Pathfinder Energy Services
End of Well Survey



Company:	Energen Resources	Local Co-ordinate Reference:	Well Carson #201S
Project:	SJ BR-S7,T30N,R4W	TVD Reference:	WELL @ 6693.0ft (AWS #222)
Site:	La Fragua Canyon	MD Reference:	WELL @ 6693.0ft (AWS #222)
Well:	Carson #201S	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 2003.16 Single User Db

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
Land Curve		0.00	0.00	3,406.0	151.1	1,207.2	2,120,621.30	1,334,380.42	36° 49' 23.682 N	107° 17' 44.253 W
- survey misses by 19.9ft at 4080.0ft MD (3397.7 TVD, 168.9 N, 1203.7 E)										
- Point										
TD Lateral		0.00	0.00	3,406.0	334.7	2,869.7	2,120,786.64	1,336,044.83	36° 49' 25.496 N	107° 17' 23.806 W
- survey misses by 7.6ft at 5760.0ft MD (3411.0 TVD, 339.9 N, 2867.4 E)										
- Point										
Drill Window		0.00	0.00	3,401.0	0.0	0.0	2,120,483.47	1,333,171.63	36° 49' 22.188 N	107° 17' 59.100 W
- survey misses by 524.3ft at 3135.0ft MD (3031.9 TVD, 41.9 N, 370.1 E)										
- Rectangle (sides W1,317.0 H1,971.0 D0.0)										
Tie in to Actual		0.00	0.00	2,809.9	12.8	189.6	2,120,494.19	1,333,361.36	36° 49' 22.315 N	107° 17' 56.768 W
- survey misses by 2.2ft at 2846.9ft MD (2809.7 TVD, 10.7 N, 190.3 E)										
- Point										

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
4,153.6	3,403.0	Coal Top		0.00	

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
3,806.0	3,366.8	112.7	937.5	Interpolated PT Top of Window
4,021.0	3,391.5	155.0	1,146.7	Top of Coal
5,760.0	3,411.0	339.9	2,867.4	BHL ST

Checked By: _____ Approved By: _____ Date: _____