

Project: WELD-NAD83-UTMFT13N
 Site: 3N-65W-29 RW 15-29HZ P2
 Well: RW 26N-5HZ
 Wellbore: Original Wellbore
 Design: Final Surveys



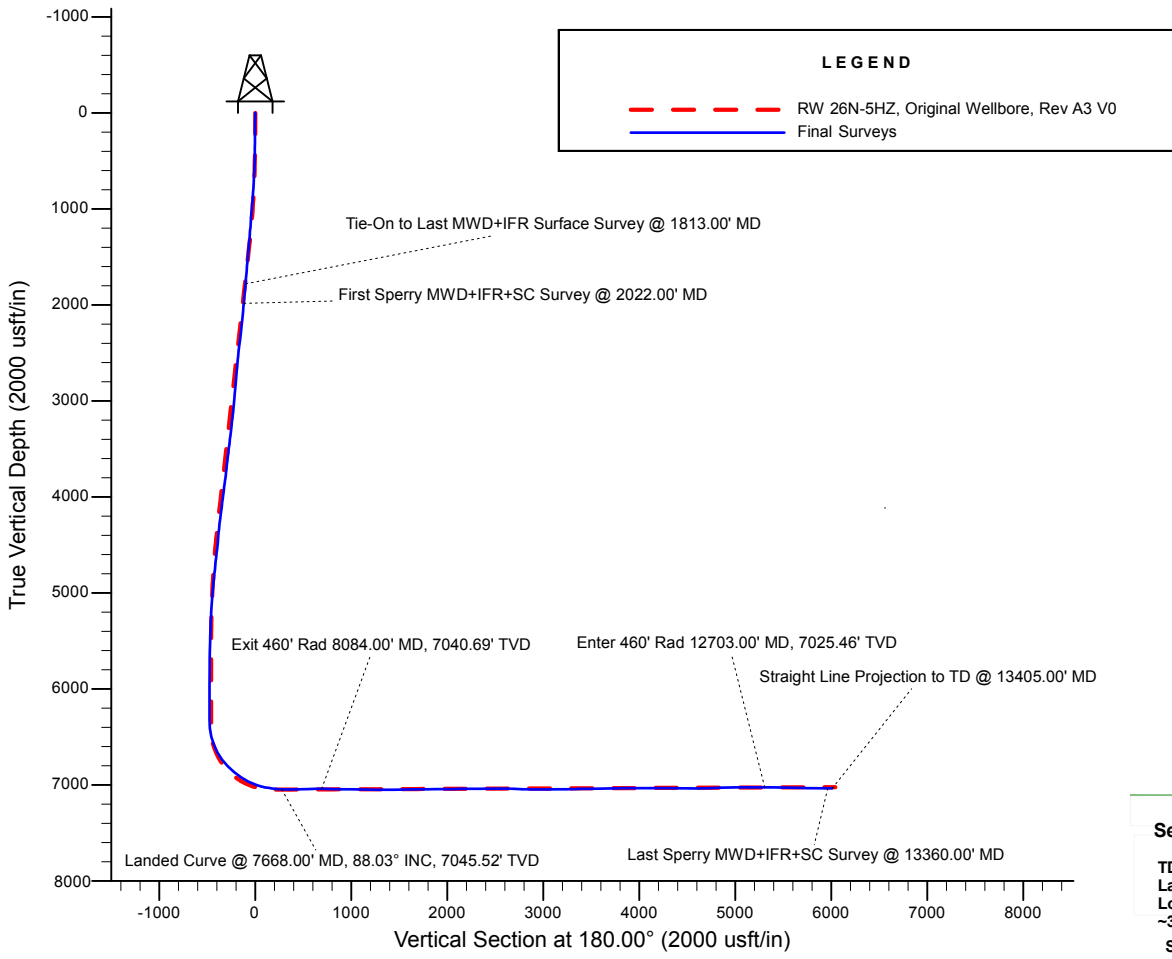
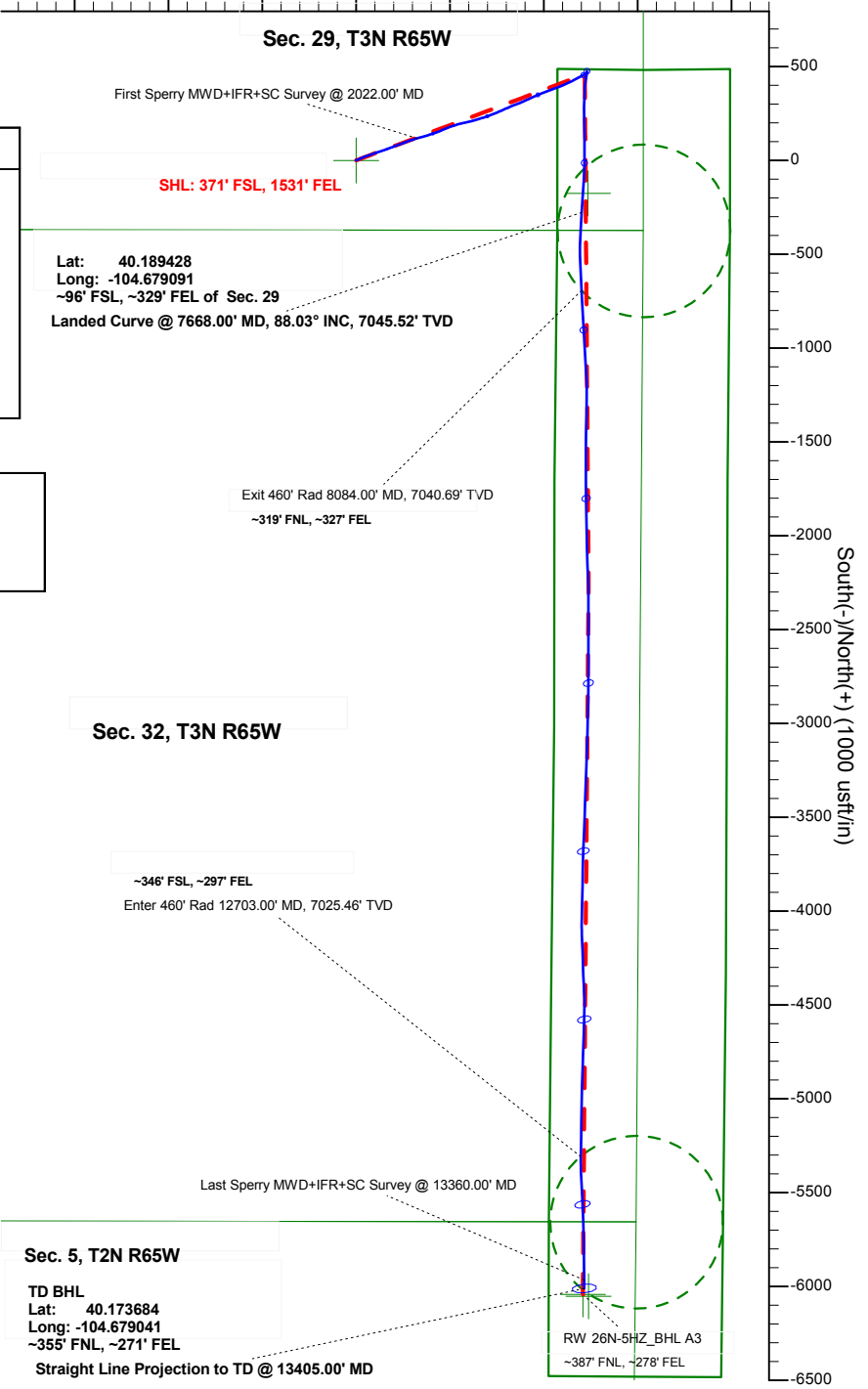
US ROCKIES WATTENBERG PLANNING

West(-)/East(+) (1000 usft/in)
 -1500 -1000 -500 0 500 1000 1500 2000

WELL DETAILS: RW 26N-5HZ	Design: Final Surveys (RW 26N-5HZ/Original Wellbore)
Ground Level: 4869.00 RKB 21' @ 4890.00usft (Precision 464)	Created By: Jerry Popp Date: 14:44, September 29 2017

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Annotation
13.00	0.00	0.00	13.00	0.00	0.00	Tie-On to Surface @ 0.00' MD (KB 8')
132.00	0.66	38.57	132.00	0.54	0.43	First Total MWD+IFR Survey @ 119.00' MD (KB 8')
1813.00	13.93	69.77	1781.63	99.88	270.29	Last Total MWD+IFR Survey @ 1800.00' MD (KB 8')
1813.00	13.93	69.77	1781.63	99.88	270.29	Tie-On to Last MWD+IFR Surface Survey @ 1813.00' MD
2022.00	17.92	73.52	1982.58	117.71	324.76	First Sperry MWD+IFR+SC Survey @ 2022.00' MD
7668.00	88.03	183.51	7045.52	-277.05	1201.77	Landed Curve @ 7668.00' MD, 88.03° INC, 7045.52' TVD
8084.00	89.43	177.08	7040.69	-692.53	1201.33	Exit 460' Rad 8084.00' MD, 7040.69' TVD
12703.00	89.76	180.77	7025.46	-5308.81	1196.83	Enter 460' Rad 12703.00' MD, 7025.46' TVD
13360.00	89.02	179.39	7035.12	-5965.37	1215.49	Last Sperry MWD+IFR+SC Survey @ 13360.00' MD
13405.00	89.02	179.39	7035.89	-6010.36	1215.97	Straight Line Projection to TD @ 13405.00' MD



Job# 904218787
Precision 464

US ROCKIES WATTENBERG PLANNING

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

API# 05-123-44752

RW 26N-5HZ

Original Wellbore

Design: Final Surveys

Sperry Drilling Services

Combo Report

29 September, 2017

Well Coordinates: 40° 11' 24.68" N
104° 41' 00.22" W

North American Datum 1983
Zone 13N (108 W to 102 W)
14,596,147.77 N
1,728,836.07 E

Ground Level: 4,869.00 usft

Local Coordinate Origin:

Centered on Well RW 26N-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 26N-5HZ - Final Surveys

Measured Depth (usft)	Inclination (°)	True Azimuth (°)	TVD below System (usft)	Vertical Depth (usft)	Local Coordinates (usft)		Map Coordinates (usft)		Dogleg Rate (°/100usft)	Vertical Section (usft)	Comments
					Northing	Easting	Northing	Easting			
0.00	0.00	0.00	-4,890.00	0.00	0.00 N	0.00 E	14,596,147.77	1,728,836.07	0.00	0.00	
13.00	0.00	0.00	-4,877.00	13.00	0.00 N	0.00 E	14,596,147.77	1,728,836.07	0.00	0.00	Tie-On to Surface @ 0.00' MD (KB 8')
132.00	0.66	38.57	-4,758.00	132.00	0.54 N	0.43 E	14,596,148.30	1,728,836.50	0.55	-0.54	First Total MWD+IFR Survey @ 119.00' MD (KB 8')
163.00	0.66	358.75	-4,727.00	163.00	0.85 N	0.53 E	14,596,148.62	1,728,836.60	1.45	-0.85	
195.00	1.01	65.29	-4,695.01	194.99	1.16 N	0.79 E	14,596,148.93	1,728,836.86	3.01	-1.16	
227.00	0.88	77.50	-4,663.01	226.99	1.33 N	1.28 E	14,596,149.10	1,728,837.35	0.75	-1.33	
259.00	1.67	76.19	-4,631.02	258.98	1.49 N	1.98 E	14,596,149.26	1,728,838.04	2.47	-1.49	
290.00	1.71	77.77	-4,600.03	289.97	1.70 N	2.87 E	14,596,149.47	1,728,838.93	0.20	-1.70	
322.00	2.29	76.54	-4,568.05	321.95	1.95 N	3.95 E	14,596,149.73	1,728,840.02	1.82	-1.95	
354.00	2.20	80.49	-4,536.08	353.92	2.20 N	5.18 E	14,596,149.98	1,728,841.25	0.56	-2.20	
385.00	2.81	85.77	-4,505.11	384.89	2.35 N	6.53 E	14,596,150.14	1,728,842.59	2.10	-2.35	
417.00	2.94	79.53	-4,473.15	416.85	2.56 N	8.12 E	14,596,150.35	1,728,844.18	1.06	-2.56	
449.00	3.38	60.45	-4,441.20	448.80	3.17 N	9.74 E	14,596,150.97	1,728,845.80	3.54	-3.17	
481.00	3.34	59.57	-4,409.25	480.75	4.11 N	11.37 E	14,596,151.92	1,728,847.43	0.20	-4.11	
512.00	4.09	62.91	-4,378.32	511.68	5.07 N	13.13 E	14,596,152.88	1,728,849.19	2.52	-5.07	
544.00	4.53	59.75	-4,346.41	543.59	6.23 N	15.24 E	14,596,154.05	1,728,851.29	1.56	-6.23	
575.00	4.97	62.47	-4,315.51	574.49	7.47 N	17.49 E	14,596,155.29	1,728,853.53	1.59	-7.47	
607.00	5.76	63.97	-4,283.65	606.35	8.81 N	20.16 E	14,596,156.65	1,728,856.20	2.51	-8.81	
638.00	6.81	63.44	-4,252.84	637.16	10.32 N	23.20 E	14,596,158.16	1,728,859.24	3.39	-10.32	
670.00	7.25	63.97	-4,221.08	668.92	12.05 N	26.71 E	14,596,159.91	1,728,862.74	1.39	-12.05	
702.00	8.26	65.29	-4,189.37	700.63	13.90 N	30.62 E	14,596,161.77	1,728,866.64	3.20	-13.90	
734.00	9.05	70.21	-4,157.74	732.26	15.71 N	35.07 E	14,596,163.60	1,728,871.09	3.38	-15.71	
765.00	9.80	69.59	-4,127.16	762.84	17.46 N	39.84 E	14,596,165.36	1,728,875.85	2.44	-17.46	
797.00	10.41	70.91	-4,095.65	794.35	19.35 N	45.12 E	14,596,167.28	1,728,881.13	2.04	-19.35	
829.00	10.50	70.30	-4,064.18	825.82	21.28 N	50.60 E	14,596,169.23	1,728,886.60	0.45	-21.28	
860.00	11.25	69.86	-4,033.74	856.26	23.27 N	56.10 E	14,596,171.24	1,728,892.09	2.43	-23.27	
892.00	12.61	71.61	-4,002.43	887.57	25.45 N	62.34 E	14,596,173.44	1,728,898.33	4.40	-25.45	
923.00	13.27	71.26	-3,972.22	917.78	27.66 N	68.92 E	14,596,175.67	1,728,904.90	2.14	-27.66	
955.00	13.89	69.68	-3,941.11	948.89	30.17 N	76.00 E	14,596,178.21	1,728,911.97	2.26	-30.17	
987.00	14.55	69.33	-3,910.10	979.90	32.93 N	83.37 E	14,596,180.99	1,728,919.32	2.08	-32.93	
1,018.00	15.03	69.59	-3,880.12	1,009.88	35.70 N	90.78 E	14,596,183.79	1,728,926.72	1.56	-35.70	
1,050.00	14.77	71.70	-3,849.20	1,040.80	38.43 N	98.54 E	14,596,186.55	1,728,934.47	1.88	-38.43	
1,082.00	14.33	72.93	-3,818.22	1,071.78	40.87 N	106.20 E	14,596,189.02	1,728,942.12	1.68	-40.87	
1,113.00	13.49	72.23	-3,788.13	1,101.87	43.10 N	113.31 E	14,596,191.27	1,728,949.23	2.76	-43.10	
1,145.00	12.92	73.20	-3,756.98	1,133.02	45.28 N	120.29 E	14,596,193.47	1,728,956.20	1.91	-45.28	
1,177.00	13.14	71.53	-3,725.80	1,164.20	47.46 N	127.16 E	14,596,195.68	1,728,963.06	1.36	-47.46	
1,208.00	13.67	71.61	-3,695.65	1,194.35	49.73 N	133.98 E	14,596,197.98	1,728,969.87	1.71	-49.73	
1,240.00	14.19	71.44	-3,664.59	1,225.41	52.18 N	141.29 E	14,596,200.45	1,728,977.17	1.63	-52.18	
1,272.00	14.55	71.97	-3,633.59	1,256.41	54.67 N	148.83 E	14,596,202.97	1,728,984.70	1.20	-54.67	
1,303.00	14.28	70.38	-3,603.57	1,286.43	57.16 N	156.13 E	14,596,205.48	1,728,992.00	1.55	-57.16	
1,335.00	13.62	69.86	-3,572.51	1,317.49	59.78 N	163.39 E	14,596,208.13	1,728,999.24	2.10	-59.78	



Design Report for RW 26N-5HZ - Final Surveys

Measured Depth (usft)	Inclination (°)	True Azimuth (°)	TVD below System (usft)	Vertical Depth (usft)	Local Coordinates (usft)		Map Coordinates (usft)		Dogleg Rate (°/100usft)	Vertical Section (usft)	Comments
					Northing	Easting	Northing	Easting			
1,366.00	14.55	68.80	-3,542.44	1,347.56	62.45 N	170.44 E	14,596,210.82	1,729,006.29	3.11	-62.45	
1,398.00	14.72	69.07	-3,511.48	1,378.52	65.35 N	177.99 E	14,596,213.75	1,729,013.83	0.57	-65.35	
1,430.00	14.24	69.33	-3,480.50	1,409.50	68.19 N	185.47 E	14,596,216.62	1,729,021.30	1.51	-68.19	
1,461.00	13.58	68.98	-3,450.41	1,439.59	70.84 N	192.43 E	14,596,219.30	1,729,028.25	2.15	-70.84	
1,493.00	13.80	69.86	-3,419.32	1,470.68	73.51 N	199.52 E	14,596,221.98	1,729,035.33	0.95	-73.51	
1,525.00	13.75	69.94	-3,388.24	1,501.76	76.12 N	206.68 E	14,596,224.63	1,729,042.48	0.17	-76.12	
1,557.00	14.37	69.07	-3,357.20	1,532.80	78.85 N	213.96 E	14,596,227.38	1,729,049.75	2.05	-78.85	
1,588.00	14.46	69.94	-3,327.17	1,562.83	81.55 N	221.19 E	14,596,230.10	1,729,056.97	0.76	-81.55	
1,620.00	13.80	71.00	-3,296.14	1,593.86	84.16 N	228.55 E	14,596,232.74	1,729,064.32	2.22	-84.16	
1,650.00	13.27	69.94	-3,266.97	1,623.03	86.51 N	235.17 E	14,596,235.11	1,729,070.93	1.95	-86.51	
1,682.00	13.32	69.51	-3,235.83	1,654.17	89.06 N	242.07 E	14,596,237.69	1,729,077.82	0.35	-89.06	
1,714.00	13.14	68.98	-3,204.68	1,685.32	91.65 N	248.92 E	14,596,240.31	1,729,084.66	0.68	-91.65	
1,746.00	13.23	68.10	-3,173.52	1,716.48	94.32 N	255.71 E	14,596,243.00	1,729,091.45	0.69	-94.32	
1,778.00	13.36	69.24	-3,142.38	1,747.62	97.00 N	262.57 E	14,596,245.70	1,729,098.29	0.91	-97.00	
1,809.00	13.84	69.77	-3,112.25	1,777.75	99.55 N	269.39 E	14,596,248.28	1,729,105.11	1.60	-99.55	
1,813.00	13.93	69.77	-3,108.37	1,781.63	99.88 N	270.29 E	14,596,248.61	1,729,106.01	2.25	-99.88	Last Total MWD+IFR Survey @ 1800.00' MD (KB 8') - Tie-On to Last MWD+IFR Surface Survey @ 1813.00' MD
2,022.00	17.92	73.52	-2,907.42	1,982.58	117.71 N	324.76 E	14,596,266.63	1,729,160.41	1.97	-117.71	First Sperry MWD+IFR+SC Survey @ 2022.00' MD
2,111.00	20.04	74.83	-2,823.27	2,066.73	125.59 N	352.61 E	14,596,274.61	1,729,188.23	2.43	-125.59	
2,200.00	19.44	73.47	-2,739.50	2,150.50	133.79 N	381.52 E	14,596,282.92	1,729,217.12	0.85	-133.79	
2,290.00	17.56	71.36	-2,654.15	2,235.85	142.39 N	408.75 E	14,596,291.62	1,729,244.31	2.22	-142.39	
2,379.00	19.13	69.15	-2,569.68	2,320.32	151.88 N	435.10 E	14,596,301.19	1,729,270.63	1.93	-151.88	
2,469.00	17.10	66.16	-2,484.14	2,405.86	162.47 N	460.99 E	14,596,311.88	1,729,296.48	2.48	-162.47	
2,559.00	17.41	69.67	-2,398.19	2,491.81	172.50 N	485.72 E	14,596,322.00	1,729,321.17	1.21	-172.50	
2,648.00	15.87	68.47	-2,312.92	2,577.08	181.59 N	509.52 E	14,596,331.17	1,729,344.94	1.77	-181.59	
2,738.00	16.74	72.91	-2,226.53	2,663.47	189.92 N	533.36 E	14,596,339.58	1,729,368.75	1.69	-189.92	
2,827.00	19.98	77.78	-2,142.07	2,747.93	196.90 N	560.48 E	14,596,346.67	1,729,395.85	4.02	-196.90	
2,917.00	19.60	76.11	-2,057.39	2,832.61	203.78 N	590.16 E	14,596,353.65	1,729,425.51	0.76	-203.78	
3,006.00	19.04	75.84	-1,973.40	2,916.60	210.92 N	618.73 E	14,596,360.89	1,729,454.05	0.64	-210.92	
3,186.00	17.36	72.47	-1,802.40	3,087.60	226.19 N	672.81 E	14,596,376.35	1,729,508.07	1.10	-226.19	
3,275.00	19.33	69.60	-1,717.93	3,172.07	235.33 N	699.28 E	14,596,385.58	1,729,534.51	2.43	-235.33	
3,365.00	17.46	68.38	-1,632.53	3,257.47	245.49 N	725.80 E	14,596,395.85	1,729,560.99	2.12	-245.49	
3,454.00	18.32	67.61	-1,547.84	3,342.16	255.74 N	751.14 E	14,596,406.18	1,729,586.30	1.00	-255.74	
3,544.00	15.45	66.04	-1,461.72	3,428.28	266.00 N	775.18 E	14,596,416.53	1,729,610.30	3.23	-266.00	
3,634.00	17.96	67.17	-1,375.53	3,514.47	276.25 N	798.93 E	14,596,426.87	1,729,634.01	2.81	-276.25	
3,723.00	15.79	64.71	-1,290.37	3,599.63	286.75 N	822.53 E	14,596,437.45	1,729,657.57	2.57	-286.75	
3,813.00	18.38	70.88	-1,204.34	3,685.66	296.63 N	847.01 E	14,596,447.42	1,729,682.02	3.51	-296.63	
3,902.00	16.27	68.08	-1,119.38	3,770.62	305.88 N	871.84 E	14,596,456.76	1,729,706.81	2.55	-305.88	
3,992.00	18.67	65.82	-1,033.53	3,856.47	316.49 N	896.68 E	14,596,467.45	1,729,731.62	2.77	-316.49	
4,171.00	15.36	64.36	-862.39	4,027.61	338.49 N	944.20 E	14,596,489.62	1,729,779.06	1.86	-338.49	
4,260.00	19.84	68.20	-777.58	4,112.42	349.21 N	968.87 E	14,596,500.43	1,729,803.69	5.20	-349.21	



Design Report for RW 26N-5HZ - Final Surveys

Measured Depth (usft)	Inclination (°)	True Azimuth (°)	TVD below System (usft)	Vertical Depth (usft)	Local Coordinates (usft)		Map Coordinates (usft)		Dogleg Rate (°/100usft)	Vertical Section (usft)	Comments
					Northing	Easting	Northing	Easting			
4,440.00	17.67	69.77	-607.14	4,282.86	370.00 N	1,022.87 E	14,596,521.41	1,729,857.61	1.24	-370.00	
4,642.00	14.26	69.62	-412.96	4,477.04	389.27 N	1,074.97 E	14,596,540.87	1,729,909.65	1.69	-389.27	
4,709.00	14.87	67.08	-348.12	4,541.88	395.49 N	1,090.62 E	14,596,547.15	1,729,925.28	1.32	-395.49	
4,798.00	16.04	65.12	-262.34	4,627.66	405.11 N	1,112.30 E	14,596,556.84	1,729,946.92	1.44	-405.11	
4,888.00	14.85	65.40	-175.59	4,714.41	415.15 N	1,134.06 E	14,596,566.95	1,729,968.65	1.32	-415.15	
4,978.00	13.12	63.12	-88.26	4,801.74	424.57 N	1,153.66 E	14,596,576.44	1,729,988.21	2.02	-424.57	
5,067.00	11.47	62.65	-1.30	4,888.70	433.20 N	1,170.53 E	14,596,585.14	1,730,005.05	1.86	-433.20	
5,157.00	10.01	60.75	87.12	4,977.12	441.13 N	1,185.31 E	14,596,593.12	1,730,019.80	1.67	-441.13	
5,247.00	8.97	61.96	175.89	5,065.89	448.25 N	1,198.32 E	14,596,600.29	1,730,032.79	1.18	-448.25	
5,337.00	8.11	62.80	264.89	5,154.89	454.45 N	1,210.16 E	14,596,606.53	1,730,044.61	0.97	-454.45	
5,426.00	5.67	58.20	353.24	5,243.24	459.64 N	1,219.48 E	14,596,611.75	1,730,053.91	2.81	-459.64	
5,516.00	3.96	52.19	442.92	5,332.92	463.89 N	1,225.72 E	14,596,616.02	1,730,060.13	1.98	-463.89	
5,695.00	1.33	347.05	621.74	5,511.74	469.70 N	1,230.14 E	14,596,621.85	1,730,064.53	2.02	-469.70	
5,785.00	0.96	316.85	711.72	5,601.72	471.27 N	1,229.39 E	14,596,623.42	1,730,063.77	0.77	-471.27	
5,875.00	0.44	349.99	801.72	5,691.72	472.16 N	1,228.81 E	14,596,624.31	1,730,063.19	0.71	-472.16	
5,964.00	0.78	347.20	890.71	5,780.71	473.09 N	1,228.62 E	14,596,625.23	1,730,063.00	0.38	-473.09	
6,144.00	0.22	67.12	1,070.70	5,960.70	474.42 N	1,228.67 E	14,596,626.56	1,730,063.04	0.43	-474.42	
6,233.00	0.15	34.09	1,159.70	6,049.70	474.58 N	1,228.89 E	14,596,626.73	1,730,063.26	0.14	-474.58	
6,323.00	0.38	72.56	1,249.70	6,139.70	474.77 N	1,229.24 E	14,596,626.92	1,730,063.61	0.31	-474.77	
6,503.00	0.11	111.76	1,429.70	6,319.70	474.88 N	1,229.97 E	14,596,627.03	1,730,064.34	0.17	-474.88	
6,592.00	3.76	186.65	1,518.64	6,408.64	471.95 N	1,229.71 E	14,596,624.10	1,730,064.09	4.19	-471.95	
6,682.00	15.22	185.94	1,607.26	6,497.26	457.22 N	1,228.14 E	14,596,609.36	1,730,062.58	12.73	-457.22	
6,772.00	21.71	191.60	1,692.58	6,582.58	429.13 N	1,223.57 E	14,596,581.26	1,730,058.10	7.47	-429.13	
6,861.00	28.84	184.27	1,773.03	6,663.03	391.55 N	1,218.65 E	14,596,543.65	1,730,053.32	8.74	-391.55	
6,951.00	37.88	181.43	1,848.13	6,738.13	342.17 N	1,216.34 E	14,596,494.27	1,730,051.18	10.19	-342.17	
7,040.00	43.79	181.40	1,915.44	6,805.44	284.02 N	1,214.90 E	14,596,436.12	1,730,049.96	6.64	-284.02	
7,130.00	49.82	177.51	1,977.02	6,867.02	218.47 N	1,215.64 E	14,596,370.57	1,730,050.92	7.40	-218.47	
7,220.00	55.83	180.55	2,031.39	6,921.39	146.81 N	1,216.78 E	14,596,298.92	1,730,052.32	7.20	-146.81	
7,310.00	64.28	179.81	2,076.28	6,966.28	68.90 N	1,216.55 E	14,596,221.00	1,730,052.37	9.42	-68.90	
7,399.00	70.40	180.58	2,110.55	7,000.55	13.19 S	1,216.26 E	14,596,138.91	1,730,052.37	6.92	13.19	
7,489.00	79.16	183.29	2,134.16	7,024.16	99.89 S	1,213.29 E	14,596,052.20	1,730,049.71	10.16	99.89	
7,578.00	82.66	184.04	2,148.21	7,038.21	187.58 S	1,207.67 E	14,595,964.50	1,730,044.40	4.02	187.58	
7,668.00	88.03	183.51	2,155.52	7,045.52	277.05 S	1,201.77 E	14,595,875.00	1,730,038.82	6.00	277.05	Landed Curve @ 7668.00' MD, 88.03° INC, 7045.52' TVD
7,758.00	90.62	183.49	2,156.58	7,046.58	366.87 S	1,196.27 E	14,595,785.16	1,730,033.65	2.88	366.87	
7,847.00	91.79	181.01	2,154.70	7,044.70	455.78 S	1,192.78 E	14,595,696.25	1,730,030.47	3.08	455.78	
7,937.00	90.86	177.28	2,152.62	7,042.62	545.73 S	1,194.12 E	14,595,606.30	1,730,032.13	4.27	545.73	
8,027.00	91.20	177.18	2,151.00	7,041.00	635.61 S	1,198.47 E	14,595,516.44	1,730,036.80	0.39	635.61	
8,084.00	89.43	177.08	2,150.69	7,040.69	692.53 S	1,201.33 E	14,595,459.52	1,730,039.86	3.12	692.53	Exit 460' Rad 8084.00' MD, 7040.69' TVD
8,116.00	88.43	177.02	2,151.29	7,041.29	724.48 S	1,202.97 E	14,595,427.58	1,730,041.62	3.12	724.48	
8,206.00	89.14	176.99	2,153.20	7,043.20	814.34 S	1,207.68 E	14,595,337.74	1,730,046.64	0.79	814.34	

Design Report for RW 26N-5HZ - Final Surveys

Measured Depth (usft)	Inclination (°)	True Azimuth (°)	TVD below System (usft)	Vertical Depth (usft)	Local Coordinates (usft)		Map Coordinates (usft)		Dogleg Rate (°/100usft)	Vertical Section (usft)	Comments
					Northing	Easting	Northing	Easting			
8,295.00	89.38	177.14	2,154.35	7,044.35	903.21 S	1,212.23 E	14,595,248.88	1,730,051.52	0.32	903.21	
8,385.00	89.17	176.72	2,155.49	7,045.49	993.08 S	1,217.05 E	14,595,159.04	1,730,056.66	0.52	993.08	
8,475.00	88.80	176.10	2,157.08	7,047.08	1,082.89 S	1,222.69 E	14,595,069.25	1,730,062.61	0.80	1,082.89	
8,565.00	89.20	177.65	2,158.65	7,048.65	1,172.74 S	1,227.59 E	14,594,979.42	1,730,067.84	1.78	1,172.74	
8,654.00	88.95	180.60	2,160.09	7,050.09	1,261.70 S	1,228.95 E	14,594,890.45	1,730,069.51	3.33	1,261.70	
8,744.00	89.26	181.37	2,161.50	7,051.50	1,351.68 S	1,227.40 E	14,594,800.47	1,730,068.29	0.92	1,351.68	
8,834.00	91.11	180.81	2,161.21	7,051.21	1,441.66 S	1,225.69 E	14,594,710.49	1,730,066.90	2.15	1,441.66	
8,923.00	91.27	180.42	2,159.36	7,049.36	1,530.63 S	1,224.74 E	14,594,621.51	1,730,066.26	0.47	1,530.63	
9,013.00	91.17	180.30	2,157.44	7,047.44	1,620.61 S	1,224.17 E	14,594,531.53	1,730,066.01	0.17	1,620.61	
9,103.00	91.42	179.68	2,155.41	7,045.41	1,710.59 S	1,224.19 E	14,594,441.56	1,730,066.35	0.74	1,710.59	
9,193.00	89.88	178.92	2,154.39	7,044.39	1,800.57 S	1,225.29 E	14,594,351.58	1,730,067.77	1.91	1,800.57	
9,282.00	91.11	178.95	2,153.62	7,043.62	1,889.55 S	1,226.94 E	14,594,262.60	1,730,069.74	1.38	1,889.55	
9,372.00	89.88	178.78	2,152.84	7,042.84	1,979.53 S	1,228.72 E	14,594,172.63	1,730,071.85	1.38	1,979.53	
9,461.00	90.77	178.87	2,152.34	7,042.34	2,068.51 S	1,230.55 E	14,594,083.66	1,730,073.99	1.01	2,068.51	
9,551.00	90.59	178.15	2,151.27	7,041.27	2,158.47 S	1,232.89 E	14,593,993.71	1,730,076.65	0.82	2,158.47	
9,641.00	90.65	177.70	2,150.29	7,040.29	2,248.41 S	1,236.15 E	14,593,903.78	1,730,080.23	0.50	2,248.41	
9,730.00	89.29	180.20	2,150.34	7,040.34	2,337.38 S	1,237.78 E	14,593,814.81	1,730,082.18	3.20	2,337.38	
9,909.00	91.30	179.83	2,149.42	7,039.42	2,516.37 S	1,237.73 E	14,593,635.83	1,730,082.77	1.14	2,516.37	
9,999.00	88.74	180.24	2,149.39	7,039.39	2,606.36 S	1,237.68 E	14,593,545.83	1,730,083.03	2.88	2,606.36	
10,089.00	88.70	179.95	2,151.40	7,041.40	2,696.34 S	1,237.53 E	14,593,455.86	1,730,083.21	0.33	2,696.34	
10,178.00	87.84	179.99	2,154.08	7,044.08	2,785.30 S	1,237.57 E	14,593,366.90	1,730,083.57	0.97	2,785.30	
10,267.00	89.60	181.16	2,156.07	7,046.07	2,874.27 S	1,236.68 E	14,593,277.93	1,730,082.99	2.37	2,874.27	
10,357.00	89.69	181.41	2,156.63	7,046.63	2,964.24 S	1,234.66 E	14,593,187.95	1,730,081.30	0.30	2,964.24	
10,447.00	90.89	181.78	2,156.17	7,046.17	3,054.20 S	1,232.16 E	14,593,097.98	1,730,079.11	1.40	3,054.20	
10,537.00	90.71	181.77	2,154.92	7,044.92	3,144.15 S	1,229.37 E	14,593,008.02	1,730,076.65	0.20	3,144.15	
10,626.00	89.63	181.53	2,154.65	7,044.65	3,233.11 S	1,226.81 E	14,592,919.05	1,730,074.40	1.24	3,233.11	
10,716.00	91.48	182.14	2,153.78	7,043.78	3,323.06 S	1,223.92 E	14,592,829.09	1,730,071.84	2.16	3,323.06	
10,805.00	90.99	181.98	2,151.86	7,041.86	3,411.98 S	1,220.73 E	14,592,740.16	1,730,068.96	0.58	3,411.98	
10,895.00	90.74	182.11	2,150.51	7,040.51	3,501.91 S	1,217.51 E	14,592,650.22	1,730,066.07	0.31	3,501.91	
10,984.00	91.14	182.27	2,149.05	7,039.05	3,590.84 S	1,214.11 E	14,592,561.28	1,730,062.98	0.48	3,590.84	
11,074.00	91.98	182.35	2,146.59	7,036.59	3,680.73 S	1,210.49 E	14,592,471.38	1,730,059.68	0.94	3,680.73	
11,164.00	90.80	181.09	2,144.41	7,034.41	3,770.66 S	1,207.79 E	14,592,381.44	1,730,057.30	1.92	3,770.66	
11,253.00	90.65	180.91	2,143.29	7,033.29	3,859.64 S	1,206.23 E	14,592,292.46	1,730,056.06	0.26	3,859.64	
11,343.00	90.46	181.36	2,142.41	7,032.41	3,949.61 S	1,204.45 E	14,592,202.47	1,730,054.60	0.54	3,949.61	
11,433.00	89.51	181.39	2,142.44	7,032.44	4,039.59 S	1,202.29 E	14,592,112.49	1,730,052.76	1.06	4,039.59	
11,522.00	90.31	177.73	2,142.58	7,032.58	4,128.57 S	1,202.98 E	14,592,023.51	1,730,053.76	4.21	4,128.57	
11,612.00	90.03	177.84	2,142.31	7,032.31	4,218.50 S	1,206.45 E	14,591,933.59	1,730,057.56	0.33	4,218.50	
11,702.00	89.85	178.36	2,142.40	7,032.40	4,308.45 S	1,209.44 E	14,591,843.66	1,730,060.87	0.61	4,308.45	
11,791.00	88.34	176.50	2,143.81	7,033.81	4,397.34 S	1,213.43 E	14,591,754.78	1,730,065.17	2.69	4,397.34	
11,881.00	89.72	179.55	2,145.33	7,035.33	4,487.27 S	1,216.53 E	14,591,664.87	1,730,068.60	3.72	4,487.27	
11,971.00	89.38	181.34	2,146.04	7,036.04	4,577.26 S	1,215.83 E	14,591,574.88	1,730,068.22	2.02	4,577.26	



Design Report for RW 26N-5HZ - Final Surveys

Measured Depth (usft)	Inclination (°)	True Azimuth (°)	TVD below System (usft)	Vertical Depth (usft)	Local Coordinates (usft)		Map Coordinates (usft)		Dogleg Rate (°/100usft)	Vertical Section (usft)	Comments
					Northing	Easting	Northing	Easting			
12,060.00	91.98	182.36	2,144.98	7,034.98	4,666.19 S	1,212.96 E	14,591,485.93	1,730,065.66	3.14	4,666.19	
12,150.00	91.54	182.18	2,142.22	7,032.22	4,756.08 S	1,209.39 E	14,591,396.03	1,730,062.42	0.53	4,756.08	
12,240.00	91.73	181.89	2,139.65	7,029.65	4,845.99 S	1,206.20 E	14,591,306.11	1,730,059.55	0.39	4,845.99	
12,330.00	91.82	181.98	2,136.86	7,026.86	4,935.89 S	1,203.16 E	14,591,216.20	1,730,056.83	0.14	4,935.89	
12,419.00	90.34	180.28	2,135.19	7,025.19	5,024.85 S	1,201.41 E	14,591,127.23	1,730,055.39	2.53	5,024.85	
12,509.00	90.09	180.90	2,134.85	7,024.85	5,114.85 S	1,200.48 E	14,591,037.23	1,730,054.79	0.74	5,114.85	
12,598.00	89.75	181.00	2,134.97	7,024.97	5,203.84 S	1,199.00 E	14,590,948.24	1,730,053.63	0.40	5,203.84	
12,688.00	89.72	181.41	2,135.39	7,025.39	5,293.81 S	1,197.11 E	14,590,858.25	1,730,052.06	0.46	5,293.81	
12,703.00	89.76	180.77	2,135.46	7,025.46	5,308.81 S	1,196.83 E	14,590,843.26	1,730,051.82	4.30	5,308.81	Enter 460' Rad 12703.00' MD, 7025.46' TVD
12,778.00	89.97	177.55	2,135.63	7,025.63	5,383.79 S	1,197.93 E	14,590,768.28	1,730,053.19	4.30	5,383.79	
12,957.00	88.40	176.97	2,138.18	7,028.18	5,562.56 S	1,206.48 E	14,590,589.54	1,730,062.39	0.94	5,562.56	
13,047.00	88.34	178.41	2,140.74	7,030.74	5,652.45 S	1,210.11 E	14,590,499.66	1,730,066.33	1.60	5,652.45	
13,136.00	89.57	178.92	2,142.36	7,032.36	5,741.41 S	1,212.18 E	14,590,410.71	1,730,068.72	1.50	5,741.41	
13,360.00	89.02	179.39	2,145.12	7,035.12	5,965.37 S	1,215.49 E	14,590,186.77	1,730,072.82	0.32	5,965.37	Last Sperry MWD+IFR+SC Survey @ 13360.00' MD
13,405.00	89.02	179.39	2,145.89	7,035.89	6,010.36 S	1,215.97 E	14,590,141.78	1,730,073.46	0.00	6,010.36	Straight Line Projection to TD @ 13405.00' MD

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	+E/-W (usft)	Comment
13.00	13.00	0.00	0.00	Tie-On to Surface @ 0.00' MD (KB 8')
132.00	132.00	0.54	0.43	First Total MWD+IFR Survey @ 119.00' MD (KB 8')
1,813.00	1,781.63	99.88	270.29	Last Total MWD+IFR Survey @ 1800.00' MD (KB 8')
1,813.00	1,781.63	99.88	270.29	Tie-On to Last MWD+IFR Surface Survey @ 1813.00' MD
2,022.00	1,982.58	117.71	324.76	First Sperry MWD+IFR+SC Survey @ 2022.00' MD
7,668.00	7,045.52	-277.05	1,201.77	Landed Curve @ 7668.00' MD, 88.03° INC, 7045.52' TVD
8,084.00	7,040.69	-692.53	1,201.33	Exit 460' Rad 8084.00' MD, 7040.69' TVD
12,703.00	7,025.46	-5,308.81	1,196.83	Enter 460' Rad 12703.00' MD, 7025.46' TVD
13,360.00	7,035.12	-5,965.37	1,215.49	Last Sperry MWD+IFR+SC Survey @ 13360.00' MD
13,405.00	7,035.89	-6,010.36	1,215.97	Straight Line Projection to TD @ 13405.00' MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	+E/-W (usft)	Start TVD (usft)
User	No Target (Freehand)	180.00	Slot	0.00	0.00	0.00

Design Report for RW 26N-5HZ - Final Surveys

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
13.00	1,813.00	Total MWD+IFR Surface Surveys	APC_ISCWSA REV 2 MWD+IFR1
1,813.00	13,360.00	Sperry MWD+IFR Surveys	APC_ISCWSA REV 2 MWD+IFR1+SC
13,405.00	13,405.00	PTB	APC_BLIND

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 26N-5HZ_HEEL PLAT () - actual wellpath misses target center by 1248.15usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E) - Point	0.00	0.00	0.00	-175.13	1,235.80	14,595,977.05	1,730,072.49	40.189708	-104.678969
RW 26N-5HZ_SHL () - actual wellpath hits target center - Point	0.00	0.00	0.00	0.00	0.00	14,596,147.77	1,728,836.07	40.190189	-104.683394
RW 26N-5HZ_BHL PLAT () - actual wellpath misses target center by 6177.61usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E) - Point	0.00	0.00	0.00	-6,052.22	1,238.35	14,590,100.00	1,730,096.00	40.173569	-104.678961
RW 26N-5HZ_BHL A3 () - actual wellpath misses target center by 35.28usft at 13405.00usft MD (7035.89 TVD, -6010.36 N, 1215.97 E) - Point	0.00	0.00	7,023.00	-6,042.22	1,208.00	14,590,109.90	1,730,065.61	40.173596	-104.679070

Directional Difficulty Index

Average Dogleg over Survey:	2.09 °/100usft	Maximum Dogleg over Survey:	12.73 °/100usft at 6,682.00 usft
Net Tortousity applicable to Plans:	1.14 °/100usft	Directional Difficulty Index:	6.619

Audit Info

North Reference Sheet for 3N-65W-29 RW 15-29HZ Pad - RW 26N-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 26N-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: 0.99960894

Grid Coordinates of Well: 14,596,147.77 usft N, 1,728,836.07 usft E

Geographical Coordinates of Well: 40° 11' 24.68" N, 104° 41' 00.22" W

Grid Convergence at Surface is: 0.20°

Based upon Minimum Curvature type calculations, at a Measured Depth of 13,405.00usft the Bottom Hole Displacement is 6,132.13usft in the Direction of 168.56° (True).

Magnetic Convergence at surface is: -8.10° (4 September 2017, , BGGM2017)

