

# Burlington Resources

Arapahoe County, Colorado

Sec. 30-T4S-R64W

Watkins 30-5-5GH

Plan A

Plan: Rev A1

## Sperry Drilling Services

### Proposal Report

02 November, 2013

Well Coordinates: 1,672,287.54 N, 3,252,694.16 E (39° 40' 32.88" N, 104° 36' 08.10" W)

Ground Level: 5,765.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Centered on Well Watkins 30-5-5GH

KB 24 ft @ 5789.00usft (H&P 280)

N

True

API - US Survey Feet - Custom

Version: 5000.1 Build: 70

**HALLIBURTON**

**Plan Report for Watkins 30-5-5GH - Rev A1**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	Toolface Azimuth (°)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,050.00	0.00	0.00	2,050.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>9 5/8" Casing Pt.</b>										
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Begin Nudge @ 2100.00 ft</b>										
2,200.00	2.00	0.00	2,199.98	1.75	0.00	0.31	2.00	2.00	0.00	0.00
2,300.00	4.00	0.00	2,299.84	6.98	0.00	1.25	2.00	2.00	0.00	0.00
2,400.00	6.00	0.00	2,399.45	15.69	0.00	2.81	2.00	2.00	0.00	0.00
2,500.00	8.00	0.00	2,498.70	27.88	0.00	5.00	2.00	2.00	0.00	0.00
2,600.00	10.00	0.00	2,597.47	43.52	0.00	7.81	2.00	2.00	0.00	0.00
2,700.00	12.00	0.00	2,695.62	62.60	0.00	11.23	2.00	2.00	0.00	0.00
2,800.00	14.00	0.00	2,793.06	85.10	0.00	15.26	2.00	2.00	0.00	0.00
<b>End Nudge @ 2800.00 ft</b>										
2,900.00	14.00	0.00	2,890.08	109.29	0.00	19.60	0.00	0.00	0.00	0.00
3,000.00	14.00	0.00	2,987.11	133.48	0.00	23.94	0.00	0.00	0.00	0.00
3,100.00	14.00	0.00	3,084.14	157.67	0.00	28.28	0.00	0.00	0.00	0.00
3,200.00	14.00	0.00	3,181.17	181.87	0.00	32.61	0.00	0.00	0.00	0.00
3,300.00	14.00	0.00	3,278.20	206.06	0.00	36.95	0.00	0.00	0.00	0.00
3,400.00	14.00	0.00	3,375.23	230.25	0.00	41.29	0.00	0.00	0.00	0.00
3,500.00	14.00	0.00	3,472.26	254.44	0.00	45.63	0.00	0.00	0.00	0.00
3,600.00	14.00	0.00	3,569.29	278.63	0.00	49.97	0.00	0.00	0.00	0.00
3,700.00	14.00	0.00	3,666.32	302.83	0.00	54.31	0.00	0.00	0.00	0.00
3,800.00	14.00	0.00	3,763.35	327.02	0.00	58.65	0.00	0.00	0.00	0.00
3,900.00	14.00	0.00	3,860.38	351.21	0.00	62.98	0.00	0.00	0.00	0.00
4,000.00	14.00	0.00	3,957.41	375.40	0.00	67.32	0.00	0.00	0.00	0.00
4,100.00	14.00	0.00	4,054.44	399.59	0.00	71.66	0.00	0.00	0.00	0.00
4,200.00	14.00	0.00	4,151.47	423.79	0.00	76.00	0.00	0.00	0.00	0.00
4,300.00	14.00	0.00	4,248.50	447.98	0.00	80.34	0.00	0.00	0.00	0.00
4,400.00	14.00	0.00	4,345.53	472.17	0.00	84.68	0.00	0.00	0.00	0.00
4,500.00	14.00	0.00	4,442.56	496.36	0.00	89.01	0.00	0.00	0.00	0.00
4,600.00	14.00	0.00	4,539.59	520.56	0.00	93.35	0.00	0.00	0.00	0.00
4,700.00	14.00	0.00	4,636.62	544.75	0.00	97.69	0.00	0.00	0.00	0.00
4,800.00	14.00	0.00	4,733.65	568.94	0.00	102.03	0.00	0.00	0.00	0.00
4,900.00	14.00	0.00	4,830.68	593.13	0.00	106.37	0.00	0.00	0.00	0.00
5,000.00	14.00	0.00	4,927.71	617.32	0.00	110.71	0.00	0.00	0.00	0.00
5,100.00	14.00	0.00	5,024.74	641.52	0.00	115.05	0.00	0.00	0.00	0.00
5,200.00	14.00	0.00	5,121.76	665.71	0.00	119.38	0.00	0.00	0.00	0.00
5,300.00	14.00	0.00	5,218.79	689.90	0.00	123.72	0.00	0.00	0.00	0.00

## Plan Report for Watkins 30-5-5GH - Rev A1

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	Toolface Azimuth (°)
5,400.00	14.00	0.00	5,315.82	714.09	0.00	128.06	0.00	0.00	0.00	0.00
5,500.00	14.00	0.00	5,412.85	738.29	0.00	132.40	0.00	0.00	0.00	0.00
5,590.00	14.00	0.00	5,500.18	760.06	0.00	136.30	0.00	0.00	0.00	0.00
<b>Begin Drop @ 5590.00 ft</b>										
5,600.00	13.80	0.00	5,509.89	762.46	0.00	136.73	2.00	-2.00	0.00	180.00
5,700.00	11.80	0.00	5,607.40	784.61	0.00	140.71	2.00	-2.00	0.00	180.00
5,800.00	9.80	0.00	5,705.62	803.35	0.00	144.07	2.00	-2.00	0.00	180.00
5,900.00	7.80	0.00	5,804.44	818.65	0.00	146.81	2.00	-2.00	0.00	180.00
6,000.00	5.80	0.00	5,903.73	830.49	0.00	148.93	2.00	-2.00	0.00	180.00
6,100.00	3.80	0.00	6,003.37	838.86	0.00	150.43	2.00	-2.00	0.00	180.00
6,200.00	1.80	0.00	6,103.25	843.74	0.00	151.31	2.00	-2.00	0.00	180.00
6,290.00	0.00	0.00	6,193.24	845.15	0.00	151.56	2.00	-2.00	0.00	-180.00
<b>End Drop @ 6290.00 ft</b>										
6,300.00	0.00	0.00	6,203.24	845.15	0.00	151.56	0.00	0.00	0.00	0.00
6,400.00	0.00	0.00	6,303.24	845.15	0.00	151.56	0.00	0.00	0.00	0.00
6,500.00	0.00	0.00	6,403.24	845.15	0.00	151.56	0.00	0.00	0.00	0.00
6,600.00	0.00	0.00	6,503.24	845.15	0.00	151.56	0.00	0.00	0.00	0.00
6,700.00	0.00	0.00	6,603.24	845.15	0.00	151.56	0.00	0.00	0.00	0.00
6,800.00	0.00	0.00	6,703.24	845.15	0.00	151.56	0.00	0.00	0.00	0.00
6,900.00	0.00	0.00	6,803.24	845.15	0.00	151.56	0.00	0.00	0.00	0.00
7,000.00	0.00	0.00	6,903.24	845.15	0.00	151.56	0.00	0.00	0.00	0.00
7,100.00	0.00	0.00	7,003.24	845.15	0.00	151.56	0.00	0.00	0.00	0.00
7,200.00	0.00	0.00	7,103.24	845.15	0.00	151.56	0.00	0.00	0.00	0.00
7,211.76	0.00	0.00	7,115.00	845.15	0.00	151.56	0.00	0.00	0.00	0.00
<b>Shallow Pierr Marker #1</b>										
7,298.82	0.00	0.00	7,202.06	845.15	0.00	151.56	0.00	0.00	0.00	0.00
<b>Kick Off Point @ 7298.82 ft</b>										
7,300.00	0.12	90.00	7,203.24	845.15	0.00	151.57	10.00	10.00	0.00	90.00
7,400.00	10.12	90.00	7,302.71	845.16	8.91	160.33	10.00	10.00	0.00	0.00
7,499.86	20.10	90.00	7,399.00	845.16	34.91	185.91	10.00	10.00	0.00	0.00
<b>Shallow Pierr Marker #2</b>										
7,500.00	20.12	90.00	7,399.13	845.16	34.96	185.95	10.00	10.00	0.00	0.00
7,600.00	30.12	90.00	7,489.56	845.16	77.35	227.66	10.00	10.00	0.00	0.00
7,694.47	39.56	90.00	7,567.00	845.16	131.26	280.69	10.00	10.00	0.00	0.00
<b>Sharon Springs</b>										
7,700.00	40.12	90.00	7,571.25	845.16	134.80	284.18	10.00	10.00	0.00	0.00
7,750.00	45.12	90.00	7,608.03	845.16	168.65	317.48	10.00	10.00	0.00	0.00
<b>Build Rate 10.00 °/100 ft</b>										
7,800.00	50.12	90.00	7,641.73	845.16	205.57	353.80	10.00	10.00	0.00	0.00
7,800.43	50.16	90.00	7,642.00	845.16	205.90	354.12	10.00	10.00	0.00	0.00
<b>Niobrara</b>										
7,839.52	54.07	90.00	7,666.00	845.16	236.74	384.47	10.00	10.00	0.00	0.00
<b>A Marl</b>										
7,900.00	60.12	90.00	7,698.84	845.16	287.50	434.40	10.00	10.00	0.00	0.00
7,918.93	62.01	90.00	7,708.00	845.17	304.06	450.70	10.00	10.00	0.00	0.00
<b>B Chalk</b>										
8,000.00	70.12	90.00	7,740.87	845.17	378.10	523.54	10.00	10.00	0.00	0.00
8,054.76	75.59	90.00	7,757.00	845.17	430.40	574.99	10.00	10.00	0.00	0.00
<b>C Chalk</b>										
8,100.00	80.12	90.00	7,766.52	845.17	474.62	618.50	10.00	10.00	0.00	0.00
8,130.93	83.21	90.00	7,771.00	845.17	505.22	648.60	10.00	10.00	0.00	0.00
<b>Top Target</b>										
8,200.00	90.12	90.00	7,775.02	845.17	574.13	716.39	10.00	10.00	0.00	0.00
8,203.06	90.42	90.00	7,775.00	845.17	577.19	719.40	10.00	10.00	0.00	0.00
<b>End Build @ 8203.06 ft</b>										
8,300.00	90.42	90.00	7,774.29	845.18	674.13	814.77	0.00	0.00	0.00	0.00
8,400.00	90.42	90.00	7,773.55	845.18	774.13	913.15	0.00	0.00	0.00	0.00
8,500.00	90.42	90.00	7,772.81	845.18	874.13	1,011.52	0.00	0.00	0.00	0.00

## Plan Report for Watkins 30-5-5GH - Rev A1

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	Toolface Azimuth (°)
8,600.00	90.42	90.00	7,772.07	845.19	974.12	1,109.90	0.00	0.00	0.00	0.00
8,700.00	90.42	90.00	7,771.33	845.19	1,074.12	1,208.28	0.00	0.00	0.00	0.00
8,800.00	90.42	90.00	7,770.59	845.19	1,174.12	1,306.65	0.00	0.00	0.00	0.00
8,900.00	90.42	90.00	7,769.85	845.20	1,274.11	1,405.03	0.00	0.00	0.00	0.00
9,000.00	90.42	90.00	7,769.11	845.20	1,374.11	1,503.41	0.00	0.00	0.00	0.00
9,100.00	90.42	90.00	7,768.37	845.20	1,474.11	1,601.78	0.00	0.00	0.00	0.00
9,200.00	90.42	90.00	7,767.64	845.21	1,574.11	1,700.16	0.00	0.00	0.00	0.00
9,300.00	90.42	90.00	7,766.90	845.21	1,674.10	1,798.54	0.00	0.00	0.00	0.00
9,400.00	90.42	90.00	7,766.16	845.21	1,774.10	1,896.91	0.00	0.00	0.00	0.00
9,500.00	90.42	90.00	7,765.42	845.22	1,874.10	1,995.29	0.00	0.00	0.00	0.00
9,600.00	90.42	90.00	7,764.68	845.22	1,974.10	2,093.67	0.00	0.00	0.00	0.00
9,700.00	90.42	90.00	7,763.94	845.23	2,074.09	2,192.04	0.00	0.00	0.00	0.00
9,800.00	90.42	90.00	7,763.20	845.23	2,174.09	2,290.42	0.00	0.00	0.00	0.00
9,900.00	90.42	90.00	7,762.46	845.23	2,274.09	2,388.80	0.00	0.00	0.00	0.00
10,000.00	90.42	90.00	7,761.72	845.24	2,374.08	2,487.18	0.00	0.00	0.00	0.00
Hold Inc 90.42°, Azi 90.00°										
10,100.00	90.42	90.00	7,760.98	845.24	2,474.08	2,585.55	0.00	0.00	0.00	0.00
10,200.00	90.42	90.00	7,760.25	845.24	2,574.08	2,683.93	0.00	0.00	0.00	0.00
10,300.00	90.42	90.00	7,759.51	845.25	2,674.08	2,782.31	0.00	0.00	0.00	0.00
10,400.00	90.42	90.00	7,758.77	845.25	2,774.07	2,880.68	0.00	0.00	0.00	0.00
10,500.00	90.42	90.00	7,758.03	845.25	2,874.07	2,979.06	0.00	0.00	0.00	0.00
10,600.00	90.42	90.00	7,757.29	845.26	2,974.07	3,077.44	0.00	0.00	0.00	0.00
10,700.00	90.42	90.00	7,756.55	845.26	3,074.07	3,175.81	0.00	0.00	0.00	0.00
10,800.00	90.42	90.00	7,755.81	845.26	3,174.06	3,274.19	0.00	0.00	0.00	0.00
10,900.00	90.42	90.00	7,755.07	845.27	3,274.06	3,372.57	0.00	0.00	0.00	0.00
11,000.00	90.42	90.00	7,754.33	845.27	3,374.06	3,470.94	0.00	0.00	0.00	0.00
11,100.00	90.42	90.00	7,753.60	845.27	3,474.05	3,569.32	0.00	0.00	0.00	0.00
11,200.00	90.42	90.00	7,752.86	845.28	3,574.05	3,667.70	0.00	0.00	0.00	0.00
11,300.00	90.42	90.00	7,752.12	845.28	3,674.05	3,766.07	0.00	0.00	0.00	0.00
11,400.00	90.42	90.00	7,751.38	845.28	3,774.05	3,864.45	0.00	0.00	0.00	0.00
11,500.00	90.42	90.00	7,750.64	845.29	3,874.04	3,962.83	0.00	0.00	0.00	0.00
11,600.00	90.42	90.00	7,749.90	845.29	3,974.04	4,061.20	0.00	0.00	0.00	0.00
11,700.00	90.42	90.00	7,749.16	845.29	4,074.04	4,159.58	0.00	0.00	0.00	0.00
11,800.00	90.42	90.00	7,748.42	845.30	4,174.03	4,257.96	0.00	0.00	0.00	0.00
11,900.00	90.42	90.00	7,747.68	845.30	4,274.03	4,356.33	0.00	0.00	0.00	0.00
12,000.00	90.42	90.00	7,746.94	845.30	4,374.03	4,454.71	0.00	0.00	0.00	0.00
12,100.00	90.42	90.00	7,746.21	845.31	4,474.03	4,553.09	0.00	0.00	0.00	0.00
12,200.00	90.42	90.00	7,745.47	845.31	4,574.02	4,651.46	0.00	0.00	0.00	0.00
12,263.20	90.42	90.00	7,745.00	845.31	4,637.22	4,713.64	0.00	0.00	0.00	0.00
Total Depth 12263.20 ft										

### Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
2,100.00	2,100.00	0.00	0.00	Begin Nudge @ 2100.00 ft
2,800.00	2,793.06	85.10	0.00	End Nudge @ 2800.00 ft
5,590.00	5,500.18	760.06	0.00	Begin Drop @ 5590.00 ft
6,290.00	6,193.24	845.15	0.00	End Drop @ 6290.00 ft
7,298.82	7,202.06	845.15	0.00	Kick Off Point @ 7298.82 ft
7,750.00	7,608.03	845.16	168.65	Build Rate 10.00 °/100 ft
8,203.06	7,775.00	845.17	577.19	End Build @ 8203.06 ft
10,000.00	7,761.72	845.24	2,374.08	Hold Inc 90.42°, Azi 90.00°
12,263.20	7,745.00	845.31	4,637.22	Total Depth 12263.20 ft

## Plan Report for Watkins 30-5-5GH - Rev A1

### Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/-S (usft)	Origin +E/-W (usft)	Start TVD (usft)
Target	Watkins 30-5-5GH_Rev A1_BHL Tgt	79.67	Slot	0.00	0.00	0.00

### Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
0.00	2,050.00	Rev A1	NSG-CT_D/P
2,050.00	12,263.20	Rev A1	MWD

### Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
2,050.00	2,050.00	9 5/8" Casing Pt.	9-5/8	13-1/2

### Formation Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
7,211.76	7,115.00	Shallow Pierr Marker #1			
7,499.86	7,399.00	Shallow Pierr Marker #2			
7,694.47	7,567.00	Sharon Springs			
7,800.43	7,642.00	Niobrara			
7,839.52	7,666.00	A Marl			
7,918.93	7,708.00	B Chalk			
8,054.76	7,757.00	C Chalk			
8,130.93	7,771.00	Top Target			

### *Targets associated with this wellbore*

Target Name	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Shape
Watkins 30-5-8H_SB	0.00	-119.39	-0.78	Polygon
Watkins 30-5-8H_SL	0.00	-119.39	-0.78	Polygon
Watkins 30-5-5GH_Rev A1_BHL Tgt	7,745.00	845.31	4,637.22	Point

### Directional Difficulty Index

Average Dogleg over Survey:	0.97 °/100usft	Maximum Dogleg over Survey:	10.00 °/100usft at 8,203.06 usft
Net Tortousity applicable to Plans:	0.97 °/100usft	Directional Difficulty Index:	6.163

**Plan Report for Watkins 30-5-5GH - Rev A1**

---

*Audit Info*

**North Reference Sheet for Sec. 30-T4S-R64W - Watkins 30-5-5GH - Plan A**

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to True North Reference .  
 Vertical Depths are relative to KB 24 ft @ 5789.00usft (H&P 280). Northing and Easting are relative to Watkins 30-5-5GH  
 Coordinate System is US State Plane 1983, Colorado Central Zone using datum North American Datum 1983, ellipsoid GRS 1980  
 Projection method is Lambert Conformal Conic (2 parallel)  
 Central Meridian is -105.50°, Longitude Origin:0° 0' 0.000 E°, Latitude Origin:39° 45' 0.000 N°  
 False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99998616

Grid Coordinates of Well: 1,672,287.54 usft N, 3,252,694.16 usft E  
 Geographical Coordinates of Well: 39° 40' 32.88" N, 104° 36' 08.10" W  
 Grid Convergence at Surface is: 0.57°

Based upon Minimum Curvature type calculations, at a Measured Depth of 12,263.20usft  
 the Bottom Hole Displacement is 4,713.64usft in the Direction of 79.67° ( True).  
 Magnetic Convergence at surface is: -7.85° (31 December 2013, , BGGM2013)

