

# Shell Exploration & Production Co. Inc.

Harper Co. (NAD-27)

Sec 14-T33S-R07W

Lockwood Farms 3307 14-1H/ Job# 9199477/ Nabors 102

Wellbore #1

Design: Wellbore #1

## Sperry Drilling Services

# Combo Report With Grid North & True North

03 April, 2012

Well Coordinates: 182,652.63 N, 2,129,423.39 E (37° 10' 02.82" N, 098° 03' 21.10" W)

Ground Level: 1,350.40 ft

Local Coordinate Origin:	Centered on Well Lockwood Farms 3307 14-1H/ Job# 9199477/ Nabors 102
Viewing Datum:	WELL @ 1382.10ft (Original Well Elev)
TVDs to System:	N
North Reference:	True
Unit System:	API-US New

Version: 2003.21 Build: 43

**HALLIBURTON**

## Design Report for Lockwood Farms 3307 14-1H/ Job# 9199477/ Nabors 102 - 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	359.71	0.00	-1,382.10	0.00	0.00 N	0.00 E	182,652.63	2,129,423.39	0.00	0.00	
200.00	0.73	244.18	244.47	-1,182.11	199.99	0.55 S	1.15 W	182,652.08	2,129,422.24	0.37	1.26	First MWD Survey
265.00	0.26	257.96	258.25	-1,117.11	264.99	0.76 S	1.67 W	182,651.87	2,129,421.72	0.74	1.81	
355.00	0.54	257.39	257.68	-1,027.11	354.99	0.89 S	2.28 W	182,651.73	2,129,421.11	0.31	2.44	
416.00	0.33	244.22	244.51	-966.11	415.99	1.03 S	2.72 W	182,651.59	2,129,420.67	0.38	2.90	
508.00	0.03	62.75	63.04	-874.11	507.99	1.13 S	2.94 W	182,651.49	2,129,420.45	0.39	3.14	
601.00	0.30	304.47	304.76	-781.11	600.99	0.98 S	3.12 W	182,651.64	2,129,420.28	0.34	3.27	
654.00	0.09	206.75	207.04	-728.11	653.99	0.94 S	3.25 W	182,651.68	2,129,420.14	0.61	3.38	
761.00	0.20	300.87	301.16	-621.11	760.99	0.92 S	3.45 W	182,651.70	2,129,419.94	0.21	3.57	
915.00	0.23	85.09	85.38	-467.11	914.99	0.75 S	3.37 W	182,651.86	2,129,420.02	0.27	3.45	
1,098.00	0.40	42.67	42.96	-284.12	1,097.98	0.25 S	2.57 W	182,652.36	2,129,420.82	0.15	2.54	
1,289.00	0.19	261.74	262.03	-93.12	1,288.98	0.19 N	2.43 W	182,652.81	2,129,420.96	0.29	2.28	
1,481.00	0.09	63.68	63.97	98.88	1,480.98	0.21 N	2.61 W	182,652.83	2,129,420.78	0.14	2.45	
1,673.00	0.44	83.26	83.55	290.88	1,672.98	0.36 N	1.74 W	182,652.98	2,129,421.65	0.19	1.57	
1,865.00	0.57	142.46	142.75	482.87	1,864.97	0.32 S	0.43 W	182,652.31	2,129,422.96	0.27	0.50	
2,057.00	0.53	157.77	158.06	674.86	2,056.96	1.90 S	0.48 E	182,650.73	2,129,423.88	0.08	0.07	
2,248.00	0.18	130.94	131.23	865.86	2,247.96	2.92 S	1.04 E	182,649.72	2,129,424.44	0.20	-0.19	
2,439.00	0.30	90.29	90.58	1,056.86	2,438.96	3.12 S	1.76 E	182,649.52	2,129,425.16	0.11	-0.83	
2,630.00	0.69	131.46	131.75	1,247.85	2,629.95	3.89 S	3.12 E	182,648.75	2,129,426.53	0.26	-1.92	
2,821.00	0.63	186.54	186.83	1,438.84	2,820.94	5.70 S	3.85 E	182,646.95	2,129,427.27	0.32	-2.12	
3,013.00	0.51	187.49	187.78	1,630.83	3,012.93	7.60 S	3.61 E	182,645.05	2,129,427.04	0.06	-1.36	
3,205.00	0.37	162.31	162.60	1,822.83	3,204.93	9.03 S	3.68 E	182,643.62	2,129,427.11	0.12	-1.03	
3,396.00	0.07	73.97	74.26	2,013.82	3,395.92	9.59 S	3.98 E	182,643.06	2,129,427.41	0.20	-1.16	
3,588.00	0.03	258.84	259.13	2,205.82	3,587.92	9.57 S	4.04 E	182,643.08	2,129,427.48	0.05	-1.23	
3,652.00	0.39	247.69	247.98	2,269.82	3,651.92	9.65 S	3.82 E	182,643.00	2,129,427.26	0.56	-1.00	
3,684.00	0.19	304.23	304.52	2,301.82	3,683.92	9.66 S	3.68 E	182,642.99	2,129,427.11	1.02	-0.86	
3,716.00	1.25	202.02	202.31	2,333.82	3,715.92	9.96 S	3.50 E	182,642.69	2,129,426.94	4.07	-0.61	
3,748.00	2.98	182.50	182.79	2,365.80	3,747.90	11.11 S	3.33 E	182,641.54	2,129,426.77	5.78	-0.12	
3,780.00	4.33	185.29	185.58	2,397.73	3,779.83	13.14 S	3.17 E	182,639.50	2,129,426.62	4.25	0.60	
3,812.00	6.00	185.73	186.02	2,429.60	3,811.70	16.01 S	2.88 E	182,636.64	2,129,426.34	5.22	1.67	
3,845.00	8.24	187.62	187.91	2,462.35	3,844.45	20.07 S	2.37 E	182,632.58	2,129,425.86	6.82	3.28	
3,877.00	10.90	186.07	186.36	2,493.90	3,876.00	25.35 S	1.72 E	182,627.29	2,129,425.23	8.35	5.37	
3,909.00	13.06	185.71	186.00	2,525.20	3,907.30	31.95 S	1.01 E	182,620.69	2,129,424.55	6.75	7.89	
3,941.00	15.55	186.06	186.35	2,556.20	3,938.30	39.81 S	0.16 E	182,612.82	2,129,423.73	7.79	10.89	
3,973.00	18.62	187.07	187.36	2,586.79	3,968.89	49.14 S	0.97 W	182,603.49	2,129,422.65	9.64	14.56	
4,005.00	21.79	186.49	186.78	2,616.81	3,998.91	60.11 S	2.33 W	182,592.51	2,129,421.35	9.93	18.90	
4,037.00	25.12	185.68	185.97	2,646.17	4,028.27	72.77 S	3.74 W	182,579.85	2,129,420.00	10.45	23.76	

**Design Report for Lockwood Farms 3307 14-1H/ Job# 9199477/ Nabors 102 - 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			
4,069.00	28.03	185.47	185.76	2,674.78	4,056.88	87.00 S	5.20 W	182,565.60	2,129,418.60	9.10	29.11	
4,100.00	28.56	186.84	187.13	2,702.08	4,084.18	101.61 S	6.85 W	182,550.99	2,129,417.02	2.70	34.75	
4,133.00	29.18	186.58	186.87	2,730.98	4,113.08	117.42 S	8.79 W	182,535.17	2,129,415.16	1.92	41.00	
4,164.00	30.16	185.52	185.81	2,757.91	4,140.01	132.67 S	10.48 W	182,519.91	2,129,413.54	3.59	46.85	
4,196.00	31.73	184.75	185.04	2,785.36	4,167.46	149.05 S	12.04 W	182,503.52	2,129,412.06	5.06	52.88	
4,228.00	34.10	183.96	184.25	2,812.22	4,194.32	166.38 S	13.44 W	182,486.19	2,129,410.74	7.53	59.04	
4,260.00	36.14	181.90	182.19	2,838.39	4,220.49	184.76 S	14.47 W	182,467.81	2,129,409.80	7.37	65.12	
4,292.00	38.13	180.02	180.31	2,863.90	4,246.00	204.07 S	14.88 W	182,448.49	2,129,409.48	7.16	70.87	
4,326.00	40.37	179.54	179.83	2,890.23	4,272.33	225.58 S	14.90 W	182,426.98	2,129,409.56	6.65	76.86	
4,358.00	43.44	180.32	180.61	2,914.04	4,296.14	246.95 S	14.99 W	182,405.61	2,129,409.57	9.73	82.86	
4,390.00	46.70	181.62	181.91	2,936.64	4,318.74	269.59 S	15.50 W	182,382.97	2,129,409.18	10.59	89.63	
4,422.00	50.38	180.81	181.10	2,957.83	4,339.93	293.56 S	16.12 W	182,358.99	2,129,408.67	11.66	96.87	
4,454.00	53.62	180.97	181.26	2,977.52	4,359.62	318.77 S	16.64 W	182,333.78	2,129,408.27	10.13	104.36	
4,486.00	56.63	180.91	181.20	2,995.82	4,377.92	345.01 S	17.20 W	182,307.54	2,129,407.83	9.41	112.18	
4,518.00	59.15	180.45	180.74	3,012.83	4,394.93	372.11 S	17.66 W	182,280.44	2,129,407.50	7.97	120.13	
4,582.00	64.60	178.10	178.39	3,042.99	4,425.09	428.53 S	17.20 W	182,224.03	2,129,408.23	9.11	135.33	
4,646.00	66.27	178.45	178.74	3,069.59	4,451.69	486.71 S	15.75 W	182,165.85	2,129,409.96	2.66	150.06	
4,678.00	66.46	178.51	178.80	3,082.42	4,464.52	516.02 S	15.12 W	182,136.54	2,129,410.73	0.62	157.58	
4,710.00	66.56	178.27	178.56	3,095.18	4,477.28	545.36 S	14.44 W	182,107.21	2,129,411.54	0.76	165.06	
4,742.00	67.27	178.91	179.20	3,107.73	4,489.83	574.80 S	13.87 W	182,077.78	2,129,412.26	2.88	172.67	
4,774.00	69.10	178.94	179.23	3,119.62	4,501.72	604.50 S	13.46 W	182,048.07	2,129,412.81	5.72	180.51	
4,806.00	71.52	179.00	179.29	3,130.40	4,512.50	634.62 S	13.07 W	182,017.95	2,129,413.34	7.56	188.49	
4,838.00	73.99	179.18	179.47	3,139.88	4,521.98	665.18 S	12.74 W	181,987.40	2,129,413.82	7.74	196.65	
4,869.00	76.57	179.82	180.11	3,147.76	4,529.86	695.16 S	12.63 W	181,957.42	2,129,414.07	8.56	204.85	
4,901.00	78.36	179.57	179.86	3,154.70	4,536.80	726.40 S	12.62 W	181,926.18	2,129,414.22	5.65	213.50	
4,933.00	80.24	178.99	179.28	3,160.65	4,542.75	757.84 S	12.39 W	181,894.74	2,129,414.61	6.14	221.99	
4,965.00	82.25	178.68	178.97	3,165.52	4,547.62	789.46 S	11.90 W	181,863.12	2,129,415.24	6.35	230.29	
4,997.00	84.14	178.91	179.20	3,169.31	4,551.41	821.23 S	11.40 W	181,831.36	2,129,415.90	5.95	238.61	
5,093.00	88.89	178.55	178.84	3,175.14	4,557.24	917.01 S	9.76 W	181,735.59	2,129,418.00	4.96	263.59	
5,193.00	90.49	178.25	178.54	3,175.68	4,557.78	1,016.98 S	7.47 W	181,635.63	2,129,420.76	1.63	289.11	
5,287.00	90.55	177.52	177.81	3,174.83	4,556.93	1,110.93 S	4.48 W	181,541.70	2,129,424.20	0.78	312.28	
5,379.00	88.74	178.30	178.59	3,175.40	4,557.50	1,202.88 S	1.59 W	181,449.76	2,129,427.53	2.14	334.99	
5,502.00	90.52	178.83	179.12	3,176.19	4,558.29	1,325.84 S	0.87 E	181,326.81	2,129,430.57	1.51	366.72	
5,594.00	89.08	178.35	178.64	3,176.51	4,558.61	1,417.82 S	2.67 E	181,234.84	2,129,432.81	1.65	390.49	
5,686.00	88.31	179.08	179.37	3,178.61	4,560.71	1,509.78 S	4.27 E	181,142.89	2,129,434.84	1.15	414.45	
5,779.00	86.88	178.47	178.76	3,182.51	4,564.61	1,602.69 S	5.78 E	181,049.99	2,129,436.80	1.67	438.75	
5,871.00	87.91	178.34	178.63	3,186.69	4,568.79	1,694.57 S	7.87 E	180,958.13	2,129,439.33	1.13	462.21	

**Design Report for Lockwood Farms 3307 14-1H/ Job# 9199477/ Nabors 102 - Wellbore #1**

Measured Depth (ft)	Inclination (°)	Grid Azimuth (°)	True Azimuth (°)	TVD below System (ft)	Vertical Depth (ft)	Local Coordinates Northing (ft)	Local Coordinates Easting (ft)	Map Coordinates Northing (ft)	Map Coordinates Easting (ft)	Dogleg Rate (°/100ft)	Vertical Section (ft)	Comments
5,963.00	89.35	178.35	178.64	3,188.89	4,570.99	1,786.51 S	10.07 E	180,866.19	2,129,441.96	1.57	485.59	
6,055.00	88.31	178.76	179.05	3,190.77	4,572.87	1,878.47 S	11.92 E	180,774.24	2,129,444.26	1.22	509.31	
6,147.00	89.54	179.10	179.39	3,192.50	4,574.60	1,970.44 S	13.17 E	180,682.28	2,129,445.95	1.39	533.60	
6,240.00	90.68	179.01	179.30	3,192.32	4,574.42	2,063.44 S	14.23 E	180,589.29	2,129,447.45	1.23	558.36	
6,336.00	88.40	178.03	178.32	3,193.09	4,575.19	2,159.41 S	16.23 E	180,493.33	2,129,449.90	2.59	583.05	
6,432.00	86.79	178.45	178.74	3,197.12	4,579.22	2,255.29 S	18.69 E	180,397.46	2,129,452.82	1.73	607.26	
6,528.00	88.27	177.63	177.92	3,201.26	4,583.36	2,351.15 S	21.48 E	180,301.61	2,129,456.07	1.76	631.16	
6,623.00	87.07	178.54	178.83	3,205.12	4,587.22	2,446.03 S	24.18 E	180,206.75	2,129,459.22	1.58	654.87	
6,719.00	88.43	178.43	178.72	3,208.89	4,590.99	2,541.94 S	26.23 E	180,110.85	2,129,461.72	1.42	679.49	
6,815.00	91.11	180.86	181.15	3,209.27	4,591.37	2,637.92 S	26.34 E	180,014.87	2,129,462.29	3.77	705.99	
6,911.00	88.28	180.36	180.65	3,209.78	4,591.88	2,733.90 S	24.83 E	179,918.89	2,129,461.24	2.99	734.05	
7,007.00	86.86	180.21	180.50	3,213.85	4,595.95	2,829.80 S	23.87 E	179,822.98	2,129,460.73	1.49	761.56	
7,103.00	86.55	179.81	180.10	3,219.37	4,601.47	2,925.64 S	23.36 E	179,727.14	2,129,460.69	0.53	788.61	
7,199.00	86.23	179.16	179.45	3,225.42	4,607.52	3,021.45 S	23.74 E	179,631.34	2,129,461.52	0.75	814.81	
7,295.00	86.34	178.29	178.58	3,231.64	4,613.74	3,117.23 S	25.39 E	179,535.56	2,129,463.62	0.91	839.78	
7,392.00	86.02	180.16	180.45	3,238.10	4,620.20	3,214.01 S	26.21 E	179,438.79	2,129,464.90	1.95	865.82	
7,488.00	87.22	180.20	180.49	3,243.76	4,625.86	3,309.84 S	25.42 E	179,342.96	2,129,464.57	1.25	893.15	
7,584.00	86.30	178.36	178.65	3,249.19	4,631.29	3,405.68 S	26.14 E	179,247.13	2,129,465.75	2.14	919.02	
7,680.00	87.10	178.53	178.82	3,254.71	4,636.81	3,501.49 S	28.25 E	179,151.32	2,129,468.32	0.85	943.55	
7,776.00	86.94	178.99	179.28	3,259.70	4,641.80	3,597.35 S	29.84 E	179,055.47	2,129,470.37	0.51	968.60	
7,872.00	88.24	179.18	179.47	3,263.74	4,645.84	3,693.26 S	30.89 E	178,959.57	2,129,471.87	1.37	994.18	
7,968.00	87.52	179.61	179.90	3,267.29	4,649.39	3,789.19 S	31.42 E	178,863.64	2,129,472.85	0.87	1,020.27	
8,064.00	86.89	179.94	180.23	3,271.97	4,654.07	3,885.07 S	31.31 E	178,767.76	2,129,473.20	0.74	1,046.96	
8,160.00	87.60	179.57	179.86	3,276.59	4,658.69	3,980.96 S	31.23 E	178,671.87	2,129,473.58	0.83	1,073.61	
8,256.00	86.08	179.43	179.72	3,281.88	4,663.98	4,076.81 S	31.58 E	178,576.02	2,129,474.39	1.59	1,099.85	
8,352.00	87.38	178.44	178.73	3,287.35	4,669.45	4,172.64 S	32.88 E	178,480.20	2,129,476.15	1.70	1,125.17	
8,448.00	86.92	179.82	180.11	3,292.13	4,674.23	4,268.52 S	33.85 E	178,384.33	2,129,477.57	1.51	1,150.81	
8,543.00	86.76	180.05	180.34	3,297.36	4,679.46	4,363.37 S	33.48 E	178,289.48	2,129,477.65	0.29	1,177.47	
8,639.00	87.50	178.54	178.83	3,302.17	4,684.27	4,459.25 S	34.17 E	178,193.61	2,129,478.80	1.75	1,203.38	
8,735.00	86.86	178.52	178.81	3,306.89	4,688.99	4,555.11 S	36.15 E	178,097.76	2,129,481.23	0.67	1,228.06	
8,831.00	85.69	178.32	178.61	3,313.13	4,695.23	4,650.88 S	38.31 E	178,002.00	2,129,483.85	1.24	1,252.53	
8,927.00	87.44	178.50	178.79	3,318.88	4,700.98	4,746.68 S	40.48 E	177,906.21	2,129,486.48	1.83	1,277.00	
9,022.00	86.83	178.75	179.04	3,323.63	4,705.73	4,841.54 S	42.28 E	177,811.35	2,129,488.73	0.69	1,301.58	
9,118.00	87.35	179.19	179.48	3,328.50	4,710.60	4,937.41 S	43.51 E	177,715.49	2,129,490.42	0.71	1,326.96	
9,214.00	87.72	180.03	180.32	3,332.63	4,714.73	5,033.32 S	43.68 E	177,619.59	2,129,491.05	0.96	1,353.39	
9,310.00	86.52	179.19	179.48	3,337.46	4,719.56	5,129.20 S	43.85 E	177,523.71	2,129,491.67	1.53	1,379.81	
9,388.00	87.94	178.86	179.15	3,341.23	4,723.33	5,207.10 S	44.78 E	177,445.82	2,129,492.97	1.87	1,400.51	Last MWD Survey



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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			
9,450.00	87.94	178.86	179.15	3,343.45	4,725.55	5,269.05 S	45.70 E	177,383.87	2,129,494.19	0.00	1,416.80	Projection to TD

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates (ft)		Comment
		+N/-S	+E/-W	
200.00	199.99	-0.55	-1.15	First MWD Survey
9,388.00	4,723.33	-5,207.10	44.78	Last MWD Survey
9,450.00	4,725.55	-5,269.05	45.70	Projection to TD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (ft)	Origin +E/-W (ft)	Start TVD (ft)
User	No Target (Freehand)	253.91	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
200.00	9,450.00	MWD	MWD+SC

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: 1.70 °/100ft      Maximum Dogleg over Survey: 11.66 °/100ft at 4,422.00 ft  
 Net Tortosity applicable to Plans: 0.60 °/100ft      Directional Difficulty Index: 6.230

Design Report for Lockwood Farms 3307 14-1H/ Job# 9199477/ Nabors 102 - Wellbore #1

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Audit Info

## North Reference Sheet for Sec 14-T33S-R07W - Lockwood Farms 3307 14-1H/ Job# 9199477/ Nabors 102 - 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 @ 1382.10ft (Original Well Elev). Northing and Easting are relative to Lockwood Farms 3307 14-1H/ Job# 9199477/ Nabors 102

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: 1.00002098

Grid Coordinates of Well: 182,652.63 ft N, 2,129,423.39 ft E

Geographical Coordinates of Well: 37° 10' 02.82" N, 098° 03' 21.10" W

Grid Convergence at Surface is: 0.27°

Based upon Minimum Curvature type calculations, at a Measured Depth of 9,450.00ft the Bottom Hole Displacement is 5,269.25ft in the Direction of 179.50° (True).

Magnetic Convergence at surface is: -4.48° ( 9 January 2012, , BGGM2011)

