



Shell

Rice County, Kansas (NAD27)
Randolph Trust 2107
31-1H

Wellbore #1

Survey: Extreme MWD

Standard Survey Report

25 February, 2013



Company:	Shell	Local Co-ordinate Reference:	Well 31-1H
Project:	Rice County, Kansas (NAD27)	TVD Reference:	WELL @ 1633.90usft (Patterson 264)
Site:	Randolph Trust 2107	MD Reference:	WELL @ 1633.90usft (Patterson 264)
Well:	31-1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	Well Planning Conroe

Project	Rice 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	31-1H				
Well Position	+N/-S	0.00 usft	Northing:	553,817.24 usft	Latitude: 38° 11' 13.4039 N
	+E/-W	0.00 usft	Easting:	2,107,650.83 usft	Longitude: 98° 7' 31.656 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level: 1,611.00 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	WMM_2010	02/01/13	4.57	66.11	52,367

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	179.97	

Survey Program	Date	02/25/13			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
146.00	7,416.00	Extreme MWD (Wellbore #1)	MWD	MWD - Standard	

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)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
146.00	0.40	5.00	146.00	0.51	0.04	-0.51	0.27	0.27	0.00	
208.00	1.00	288.60	207.99	0.90	-0.45	-0.90	1.59	0.97	-123.23	
300.00	2.20	277.30	299.96	1.38	-2.96	-1.38	1.34	1.30	-12.28	
392.00	3.40	272.30	391.85	1.71	-7.44	-1.71	1.33	1.30	-5.43	
484.00	4.30	271.40	483.64	1.90	-13.61	-1.91	0.98	0.98	-0.98	
610.00	4.20	274.00	609.29	2.34	-22.94	-2.35	0.17	-0.08	2.06	
704.00	1.60	237.10	703.17	1.87	-27.48	-1.88	3.27	-2.77	-39.26	
797.00	2.30	170.90	796.13	-0.68	-28.27	0.66	2.38	0.75	-71.18	
891.00	1.10	154.90	890.08	-3.36	-27.59	3.34	1.36	-1.28	-17.02	
983.00	0.70	180.60	982.07	-4.72	-27.22	4.71	0.61	-0.43	27.93	
1,075.00	0.40	185.80	1,074.07	-5.60	-27.26	5.59	0.33	-0.33	5.65	
1,168.00	0.30	205.50	1,167.07	-6.15	-27.40	6.13	0.17	-0.11	21.18	
1,260.00	0.20	174.80	1,259.06	-6.52	-27.49	6.51	0.18	-0.11	-33.37	
1,352.00	0.30	189.10	1,351.06	-6.92	-27.51	6.91	0.13	0.11	15.54	



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Well:	31-1H	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)
1,444.00	0.20	200.00	1,443.06	-7.31	-27.60	7.29	0.12	-0.11	11.85
1,536.00	0.20	238.50	1,535.06	-7.54	-27.79	7.53	0.14	0.00	41.85
1,659.00	0.40	354.80	1,658.06	-7.23	-28.02	7.21	0.42	0.16	94.55
1,751.00	0.40	27.90	1,750.06	-6.62	-27.89	6.61	0.25	0.00	35.98
1,843.00	0.50	46.00	1,842.06	-6.06	-27.46	6.05	0.19	0.11	19.67
1,937.00	0.50	31.20	1,936.05	-5.43	-26.95	5.41	0.14	0.00	-15.74
2,031.00	0.80	24.30	2,030.05	-4.48	-26.47	4.46	0.33	0.32	-7.34
2,125.00	0.80	11.20	2,124.04	-3.24	-26.07	3.22	0.19	0.00	-13.94
2,219.00	0.80	0.40	2,218.03	-1.94	-25.94	1.92	0.16	0.00	-11.49
2,312.00	0.70	353.20	2,311.02	-0.72	-26.00	0.71	0.15	-0.11	-7.74
2,406.00	0.70	345.50	2,405.01	0.40	-26.21	-0.42	0.10	0.00	-8.19
2,500.00	0.50	345.40	2,499.01	1.36	-26.46	-1.37	0.21	-0.21	-0.11
2,594.00	0.60	328.00	2,593.00	2.17	-26.82	-2.18	0.21	0.11	-18.51
2,688.00	0.60	323.80	2,687.00	2.99	-27.37	-3.00	0.05	0.00	-4.47
2,782.00	0.50	311.70	2,780.99	3.66	-27.97	-3.67	0.16	-0.11	-12.87
2,875.00	0.60	300.80	2,873.99	4.17	-28.69	-4.19	0.16	0.11	-11.72
2,938.00	0.40	273.50	2,936.99	4.36	-29.19	-4.37	0.49	-0.32	-43.33
2,969.00	2.20	209.70	2,967.98	3.85	-29.60	-3.86	6.63	5.81	-205.81
3,000.00	3.80	192.70	2,998.94	2.33	-30.12	-2.34	5.85	5.16	-54.84
3,032.00	6.60	179.30	3,030.80	-0.55	-30.33	0.53	9.48	8.75	-41.88
3,063.00	10.30	178.10	3,061.46	-5.10	-30.22	5.08	11.95	11.94	-3.87
3,094.00	13.80	178.90	3,091.77	-11.57	-30.05	11.55	11.30	11.29	2.58
3,125.00	17.30	177.80	3,121.63	-19.87	-29.80	19.86	11.33	11.29	-3.55
3,157.00	20.50	178.30	3,151.90	-30.23	-29.46	30.22	10.01	10.00	1.56
3,188.00	24.40	176.00	3,180.55	-42.05	-28.85	42.03	12.89	12.58	-7.42
3,219.00	28.50	174.90	3,208.30	-55.81	-27.74	55.79	13.32	13.23	-3.55
3,250.00	32.10	175.60	3,235.06	-71.39	-26.45	71.38	11.67	11.61	2.26
3,282.00	35.10	177.80	3,261.71	-89.07	-25.45	89.06	10.12	9.38	6.88
3,313.00	38.30	180.00	3,286.56	-107.59	-25.11	107.57	11.16	10.32	7.10
3,344.00	41.50	181.40	3,310.34	-127.47	-25.36	127.45	10.72	10.32	4.52
3,376.00	45.10	182.10	3,333.63	-149.40	-26.03	149.38	11.35	11.25	2.19
3,407.00	48.00	181.00	3,354.95	-171.89	-26.63	171.88	9.70	9.35	-3.55
3,438.00	50.80	180.00	3,375.12	-195.43	-26.84	195.41	9.36	9.03	-3.23
3,469.00	55.00	179.90	3,393.81	-220.15	-26.81	220.13	13.55	13.55	-0.32
3,501.00	58.90	180.10	3,411.26	-246.96	-26.81	246.95	12.20	12.19	0.63
3,532.00	62.30	180.30	3,426.48	-273.97	-26.91	273.95	10.98	10.97	0.65
3,563.00	65.20	181.00	3,440.19	-301.76	-27.23	301.75	9.57	9.35	2.26
3,594.00	68.00	181.70	3,452.50	-330.20	-27.90	330.19	9.27	9.03	2.26
3,625.00	71.00	181.80	3,463.35	-359.22	-28.79	359.21	9.68	9.68	0.32
3,656.00	75.10	181.90	3,472.39	-388.86	-29.74	388.84	13.23	13.23	0.32
3,688.00	79.00	181.80	3,479.56	-420.02	-30.75	420.00	12.19	12.19	-0.31
3,719.00	83.00	181.00	3,484.41	-450.62	-31.50	450.61	13.15	12.90	-2.58
3,750.00	85.30	180.70	3,487.57	-481.46	-31.95	481.44	7.48	7.42	-0.97
3,880.00	88.50	180.70	3,494.60	-611.24	-33.54	611.22	2.46	2.46	0.00



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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	92.20	179.70	3,494.04	-702.22	-33.86	702.20	4.21	4.07	-1.10
4,063.00	90.70	180.60	3,491.71	-794.19	-34.10	794.17	1.90	-1.63	0.98
4,156.00	91.20	181.10	3,490.17	-887.16	-35.48	887.14	0.76	0.54	0.54
4,250.00	90.10	180.00	3,489.10	-981.15	-36.38	981.13	1.65	-1.17	-1.17
4,344.00	90.60	179.60	3,488.53	-1,075.15	-36.05	1,075.13	0.68	0.53	-0.43
4,437.00	91.20	179.60	3,487.07	-1,168.13	-35.40	1,168.11	0.65	0.65	0.00
4,531.00	89.30	178.50	3,486.66	-1,262.11	-33.84	1,262.09	2.34	-2.02	-1.17
4,625.00	89.90	177.80	3,487.32	-1,356.06	-30.81	1,356.04	0.98	0.64	-0.74
4,718.00	89.30	177.80	3,487.97	-1,448.99	-27.24	1,448.97	0.65	-0.65	0.00
4,812.00	89.80	177.40	3,488.70	-1,542.90	-23.30	1,542.89	0.68	0.53	-0.43
4,906.00	91.30	179.40	3,487.80	-1,636.85	-20.68	1,636.84	2.66	1.60	2.13
4,999.00	91.50	180.30	3,485.53	-1,729.83	-20.43	1,729.81	0.99	0.22	0.97
5,093.00	89.10	179.20	3,485.04	-1,823.81	-20.02	1,823.80	2.81	-2.55	-1.17
5,186.00	87.70	177.40	3,487.63	-1,916.73	-17.27	1,916.72	2.45	-1.51	-1.94
5,280.00	88.00	176.60	3,491.16	-2,010.54	-12.35	2,010.53	0.91	0.32	-0.85
5,374.00	88.60	175.30	3,493.95	-2,104.26	-5.72	2,104.25	1.52	0.64	-1.38
5,468.00	88.80	177.10	3,496.08	-2,198.02	0.51	2,198.02	1.93	0.21	1.91
5,561.00	89.80	179.60	3,497.22	-2,290.97	3.19	2,290.97	2.90	1.08	2.69
5,655.00	90.50	179.70	3,496.97	-2,384.97	3.76	2,384.97	0.75	0.74	0.11
5,749.00	91.30	179.00	3,495.50	-2,478.95	4.83	2,478.95	1.13	0.85	-0.74
5,842.00	90.50	180.70	3,494.03	-2,571.93	5.07	2,571.93	2.02	-0.86	1.83
5,936.00	88.70	181.20	3,494.69	-2,665.91	3.51	2,665.91	1.99	-1.91	0.53
6,030.00	89.40	180.30	3,496.25	-2,759.89	2.28	2,759.89	1.21	0.74	-0.96
6,124.00	90.40	180.10	3,496.41	-2,853.89	1.96	2,853.89	1.08	1.06	-0.21
6,217.00	89.70	181.80	3,496.33	-2,946.87	0.41	2,946.87	1.98	-0.75	1.83
6,311.00	90.10	181.70	3,496.50	-3,040.83	-2.46	3,040.82	0.44	0.43	-0.11
6,405.00	90.40	181.00	3,496.09	-3,134.80	-4.67	3,134.80	0.81	0.32	-0.74
6,498.00	91.30	180.40	3,494.71	-3,227.78	-5.81	3,227.78	1.16	0.97	-0.65
6,592.00	89.50	180.70	3,494.05	-3,321.77	-6.71	3,321.77	1.94	-1.91	0.32
6,686.00	90.20	181.00	3,494.30	-3,415.76	-8.10	3,415.75	0.81	0.74	0.32
6,779.00	89.30	180.30	3,494.70	-3,508.75	-9.16	3,508.74	1.23	-0.97	-0.75
6,873.00	90.10	179.20	3,495.19	-3,602.75	-8.75	3,602.74	1.45	0.85	-1.17
6,967.00	89.50	179.60	3,495.52	-3,696.74	-7.76	3,696.73	0.77	-0.64	0.43
7,061.00	89.30	178.30	3,496.51	-3,790.72	-6.04	3,790.71	1.40	-0.21	-1.38
7,154.00	89.30	177.80	3,497.64	-3,883.65	-2.88	3,883.65	0.54	0.00	-0.54
7,248.00	89.50	177.10	3,498.63	-3,977.56	1.30	3,977.56	0.77	0.21	-0.74
7,342.00	89.80	176.30	3,499.20	-4,071.40	6.72	4,071.40	0.91	0.32	-0.85
7,416.00	89.80	176.30	3,499.46	-4,145.24	11.49	4,145.25	0.00	0.00	0.00

Projection to TD-7416.00' MD



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Project:	Rice County, Kansas (NAD27)	TVD Reference:	WELL @ 1633.90usft (Patterson 264)
Site:	Randolph Trust 2107	MD Reference:	WELL @ 1633.90usft (Patterson 264)
Well:	31-1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	Well Planning Conroe

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
7,416.00	3,499.46	-4,145.24	11.49	Projection to TD-7416.00' MD