

Project: WELD-NAD83-UTMFT13N
 Site: 3N-65W-29 RW 15-29HZ Pad
 Well: RW 2N-29HZ
 Wellbore: Original Wellbore
 Design: Final Surveys



US ROCKIES WATTENBERG PLANNING

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



WELL DETAILS: RW 2N-29HZ		Design: Final Surveys (RW 2N-29HZ/Original Wellbore)	
Ground Level: 4869.00 RKB 21' @ 4890.00usft (Precision 464)		Created By: Jerry Popp Date: 16:14, 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
132.00	132.00	0.18	218.39	-0.15	-0.12	First Total MWD+IFR Survey @ 119.00' MD (KB 8')
1783.22	1809.00	11.03	177.70	-261.78	-10.56	Last Total MWD+IFR Survey @ 1796.00' MD (KB 8')
1783.22	1809.00	11.03	177.70	-261.78	-10.56	Tie-On to Last Surface Survey @ 1809.00' MD
1904.13	1932.00	10.15	177.50	-284.37	-9.62	First Sperry MWD+IFR Survey @ 1932.00' MD
7065.70	7433.00	79.59	4.09	-109.18	-67.23	Cross 460' Rad 7433.00' MD, 7065.70' TVD
7074.60	7515.00	87.93	1.27	-27.83	-63.44	Landed Curve @ 7515.00' MD, 87.93° INC, 7074.60' TVD
7077.53	7630.00	89.09	1.05	87.10	-61.00	Exit 460' FSL 7630.00' MD, 7077.53' TVD
7086.75	12004.00	90.83	354.28	4452.25	-143.29	Enter 460' FSL @ 12004.00' MD, 7086.75' TVD
7088.04	12363.00	89.04	353.68	4809.36	-179.97	Last Sperry MWD+IFR Survey @ 12363.00' MD
7088.71	12405.00	89.04	353.68	4851.09	-184.59	Straight Line Projection to TD @ 12405.00' MD

TD BHL
 Lat: 40.203513
 Long: -104.684377
 -59' FNL, -1806' FEL
 Straight Line Projection to TD @ 12405.00' MD

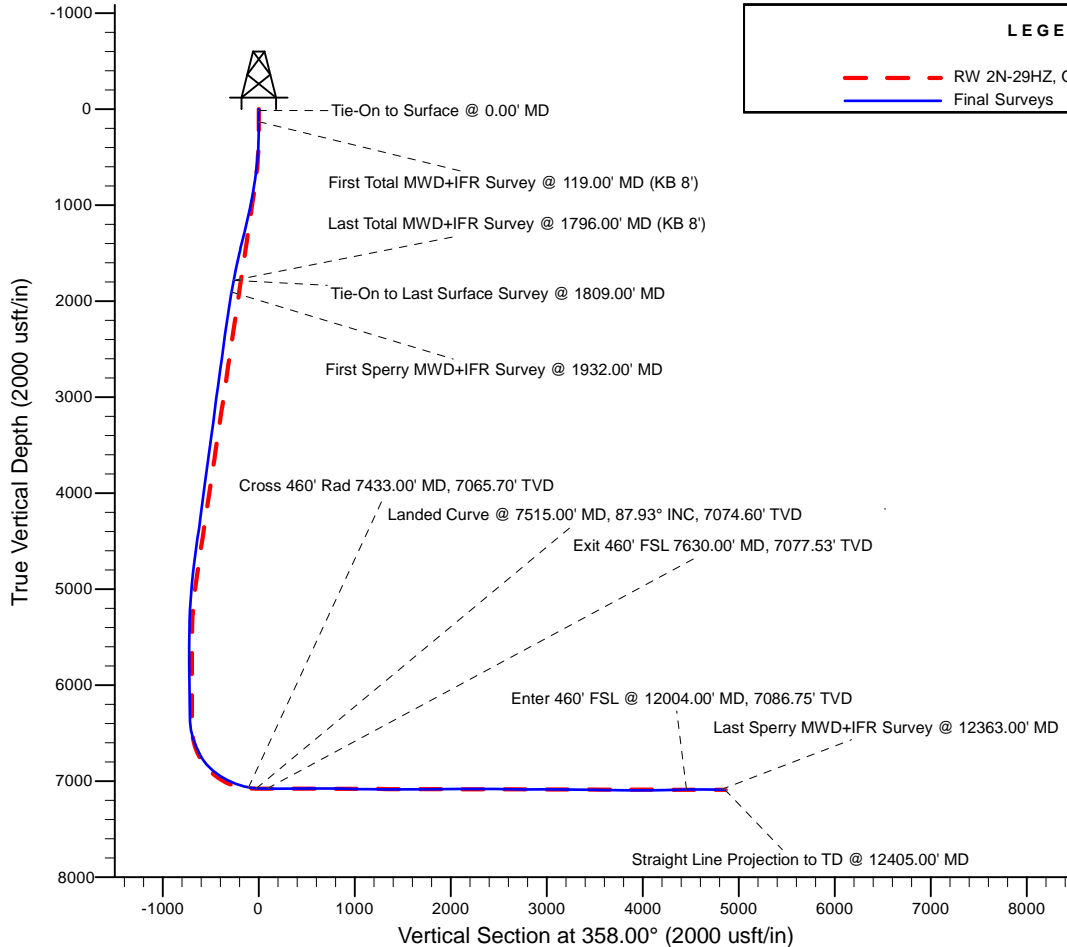
Last Sperry MWD+IFR Survey @ 12363.00' MD

Enter 460' FSL @ 12004.00' MD, 7086.75' TVD
 -460' FNL, -1764' FEL

LEGEND

- RW 2N-29HZ, Original Wellbore, Rev A2 V0
- Final Surveys

Sec. 29, T3N
 R65W



-460' FSL, -1682' FEL
 Exit 460' FSL 7630.00' MD, 7077.53' TVD
 Landed Curve @ 7515.00' MD, 87.93° INC, 7074.60' TVD
 Lat: 40.190115
 Long: -104.683943
 -344' FSL, -1684' FEL

Cross 460' Rad 7433.00' MD, 7065.70' TVD
 -262' FSL, -1688' FEL

SHL: 372' FSL 1621' FEL

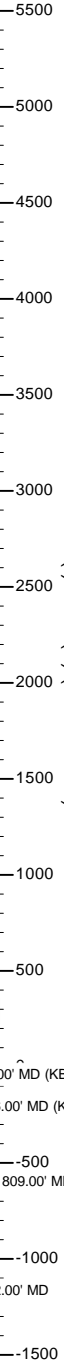
First Total MWD+IFR Survey @ 119.00' MD (KB 8')

Last Total MWD+IFR Survey @ 1796.00' MD (KB 8')

Tie-On to Last Surface Survey @ 1809.00' MD

First Sperry MWD+IFR Survey @ 1932.00' MD

South(-)/North(+) (1000 usft/in)



Job# 904218780
Precision 464

US ROCKIES WATTENBERG PLANNING

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

API# 05-123-44750

RW 2N-29HZ

Original Wellbore

Design: Final Surveys

Sperry Drilling Services

Combo Report

28 September, 2017

Well Coordinates: 40° 11' 24.69" N
104° 41' 01.38" W

North American Datum 1983
Zone 13N (108 W to 102 W)
14,596,148.17 N
1,728,746.14 E

Ground Level: 4,869.00 usft

Local Coordinate Origin:

Centered on Well RW 2N-29HZ

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 2N-29HZ - 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	14,596,148.17	1,728,746.14	0.00	0.00	
13.00	0.00	0.00	-4,877.00	13.00	0.00 N	0.00 E	14,596,148.17	1,728,746.14	0.00	0.00	Tie-On to Surface @ 0.00' MD
132.00	0.18	218.39	-4,758.00	132.00	0.15 S	0.12 W	14,596,148.03	1,728,746.03	0.15	-0.14	First Total MWD+IFR Survey @ 119.00' MD (KB 8')
163.00	0.18	196.07	-4,727.00	163.00	0.23 S	0.16 W	14,596,147.94	1,728,745.98	0.22	-0.23	
195.00	0.26	170.40	-4,695.00	195.00	0.35 S	0.16 W	14,596,147.82	1,728,745.98	0.39	-0.35	
227.00	0.35	166.36	-4,663.00	227.00	0.52 S	0.13 W	14,596,147.66	1,728,746.02	0.29	-0.51	
259.00	0.70	183.50	-4,631.00	259.00	0.81 S	0.12 W	14,596,147.37	1,728,746.03	1.19	-0.80	
290.00	0.92	196.60	-4,600.01	289.99	1.24 S	0.20 W	14,596,146.94	1,728,745.95	0.92	-1.23	
322.00	1.98	198.27	-4,568.02	321.98	2.01 S	0.44 W	14,596,146.17	1,728,745.71	3.31	-1.99	
354.00	2.42	194.22	-4,536.04	353.96	3.19 S	0.78 W	14,596,144.98	1,728,745.37	1.46	-3.16	
385.00	2.24	192.29	-4,505.07	384.93	4.41 S	1.07 W	14,596,143.76	1,728,745.09	0.63	-4.37	
417.00	3.38	187.02	-4,473.10	416.90	5.96 S	1.32 W	14,596,142.21	1,728,744.84	3.65	-5.91	
449.00	3.82	181.39	-4,441.17	448.83	7.96 S	1.46 W	14,596,140.21	1,728,744.71	1.76	-7.91	
481.00	4.22	181.48	-4,409.25	480.75	10.20 S	1.52 W	14,596,137.96	1,728,744.66	1.25	-10.15	
512.00	4.70	183.94	-4,378.34	511.66	12.61 S	1.64 W	14,596,135.56	1,728,744.55	1.67	-12.55	
544.00	5.54	181.74	-4,346.47	543.53	15.46 S	1.77 W	14,596,132.70	1,728,744.43	2.70	-15.39	
575.00	6.24	179.63	-4,315.63	574.37	18.64 S	1.81 W	14,596,129.52	1,728,744.40	2.36	-18.57	
607.00	6.81	182.36	-4,283.84	606.16	22.28 S	1.87 W	14,596,125.89	1,728,744.35	2.03	-22.20	
638.00	7.73	180.78	-4,253.09	636.91	26.20 S	1.98 W	14,596,121.97	1,728,744.26	3.04	-26.12	
670.00	7.43	181.30	-4,221.37	668.63	30.42 S	2.05 W	14,596,117.75	1,728,744.20	0.96	-30.33	
702.00	7.51	181.65	-4,189.64	700.36	34.58 S	2.16 W	14,596,113.59	1,728,744.10	0.29	-34.48	
734.00	8.22	180.25	-4,157.94	732.06	38.96 S	2.23 W	14,596,109.21	1,728,744.05	2.30	-38.86	
765.00	8.17	181.74	-4,127.26	762.74	43.38 S	2.31 W	14,596,104.79	1,728,743.99	0.70	-43.27	
797.00	8.70	181.22	-4,095.60	794.40	48.07 S	2.43 W	14,596,100.10	1,728,743.89	1.67	-47.95	
829.00	9.14	181.04	-4,063.99	826.01	53.03 S	2.53 W	14,596,095.14	1,728,743.81	1.38	-52.91	
860.00	9.62	183.59	-4,033.41	856.59	58.08 S	2.73 W	14,596,090.09	1,728,743.62	2.05	-57.94	
892.00	9.93	182.09	-4,001.87	888.13	63.50 S	3.00 W	14,596,084.66	1,728,743.37	1.25	-63.36	
923.00	10.68	183.06	-3,971.37	918.63	69.04 S	3.25 W	14,596,079.12	1,728,743.14	2.48	-68.88	
955.00	11.21	182.71	-3,939.95	950.05	75.11 S	3.56 W	14,596,073.05	1,728,742.85	1.67	-74.94	
987.00	11.91	182.09	-3,908.60	981.40	81.52 S	3.83 W	14,596,066.65	1,728,742.61	2.22	-81.33	
1,018.00	12.08	180.60	-3,878.28	1,011.72	87.96 S	3.98 W	14,596,060.20	1,728,742.48	1.14	-87.76	
1,050.00	12.30	181.13	-3,847.00	1,043.00	94.71 S	4.08 W	14,596,053.45	1,728,742.40	0.77	-94.51	
1,082.00	12.08	179.90	-3,815.72	1,074.28	101.47 S	4.14 W	14,596,046.69	1,728,742.37	1.06	-101.26	
1,113.00	12.39	178.75	-3,785.43	1,104.57	108.04 S	4.06 W	14,596,040.12	1,728,742.47	1.27	-107.83	
1,145.00	12.52	179.02	-3,754.18	1,135.82	114.94 S	3.93 W	14,596,033.22	1,728,742.63	0.45	-114.73	
1,177.00	12.83	179.90	-3,722.96	1,167.04	121.96 S	3.86 W	14,596,026.20	1,728,742.72	1.14	-121.75	
1,208.00	13.14	178.49	-3,692.75	1,197.25	128.92 S	3.76 W	14,596,019.24	1,728,742.84	1.43	-128.71	
1,272.00	13.71	179.72	-3,630.50	1,259.50	143.78 S	3.53 W	14,596,004.38	1,728,743.12	1.00	-143.57	
1,303.00	13.40	182.36	-3,600.36	1,289.64	151.04 S	3.66 W	14,595,997.12	1,728,743.02	2.23	-150.82	
1,335.00	13.80	182.53	-3,569.26	1,320.74	158.56 S	3.99 W	14,595,989.60	1,728,742.72	1.26	-158.32	
1,366.00	14.59	182.88	-3,539.21	1,350.79	166.15 S	4.34 W	14,595,982.01	1,728,742.39	2.56	-165.90	



Design Report for RW 2N-29HZ - 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			
1,398.00	14.11	181.74	-3,508.21	1,381.79	174.08 S	4.67 W	14,595,974.08	1,728,742.10	1.74	-173.81	
1,430.00	13.80	185.17	-3,477.15	1,412.85	181.78 S	5.13 W	14,595,966.38	1,728,741.66	2.76	-181.49	
1,461.00	13.23	185.35	-3,447.01	1,442.99	188.99 S	5.79 W	14,595,959.16	1,728,741.02	1.84	-188.67	
1,493.00	12.57	187.72	-3,415.82	1,474.18	196.09 S	6.60 W	14,595,952.06	1,728,740.24	2.64	-195.74	
1,525.00	12.92	186.27	-3,384.60	1,505.40	203.09 S	7.46 W	14,595,945.05	1,728,739.41	1.48	-202.71	
1,557.00	13.05	184.47	-3,353.42	1,536.58	210.25 S	8.13 W	14,595,937.89	1,728,738.76	1.33	-209.84	
1,588.00	12.39	185.78	-3,323.18	1,566.82	217.05 S	8.74 W	14,595,931.09	1,728,738.18	2.32	-216.61	
1,620.00	12.26	184.47	-3,291.92	1,598.08	223.85 S	9.35 W	14,595,924.29	1,728,737.59	0.96	-223.39	
1,650.00	11.95	184.03	-3,262.59	1,627.41	230.13 S	9.82 W	14,595,918.01	1,728,737.15	1.08	-229.64	
1,682.00	11.82	182.27	-3,231.27	1,658.73	236.71 S	10.18 W	14,595,911.43	1,728,736.81	1.20	-236.21	
1,714.00	11.69	182.53	-3,199.95	1,690.05	243.22 S	10.45 W	14,595,904.92	1,728,736.56	0.44	-242.71	
1,778.00	11.07	179.63	-3,137.20	1,752.80	255.84 S	10.70 W	14,595,892.30	1,728,736.36	1.32	-255.31	
1,809.00	11.03	177.70	-3,106.78	1,783.22	261.78 S	10.56 W	14,595,886.36	1,728,736.52	1.20	-261.25	Last Total MWD+IFR Survey @ 1796.00' MD (KB 8') - Tie-On to Last Surface Survey @ 1809.00' MD First Sperry MWD+IFR Survey @ 1932.00' MD
1,932.00	10.15	177.50	-2,985.87	1,904.13	284.37 S	9.62 W	14,595,863.78	1,728,737.54	0.72	-283.86	
2,022.00	9.26	173.19	-2,897.16	1,992.84	299.48 S	8.41 W	14,595,848.67	1,728,738.80	1.28	-299.00	
2,111.00	9.27	187.54	-2,809.31	2,080.69	313.70 S	8.50 W	14,595,834.45	1,728,738.76	2.59	-313.21	
2,201.00	8.38	193.66	-2,720.38	2,169.62	327.26 S	11.00 W	14,595,820.88	1,728,736.31	1.44	-326.67	
2,290.00	7.19	189.43	-2,632.20	2,257.80	339.05 S	13.45 W	14,595,809.07	1,728,733.90	1.48	-338.38	
2,469.00	8.47	194.56	-2,454.87	2,435.13	362.86 S	18.60 W	14,595,785.25	1,728,728.84	0.81	-361.99	
2,559.00	7.43	189.31	-2,365.73	2,524.27	375.02 S	21.20 W	14,595,773.08	1,728,726.28	1.41	-374.05	
2,648.00	8.63	189.87	-2,277.61	2,612.39	387.28 S	23.28 W	14,595,760.81	1,728,724.24	1.35	-386.23	
2,738.00	8.20	191.35	-2,188.58	2,701.42	400.23 S	25.70 W	14,595,747.86	1,728,721.87	0.53	-399.08	
2,827.00	7.98	189.24	-2,100.46	2,789.54	412.55 S	27.94 W	14,595,735.53	1,728,719.67	0.42	-411.32	
2,917.00	7.74	187.03	-2,011.31	2,878.69	424.73 S	29.69 W	14,595,723.34	1,728,717.97	0.43	-423.43	
3,007.00	8.59	193.74	-1,922.22	2,967.78	437.27 S	32.02 W	14,595,710.79	1,728,715.68	1.42	-435.89	
3,096.00	7.95	192.82	-1,834.14	3,055.86	449.73 S	34.97 W	14,595,698.32	1,728,712.78	0.73	-448.23	
3,186.00	7.51	193.98	-1,744.96	3,145.04	461.51 S	37.77 W	14,595,686.54	1,728,710.02	0.52	-459.90	
3,275.00	6.55	193.56	-1,656.63	3,233.37	472.08 S	40.37 W	14,595,675.95	1,728,707.46	1.08	-470.38	
3,365.00	8.97	191.53	-1,567.46	3,322.54	483.95 S	42.97 W	14,595,664.07	1,728,704.90	2.71	-482.15	
3,455.00	7.98	189.03	-1,478.45	3,411.55	497.00 S	45.36 W	14,595,651.02	1,728,702.56	1.17	-495.11	
3,544.00	7.26	182.67	-1,390.23	3,499.77	508.72 S	46.59 W	14,595,639.30	1,728,701.37	1.24	-506.78	
3,634.00	8.45	188.70	-1,301.07	3,588.93	520.93 S	47.85 W	14,595,627.07	1,728,700.15	1.61	-518.94	
3,723.00	7.75	192.96	-1,212.96	3,677.04	533.25 S	50.19 W	14,595,614.75	1,728,697.86	1.04	-531.16	
3,903.00	8.52	200.29	-1,034.77	3,855.23	557.58 S	57.53 W	14,595,590.39	1,728,690.60	0.72	-555.23	
3,992.00	8.18	194.59	-946.71	3,943.29	569.89 S	61.41 W	14,595,578.07	1,728,686.76	1.00	-567.40	
4,082.00	7.96	195.18	-857.60	4,032.40	582.10 S	64.66 W	14,595,565.85	1,728,683.56	0.26	-579.49	
4,171.00	7.54	196.91	-769.42	4,120.58	593.64 S	67.97 W	14,595,554.30	1,728,680.29	0.54	-590.90	
4,261.00	6.90	198.63	-680.13	4,209.87	604.41 S	71.42 W	14,595,543.51	1,728,676.88	0.75	-601.54	
4,440.00	9.46	198.06	-502.97	4,387.03	628.59 S	79.41 W	14,595,519.31	1,728,668.97	1.43	-625.43	
4,530.00	8.91	196.69	-414.12	4,475.88	642.30 S	83.71 W	14,595,505.58	1,728,664.73	0.66	-638.98	

Design Report for RW 2N-29HZ - 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			
4,619.00	8.27	194.88	-326.12	4,563.88	655.08 S	87.33 W	14,595,492.78	1,728,661.15	0.78	-651.63	
4,709.00	7.75	192.46	-237.00	4,653.00	667.26 S	90.30 W	14,595,480.59	1,728,658.22	0.69	-663.70	
4,799.00	7.08	194.38	-147.75	4,742.25	678.56 S	92.99 W	14,595,469.28	1,728,655.57	0.79	-674.90	
5,003.00	5.36	191.95	55.04	4,945.04	700.06 S	98.08 W	14,595,447.76	1,728,650.55	0.85	-696.21	
5,183.00	4.34	193.14	234.39	5,124.39	714.92 S	101.37 W	14,595,432.90	1,728,647.32	0.57	-710.94	
5,272.00	2.68	186.71	323.22	5,213.22	720.27 S	102.38 W	14,595,427.55	1,728,646.33	1.91	-716.25	
5,362.00	1.44	162.85	413.17	5,303.17	723.44 S	102.29 W	14,595,424.38	1,728,646.43	1.65	-719.42	
5,452.00	1.15	142.95	503.14	5,393.14	725.24 S	101.42 W	14,595,422.58	1,728,647.31	0.59	-721.25	
5,541.00	1.51	141.68	592.12	5,482.12	726.87 S	100.15 W	14,595,420.95	1,728,648.58	0.41	-722.93	
5,631.00	1.45	140.05	682.09	5,572.09	728.68 S	98.69 W	14,595,419.15	1,728,650.06	0.08	-724.78	
5,721.00	0.59	354.61	772.08	5,662.08	729.09 S	98.00 W	14,595,418.74	1,728,650.74	2.18	-725.22	
5,811.00	0.68	344.22	862.08	5,752.08	728.11 S	98.19 W	14,595,419.72	1,728,650.55	0.16	-724.23	
5,990.00	0.63	32.70	1,041.07	5,931.07	726.26 S	97.94 W	14,595,421.57	1,728,650.79	0.30	-722.39	
6,080.00	1.02	35.72	1,131.06	6,021.06	725.20 S	97.21 W	14,595,422.64	1,728,651.52	0.44	-721.35	
6,169.00	1.00	42.80	1,220.04	6,110.04	723.98 S	96.22 W	14,595,423.85	1,728,652.51	0.14	-720.18	
6,259.00	1.21	48.84	1,310.03	6,200.03	722.78 S	94.97 W	14,595,425.06	1,728,653.75	0.27	-719.02	
6,349.00	1.02	54.31	1,400.01	6,290.01	721.69 S	93.60 W	14,595,426.16	1,728,655.11	0.24	-717.97	
6,438.00	1.18	39.29	1,488.99	6,378.99	720.52 S	92.38 W	14,595,427.33	1,728,656.33	0.37	-716.85	
6,528.00	10.71	8.46	1,578.41	6,468.41	711.51 S	90.56 W	14,595,436.35	1,728,658.12	10.79	-707.90	
6,618.00	18.21	6.99	1,665.50	6,555.50	689.24 S	87.61 W	14,595,458.62	1,728,660.99	8.34	-685.76	
6,708.00	24.17	11.12	1,749.38	6,639.38	657.18 S	82.34 W	14,595,490.71	1,728,666.14	6.82	-653.90	
6,797.00	28.97	0.91	1,829.00	6,719.00	617.70 S	78.48 W	14,595,530.19	1,728,669.86	7.43	-614.58	
6,887.00	36.14	4.10	1,904.82	6,794.82	569.37 S	76.23 W	14,595,578.53	1,728,671.94	8.19	-566.36	
6,977.00	45.13	4.49	1,973.04	6,863.04	510.99 S	71.83 W	14,595,636.93	1,728,676.13	9.99	-508.16	
7,066.00	54.45	1.34	2,030.45	6,920.45	443.19 S	68.51 W	14,595,704.74	1,728,679.21	10.81	-440.53	
7,156.00	60.85	358.50	2,078.59	6,968.59	367.21 S	68.68 W	14,595,780.72	1,728,678.77	7.59	-364.59	
7,245.00	66.02	358.87	2,118.38	7,008.38	287.66 S	70.50 W	14,595,860.27	1,728,676.67	5.82	-285.01	
7,335.00	71.40	0.09	2,151.04	7,041.04	203.83 S	71.25 W	14,595,944.09	1,728,675.62	6.11	-201.22	
7,425.00	78.78	4.37	2,174.19	7,064.19	117.02 S	67.81 W	14,596,030.92	1,728,678.75	9.40	-114.57	
7,433.00	79.59	4.09	2,175.70	7,065.70	109.18 S	67.23 W	14,596,038.76	1,728,679.30	10.73	-106.76	Cross 460' Rad 7433.00' MD, 7065.70' TVD
7,515.00	87.93	1.27	2,184.60	7,074.60	27.83 S	63.44 W	14,596,120.12	1,728,682.80	10.73	-25.60	Landed Curve @ 7515.00' MD, 87.93' INC, 7074.60' TVD
7,528.00	87.93	1.27	2,185.07	7,075.07	14.84 S	63.15 W	14,596,133.10	1,728,683.05	0.00	-12.63	
7,604.00	89.01	1.20	2,187.10	7,077.10	61.11 N	61.51 W	14,596,209.06	1,728,684.41	1.42	63.22	
7,630.00	89.09	1.05	2,187.53	7,077.53	87.10 N	61.00 W	14,596,235.06	1,728,684.83	0.66	89.18	Exit 460' FSL 7630.00' MD, 7077.53' TVD
7,693.00	89.29	0.68	2,188.42	7,078.42	150.09 N	60.05 W	14,596,298.05	1,728,685.56	0.66	152.10	
7,783.00	90.18	3.33	2,188.84	7,078.84	240.02 N	56.91 W	14,596,387.99	1,728,688.38	3.11	241.87	
7,873.00	90.80	4.16	2,188.07	7,078.07	329.83 N	51.03 W	14,596,477.82	1,728,693.94	1.15	331.41	
7,963.00	90.74	4.09	2,186.86	7,076.86	419.58 N	44.55 W	14,596,567.60	1,728,700.10	0.10	420.89	
8,052.00	89.91	3.80	2,186.35	7,076.35	508.37 N	38.43 W	14,596,656.40	1,728,705.90	0.99	509.40	
8,142.00	89.82	3.25	2,186.56	7,076.56	598.20 N	32.90 W	14,596,746.25	1,728,711.12	0.62	598.98	

Design Report for RW 2N-29HZ - 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)			
8,232.00	89.91	2.85	2,186.78	7,076.78	688.07 N	28.11 W	14,596,836.14	1,728,715.58	0.46	688.63	
8,321.00	89.51	2.57	2,187.23	7,077.23	776.97 N	23.90 W	14,596,925.06	1,728,719.48	0.55	777.33	
8,411.00	89.08	2.51	2,188.33	7,078.33	866.88 N	19.91 W	14,597,014.97	1,728,723.14	0.48	867.04	
8,500.00	88.61	2.13	2,190.13	7,080.13	955.78 N	16.31 W	14,597,103.89	1,728,726.43	0.68	955.77	
8,590.00	88.77	2.05	2,192.19	7,082.19	1,045.70 N	13.03 W	14,597,193.82	1,728,729.39	0.20	1,045.52	
8,680.00	89.66	0.90	2,193.42	7,083.42	1,135.66 N	10.71 W	14,597,283.79	1,728,731.39	1.62	1,135.34	
8,769.00	88.68	0.40	2,194.71	7,084.71	1,224.64 N	9.70 W	14,597,372.78	1,728,732.08	1.24	1,224.23	
8,859.00	90.22	1.75	2,195.57	7,085.57	1,314.62 N	8.01 W	14,597,462.76	1,728,733.45	2.28	1,314.10	
8,949.00	89.63	2.07	2,195.69	7,085.69	1,404.57 N	5.02 W	14,597,552.72	1,728,736.12	0.75	1,403.89	
9,039.00	90.03	2.54	2,195.96	7,085.96	1,494.49 N	1.40 W	14,597,642.65	1,728,739.42	0.69	1,493.63	
9,128.00	90.80	2.57	2,195.31	7,085.31	1,583.40 N	2.57 E	14,597,731.58	1,728,743.07	0.87	1,582.35	
9,218.00	90.31	1.90	2,194.44	7,084.44	1,673.33 N	6.08 E	14,597,821.52	1,728,746.26	0.92	1,672.09	
9,308.00	89.45	1.24	2,194.63	7,084.63	1,763.29 N	8.55 E	14,597,911.49	1,728,748.41	1.20	1,761.92	
9,397.00	89.23	0.34	2,195.65	7,085.65	1,852.28 N	9.77 E	14,598,000.48	1,728,749.32	1.04	1,850.80	
9,487.00	91.73	0.00	2,194.90	7,084.90	1,942.27 N	10.04 E	14,598,090.47	1,728,749.27	2.80	1,940.73	
9,576.00	91.33	359.69	2,192.52	7,082.52	2,031.24 N	9.80 E	14,598,179.43	1,728,748.71	0.57	2,029.65	
9,666.00	91.29	0.56	2,190.47	7,080.47	2,121.21 N	10.00 E	14,598,269.41	1,728,748.58	0.97	2,119.56	
9,756.00	89.35	359.75	2,189.96	7,079.96	2,211.20 N	10.24 E	14,598,359.40	1,728,748.51	2.34	2,209.49	
9,845.00	89.60	359.56	2,190.78	7,080.78	2,300.20 N	9.70 E	14,598,448.39	1,728,747.65	0.35	2,298.45	
9,935.00	89.72	359.27	2,191.31	7,081.31	2,390.19 N	8.79 E	14,598,538.38	1,728,746.41	0.35	2,388.42	
10,025.00	89.38	359.55	2,192.02	7,082.02	2,480.19 N	7.86 E	14,598,628.37	1,728,745.17	0.49	2,478.39	
10,114.00	88.80	357.69	2,193.43	7,083.43	2,569.14 N	5.72 E	14,598,717.32	1,728,742.71	2.19	2,567.37	
10,204.00	88.83	357.90	2,195.29	7,085.29	2,659.06 N	2.25 E	14,598,807.22	1,728,738.92	0.24	2,657.35	
10,293.00	88.67	357.61	2,197.24	7,087.24	2,747.97 N	1.23 W	14,598,896.12	1,728,735.12	0.37	2,746.33	
10,383.00	90.52	356.76	2,197.87	7,087.87	2,837.85 N	5.65 W	14,598,985.99	1,728,730.38	2.26	2,836.32	
10,472.00	90.03	356.86	2,197.44	7,087.44	2,926.71 N	10.60 W	14,599,074.83	1,728,725.11	0.56	2,925.29	
10,562.00	89.54	354.21	2,197.78	7,087.78	3,016.43 N	17.61 W	14,599,164.52	1,728,717.79	2.99	3,015.20	
10,742.00	90.00	353.55	2,198.51	7,088.51	3,195.40 N	36.80 W	14,599,343.43	1,728,697.96	0.45	3,194.74	
10,831.00	89.78	353.52	2,198.68	7,088.68	3,283.84 N	46.82 W	14,599,431.82	1,728,687.62	0.25	3,283.47	
10,921.00	89.57	353.52	2,199.19	7,089.19	3,373.26 N	56.98 W	14,599,521.21	1,728,677.15	0.23	3,373.19	
11,010.00	89.54	353.21	2,199.88	7,089.88	3,461.66 N	67.26 W	14,599,609.57	1,728,666.55	0.35	3,461.90	
11,100.00	89.41	353.40	2,200.70	7,090.70	3,551.04 N	77.75 W	14,599,698.92	1,728,655.74	0.26	3,551.59	
11,189.00	89.45	355.75	2,201.59	7,091.59	3,639.63 N	86.17 W	14,599,787.48	1,728,647.01	2.64	3,640.42	
11,369.00	88.09	355.92	2,205.45	7,095.45	3,819.11 N	99.24 W	14,599,966.91	1,728,633.30	0.76	3,820.25	
11,458.00	89.14	357.70	2,207.60	7,097.60	3,907.94 N	104.19 W	14,600,055.72	1,728,628.04	2.32	3,909.20	
11,548.00	90.59	357.72	2,207.82	7,097.82	3,997.87 N	107.78 W	14,600,145.63	1,728,624.12	1.61	3,999.19	
11,637.00	90.80	356.98	2,206.74	7,096.74	4,086.77 N	111.90 W	14,600,234.52	1,728,619.69	0.86	4,088.18	
11,727.00	92.10	355.21	2,204.46	7,094.46	4,176.52 N	118.02 W	14,600,324.25	1,728,613.24	2.44	4,178.10	
11,817.00	92.03	354.73	2,201.21	7,091.21	4,266.12 N	125.91 W	14,600,413.82	1,728,605.04	0.54	4,267.91	
11,907.00	91.32	354.85	2,198.58	7,088.58	4,355.71 N	134.08 W	14,600,503.38	1,728,596.55	0.80	4,357.73	
11,996.00	90.89	354.30	2,196.87	7,086.87	4,444.29 N	142.49 W	14,600,591.93	1,728,587.82	0.78	4,446.56	

Design Report for RW 2N-29HZ - 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			
12,004.00	90.83	354.28	2,196.75	7,086.75	4,452.25 N	143.29 W	14,600,599.89	1,728,587.00	0.83	4,454.54	Enter 460' FSL @ 12004.00' MD, 7086.75' TVD
12,086.00	90.18	354.07	2,196.03	7,086.03	4,533.83 N	151.61 W	14,600,681.43	1,728,578.38	0.83	4,536.35	
12,176.00	89.75	354.44	2,196.08	7,086.08	4,623.37 N	160.62 W	14,600,770.95	1,728,569.06	0.63	4,626.16	
12,363.00	89.04	353.68	2,198.06	7,088.06	4,809.36 N	179.97 W	14,600,956.86	1,728,549.04	0.56	4,812.71	Last Sperry MWD+IFR Survey @ 12363.00' MD
12,405.00	89.04	353.68	2,198.76	7,088.76	4,851.09 N	184.59 W	14,600,998.58	1,728,544.27	0.00	4,854.58	Straight Line Projection to TD @ 12405.00' MD

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates (usft)		Comment
		+N/-S	+E/-W	
13.00	13.00	0.00	0.00	Tie-On to Surface @ 0.00' MD
132.00	132.00	-0.15	-0.12	First Total MWD+IFR Survey @ 119.00' MD (KB 8')
1,809.00	1,783.22	-261.78	-10.56	Last Total MWD+IFR Survey @ 1796.00' MD (KB 8')
1,809.00	1,783.22	-261.78	-10.56	Tie-On to Last Surface Survey @ 1809.00' MD
1,932.00	1,904.13	-284.37	-9.62	First Sperry MWD+IFR Survey @ 1932.00' MD
7,433.00	7,065.70	-109.18	-67.23	Cross 460' Rad 7433.00' MD, 7065.70' TVD
7,515.00	7,074.60	-27.83	-63.44	Landed Curve @ 7515.00' MD, 87.93° INC, 7074.60' TVD
7,630.00	7,077.53	87.10	-61.00	Exit 460' FSL 7630.00' MD, 7077.53' TVD
12,004.00	7,086.75	4,452.25	-143.29	Enter 460' FSL @ 12004.00' MD, 7086.75' TVD
12,363.00	7,088.06	4,809.36	-179.97	Last Sperry MWD+IFR Survey @ 12363.00' MD
12,405.00	7,088.76	4,851.09	-184.59	Straight Line Projection to TD @ 12405.00' MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	Origin +E/-W (usft)	Start TVD (usft)
Target	RW 2N-29HZ_BHL PLAT	358.00	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
13.00	1,809.00	Total MWD+IFR Surface Surveys	APC_ISCWSA REV 2 MWD+IFR1
1,809.00	12,363.00	Sperry MWD+IFR Surveys	APC_ISCWSA REV 2 MWD+IFR1+SC
12,405.00	12,405.00	PTB	APC_BLIND

Design Report for RW 2N-29HZ - 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 2N-29HZ_BHL PLAT ()	0.00	0.00	0.00	4,858.96	-170.00	14,601,006.50	1,728,558.83	40.203534	-104.684325
- actual wellpath misses target center by 4861.93usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									
RW 2N-29HZ_SHL ()	0.00	0.00	0.00	0.00	0.00	14,596,148.17	1,728,746.14	40.190191	-104.683716
- actual wellpath hits target center									
- Point									
RW 2N-29HZ_HEEL PLAT ()	0.00	0.00	0.00	-25.75	-21.78	14,596,122.35	1,728,724.45	40.190120	-104.683794
- actual wellpath misses target center by 33.73usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	1.69 °/100usft	Maximum Dogleg over Survey:	10.81 °/100usft at 7,066.00 usft
Net Tortosity applicable to Plans:	0.76 °/100usft	Directional Difficulty Index:	6.365

Audit Info

North Reference Sheet for 3N-65W-29 RW 15-29HZ Pad - RW 2N-29HZ - 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 2N-29HZ

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: 14,596,148.17 usft N, 1,728,746.14 usft E

Geographical Coordinates of Well: 40° 11' 24.69" N, 104° 41' 01.38" W

Grid Convergence at Surface is: 0.20°

Based upon Minimum Curvature type calculations, at a Measured Depth of 12,405.00usft the Bottom Hole Displacement is 4,854.61usft in the Direction of 357.82° (True).

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

