



Shell

Reno County, Kansas (NAD27)

Reffner 2308

4-1HN

Wellbore #1

Survey: MS MWD

Standard Survey Report

01 April, 2013



Company:	Shell	Local Co-ordinate Reference:	Well 4-1HN
Project:	Reno County, Kansas (NAD27)	TVD Reference:	WELL @ 1681.90usft (Patterson 264)
Site:	Reffner 2308	MD Reference:	WELL @ 1681.90usft (Patterson 264)
Well:	4-1HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	Well Planning Conroe

Project	Reno County, Kansas (NAD27)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	Kansas South 1502		

Well	4-1HN				
Well Position	+N/-S	0.00 usft	Northing:	516,692.65 usft	Latitude: 38° 5' 7.2285 N
	+E/-W	0.00 usft	Easting:	2,083,651.69 usft	Longitude: 98° 12' 33.696 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level: 1,659.00 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	WMM_2010	03/10/13	4.62	66.01	52,296

Design	Surveys				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	344.44	

Survey Program	Date	04/01/13			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
146.00	8,722.00	MS MWD (Wellbore #1)	MWD	MWD - Standard	

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
146.00	0.70	16.70	146.00	0.85	0.26	0.75	0.48	0.48	0.00
236.00	1.70	335.90	235.98	2.60	-0.13	2.54	1.40	1.11	-45.33
293.00	2.70	316.80	292.93	4.35	-1.40	4.56	2.15	1.75	-33.51
418.00	3.50	312.90	417.75	9.09	-6.21	10.42	0.66	0.64	-3.12
510.00	3.50	314.40	509.58	12.97	-10.27	15.25	0.10	0.00	1.63
602.00	3.90	292.30	601.39	16.12	-15.17	19.60	1.60	0.43	-24.02
695.00	3.10	246.80	694.23	16.33	-20.41	21.21	3.02	-0.86	-48.92
787.00	0.90	230.40	786.17	14.89	-23.25	20.58	2.45	-2.39	-17.83
876.00	0.70	218.70	875.17	14.02	-24.13	19.98	0.29	-0.22	-13.15
968.00	0.80	219.60	967.16	13.09	-24.89	19.29	0.11	0.11	0.98
1,062.00	0.80	224.90	1,061.15	12.12	-25.77	18.59	0.08	0.00	5.64
1,156.00	0.90	226.50	1,155.14	11.14	-26.77	17.92	0.11	0.11	1.70
1,249.00	0.90	219.60	1,248.13	10.08	-27.77	17.16	0.12	0.00	-7.42
1,343.00	0.80	208.10	1,342.12	8.93	-28.55	16.26	0.21	-0.11	-12.23



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Well:	4-1HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	Well Planning Conroe

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,436.00	0.60	216.20	1,435.11	7.97	-29.14	15.49	0.24	-0.22	8.71
1,530.00	0.80	213.70	1,529.10	7.02	-29.80	14.76	0.22	-0.21	-2.66
1,624.00	0.80	214.60	1,623.09	5.94	-30.53	13.91	0.01	0.00	0.96
1,717.00	0.60	215.80	1,716.09	5.01	-31.19	13.19	0.22	-0.22	1.29
1,811.00	0.90	210.70	1,810.08	3.97	-31.85	12.37	0.33	0.32	-5.43
1,905.00	0.80	205.40	1,904.07	2.75	-32.51	11.37	0.14	-0.11	-5.64
1,999.00	0.60	208.70	1,998.06	1.72	-33.03	10.52	0.22	-0.21	3.51
2,093.00	0.80	198.90	2,092.05	0.67	-33.48	9.62	0.25	0.21	-10.43
2,186.00	0.60	168.60	2,185.05	-0.42	-33.59	8.60	0.44	-0.22	-32.58
2,280.00	0.70	188.70	2,279.04	-1.47	-33.58	7.59	0.26	0.11	21.38
2,374.00	0.80	200.30	2,373.03	-2.66	-33.89	6.53	0.19	0.11	12.34
2,467.00	0.60	184.00	2,466.03	-3.75	-34.15	5.55	0.30	-0.22	-17.53
2,561.00	0.40	194.40	2,560.02	-4.56	-34.27	4.80	0.23	-0.21	11.06
2,655.00	0.50	189.00	2,654.02	-5.28	-34.41	4.14	0.12	0.11	-5.74
2,748.00	0.40	207.30	2,747.02	-5.97	-34.63	3.54	0.19	-0.11	19.68
2,842.00	0.70	137.10	2,841.01	-6.68	-34.39	2.78	0.72	0.32	-74.68
2,936.00	0.50	169.90	2,935.01	-7.51	-33.92	1.87	0.41	-0.21	34.89
3,029.00	0.50	154.40	3,028.00	-8.27	-33.68	1.06	0.14	0.00	-16.67
3,123.00	0.30	174.50	3,122.00	-8.89	-33.48	0.42	0.26	-0.21	21.38
3,154.00	0.40	160.50	3,153.00	-9.07	-33.43	0.23	0.42	0.32	-45.16
3,185.00	0.10	315.60	3,184.00	-9.15	-33.42	0.14	1.59	-0.97	500.32
3,217.00	3.40	347.40	3,215.98	-8.21	-33.64	1.12	10.36	10.31	99.38
3,248.00	7.40	350.60	3,246.84	-5.34	-34.17	4.02	12.93	12.90	10.32
3,279.00	10.30	351.30	3,277.47	-0.63	-34.91	8.76	9.36	9.35	2.26
3,310.00	13.50	351.20	3,307.80	5.69	-35.89	15.10	10.32	10.32	-0.32
3,342.00	16.10	349.70	3,338.73	13.74	-37.25	23.23	8.21	8.13	-4.69
3,373.00	19.50	347.50	3,368.24	23.03	-39.14	32.68	11.18	10.97	-7.10
3,404.00	23.60	346.80	3,397.07	34.13	-41.68	44.06	13.25	13.23	-2.26
3,435.00	27.70	348.80	3,425.01	47.24	-44.50	57.45	13.52	13.23	6.45
3,467.00	31.60	349.60	3,452.82	62.79	-47.46	73.22	12.25	12.19	2.50
3,498.00	35.30	349.10	3,478.68	79.58	-50.62	90.24	11.97	11.94	-1.61
3,529.00	39.40	348.50	3,503.31	98.02	-54.27	108.99	13.28	13.23	-1.94
3,560.00	43.10	349.60	3,526.62	118.09	-58.15	129.36	12.16	11.94	3.55
3,592.00	45.00	347.70	3,549.62	139.90	-62.53	151.54	7.23	5.94	-5.94
3,623.00	47.90	346.90	3,570.97	161.81	-67.48	173.98	9.54	9.35	-2.58
3,654.00	51.80	346.30	3,590.96	184.86	-72.97	197.65	12.67	12.58	-1.94
3,685.00	56.00	347.20	3,609.22	209.23	-78.70	222.68	13.75	13.55	2.90
3,717.00	60.10	348.40	3,626.15	235.77	-84.43	249.77	13.20	12.81	3.75
3,748.00	64.30	349.10	3,640.60	262.66	-89.78	277.11	13.69	13.55	2.26
3,779.00	68.80	348.90	3,652.94	290.57	-95.21	305.45	14.53	14.52	-0.65
3,810.00	73.80	348.30	3,662.87	319.34	-101.01	334.73	16.23	16.13	-1.94
3,841.00	79.00	347.80	3,670.16	348.81	-107.25	364.79	16.85	16.77	-1.61
3,873.00	83.90	347.00	3,674.92	379.68	-114.15	396.38	15.51	15.31	-2.50
3,888.00	86.40	346.70	3,676.19	394.23	-117.55	411.32	16.79	16.67	-2.00



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Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
3,971.00	89.80	346.20	3,678.94	474.87	-136.98	494.21	4.14	4.10	-0.60	
4,063.00	91.30	345.50	3,678.05	564.07	-159.47	586.17	1.80	1.63	-0.76	
4,156.00	90.60	344.70	3,676.51	653.93	-183.38	679.15	1.14	-0.75	-0.86	
4,247.00	89.80	344.00	3,676.19	741.55	-207.93	770.15	1.17	-0.88	-0.77	
4,337.00	89.60	343.50	3,676.67	827.95	-233.11	860.14	0.60	-0.22	-0.56	
4,428.00	89.40	343.90	3,677.46	915.29	-258.65	951.13	0.49	-0.22	0.44	
4,518.00	88.50	343.20	3,679.11	1,001.59	-284.13	1,041.10	1.27	-1.00	-0.78	
4,608.00	88.10	343.00	3,681.78	1,087.67	-310.29	1,131.04	0.50	-0.44	-0.22	
4,701.00	88.50	342.60	3,684.54	1,176.47	-337.77	1,223.96	0.61	0.43	-0.43	
4,795.00	88.40	342.60	3,687.08	1,266.14	-365.87	1,317.88	0.11	-0.11	0.00	
4,889.00	88.50	342.80	3,689.62	1,355.85	-393.82	1,411.80	0.24	0.11	0.21	
4,983.00	89.40	344.00	3,691.35	1,445.91	-420.67	1,505.76	1.60	0.96	1.28	
5,076.00	90.10	344.80	3,691.75	1,535.49	-445.68	1,598.76	1.14	0.75	0.86	
5,174.00	91.30	346.20	3,690.55	1,630.35	-470.21	1,696.73	1.88	1.22	1.43	
5,264.00	91.90	345.60	3,688.04	1,717.61	-492.13	1,786.67	0.94	0.67	-0.67	
5,357.00	92.20	344.00	3,684.71	1,807.29	-516.49	1,879.60	1.75	0.32	-1.72	
5,451.00	91.90	344.10	3,681.35	1,897.62	-542.31	1,973.54	0.34	-0.32	0.11	
5,545.00	91.20	344.00	3,678.81	1,987.96	-568.13	2,067.50	0.75	-0.74	-0.11	
5,639.00	91.30	344.20	3,676.76	2,078.35	-593.88	2,161.48	0.24	0.11	0.21	
5,732.00	90.20	344.30	3,675.54	2,167.85	-619.12	2,254.47	1.19	-1.18	0.11	
5,826.00	90.00	344.60	3,675.38	2,258.41	-644.32	2,348.47	0.38	-0.21	0.32	
5,920.00	90.40	343.80	3,675.05	2,348.85	-669.91	2,442.47	0.95	0.43	-0.85	
6,013.00	88.40	344.00	3,676.02	2,438.20	-695.70	2,535.45	2.16	-2.15	0.22	
6,107.00	88.20	343.20	3,678.81	2,528.33	-722.23	2,629.40	0.88	-0.21	-0.85	
6,201.00	88.70	344.00	3,681.35	2,618.47	-748.76	2,723.36	1.00	0.53	0.85	
6,295.00	90.10	344.30	3,682.34	2,708.89	-774.43	2,817.35	1.52	1.49	0.32	
6,388.00	90.00	343.80	3,682.26	2,798.31	-799.98	2,910.35	0.55	-0.11	-0.54	
6,482.00	90.80	343.70	3,681.60	2,888.55	-826.29	3,004.34	0.86	0.85	-0.11	
6,576.00	91.90	343.10	3,679.39	2,978.61	-853.13	3,098.29	1.33	1.17	-0.64	
6,669.00	90.80	342.40	3,677.20	3,067.40	-880.70	3,191.22	1.40	-1.18	-0.75	
6,763.00	89.70	342.30	3,676.78	3,156.97	-909.20	3,285.16	1.18	-1.17	-0.11	
6,857.00	87.80	341.80	3,678.84	3,246.37	-938.16	3,379.05	2.09	-2.02	-0.53	
6,951.00	88.10	342.30	3,682.20	3,335.74	-967.11	3,472.91	0.62	0.32	0.53	
7,044.00	88.30	344.00	3,685.12	3,424.70	-994.06	3,565.83	1.84	0.22	1.83	
7,138.00	89.30	345.30	3,687.09	3,515.32	-1,018.93	3,659.81	1.74	1.06	1.38	
7,315.00	92.70	344.80	3,684.00	3,686.28	-1,064.58	3,836.75	1.94	1.92	-0.28	
7,409.00	92.90	344.70	3,679.41	3,776.86	-1,089.28	3,930.63	0.24	0.21	-0.11	
7,503.00	91.20	343.90	3,676.05	3,867.29	-1,114.70	4,024.57	2.00	-1.81	-0.85	
7,597.00	88.60	344.30	3,676.21	3,957.69	-1,140.45	4,118.56	2.80	-2.77	0.43	
7,690.00	91.40	344.00	3,676.21	4,047.14	-1,165.84	4,211.55	3.03	3.01	-0.32	
7,784.00	91.00	343.70	3,674.24	4,137.41	-1,191.99	4,305.52	0.53	-0.43	-0.32	
7,878.00	91.10	343.30	3,672.52	4,227.52	-1,218.68	4,399.49	0.44	0.11	-0.43	
7,971.00	93.00	343.70	3,669.19	4,316.63	-1,245.07	4,492.42	2.09	2.04	0.43	



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Well:	4-1HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	Well Planning Conroe

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
8,065.00	89.40	342.10	3,667.22	4,406.44	-1,272.70	4,586.34	4.19	-3.83	-1.70	
8,158.00	90.30	341.70	3,667.47	4,494.84	-1,301.60	4,679.25	1.06	0.97	-0.43	
8,251.00	90.40	342.80	3,666.90	4,583.41	-1,329.95	4,772.18	1.19	0.11	1.18	
8,345.00	91.20	344.00	3,665.59	4,673.48	-1,356.80	4,866.15	1.53	0.85	1.28	
8,439.00	92.20	343.80	3,662.80	4,763.75	-1,382.85	4,960.11	1.08	1.06	-0.21	
8,532.00	91.60	344.00	3,659.71	4,853.05	-1,408.63	5,053.05	0.68	-0.65	0.22	
8,626.00	91.50	343.50	3,657.17	4,943.26	-1,434.92	5,147.01	0.54	-0.11	-0.53	
8,722.00	91.50	343.50	3,654.66	5,035.28	-1,462.18	5,242.96	0.00	0.00	0.00	
Projection to TD-8722.00' MD										

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
8,722.00	3,654.66	5,035.28	-1,462.18	Projection to TD-8722.00' MD	