

Shell Exploration & Production Co. Inc.

Harper Co. KS (NAD-27)

Sec 27-T34S-R07W

Croft Farms 3407 #27-2H

9858293

Wellbore #1

Design: Wellbore #1

Sperry Drilling Services

Combo Report With Grid North & True North

17 January, 2013

Surface UWI : 9858293

TD Date : 19th Nov, 2012

Well Coordinates: 145,105.91 N, 2,128,598.67 E (37° 03' 51.63" N, 098° 03' 33.48" W)

Ground Level: 1,385.00 ft

Local Coordinate Origin:

Centered on Well Croft Farms 3407 #27-2H

Viewing Datum:

WELL @ 1408.00ft (Nabors 180 (23'))

TVDs to System:

N

North Reference:

Grid

Unit System:

API US New

Version: 2003.21 Build: 46

HALLIBURTON

Design Report for Croft Farms 3407 #27-2H - Wellbore #1

Measured Depth (ft)	Inclination (°)	Grid Azimuth (°)	True Azimuth (°)	TVD below System (ft)	Vertical Depth (ft)	Local Coordinates (ft)		Map Coordinates (ft)		Dogleg Rate (°/100ft)	Vertical Section (ft)	Comments
						Northing	Easting	Northing	Easting			
0.00	0.00	0.00	0.27	-1,408.00	0.00	0.00 N	0.00 E	145,105.91	2,128,598.67	0.00	0.00	
147.00	0.15	266.67	266.94	-1,261.00	147.00	0.01 S	0.19 W	145,105.90	2,128,598.48	0.10	-0.13	Start MWD @ 147.00 MD
209.00	0.61	186.47	186.74	-1,199.00	209.00	0.34 S	0.31 W	145,105.57	2,128,598.36	0.97	0.02	
241.00	0.86	168.29	168.56	-1,167.00	241.00	0.75 S	0.28 W	145,105.16	2,128,598.39	1.06	0.32	
272.00	1.40	165.86	166.13	-1,136.01	271.99	1.34 S	0.14 W	145,104.57	2,128,598.53	1.75	0.83	
301.00	1.99	159.28	159.55	-1,107.02	300.98	2.16 S	0.12 E	145,103.75	2,128,598.79	2.14	1.59	
332.00	2.64	157.88	158.15	-1,076.05	331.95	3.32 S	0.58 E	145,102.59	2,128,599.25	2.10	2.73	
363.00	3.29	155.10	155.37	-1,045.09	362.91	4.79 S	1.23 E	145,101.12	2,128,599.90	2.15	4.21	
394.00	3.70	153.02	153.29	-1,014.15	393.85	6.49 S	2.05 E	145,099.42	2,128,600.72	1.38	5.99	
425.00	4.18	154.94	155.21	-983.22	424.78	8.40 S	2.99 E	145,097.51	2,128,601.66	1.61	7.99	
609.00	7.28	147.86	148.13	-800.16	607.84	24.35 S	12.03 E	145,081.56	2,128,610.70	1.72	25.58	
703.00	8.34	145.79	146.06	-707.03	700.97	35.04 S	19.03 E	145,070.87	2,128,617.70	1.17	38.04	
797.00	6.73	137.79	138.06	-613.85	794.15	44.75 S	26.57 E	145,061.16	2,128,625.24	2.04	50.21	
890.00	5.55	134.57	134.84	-521.38	886.62	51.95 S	33.43 E	145,053.96	2,128,632.10	1.32	60.14	
982.00	5.72	134.27	134.54	-429.83	978.17	58.27 S	39.88 E	145,047.64	2,128,638.55	0.19	69.18	
1,076.00	7.31	134.34	134.61	-336.44	1,071.56	65.72 S	47.52 E	145,040.19	2,128,646.19	1.69	79.84	
1,266.00	6.85	135.25	135.52	-147.88	1,260.12	82.21 S	64.14 E	145,023.70	2,128,662.81	0.25	103.26	
1,455.00	5.70	127.78	128.05	39.98	1,447.98	95.97 S	79.49 E	145,009.94	2,128,678.16	0.75	123.86	
1,645.00	4.67	111.33	111.60	229.21	1,637.21	104.56 S	94.16 E	145,001.35	2,128,692.83	0.95	140.37	
1,834.00	7.01	124.97	125.24	417.23	1,825.23	113.97 S	110.78 E	144,991.94	2,128,709.45	1.43	158.86	
2,024.00	7.35	128.43	128.70	605.74	2,013.74	128.17 S	129.80 E	144,977.74	2,128,728.47	0.29	182.41	
2,119.00	8.09	134.18	134.45	699.88	2,107.88	136.61 S	139.35 E	144,969.30	2,128,738.02	1.13	195.14	
2,214.00	9.26	138.60	138.87	793.79	2,201.79	147.00 S	149.20 E	144,958.91	2,128,747.87	1.42	209.44	
2,309.00	9.22	138.04	138.31	887.56	2,295.56	158.39 S	159.34 E	144,947.52	2,128,758.01	0.10	224.66	
2,404.00	11.00	134.12	134.39	981.08	2,389.08	170.36 S	170.94 E	144,935.55	2,128,769.61	2.01	241.31	
2,498.00	14.85	134.76	135.03	1,072.68	2,480.68	185.09 S	185.94 E	144,920.82	2,128,784.61	4.10	262.33	
2,593.00	15.39	135.95	136.22	1,164.39	2,572.39	202.73 S	203.35 E	144,903.18	2,128,802.02	0.66	287.10	
2,688.00	15.95	135.07	135.34	1,255.86	2,663.86	221.03 S	221.33 E	144,884.88	2,128,820.00	0.64	312.75	
2,783.00	17.95	137.48	137.75	1,346.73	2,754.73	241.06 S	240.44 E	144,864.85	2,128,839.11	2.23	340.42	
2,878.00	19.36	138.45	138.72	1,436.74	2,844.74	263.64 S	260.78 E	144,842.27	2,128,859.45	1.52	370.74	
2,973.00	18.07	139.54	139.81	1,526.71	2,934.71	286.63 S	280.79 E	144,819.28	2,128,879.46	1.41	401.10	
3,068.00	16.05	136.06	136.33	1,617.53	3,025.53	307.30 S	299.47 E	144,798.61	2,128,898.13	2.38	428.90	
3,163.00	13.84	135.01	135.28	1,709.31	3,117.31	324.80 S	316.61 E	144,781.11	2,128,915.28	2.34	453.38	
3,257.00	13.15	132.75	133.02	1,800.72	3,208.72	340.01 S	332.41 E	144,765.91	2,128,931.08	0.92	475.32	
3,352.00	13.48	129.11	129.38	1,893.17	3,301.17	354.33 S	348.94 E	144,751.58	2,128,947.61	0.95	497.15	
3,447.00	12.76	126.78	127.05	1,985.69	3,393.69	367.59 S	365.94 E	144,738.32	2,128,964.61	0.94	518.59	
3,542.00	12.30	127.70	127.97	2,078.42	3,486.42	380.06 S	382.35 E	144,725.85	2,128,981.01	0.53	539.05	

Design Report for Croft Farms 3407 #27-2H - Wellbore #1

Measured Depth (ft)	Inclination (°)	Grid Azimuth (°)	True Azimuth (°)	TVD below System (ft)	Vertical Depth (ft)	Local Coordinates (ft)		Map Coordinates (ft)		Dogleg Rate (°/100ft)	Vertical Section (ft)	Comments
						Northing	Easting	Northing	Easting			
3,637.00	11.20	127.00	127.27	2,171.43	3,579.43	391.80 S	397.72 E	144,714.11	2,128,996.39	1.17	558.27	
3,731.00	9.06	124.34	124.61	2,263.96	3,671.96	401.47 S	411.12 E	144,704.44	2,129,009.79	2.33	574.63	
3,826.00	7.68	127.18	127.45	2,357.95	3,765.95	409.53 S	422.36 E	144,696.38	2,129,021.03	1.52	588.30	
3,921.00	6.53	135.44	135.71	2,452.22	3,860.22	417.21 S	431.21 E	144,688.70	2,129,029.88	1.62	600.01	
4,015.00	5.71	129.97	130.24	2,545.68	3,953.68	424.03 S	438.54 E	144,681.88	2,129,037.21	1.07	610.01	
4,110.00	4.30	133.84	134.11	2,640.32	4,048.32	429.53 S	444.73 E	144,676.38	2,129,043.40	1.53	618.29	
4,142.00	4.11	133.08	133.35	2,672.23	4,080.23	431.14 S	446.43 E	144,674.77	2,129,045.10	0.62	620.64	
4,206.00	4.75	135.89	136.16	2,736.04	4,144.04	434.61 S	449.95 E	144,671.30	2,129,048.62	1.06	625.58	
4,237.00	6.80	149.04	149.31	2,766.88	4,174.88	437.11 S	451.79 E	144,668.80	2,129,050.46	7.83	628.63	
4,269.00	10.08	157.77	158.04	2,798.53	4,206.53	441.33 S	453.83 E	144,664.58	2,129,052.50	10.98	633.03	
4,300.00	13.50	159.88	160.15	2,828.87	4,236.87	447.24 S	456.10 E	144,658.67	2,129,054.77	11.12	638.77	
4,332.00	17.18	168.04	168.31	2,859.73	4,267.73	455.37 S	458.36 E	144,650.54	2,129,057.03	13.31	646.05	
4,364.00	21.02	170.01	170.28	2,889.97	4,297.97	465.65 S	460.34 E	144,640.26	2,129,059.01	12.17	654.62	
4,395.00	23.72	172.50	172.77	2,918.63	4,326.63	477.31 S	462.12 E	144,628.60	2,129,060.79	9.23	664.00	
4,427.00	26.31	174.66	174.93	2,947.63	4,355.63	490.76 S	463.62 E	144,615.16	2,129,062.29	8.58	674.43	
4,441.82	26.84	176.72	176.99	2,960.88	4,368.88	497.37 S	464.12 E	144,608.54	2,129,062.78	7.19	679.38	Croft Farms 3407 #27-2H PP
4,458.00	27.46	178.88	179.15	2,975.28	4,383.28	504.74 S	464.40 E	144,601.17	2,129,063.07	7.19	684.71	
4,490.00	29.42	180.81	181.08	3,003.42	4,411.42	519.98 S	464.43 E	144,585.93	2,129,063.10	6.76	695.33	
4,522.00	31.48	181.35	181.62	3,031.00	4,439.00	536.19 S	464.12 E	144,569.72	2,129,062.79	6.49	706.38	
4,553.00	34.24	180.62	180.89	3,057.04	4,465.04	553.01 S	463.84 E	144,552.90	2,129,062.51	8.99	717.86	
4,585.00	37.05	178.96	179.23	3,083.04	4,491.04	571.65 S	463.92 E	144,534.26	2,129,062.58	9.29	730.88	
4,617.00	39.40	178.42	178.69	3,108.18	4,516.18	591.45 S	464.37 E	144,514.46	2,129,063.04	7.42	744.97	
4,648.00	42.21	178.64	178.91	3,131.64	4,539.64	611.70 S	464.89 E	144,494.21	2,129,063.56	9.08	759.41	
4,680.00	44.40	178.60	178.87	3,154.93	4,562.93	633.64 S	465.42 E	144,472.27	2,129,064.09	6.84	775.05	
4,711.00	46.99	179.57	179.84	3,176.58	4,584.58	655.82 S	465.77 E	144,450.09	2,129,064.44	8.65	790.72	
4,743.00	49.72	180.91	181.18	3,197.84	4,605.84	679.73 S	465.66 E	144,426.18	2,129,064.33	9.09	807.26	
4,775.00	51.64	181.12	181.39	3,218.12	4,626.12	704.48 S	465.22 E	144,401.43	2,129,063.89	6.02	824.15	
4,806.00	53.59	180.24	180.51	3,236.94	4,644.94	729.11 S	464.93 E	144,376.81	2,129,063.60	6.68	841.06	
4,838.00	55.53	180.51	180.78	3,255.49	4,663.49	755.18 S	464.76 E	144,350.74	2,129,063.43	6.10	859.06	
4,870.00	56.71	181.67	181.94	3,273.33	4,681.33	781.74 S	464.25 E	144,324.18	2,129,062.92	4.76	877.16	
4,901.00	58.25	182.14	182.41	3,290.00	4,698.00	807.86 S	463.38 E	144,298.05	2,129,062.05	5.13	894.70	
4,933.00	60.69	182.30	182.57	3,306.25	4,714.25	835.40 S	462.32 E	144,270.51	2,129,060.99	7.64	913.07	
4,964.00	64.40	182.54	182.81	3,320.54	4,728.54	862.88 S	461.15 E	144,243.03	2,129,059.82	11.99	931.34	
4,996.00	68.43	181.93	182.20	3,333.34	4,741.34	892.18 S	460.01 E	144,213.73	2,129,058.68	12.71	950.89	
5,028.00	71.72	181.79	182.06	3,344.25	4,752.25	922.24 S	459.04 E	144,183.67	2,129,057.71	10.29	971.09	
5,059.00	73.60	180.18	180.45	3,353.48	4,761.48	951.83 S	458.53 E	144,154.08	2,129,057.20	7.83	991.29	
5,091.00	75.43	179.33	179.60	3,362.03	4,770.03	982.66 S	458.66 E	144,123.25	2,129,057.33	6.27	1,012.82	

Design Report for Croft Farms 3407 #27-2H - Wellbore #1

Measured Depth (ft)	Inclination (°)	Grid Azimuth (°)	True Azimuth (°)	TVD below System (ft)	Vertical Depth (ft)	Local Coordinates (ft)		Map Coordinates (ft)		Dogleg Rate (°/100ft)	Vertical Section (ft)	Comments
						Northing	Easting	Northing	Easting			
5,123.00	77.70	178.06	178.33	3,369.46	4,777.46	1,013.78 S	459.37 E	144,092.14	2,129,058.04	8.08	1,034.96	
5,154.00	79.43	176.73	177.00	3,375.61	4,783.61	1,044.13 S	460.76 E	144,061.78	2,129,059.42	6.99	1,057.05	
5,186.00	80.42	175.54	175.81	3,381.21	4,789.21	1,075.56 S	462.88 E	144,030.35	2,129,061.55	4.79	1,080.43	
5,217.00	81.50	174.55	174.82	3,386.08	4,794.08	1,106.06 S	465.52 E	143,999.85	2,129,064.19	4.70	1,103.53	
5,249.00	82.58	173.65	173.92	3,390.51	4,798.51	1,137.58 S	468.78 E	143,968.33	2,129,067.45	4.38	1,127.79	
5,281.00	84.04	172.88	173.15	3,394.24	4,802.24	1,169.15 S	472.51 E	143,936.77	2,129,071.18	5.15	1,152.41	
5,312.00	85.68	172.73	173.00	3,397.01	4,805.01	1,199.78 S	476.38 E	143,906.13	2,129,075.05	5.31	1,176.48	
5,344.00	87.29	172.58	172.85	3,398.98	4,806.98	1,231.45 S	480.46 E	143,874.46	2,129,079.13	5.05	1,201.44	
5,526.00	91.05	173.73	174.00	3,401.61	4,809.61	1,412.10 S	502.14 E	143,693.81	2,129,100.81	2.16	1,342.60	
5,621.00	90.74	175.90	176.17	3,400.13	4,808.13	1,506.70 S	510.73 E	143,599.22	2,129,109.40	2.31	1,414.53	
5,716.00	90.98	176.56	176.83	3,398.70	4,806.70	1,601.48 S	516.97 E	143,504.43	2,129,115.64	0.74	1,484.91	
5,811.00	93.51	178.04	178.31	3,394.98	4,802.98	1,696.29 S	521.45 E	143,409.62	2,129,120.11	3.08	1,554.03	
5,906.00	92.81	177.86	178.13	3,389.74	4,797.74	1,791.09 S	524.84 E	143,314.83	2,129,123.51	0.76	1,622.37	
6,001.00	91.57	176.96	177.23	3,386.11	4,794.11	1,885.92 S	529.13 E	143,220.00	2,129,127.80	1.61	1,691.38	
6,096.00	90.65	177.00	177.27	3,384.27	4,792.27	1,980.77 S	534.13 E	143,125.15	2,129,132.80	0.97	1,760.91	
6,191.00	91.17	176.91	177.18	3,382.76	4,790.76	2,075.62 S	539.18 E	143,030.30	2,129,137.85	0.56	1,830.47	
6,286.00	89.54	178.33	178.60	3,382.18	4,790.18	2,170.53 S	543.12 E	142,935.38	2,129,141.79	2.28	1,899.29	
6,381.00	90.92	178.15	178.42	3,381.79	4,789.79	2,265.48 S	546.04 E	142,840.43	2,129,144.71	1.46	1,967.39	
6,476.00	88.55	178.45	178.72	3,382.23	4,790.23	2,360.43 S	548.86 E	142,745.48	2,129,147.53	2.51	2,035.42	
6,570.00	88.31	178.95	179.22	3,384.81	4,792.81	2,454.37 S	550.99 E	142,651.54	2,129,149.66	0.59	2,102.26	
6,665.00	88.00	177.74	178.01	3,387.87	4,795.87	2,549.28 S	553.73 E	142,556.63	2,129,152.40	1.31	2,170.20	
6,760.00	88.12	177.28	177.55	3,391.08	4,799.08	2,644.14 S	557.86 E	142,461.78	2,129,156.53	0.50	2,239.11	
6,855.00	87.93	177.40	177.67	3,394.36	4,802.36	2,738.98 S	562.26 E	142,366.94	2,129,160.93	0.24	2,308.21	
6,950.00	87.35	175.90	176.17	3,398.27	4,806.27	2,833.73 S	567.81 E	142,272.18	2,129,166.48	1.69	2,378.06	
7,045.00	88.89	176.56	176.83	3,401.39	4,809.39	2,928.47 S	574.05 E	142,177.44	2,129,172.72	1.76	2,448.41	
7,145.00	89.57	176.15	176.42	3,402.73	4,810.73	3,028.26 S	580.41 E	142,077.66	2,129,179.08	0.79	2,522.35	
7,240.00	89.88	176.64	176.91	3,403.19	4,811.19	3,123.07 S	586.38 E	141,982.85	2,129,185.05	0.61	2,592.55	
7,335.00	91.69	176.49	176.76	3,401.89	4,809.89	3,217.89 S	592.07 E	141,888.03	2,129,190.74	1.91	2,662.55	
7,430.00	91.57	177.35	177.62	3,399.18	4,807.18	3,312.71 S	597.18 E	141,793.21	2,129,195.85	0.91	2,732.14	
7,525.00	90.90	176.80	177.07	3,397.14	4,805.14	3,407.56 S	602.02 E	141,698.35	2,129,200.69	0.91	2,801.56	
7,620.00	90.19	177.75	178.02	3,396.23	4,804.23	3,502.45 S	606.54 E	141,603.47	2,129,205.21	1.25	2,870.77	
7,715.00	90.00	177.29	177.56	3,396.07	4,804.07	3,597.36 S	610.65 E	141,508.56	2,129,209.32	0.52	2,939.70	
7,809.00	90.22	176.67	176.94	3,395.89	4,803.89	3,691.23 S	615.60 E	141,414.69	2,129,214.27	0.70	3,008.51	
7,904.00	89.69	179.73	180.00	3,395.97	4,803.97	3,786.17 S	618.59 E	141,319.75	2,129,217.25	3.27	3,076.66	
7,999.00	89.60	178.73	179.00	3,396.56	4,804.56	3,881.16 S	619.86 E	141,224.76	2,129,218.53	1.06	3,143.61	
8,094.00	90.09	178.97	179.24	3,396.81	4,804.81	3,976.14 S	621.77 E	141,129.78	2,129,220.44	0.57	3,211.00	
8,189.00	90.40	177.53	177.80	3,396.41	4,804.41	4,071.09 S	624.67 E	141,034.83	2,129,223.34	1.55	3,279.09	

Design Report for Croft Farms 3407 #27-2H - Wellbore #1

Measured Depth (ft)	Inclination (°)	Grid Azimuth (°)	True Azimuth (°)	TVD below System (ft)	Vertical Depth (ft)	Local Coordinates (ft)		Map Coordinates (ft)		Dogleg Rate (°/100ft)	Vertical Section (ft)	Comments
						Northing	Easting	Northing	Easting			
8,284.00	87.75	178.46	178.73	3,397.94	4,805.94	4,166.01 S	627.99 E	140,939.91	2,129,226.66	2.96	3,347.47	
8,379.00	90.99	178.20	178.47	3,398.99	4,806.99	4,260.95 S	630.76 E	140,844.97	2,129,229.43	3.42	3,415.46	
8,474.00	89.91	178.60	178.87	3,398.24	4,806.24	4,355.91 S	633.41 E	140,750.01	2,129,232.08	1.21	3,483.37	
8,569.00	90.71	177.87	178.14	3,397.73	4,805.73	4,450.86 S	636.34 E	140,655.06	2,129,235.01	1.14	3,551.48	End MWD @ 8569.00 MD
8,698.00	90.71	177.87	178.14	3,396.13	4,804.13	4,579.76 S	641.13 E	140,526.15	2,129,239.80	0.00	3,644.54	Projection to TD 8698.00 MD, 4804.13 TVD -4579.76 N, 641.13 E 337 FSL, 409 FEL - Croft Farms 3407 #27-2H BHL

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
147.00	147.00	-0.01	-0.19	Start MWD @ 147.00 MD
8,569.00	4,805.73	-4,450.86	636.34	End MWD @ 8569.00 MD
8,698.00	4,804.13	-4,579.76	641.13	Projection to TD 8698.00 MD, 4804.13 TVD -4579.76 N, 641.13 E 337 FSL, 409 FEL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/_S (ft)	+E/-W (ft)	
User	No Target (Freehand)	134.04	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
147.00	425.00	Run 0100	MWD+SC
609.00	4,142.00	Run 0200	MWD+SC
4,206.00	5,344.00	Run 0300	MWD+SC
5,526.00	7,045.00	Run 0500	MWD+SC
7,145.00	8,379.00	Run 0600	MWD+SC
8,474.00	8,698.00	Run 0700	MWD+SC

HALLIBURTON

Design Report for Croft Farms 3407 #27-2H - Wellbore #1

Design Targets

Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target									
- Shape	()	()	()	()	()	()	()		

Directional Difficulty Index

Average Dogleg over Survey: 2.17 °/100ft Maximum Dogleg over Survey: 13.31 °/100ft at 4,332.00 ft

Net Tortousity applicable to Plans: 0.55 °/100ft Directional Difficulty Index: 6.212

Audit Info

North Reference Sheet for Sec 27-T34S-R07W - Croft Farms 3407 #27-2H - Wellbore #1

All data is in Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.

Vertical Depths are relative to WELL @ 1408.00ft (Nabors 180 (23')). Northing and Easting are relative to Croft Farms 3407 #27-2H

Coordinate System is US State Plane 1927 (Exact solution), Kansas South 1502 using datum NAD 1927 (NADCON CONUS), ellipsoid Clarke 1866

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is 98° 30' 0.000 W°, Longitude Origin:0° 0' 0.000 E°, Latitude Origin:37° 16' 0.000 N°

False Easting: 2,000,000.00ft, False Northing: 0.00ft, Scale Reduction: 1.00004592

Grid Coordinates of Well: 145,105.91 ft N, 2,128,598.67 ft E

Geographical Coordinates of Well: 37° 03' 51.63" N, 098° 03' 33.48" W

Grid Convergence at Surface is: 0.27°

Based upon Minimum Curvature type calculations, at a Measured Depth of 8,698.00ft the Bottom Hole Displacement is 4,624.42ft in the Direction of 172.03° (Grid).

Magnetic Convergence at surface is: -4.35° (7 November 2012, , BGGM2012)

