

Project: WELD-NAD83-UTMFT13N
Site: 3N-65W-29 RW 15-29HZ Pad
Well: RW 15N-32HZ
Wellbore: Original Wellbore
Design: Final Surveys



US ROCKIES WATTENBERG PLANNING

WELL DETAILS: RW 15N-32HZ

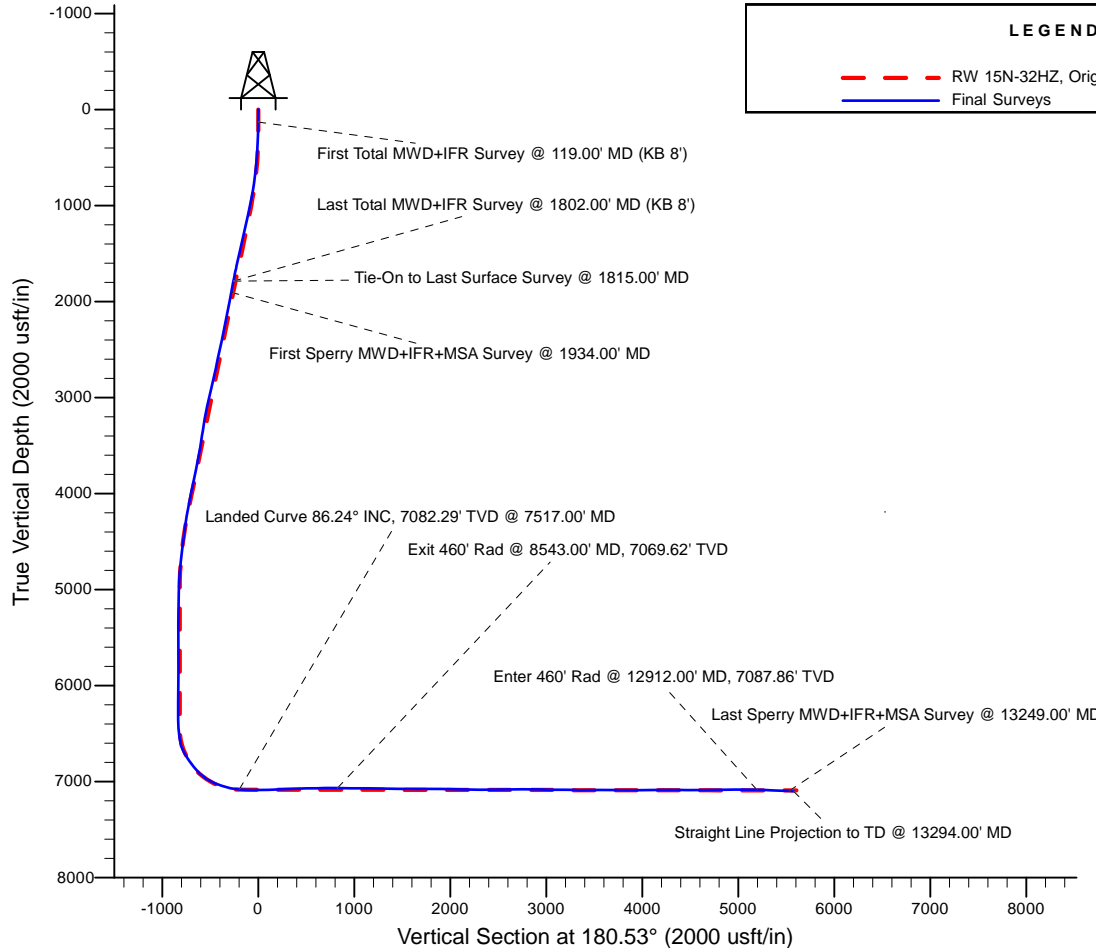
Design: Final Surveys (RW 15N-32HZ/Original Wellbore)

Ground Level: 4869.00
RKB 21' @ 4890.00usft (Precision 464)

Created By: Jerry Popp Date: 18:14, September 28 2017

ANNOTATIONS

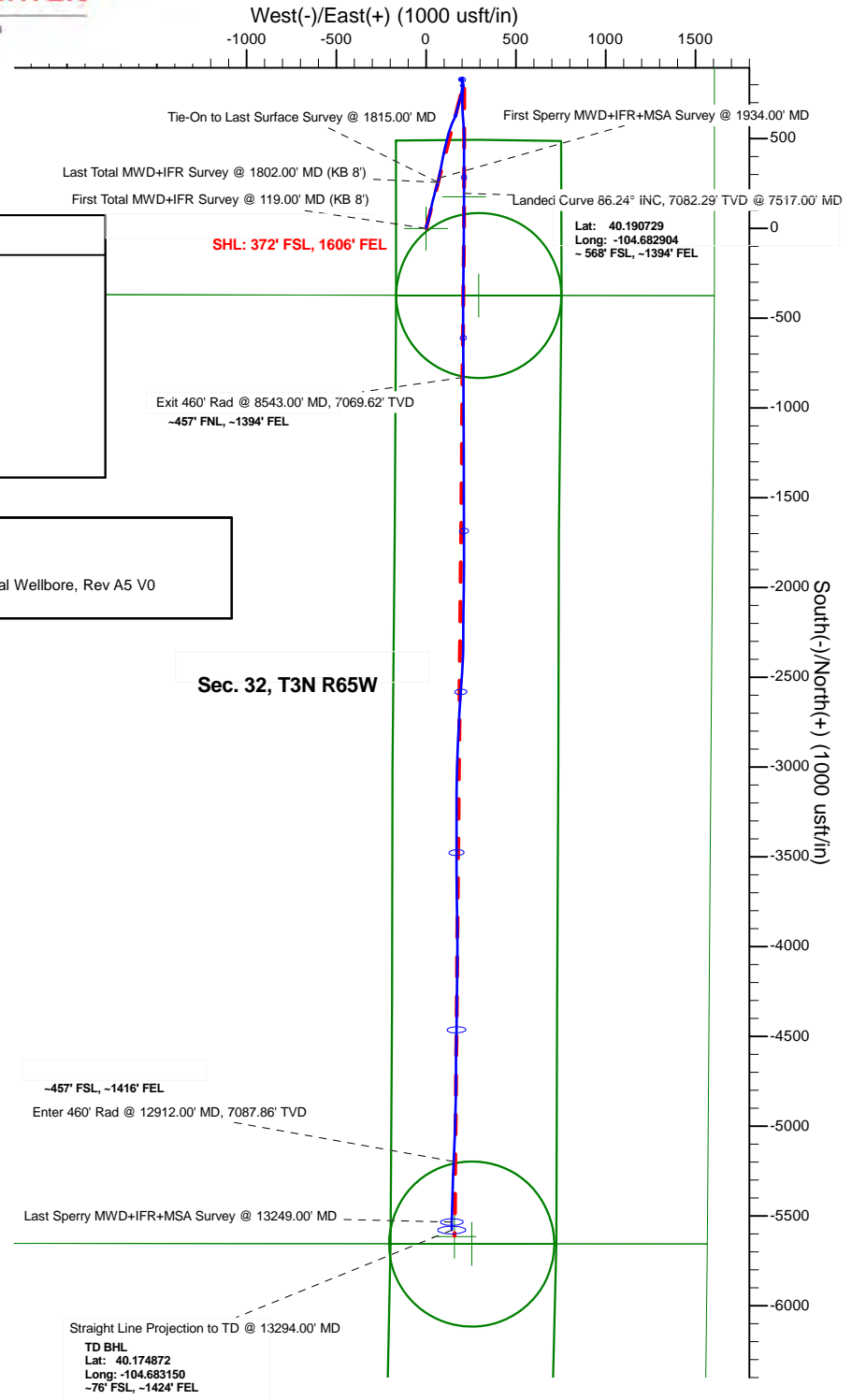
TVD	MD	Inc	Azi	+N/-S	+E/-W	Annotation
13.00	13.00	0.00	0.00	0.00	0.00	Tie-On to Surface @ 0.00' MD (KB 8')
132.00	132.00	0.88	321.75	0.72	-0.57	First Total MWD+IFR Survey @ 119.00' MD (KB 8')
1788.80	1815.00	11.60	13.87	257.95	66.54	Last Total MWD+IFR Survey @ 1802.00' MD (KB 8')
1788.80	1815.00	11.60	13.87	257.95	66.54	Tie-On to Last Surface Survey @ 1815.00' MD
1905.47	1934.00	11.14	12.22	280.80	71.84	First Sperry MWD+IFR+MSA Survey @ 1934.00' MD
7082.29	7517.00	86.24	180.09	195.78	211.68	Landed Curve 86.24° INC, 7082.29' TVD @ 7517.00' MD
7069.62	8543.00	89.75	179.52	-829.58	207.99	Exit 460' Rad @ 8543.00' MD, 7069.62' TVD
7087.86	12912.00	89.03	182.67	-5196.82	153.47	Enter 460' Rad @ 12912.00' MD, 7087.86' TVD
7099.71	13249.00	87.69	181.01	-5533.44	143.84	Last Sperry MWD+IFR+MSA Survey @ 13249.00' MD
7101.58	13294.00	87.69	181.01	-5578.40	143.04	Straight Line Projection to TD @ 13294.00' MD



LEGEND

- RW 15N-32HZ, Original Wellbore, Rev A5 V0
- Final Surveys

Sec. 32, T3N R65W



Job# 904218785

Precision 464

US ROCKIES WATTENBERG PLANNING

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

API# 05-123-44754

RW 15N-32HZ

Original Wellbore

Design: Final Surveys

Sperry Drilling Services

Combo Report

28 September, 2017

Well Coordinates: 40° 11' 24.69" N
104° 41' 01.18" W

North American Datum 1983
Zone 13N (108 W to 102 W)
14,596,148.23 N
1,728,761.22 E

Ground Level: 4,869.00 usft

Local Coordinate Origin:

Centered on Well RW 15N-32HZ

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 15N-32HZ - 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	14,596,148.23	1,728,761.22	0.00	0.00	
13.00	0.00	0.00	-4,877.00	13.00	0.00 N	0.00 E	14,596,148.23	1,728,761.22	0.00	0.00	Tie-On to Surface @ 0.00' MD (KB 8')
132.00	0.88	321.75	-4,758.00	132.00	0.72 N	0.57 W	14,596,148.94	1,728,760.66	0.74	-0.71	First Total MWD+IFR Survey @ 119.00' MD (KB 8')
163.00	1.01	333.44	-4,727.01	162.99	1.15 N	0.84 W	14,596,149.37	1,728,760.39	0.75	-1.14	
195.00	1.36	357.17	-4,695.02	194.98	1.78 N	0.98 W	14,596,150.00	1,728,760.24	1.86	-1.77	
227.00	1.14	352.16	-4,663.02	226.98	2.48 N	1.04 W	14,596,150.70	1,728,760.17	0.77	-2.47	
259.00	1.36	359.55	-4,631.03	258.97	3.17 N	1.09 W	14,596,151.39	1,728,760.12	0.85	-3.16	
290.00	1.49	4.47	-4,600.04	289.96	3.94 N	1.06 W	14,596,152.16	1,728,760.15	0.58	-3.93	
322.00	1.76	3.76	-4,568.05	321.95	4.85 N	1.00 W	14,596,153.07	1,728,760.21	0.85	-4.84	
354.00	2.37	21.08	-4,536.07	353.93	5.95 N	0.73 W	14,596,154.18	1,728,760.48	2.71	-5.95	
385.00	2.81	16.07	-4,505.11	384.89	7.28 N	0.28 W	14,596,155.51	1,728,760.91	1.59	-7.28	
417.00	2.81	23.36	-4,473.14	416.86	8.75 N	0.24 E	14,596,156.98	1,728,761.44	1.12	-8.76	
449.00	3.65	24.33	-4,441.20	448.80	10.40 N	0.97 E	14,596,158.63	1,728,762.16	2.63	-10.41	
481.00	4.04	25.12	-4,409.27	480.73	12.35 N	1.87 E	14,596,160.59	1,728,763.05	1.23	-12.37	
512.00	4.61	16.33	-4,378.36	511.64	14.54 N	2.69 E	14,596,162.77	1,728,763.86	2.82	-14.56	
544.00	5.36	18.97	-4,346.48	543.52	17.18 N	3.53 E	14,596,165.42	1,728,764.70	2.45	-17.22	
575.00	5.84	18.79	-4,315.62	574.38	20.05 N	4.51 E	14,596,168.29	1,728,765.67	1.55	-20.09	
607.00	6.20	22.48	-4,283.80	606.20	23.18 N	5.70 E	14,596,171.43	1,728,766.84	1.65	-23.24	
670.00	7.51	20.02	-4,221.25	668.75	30.20 N	8.41 E	14,596,178.45	1,728,769.52	2.13	-30.27	
702.00	7.60	17.83	-4,189.53	700.47	34.18 N	9.77 E	14,596,182.44	1,728,770.87	0.94	-34.26	
734.00	7.56	17.03	-4,157.81	732.19	38.20 N	11.04 E	14,596,186.47	1,728,772.12	0.35	-38.30	
765.00	8.13	15.63	-4,127.10	762.90	42.26 N	12.22 E	14,596,190.53	1,728,773.30	1.94	-42.37	
797.00	8.96	13.34	-4,095.46	794.54	46.87 N	13.41 E	14,596,195.14	1,728,774.47	2.80	-46.99	
829.00	9.67	15.28	-4,063.88	826.12	51.88 N	14.69 E	14,596,200.16	1,728,775.73	2.43	-52.02	
860.00	10.11	13.52	-4,033.34	856.66	57.04 N	16.01 E	14,596,205.33	1,728,777.04	1.72	-57.19	
892.00	11.03	12.73	-4,001.88	888.12	62.76 N	17.35 E	14,596,211.05	1,728,778.35	2.91	-62.92	
923.00	11.25	12.46	-3,971.47	918.53	68.60 N	18.65 E	14,596,216.90	1,728,779.63	0.73	-68.77	
955.00	11.43	11.06	-3,940.09	949.91	74.76 N	19.93 E	14,596,223.06	1,728,780.89	1.03	-74.94	
987.00	12.09	14.40	-3,908.76	981.24	81.12 N	21.37 E	14,596,229.42	1,728,782.31	2.96	-81.32	
1,018.00	12.44	13.17	-3,878.47	1,011.53	87.52 N	22.94 E	14,596,235.83	1,728,783.86	1.41	-87.73	
1,050.00	11.78	10.62	-3,847.18	1,042.82	94.08 N	24.33 E	14,596,242.40	1,728,785.22	2.65	-94.30	
1,082.00	12.48	10.62	-3,815.90	1,074.10	100.69 N	25.57 E	14,596,249.01	1,728,786.44	2.19	-100.92	
1,113.00	12.48	11.94	-3,785.63	1,104.37	107.26 N	26.88 E	14,596,255.58	1,728,787.72	0.92	-107.51	
1,145.00	12.35	13.43	-3,754.38	1,135.62	113.97 N	28.39 E	14,596,262.30	1,728,789.21	1.08	-114.23	
1,177.00	12.26	13.61	-3,723.11	1,166.89	120.60 N	29.98 E	14,596,268.94	1,728,790.78	0.31	-120.88	
1,208.00	12.44	10.62	-3,692.83	1,197.17	127.08 N	31.37 E	14,596,275.42	1,728,792.15	2.14	-127.37	
1,240.00	12.92	9.74	-3,661.61	1,228.39	134.00 N	32.61 E	14,596,282.34	1,728,793.36	1.62	-134.29	
1,272.00	13.05	12.20	-3,630.43	1,259.57	141.06 N	33.98 E	14,596,289.40	1,728,794.70	1.77	-141.36	
1,303.00	13.67	15.89	-3,600.27	1,289.73	148.00 N	35.73 E	14,596,296.35	1,728,796.42	3.40	-148.32	
1,335.00	13.40	14.31	-3,569.15	1,320.85	155.23 N	37.68 E	14,596,303.59	1,728,798.35	1.43	-155.57	
1,366.00	13.32	16.60	-3,538.99	1,351.01	162.13 N	39.59 E	14,596,310.50	1,728,800.23	1.73	-162.49	

Design Report for RW 15N-32HZ - 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)			
1,398.00	13.97	14.93	-3,507.90	1,382.10	169.40 N	41.63 E	14,596,317.77	1,728,802.25	2.38	-169.78	
1,430.00	13.18	15.98	-3,476.79	1,413.21	176.64 N	43.63 E	14,596,325.02	1,728,804.23	2.59	-177.03	
1,461.00	12.79	15.19	-3,446.58	1,443.42	183.35 N	45.51 E	14,596,331.73	1,728,806.08	1.38	-183.76	
1,493.00	12.83	13.17	-3,415.38	1,474.62	190.22 N	47.24 E	14,596,338.62	1,728,807.79	1.41	-190.65	
1,525.00	13.18	13.26	-3,384.20	1,505.80	197.23 N	48.89 E	14,596,345.63	1,728,809.41	1.10	-197.68	
1,557.00	12.66	15.98	-3,353.01	1,536.99	204.16 N	50.69 E	14,596,352.56	1,728,811.19	2.50	-204.62	
1,588.00	12.70	17.21	-3,322.77	1,567.23	210.68 N	52.64 E	14,596,359.09	1,728,813.11	0.88	-211.16	
1,650.00	13.62	15.28	-3,262.40	1,627.60	224.23 N	56.58 E	14,596,372.66	1,728,817.00	1.64	-224.74	
1,682.00	13.01	17.91	-3,231.26	1,658.74	231.29 N	58.68 E	14,596,379.73	1,728,819.08	2.69	-231.82	
1,714.00	12.22	18.53	-3,200.03	1,689.97	237.93 N	60.86 E	14,596,386.37	1,728,821.24	2.50	-238.48	
1,746.00	12.17	15.80	-3,168.75	1,721.25	244.39 N	62.85 E	14,596,392.84	1,728,823.21	1.81	-244.96	
1,778.00	11.65	15.63	-3,137.44	1,752.56	250.74 N	64.64 E	14,596,399.20	1,728,824.97	1.63	-251.33	
1,815.00	11.60	13.87	-3,101.20	1,788.80	257.95 N	66.54 E	14,596,406.42	1,728,826.85	0.97	-258.56	Last Total MWD+IFR Survey @ 1802.00' MD (KB 8') - Tie-On to Last Surface Survey @ 1815.00' MD First Sperry MWD+IFR+MSA Survey @ 1934.00' MD
1,934.00	11.14	12.22	-2,984.53	1,905.47	280.80 N	71.84 E	14,596,429.29	1,728,832.07	0.47	-281.46	
2,023.00	10.33	9.62	-2,897.09	1,992.91	297.07 N	75.00 E	14,596,445.57	1,728,835.16	1.06	-297.76	
2,202.00	11.28	12.01	-2,721.27	2,168.73	330.02 N	81.32 E	14,596,478.54	1,728,841.37	0.59	-330.76	
2,381.00	12.11	11.21	-2,545.98	2,344.02	365.56 N	88.61 E	14,596,514.11	1,728,848.54	0.47	-366.37	
2,471.00	11.72	9.37	-2,457.92	2,432.08	383.84 N	91.94 E	14,596,532.40	1,728,851.79	0.60	-384.68	
2,560.00	12.95	15.06	-2,370.97	2,519.03	402.39 N	96.00 E	14,596,550.96	1,728,855.79	1.94	-403.26	
2,650.00	11.77	10.15	-2,283.06	2,606.94	421.17 N	100.24 E	14,596,569.75	1,728,859.96	1.75	-422.08	
2,829.00	13.38	11.29	-2,108.36	2,781.64	459.45 N	107.51 E	14,596,608.06	1,728,867.10	0.91	-460.43	
2,918.00	13.00	11.35	-2,021.71	2,868.29	479.36 N	111.50 E	14,596,627.99	1,728,871.01	0.43	-480.38	
3,008.00	13.80	19.91	-1,934.15	2,955.85	499.38 N	117.15 E	14,596,648.03	1,728,876.59	2.37	-500.45	
3,097.00	13.00	18.04	-1,847.57	3,042.43	518.88 N	123.86 E	14,596,667.55	1,728,883.24	1.02	-520.01	
3,277.00	10.91	11.53	-1,671.48	3,218.52	554.83 N	133.54 E	14,596,703.53	1,728,892.78	1.38	-556.04	
3,366.00	9.50	26.83	-1,583.87	3,306.13	569.64 N	138.54 E	14,596,718.36	1,728,897.73	3.42	-570.90	
3,456.00	10.93	24.92	-1,495.30	3,394.70	584.01 N	145.48 E	14,596,732.75	1,728,904.63	1.63	-585.33	
3,546.00	8.71	23.65	-1,406.63	3,483.37	597.99 N	151.81 E	14,596,746.75	1,728,910.91	2.48	-599.37	
3,635.00	10.39	23.19	-1,318.86	3,571.14	611.54 N	157.68 E	14,596,760.32	1,728,916.72	1.89	-612.97	
3,725.00	12.21	16.63	-1,230.61	3,659.39	628.12 N	163.60 E	14,596,776.93	1,728,922.58	2.47	-629.61	
3,815.00	10.66	15.29	-1,142.40	3,747.60	645.27 N	168.52 E	14,596,794.09	1,728,927.44	1.75	-646.80	
3,904.00	13.65	16.75	-1,055.40	3,834.60	663.27 N	173.72 E	14,596,812.11	1,728,932.58	3.38	-664.85	
4,083.00	11.37	13.73	-880.66	4,009.34	700.64 N	183.99 E	14,596,849.52	1,728,942.72	1.32	-702.31	
4,172.00	11.30	16.57	-793.40	4,096.60	717.52 N	188.56 E	14,596,866.42	1,728,947.23	0.63	-719.23	
4,262.00	10.34	14.61	-705.00	4,185.00	733.79 N	193.11 E	14,596,882.70	1,728,951.72	1.14	-735.54	
4,351.00	8.93	10.96	-617.25	4,272.75	748.30 N	196.44 E	14,596,897.22	1,728,955.00	1.73	-750.08	
4,441.00	8.45	8.54	-528.29	4,361.71	761.70 N	198.75 E	14,596,910.63	1,728,957.26	0.67	-763.50	
4,531.00	7.58	7.01	-439.17	4,450.83	774.13 N	200.46 E	14,596,923.07	1,728,958.92	1.00	-775.95	
4,621.00	7.12	6.83	-349.91	4,540.09	785.56 N	201.85 E	14,596,934.50	1,728,960.27	0.51	-787.39	
4,710.00	6.22	0.31	-261.51	4,628.49	795.86 N	202.53 E	14,596,944.80	1,728,960.92	1.32	-797.70	

Design Report for RW 15N-32HZ - 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)			
4,800.00	5.96	356.44	-172.02	4,717.98	805.40 N	202.26 E	14,596,954.34	1,728,960.62	0.54	-807.23	
4,889.00	5.08	353.53	-83.43	4,806.57	813.92 N	201.53 E	14,596,962.86	1,728,959.86	1.04	-815.75	
5,005.00	3.87	346.95	32.22	4,922.22	822.84 N	200.07 E	14,596,971.77	1,728,958.36	1.13	-824.65	
5,095.00	1.86	325.49	122.10	5,012.10	827.00 N	198.56 E	14,596,975.93	1,728,956.83	2.49	-828.80	
5,185.00	1.99	306.26	212.05	5,102.05	829.13 N	196.47 E	14,596,978.05	1,728,954.74	0.73	-830.91	
5,274.00	0.31	80.35	301.04	5,191.04	830.08 N	195.46 E	14,596,979.00	1,728,953.73	2.49	-831.86	
5,364.00	0.17	181.48	391.03	5,281.03	829.99 N	195.70 E	14,596,978.91	1,728,953.96	0.42	-831.77	
5,454.00	0.25	236.39	481.03	5,371.03	829.75 N	195.53 E	14,596,978.67	1,728,953.80	0.23	-831.52	
5,543.00	0.58	260.28	570.03	5,460.03	829.57 N	194.92 E	14,596,978.48	1,728,953.19	0.41	-831.33	
5,633.00	0.76	284.66	660.03	5,550.03	829.64 N	193.90 E	14,596,978.55	1,728,952.17	0.37	-831.40	
5,723.00	2.07	88.50	750.01	5,640.01	829.83 N	194.95 E	14,596,978.75	1,728,953.21	3.12	-831.60	
5,813.00	1.64	83.15	839.96	5,729.96	830.03 N	197.85 E	14,596,978.96	1,728,956.12	0.51	-831.82	
5,902.00	1.52	84.20	928.93	5,818.93	830.30 N	200.29 E	14,596,979.24	1,728,958.55	0.14	-832.12	
5,992.00	1.41	90.28	1,018.90	5,908.90	830.42 N	202.58 E	14,596,979.36	1,728,960.85	0.21	-832.25	
6,082.00	1.19	90.19	1,108.88	5,998.88	830.41 N	204.62 E	14,596,979.36	1,728,962.89	0.24	-832.26	
6,171.00	0.07	319.62	1,197.87	6,087.87	830.45 N	205.51 E	14,596,979.40	1,728,963.78	1.39	-832.31	
6,261.00	0.25	311.04	1,287.87	6,177.87	830.62 N	205.33 E	14,596,979.57	1,728,963.59	0.20	-832.48	
6,351.00	0.48	331.91	1,377.87	6,267.87	831.08 N	205.00 E	14,596,980.03	1,728,963.27	0.29	-832.94	
6,440.00	0.87	336.88	1,466.86	6,356.86	832.03 N	204.56 E	14,596,980.98	1,728,962.82	0.44	-833.89	
6,530.00	4.94	177.98	1,556.77	6,446.77	828.78 N	204.43 E	14,596,977.73	1,728,962.70	6.40	-830.64	
6,620.00	6.88	176.93	1,646.28	6,536.28	819.53 N	204.86 E	14,596,968.48	1,728,963.16	2.16	-821.39	
6,709.00	15.55	178.12	1,733.50	6,623.50	802.25 N	205.54 E	14,596,951.20	1,728,963.90	9.74	-804.11	
6,799.00	29.77	182.87	1,816.35	6,706.35	767.69 N	204.81 E	14,596,916.65	1,728,963.30	15.92	-769.56	
6,889.00	35.69	182.93	1,892.02	6,782.02	719.12 N	202.35 E	14,596,868.06	1,728,961.01	6.58	-720.96	
6,978.00	38.23	177.39	1,963.15	6,853.15	665.66 N	202.27 E	14,596,814.60	1,728,961.12	4.70	-667.50	
7,068.00	45.73	174.62	2,030.02	6,920.02	605.67 N	206.57 E	14,596,754.63	1,728,965.63	8.58	-607.55	
7,158.00	58.05	177.78	2,085.46	6,975.46	535.15 N	211.09 E	14,596,684.13	1,728,970.40	13.96	-537.08	
7,247.00	66.40	181.12	2,126.91	7,016.91	456.49 N	211.75 E	14,596,605.47	1,728,971.35	9.95	-458.43	
7,337.00	73.26	179.74	2,157.92	7,047.92	372.07 N	211.14 E	14,596,521.04	1,728,971.04	7.76	-374.00	
7,427.00	78.19	179.73	2,180.11	7,070.11	284.87 N	211.55 E	14,596,433.85	1,728,971.75	5.48	-286.82	
7,517.00	86.24	180.09	2,192.29	7,082.29	195.78 N	211.68 E	14,596,344.76	1,728,972.21	8.95	-197.73	Landed Curve 86.24° INC, 7082.29' TVD @ 7517.00' MD
7,606.00	87.29	180.43	2,197.31	7,087.31	106.92 N	211.28 E	14,596,255.90	1,728,972.12	1.24	-108.87	
7,695.00	88.86	181.17	2,200.30	7,090.30	17.98 N	210.04 E	14,596,166.96	1,728,971.20	1.95	-19.92	
7,785.00	92.53	179.83	2,199.21	7,089.21	71.99 S	209.25 E	14,596,076.98	1,728,970.73	4.34	70.05	
7,875.00	92.96	180.20	2,194.90	7,084.90	161.89 S	209.23 E	14,595,987.09	1,728,971.03	0.63	159.94	
7,965.00	92.96	180.33	2,190.25	7,080.25	251.77 S	208.81 E	14,595,897.21	1,728,970.93	0.14	249.82	
8,054.00	91.17	180.88	2,187.05	7,077.05	340.70 S	207.87 E	14,595,808.27	1,728,970.31	2.10	338.76	
8,144.00	91.23	180.62	2,185.16	7,075.16	430.67 S	206.70 E	14,595,718.30	1,728,969.45	0.30	428.74	
8,234.00	91.82	180.19	2,182.77	7,072.77	520.64 S	206.06 E	14,595,628.33	1,728,969.14	0.81	518.71	
8,323.00	91.39	178.92	2,180.27	7,070.27	609.60 S	206.75 E	14,595,539.37	1,728,970.15	1.51	607.66	

Design Report for RW 15N-32HZ - 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)			
8,413.00	89.82	180.22	2,179.32	7,069.32	699.58 S	207.43 E	14,595,449.39	1,728,971.14	2.26	697.64	
8,502.00	89.94	179.50	2,179.51	7,069.51	788.58 S	207.64 E	14,595,360.39	1,728,971.68	0.82	786.63	
8,543.00	89.75	179.52	2,179.62	7,069.62	829.58 S	207.99 E	14,595,319.39	1,728,972.17	0.46	827.62	Exit 460' Rad @ 8543.00' MD, 7069.62' TVD
8,682.00	89.11	179.60	2,181.00	7,071.00	968.57 S	209.06 E	14,595,180.41	1,728,973.73	0.46	966.60	
8,772.00	90.00	180.02	2,181.70	7,071.70	1,058.57 S	209.36 E	14,595,090.41	1,728,974.35	1.09	1,056.58	
8,861.00	89.78	180.24	2,181.87	7,071.87	1,147.57 S	209.15 E	14,595,001.41	1,728,974.47	0.35	1,145.58	
8,951.00	89.04	179.60	2,182.80	7,072.80	1,237.56 S	209.28 E	14,594,911.42	1,728,974.91	1.09	1,235.57	
9,041.00	88.55	179.67	2,184.69	7,074.69	1,327.54 S	209.85 E	14,594,821.45	1,728,975.81	0.55	1,325.54	
9,130.00	89.11	180.35	2,186.51	7,076.51	1,416.52 S	209.84 E	14,594,732.47	1,728,976.11	0.99	1,414.52	
9,310.00	90.06	179.28	2,187.81	7,077.81	1,596.51 S	210.42 E	14,594,552.48	1,728,977.33	0.79	1,594.49	
9,399.00	89.60	179.31	2,188.08	7,078.08	1,685.50 S	211.51 E	14,594,463.49	1,728,978.74	0.52	1,683.47	
9,489.00	89.85	179.98	2,188.51	7,078.51	1,775.50 S	212.07 E	14,594,373.50	1,728,979.62	0.79	1,773.46	
9,579.00	89.51	180.22	2,189.01	7,079.01	1,865.50 S	211.91 E	14,594,283.50	1,728,979.78	0.46	1,863.46	
9,668.00	89.78	181.17	2,189.56	7,079.56	1,954.49 S	210.83 E	14,594,194.51	1,728,979.02	1.11	1,952.45	
9,758.00	89.08	180.66	2,190.46	7,080.46	2,044.47 S	209.40 E	14,594,104.52	1,728,977.91	0.96	2,042.44	
9,847.00	88.68	180.71	2,192.20	7,082.20	2,133.45 S	208.33 E	14,594,015.54	1,728,977.16	0.45	2,131.43	
9,937.00	88.55	180.32	2,194.37	7,084.37	2,223.42 S	207.52 E	14,593,925.57	1,728,976.67	0.46	2,221.40	
10,027.00	88.64	180.12	2,196.58	7,086.58	2,313.39 S	207.18 E	14,593,835.59	1,728,976.65	0.24	2,311.37	
10,116.00	91.23	183.08	2,196.68	7,086.68	2,402.34 S	204.69 E	14,593,746.64	1,728,974.48	4.42	2,400.34	
10,206.00	91.45	183.60	2,194.58	7,084.58	2,492.16 S	199.45 E	14,593,656.80	1,728,969.56	0.63	2,490.21	
10,295.00	91.11	183.81	2,192.59	7,082.59	2,580.95 S	193.70 E	14,593,567.98	1,728,964.12	0.45	2,579.05	
10,385.00	91.17	183.57	2,190.80	7,080.80	2,670.74 S	187.91 E	14,593,478.17	1,728,958.65	0.27	2,668.89	
10,474.00	89.35	182.68	2,190.39	7,080.39	2,759.61 S	183.06 E	14,593,389.29	1,728,954.12	2.28	2,757.80	
10,564.00	88.61	182.92	2,192.00	7,082.00	2,849.48 S	178.66 E	14,593,299.40	1,728,950.04	0.86	2,847.71	
10,654.00	88.25	182.46	2,194.46	7,084.46	2,939.35 S	174.44 E	14,593,209.52	1,728,946.14	0.65	2,937.61	
10,743.00	89.54	181.06	2,196.18	7,086.18	3,028.29 S	171.71 E	14,593,120.57	1,728,943.72	2.14	3,026.57	
10,833.00	89.51	180.96	2,196.92	7,086.92	3,118.27 S	170.12 E	14,593,030.58	1,728,942.46	0.12	3,116.56	
10,922.00	89.29	180.15	2,197.86	7,087.86	3,207.26 S	169.26 E	14,592,941.59	1,728,941.91	0.94	3,205.56	
11,012.00	88.83	179.68	2,199.33	7,089.33	3,297.25 S	169.39 E	14,592,851.60	1,728,942.37	0.73	3,295.54	
11,102.00	89.87	180.00	2,200.35	7,090.35	3,387.24 S	169.65 E	14,592,761.61	1,728,942.94	1.21	3,385.53	
11,191.00	90.34	180.13	2,200.19	7,090.19	3,476.24 S	169.55 E	14,592,672.61	1,728,943.15	0.55	3,474.52	
11,281.00	90.99	179.99	2,199.15	7,089.15	3,566.23 S	169.45 E	14,592,582.62	1,728,943.38	0.74	3,564.51	
11,370.00	89.66	179.25	2,198.64	7,088.64	3,655.23 S	170.04 E	14,592,493.63	1,728,944.29	1.71	3,653.50	
11,460.00	89.48	178.70	2,199.32	7,089.32	3,745.21 S	171.65 E	14,592,403.65	1,728,946.22	0.64	3,743.46	
11,550.00	89.20	178.61	2,200.35	7,090.35	3,835.18 S	173.76 E	14,592,313.69	1,728,948.65	0.33	3,833.41	
11,640.00	90.09	180.51	2,200.91	7,090.91	3,925.17 S	174.45 E	14,592,223.70	1,728,949.66	2.33	3,923.39	
11,819.00	90.58	180.28	2,199.86	7,089.86	4,104.16 S	173.22 E	14,592,044.71	1,728,949.07	0.30	4,102.39	
11,908.00	90.86	179.98	2,198.75	7,088.75	4,193.16 S	173.02 E	14,591,955.72	1,728,949.18	0.46	4,191.38	
11,998.00	89.54	181.24	2,198.43	7,088.43	4,283.15 S	172.06 E	14,591,865.72	1,728,948.55	2.03	4,281.37	
12,088.00	88.92	180.29	2,199.64	7,089.64	4,373.13 S	170.86 E	14,591,775.74	1,728,947.66	1.26	4,371.36	
12,178.00	90.18	181.30	2,200.35	7,090.35	4,463.11 S	169.61 E	14,591,685.75	1,728,946.74	1.79	4,461.35	

Design Report for RW 15N-32HZ - 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								
12,357.00	90.43	180.38	2,199.39	7,089.39	4,642.09 S	166.99 E	14,591,506.76	1,728,944.75	0.53	4,640.35	
12,446.00	90.92	180.37	2,198.35	7,088.35	4,731.08 S	166.40 E	14,591,417.77	1,728,944.48	0.55	4,729.34	
12,536.00	91.17	180.32	2,196.70	7,086.70	4,821.07 S	165.86 E	14,591,327.78	1,728,944.26	0.28	4,819.32	
12,626.00	90.03	181.79	2,195.76	7,085.76	4,911.04 S	164.20 E	14,591,237.80	1,728,942.93	2.07	4,909.31	
12,715.00	89.66	181.52	2,196.00	7,086.00	5,000.00 S	161.63 E	14,591,148.83	1,728,940.67	0.51	4,998.29	
12,805.00	89.57	182.54	2,196.61	7,086.61	5,089.94 S	158.45 E	14,591,058.88	1,728,937.81	1.14	5,088.26	
12,895.00	89.17	182.77	2,197.60	7,087.60	5,179.84 S	154.28 E	14,590,968.97	1,728,933.96	0.51	5,178.19	
12,912.00	89.03	182.67	2,197.86	7,087.86	5,196.82 S	153.47 E	14,590,951.99	1,728,933.21	1.00	5,195.18	Enter 460' Rad @ 12912.00' MD, 7087.86' TVD
12,984.00	88.46	182.23	2,199.44	7,089.44	5,268.74 S	150.40 E	14,590,880.06	1,728,930.39	1.00	5,267.12	
13,164.00	87.32	181.00	2,206.07	7,096.07	5,448.54 S	145.33 E	14,590,700.24	1,728,925.96	0.93	5,446.96	
13,249.00	87.69	181.01	2,209.77	7,099.77	5,533.44 S	143.84 E	14,590,615.33	1,728,924.78	0.44	5,531.88	Last Sperry MWD+IFR+MSA Survey @ 13249.00' MD
13,294.00	87.69	181.01	2,211.58	7,101.58	5,578.40 S	143.04 E	14,590,570.37	1,728,924.14	0.00	5,576.84	Straight Line Projection to TD @ 13294.00' 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	0.72	-0.57	First Total MWD+IFR Survey @ 119.00' MD (KB 8')
1,815.00	1,788.80	257.95	66.54	Last Total MWD+IFR Survey @ 1802.00' MD (KB 8')
1,815.00	1,788.80	257.95	66.54	Tie-On to Last Surface Survey @ 1815.00' MD
1,934.00	1,905.47	280.80	71.84	First Sperry MWD+IFR+MSA Survey @ 1934.00' MD
7,517.00	7,082.29	195.78	211.68	Landed Curve 86.24° INC, 7082.29' TVD @ 7517.00' MD
8,543.00	7,069.62	-829.58	207.99	Exit 460' Rad @ 8543.00' MD, 7069.62' TVD
12,912.00	7,087.86	-5,196.82	153.47	Enter 460' Rad @ 12912.00' MD, 7087.86' TVD
13,249.00	7,099.77	-5,533.44	143.84	Last Sperry MWD+IFR+MSA Survey @ 13249.00' MD
13,294.00	7,101.58	-5,578.40	143.04	Straight Line Projection to TD @ 13294.00' MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
+N/-S (usft)	+E/-W (usft)					
User	No Target (Freehand)	180.53	Slot	0.00	0.00	0.00

Design Report for RW 15N-32HZ - Final Surveys

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
13.00	1,815.00	Total MWD+IFR Surface Surveys	APC_ISCWSA REV 2 MWD+IFR1
1,815.00	13,249.00	Sperry MWD+IFR Surveys	APC_ISCWSA REV 2 MWD+IFR1+MSA
13,294.00	13,294.00	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 15N-32HZ_460 S ()									
	0.00	0.00	0.00	-5,655.64	254.23	14,590,493.53	1,729,035.60	40.174660	-104.682752
- actual wellpath misses target center by 5661.35usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Circle (radius 460.00)									
RW 15N-32HZ_HEEL PLAT ()									
	0.00	0.00	0.00	176.62	211.97	14,596,325.60	1,728,972.56	40.190676	-104.682903
- actual wellpath misses target center by 275.91usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									
RW 15N-32HZ_SHL ()									
	0.00	0.00	0.00	0.00	0.00	14,596,148.23	1,728,761.22	40.190191	-104.683662
- actual wellpath hits target center									
- Point									
RW 15N-32HZ_BHL PLAT ()									
	0.00	0.00	0.00	-5,614.01	158.94	14,590,534.82	1,728,940.17	40.174774	-104.683093
- actual wellpath misses target center by 5616.26usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									
RW 15N-32HZ_460 N ()									
	0.00	0.00	0.00	-373.42	293.89	14,595,775.86	1,729,056.44	40.189166	-104.682610
- actual wellpath misses target center by 475.20usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Circle (radius 460.00)									

Directional Difficulty Index

Average Dogleg over Survey:	1.74 °/100usft	Maximum Dogleg over Survey:	15.92 °/100usft at 6,799.00 usft
Net Tortousity applicable to Plans:	0.87 °/100usft	Directional Difficulty Index:	6.499

Design Report for RW 15N-32HZ - Final Surveys

Audit Info

North Reference Sheet for 3N-65W-29 RW 15-29HZ Pad - RW 15N-32HZ - 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 15N-32HZ

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: 0.99960893

Grid Coordinates of Well: 14,596,148.23 usft N, 1,728,761.22 usft E

Geographical Coordinates of Well: 40° 11' 24.69" N, 104° 41' 01.18" W

Grid Convergence at Surface is: 0.20°

Based upon Minimum Curvature type calculations, at a Measured Depth of 13,294.00usft
the Bottom Hole Displacement is 5,580.23usft in the Direction of 178.53° (True).

Magnetic Convergence at surface is: -8.10° (21 August 2017, , BGGM2017)

