

# Shell Exploration & Production Co. Inc.

Barber Co. KS (NAD-27)

Sec 18-T35S-R10W

Watkins & Farney 3510 #18-1H / Job #9507142 / Nab 180

Wellbore #1

Design: Wellbore #1

## Sperry Drilling Services

# Combo Report With Grid North & True North

10 August, 2012

Well Coordinates: 121,116.01 N, 2,015,172.36 E (36° 59' 57.41" N, 098° 26' 52.98" W)

Ground Level: 1,302.00 ft

Local Coordinate Origin:	Centered on Well Watkins & Farney 3510 #18-1H / Job #9507142 / Nab 180
Viewing Datum:	WELL @ 1325.80ft (Original Well Elev)
TVDs to System:	N
North Reference:	True
Unit System:	API-US-new

Version: 2003.21 Build: 43

**HALLIBURTON**

**Design Report for Watkins & Farney 3510 #18-1H / Job #9507142 / Nab 180 - 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	359.96	0.00	1,325.80	0.00	0.00 N	0.00 E	121,116.01	2,015,172.36	0.00	0.00	
144.00	0.15	174.61	174.65	1,181.80	144.00	0.19 S	0.02 E	121,115.82	2,015,172.38	0.10	-0.19	First MWD Survey
206.00	0.99	42.20	42.24	1,119.80	206.00	0.13 N	0.39 E	121,116.14	2,015,172.75	1.77	0.13	
266.00	1.94	39.72	39.76	1,059.82	265.98	1.29 N	1.38 E	121,117.30	2,015,173.74	1.59	1.31	
329.00	3.64	34.77	34.81	996.90	328.90	3.75 N	3.21 E	121,119.77	2,015,175.57	2.72	3.80	
423.00	6.20	34.50	34.54	903.25	422.55	10.39 N	7.79 E	121,126.40	2,015,180.15	2.72	10.49	
516.00	5.67	37.50	37.54	810.75	515.05	18.17 N	13.44 E	121,134.18	2,015,185.79	0.66	18.35	
610.00	5.80	36.17	36.21	717.22	608.58	25.68 N	19.07 E	121,141.70	2,015,191.42	0.20	25.93	
704.00	4.90	41.34	41.38	623.63	702.17	32.53 N	24.53 E	121,148.55	2,015,196.87	1.09	32.85	
829.00	3.73	48.47	48.51	498.99	826.81	39.23 N	31.11 E	121,155.25	2,015,203.45	1.03	39.64	
951.00	1.65	58.68	58.72	377.13	948.67	42.77 N	35.58 E	121,158.80	2,015,207.92	1.74	43.24	
1,077.00	1.22	311.45	311.49	251.15	1,074.65	44.60 N	36.13 E	121,160.63	2,015,208.46	1.84	45.08	
1,171.00	1.65	270.46	270.50	157.18	1,168.62	45.27 N	34.02 E	121,161.30	2,015,206.36	1.15	45.73	
1,266.00	0.63	299.85	299.89	62.20	1,263.60	45.54 N	32.20 E	121,161.57	2,015,204.54	1.20	45.97	
1,361.00	0.79	39.67	39.71	-32.80	1,358.60	46.31 N	32.17 E	121,162.34	2,015,204.50	1.15	46.74	
1,456.00	0.66	69.71	69.75	-127.79	1,453.59	47.00 N	33.10 E	121,163.03	2,015,205.44	0.42	47.44	
1,551.00	0.85	95.86	95.90	-222.78	1,548.58	47.12 N	34.31 E	121,163.15	2,015,206.65	0.41	47.58	
1,645.00	0.78	101.13	101.17	-316.77	1,642.57	46.92 N	35.64 E	121,162.95	2,015,207.97	0.11	47.40	
1,740.00	0.62	103.64	103.68	-411.76	1,737.56	46.68 N	36.77 E	121,162.71	2,015,209.10	0.17	47.17	
1,835.00	0.65	95.45	95.49	-506.76	1,832.56	46.50 N	37.80 E	121,162.53	2,015,210.14	0.10	47.01	
1,930.00	0.51	87.18	87.22	-601.75	1,927.55	46.47 N	38.76 E	121,162.50	2,015,211.10	0.17	46.99	
2,025.00	0.74	86.78	86.82	-696.75	2,022.55	46.53 N	39.80 E	121,162.56	2,015,212.13	0.24	47.06	
2,215.00	0.74	138.94	138.98	-886.73	2,212.53	45.67 N	41.83 E	121,161.70	2,015,214.17	0.34	46.23	
2,404.00	0.81	115.20	115.24	-1,075.72	2,401.52	44.18 N	43.84 E	121,160.21	2,015,216.18	0.17	44.76	
2,594.00	0.70	116.39	116.43	-1,265.70	2,591.50	43.09 N	46.09 E	121,159.12	2,015,218.43	0.06	43.70	
2,784.00	0.59	151.10	151.14	-1,455.69	2,781.49	41.72 N	47.60 E	121,157.75	2,015,219.94	0.21	42.35	
2,974.00	0.75	150.89	150.93	-1,645.68	2,971.48	39.77 N	48.68 E	121,155.81	2,015,221.02	0.08	40.42	
3,164.00	0.28	182.21	182.25	-1,835.67	3,161.47	38.22 N	49.27 E	121,154.26	2,015,221.61	0.28	38.88	
3,353.00	0.44	177.06	177.10	-2,024.66	3,350.46	37.04 N	49.28 E	121,153.07	2,015,221.63	0.09	37.69	
3,543.00	0.25	113.51	113.55	-2,214.66	3,540.46	36.14 N	49.70 E	121,152.18	2,015,222.04	0.21	36.81	
3,733.00	0.07	295.95	295.99	-2,404.66	3,730.46	36.03 N	49.98 E	121,152.06	2,015,222.32	0.17	36.69	
3,922.00	0.19	109.12	109.16	-2,593.66	3,919.46	35.97 N	50.17 E	121,152.01	2,015,222.51	0.14	36.64	
4,112.00	0.22	123.09	123.13	-2,783.66	4,109.46	35.67 N	50.77 E	121,151.71	2,015,223.11	0.03	36.35	
4,207.00	0.35	26.26	26.30	-2,878.66	4,204.46	35.83 N	51.05 E	121,151.87	2,015,223.40	0.46	36.51	
4,270.00	4.01	351.74	351.78	-2,941.60	4,267.40	38.19 N	50.82 E	121,154.22	2,015,223.16	5.92	38.86	
4,302.00	6.88	356.96	357.00	-2,973.46	4,299.26	41.21 N	50.56 E	121,157.24	2,015,222.90	9.09	41.88	
4,334.00	9.71	0.29	0.33	-3,005.12	4,330.92	45.82 N	50.48 E	121,161.86	2,015,222.82	8.97	46.49	

**Design Report for Watkins & Farney 3510 #18-1H / Job #9507142 / Nab 180 - Wellbore #1**

Measured Depth (ft)	Inclination (°)	Grid Azimuth (°)	True Azimuth (°)	TVD below System (ft)	Vertical Depth (ft)	Local Coordinates Northing (ft) Easting (ft)		Map Coordinates Northing (ft) Easting (ft)		Dogleg Rate (°/100ft)	Vertical Section (ft)	Comments
4,366.00	13.64	1.87	1.91	-3,036.45	4,362.25	52.29 N	50.62 E	121,168.33	2,015,222.95	12.32	52.97	
4,398.00	16.79	3.32	3.36	-3,067.32	4,393.12	60.68 N	51.02 E	121,176.72	2,015,223.34	9.91	61.36	
4,430.00	19.63	3.81	3.85	-3,097.72	4,423.52	70.66 N	51.65 E	121,186.70	2,015,223.97	8.89	71.35	
4,461.00	22.28	4.10	4.14	-3,126.67	4,452.47	81.72 N	52.42 E	121,197.76	2,015,224.74	8.55	82.41	
4,493.00	24.37	4.13	4.17	-3,156.05	4,481.85	94.35 N	53.34 E	121,210.39	2,015,225.65	6.53	95.06	
4,525.00	27.10	3.79	3.83	-3,184.87	4,510.67	108.21 N	54.31 E	121,224.25	2,015,226.61	8.54	108.93	
4,556.00	29.85	3.44	3.48	-3,212.12	4,537.92	122.96 N	55.25 E	121,239.00	2,015,227.54	8.89	123.69	
4,588.00	32.66	3.28	3.32	-3,239.47	4,565.27	139.53 N	56.23 E	121,255.57	2,015,228.52	8.79	140.28	
4,620.00	34.99	2.86	2.90	-3,266.05	4,591.85	157.32 N	57.20 E	121,273.36	2,015,229.47	7.32	158.07	
4,651.00	38.05	2.59	2.63	-3,290.96	4,616.76	175.74 N	58.08 E	121,291.79	2,015,230.35	9.88	176.51	
4,683.00	41.01	2.01	2.05	-3,315.64	4,641.44	196.09 N	58.91 E	121,312.13	2,015,231.17	9.32	196.87	
4,715.00	44.29	1.95	1.99	-3,339.18	4,664.98	217.76 N	59.68 E	121,333.80	2,015,231.92	10.25	218.54	
4,746.00	47.51	1.60	1.64	-3,360.75	4,686.55	240.00 N	60.38 E	121,356.05	2,015,232.61	10.42	240.79	
4,778.00	50.77	2.15	2.19	-3,381.68	4,707.48	264.19 N	61.19 E	121,380.23	2,015,233.41	10.27	264.99	
4,810.00	53.60	1.91	1.95	-3,401.30	4,727.10	289.45 N	62.10 E	121,405.49	2,015,234.30	8.86	290.26	
4,841.00	56.07	1.50	1.54	-3,419.15	4,744.95	314.78 N	62.87 E	121,430.82	2,015,235.06	8.04	315.60	
4,873.00	58.44	1.24	1.28	-3,436.46	4,762.26	341.68 N	63.53 E	121,457.73	2,015,235.71	7.44	342.51	
4,904.00	61.50	1.00	1.04	-3,451.97	4,777.77	368.51 N	64.08 E	121,484.56	2,015,236.23	9.89	369.34	
4,936.00	64.72	1.16	1.20	-3,466.44	4,792.24	397.04 N	64.64 E	121,513.09	2,015,236.78	10.07	397.88	
4,966.00	67.36	0.79	0.83	-3,478.62	4,804.42	424.45 N	65.12 E	121,540.50	2,015,237.25	8.87	425.29	
4,998.00	69.79	1.12	1.16	-3,490.31	4,816.11	454.23 N	65.64 E	121,570.28	2,015,237.75	7.65	455.08	
5,030.00	73.80	1.80	1.84	-3,500.31	4,826.11	484.62 N	66.44 E	121,600.66	2,015,238.53	12.69	485.46	
5,061.00	78.19	3.24	3.28	-3,507.81	4,833.61	514.66 N	67.78 E	121,630.70	2,015,239.86	14.86	515.52	
5,093.00	82.13	3.59	3.63	-3,513.27	4,839.07	546.12 N	69.68 E	121,662.17	2,015,241.74	12.36	547.01	
5,125.00	84.62	3.44	3.48	-3,516.97	4,842.77	577.84 N	71.65 E	121,693.89	2,015,243.69	7.80	578.75	
5,156.00	85.71	4.22	4.26	-3,519.58	4,845.38	608.66 N	73.74 E	121,724.71	2,015,245.76	4.32	609.60	
5,180.00	86.96	4.04	4.08	-3,521.11	4,846.91	632.55 N	75.48 E	121,748.60	2,015,247.49	5.26	633.51	
5,297.00	90.95	2.68	2.72	-3,523.25	4,849.05	749.30 N	82.42 E	121,865.35	2,015,254.36	3.60	750.34	
5,329.00	90.56	1.81	1.85	-3,522.82	4,848.62	781.27 N	83.69 E	121,897.32	2,015,255.62	2.98	782.32	
5,361.00	89.85	0.68	0.72	-3,522.71	4,848.51	813.26 N	84.41 E	121,929.31	2,015,256.32	4.17	814.32	
5,392.00	89.82	359.98	0.02	-3,522.80	4,848.60	844.26 N	84.61 E	121,960.31	2,015,256.50	2.26	845.32	
5,424.00	90.12	0.09	0.13	-3,522.82	4,848.62	876.26 N	84.65 E	121,992.31	2,015,256.52	1.00	877.32	
5,455.00	90.06	359.50	359.54	-3,522.77	4,848.57	907.26 N	84.56 E	122,023.31	2,015,256.42	1.91	908.31	
5,487.00	89.72	357.88	357.92	-3,522.83	4,848.63	939.25 N	83.85 E	122,055.30	2,015,255.69	5.17	940.29	
5,519.00	90.25	357.83	357.87	-3,522.84	4,848.64	971.23 N	82.68 E	122,087.28	2,015,254.50	1.66	972.25	
5,550.00	90.49	357.63	357.67	-3,522.64	4,848.44	1,002.20 N	81.47 E	122,118.26	2,015,253.27	1.01	1,003.21	
5,582.00	90.25	357.90	357.94	-3,522.43	4,848.23	1,034.18 N	80.24 E	122,150.23	2,015,252.03	1.13	1,035.16	

**Design Report for Watkins & Farney 3510 #18-1H / Job #9507142 / Nab 180 - 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
5,614.00	90.71	357.92	357.96	-3,522.16	4,847.96	1,066.16 N	79.10 E	122,182.21	2,015,250.87	1.44	1,067.12	
5,645.00	90.31	357.05	357.09	-3,521.89	4,847.69	1,097.13 N	77.76 E	122,213.18	2,015,249.51	3.09	1,098.07	
5,676.00	89.07	356.18	356.22	-3,522.05	4,847.85	1,128.07 N	75.95 E	122,244.12	2,015,247.69	4.89	1,128.99	
5,708.00	88.36	355.37	355.41	-3,522.77	4,848.57	1,159.98 N	73.62 E	122,276.03	2,015,245.33	3.37	1,160.86	
5,739.00	88.98	354.78	354.82	-3,523.49	4,849.29	1,190.86 N	70.98 E	122,306.90	2,015,242.68	2.76	1,191.70	
5,770.00	89.01	355.45	355.49	-3,524.03	4,849.83	1,221.74 N	68.36 E	122,337.79	2,015,240.04	2.16	1,222.55	
5,802.00	89.47	356.03	356.07	-3,524.46	4,850.26	1,253.65 N	66.01 E	122,369.70	2,015,237.67	2.31	1,254.43	
5,833.00	90.46	355.70	355.74	-3,524.48	4,850.28	1,284.57 N	63.79 E	122,400.62	2,015,235.44	3.37	1,285.31	
5,864.00	91.48	356.25	356.29	-3,523.95	4,849.75	1,315.49 N	61.64 E	122,431.53	2,015,233.27	3.74	1,316.20	
5,895.00	92.13	356.08	356.12	-3,522.98	4,848.78	1,346.41 N	59.59 E	122,462.45	2,015,231.20	2.17	1,347.09	
5,927.00	91.76	357.41	357.45	-3,521.89	4,847.69	1,378.34 N	57.79 E	122,494.38	2,015,229.39	4.31	1,378.99	
5,958.00	91.97	357.00	357.04	-3,520.88	4,846.68	1,409.29 N	56.31 E	122,525.33	2,015,227.88	1.49	1,409.92	
5,989.00	90.52	357.08	357.12	-3,520.21	4,846.01	1,440.24 N	54.73 E	122,556.28	2,015,226.29	4.68	1,440.85	
6,021.00	89.81	357.81	357.85	-3,520.12	4,845.92	1,472.21 N	53.32 E	122,588.24	2,015,224.86	3.18	1,472.79	
6,052.00	89.88	357.76	357.80	-3,520.20	4,846.00	1,503.19 N	52.15 E	122,619.22	2,015,223.67	0.28	1,503.75	
6,083.00	90.80	357.83	357.87	-3,520.02	4,845.82	1,534.16 N	50.98 E	122,650.20	2,015,222.48	2.98	1,534.71	
6,114.00	90.74	358.14	358.18	-3,519.60	4,845.40	1,565.14 N	49.91 E	122,681.18	2,015,221.40	1.02	1,565.67	
6,146.00	89.66	358.37	358.41	-3,519.49	4,845.29	1,597.13 N	48.95 E	122,713.16	2,015,220.43	3.45	1,597.64	
6,177.00	88.55	358.08	358.12	-3,519.97	4,845.77	1,628.11 N	48.02 E	122,744.14	2,015,219.47	3.70	1,628.61	
6,208.00	89.51	358.10	358.14	-3,520.50	4,846.30	1,659.09 N	47.00 E	122,775.12	2,015,218.44	3.10	1,659.57	
6,239.00	89.97	358.15	358.19	-3,520.64	4,846.44	1,690.07 N	46.01 E	122,806.10	2,015,217.43	1.49	1,690.54	
6,271.00	90.09	357.89	357.93	-3,520.62	4,846.42	1,722.05 N	44.93 E	122,838.08	2,015,216.33	0.89	1,722.50	
6,302.00	90.12	357.99	358.03	-3,520.56	4,846.36	1,753.03 N	43.84 E	122,869.06	2,015,215.22	0.34	1,753.46	
6,333.00	89.17	358.11	358.15	-3,520.76	4,846.56	1,784.01 N	42.80 E	122,900.04	2,015,214.17	3.09	1,784.43	
6,364.00	88.95	358.57	358.61	-3,521.26	4,847.06	1,815.00 N	41.93 E	122,931.03	2,015,213.28	1.64	1,815.40	
6,396.00	89.14	358.85	358.89	-3,521.80	4,847.60	1,846.99 N	41.23 E	122,963.01	2,015,212.56	1.06	1,847.37	
6,427.00	89.35	359.19	359.23	-3,522.21	4,848.01	1,877.98 N	40.72 E	122,994.01	2,015,212.04	1.29	1,878.36	
6,458.00	89.57	359.52	359.56	-3,522.50	4,848.30	1,908.98 N	40.39 E	123,025.00	2,015,211.69	1.28	1,909.35	
6,490.00	90.06	0.85	0.89	-3,522.60	4,848.40	1,940.97 N	40.52 E	123,057.00	2,015,211.80	4.43	1,941.34	
6,521.00	90.28	1.18	1.22	-3,522.51	4,848.31	1,971.97 N	41.09 E	123,088.00	2,015,212.35	1.28	1,972.34	
6,552.00	90.52	1.57	1.61	-3,522.29	4,848.09	2,002.96 N	41.85 E	123,118.99	2,015,213.10	1.48	2,003.34	
6,584.00	90.12	1.65	1.69	-3,522.11	4,847.91	2,034.95 N	42.78 E	123,150.97	2,015,214.00	1.27	2,035.34	
6,615.00	89.97	1.80	1.84	-3,522.09	4,847.89	2,065.93 N	43.73 E	123,181.96	2,015,214.94	0.68	2,066.33	
6,646.00	90.03	1.86	1.90	-3,522.09	4,847.89	2,096.91 N	44.74 E	123,212.94	2,015,215.94	0.27	2,097.33	
6,678.00	90.37	1.66	1.70	-3,521.98	4,847.78	2,128.90 N	45.75 E	123,244.93	2,015,216.92	1.23	2,129.32	
6,709.00	90.37	1.27	1.31	-3,521.78	4,847.58	2,159.89 N	46.56 E	123,275.92	2,015,217.72	1.26	2,160.32	
6,740.00	90.68	1.12	1.16	-3,521.49	4,847.29	2,190.88 N	47.23 E	123,306.91	2,015,218.37	1.11	2,191.31	

## Design Report for Watkins &amp; Farney 3510 #18-1H / Job #9507142 / Nab 180 - 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
6,772.00	90.90	0.89	0.93	-3,521.05	4,846.85	2,222.87 N	47.81 E	123,338.90	2,015,218.94	0.99	2,223.31	
6,804.00	90.68	1.11	1.15	-3,520.61	4,846.41	2,254.86 N	48.39 E	123,370.89	2,015,219.50	0.97	2,255.31	
6,835.00	90.52	0.65	0.69	-3,520.29	4,846.09	2,285.86 N	48.89 E	123,401.89	2,015,219.98	1.57	2,286.31	
6,867.00	89.69	0.72	0.76	-3,520.23	4,846.03	2,317.85 N	49.30 E	123,433.88	2,015,220.37	2.60	2,318.31	
6,899.00	89.45	0.27	0.31	-3,520.47	4,846.27	2,349.85 N	49.60 E	123,465.88	2,015,220.65	1.59	2,350.30	
6,930.00	90.22	0.37	0.41	-3,520.56	4,846.36	2,380.85 N	49.79 E	123,496.88	2,015,220.83	2.50	2,381.30	
6,962.00	90.31	0.25	0.29	-3,520.41	4,846.21	2,412.85 N	49.99 E	123,528.88	2,015,221.00	0.47	2,413.30	
6,993.00	90.09	359.92	359.96	-3,520.30	4,846.10	2,443.85 N	50.05 E	123,559.88	2,015,221.05	1.28	2,444.30	
7,025.00	90.31	0.02	0.06	-3,520.19	4,845.99	2,475.85 N	50.06 E	123,591.88	2,015,221.04	0.76	2,476.30	
7,057.00	90.65	0.10	0.14	-3,519.92	4,845.72	2,507.85 N	50.12 E	123,623.88	2,015,221.08	1.09	2,508.29	
7,088.00	90.52	0.12	0.16	-3,519.61	4,845.41	2,538.84 N	50.20 E	123,654.88	2,015,221.14	0.42	2,539.29	
7,151.00	91.14	0.20	0.24	-3,518.69	4,844.49	2,601.84 N	50.42 E	123,717.87	2,015,221.33	0.99	2,602.28	
7,185.17	91.18	0.26	0.30	-3,518.00	4,843.80	2,636.00 N	50.58 E	123,752.03	2,015,221.47	0.22	2,636.44	Cross Sec Line @7,185.17' MD, 4,843.80' TVD (2,808.75' FWL)
7,246.00	91.26	0.37	0.41	-3,516.70	4,842.50	2,696.81 N	50.95 E	123,812.85	2,015,221.81	0.22	2,697.26	
7,340.00	90.52	0.43	0.47	-3,515.24	4,841.04	2,790.80 N	51.68 E	123,906.83	2,015,222.48	0.79	2,791.24	
7,435.00	89.51	0.65	0.69	-3,515.22	4,841.02	2,885.79 N	52.64 E	124,001.83	2,015,223.39	1.09	2,886.24	
7,530.00	91.54	1.74	1.78	-3,514.35	4,840.15	2,980.76 N	54.69 E	124,096.79	2,015,225.39	2.43	2,981.23	
7,625.00	90.03	359.76	359.80	-3,513.05	4,838.85	3,075.74 N	55.99 E	124,191.77	2,015,226.64	2.62	3,076.21	
7,720.00	89.66	359.16	359.20	-3,513.30	4,839.10	3,170.73 N	55.17 E	124,286.76	2,015,225.76	0.74	3,171.19	
7,814.00	91.29	0.70	0.74	-3,512.52	4,838.32	3,264.72 N	55.12 E	124,380.75	2,015,225.66	2.39	3,265.17	
7,909.00	90.93	0.65	0.69	-3,510.68	4,836.48	3,359.70 N	56.30 E	124,475.73	2,015,226.79	0.38	3,360.15	
8,004.00	90.37	0.95	0.99	-3,509.61	4,835.41	3,454.68 N	57.69 E	124,570.71	2,015,228.13	0.67	3,455.14	
8,099.00	88.67	0.16	0.20	-3,510.40	4,836.20	3,549.67 N	58.68 E	124,665.70	2,015,229.06	1.97	3,550.14	
8,194.00	89.11	1.29	1.33	-3,512.24	4,838.04	3,644.64 N	59.95 E	124,760.67	2,015,230.28	1.28	3,645.12	
8,289.00	90.62	2.73	2.77	-3,512.47	4,838.27	3,739.57 N	63.35 E	124,855.61	2,015,233.63	2.20	3,740.09	
8,384.00	90.89	3.24	3.28	-3,511.21	4,837.01	3,834.43 N	68.36 E	124,950.47	2,015,238.59	0.61	3,835.00	
8,479.00	91.08	3.11	3.15	-3,509.58	4,835.38	3,929.27 N	73.69 E	125,045.31	2,015,243.86	0.24	3,929.90	
8,574.00	90.99	3.48	3.52	-3,507.87	4,833.67	4,024.09 N	79.21 E	125,140.14	2,015,249.33	0.40	4,024.79	
8,669.00	91.23	2.20	2.24	-3,506.02	4,831.82	4,118.95 N	83.98 E	125,235.00	2,015,254.05	1.37	4,119.71	
8,764.00	91.54	1.84	1.88	-3,503.73	4,829.53	4,213.86 N	87.40 E	125,329.91	2,015,257.41	0.50	4,214.66	
8,859.00	90.52	0.15	0.19	-3,502.02	4,827.82	4,308.83 N	89.11 E	125,424.88	2,015,259.08	2.08	4,309.64	
8,954.00	91.08	0.39	0.43	-3,500.69	4,826.49	4,403.82 N	89.63 E	125,519.87	2,015,259.54	0.64	4,404.62	
9,049.00	90.22	0.39	0.43	-3,499.62	4,825.42	4,498.81 N	90.34 E	125,614.86	2,015,260.20	0.91	4,499.61	
9,144.00	90.03	359.94	359.98	-3,499.41	4,825.21	4,593.81 N	90.68 E	125,709.85	2,015,260.48	0.51	4,594.61	
9,239.00	90.25	359.54	359.58	-3,499.18	4,824.98	4,688.80 N	90.32 E	125,804.85	2,015,260.07	0.48	4,689.59	
9,334.00	90.40	0.25	0.29	-3,498.64	4,824.44	4,783.80 N	90.21 E	125,899.85	2,015,259.90	0.76	4,784.58	
9,428.00	91.81	359.99	0.03	-3,496.83	4,822.63	4,877.78 N	90.47 E	125,993.83	2,015,260.11	1.53	4,878.56	



**Design Report for Watkins & Farney 3510 #18-1H / Job #9507142 / Nab 180 - 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			
9,523.00	90.40	358.81	358.85	-3,494.99	4,820.79	4,972.76 N	89.54 E	126,088.80	2,015,259.13	1.94	4,973.51	
9,617.00	89.88	359.16	359.20	-3,494.76	4,820.56	5,066.74 N	87.94 E	126,182.79	2,015,257.48	0.67	5,067.47	
9,713.00	90.31	357.92	357.96	-3,494.60	4,820.40	5,162.71 N	85.56 E	126,278.75	2,015,255.05	1.37	5,163.39	
9,762.00	90.37	358.15	358.19	-3,494.31	4,820.11	5,211.68 N	83.92 E	126,327.73	2,015,253.38	0.49	5,212.34	Last MWD Survey
9,814.00	90.37	358.15	358.19	-3,493.98	4,819.78	5,263.65 N	82.28 E	126,379.70	2,015,251.70	0.00	5,264.28	Projected to TD

**Design Annotations**

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
144.00	144.00	-0.19	0.02	First MWD Survey
7,185.17	4,843.80	2,636.00	50.58	Cross Sec Line @7,185.17' MD, 4,843.80' TVD (2,808.75' FWL)
9,762.00	4,820.11	5,211.68	83.92	Last MWD Survey
9,814.00	4,819.78	5,263.65	82.28	Projected 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)	0.77	Slot	0.00	0.00	0.00

**Survey tool program**

From (ft)	To (ft)	Survey/Plan	Survey Tool
144.00	9,814.00	MWD Survey's	MWD+SC

**Design Targets**

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

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**Design Report for Watkins & Farney 3510 #18-1H / Job #9507142 / Nab 180 - Wellbore #1**

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**Directional Difficulty Index**

Average Dogleg over Survey:	1.85 °/100ft	Maximum Dogleg over Survey:	14.86 °/100ft at 5,061.00 ft
Net Tortosity applicable to Plans:	0.79 °/100ft	Directional Difficulty Index:	6.291

**Audit Info**

**North Reference Sheet for Sec 18-T35S-R10W - Watkins & Farney 3510 #18-1H / Job #9507142 / Nab 180 - 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 @ 1325.80ft (Original Well Elev). Northing and Easting are relative to Watkins & Farney 3510 #18-1H / Job #9507142 / Nab 180

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: 1.00006330

Grid Coordinates of Well: 121,116.01 ft N, 2,015,172.36 ft E

Geographical Coordinates of Well: 36° 59' 57.41" N, 098° 26' 52.98" W

Grid Convergence at Surface is: 0.03°

Based upon Minimum Curvature type calculations, at a Measured Depth of 9,814.00ft the Bottom Hole Displacement is 5,264.30ft in the Direction of 0.90° (True).

Magnetic Convergence at surface is: -4.93° (21 May 2012, , BGGM2011)

