

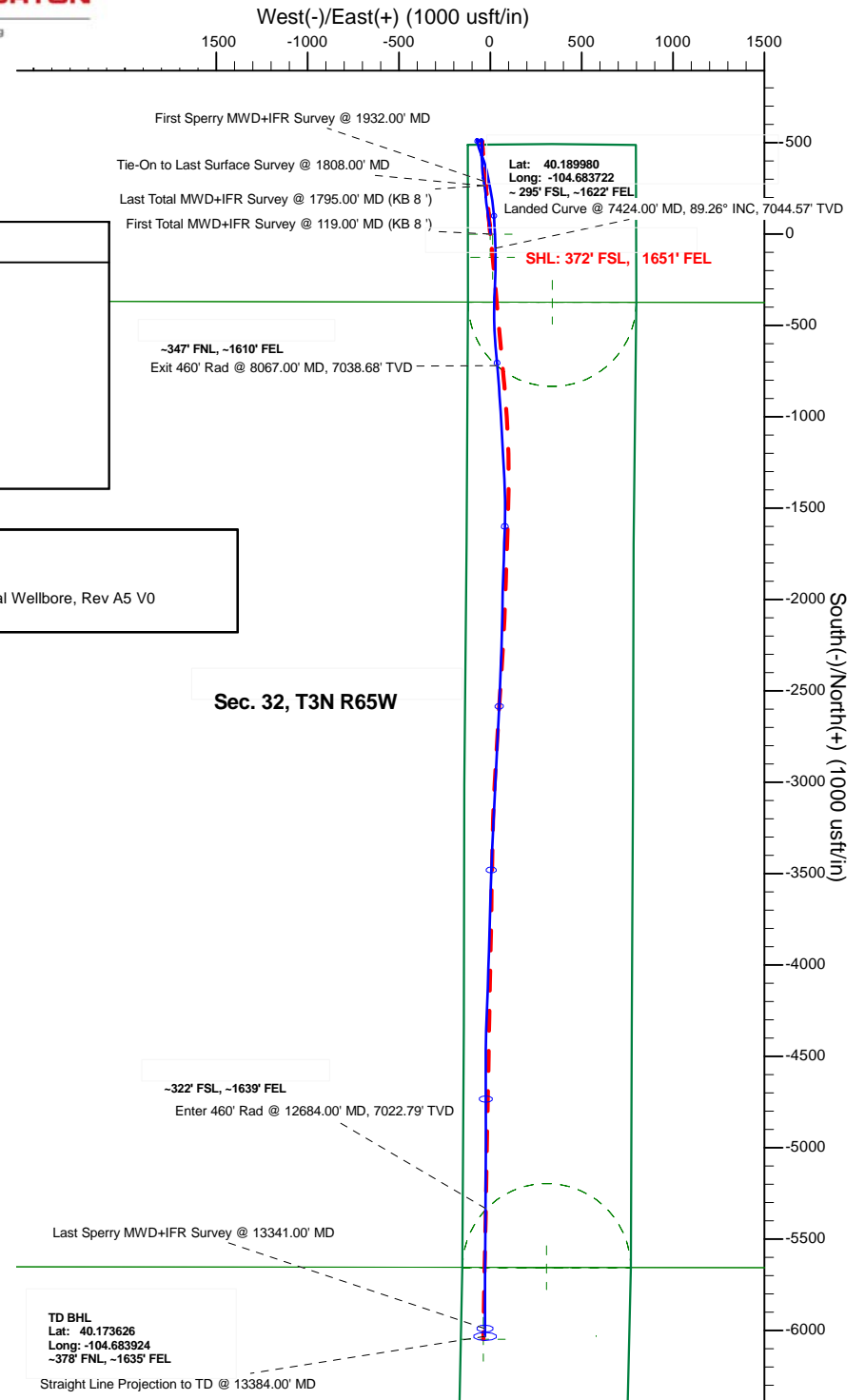
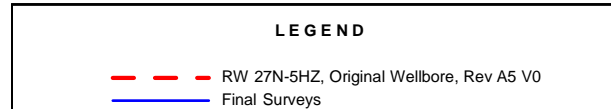
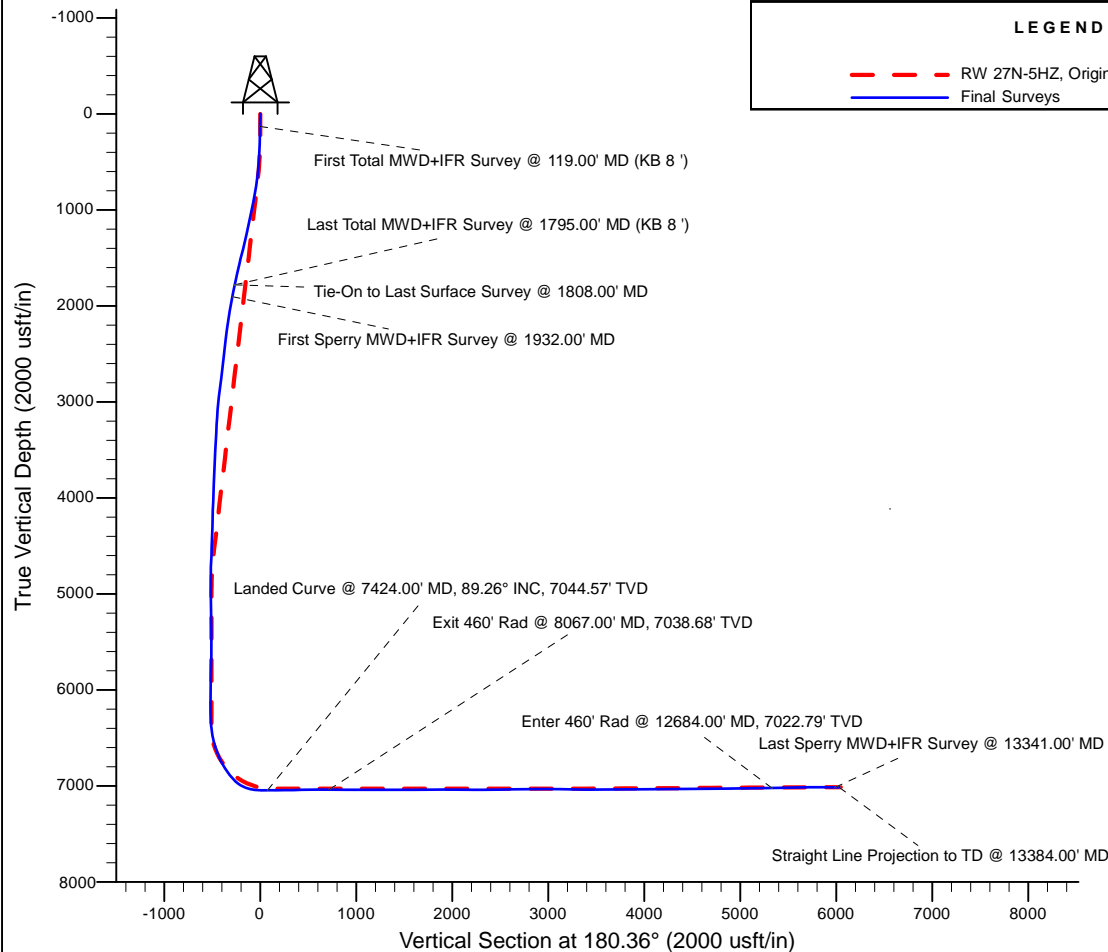
Project: WELD-NAD83-UTMFT13N
 Site: 3N-65W-29 RW 15-29HZ Pad
 Well: RW 27N-5HZ
 Wellbore: Original Wellbore
 Design: Final Surveys



US ROCKIES WATTENBERG PLANNING

WELL DETAILS: RW 27N-5HZ	Design: Final Surveys (RW 27N-5HZ/Original Wellbore)
Ground Level: 4869.00 RKB 21' @ 4890.00usft (Precision 464)	Created By: Jerry Popp Date: 20:51, September 28 2017

ANNOTATIONS						
TVD	MD	Inc	Azi	+N/-S	+E/-W	Annotation
13.00	13.00	0.00	0.00	0.00	0.00	Tie-On to Surface @ 0.00' MD (KB 8 ')
132.00	132.00	0.79	356.47	0.82	-0.05	First Total MWD+IFR Survey @ 119.00' MD (KB 8 ')
1781.52	1808.00	11.69	349.70	264.39	-31.06	Last Total MWD+IFR Survey @ 1795.00' MD (KB 8 ')
1781.52	1808.00	11.69	349.70	264.39	-31.06	Tie-On to Last Surface Survey @ 1808.00' MD
1902.91	1932.00	11.90	348.07	289.26	-35.95	First Sperry MWD+IFR Survey @ 1932.00' MD
7044.57	7424.00	89.26	177.26	-77.31	28.39	Landed Curve @ 7424.00' MD, 89.26° INC, 7044.57' TVD
7038.68	8067.00	89.42	175.42	-719.45	38.37	Exit 460' Rad @ 8067.00' MD, 7038.68' TVD
7022.79	12684.00	90.94	180.51	-5332.64	-25.72	Enter 460' Rad @ 12684.00' MD, 7022.79' TVD
7014.32	13341.00	89.32	179.69	-5989.50	-28.27	Last Sperry MWD+IFR Survey @ 13341.00' MD
7014.83	13384.00	89.32	179.69	-6032.49	-28.04	Straight Line Projection to TD @ 13384.00' MD



Job# 904218781

Precision 464

US ROCKIES WATTENBERG PLANNING

WELD-NAD83-UTMFT13N 3N-65W-29 RW 15-29HZ Pad

API# 05-123-44766

RW 27N-5HZ

Original Wellbore

Design: Final Surveys

Sperry Drilling Services

Combo Report

28 September, 2017

Well Coordinates: 40° 11' 24.69" N
104° 41' 01.76" W

North American Datum 1983
Zone 13N (108 W to 102 W)
14,596,148.43 N
1,728,716.26 E

Ground Level: 4,869.00 usft

Local Coordinate Origin:

Centered on Well RW 27N-5HZ

Viewing Datum:

RKB 21' @ 4890.00usft (Precision 464)

TVDs to System:

N

North Reference:

True

Unit System:

Dec-Deg - API - US Survey Feet - Custom

Version: 5000.1 Build: 81D

Report Version: Midcon Combo v1.11

HALLIBURTON

Design Report for RW 27N-5HZ - Final Surveys

Measured Depth (usft)	Inclination (°)	True Azimuth (°)	TVD below System (usft)	Vertical Depth (usft)	Local Coordinates		Map Coordinates		Dogleg Rate (°/100usft)	Vertical Section (usft)	Comments
					Northing (usft)	Easting (usft)	Northing (usft)	Easting (usft)			
0.00	0.00	0.00	-4,890.00	0.00	0.00 N	0.00 E	14,596,148.43	1,728,716.26	0.00	0.00	
13.00	0.00	0.00	-4,877.00	13.00	0.00 N	0.00 E	14,596,148.43	1,728,716.26	0.00	0.00	Tie-On to Surface @ 0.00' MD (KB 8 ')
132.00	0.79	356.47	-4,758.00	132.00	0.82 N	0.05 W	14,596,149.25	1,728,716.21	0.66	-0.82	First Total MWD+IFR Survey @ 119.00' MD (KB 8 ')
163.00	0.44	11.41	-4,727.01	162.99	1.15 N	0.04 W	14,596,149.58	1,728,716.22	1.23	-1.15	
195.00	0.31	10.36	-4,695.01	194.99	1.35 N	0.00 W	14,596,149.79	1,728,716.26	0.41	-1.35	
227.00	0.88	344.78	-4,663.01	226.99	1.68 N	0.05 W	14,596,150.11	1,728,716.21	1.92	-1.68	
259.00	1.67	357.61	-4,631.02	258.98	2.38 N	0.13 W	14,596,150.81	1,728,716.12	2.61	-2.38	
290.00	1.67	359.37	-4,600.03	289.97	3.28 N	0.16 W	14,596,151.71	1,728,716.09	0.17	-3.28	
322.00	2.02	9.47	-4,568.05	321.95	4.31 N	0.07 W	14,596,152.74	1,728,716.18	1.49	-4.30	
354.00	2.59	2.27	-4,536.07	353.93	5.58 N	0.05 E	14,596,154.02	1,728,716.29	1.99	-5.58	
385.00	2.99	0.42	-4,505.11	384.89	7.09 N	0.09 E	14,596,155.52	1,728,716.32	1.32	-7.09	
417.00	2.55	5.16	-4,473.15	416.85	8.64 N	0.16 E	14,596,157.07	1,728,716.39	1.55	-8.64	
481.00	3.69	354.89	-4,409.24	480.76	12.11 N	0.10 E	14,596,160.54	1,728,716.32	1.98	-12.11	
512.00	4.31	359.54	-4,378.32	511.68	14.26 N	0.00 E	14,596,162.70	1,728,716.21	2.26	-14.26	
544.00	4.48	358.14	-4,346.41	543.59	16.72 N	0.05 W	14,596,165.15	1,728,716.15	0.63	-16.71	
575.00	5.14	354.36	-4,315.52	574.48	19.31 N	0.22 W	14,596,167.74	1,728,715.97	2.36	-19.31	
607.00	6.24	353.57	-4,283.68	606.32	22.46 N	0.56 W	14,596,170.89	1,728,715.62	3.45	-22.46	
638.00	6.59	352.60	-4,252.87	637.13	25.90 N	0.98 W	14,596,174.33	1,728,715.19	1.18	-25.89	
670.00	7.65	353.57	-4,221.12	668.88	29.84 N	1.45 W	14,596,178.26	1,728,714.70	3.33	-29.83	
702.00	7.60	353.30	-4,189.40	700.60	34.06 N	1.94 W	14,596,182.48	1,728,714.20	0.19	-34.04	
765.00	9.10	354.01	-4,127.07	762.93	43.15 N	2.94 W	14,596,191.57	1,728,713.16	2.39	-43.13	
797.00	9.71	352.25	-4,095.50	794.50	48.34 N	3.57 W	14,596,196.76	1,728,712.52	2.11	-48.32	
829.00	10.24	353.04	-4,063.99	826.01	53.84 N	4.28 W	14,596,202.25	1,728,711.79	1.71	-53.81	
860.00	10.20	351.02	-4,033.48	856.52	59.28 N	5.04 W	14,596,207.70	1,728,711.01	1.16	-59.25	
892.00	11.21	352.25	-4,002.04	887.96	65.16 N	5.90 W	14,596,213.57	1,728,710.12	3.24	-65.13	
923.00	11.60	353.04	-3,971.65	918.35	71.24 N	6.69 W	14,596,219.65	1,728,709.32	1.36	-71.20	
987.00	11.69	349.96	-3,908.96	981.04	84.02 N	8.60 W	14,596,232.42	1,728,707.36	0.98	-83.96	
1,018.00	11.73	348.65	-3,878.61	1,011.39	90.20 N	9.77 W	14,596,238.59	1,728,706.17	0.87	-90.13	
1,050.00	11.82	352.69	-3,847.28	1,042.72	96.64 N	10.82 W	14,596,245.03	1,728,705.09	2.59	-96.57	
1,082.00	11.82	353.66	-3,815.96	1,074.04	103.15 N	11.60 W	14,596,251.54	1,728,704.29	0.62	-103.07	
1,145.00	11.73	350.58	-3,754.29	1,135.71	115.88 N	13.36 W	14,596,264.26	1,728,702.48	1.01	-115.79	
1,177.00	11.87	349.79	-3,722.96	1,167.04	122.32 N	14.48 W	14,596,270.70	1,728,701.35	0.67	-122.23	
1,240.00	12.70	352.95	-3,661.40	1,228.60	135.57 N	16.48 W	14,596,283.95	1,728,699.30	1.70	-135.47	
1,272.00	12.74	353.66	-3,630.19	1,259.81	142.57 N	17.30 W	14,596,290.94	1,728,698.45	0.50	-142.46	
1,303.00	13.52	350.14	-3,600.00	1,290.00	149.54 N	18.30 W	14,596,297.91	1,728,697.43	3.60	-149.42	
1,366.00	13.84	352.95	-3,538.79	1,351.21	164.27 N	20.48 W	14,596,312.63	1,728,695.19	1.17	-164.14	
1,398.00	14.19	353.66	-3,507.74	1,382.26	171.97 N	21.39 W	14,596,320.32	1,728,694.26	1.22	-171.83	
1,430.00	14.33	353.92	-3,476.73	1,413.27	179.81 N	22.24 W	14,596,328.16	1,728,693.38	0.48	-179.66	
1,461.00	13.97	355.15	-3,446.67	1,443.33	187.35 N	22.96 W	14,596,335.70	1,728,692.63	1.51	-187.20	
1,493.00	13.75	354.53	-3,415.60	1,474.40	194.98 N	23.65 W	14,596,343.33	1,728,691.92	0.83	-194.83	
1,525.00	13.62	356.03	-3,384.51	1,505.49	202.53 N	24.27 W	14,596,350.87	1,728,691.27	1.18	-202.37	

Design Report for RW 27N-5HZ - Final Surveys

Measured Depth (usft)	Inclination (°)	True Azimuth (°)	TVD below System (usft)	Vertical Depth (usft)	Local Coordinates		Map Coordinates		Dogleg Rate (°/100usft)	Vertical Section (usft)	Comments
					Northing (usft)	Easting (usft)	Northing (usft)	Easting (usft)			
1,588.00	13.18	356.47	-3,323.22	1,566.78	217.10 N	25.23 W	14,596,365.44	1,728,690.26	0.72	-216.93	
1,620.00	13.18	356.64	-3,292.06	1,597.94	224.38 N	25.67 W	14,596,372.72	1,728,689.79	0.12	-224.21	
1,650.00	13.27	355.41	-3,262.86	1,627.14	231.23 N	26.14 W	14,596,379.56	1,728,689.29	0.98	-231.06	
1,682.00	13.23	354.18	-3,231.71	1,658.29	238.53 N	26.81 W	14,596,386.86	1,728,688.60	0.89	-238.36	
1,714.00	12.17	352.86	-3,200.49	1,689.51	245.52 N	27.60 W	14,596,393.85	1,728,687.79	3.43	-245.34	
1,746.00	11.42	350.14	-3,169.17	1,720.83	251.99 N	28.56 W	14,596,400.32	1,728,686.80	2.92	-251.80	
1,778.00	12.00	347.33	-3,137.84	1,752.16	258.36 N	29.83 W	14,596,406.68	1,728,685.51	2.54	-258.16	
1,808.00	11.69	349.70	-3,108.48	1,781.52	264.39 N	31.06 W	14,596,412.71	1,728,684.26	1.92	-264.19	Last Total MWD+IFR Survey @ 1795.00' MD (KB 8') - Tie-On to Last Surface Survey @ 1808.00' MD First Sperry MWD+IFR Survey @ 1932.00' MD
1,932.00	11.90	348.07	-2,987.09	1,902.91	289.26 N	35.95 W	14,596,437.56	1,728,679.28	0.32	-289.02	
2,022.00	10.17	354.58	-2,898.76	1,991.24	306.25 N	38.62 W	14,596,454.54	1,728,676.55	2.37	-306.00	
2,111.00	8.77	354.96	-2,810.97	2,079.03	320.83 N	39.96 W	14,596,469.12	1,728,675.16	1.57	-320.57	
2,201.00	8.51	352.86	-2,721.99	2,168.01	334.27 N	41.39 W	14,596,482.55	1,728,673.68	0.45	-334.00	
2,290.00	7.98	354.65	-2,633.91	2,256.09	346.96 N	42.78 W	14,596,495.23	1,728,672.24	0.66	-346.68	
2,380.00	6.79	1.02	-2,544.66	2,345.34	358.50 N	43.27 W	14,596,506.77	1,728,671.71	1.60	-358.22	
2,469.00	6.82	357.33	-2,456.29	2,433.71	369.04 N	43.42 W	14,596,517.31	1,728,671.52	0.49	-368.76	
2,559.00	6.79	356.17	-2,366.92	2,523.08	379.68 N	44.03 W	14,596,527.95	1,728,670.88	0.16	-379.40	
2,648.00	6.49	353.17	-2,278.52	2,611.48	389.93 N	44.98 W	14,596,538.19	1,728,669.90	0.52	-389.64	
2,738.00	6.41	358.71	-2,189.09	2,700.91	400.00 N	45.69 W	14,596,548.27	1,728,669.14	0.70	-399.70	
2,917.00	6.92	354.70	-2,011.30	2,878.70	420.73 N	46.91 W	14,596,568.99	1,728,667.85	0.39	-420.42	
3,006.00	7.26	2.70	-1,922.97	2,967.03	431.68 N	47.15 W	14,596,579.94	1,728,667.58	1.17	-431.38	
3,096.00	4.67	14.71	-1,833.47	3,056.53	440.91 N	45.95 W	14,596,589.17	1,728,668.74	3.18	-440.61	
3,186.00	3.93	12.39	-1,743.72	3,146.28	447.46 N	44.35 W	14,596,595.73	1,728,670.31	0.84	-447.18	
3,275.00	3.33	7.60	-1,654.90	3,235.10	453.01 N	43.36 W	14,596,601.28	1,728,671.29	0.75	-452.72	
3,365.00	3.04	0.10	-1,565.04	3,324.96	457.98 N	43.01 W	14,596,606.26	1,728,671.62	0.56	-457.70	
3,454.00	2.80	348.00	-1,476.15	3,413.85	462.47 N	43.46 W	14,596,610.74	1,728,671.16	0.74	-462.19	
3,544.00	2.73	353.46	-1,386.26	3,503.74	466.75 N	44.16 W	14,596,615.02	1,728,670.44	0.30	-466.46	
3,634.00	2.70	1.65	-1,296.36	3,593.64	471.00 N	44.34 W	14,596,619.27	1,728,670.24	0.43	-470.71	
3,723.00	2.47	348.72	-1,207.45	3,682.55	474.97 N	44.66 W	14,596,623.24	1,728,669.91	0.70	-474.68	
3,813.00	2.87	345.84	-1,117.54	3,772.46	479.06 N	45.59 W	14,596,627.33	1,728,668.97	0.47	-478.76	
3,902.00	2.60	344.22	-1,028.65	3,861.35	483.16 N	46.68 W	14,596,631.42	1,728,667.86	0.32	-482.86	
3,992.00	2.20	11.09	-938.72	3,951.28	486.82 N	46.90 W	14,596,635.08	1,728,667.62	1.31	-486.52	
4,081.00	1.77	5.65	-849.78	4,040.22	489.87 N	46.44 W	14,596,638.13	1,728,668.08	0.53	-489.56	
4,171.00	1.66	16.33	-759.82	4,130.18	492.50 N	45.94 W	14,596,640.77	1,728,668.57	0.37	-492.20	
4,350.00	1.74	0.41	-580.89	4,309.11	497.71 N	45.19 W	14,596,645.97	1,728,669.30	0.27	-497.41	
4,554.00	2.03	7.96	-377.00	4,513.00	504.38 N	44.66 W	14,596,652.65	1,728,669.80	0.19	-504.09	
4,644.00	2.89	12.21	-287.09	4,602.91	508.18 N	43.96 W	14,596,656.45	1,728,670.49	0.98	-507.89	
4,733.00	2.41	4.23	-198.18	4,691.82	512.24 N	43.35 W	14,596,660.51	1,728,671.08	0.68	-511.95	
4,823.00	0.34	244.58	-108.21	4,781.79	514.01 N	43.45 W	14,596,662.28	1,728,670.98	2.88	-513.73	
4,913.00	2.05	260.92	-18.23	4,871.77	513.64 N	45.28 W	14,596,661.91	1,728,669.15	1.92	-513.35	
5,002.00	2.71	264.94	70.69	4,960.69	513.20 N	48.95 W	14,596,661.46	1,728,665.48	0.76	-512.89	

Design Report for RW 27N-5HZ - Final Surveys

Measured Depth (usft)	Inclination (°)	True Azimuth (°)	TVD below System (usft)	Vertical Depth (usft)	Local Coordinates		Map Coordinates		Dogleg Rate (°/100usft)	Vertical Section (usft)	Comments
					Northing (usft)	Easting (usft)	Northing (usft)	Easting (usft)			
5,092.00	1.34	246.09	160.63	5,050.63	512.59 N	52.03 W	14,596,660.83	1,728,662.40	1.67	-512.25	
5,361.00	2.26	248.12	429.50	5,319.50	509.34 N	59.83 W	14,596,657.55	1,728,654.62	0.34	-508.95	
5,630.00	1.63	289.67	698.35	5,588.35	508.65 N	68.36 W	14,596,656.83	1,728,646.09	0.56	-508.21	
5,721.00	1.36	314.75	789.32	5,679.32	509.85 N	70.34 W	14,596,658.02	1,728,644.10	0.77	-509.39	
5,810.00	1.89	8.55	878.29	5,768.29	512.04 N	70.87 W	14,596,660.22	1,728,643.56	1.74	-511.59	
5,990.00	1.04	326.11	1,058.24	5,948.24	516.33 N	71.34 W	14,596,664.51	1,728,643.08	0.74	-515.87	
6,169.00	0.78	162.36	1,237.23	6,127.23	516.52 N	71.88 W	14,596,664.69	1,728,642.54	1.01	-516.06	
6,259.00	0.80	195.30	1,327.22	6,217.22	515.33 N	71.86 W	14,596,663.50	1,728,642.57	0.50	-514.87	
6,348.00	0.74	216.26	1,416.21	6,306.21	514.27 N	72.36 W	14,596,662.44	1,728,642.07	0.32	-513.80	
6,438.00	5.23	165.20	1,506.07	6,396.07	509.83 N	71.66 W	14,596,658.00	1,728,642.79	5.33	-509.37	
6,528.00	12.85	165.88	1,594.89	6,484.89	496.14 N	68.16 W	14,596,644.32	1,728,646.33	8.47	-495.70	
6,618.00	17.94	167.28	1,681.63	6,571.63	472.90 N	62.67 W	14,596,621.10	1,728,651.91	5.67	-472.49	
6,707.00	21.69	155.12	1,765.39	6,655.39	444.58 N	52.72 W	14,596,592.82	1,728,661.96	6.24	-444.24	
6,797.00	26.72	159.50	1,847.45	6,737.45	410.52 N	38.63 W	14,596,558.81	1,728,676.17	5.93	-410.27	
6,887.00	34.45	163.71	1,924.88	6,814.88	367.06 N	24.38 W	14,596,515.40	1,728,690.57	8.91	-366.90	
6,976.00	36.21	169.41	1,997.51	6,887.51	317.04 N	12.48 W	14,596,465.43	1,728,702.65	4.20	-316.96	
7,066.00	48.53	169.95	2,063.87	6,953.87	257.48 N	1.67 W	14,596,405.90	1,728,713.67	13.69	-257.46	
7,111.00	57.34	169.10	2,090.97	6,980.97	222.21 N	4.87 E	14,596,370.66	1,728,720.33	19.64	-222.23	
7,156.00	63.58	171.71	2,113.15	7,003.15	183.63 N	11.36 E	14,596,332.10	1,728,726.97	14.75	-183.69	
7,246.00	76.54	175.65	2,143.79	7,033.79	99.72 N	20.53 E	14,596,248.23	1,728,736.44	14.97	-99.85	
7,299.00	85.03	177.10	2,152.27	7,042.27	47.56 N	23.83 E	14,596,196.07	1,728,739.92	16.24	-47.71	
7,335.00	89.85	178.60	2,153.87	7,043.87	11.63 N	25.18 E	14,596,160.15	1,728,741.40	14.02	-11.79	
7,424.00	89.26	177.26	2,154.57	7,044.57	77.31 S	28.39 E	14,596,071.23	1,728,744.93	1.65	77.13	Landed Curve @ 7424.00' MD, 89.26° INC, 7044.57' TVD
7,514.00	90.43	181.63	2,154.81	7,044.81	167.28 S	29.26 E	14,595,981.26	1,728,746.12	5.03	167.09	
7,603.00	90.89	182.51	2,153.78	7,043.78	256.21 S	26.05 E	14,595,892.31	1,728,743.22	1.12	256.04	
7,693.00	90.96	181.88	2,152.33	7,042.33	346.13 S	22.60 E	14,595,802.38	1,728,740.09	0.70	345.99	
7,782.00	91.45	179.89	2,150.46	7,040.46	435.10 S	21.23 E	14,595,713.41	1,728,739.04	2.30	434.96	
7,872.00	90.62	177.41	2,148.83	7,038.83	525.05 S	23.35 E	14,595,623.47	1,728,741.48	2.91	524.89	
7,962.00	90.12	174.82	2,148.25	7,038.25	614.84 S	29.44 E	14,595,533.71	1,728,747.89	2.93	614.64	
8,052.00	89.51	175.34	2,148.54	7,038.54	704.50 S	37.16 E	14,595,444.07	1,728,755.93	0.89	704.25	
8,067.00	89.42	175.42	2,148.68	7,038.68	719.45 S	38.37 E	14,595,429.12	1,728,757.19	0.81	719.20	Exit 460' Rad @ 8067.00' MD, 7038.68' TVD
8,141.00	88.98	175.83	2,149.72	7,039.72	793.23 S	44.01 E	14,595,355.36	1,728,763.10	0.81	792.94	
8,231.00	89.41	175.74	2,150.98	7,040.98	882.98 S	50.63 E	14,595,265.64	1,728,770.03	0.49	882.64	
8,321.00	90.34	176.13	2,151.18	7,041.18	972.75 S	57.01 E	14,595,175.89	1,728,776.73	1.12	972.37	
8,410.00	90.12	176.70	2,150.82	7,040.82	1,061.57 S	62.57 E	14,595,087.09	1,728,782.61	0.69	1,061.16	
8,500.00	90.00	176.81	2,150.72	7,040.72	1,151.43 S	67.67 E	14,594,997.25	1,728,788.03	0.18	1,150.98	
8,590.00	89.48	176.95	2,151.13	7,041.13	1,241.30 S	72.57 E	14,594,907.40	1,728,793.25	0.60	1,240.81	
8,679.00	89.94	177.62	2,151.58	7,041.58	1,330.19 S	76.78 E	14,594,818.52	1,728,797.78	0.91	1,329.68	
8,769.00	89.60	177.95	2,151.94	7,041.94	1,420.13 S	80.26 E	14,594,728.60	1,728,801.58	0.53	1,419.59	
8,859.00	90.74	180.05	2,151.68	7,041.68	1,510.10 S	81.83 E	14,594,638.63	1,728,803.47	2.65	1,509.56	

Design Report for RW 27N-5HZ - Final Surveys

Measured Depth (usft)	Inclination (°)	True Azimuth (°)	TVD below System (usft)	Vertical Depth (usft)	Local Coordinates		Map Coordinates		Dogleg Rate (°/100usft)	Vertical Section (usft)	Comments
					Northing (usft)	Easting (usft)	Northing (usft)	Easting (usft)			
8,948.00	91.11	182.29	2,150.24	7,040.24	1,599.07 S	80.01 E	14,594,549.66	1,728,801.97	2.55	1,598.53	
9,038.00	90.31	181.72	2,149.13	7,039.13	1,689.01 S	76.87 E	14,594,459.71	1,728,799.14	1.09	1,688.49	
9,128.00	89.63	181.90	2,149.17	7,039.17	1,778.96 S	74.02 E	14,594,369.75	1,728,796.62	0.78	1,778.46	
9,218.00	90.52	181.49	2,149.05	7,039.05	1,868.92 S	71.36 E	14,594,279.78	1,728,794.28	1.09	1,868.43	
9,307.00	89.94	181.75	2,148.70	7,038.70	1,957.88 S	68.84 E	14,594,190.81	1,728,792.08	0.71	1,957.41	
9,397.00	89.54	181.14	2,149.11	7,039.11	2,047.85 S	66.58 E	14,594,100.83	1,728,790.13	0.81	2,047.39	
9,486.00	89.01	181.05	2,150.23	7,040.23	2,136.83 S	64.87 E	14,594,011.85	1,728,788.74	0.60	2,136.38	
9,576.00	89.97	181.74	2,151.03	7,041.03	2,226.80 S	62.68 E	14,593,921.87	1,728,786.87	1.31	2,226.36	
9,666.00	89.97	181.46	2,151.08	7,041.08	2,316.76 S	60.17 E	14,593,831.90	1,728,784.68	0.31	2,316.34	
9,845.00	91.79	182.83	2,148.33	7,038.33	2,495.60 S	53.47 E	14,593,653.03	1,728,778.62	1.27	2,495.22	
9,934.00	91.66	182.88	2,145.65	7,035.65	2,584.45 S	49.04 E	14,593,564.17	1,728,774.51	0.16	2,584.09	
10,024.00	90.43	182.65	2,144.01	7,034.01	2,674.33 S	44.70 E	14,593,474.28	1,728,770.49	1.39	2,674.00	
10,114.00	90.34	182.69	2,143.41	7,033.41	2,764.23 S	40.51 E	14,593,384.36	1,728,766.61	0.11	2,763.92	
10,203.00	90.12	183.22	2,143.05	7,033.05	2,853.11 S	35.92 E	14,593,295.47	1,728,762.34	0.64	2,852.83	
10,293.00	91.02	183.11	2,142.15	7,032.15	2,942.97 S	30.95 E	14,593,205.59	1,728,757.69	1.01	2,942.72	
10,382.00	89.44	182.48	2,141.80	7,031.80	3,031.86 S	26.61 E	14,593,116.69	1,728,753.67	1.91	3,031.63	
10,472.00	89.08	182.28	2,142.96	7,032.96	3,121.77 S	22.88 E	14,593,026.76	1,728,750.25	0.46	3,121.57	
10,562.00	88.61	182.79	2,144.77	7,034.77	3,211.67 S	18.90 E	14,592,936.85	1,728,746.59	0.77	3,211.49	
10,651.00	88.46	183.28	2,147.05	7,037.05	3,300.51 S	14.18 E	14,592,847.99	1,728,742.20	0.58	3,300.36	
10,741.00	88.18	183.16	2,149.69	7,039.69	3,390.33 S	9.13 E	14,592,758.15	1,728,737.47	0.34	3,390.21	
10,831.00	90.80	181.38	2,150.49	7,040.49	3,480.25 S	5.57 E	14,592,668.23	1,728,734.22	3.52	3,480.14	
10,920.00	90.77	181.54	2,149.27	7,039.27	3,569.21 S	3.30 E	14,592,579.26	1,728,732.27	0.18	3,569.12	
11,099.00	90.25	181.34	2,147.67	7,037.67	3,748.15 S	1.20 W	14,592,400.31	1,728,728.41	0.31	3,748.08	
11,278.00	90.00	182.33	2,147.28	7,037.28	3,927.05 S	6.93 W	14,592,221.38	1,728,723.32	0.57	3,927.02	
11,368.00	91.48	181.98	2,146.12	7,036.12	4,016.98 S	10.31 W	14,592,131.44	1,728,720.25	1.69	4,016.96	
11,458.00	90.92	181.74	2,144.24	7,034.24	4,106.91 S	13.23 W	14,592,041.50	1,728,717.65	0.68	4,106.91	
11,547.00	90.83	181.74	2,142.88	7,032.88	4,195.86 S	15.94 W	14,591,952.54	1,728,715.27	0.10	4,195.88	
11,727.00	90.52	182.37	2,140.76	7,030.76	4,375.73 S	22.39 W	14,591,772.65	1,728,709.45	0.39	4,375.78	
11,816.00	90.99	180.09	2,139.58	7,029.58	4,464.69 S	24.30 W	14,591,683.68	1,728,707.86	2.62	4,464.76	
11,906.00	90.55	179.89	2,138.38	7,028.38	4,554.69 S	24.28 W	14,591,593.69	1,728,708.20	0.54	4,554.75	
12,085.00	89.85	180.14	2,137.75	7,027.75	4,733.68 S	24.33 W	14,591,414.69	1,728,708.79	0.42	4,733.74	
12,265.00	90.43	180.12	2,137.31	7,027.31	4,913.68 S	24.74 W	14,591,234.69	1,728,709.02	0.32	4,913.74	
12,444.00	90.18	179.61	2,136.36	7,026.36	5,092.68 S	24.32 W	14,591,055.70	1,728,710.08	0.32	5,092.73	
12,534.00	91.05	180.50	2,135.39	7,025.39	5,182.67 S	24.40 W	14,590,965.71	1,728,710.31	1.38	5,182.72	
12,684.00	90.94	180.51	2,132.79	7,022.79	5,332.64 S	25.72 W	14,590,815.73	1,728,709.53	0.07	5,332.70	Enter 460' Rad @ 12684.00' MD, 7022.79' TVD
12,713.00	90.92	180.51	2,132.31	7,022.31	5,361.64 S	25.98 W	14,590,786.74	1,728,709.37	0.07	5,361.69	
12,803.00	91.60	180.29	2,130.34	7,020.34	5,451.61 S	26.61 W	14,590,696.76	1,728,709.07	0.79	5,451.67	
12,892.00	91.91	180.50	2,127.61	7,017.61	5,540.57 S	27.22 W	14,590,607.80	1,728,708.77	0.42	5,540.63	
13,072.00	90.89	180.16	2,123.21	7,013.21	5,720.51 S	28.26 W	14,590,427.86	1,728,708.37	0.60	5,720.57	
13,206.00	89.48	179.96	2,122.78	7,012.78	5,854.51 S	28.40 W	14,590,293.86	1,728,708.71	1.06	5,854.57	
13,251.00	89.32	180.11	2,123.25	7,013.25	5,899.50 S	28.43 W	14,590,248.87	1,728,708.84	0.49	5,899.56	

Design Report for RW 27N-5HZ - Final Surveys

Measured Depth (usft)	Inclination (°)	True Azimuth (°)	TVD below System (usft)	Vertical Depth (usft)	Local Coordinates		Map Coordinates		Dogleg Rate (°/100usft)	Vertical Section (usft)	Comments
					Northing (usft)	Easting (usft)	Northing (usft)	Easting (usft)			
13,341.00	89.32	179.69	2,124.32	7,014.32	5,989.50 S	28.27 W	14,590,158.87	1,728,709.32	0.47	5,989.56	Last Sperry MWD+IFR Survey @ 13341.00' MD
13,384.00	89.32	179.69	2,124.83	7,014.83	6,032.49 S	28.04 W	14,590,115.88	1,728,709.71	0.00	6,032.55	Straight Line Projection to TD @ 13384.00' MD

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
13.00	13.00	0.00	0.00	Tie-On to Surface @ 0.00' MD (KB 8 ')
132.00	132.00	0.82	-0.05	First Total MWD+IFR Survey @ 119.00' MD (KB 8 ')
1,808.00	1,781.52	264.39	-31.06	Last Total MWD+IFR Survey @ 1795.00' MD (KB 8 ')
1,808.00	1,781.52	264.39	-31.06	Tie-On to Last Surface Survey @ 1808.00' MD
1,932.00	1,902.91	289.26	-35.95	First Sperry MWD+IFR Survey @ 1932.00' MD
7,424.00	7,044.57	-77.31	28.39	Landed Curve @ 7424.00' MD, 89.26° INC, 7044.57' TVD
8,067.00	7,038.68	-719.45	38.37	Exit 460' Rad @ 8067.00' MD, 7038.68' TVD
12,684.00	7,022.79	-5,332.64	-25.72	Enter 460' Rad @ 12684.00' MD, 7022.79' TVD
13,341.00	7,014.32	-5,989.50	-28.27	Last Sperry MWD+IFR Survey @ 13341.00' MD
13,384.00	7,014.83	-6,032.49	-28.04	Straight Line Projection to TD @ 13384.00' MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/-S (usft)	+E/-W (usft)	
User	No Target (Freehand)	180.36	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
13.00	1,808.00	Total MWD+IFR Surface Surveys	APC_ISCWSA REV 2 MWD+IFR1
1,808.00	13,341.00	Sperry MWD+IFR Surveys	APC_ISCWSA REV 2 MWD+IFR1+SC
13,384.00	13,384.00	PTB	APC_BLIND

Design Report for RW 27N-5HZ - Final Surveys

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
RW 27N-5HZ_460 Polygon North ()	0.00	0.00	0.00	-373.78	339.25	14,595,775.86	1,729,056.83	40.189166	-104.682608
- actual wellpath misses target center by 504.78usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Circle (radius 460.00)									
RW 27N-5HZ_460 Polygon South ()	0.00	0.00	0.00	-5,656.02	308.89	14,590,493.54	1,729,045.29	40.174660	-104.682717
- actual wellpath misses target center by 5664.45usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Circle (radius 460.00)									
RW 27N-5HZ_BHL PLAT ()	0.00	0.00	0.00	-6,048.26	-37.80	14,590,100.07	1,728,700.00	40.173583	-104.683958
- actual wellpath misses target center by 6048.38usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									
RW 27N-5HZ_HEEL PLAT ()	0.00	0.00	0.00	-127.09	13.13	14,596,021.39	1,728,729.84	40.189843	-104.683776
- actual wellpath misses target center by 127.77usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									
RW 27N-5HZ_SHL ()	0.00	0.00	0.00	0.00	0.00	14,596,148.43	1,728,716.26	40.190192	-104.683823
- actual wellpath hits target center									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	1.62 °/100usft	Maximum Dogleg over Survey:	19.64 °/100usft at 7,111.00 usft
Net Tortousity applicable to Plans:	0.76 °/100usft	Directional Difficulty Index:	6.467

Audit Info

North Reference Sheet for 3N-65W-29 RW 15-29HZ Pad - RW 27N-5HZ - Original Wellbore

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

Vertical Depths are relative to RKB 21' @ 4890.00usft (Precision 464). Northing and Easting are relative to RW 27N-5HZ

Coordinate System is Universal Transverse Mercator (US Survey Feet), Zone 13N (108 W to 102 W) using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Transverse Mercator (Gauss-Kruger)

Central Meridian is -105.000000°, Longitude Origin:0.000000°, Latitude Origin:0.000000°

False Easting: 1,640,416.67usft, False Northing: 0.00usft, Scale Reduction: 0.99960892

Grid Coordinates of Well: 14,596,148.43 usft N, 1,728,716.26 usft E

Geographical Coordinates of Well: 40° 11' 24.69" N, 104° 41' 01.76" W

Grid Convergence at Surface is: 0.20°

Based upon Minimum Curvature type calculations, at a Measured Depth of 13,384.00usft the Bottom Hole Displacement is 6,032.56usft in the Direction of 180.27° (True).

Magnetic Convergence at surface is: -8.11° (21 August 2017, , BGGM2017)

