

Shell Exploration & Production Co. Inc.

Harper Co. KS (NAD-27)

Sec 27-T34S-R07W

Croft Farms 3407 #27-1H

API# 15-007-23927-01-00/ Job# 9858074/ Nabors 180

Wellbore #1

Survey: Survey #1

Sperry Drilling Services

Standard Report With Distance & X, Y Offsets to Plan

03 January, 2013

Well Coordinates: 145,105.97 N, 2,128,613.87 E (37° 03' 51.63" N, 098° 03' 33.29" W)

Ground Level: 1,385.00 ft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Centered on Well Croft Farms 3407 #27-1H

WELL @ 1408.0ft (Original Well Elev+23'KB)

N

Grid

API - US Survey Feet

Version: 2003.21 Build: 46

HALLIBURTON

HALLIBURTON**Survey Report for Croft Farms 3407 #27-1H - Survey #1**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Toolface Azimuth (°)	Build Rate (°/100ft)	Turn Rate (°/100ft)	Distance to Plan (ft)	Y Offset to Plan (ft)	X Offset to Plan (ft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
147.0	0.74	355.20	147.0	0.9	-0.1	0.9	0.50	355.20	0.50	0.00	0.00	0.00	0.00
209.0	1.19	359.57	209.0	2.0	-0.1	2.0	0.73	11.48	0.73	7.05	0.00	0.00	0.00
241.0	1.58	355.45	241.0	2.8	-0.2	2.8	1.26	-16.39	1.22	-12.88	0.00	0.00	0.00
272.0	2.30	2.24	272.0	3.8	-0.2	3.8	2.43	21.12	2.32	21.90	0.00	0.00	0.00
301.0	2.90	4.75	300.9	5.1	-0.1	5.1	2.11	12.00	2.07	8.66	0.00	0.00	0.00
332.0	3.20	1.51	331.9	6.8	0.0	6.8	1.12	-31.51	0.97	-10.45	0.00	0.00	0.00
363.0	3.67	15.50	362.8	8.6	0.3	8.6	3.09	67.82	1.52	45.13	0.00	0.00	0.00
394.0	3.79	4.25	393.8	10.6	0.6	10.6	2.39	-86.33	0.39	-36.29	0.00	0.00	0.00
425.0	3.92	4.00	424.7	12.6	0.8	12.6	0.42	-7.49	0.42	-0.81	0.00	0.00	0.00
550.0	4.58	4.48	549.4	21.9	1.5	21.8	0.53	3.32	0.53	0.38	0.00	0.00	0.00
611.0	5.96	12.96	610.1	27.4	2.4	27.3	2.59	33.71	2.26	13.90	0.00	0.00	0.00
705.0	4.75	0.89	703.7	36.0	3.5	36.0	1.75	-142.95	-1.29	-12.84	0.00	0.00	0.00
798.0	3.08	342.42	796.5	42.3	2.8	42.2	2.23	-151.92	-1.80	-19.86	0.00	0.00	0.00
892.0	1.14	347.95	890.4	45.6	1.9	45.6	2.07	176.77	-2.06	5.88	0.00	0.00	0.00
984.0	0.59	359.72	982.4	47.0	1.7	46.9	0.63	167.92	-0.60	12.79	0.00	0.00	0.00
1,077.0	0.70	338.88	1,075.4	48.0	1.5	47.9	0.28	-75.54	0.12	-22.41	0.00	0.00	0.00
1,268.0	0.09	267.67	1,266.4	49.1	0.9	49.0	0.35	-172.76	-0.32	-37.28	0.00	0.00	0.00
1,457.0	0.04	145.72	1,455.4	49.0	0.8	49.0	0.06	-163.02	-0.03	-64.52	0.00	0.00	0.00
1,647.0	0.22	109.26	1,645.4	48.8	1.2	48.8	0.10	-43.67	0.09	-19.19	0.00	0.00	0.00
1,836.0	0.13	112.25	1,834.4	48.6	1.7	48.6	0.05	175.70	-0.05	1.58	0.00	0.00	0.00
2,026.0	0.14	154.54	2,024.4	48.3	2.0	48.3	0.05	105.67	0.01	22.26	0.00	0.00	0.00
2,216.0	0.31	99.41	2,214.4	48.0	2.6	48.0	0.14	-81.67	0.09	-29.02	0.00	0.00	0.00
2,406.0	0.38	144.57	2,404.4	47.4	3.5	47.4	0.14	98.87	0.04	23.77	0.00	0.00	0.00
2,595.0	0.56	91.56	2,593.4	46.9	4.8	46.8	0.24	-95.50	0.10	-28.05	0.00	0.00	0.00
2,785.0	0.31	36.89	2,783.4	47.3	6.0	47.2	0.24	-146.40	-0.13	-28.77	0.00	0.00	0.00
2,975.0	0.28	4.98	2,973.4	48.2	6.4	48.0	0.09	-116.04	-0.02	-16.79	0.00	0.00	0.00
3,165.0	0.99	332.28	3,163.3	50.1	5.6	50.0	0.40	-44.04	0.37	-17.21	0.00	0.00	0.00
3,354.0	0.62	3.59	3,352.3	52.5	4.9	52.4	0.30	145.01	-0.20	16.57	0.00	0.00	0.00
3,544.0	0.60	35.47	3,542.3	54.4	5.6	54.3	0.18	109.22	-0.01	16.78	0.56	-0.12	-0.54
3,733.0	0.47	148.18	3,731.3	54.5	6.6	54.4	0.47	150.98	-0.07	59.64	2.51	-2.51	0.05
3,923.0	1.26	210.42	3,921.3	52.1	5.9	51.9	0.59	84.01	0.42	32.76	6.65	-5.41	3.87
4,112.0	0.35	77.27	4,110.3	50.4	5.4	50.3	0.80	-170.33	-0.48	-70.45	10.33	2.30	-10.07
4,144.0	0.43	128.17	4,142.3	50.3	5.6	50.2	1.07	103.29	0.25	159.06	10.73	-6.74	-8.35
4,175.0	0.56	68.97	4,173.3	50.3	5.9	50.2	1.62	-106.58	0.42	-190.97	11.09	3.65	-10.47
4,207.0	0.64	23.07	4,205.3	50.6	6.1	50.4	1.48	-104.00	0.25	-143.44	11.22	10.09	-4.90
4,238.0	2.02	25.73	4,236.3	51.2	6.4	51.1	4.45	3.89	4.45	8.58	10.92	9.45	-5.48

HALLIBURTON**Survey Report for Croft Farms 3407 #27-1H - Survey #1**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Toolface Azimuth (°)	Build Rate (°/100ft)	Turn Rate (°/100ft)	Distance to Plan (ft)	Y Offset to Plan (ft)	X Offset to Plan (ft)
4,270.0	4.59	15.29	4,268.2	52.9	7.0	52.8	8.22	-18.43	8.03	-32.63	10.16	9.34	-4.01
4,301.0	8.03	8.00	4,299.0	56.3	7.6	56.1	11.37	-16.75	11.10	-23.52	9.48	8.88	-3.33
4,333.0	12.31	5.26	4,330.5	61.9	8.2	61.7	13.46	-7.80	13.38	-8.56	8.42	7.67	-3.46
4,364.0	15.49	3.71	4,360.6	69.3	8.8	69.1	10.33	-7.43	10.26	-5.00	7.21	6.12	-3.82
4,396.0	18.23	1.91	4,391.2	78.6	9.2	78.4	8.72	-11.65	8.56	-5.63	6.22	4.63	-4.16
4,428.0	20.08	1.29	4,421.4	89.1	9.5	88.9	5.82	-6.57	5.78	-1.94	5.78	3.56	-4.56
4,459.0	22.52	359.57	4,450.3	100.3	9.6	100.1	8.12	-15.17	7.87	-5.55	5.69	3.14	-4.74
4,491.0	25.17	357.16	4,479.6	113.3	9.2	113.1	8.82	-21.29	8.28	-7.53	5.46	3.09	-4.50
4,522.0	27.97	358.12	4,507.3	127.1	8.6	126.9	9.14	9.15	9.03	3.10	5.22	3.01	-4.27
4,554.0	30.96	0.04	4,535.2	142.9	8.4	142.7	9.80	18.37	9.34	6.00	5.36	3.01	-4.44
4,586.0	33.44	0.98	4,562.3	159.9	8.6	159.7	7.91	11.82	7.75	2.94	6.00	3.32	-5.00
4,617.0	36.39	0.77	4,587.7	177.7	8.8	177.4	9.52	-2.42	9.52	-0.68	6.87	3.92	-5.64
4,649.0	39.54	0.93	4,612.9	197.3	9.1	197.1	9.85	1.85	9.84	0.50	7.83	4.56	-6.37
4,681.0	43.07	1.55	4,636.9	218.4	9.6	218.2	11.11	6.85	11.03	1.94	8.90	5.06	-7.32
4,712.0	46.24	0.91	4,659.0	240.2	10.1	240.0	10.33	-8.31	10.23	-2.06	9.91	5.53	-8.21
4,744.0	49.21	0.44	4,680.5	263.9	10.3	263.6	9.34	-6.84	9.28	-1.47	10.81	6.04	-8.97
4,776.0	52.38	0.17	4,700.7	288.7	10.5	288.4	9.93	-3.86	9.91	-0.84	11.65	6.58	-9.61
4,807.0	56.23	0.03	4,718.8	313.9	10.5	313.6	12.42	-1.73	12.42	-0.45	12.29	6.88	-10.18
4,839.0	60.42	0.61	4,735.6	341.1	10.7	340.8	13.18	6.87	13.09	1.81	12.79	6.61	-10.95
4,870.0	64.06	1.03	4,750.0	368.5	11.1	368.2	11.80	5.93	11.74	1.35	13.33	5.94	-11.93
4,902.0	67.61	0.51	4,763.1	397.7	11.4	397.4	11.19	-7.72	11.09	-1.63	13.87	5.06	-12.91
4,934.0	71.22	359.48	4,774.4	427.7	11.4	427.3	11.68	-15.14	11.28	-3.22	14.09	3.99	-13.52
4,965.0	75.74	358.80	4,783.2	457.4	11.0	457.0	14.73	-8.31	14.58	-2.19	13.91	2.40	-13.70
4,997.0	79.81	358.43	4,790.0	488.6	10.2	488.3	12.77	-5.12	12.72	-1.16	13.63	0.08	-13.63
5,029.0	82.92	358.16	4,794.8	520.2	9.3	519.9	9.75	-4.93	9.72	-0.84	13.61	-2.47	-13.39
5,060.0	85.19	358.06	4,798.0	551.1	8.3	550.8	7.33	-2.51	7.32	-0.32	13.87	-4.71	-13.05
5,092.0	86.95	358.80	4,800.2	583.0	7.4	582.7	5.96	22.78	5.50	2.31	14.37	-6.39	-12.87
5,123.0	87.69	358.80	4,801.6	613.9	6.8	613.7	2.39	0.00	2.39	0.00	14.67	-6.96	-12.91
5,155.0	88.68	358.87	4,802.7	645.9	6.1	645.6	3.10	4.04	3.09	0.22	14.44	-6.35	-12.97
5,257.0	91.35	359.04	4,802.6	747.9	4.2	747.6	2.62	3.64	2.62	0.17	14.81	-6.37	-13.37
5,350.0	89.91	359.29	4,801.6	840.9	2.9	840.6	1.57	170.15	-1.55	0.27	15.90	-7.40	-14.07
5,444.0	90.12	359.77	4,801.6	934.9	2.1	934.6	0.56	66.37	0.22	0.51	17.08	-7.42	-15.38
5,537.0	89.51	359.34	4,801.9	1,027.9	1.4	1,027.6	0.80	-144.82	-0.66	-0.46	18.18	-7.12	-16.72
5,631.0	88.12	358.64	4,803.8	1,121.8	-0.3	1,121.6	1.66	-153.28	-1.48	-0.74	17.92	-5.18	-17.15
5,723.0	89.32	358.37	4,805.9	1,213.8	-2.7	1,213.6	1.34	-12.68	1.30	-0.29	17.08	-3.12	-16.79
5,816.0	90.19	358.36	4,806.3	1,306.7	-5.3	1,306.5	0.94	-0.66	0.94	-0.01	16.42	-2.73	-16.20
5,911.0	89.97	358.34	4,806.1	1,401.7	-8.1	1,401.5	0.23	-174.81	-0.23	-0.02	15.83	-2.86	-15.57
6,006.0	90.25	358.34	4,806.0	1,496.6	-10.8	1,496.5	0.29	0.00	0.29	0.00	15.23	-3.04	-14.92
6,101.0	90.77	358.33	4,805.1	1,591.6	-13.6	1,591.5	0.55	-1.10	0.55	-0.01	14.78	-3.89	-14.26

HALLIBURTON**Survey Report for Croft Farms 3407 #27-1H - Survey #1**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Toolface Azimuth (°)	Build Rate (°/100ft)	Turn Rate (°/100ft)	Distance to Plan (ft)	Y Offset to Plan (ft)	X Offset to Plan (ft)
6,196.0	90.00	357.83	4,804.5	1,686.5	-16.7	1,686.5	0.97	-147.00	-0.81	-0.53	13.94	-4.53	-13.19
6,291.0	90.68	358.27	4,803.9	1,781.5	-20.0	1,781.5	0.85	32.90	0.72	0.46	13.09	-5.09	-12.06
6,386.0	89.72	358.21	4,803.6	1,876.4	-22.9	1,876.5	1.01	-176.42	-1.01	-0.06	12.48	-5.42	-11.25
6,481.0	90.65	358.55	4,803.3	1,971.4	-25.6	1,971.5	1.04	20.08	0.98	0.36	12.11	-5.73	-10.67
6,576.0	86.85	359.76	4,805.3	2,066.3	-27.0	2,066.5	4.20	162.35	-4.00	1.27	11.94	-3.66	-11.37
6,670.0	88.49	358.32	4,809.2	2,160.2	-28.6	2,160.4	2.32	-41.29	1.74	-1.53	11.88	0.17	-11.88
6,765.0	88.40	356.61	4,811.7	2,255.1	-32.8	2,255.3	1.80	-93.04	-0.09	-1.80	10.16	2.75	-9.78
6,860.0	89.07	357.16	4,813.8	2,349.9	-37.9	2,350.2	0.91	39.38	0.71	0.58	8.28	4.84	-6.72
6,955.0	90.25	357.64	4,814.4	2,444.8	-42.2	2,445.2	1.34	22.14	1.24	0.51	7.04	5.41	-4.52
7,050.0	91.20	358.16	4,813.2	2,539.8	-45.7	2,540.2	1.14	28.69	1.00	0.55	5.25	4.20	-3.14
7,145.0	88.28	359.45	4,813.6	2,634.7	-47.7	2,635.2	3.36	156.17	-3.07	1.36	5.67	4.63	-3.27
7,239.0	88.58	359.38	4,816.2	2,728.7	-48.7	2,729.1	0.33	-13.13	0.32	-0.07	8.44	7.21	-4.39
7,334.0	90.25	358.22	4,817.2	2,823.7	-50.6	2,824.1	2.14	-34.79	1.76	-1.22	9.34	8.18	-4.50
7,429.0	90.58	357.77	4,816.5	2,918.6	-54.0	2,919.1	0.59	-53.74	0.35	-0.47	8.18	7.49	-3.29
7,524.0	89.63	357.79	4,816.3	3,013.5	-57.6	3,014.1	1.00	178.79	-1.00	0.02	7.51	7.32	-1.71
7,619.0	89.10	356.80	4,817.4	3,108.4	-62.1	3,109.0	1.18	-118.17	-0.56	-1.04	8.40	8.37	0.67
7,714.0	92.94	358.05	4,815.7	3,203.3	-66.4	3,204.0	4.25	18.02	4.04	1.32	7.26	6.68	2.83
7,809.0	92.22	359.30	4,811.4	3,298.2	-68.6	3,298.9	1.52	119.94	-0.76	1.32	3.78	2.40	2.92
7,904.0	90.03	358.90	4,809.5	3,393.1	-70.1	3,393.9	2.34	-169.65	-2.31	-0.42	2.37	0.54	2.31
7,999.0	90.06	358.92	4,809.5	3,488.1	-71.9	3,488.9	0.04	33.69	0.03	0.02	2.06	0.46	2.01
8,094.0	90.62	358.67	4,808.9	3,583.1	-73.9	3,583.9	0.65	-24.06	0.59	-0.26	1.91	-0.10	1.90
8,188.0	89.48	359.38	4,808.8	3,677.1	-75.5	3,677.9	1.43	148.08	-1.21	0.76	1.43	-0.18	1.42
8,283.0	89.78	359.49	4,809.4	3,772.1	-76.4	3,772.8	0.34	20.14	0.32	0.12	0.50	0.43	0.25
8,378.0	90.31	359.22	4,809.4	3,867.1	-77.5	3,867.8	0.63	-27.00	0.56	-0.28	0.86	0.36	-0.78
8,473.0	90.65	359.48	4,808.6	3,962.1	-78.6	3,962.8	0.45	37.40	0.36	0.27	1.86	-0.44	-1.81
8,568.0	90.03	0.01	4,808.0	4,057.0	-79.0	4,057.8	0.86	139.47	-0.65	0.56	3.64	-1.00	-3.49
8,663.0	90.37	0.29	4,807.7	4,152.0	-78.7	4,152.8	0.46	39.47	0.36	0.29	6.00	-1.33	-5.85

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
9,706.0	4,815.8	5,194.0	-94.6	Final MWD Survey
9,777.0	4,815.1	5,264.8	-100.0	Final survey is a straight line projection to the bit

Survey Report for Croft Farms 3407 #27-1H - Survey #1

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (ft)	Origin +E/-W (ft)	Start TVD (ft)
Target	Croft Farms 3407 #27-1H BHL	358.81	Slot	0.0	0.0	0.0

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
147.0	9,777.0	Survey #1	MWD+SC

Targets associated with this design

Target Name	TVD (')	+N/-S (')	+E/-W (')	Shape

Directional Difficulty Index

Average Dogleg over Survey:	1.73 °/100ft	Maximum Dogleg over Survey:	14.73 °/100ft at 4,965.0 ft
Net Tortosity applicable to Plans:	0.63 °/100ft	Directional Difficulty Index:	6.259

Audit Info

North Reference Sheet for Sec 27-T34S-R07W - Croft Farms 3407 #27-1H - 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 @ 1408.0ft (Original Well Elev+23'KB). Northing and Easting are relative to Croft Farms 3407 #27-1H

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 -98.50°, 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: 145,105.97 ft N, 2,128,613.87 ft E

Geographical Coordinates of Well: 37° 03' 51.63" N, 098° 03' 33.29" W

Grid Convergence at Surface is: 0.27°

Based upon Minimum Curvature type calculations, at a Measured Depth of 8,663.00ft
the Bottom Hole Displacement is 4,152.80ft in the Direction of 358.91° (Grid).

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

