

Project: WELD-NAD83-UTMFT13N
Site: 3N-65W-29 RW 15-29HZ P₂
Well: RW 36N-32HZ
Wellbore: Original Wellbore
Design: Final Surveys



US ROCKIES WATTENBERG PLANNING

West(-)/East(+) (1000 usft/in)

-2500 -2000 -1500 -1000 -500 0 500 1000 1500

WELL DETAILS: RW 36N-32HZ

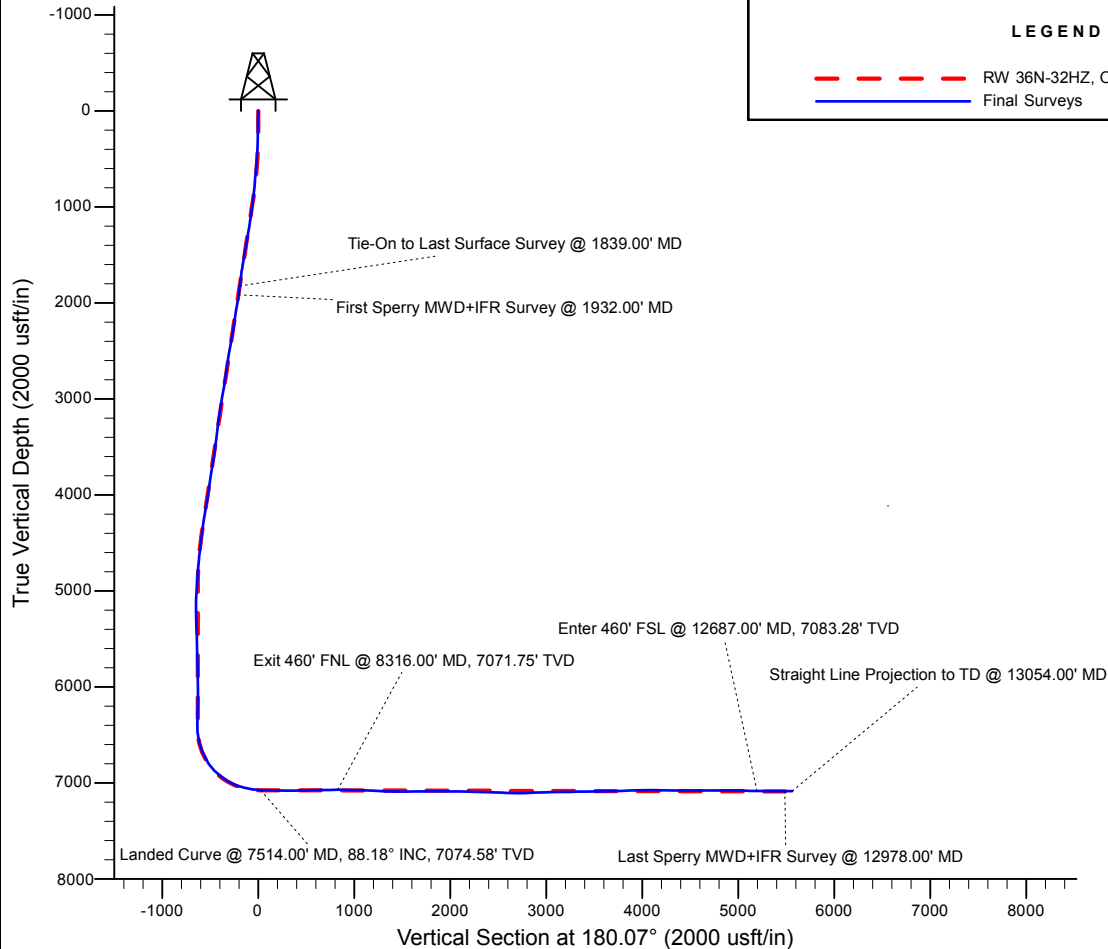
Design: Final Surveys (RW 36N-32HZ/Original Wellbore)

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

Created By: Jerry Popp Date: 11:49, 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 Surface @ 0.00' MD (KB 8')
132.00	1.10	316.48	131.99	0.83	-0.79	First Total MWD+IFR Surface Survey @ 119.00' MD (KB 8')
1839.00	8.31	334.76	1822.50	191.17	-100.61	Last Total MWD+IFR Surface Survey @ 1826.00' MD (KB 8')
1839.00	8.31	334.76	1822.50	191.17	-100.61	Tie-On to Last Surface Survey @ 1839.00' MD
1932.00	8.58	334.98	1914.49	203.53	-106.41	First Sperry MWD+IFR Survey @ 1932.00' MD
7514.00	88.18	181.70	7074.58	-27.41	-324.21	Landed Curve @ 7514.00' MD, 88.18° INC, 7074.58' TVD
8316.00	89.84	179.55	7071.75	-829.05	-339.01	Exit 460' FNL @ 8316.00' MD, 7071.75' TVD
12687.00	89.14	176.40	7083.28	-5196.70	-321.62	Enter 460' FSL @ 12687.00' MD, 7083.28' TVD
12978.00	89.88	177.08	7085.80	-5487.32	-307.05	Last Sperry MWD+IFR Survey @ 12978.00' MD
13054.00	89.88	177.08	7085.96	-5563.22	-303.18	Straight Line Projection to TD @ 13054.00' MD



LEGEND

--- RW 36N-32HZ, Original Wellbore, Rev A2 V0
— Final Surveys

Sec. 29, T3N R65W

Landed Curve @ 7514.00' MD, 88.18° INC, 7074.58' TVD

Lat: 40.190118
Long: -104.685038
~344' FSL, ~1989' FEL

First Sperry MWD+IFR Survey @ 1932.00' MD

SHL: 372' FSL, 1666' FEL

Exit 460' FNL @ 8316.00' MD, 7071.75' TVD
~460' FNL, ~2001' FEL

Sec. 32, T3N R65W

~460' FSL, ~1951' FEL

Enter 460' FSL @ 12687.00' MD, 7083.28' TVD

Last Sperry MWD+IFR Survey @ 12978.00' MD

Straight Line Projection to TD @ 13054.00' MD

TD BHL
Lat: 40.174916
Long: -104.684963
~91' FSL, ~1930' FEL

Job# 904218776

Precision 464

US ROCKIES WATTENBERG PLANNING

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

API# 05-123-44753

RW 36N-32HZ

Original Wellbore

Design: Final Surveys

Sperry Drilling Services

Combo Report

29 September, 2017

Well Coordinates: 40° 11' 24.69" N
104° 41' 01.96" W

North American Datum 1983
Zone 13N (108 W to 102 W)
14,596,148.74 N
1,728,701.18 E

Ground Level: 4,869.00 usft

Local Coordinate Origin:

Centered on Well RW 36N-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 36N-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	14,596,148.74	1,728,701.18	0.00	0.00	
13.00	0.00	0.00	-4,877.00	13.00	0.00 N	0.00 E	14,596,148.74	1,728,701.18	0.00	0.00	Tie-On Surface @ 0.00' MD (KB 8')
132.00	1.10	316.48	-4,758.01	131.99	0.83 N	0.79 W	14,596,149.57	1,728,700.39	0.92	-0.83	First Total MWD+IFR Surface Survey @ 119.00' MD (KB 8')
163.00	0.97	315.51	-4,727.01	162.99	1.23 N	1.18 W	14,596,149.97	1,728,700.00	0.42	-1.23	
195.00	0.97	315.51	-4,695.02	194.98	1.62 N	1.56 W	14,596,150.35	1,728,699.62	0.00	-1.62	
227.00	0.92	344.78	-4,663.02	226.98	2.06 N	1.81 W	14,596,150.79	1,728,699.36	1.50	-2.06	
259.00	1.54	343.81	-4,631.03	258.97	2.72 N	2.00 W	14,596,151.45	1,728,699.17	1.94	-2.72	
290.00	1.76	340.56	-4,600.04	289.96	3.57 N	2.27 W	14,596,152.30	1,728,698.89	0.77	-3.57	
322.00	1.58	346.88	-4,568.06	321.94	4.46 N	2.54 W	14,596,153.19	1,728,698.62	0.80	-4.46	
354.00	2.33	349.35	-4,536.07	353.93	5.53 N	2.76 W	14,596,154.26	1,728,698.40	2.36	-5.53	
385.00	2.86	338.19	-4,505.11	384.89	6.87 N	3.16 W	14,596,155.60	1,728,697.99	2.35	-6.86	
417.00	3.52	342.05	-4,473.16	416.84	8.54 N	3.76 W	14,596,157.27	1,728,697.39	2.17	-8.54	
449.00	3.56	341.09	-4,441.22	448.78	10.42 N	4.39 W	14,596,159.14	1,728,696.76	0.22	-10.41	
512.00	4.57	333.27	-4,378.38	511.62	14.51 N	6.15 W	14,596,163.23	1,728,694.98	1.83	-14.50	
544.00	5.40	335.99	-4,346.50	543.50	17.02 N	7.34 W	14,596,165.74	1,728,693.78	2.70	-17.02	
575.00	5.71	333.53	-4,315.64	574.36	19.74 N	8.62 W	14,596,168.45	1,728,692.49	1.26	-19.73	
612.00	5.40	333.35	-4,278.82	611.18	22.94 N	10.22 W	14,596,171.65	1,728,690.88	0.84	-22.93	
638.00	5.45	330.10	-4,252.93	637.07	25.10 N	11.38 W	14,596,173.81	1,728,689.71	1.20	-25.09	
670.00	5.36	329.84	-4,221.07	668.93	27.71 N	12.89 W	14,596,176.41	1,728,688.19	0.29	-27.70	
702.00	5.53	328.96	-4,189.22	700.78	30.33 N	14.44 W	14,596,179.02	1,728,686.63	0.59	-30.31	
765.00	6.02	330.63	-4,126.54	763.46	35.81 N	17.62 W	14,596,184.49	1,728,683.43	0.82	-35.79	
797.00	6.06	328.08	-4,094.72	795.28	38.70 N	19.34 W	14,596,187.38	1,728,681.70	0.85	-38.68	
829.00	6.72	330.72	-4,062.92	827.08	41.77 N	21.15 W	14,596,190.44	1,728,679.88	2.26	-41.74	
860.00	6.99	326.85	-4,032.14	857.86	44.93 N	23.06 W	14,596,193.59	1,728,677.95	1.73	-44.90	
892.00	7.65	331.77	-4,000.40	889.60	48.44 N	25.14 W	14,596,197.09	1,728,675.87	2.84	-48.41	
923.00	7.95	328.17	-3,969.68	920.32	52.08 N	27.24 W	14,596,200.72	1,728,673.75	1.85	-52.04	
987.00	8.53	331.51	-3,906.34	983.66	60.01 N	31.84 W	14,596,208.64	1,728,669.12	1.17	-59.97	
1,018.00	8.70	329.57	-3,875.69	1,014.31	64.05 N	34.13 W	14,596,212.67	1,728,666.82	1.09	-64.01	
1,050.00	9.14	329.13	-3,844.08	1,045.92	68.32 N	36.66 W	14,596,216.93	1,728,664.28	1.39	-68.28	
1,082.00	9.18	332.30	-3,812.49	1,077.51	72.76 N	39.15 W	14,596,221.36	1,728,661.77	1.58	-72.71	
1,113.00	9.93	334.06	-3,781.92	1,108.08	77.36 N	41.47 W	14,596,225.95	1,728,659.44	2.60	-77.30	
1,145.00	9.49	332.47	-3,750.38	1,139.62	82.18 N	43.89 W	14,596,230.76	1,728,656.99	1.61	-82.12	
1,177.00	9.93	330.45	-3,718.84	1,171.16	86.92 N	46.47 W	14,596,235.49	1,728,654.40	1.74	-86.86	
1,208.00	10.41	331.51	-3,688.32	1,201.68	91.70 N	49.13 W	14,596,240.27	1,728,651.73	1.66	-91.64	
1,240.00	10.94	332.21	-3,656.88	1,233.12	96.93 N	51.92 W	14,596,245.49	1,728,648.91	1.71	-96.87	
1,272.00	11.07	330.28	-3,625.47	1,264.53	102.28 N	54.86 W	14,596,250.83	1,728,645.95	1.22	-102.22	
1,303.00	11.34	328.78	-3,595.06	1,294.94	107.48 N	57.91 W	14,596,256.01	1,728,642.88	1.28	-107.40	
1,335.00	11.56	329.22	-3,563.69	1,326.31	112.92 N	61.19 W	14,596,261.44	1,728,639.59	0.74	-112.85	
1,366.00	11.60	330.19	-3,533.32	1,356.68	118.29 N	64.33 W	14,596,266.81	1,728,636.43	0.64	-118.21	
1,398.00	11.78	329.83	-3,501.99	1,388.01	123.91 N	67.57 W	14,596,272.41	1,728,633.17	0.61	-123.83	

Design Report for RW 36N-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)			
1,430.00	11.47	332.56	-3,470.64	1,419.36	129.56 N	70.67 W	14,596,278.05	1,728,630.04	1.97	-129.47	
1,461.00	11.34	333.27	-3,440.26	1,449.74	135.01 N	73.47 W	14,596,283.49	1,728,627.23	0.62	-134.92	
1,493.00	10.15	331.60	-3,408.82	1,481.18	140.30 N	76.22 W	14,596,288.77	1,728,624.46	3.84	-140.21	
1,525.00	10.72	332.21	-3,377.35	1,512.65	145.42 N	78.95 W	14,596,293.88	1,728,621.71	1.81	-145.32	
1,557.00	10.55	333.71	-3,345.90	1,544.10	150.68 N	81.64 W	14,596,299.13	1,728,619.01	1.02	-150.58	
1,588.00	10.46	332.34	-3,315.42	1,574.58	155.71 N	84.20 W	14,596,304.16	1,728,616.43	0.86	-155.61	
1,620.00	10.10	335.46	-3,283.93	1,606.07	160.84 N	86.71 W	14,596,309.27	1,728,613.89	2.07	-160.73	
1,682.00	9.01	336.78	-3,222.79	1,667.21	170.25 N	90.88 W	14,596,318.66	1,728,609.69	1.79	-170.14	
1,714.00	8.70	334.84	-3,191.17	1,698.83	174.74 N	92.90 W	14,596,323.15	1,728,607.66	1.35	-174.63	
1,746.00	8.75	335.55	-3,159.54	1,730.46	179.15 N	94.94 W	14,596,327.55	1,728,605.60	0.37	-179.03	
1,778.00	8.08	335.29	-3,127.89	1,762.11	183.40 N	96.89 W	14,596,331.80	1,728,603.64	2.10	-183.29	
1,809.00	8.04	333.71	-3,097.19	1,792.81	187.33 N	98.76 W	14,596,335.72	1,728,601.76	0.73	-187.21	
1,839.00	8.31	334.76	-3,067.50	1,822.50	191.17 N	100.61 W	14,596,339.55	1,728,599.89	1.03	-191.05	Last Total MWD+IFR Surface Survey @ 1826.00' MD (KB 8') - Tie-On to Last Surface Survey @ 1839.00' MD
1,932.00	8.58	334.98	-2,975.51	1,914.49	203.53 N	106.41 W	14,596,351.90	1,728,594.04	0.29	-203.40	First Sperry MWD+IFR Survey @ 1932.00' MD
2,021.00	10.05	338.96	-2,887.68	2,002.32	216.80 N	112.01 W	14,596,365.14	1,728,588.40	1.80	-216.66	
2,111.00	10.18	336.01	-2,799.08	2,090.92	231.39 N	118.06 W	14,596,379.72	1,728,582.30	0.59	-231.25	
2,200.00	9.75	334.04	-2,711.42	2,178.58	245.36 N	124.56 W	14,596,393.65	1,728,575.75	0.62	-245.20	
2,290.00	8.82	331.35	-2,622.60	2,267.40	258.26 N	131.20 W	14,596,406.54	1,728,569.06	1.14	-258.10	
2,379.00	11.64	340.08	-2,535.02	2,354.98	272.70 N	137.53 W	14,596,420.95	1,728,562.68	3.61	-272.53	
2,469.00	11.29	335.49	-2,446.82	2,443.18	289.25 N	144.28 W	14,596,437.48	1,728,555.87	1.09	-289.07	
2,558.00	10.76	330.90	-2,359.46	2,530.54	304.44 N	151.94 W	14,596,452.63	1,728,548.16	1.15	-304.25	
2,648.00	9.65	329.29	-2,270.88	2,619.12	318.26 N	159.87 W	14,596,466.43	1,728,540.17	1.27	-318.07	
2,738.00	8.94	326.12	-2,182.06	2,707.94	330.55 N	167.62 W	14,596,478.70	1,728,532.38	0.97	-330.35	
2,827.00	10.39	330.45	-2,094.33	2,795.67	343.28 N	175.44 W	14,596,491.39	1,728,524.52	1.82	-343.06	
2,916.00	11.24	334.49	-2,006.91	2,883.09	358.09 N	183.13 W	14,596,506.18	1,728,516.77	1.28	-357.86	
3,006.00	10.90	332.28	-1,918.58	2,971.42	373.54 N	190.87 W	14,596,521.60	1,728,508.98	0.60	-373.30	
3,096.00	10.39	331.56	-1,830.13	3,059.87	388.21 N	198.69 W	14,596,536.24	1,728,501.11	0.59	-387.96	
3,185.00	9.60	331.26	-1,742.48	3,147.52	401.77 N	206.08 W	14,596,549.78	1,728,493.67	0.89	-401.52	
3,275.00	8.75	330.21	-1,653.64	3,236.36	414.29 N	213.09 W	14,596,562.27	1,728,486.61	0.96	-414.03	
3,365.00	8.10	330.13	-1,564.61	3,325.39	425.73 N	219.65 W	14,596,573.69	1,728,480.01	0.72	-425.46	
3,454.00	7.26	332.45	-1,476.41	3,413.59	436.15 N	225.37 W	14,596,584.09	1,728,474.25	1.01	-435.88	
3,544.00	9.13	329.38	-1,387.33	3,502.67	447.34 N	231.64 W	14,596,595.26	1,728,467.95	2.13	-447.06	
3,633.00	9.49	330.79	-1,299.50	3,590.50	459.82 N	238.82 W	14,596,607.71	1,728,460.72	0.48	-459.53	
3,723.00	10.63	335.30	-1,210.88	3,679.12	473.84 N	245.91 W	14,596,621.70	1,728,453.58	1.54	-473.54	
3,813.00	10.23	335.00	-1,122.37	3,767.63	488.62 N	252.75 W	14,596,636.46	1,728,446.69	0.45	-488.32	
3,902.00	8.92	334.06	-1,034.61	3,855.39	501.99 N	259.11 W	14,596,649.81	1,728,440.28	1.48	-501.68	
3,992.00	8.55	332.11	-945.66	3,944.34	514.18 N	265.29 W	14,596,661.97	1,728,434.05	0.53	-513.86	
4,081.00	10.47	337.50	-857.88	4,032.12	527.50 N	271.48 W	14,596,675.27	1,728,427.82	2.38	-527.17	
4,171.00	10.75	339.57	-769.42	4,120.58	542.92 N	277.54 W	14,596,690.67	1,728,421.70	0.53	-542.58	
4,260.00	9.81	336.65	-681.85	4,208.15	557.66 N	283.45 W	14,596,705.39	1,728,415.75	1.21	-557.31	

Design Report for RW 36N-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)			
4,350.00	8.54	335.28	-593.00	4,297.00	570.77 N	289.28 W	14,596,718.48	1,728,409.87	1.43	-570.42	
4,464.00	8.10	332.39	-480.20	4,409.80	585.58 N	296.54 W	14,596,733.26	1,728,402.55	0.53	-585.21	
4,554.00	7.96	332.91	-391.09	4,498.91	596.74 N	302.32 W	14,596,744.40	1,728,396.74	0.18	-596.37	
4,643.00	7.61	333.52	-302.91	4,587.09	607.50 N	307.75 W	14,596,755.15	1,728,391.26	0.40	-607.13	
4,733.00	6.41	323.80	-213.58	4,676.42	616.89 N	313.38 W	14,596,764.52	1,728,385.61	1.87	-616.51	
4,823.00	5.56	322.33	-124.07	4,765.93	624.40 N	319.01 W	14,596,772.00	1,728,379.95	0.96	-624.01	
4,912.00	5.46	331.10	-35.48	4,854.52	631.52 N	323.69 W	14,596,779.10	1,728,375.24	0.95	-631.12	
5,002.00	3.82	356.17	54.23	4,944.23	638.26 N	325.96 W	14,596,785.84	1,728,372.95	2.86	-637.86	
5,092.00	3.72	349.43	144.04	5,034.04	644.12 N	326.70 W	14,596,791.70	1,728,372.19	0.50	-643.72	
5,182.00	1.01	341.94	233.95	5,123.95	647.75 N	327.48 W	14,596,795.32	1,728,371.40	3.02	-647.34	
5,271.00	1.52	193.53	322.94	5,212.94	647.34 N	328.00 W	14,596,794.91	1,728,370.88	2.74	-646.94	
5,361.00	1.65	192.88	412.91	5,302.91	644.92 N	328.57 W	14,596,792.49	1,728,370.32	0.15	-644.52	
5,451.00	1.79	193.08	502.87	5,392.87	642.29 N	329.17 W	14,596,789.85	1,728,369.72	0.16	-641.88	
5,540.00	1.73	207.78	591.83	5,481.83	639.75 N	330.11 W	14,596,787.31	1,728,368.79	0.51	-639.34	
5,630.00	1.90	216.75	681.78	5,571.78	637.35 N	331.64 W	14,596,784.90	1,728,367.27	0.37	-636.94	
5,720.00	1.76	196.51	771.74	5,661.74	634.83 N	332.92 W	14,596,782.38	1,728,366.00	0.73	-634.42	
5,810.00	1.74	195.56	861.70	5,751.70	632.19 N	333.68 W	14,596,779.74	1,728,365.25	0.04	-631.78	
5,899.00	1.13	126.90	950.67	5,840.67	630.36 N	333.34 W	14,596,777.91	1,728,365.59	1.90	-629.95	
5,989.00	1.16	156.18	1,040.66	5,930.66	628.99 N	332.27 W	14,596,776.55	1,728,366.67	0.64	-628.58	
6,079.00	0.57	153.55	1,130.65	6,020.65	627.76 N	331.70 W	14,596,775.31	1,728,367.25	0.66	-627.35	
6,168.00	1.05	46.76	1,219.64	6,109.64	627.92 N	330.91 W	14,596,775.48	1,728,368.04	1.50	-627.51	
6,258.00	1.28	2.97	1,309.62	6,199.62	629.49 N	330.25 W	14,596,777.05	1,728,368.68	0.99	-629.08	
6,348.00	1.43	334.40	1,399.60	6,289.60	631.50 N	330.69 W	14,596,779.06	1,728,368.24	0.76	-631.10	
6,437.00	1.55	326.16	1,488.57	6,378.57	633.51 N	331.84 W	14,596,781.06	1,728,367.09	0.28	-633.10	
6,527.00	4.69	183.52	1,578.48	6,468.48	630.84 N	332.74 W	14,596,778.39	1,728,366.19	6.66	-630.43	
6,617.00	12.26	188.34	1,667.44	6,557.44	617.70 N	334.36 W	14,596,765.24	1,728,364.62	8.44	-617.29	
6,706.00	20.37	177.52	1,752.80	6,642.80	592.82 N	335.06 W	14,596,740.37	1,728,364.01	9.69	-592.41	
6,796.00	25.49	181.43	1,835.67	6,725.67	557.79 N	334.86 W	14,596,705.34	1,728,364.33	5.93	-557.38	
6,886.00	33.61	179.97	1,913.89	6,803.89	513.45 N	335.34 W	14,596,660.99	1,728,364.02	9.06	-513.04	
6,976.00	45.74	178.73	1,983.04	6,873.04	456.10 N	334.61 W	14,596,603.65	1,728,364.95	13.51	-455.69	
7,065.00	51.29	181.30	2,041.98	6,931.98	389.46 N	334.69 W	14,596,537.01	1,728,365.11	6.60	-389.06	
7,155.00	58.31	177.12	2,093.84	6,983.84	316.00 N	333.56 W	14,596,463.56	1,728,366.50	8.67	-315.60	
7,244.00	70.49	176.02	2,132.22	7,022.22	236.04 N	328.73 W	14,596,383.61	1,728,371.61	13.73	-235.64	
7,334.00	74.66	177.67	2,159.17	7,049.17	150.32 N	324.01 W	14,596,297.91	1,728,376.63	4.95	-149.93	
7,424.00	82.31	180.40	2,177.12	7,067.12	62.22 N	322.56 W	14,596,209.81	1,728,378.40	9.00	-61.82	
7,514.00	88.18	181.70	2,184.58	7,074.58	27.41 S	324.21 W	14,596,120.17	1,728,377.07	6.68	27.81	Landed Curve @ 7514.00' MD, 88.18° INC, 7074.58' TVD
7,603.00	89.23	181.74	2,186.59	7,076.59	116.35 S	326.88 W	14,596,031.23	1,728,374.72	1.18	116.75	
7,692.00	88.83	181.18	2,188.10	7,078.10	205.31 S	329.14 W	14,595,942.26	1,728,372.77	0.77	205.71	
7,782.00	88.46	181.31	2,190.23	7,080.23	295.26 S	331.10 W	14,595,852.30	1,728,371.13	0.44	295.67	
7,872.00	91.26	181.90	2,190.45	7,080.45	385.22 S	333.62 W	14,595,762.34	1,728,368.93	3.18	385.62	

Design Report for RW 36N-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)			
7,962.00	91.54	181.50	2,188.25	7,078.25	475.15 S	336.29 W	14,595,672.40	1,728,366.58	0.54	475.56	
8,051.00	91.45	181.28	2,185.93	7,075.93	564.09 S	338.45 W	14,595,583.45	1,728,364.74	0.27	564.51	
8,141.00	91.02	179.86	2,183.99	7,073.99	654.07 S	339.34 W	14,595,493.47	1,728,364.17	1.65	654.48	
8,231.00	91.02	180.07	2,182.39	7,072.39	744.05 S	339.29 W	14,595,403.49	1,728,364.54	0.23	744.47	
8,316.00	89.84	179.55	2,181.75	7,071.75	829.05 S	339.01 W	14,595,318.49	1,728,365.12	1.52	829.46	Exit 460' FNL @ 8316.00' MD, 7071.75' TVD
8,320.00	89.78	179.53	2,181.76	7,071.76	833.05 S	338.98 W	14,595,314.49	1,728,365.17	1.52	833.46	
8,410.00	89.23	177.98	2,182.54	7,072.54	923.02 S	337.02 W	14,595,224.53	1,728,367.45	1.83	923.43	
8,499.00	88.89	179.21	2,184.00	7,074.00	1,011.98 S	334.84 W	14,595,135.58	1,728,369.94	1.43	1,012.39	
8,589.00	87.29	179.62	2,187.00	7,077.00	1,101.92 S	333.92 W	14,595,045.64	1,728,371.18	1.84	1,102.33	
8,679.00	87.23	179.34	2,191.30	7,081.30	1,191.81 S	333.11 W	14,594,955.75	1,728,372.32	0.32	1,192.22	
8,768.00	86.82	178.84	2,195.92	7,085.92	1,280.68 S	331.69 W	14,594,866.89	1,728,374.05	0.73	1,281.09	
8,854.00	88.46	179.09	2,199.46	7,089.46	1,366.59 S	330.14 W	14,594,780.98	1,728,375.90	1.93	1,366.99	
8,944.00	90.18	178.79	2,200.53	7,090.53	1,456.57 S	328.48 W	14,594,691.01	1,728,377.89	1.94	1,456.97	
9,034.00	90.15	177.91	2,200.27	7,090.27	1,546.53 S	325.89 W	14,594,601.06	1,728,380.80	0.98	1,546.93	
9,123.00	91.02	177.47	2,199.36	7,089.36	1,635.45 S	322.30 W	14,594,512.15	1,728,384.71	1.10	1,635.84	
9,213.00	89.97	179.50	2,198.59	7,088.59	1,725.41 S	319.92 W	14,594,422.20	1,728,387.40	2.54	1,725.80	
9,303.00	91.11	179.59	2,197.74	7,087.74	1,815.40 S	319.20 W	14,594,332.22	1,728,388.44	1.27	1,815.79	
9,392.00	89.38	180.30	2,197.36	7,087.36	1,904.40 S	319.12 W	14,594,243.22	1,728,388.84	2.10	1,904.79	
9,482.00	89.26	179.64	2,198.43	7,088.43	1,994.39 S	319.07 W	14,594,153.23	1,728,389.21	0.75	1,994.78	
9,571.00	89.11	179.61	2,199.69	7,089.69	2,083.38 S	318.49 W	14,594,064.24	1,728,390.11	0.17	2,083.77	
9,661.00	89.11	179.66	2,201.09	7,091.09	2,173.37 S	317.92 W	14,593,974.26	1,728,391.00	0.06	2,173.75	
9,751.00	88.77	179.62	2,202.76	7,092.76	2,263.35 S	317.35 W	14,593,884.28	1,728,391.89	0.38	2,263.73	
9,840.00	88.37	179.23	2,204.98	7,094.98	2,352.32 S	316.46 W	14,593,795.31	1,728,393.10	0.63	2,352.70	
9,930.00	87.72	178.87	2,208.05	7,098.05	2,442.25 S	314.97 W	14,593,705.39	1,728,394.91	0.83	2,442.63	
10,020.00	87.35	179.19	2,211.92	7,101.92	2,532.15 S	313.44 W	14,593,615.49	1,728,396.75	0.54	2,532.54	
10,109.00	88.83	179.84	2,214.88	7,104.88	2,621.10 S	312.69 W	14,593,526.55	1,728,397.82	1.82	2,621.48	
10,199.00	89.48	182.40	2,216.21	7,106.21	2,711.06 S	314.45 W	14,593,436.58	1,728,396.38	2.93	2,711.45	
10,288.00	91.82	184.41	2,215.20	7,105.20	2,799.89 S	319.74 W	14,593,347.73	1,728,391.41	3.47	2,800.28	
10,378.00	92.47	185.00	2,211.83	7,101.83	2,889.52 S	327.11 W	14,593,258.07	1,728,384.36	0.98	2,889.92	
10,467.00	91.69	184.16	2,208.60	7,098.60	2,978.18 S	334.21 W	14,593,169.39	1,728,377.57	1.29	2,978.59	
10,557.00	91.73	184.41	2,205.92	7,095.92	3,067.89 S	340.94 W	14,593,079.66	1,728,371.17	0.28	3,068.30	
10,647.00	91.05	182.67	2,203.73	7,093.73	3,157.69 S	346.49 W	14,592,989.84	1,728,365.93	2.08	3,158.11	
10,737.00	90.28	181.47	2,202.69	7,092.69	3,247.62 S	349.74 W	14,592,899.90	1,728,363.00	1.58	3,248.04	
10,826.00	90.77	180.73	2,201.87	7,091.87	3,336.60 S	351.45 W	14,592,810.91	1,728,361.61	1.00	3,337.02	
10,916.00	90.62	180.08	2,200.78	7,090.78	3,426.59 S	352.09 W	14,592,720.92	1,728,361.30	0.74	3,427.02	
11,005.00	91.76	180.20	2,198.93	7,088.93	3,515.57 S	352.30 W	14,592,631.94	1,728,361.39	1.29	3,515.99	
11,095.00	91.11	179.09	2,196.68	7,086.68	3,605.54 S	351.75 W	14,592,541.98	1,728,362.27	1.43	3,605.96	
11,184.00	91.14	179.06	2,194.93	7,084.93	3,694.51 S	350.31 W	14,592,453.01	1,728,364.03	0.05	3,694.93	
11,274.00	92.22	179.02	2,192.29	7,082.29	3,784.45 S	348.80 W	14,592,363.07	1,728,365.85	1.20	3,784.88	
11,364.00	91.88	178.45	2,189.07	7,079.07	3,874.37 S	346.82 W	14,592,273.16	1,728,368.16	0.74	3,874.79	
11,453.00	91.33	178.15	2,186.58	7,076.58	3,963.30 S	344.18 W	14,592,184.24	1,728,371.12	0.70	3,963.72	

Design Report for RW 36N-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)			
11,543.00	89.91	178.52	2,185.61	7,075.61	4,053.25 S	341.56 W	14,592,094.30	1,728,374.05	1.63	4,053.67	
11,632.00	89.88	179.17	2,185.77	7,075.77	4,142.23 S	339.77 W	14,592,005.32	1,728,376.16	0.73	4,142.65	
11,722.00	88.86	179.60	2,186.76	7,076.76	4,232.22 S	338.80 W	14,591,915.34	1,728,377.45	1.23	4,232.63	
11,812.00	89.51	180.39	2,188.04	7,078.04	4,322.21 S	338.79 W	14,591,825.35	1,728,377.78	1.14	4,322.62	
11,902.00	88.92	180.74	2,189.27	7,079.27	4,412.20 S	339.68 W	14,591,735.36	1,728,377.21	0.76	4,412.61	
11,991.00	90.03	180.56	2,190.09	7,080.09	4,501.19 S	340.69 W	14,591,646.37	1,728,376.52	1.26	4,501.60	
12,081.00	90.92	179.88	2,189.34	7,079.34	4,591.18 S	341.04 W	14,591,556.37	1,728,376.49	1.24	4,591.60	
12,171.00	89.54	179.86	2,188.98	7,078.98	4,681.18 S	340.83 W	14,591,466.38	1,728,377.02	1.53	4,681.59	
12,260.00	89.88	178.67	2,189.43	7,079.43	4,770.17 S	339.69 W	14,591,377.39	1,728,378.47	1.39	4,770.58	
12,350.00	90.03	178.12	2,189.50	7,079.50	4,860.13 S	337.17 W	14,591,287.44	1,728,381.32	0.63	4,860.54	
12,440.00	90.74	178.00	2,188.90	7,078.90	4,950.08 S	334.12 W	14,591,197.50	1,728,384.68	0.80	4,950.48	
12,529.00	88.24	177.00	2,189.69	7,079.69	5,038.98 S	330.24 W	14,591,108.61	1,728,388.88	3.03	5,039.38	
12,619.00	88.77	177.00	2,192.04	7,082.04	5,128.83 S	325.53 W	14,591,018.79	1,728,393.91	0.59	5,129.22	
12,687.00	89.14	176.40	2,193.28	7,083.28	5,196.70 S	321.62 W	14,590,950.93	1,728,398.07	1.04	5,197.09	Enter 460' FSL @ 12687.00' MD, 7083.28' TVD
12,708.00	89.26	176.21	2,193.57	7,083.57	5,217.66 S	320.26 W	14,590,929.98	1,728,399.49	1.04	5,218.05	
12,798.00	89.38	177.60	2,194.64	7,084.64	5,307.52 S	315.41 W	14,590,840.13	1,728,404.67	1.55	5,307.90	
12,978.00	89.88	177.08	2,195.80	7,085.80	5,487.32 S	307.05 W	14,590,660.36	1,728,413.67	0.40	5,487.69	Last Sperry MWD+IFR Survey @ 12978.00' MD
13,054.00	89.88	177.08	2,195.96	7,085.96	5,563.22 S	303.18 W	14,590,584.48	1,728,417.81	0.00	5,563.59	Straight Line Projection to TD @ 13054.00' 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 Surface @ 0.00' MD (KB 8')
132.00	131.99	0.83	-0.79	First Total MWD+IFR Surface Survey @ 119.00' MD (KB 8')
1,839.00	1,822.50	191.17	-100.61	Last Total MWD+IFR Surface Survey @ 1826.00' MD (KB 8')
1,839.00	1,822.50	191.17	-100.61	Tie-On to Last Surface Survey @ 1839.00' MD
1,932.00	1,914.49	203.53	-106.41	First Sperry MWD+IFR Survey @ 1932.00' MD
7,514.00	7,074.58	-27.41	-324.21	Landed Curve @ 7514.00' MD, 88.18° INC, 7074.58' TVD
8,316.00	7,071.75	-829.05	-339.01	Exit 460' FNL @ 8316.00' MD, 7071.75' TVD
12,687.00	7,083.28	-5,196.70	-321.62	Enter 460' FSL @ 12687.00' MD, 7083.28' TVD
12,978.00	7,085.80	-5,487.32	-307.05	Last Sperry MWD+IFR Survey @ 12978.00' MD
13,054.00	7,085.96	-5,563.22	-303.18	Straight Line Projection to TD @ 13054.00' MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	180.07	Slot	0.00	0.00	0.00

Design Report for RW 36N-32HZ - Final Surveys

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
13.00	1,839.00	Total MWD+IFR Surface Surveys	APC_ISCWSA REV 2 MWD+IFR1
1,839.00	12,978.00	Sperry MWD+IFR Surveys	APC_ISCWSA REV 2 MWD+IFR1+SC
13,054.00	13,054.00	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 36N-32HZ_HEEL PLAT ()	0.00	0.00	0.00	-5.82	-326.75	14,596,141.75	1,728,374.45	40.190177	-104.685047
- actual wellpath misses target center by 326.80usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									
RW 36N-32HZ_BHL PLAT ()	0.00	0.00	0.00	-5,612.59	-333.17	14,590,535.00	1,728,388.00	40.174780	-104.685070
- actual wellpath misses target center by 5622.47usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									
RW 36N-32HZ_SHL ()	0.00	0.00	7,089.00	0.00	0.00	14,596,148.74	1,728,701.18	40.190193	-104.683877
- actual wellpath misses target center by 323.81usft at 7481.93usft MD (7072.98 TVD, 4.60 N, -323.39 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	1.77 °/100usft	Maximum Dogleg over Survey:	13.73 °/100usft at 7,244.00 usft
Net Tortousity applicable to Plans:	0.93 °/100usft	Directional Difficulty Index:	6.471

Audit Info

North Reference Sheet for 3N-65W-29 RW 15-29HZ Pad - RW 36N-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 36N-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: 0.99960891

Grid Coordinates of Well: 14,596,148.74 usft N, 1,728,701.18 usft E

Geographical Coordinates of Well: 40° 11' 24.69" N, 104° 41' 01.96" W

Grid Convergence at Surface is: 0.20°

Based upon Minimum Curvature type calculations, at a Measured Depth of 13,054.00usft
the Bottom Hole Displacement is 5,571.48usft in the Direction of 183.12° (True).

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

