

Shell Exploration & Production Co. Inc.

Harper Co. KS (NAD-27)

Sec 30-T34S-R07W

Croft Farms 3407 #30-1H/ Job#9281846 / Nabors 774

Wellbore #1

Design: Wellbore #1

Sperry Drilling Services

Combo Report With Grid North & True North

27 July, 2012

Well Coordinates: 140,456.71 N, 2,109,796.88 E (37° 03' 06.48" N, 098° 07' 25.67" W)

Ground Level: 1,329.00 ft

Local Coordinate Origin:	Centered on Well Croft Farms 3407 #30-1H/ Job#9281846 / Nabors 774
Viewing Datum:	WELL @ 1350.68ft (Original Well Elev)
TVDs to System:	N
North Reference:	True
Unit System:	API-US-new

Version: 2003.21 Build: 43

HALLIBURTON

Design Report for Croft Farms 3407 #30-1H/ Job#9281846 / Nabors 774 - 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	359.77	0.00	1,350.68	0.00	0.00 N	0.00 E	140,456.71	2,109,796.88	0.00	0.00	
144.00	0.46	250.36	250.59	1,206.68	144.00	0.19 S	0.55 W	140,456.52	2,109,796.34	0.32	-0.18	First MWD Survey
205.00	0.87	296.68	296.91	1,145.69	204.99	0.06 S	1.19 W	140,456.64	2,109,795.69	1.06	-0.05	
267.00	2.29	329.27	329.50	1,083.71	266.97	1.22 N	2.24 W	140,457.92	2,109,794.64	2.62	1.25	
328.00	4.17	350.57	350.80	1,022.81	327.87	4.46 N	3.21 W	140,461.15	2,109,793.65	3.61	4.50	
389.00	6.08	355.29	355.52	962.05	388.63	9.87 N	3.82 W	140,466.56	2,109,793.02	3.20	9.92	
451.00	6.77	355.91	356.14	900.44	450.24	16.79 N	4.32 W	140,473.48	2,109,792.49	1.12	16.85	
512.00	6.54	356.39	356.62	839.85	510.83	23.84 N	4.77 W	140,480.53	2,109,792.02	0.39	23.91	
604.00	4.97	353.14	353.37	748.32	602.36	33.03 N	5.54 W	140,489.72	2,109,791.21	1.74	33.11	
696.00	3.85	353.94	354.17	656.59	694.09	40.06 N	6.31 W	140,496.75	2,109,790.41	1.22	40.15	
731.00	3.55	355.17	355.40	621.67	729.01	42.31 N	6.52 W	140,498.99	2,109,790.19	0.89	42.40	
898.00	2.89	357.25	357.48	454.93	895.75	51.67 N	7.12 W	140,508.35	2,109,789.56	0.40	51.77	
990.00	2.38	356.53	356.76	363.03	987.65	55.90 N	7.33 W	140,512.57	2,109,789.33	0.56	56.00	
1,082.00	2.34	351.81	352.04	271.11	1,079.57	59.66 N	7.69 W	140,516.34	2,109,788.95	0.22	59.77	
1,174.00	1.58	334.52	334.75	179.16	1,171.52	62.67 N	8.50 W	140,519.34	2,109,788.13	1.04	62.79	
1,267.00	0.68	263.65	263.88	86.18	1,264.50	63.77 N	9.59 W	140,520.44	2,109,787.03	1.61	63.91	
1,359.00	0.75	221.20	221.43	-5.82	1,356.50	63.26 N	10.53 W	140,519.93	2,109,786.09	0.57	63.41	
1,451.00	0.87	197.13	197.36	-97.81	1,448.49	62.14 N	11.14 W	140,518.81	2,109,785.49	0.39	62.30	
1,543.00	0.87	203.94	204.17	-189.80	1,540.48	60.84 N	11.63 W	140,517.50	2,109,785.00	0.11	61.00	
1,638.00	0.62	214.20	214.43	-284.79	1,635.47	59.76 N	12.22 W	140,516.42	2,109,784.42	0.30	59.93	
1,732.00	0.69	194.94	195.17	-378.78	1,729.46	58.79 N	12.65 W	140,515.45	2,109,783.99	0.24	58.97	
1,827.00	0.53	215.27	215.50	-473.78	1,824.46	57.88 N	13.06 W	140,514.54	2,109,783.59	0.28	58.07	
1,921.00	0.46	199.63	199.86	-567.77	1,918.45	57.17 N	13.44 W	140,513.83	2,109,783.21	0.16	57.37	
2,016.00	0.59	200.08	200.31	-662.77	2,013.45	56.36 N	13.74 W	140,513.01	2,109,782.91	0.14	56.55	
2,110.00	0.44	207.09	207.32	-756.77	2,107.45	55.58 N	14.07 W	140,512.23	2,109,782.58	0.17	55.78	
2,205.00	0.20	198.26	198.49	-851.76	2,202.44	55.10 N	14.29 W	140,511.75	2,109,782.36	0.26	55.31	
2,299.00	0.33	170.30	170.53	-945.76	2,296.44	54.68 N	14.30 W	140,511.33	2,109,782.36	0.19	54.88	
2,394.00	0.25	195.02	195.25	-1,040.76	2,391.44	54.21 N	14.31 W	140,510.86	2,109,782.35	0.15	54.41	
2,489.00	0.28	187.76	187.99	-1,135.76	2,486.44	53.78 N	14.40 W	140,510.43	2,109,782.27	0.05	53.98	
2,583.00	0.34	222.22	222.45	-1,229.76	2,580.44	53.34 N	14.62 W	140,509.99	2,109,782.05	0.20	53.55	
2,678.00	0.22	258.79	259.02	-1,324.76	2,675.44	53.10 N	14.99 W	140,509.75	2,109,781.68	0.22	53.32	
2,772.00	0.10	328.60	328.83	-1,418.76	2,769.44	53.14 N	15.21 W	140,509.78	2,109,781.46	0.22	53.36	
2,867.00	0.15	285.97	286.20	-1,513.76	2,864.44	53.24 N	15.37 W	140,509.89	2,109,781.30	0.11	53.46	
2,961.00	0.29	223.95	224.18	-1,607.76	2,958.44	53.11 N	15.65 W	140,509.75	2,109,781.01	0.27	53.33	
3,056.00	0.28	195.94	196.17	-1,702.76	3,053.44	52.71 N	15.88 W	140,509.36	2,109,780.78	0.15	52.94	
3,150.00	0.32	165.14	165.37	-1,796.76	3,147.44	52.24 N	15.88 W	140,508.88	2,109,780.79	0.17	52.47	
3,245.00	0.59	155.35	155.58	-1,891.75	3,242.43	51.53 N	15.61 W	140,508.18	2,109,781.06	0.29	51.76	

Design Report for Croft Farms 3407 #30-1H/ Job#9281846 / Nabors 774 - 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			
3,339.00	0.35	139.17	139.40	-1,985.75	3,336.43	50.88 N	15.23 W	140,507.52	2,109,781.45	0.29	51.10	
3,434.00	0.20	154.95	155.18	-2,080.75	3,431.43	50.50 N	14.97 W	140,507.15	2,109,781.71	0.18	50.72	
3,528.00	0.22	158.48	158.71	-2,174.75	3,525.43	50.19 N	14.83 W	140,506.84	2,109,781.84	0.03	50.40	
3,623.00	0.29	97.67	97.90	-2,269.75	3,620.43	49.98 N	14.53 W	140,506.64	2,109,782.15	0.28	50.19	
3,718.00	1.13	68.57	68.80	-2,364.74	3,715.42	50.29 N	13.42 W	140,506.95	2,109,783.26	0.93	50.48	
3,812.00	1.16	56.95	57.18	-2,458.72	3,809.40	51.14 N	11.75 W	140,507.80	2,109,784.92	0.25	51.31	
3,907.00	0.76	64.34	64.57	-2,553.71	3,904.39	51.93 N	10.38 W	140,508.60	2,109,786.29	0.44	52.08	
3,970.00	0.97	27.37	27.60	-2,616.70	3,967.38	52.59 N	9.75 W	140,509.26	2,109,786.92	0.93	52.72	
4,001.00	3.45	16.12	16.35	-2,647.67	3,998.35	53.71 N	9.37 W	140,510.38	2,109,787.30	8.08	53.85	
4,033.00	7.82	16.30	16.53	-2,679.51	4,030.19	56.73 N	8.48 W	140,513.40	2,109,788.17	13.66	56.84	
4,064.00	11.90	16.97	17.20	-2,710.05	4,060.73	61.80 N	6.93 W	140,518.48	2,109,789.70	13.17	61.90	
4,096.00	15.51	21.03	21.26	-2,741.13	4,091.81	68.94 N	4.40 W	140,525.64	2,109,792.20	11.67	69.00	
4,127.00	17.60	23.83	24.06	-2,770.85	4,121.53	77.09 N	0.99 W	140,533.79	2,109,795.58	7.21	77.09	
4,159.00	18.55	24.74	24.97	-2,801.27	4,151.95	86.12 N	3.13 E	140,542.84	2,109,799.66	3.10	86.06	
4,190.00	19.96	23.99	24.22	-2,830.53	4,181.21	95.42 N	7.38 E	140,552.15	2,109,803.88	4.62	95.30	
4,222.00	22.44	23.04	23.27	-2,860.36	4,211.04	106.01 N	12.04 E	140,562.77	2,109,808.49	7.82	105.82	
4,253.00	26.12	22.30	22.53	-2,888.62	4,239.30	117.75 N	16.99 E	140,574.53	2,109,813.40	11.91	117.49	
4,285.00	29.58	21.80	22.03	-2,916.91	4,267.59	131.58 N	22.66 E	140,588.38	2,109,819.00	10.84	131.23	
4,317.00	32.95	20.81	21.04	-2,944.26	4,294.94	147.03 N	28.74 E	140,603.86	2,109,825.03	10.65	146.59	
4,348.00	35.06	18.96	19.19	-2,969.95	4,320.63	163.31 N	34.70 E	140,620.16	2,109,830.92	7.58	162.78	
4,380.00	36.35	16.32	16.55	-2,995.94	4,346.62	181.08 N	40.42 E	140,637.96	2,109,836.57	6.28	180.46	
4,411.00	37.63	13.51	13.74	-3,020.70	4,371.38	199.09 N	45.29 E	140,655.98	2,109,841.36	6.84	198.39	
4,443.00	39.50	11.84	12.07	-3,045.72	4,396.40	218.53 N	49.74 E	140,675.44	2,109,845.73	6.69	217.77	
4,474.00	40.67	9.87	10.10	-3,069.44	4,420.12	238.12 N	53.57 E	140,695.04	2,109,849.49	5.57	237.30	
4,506.00	42.27	8.49	8.72	-3,093.42	4,444.10	259.02 N	57.03 E	140,715.96	2,109,852.86	5.76	258.15	
4,537.00	43.80	7.24	7.47	-3,116.08	4,466.76	279.97 N	60.01 E	140,736.92	2,109,855.76	5.65	279.05	
4,569.00	45.24	5.60	5.83	-3,138.89	4,489.57	302.25 N	62.60 E	140,759.21	2,109,858.26	5.76	301.29	
4,600.00	48.05	3.88	4.11	-3,160.17	4,510.85	324.70 N	64.54 E	140,781.67	2,109,860.11	9.92	323.71	
4,632.00	50.94	2.10	2.33	-3,180.96	4,531.64	348.99 N	65.90 E	140,805.96	2,109,861.37	9.97	347.98	
4,663.00	52.36	0.37	0.60	-3,200.19	4,550.87	373.29 N	66.52 E	140,830.27	2,109,861.89	6.34	372.27	
4,695.00	53.70	359.08	359.31	-3,219.44	4,570.12	398.86 N	66.50 E	140,855.83	2,109,861.77	5.28	397.83	
4,758.00	58.29	356.97	357.20	-3,254.66	4,605.34	451.04 N	64.88 E	140,908.01	2,109,859.94	7.80	450.03	
4,852.00	58.92	357.31	357.54	-3,303.63	4,654.31	531.19 N	61.20 E	140,988.15	2,109,855.94	0.74	530.23	
4,915.00	60.21	359.06	359.29	-3,335.55	4,686.23	585.49 N	59.70 E	141,042.43	2,109,854.22	3.15	584.54	
4,947.00	62.46	1.53	1.76	-3,350.90	4,701.58	613.56 N	59.97 E	141,070.51	2,109,854.37	9.76	612.60	
4,979.00	64.89	3.31	3.54	-3,365.09	4,715.77	642.21 N	61.30 E	141,099.16	2,109,855.59	9.08	641.23	
5,010.00	66.92	4.13	4.36	-3,377.74	4,728.42	670.44 N	63.25 E	141,127.39	2,109,857.42	6.98	669.42	



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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			
5,042.00	70.91	4.71	4.94	-3,389.25	4,739.93	700.19 N	65.67 E	141,157.16	2,109,859.73	12.58	699.14	
5,073.00	73.87	5.82	6.05	-3,398.63	4,749.31	729.60 N	68.50 E	141,186.58	2,109,862.44	10.14	728.50	
5,105.00	77.16	5.59	5.82	-3,406.63	4,757.31	760.41 N	71.71 E	141,217.40	2,109,865.52	10.30	759.26	
5,136.00	80.16	4.75	4.98	-3,412.73	4,763.41	790.67 N	74.56 E	141,247.67	2,109,868.25	10.04	789.47	
5,168.00	83.47	3.67	3.90	-3,417.28	4,767.96	822.24 N	77.01 E	141,279.25	2,109,870.58	10.87	821.01	Last MWD Survey

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
144.00	144.00	-0.19	-0.55	First MWD Survey
5,168.00	4,767.96	822.24	77.01	Last MWD Survey

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (ft)	Origin +E/-W (ft)	Start TVD (ft)
User	No Target (Freehand)	359.15	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
144.00	5,168.00	MWD Survey	MWD+SC

Design Targets

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

Design Report for Croft Farms 3407 #30-1H/ Job#9281846 / Nabors 774 - Wellbore #1

Directional Difficulty Index

Average Dogleg over Survey: 2.18 °/100ft

Maximum Dogleg over Survey: 13.66 °/100ft at 4,033.00 ft

Net Tortosity applicable to Plans: 0.14 °/100ft

Directional Difficulty Index: 5.028

Audit Info

North Reference Sheet for Sec 30-T34S-R07W - Croft Farms 3407 #30-1H/ Job#9281846 / Nabors 774 - Wellbore #1

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

Vertical Depths are relative to WELL @ 1350.68ft (Original Well Elev). Northing and Easting are relative to Croft Farms 3407 #30-1H/ Job#9281846 / Nabors 774

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: 1.00004918

Grid Coordinates of Well: 140,456.71 ft N, 2,109,796.88 ft E

Geographical Coordinates of Well: 37° 03' 06.48" N, 098° 07' 25.67" W

Grid Convergence at Surface is: 0.23°

Based upon Minimum Curvature type calculations, at a Measured Depth of 5,168.00ft the Bottom Hole Displacement is 825.84ft in the Direction of 5.35° (True).

Magnetic Convergence at surface is: -4.53° (27 April 2012, , BGGM2011)

