

# **Sandridge Energy**

**Harper County (KS27S)**

**Sec 14-T35S-R6W**

**Cynthia 1-14H**

**Wellbore #1**

**Survey: MWD Surveys**

## **Standard Survey Report**

**29 November, 2011**

# Wolverine Directional, LLC

## Survey Report

Company: Sandridge Energy	Local Co-ordinate Reference: Well Cynthia 1-14H
Project: Harper County (KS27S)	TVD Reference: WELL @ 0.0ft (Original Well Elev)
Site: Sec 14-T35S-R6W	MD Reference: WELL @ 0.0ft (Original Well Elev)
Well: Cynthia 1-14H	North Reference: Grid
Wellbore: Wellbore #1	Survey Calculation Method: Minimum Curvature
Design: Wellbore #1	Database: EDM 2003.21 Single User Db

Design	Wellbore #1				
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	359.16	

Survey Program	Date 2011/11/29			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
250.0	9,308.0	MWD Surveys (Wellbore #1)	MWD	MWD - Standard

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
250.0	0.40	233.50	250.0	-0.5	-0.7	-0.5	0.16	0.16	0.00
<b>First Rig Survey</b>									
503.0	0.70	233.50	503.0	-2.0	-2.7	-1.9	0.12	0.12	0.00
713.0	0.30	233.50	713.0	-3.1	-4.1	-3.0	0.19	-0.19	0.00
<b>Last Rig Survey</b>									
812.0	0.30	233.50	812.0	-3.4	-4.5	-3.3	0.00	0.00	0.00
<b>First MWD Survey</b>									
1,059.0	1.00	217.20	1,059.0	-5.5	-6.4	-5.4	0.29	0.28	-6.60
1,343.0	0.90	211.70	1,342.9	-9.3	-9.0	-9.2	0.05	-0.04	-1.94
1,816.0	0.40	273.50	1,815.9	-12.4	-12.6	-12.2	0.17	-0.11	13.07
2,289.0	0.60	120.90	2,288.9	-13.6	-12.2	-13.4	0.21	0.04	-32.26
2,761.0	1.00	100.00	2,760.8	-15.6	-6.0	-15.5	0.10	0.08	-4.43
3,232.0	2.80	100.70	3,231.6	-18.4	9.4	-18.5	0.38	0.38	0.15
3,706.0	1.10	61.90	3,705.3	-18.4	24.8	-18.8	0.43	-0.36	-8.19
3,758.0	1.30	59.10	3,757.3	-17.9	25.7	-18.2	0.40	0.38	-5.38
3,801.0	1.50	46.50	3,800.3	-17.2	26.5	-17.6	0.85	0.47	-29.30
3,833.0	2.60	3.00	3,832.2	-16.2	26.9	-16.6	5.72	3.44	-135.94
3,864.0	5.30	350.70	3,863.2	-14.1	26.7	-14.5	9.08	8.71	-39.68
3,896.0	6.70	352.30	3,895.0	-10.8	26.2	-11.2	4.41	4.38	5.00
3,928.0	8.70	355.20	3,926.7	-6.5	25.7	-6.9	6.36	6.25	9.06
3,959.0	10.60	353.00	3,957.3	-1.4	25.2	-1.7	6.24	6.13	-7.10
3,991.0	12.00	353.50	3,988.6	4.9	24.5	4.5	4.39	4.38	1.56
4,023.0	13.80	352.90	4,019.8	12.0	23.6	11.6	5.64	5.63	-1.88
4,054.0	15.20	352.60	4,049.8	19.7	22.6	19.3	4.52	4.52	-0.97
4,086.0	15.30	355.50	4,080.7	28.0	21.8	27.7	2.40	0.31	9.06
4,118.0	16.00	356.40	4,111.5	36.6	21.2	36.3	2.32	2.19	2.81
4,149.0	19.10	355.60	4,141.1	46.0	20.5	45.7	10.03	10.00	-2.58
4,181.0	22.20	355.90	4,171.0	57.2	19.7	56.9	9.69	9.69	0.94
4,213.0	24.10	355.10	4,200.4	69.8	18.7	69.5	6.02	5.94	-2.50
4,244.0	25.30	355.40	4,228.6	82.7	17.6	82.4	3.89	3.87	0.97
4,276.0	26.60	356.10	4,257.4	96.6	16.6	96.4	4.17	4.06	2.19
4,308.0	29.60	355.50	4,285.6	111.7	15.5	111.4	9.42	9.38	-1.88
4,339.0	31.70	355.10	4,312.3	127.4	14.2	127.2	6.81	6.77	-1.29
4,371.0	32.20	354.00	4,339.4	144.3	12.5	144.1	2.40	1.56	-3.44
4,403.0	33.50	353.00	4,366.3	161.5	10.6	161.3	4.40	4.06	-3.13
4,434.0	35.50	352.70	4,391.9	178.9	8.4	178.8	6.47	6.45	-0.97
4,466.0	38.20	354.40	4,417.5	198.0	6.2	197.9	9.02	8.44	5.31

# Wolverine Directional, LLC

## Survey Report

<b>Company:</b> Sandridge Energy	<b>Local Co-ordinate Reference:</b> Well Cynthia 1-14H
<b>Project:</b> Harper County (KS27S)	<b>TVD Reference:</b> WELL @ 0.0ft (Original Well Elev)
<b>Site:</b> Sec 14-T35S-R6W	<b>MD Reference:</b> WELL @ 0.0ft (Original Well Elev)
<b>Well:</b> Cynthia 1-14H	<b>North Reference:</b> Grid
<b>Wellbore:</b> Wellbore #1	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> Wellbore #1	<b>Database:</b> EDM 2003.21 Single User Db

### Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
4,498.0	41.50	355.70	4,442.0	218.4	4.5	218.3	10.64	10.31	4.06
4,529.0	43.10	356.60	4,465.0	239.2	3.1	239.2	5.52	5.16	2.90
4,561.0	45.50	357.20	4,487.9	261.5	1.9	261.5	7.61	7.50	1.88
4,592.0	48.40	358.00	4,509.0	284.2	0.9	284.1	9.54	9.35	2.58
4,624.0	50.80	357.60	4,529.8	308.5	0.0	308.5	7.56	7.50	-1.25
4,656.0	51.30	357.60	4,549.9	333.4	-1.0	333.4	1.56	1.56	0.00
4,687.0	50.50	356.70	4,569.4	357.4	-2.2	357.4	3.43	-2.58	-2.90
4,719.0	49.50	356.50	4,590.0	381.9	-3.7	381.9	3.16	-3.13	-0.63
4,751.0	50.00	356.60	4,610.7	406.3	-5.2	406.3	1.58	1.56	0.31
4,781.0	51.30	357.10	4,629.7	429.4	-6.4	429.5	4.52	4.33	1.67
4,813.0	50.70	357.20	4,649.8	454.3	-7.7	454.3	1.89	-1.88	0.31
4,844.0	52.50	357.20	4,669.1	478.5	-8.9	478.6	5.81	5.81	0.00
4,876.0	55.50	358.50	4,687.9	504.4	-9.8	504.5	9.93	9.38	4.06
4,908.0	58.90	359.00	4,705.2	531.3	-10.4	531.4	10.71	10.63	1.56
4,939.0	61.50	359.90	4,720.6	558.2	-10.7	558.3	8.76	8.39	2.90
4,971.0	64.90	359.50	4,735.0	586.7	-10.8	586.8	10.68	10.63	-1.25
5,002.0	67.90	359.90	4,747.5	615.1	-11.0	615.2	9.75	9.68	1.29
5,034.0	70.20	359.90	4,758.9	645.0	-11.0	645.1	7.19	7.19	0.00
5,065.0	73.80	359.50	4,768.5	674.5	-11.2	674.6	11.68	11.61	-1.29
5,097.0	76.50	358.70	4,776.7	705.4	-11.7	705.5	8.78	8.44	-2.50
5,129.0	78.90	357.80	4,783.5	736.7	-12.6	736.8	7.99	7.50	-2.81
5,160.0	82.70	357.40	4,788.4	767.2	-13.9	767.4	12.32	12.26	-1.29
5,196.0	85.50	357.20	4,792.2	803.0	-15.6	803.2	7.80	7.78	-0.56
5,231.0	89.30	357.60	4,793.7	837.9	-17.2	838.1	10.92	10.86	1.14
5,263.0	89.40	357.20	4,794.1	869.9	-18.6	870.1	1.29	0.31	-1.25
5,294.0	89.00	357.90	4,794.5	900.9	-19.9	901.1	2.60	-1.29	2.26
5,326.0	89.60	358.40	4,794.9	932.8	-21.0	933.1	2.44	1.88	1.56
5,358.0	90.70	359.10	4,794.8	964.8	-21.7	965.1	4.07	3.44	2.19
5,390.0	90.90	359.00	4,794.4	996.8	-22.2	997.1	0.70	0.63	-0.31
5,421.0	90.60	359.00	4,794.0	1,027.8	-22.7	1,028.0	0.97	-0.97	0.00
5,484.0	91.30	358.40	4,792.9	1,090.8	-24.2	1,091.0	1.46	1.11	-0.95
5,516.0	91.10	358.70	4,792.3	1,122.8	-25.0	1,123.0	1.13	-0.63	0.94
5,610.0	91.40	358.50	4,790.2	1,216.7	-27.3	1,217.0	0.38	0.32	-0.21
5,705.0	91.60	359.30	4,787.7	1,311.7	-29.1	1,312.0	0.87	0.21	0.84
5,800.0	91.90	359.40	4,784.8	1,406.6	-30.2	1,406.9	0.33	0.32	0.11
5,894.0	90.20	358.80	4,783.1	1,500.6	-31.7	1,500.9	1.92	-1.81	-0.64
5,989.0	90.90	358.30	4,782.2	1,595.6	-34.1	1,595.9	0.91	0.74	-0.53
6,085.0	89.90	359.60	4,781.5	1,691.5	-35.8	1,691.9	1.71	-1.04	1.35
6,180.0	90.50	359.30	4,781.2	1,786.5	-36.7	1,786.9	0.71	0.63	-0.32
6,275.0	90.50	0.40	4,780.4	1,881.5	-37.0	1,881.9	1.16	0.00	1.16
6,370.0	88.90	1.10	4,780.9	1,976.5	-35.7	1,976.8	1.84	-1.68	0.74
6,465.0	89.50	0.60	4,782.2	2,071.5	-34.3	2,071.8	0.82	0.63	-0.53
6,560.0	90.20	0.60	4,782.4	2,166.5	-33.3	2,166.7	0.74	0.74	0.00
6,655.0	91.60	1.30	4,780.9	2,261.5	-31.8	2,261.7	1.65	1.47	0.74
6,750.0	90.90	1.50	4,778.9	2,356.4	-29.4	2,356.6	0.77	-0.74	0.21
6,845.0	90.60	1.30	4,777.6	2,451.4	-27.1	2,451.5	0.38	-0.32	-0.21
6,940.0	91.80	0.60	4,775.6	2,546.3	-25.5	2,546.4	1.46	1.26	-0.74
7,035.0	90.80	359.80	4,773.5	2,641.3	-25.2	2,641.4	1.35	-1.05	-0.84
7,130.0	90.70	359.90	4,772.2	2,736.3	-25.5	2,736.4	0.15	-0.11	0.11
7,226.0	89.80	359.70	4,771.8	2,832.3	-25.8	2,832.4	0.96	-0.94	-0.21
7,321.0	89.80	358.40	4,772.2	2,927.3	-27.4	2,927.4	1.37	0.00	-1.37
7,416.0	91.20	358.10	4,771.3	3,022.2	-30.3	3,022.4	1.51	1.47	-0.32
7,511.0	91.60	357.10	4,769.0	3,117.1	-34.2	3,117.3	1.13	0.42	-1.05
7,606.0	90.70	357.80	4,767.1	3,212.0	-38.5	3,212.2	1.20	-0.95	0.74



# Wolverine Directional, LLC

## Survey Report

**Company:** Sandridge Energy  
**Project:** Harper County (KS27S)  
**Site:** Sec 14-T35S-R6W  
**Well:** Cynthia 1-14H  
**Wellbore:** Wellbore #1  
**Design:** Wellbore #1

**Local Co-ordinate Reference:** Well Cynthia 1-14H  
**TVD Reference:** WELL @ 0.0ft (Original Well Elev)  
**MD Reference:** WELL @ 0.0ft (Original Well Elev)  
**North Reference:** Grid  
**Survey Calculation Method:** Minimum Curvature  
**Database:** EDM 2003.21 Single User Db

### Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
7,701.0	90.50	359.10	4,766.1	3,307.0	-41.0	3,307.2	1.38	-0.21	1.37
7,796.0	91.50	358.90	4,764.4	3,401.9	-42.7	3,402.2	1.07	1.05	-0.21
7,891.0	90.70	358.30	4,762.6	3,496.9	-45.0	3,497.2	1.05	-0.84	-0.63
7,986.0	90.30	357.60	4,761.8	3,591.8	-48.4	3,592.1	0.85	-0.42	-0.74
8,081.0	90.80	357.70	4,760.9	3,686.7	-52.3	3,687.1	0.54	0.53	0.11
8,176.0	90.80	357.40	4,759.6	3,781.6	-56.4	3,782.1	0.32	0.00	-0.32
8,272.0	89.60	359.90	4,759.2	3,877.6	-58.6	3,878.0	2.89	-1.25	2.60
8,367.0	90.20	359.50	4,759.4	3,972.6	-59.1	3,973.0	0.76	0.63	-0.42
8,461.0	90.20	0.20	4,759.1	4,066.6	-59.4	4,067.0	0.74	0.00	0.74
8,556.0	90.90	359.90	4,758.1	4,161.6	-59.3	4,162.0	0.80	0.74	-0.32
8,651.0	90.40	0.40	4,757.1	4,256.6	-59.0	4,257.0	0.74	-0.53	0.53
8,745.0	90.10	359.90	4,756.7	4,350.6	-58.8	4,351.0	0.62	-0.32	-0.53
8,840.0	90.10	359.90	4,756.5	4,445.6	-59.0	4,446.0	0.00	0.00	0.00
8,935.0	90.30	359.60	4,756.2	4,540.6	-59.4	4,541.0	0.38	0.21	-0.32
9,030.0	90.50	359.90	4,755.5	4,635.6	-59.8	4,636.0	0.38	0.21	0.32
9,125.0	89.50	1.00	4,755.5	4,730.6	-59.0	4,730.9	1.56	-1.05	1.16
9,220.0	90.50	0.50	4,755.5	4,825.6	-57.8	4,825.9	1.18	1.05	-0.53
9,264.0	90.40	0.80	4,755.2	4,869.6	-57.3	4,869.9	0.72	-0.23	0.68
<b>Last MWD Survey</b>									
9,308.0	90.40	0.80	4,754.8	4,913.6	-56.7	4,913.9	0.00	0.00	0.00
<b>Proj to TD - Cynthia 1-14H PBHL</b>									

### Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
250.0	250.0	-0.5	-0.7	First Rig Survey
713.0	713.0	-3.1	-4.1	Last Rig Survey
812.0	812.0	-3.4	-4.5	First MWD Survey
9,264.0	4,755.2	4,869.6	-57.3	Last MWD Survey
9,308.0	4,754.8	4,913.6	-56.7	Proj to TD

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_