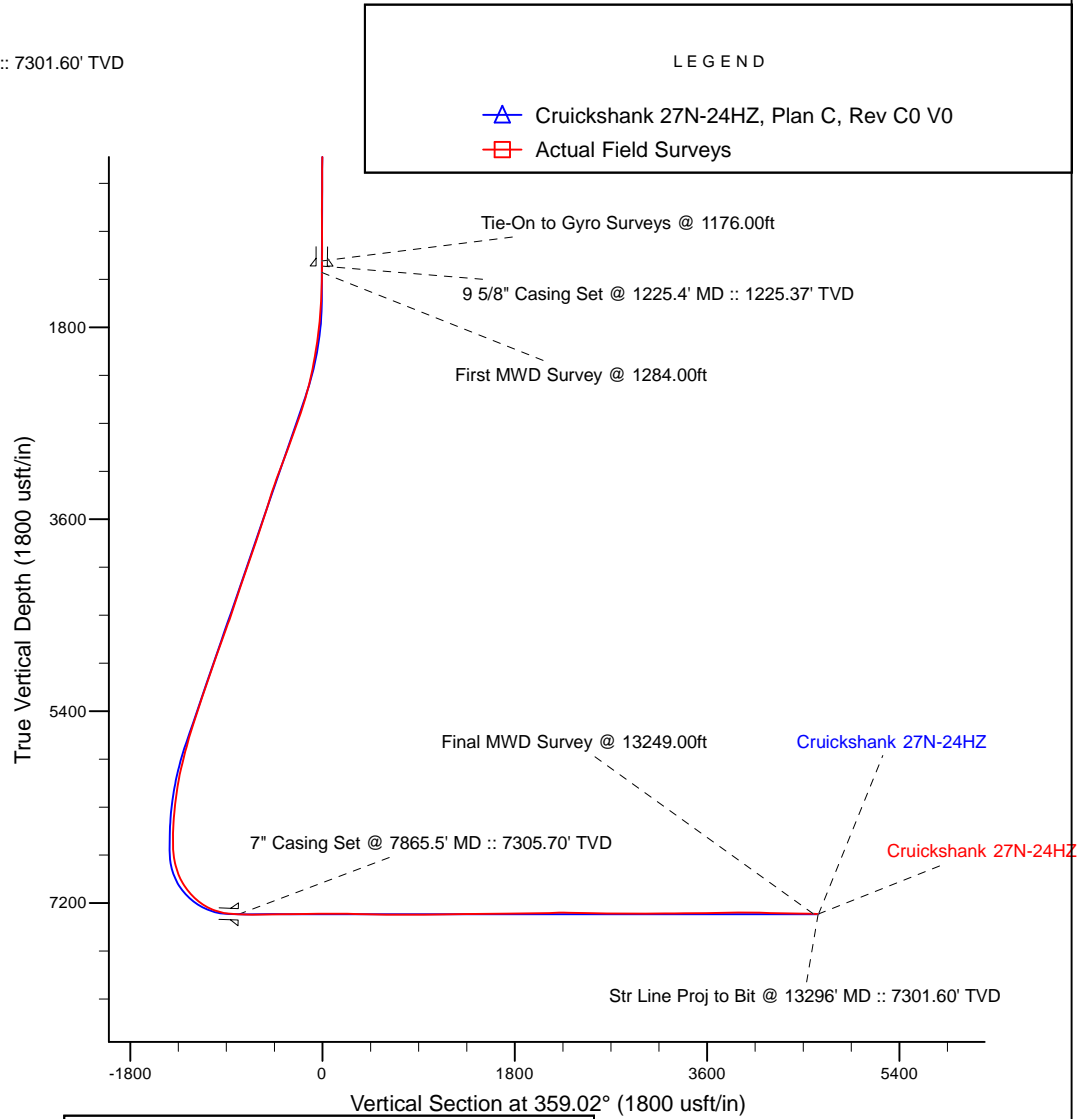
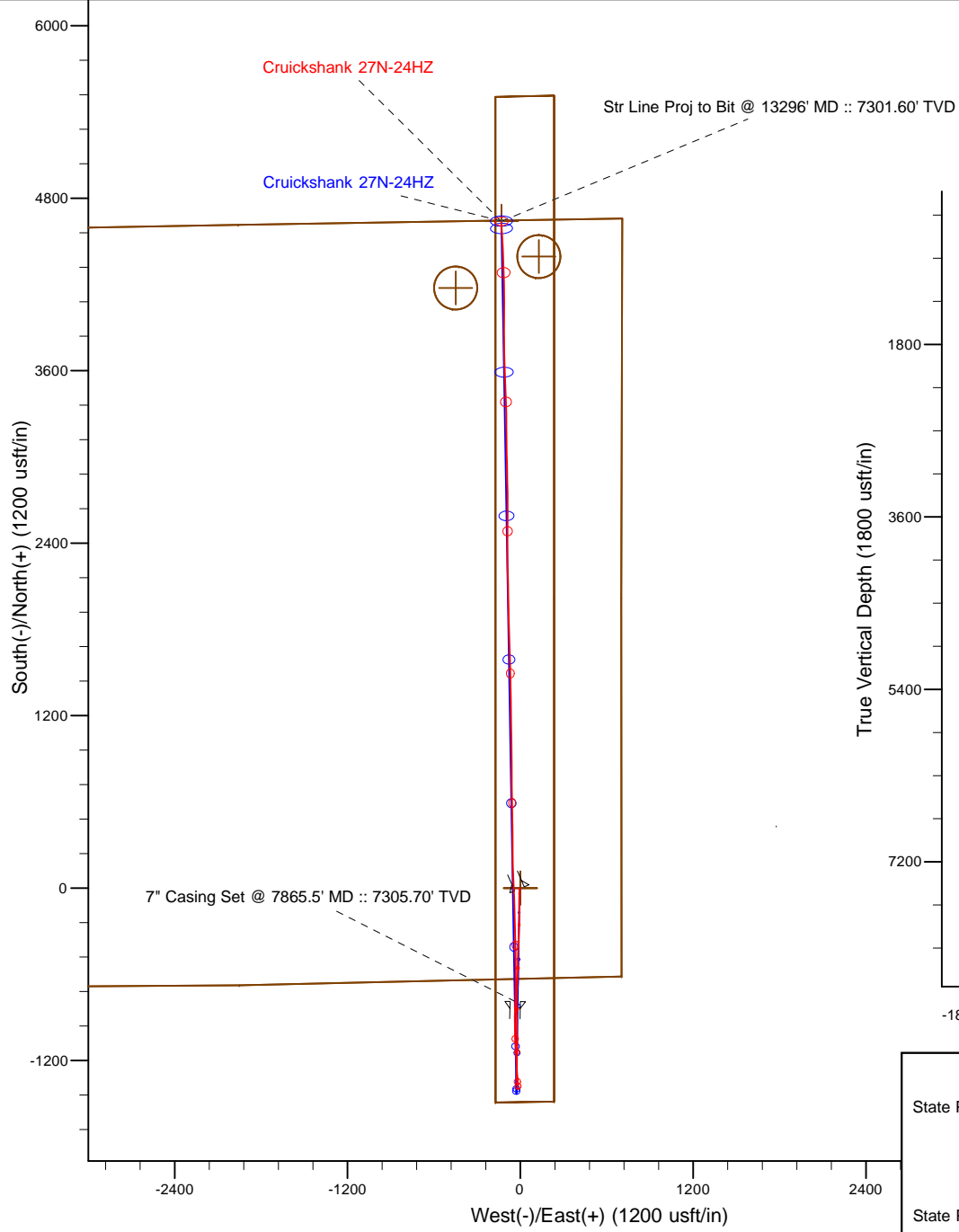


Project: Weld County, CO (NAD 83)
 Site: Sec. 24-T3N-R66W
 Well: Cruickshank 27N-24HZ
 Wellbore: Plan C
 Design: Actual Field Surveys



LEGEND

- ▲ Cruickshank 27N-24HZ, Plan C, Rev C0 V0
- Actual Field Surveys

7" Casing: ~156.70' FNL, ~737.91' FEL
 Lat/Long: 40.203202 N, -104.718362 E
 State Planes - CO Northern: 1,317,830.98' N, 3,218,323.34' E
 Location: Sec. 24-T3N-R66W

BHL: ~6.13' FNL, ~840.18' FEL
 Lat/Long: 40.218102 N, -104.718711 E
 State Planes - CO Northern: 1,323,258.03' N, 3,218,178.08' E
 Location: Sec. 24-T3N-R66W

WELL DETAILS: Cruickshank 27N-24HZ	
Ground Level:	5015.00
RKB = 13' @ 5028.00usft (Ensign 145)	
Design: Actual Field Surveys (Cruickshank 27N-24HZ/Plan C)	
Created By: Clint Eshelman	Date: 9/30/2014
Reviewed: _____	Date: _____

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 24-T3N-R66W

Cruickshank 27N-24HZ

API # 05-123-39496

Plan C

Design: Actual Field Surveys

Sperry Drilling Services

Standard Report

30 September, 2014

Surface UWI : API # 05-123-39496

Well Coordinates: 1,318,620.42 N, 3,218,350.23 E (40° 12' 19.32" N, 104° 43' 05.67" W)

Ground Level: 5,015.00 usft

Local Coordinate Origin:

Centered on Well Cruickshank 27N-24HZ

Viewing Datum:

RKB = 13' @ 5028.00usft (Ensign 145)

TVDs to System:

N

North Reference:

True

Unit System:

API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

HALLIBURTON

Design Report for Cruickshank 27N-24HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13.00	0.00	0.00	13.00	0.00	0.00	0.00	0.00
113.00	0.61	203.05	113.00	-0.49	-0.21	-0.49	0.61
213.00	0.56	197.45	212.99	-1.45	-0.56	-1.44	0.08
313.00	0.39	205.41	312.99	-2.22	-0.86	-2.20	0.18
413.00	0.43	214.18	412.99	-2.84	-1.21	-2.82	0.07
513.00	0.43	257.33	512.98	-3.23	-1.79	-3.20	0.32
613.00	0.34	240.24	612.98	-3.46	-2.41	-3.42	0.14
713.00	0.42	251.62	712.98	-3.72	-3.02	-3.67	0.11
813.00	0.41	244.25	812.98	-3.99	-3.69	-3.93	0.05
913.00	0.38	238.90	912.97	-4.32	-4.30	-4.25	0.05
1,013.00	0.38	215.37	1,012.97	-4.76	-4.77	-4.68	0.15
1,113.00	0.43	172.34	1,112.97	-5.40	-4.91	-5.32	0.30
1,176.00	0.32	185.64	1,175.97	-5.81	-4.90	-5.73	0.22
Tie-On to Gyro Surveys @ 1176.00ft							
1,225.40	0.21	156.74	1,225.37	-6.03	-4.88	-5.95	0.35
9 5/8" Casing Set @ 1225.4' MD :: 1225.37' TVD							
1,284.00	0.22	100.25	1,283.97	-6.15	-4.72	-6.07	0.35
First MWD Survey @ 1284.00ft							
1,377.00	0.21	82.20	1,376.97	-6.16	-4.38	-6.08	0.07
1,471.00	1.83	175.67	1,470.95	-7.63	-4.10	-7.56	1.97
1,564.00	3.65	188.13	1,563.84	-12.04	-4.40	-11.97	2.05
1,658.00	4.98	188.35	1,657.57	-19.04	-5.42	-18.95	1.42
1,751.00	6.73	180.88	1,750.09	-28.49	-6.09	-28.38	2.05
1,845.00	6.37	176.95	1,843.47	-39.20	-5.90	-39.09	0.61
1,939.00	7.98	180.49	1,936.73	-50.93	-5.67	-50.83	1.78
2,032.00	8.78	179.00	2,028.74	-64.49	-5.60	-64.38	0.89
2,126.00	10.34	179.03	2,121.43	-80.09	-5.34	-79.99	1.66
2,219.00	12.09	179.49	2,212.65	-98.18	-5.11	-98.08	1.88
2,313.00	12.86	180.09	2,304.43	-118.48	-5.04	-118.38	0.83
2,406.00	14.74	180.67	2,394.74	-140.67	-5.19	-140.56	2.03
2,500.00	16.92	180.76	2,485.17	-166.30	-5.51	-166.19	2.32
2,593.00	18.54	180.28	2,573.75	-194.62	-5.77	-194.50	1.75
2,687.00	19.76	183.64	2,662.55	-225.43	-6.85	-225.28	1.75
2,780.00	18.09	181.78	2,750.52	-255.55	-8.29	-255.37	1.91
2,874.00	19.59	182.35	2,839.49	-285.89	-9.39	-285.68	1.61
2,964.00	21.10	181.47	2,923.87	-317.16	-10.43	-316.93	1.71
3,054.00	21.20	181.91	3,007.81	-349.62	-11.39	-349.37	0.21
3,144.00	21.47	182.45	3,091.64	-382.34	-12.63	-382.06	0.37
3,234.00	20.83	181.89	3,175.58	-414.78	-13.86	-414.49	0.75
3,324.00	18.07	181.06	3,260.43	-444.74	-14.65	-444.42	3.08
3,414.00	19.70	183.33	3,345.58	-473.84	-15.79	-473.50	1.99
3,504.00	17.45	181.56	3,430.89	-502.48	-17.04	-502.11	2.58
3,594.00	17.46	178.95	3,516.75	-529.47	-17.16	-529.10	0.87
3,684.00	16.92	177.68	3,602.73	-556.05	-16.38	-555.69	0.73
3,774.00	17.50	183.63	3,688.71	-582.65	-16.71	-582.27	2.06
3,864.00	18.15	183.17	3,774.38	-610.15	-18.34	-609.74	0.74
3,953.00	19.23	181.95	3,858.69	-638.64	-19.60	-638.21	1.29
4,043.00	18.24	181.52	3,943.92	-667.53	-20.48	-667.08	1.11
4,133.00	19.44	181.89	4,029.10	-696.58	-21.35	-696.11	1.34

Design Report for Cruickshank 27N-24HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,223.00	19.68	182.15	4,113.90	-726.69	-22.41	-726.20	0.28
4,313.00	19.91	182.19	4,198.59	-757.15	-23.57	-756.64	0.26
4,403.00	19.16	182.12	4,283.40	-787.22	-24.70	-786.68	0.83
4,493.00	16.92	181.76	4,368.97	-815.08	-25.65	-814.52	2.49
4,583.00	17.86	179.07	4,454.86	-841.97	-25.83	-841.40	1.37
4,673.00	20.06	179.00	4,539.97	-871.20	-25.33	-870.64	2.44
4,763.00	18.98	178.78	4,624.80	-901.27	-24.75	-900.71	1.20
4,853.00	20.36	177.36	4,709.55	-931.54	-23.72	-931.00	1.62
4,943.00	19.64	176.82	4,794.12	-962.28	-22.16	-961.76	0.83
5,034.00	20.06	178.80	4,879.71	-993.16	-20.98	-992.65	0.87
5,124.00	18.58	180.29	4,964.64	-1,022.93	-20.73	-1,022.42	1.73
5,214.00	19.32	180.54	5,049.76	-1,052.15	-20.94	-1,051.64	0.83
5,304.00	18.01	180.25	5,135.03	-1,080.96	-21.15	-1,080.44	1.46
5,394.00	19.66	181.33	5,220.21	-1,110.01	-21.56	-1,109.48	1.87
5,484.00	18.33	180.79	5,305.30	-1,139.29	-22.10	-1,138.75	1.49
5,574.00	17.66	180.62	5,390.90	-1,167.10	-22.45	-1,166.54	0.75
5,664.00	19.39	183.08	5,476.23	-1,195.67	-23.40	-1,195.09	2.11
5,754.00	17.84	181.17	5,561.52	-1,224.37	-24.48	-1,223.77	1.85
5,843.00	14.78	179.11	5,646.93	-1,249.36	-24.58	-1,248.76	3.50
5,934.00	15.76	178.81	5,734.72	-1,273.32	-24.15	-1,272.72	1.08
6,024.00	14.24	178.78	5,821.65	-1,296.61	-23.66	-1,296.01	1.69
6,204.00	12.03	172.39	5,996.94	-1,337.34	-20.70	-1,336.79	1.47
6,294.00	9.61	170.89	6,085.33	-1,354.06	-18.27	-1,353.55	2.71
6,384.00	7.52	169.18	6,174.32	-1,367.26	-15.97	-1,366.79	2.34
6,474.00	6.24	183.89	6,263.68	-1,377.93	-15.20	-1,377.47	2.41
6,564.00	5.71	179.46	6,353.19	-1,387.29	-15.49	-1,386.82	0.78
6,654.00	4.12	189.38	6,442.86	-1,394.95	-15.98	-1,394.48	2.00
6,744.00	1.25	223.25	6,532.76	-1,398.86	-17.18	-1,398.36	3.51
6,834.00	0.44	288.65	6,622.75	-1,399.46	-18.18	-1,398.95	1.27
6,924.00	3.37	352.22	6,712.69	-1,396.73	-18.86	-1,396.20	3.55
6,969.00	7.60	359.26	6,757.48	-1,392.44	-19.08	-1,391.91	9.50
7,014.00	11.52	1.00	6,801.84	-1,384.97	-19.04	-1,384.44	8.73
7,059.00	13.94	359.51	6,845.73	-1,375.06	-19.01	-1,374.53	5.43
7,104.00	17.23	359.04	6,889.07	-1,362.97	-19.16	-1,362.44	7.32
7,149.00	22.07	358.07	6,931.44	-1,347.85	-19.56	-1,347.32	10.78
7,194.00	25.90	356.62	6,972.55	-1,329.58	-20.43	-1,329.04	8.61
7,239.00	29.87	355.96	7,012.31	-1,308.58	-21.80	-1,308.02	8.85
7,284.00	35.01	357.33	7,050.28	-1,284.49	-23.19	-1,283.91	11.54
7,329.00	39.82	358.56	7,086.01	-1,257.18	-24.15	-1,256.58	10.82
7,374.00	42.36	357.89	7,119.92	-1,227.62	-25.07	-1,227.01	5.73
7,419.00	46.69	356.57	7,152.00	-1,196.11	-26.61	-1,195.48	9.84
7,464.00	50.93	356.16	7,181.63	-1,162.32	-28.76	-1,161.66	9.45
7,509.00	55.41	356.38	7,208.60	-1,126.39	-31.10	-1,125.69	9.96
7,554.00	60.10	356.66	7,232.60	-1,088.41	-33.41	-1,087.68	10.44
7,599.00	65.56	357.13	7,253.14	-1,048.45	-35.57	-1,047.69	12.17
7,644.00	71.20	358.24	7,269.71	-1,006.67	-37.25	-1,005.88	12.74
7,689.00	74.91	359.54	7,282.83	-963.64	-38.08	-962.85	8.70
7,732.00	78.20	0.73	7,292.82	-921.82	-37.98	-921.04	8.11
7,779.00	83.34	2.14	7,300.36	-875.46	-36.81	-874.71	11.33
7,829.00	87.50	2.01	7,304.35	-825.67	-35.01	-824.95	8.32
7,865.50	88.25	1.63	7,305.70	-789.21	-33.85	-788.52	2.30

Design Report for Cruickshank 27N-24HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
7" Casing Set @ 7865.5' MD :: 7305.70' TVD							
7,898.00	88.92	1.30	7,306.51	-756.73	-33.02	-756.06	2.30
7,988.00	90.65	0.15	7,306.84	-666.74	-31.88	-666.10	2.31
8,078.00	90.46	359.40	7,305.97	-576.75	-32.23	-576.11	0.86
8,168.00	90.09	359.39	7,305.54	-486.76	-33.18	-486.12	0.41
8,258.00	89.72	358.85	7,305.69	-396.77	-34.57	-396.12	0.73
8,348.00	91.42	359.44	7,304.80	-306.79	-35.91	-306.13	2.00
8,438.00	91.39	358.46	7,302.59	-216.83	-37.56	-216.16	1.09
8,618.00	89.88	357.19	7,300.59	-36.98	-44.39	-36.21	1.10
8,708.00	90.25	357.80	7,300.49	52.93	-48.32	53.75	0.79
8,798.00	90.15	359.20	7,300.18	142.90	-50.68	143.75	1.56
8,888.00	89.35	358.79	7,300.57	232.89	-52.26	233.74	1.00
8,978.00	88.68	0.03	7,302.12	322.86	-53.18	323.73	1.57
9,068.00	89.17	359.38	7,303.81	412.85	-53.65	413.70	0.90
9,158.00	88.83	359.18	7,305.38	502.83	-54.78	503.69	0.44
9,248.00	88.34	358.70	7,307.60	592.78	-56.44	593.66	0.76
9,338.00	89.97	359.45	7,308.93	682.76	-57.89	683.65	1.99
9,428.00	90.31	359.30	7,308.71	772.75	-58.88	773.65	0.41
9,518.00	90.28	359.53	7,308.24	862.75	-59.80	863.64	0.26
9,608.00	89.88	359.31	7,308.12	952.74	-60.71	953.64	0.51
9,698.00	91.11	359.12	7,307.34	1,042.73	-61.94	1,043.63	1.38
9,788.00	91.82	359.13	7,305.04	1,132.69	-63.31	1,133.60	0.79
9,878.00	90.46	359.42	7,303.25	1,222.66	-64.45	1,223.58	1.55
9,969.00	90.37	359.00	7,302.59	1,313.65	-65.71	1,314.58	0.47
10,059.00	90.59	359.09	7,301.83	1,403.63	-67.21	1,404.58	0.26
10,149.00	90.68	358.78	7,300.84	1,493.61	-68.88	1,494.57	0.36
10,239.00	91.02	358.42	7,299.50	1,583.57	-71.08	1,584.56	0.55
10,329.00	90.15	358.28	7,298.58	1,673.53	-73.67	1,674.55	0.98
10,419.00	89.78	357.63	7,298.64	1,763.47	-76.88	1,764.53	0.83
10,509.00	90.68	358.62	7,298.28	1,853.42	-79.83	1,854.52	1.49
10,599.00	91.20	359.47	7,296.80	1,943.40	-81.32	1,944.50	1.11
10,689.00	91.35	358.63	7,294.80	2,033.36	-82.82	2,034.48	0.95
10,778.00	92.03	358.33	7,292.17	2,122.29	-85.18	2,123.44	0.84
10,869.00	90.46	359.79	7,290.20	2,213.25	-86.67	2,214.41	2.36
10,959.00	89.17	358.92	7,290.49	2,303.24	-87.68	2,304.41	1.73
11,139.00	88.95	0.85	7,293.44	2,483.21	-88.04	2,484.35	1.08
11,229.00	88.77	0.95	7,295.23	2,573.18	-86.63	2,574.29	0.23
11,319.00	88.52	359.28	7,297.36	2,663.15	-86.45	2,664.24	1.88
11,409.00	89.88	358.55	7,298.62	2,753.12	-88.15	2,754.23	1.71
11,499.00	90.09	358.64	7,298.64	2,843.10	-90.36	2,844.23	0.25
11,589.00	89.97	358.79	7,298.59	2,933.07	-92.38	2,934.23	0.21
11,679.00	90.09	359.24	7,298.54	3,023.06	-93.93	3,024.23	0.52
11,769.00	90.28	359.00	7,298.25	3,113.05	-95.31	3,114.22	0.34
11,859.00	90.99	359.11	7,297.26	3,203.03	-96.79	3,204.22	0.80
11,949.00	91.02	359.60	7,295.68	3,293.01	-97.80	3,294.20	0.55
12,039.00	90.77	358.64	7,294.27	3,382.99	-99.19	3,384.19	1.10
12,129.00	90.40	357.56	7,293.35	3,472.93	-102.17	3,474.17	1.27
12,219.00	90.12	356.78	7,292.94	3,562.82	-106.61	3,564.12	0.92
12,309.00	91.02	359.09	7,292.05	3,652.75	-109.86	3,654.10	2.75
12,399.00	91.32	358.73	7,290.21	3,742.72	-111.57	3,744.08	0.52
12,489.00	90.92	0.41	7,288.45	3,832.69	-112.24	3,834.05	1.92

Design Report for Cruickshank 27N-24HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
12,579.00	89.32	0.33	7,288.26	3,922.69	-111.66	3,924.02	1.78
12,669.00	89.63	0.35	7,289.09	4,012.68	-111.13	4,014.00	0.35
12,759.00	88.98	359.41	7,290.18	4,102.67	-111.32	4,103.98	1.27
12,849.00	88.49	358.47	7,292.17	4,192.64	-112.98	4,193.96	1.18
12,939.00	88.67	358.38	7,294.40	4,282.57	-115.45	4,283.92	0.22
13,029.00	88.89	357.76	7,296.31	4,372.50	-118.48	4,373.89	0.73
13,119.00	88.71	357.28	7,298.20	4,462.40	-122.38	4,463.84	0.57
13,249.00	89.01	357.03	7,300.79	4,592.21	-128.83	4,593.74	0.30
Final MWD Survey @ 13249.00ft							
13,296.00	89.01	357.03	7,301.60	4,639.14	-131.26	4,640.71	0.00
Str Line Proj to Bit @ 13296' MD :: 7301.60' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,176.00	1,175.97	-5.81	-4.90	Tie-On to Gyro Surveys @ 1176.00ft
1,284.00	1,283.97	-6.15	-4.72	First MWD Survey @ 1284.00ft
13,249.00	7,300.79	4,592.21	-128.83	Final MWD Survey @ 13249.00ft
13,296.00	7,301.60	4,639.14	-131.26	Str Line Proj to Bit @ 13296' MD :: 7301.60' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	359.02	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
13.00	1,176.00	MS Energy Gyro Surveys	NS-GYRO-MS
1,284.00	7,988.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
8,078.00	13,249.00	MWD Lateral Surveys	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,225.40	1,225.37	9 5/8" Casing Set @ 1225.4' MD :: 1225.37' TVD	9-5/8	13-1/2
7,865.50	7,305.70	7" Casing Set @ 7865.5' MD :: 7305.70' TVD	7	8-3/4

Design Report for Cruickshank 27N-24HZ - Actual Field Surveys**Wellbore 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
Cruickshank 27N-24H; - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,318,620.42	3,218,350.23	40° 12' 19.325 N	104° 43' 5.668 W
Point 1				0.00	4,566.88	-4,611.86	1,323,146.27	3,213,698.48	
Point 2				0.00	4,615.31	-1,959.28	1,323,218.08	3,216,350.42	
Point 3				0.00	4,659.05	709.01	1,323,285.34	3,219,018.11	
Point 4				0.00	2,019.67	701.57	1,320,646.11	3,219,033.94	
Point 5				0.00	-615.46	703.94	1,318,011.22	3,219,059.54	
Point 6				0.00	-676.64	-1,950.86	1,317,926.64	3,216,405.49	
Point 7				0.00	-694.54	-4,661.60	1,317,884.84	3,213,695.13	
Point 8				0.00	1,919.27	-4,647.73	1,320,498.56	3,213,685.96	
Cruickshank 27N-24H; - actual wellpath hits target center - Point	0.00	0.00	0.00	0.00	0.00	1,318,620.42	3,218,350.23	40° 12' 19.325 N	104° 43' 5.668 W
Cruickshank 27N-24H; - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,318,620.42	3,218,350.23	40° 12' 19.325 N	104° 43' 5.668 W
Point 1				0.00	5,506.02	-172.73	1,324,124.47	3,218,128.97	
Point 2				0.00	5,513.92	234.83	1,324,135.96	3,218,536.43	
Point 3				0.00	2,012.73	234.62	1,320,635.06	3,218,567.08	
Point 4				0.00	-1,484.82	234.89	1,317,137.79	3,218,598.19	
Point 5				0.00	-1,491.89	-170.74	1,317,127.15	3,218,192.65	
HPD PLATTEVILLE 2_ - actual wellpath misses target center by 4396.07usft at 1.00usft MD (1.00 TVD, 0.00 N, 0.00 E) - Circle (radius 150.00)	0.00	0.00	1.00	4,394.19	128.74	1,323,015.39	3,218,440.22	40° 13' 2.748 N	104° 43' 4.008 W
HPD PLATTEVILLE 1_ - actual wellpath misses target center by 4199.63usft at 1.00usft MD (1.00 TVD, 0.00 N, 0.00 E) - Circle (radius 150.00)	0.00	0.00	1.00	4,175.61	-448.52	1,322,791.74	3,217,864.94	40° 13' 0.588 N	104° 43' 11.449 W
Cruickshank 27N-24H; - actual wellpath misses target center by 2.40usft at 13296.00usft MD (7301.60 TVD, 4639.14 N, -131.26 E) - Point	0.00	0.00	7,303.00	4,641.00	-130.67	1,323,259.89	3,218,178.65	40° 13' 5.187 N	104° 43' 7.352 W

Directional Difficulty Index

Average Dogleg over Survey:	1.74 °/100usft	Maximum Dogleg over Survey:	12.74 °/100usft at 7,644.00 usft
Net Tortousity applicable to Plans:	0.37 °/100usft	Directional Difficulty Index:	6.496

Audit Info

North Reference Sheet for Sec. 24-T3N-R66W - Cruickshank 27N-24HZ - Plan C

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

Vertical Depths are relative to RKB = 13' @ 5028.00usft (Ensign 145). Northing and Easting are relative to Cruickshank 27N-24HZ

Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is 105° 30' 0.000 W°, Longitude Origin:0° 0' 0.000 E°, Latitude Origin:40° 47' 0.000 N°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99995716

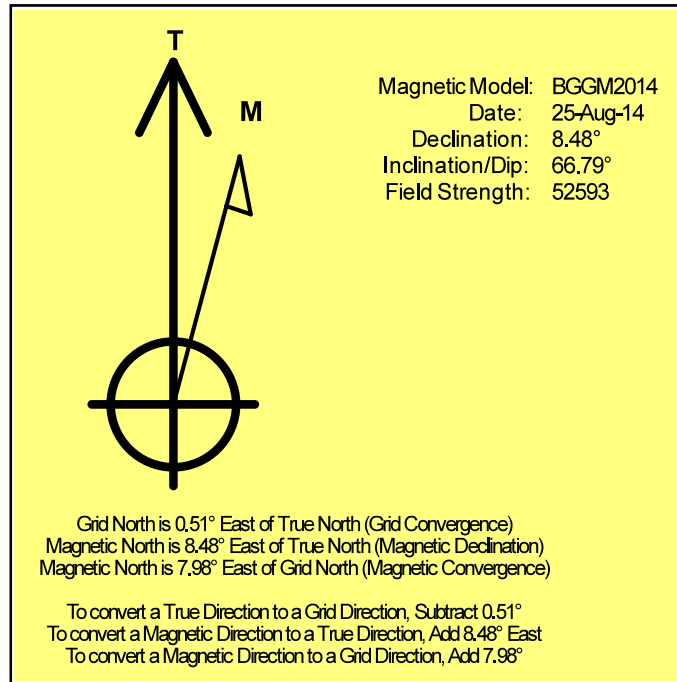
Grid Coordinates of Well: 1,318,620.42 usft N, 3,218,350.23 usft E

Geographical Coordinates of Well: 40° 12' 19.32" N, 104° 43' 05.67" W

Grid Convergence at Surface is: 0.51°

Based upon Minimum Curvature type calculations, at a Measured Depth of 13,296.00usft the Bottom Hole Displacement is 4,641.00usft in the Direction of 358.38° (True).

Magnetic Convergence at surface is: -7.98° (25 August 2014, , BGGM2014)



Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 24-T3N-R66W

Cruickshank 27N-24HZ

API # 05-123-39496

Plan C

Design: Actual Field Surveys

Sperry Drilling Services

Geodetic Report

30 September, 2014

Well Coordinates: 1,318,620.42 N, 3,218,350.23 E (40° 12' 19.32" N, 104° 43' 05.67" W)

Ground Level: 5,015.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

Centered on Well Cruickshank 27N-24HZ

RKB = 13' @ 5028.00usft (Ensign 145)

N

True

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Design Report for Cruickshank 27N-24HZ - Actual Field Surveys

Measured			Vertical	Local Coordinates		Geographic Coordinates		UTM Coordinates	
Depth (usft)	Inclination (°)	Azimuth (°)	Depth (usft)	+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
0.00	0.00	0.00	0.00	0.00	0.00	40.205368	-104.718241	1,318,620.42	3,218,350.23
13.00	0.00	0.00	13.00	0.00	0.00	40.205368	-104.718241	1,318,620.42	3,218,350.23
113.00	0.61	203.05	113.00	-0.49	-0.21	40.205367	-104.718242	1,318,619.93	3,218,350.02
213.00	0.56	197.45	212.99	-1.45	-0.56	40.205364	-104.718243	1,318,618.97	3,218,349.68
313.00	0.39	205.41	312.99	-2.22	-0.86	40.205362	-104.718244	1,318,618.19	3,218,349.39
413.00	0.43	214.18	412.99	-2.84	-1.21	40.205360	-104.718246	1,318,617.57	3,218,349.04
513.00	0.43	257.33	512.98	-3.23	-1.79	40.205359	-104.718248	1,318,617.18	3,218,348.47
613.00	0.34	240.24	612.98	-3.46	-2.41	40.205359	-104.718250	1,318,616.94	3,218,347.84
713.00	0.42	251.62	712.98	-3.72	-3.02	40.205358	-104.718252	1,318,616.67	3,218,347.24
813.00	0.41	244.25	812.98	-3.99	-3.69	40.205357	-104.718254	1,318,616.40	3,218,346.57
913.00	0.38	238.90	912.97	-4.32	-4.30	40.205356	-104.718257	1,318,616.06	3,218,345.97
1,013.00	0.38	215.37	1,012.97	-4.76	-4.77	40.205355	-104.718258	1,318,615.62	3,218,345.50
1,113.00	0.43	172.34	1,112.97	-5.40	-4.91	40.205353	-104.718259	1,318,614.97	3,218,345.36
1,176.00	0.32	185.64	1,175.97	-5.81	-4.90	40.205352	-104.718259	1,318,614.57	3,218,345.38
1,225.40	0.21	156.74	1,225.37	-6.03	-4.88	40.205352	-104.718259	1,318,614.35	3,218,345.40
1,284.00	0.22	100.25	1,283.97	-6.15	-4.72	40.205351	-104.718258	1,318,614.23	3,218,345.56
1,377.00	0.21	82.20	1,376.97	-6.16	-4.38	40.205351	-104.718257	1,318,614.22	3,218,345.90
1,471.00	1.83	175.67	1,470.95	-7.63	-4.10	40.205347	-104.718256	1,318,612.75	3,218,346.20
1,564.00	3.65	188.13	1,563.84	-12.04	-4.40	40.205335	-104.718257	1,318,608.34	3,218,345.93
1,658.00	4.98	188.35	1,657.57	-19.04	-5.42	40.205316	-104.718261	1,318,601.33	3,218,344.98
1,751.00	6.73	180.88	1,750.09	-28.49	-6.09	40.205290	-104.718263	1,318,591.88	3,218,344.39
1,845.00	6.37	176.95	1,843.47	-39.20	-5.90	40.205260	-104.718262	1,318,581.17	3,218,344.68
1,939.00	7.98	180.49	1,936.73	-50.93	-5.67	40.205228	-104.718262	1,318,569.44	3,218,345.00
2,032.00	8.78	179.00	2,028.74	-64.49	-5.60	40.205191	-104.718261	1,318,555.89	3,218,345.19
2,126.00	10.34	179.03	2,121.43	-80.09	-5.34	40.205148	-104.718260	1,318,540.29	3,218,345.60
2,219.00	12.09	179.49	2,212.65	-98.18	-5.11	40.205099	-104.718260	1,318,522.20	3,218,345.98
2,313.00	12.86	180.09	2,304.43	-118.48	-5.04	40.205043	-104.718259	1,318,501.90	3,218,346.23
2,406.00	14.74	180.67	2,394.74	-140.67	-5.19	40.204982	-104.718260	1,318,479.72	3,218,346.28
2,500.00	16.92	180.76	2,485.17	-166.30	-5.51	40.204912	-104.718261	1,318,454.08	3,218,346.18
2,593.00	18.54	180.28	2,573.75	-194.62	-5.77	40.204834	-104.718262	1,318,425.76	3,218,346.18
2,687.00	19.76	183.64	2,662.55	-225.43	-6.85	40.204749	-104.718266	1,318,394.95	3,218,345.37
2,780.00	18.09	181.78	2,750.52	-255.55	-8.29	40.204667	-104.718271	1,318,364.82	3,218,344.19
2,874.00	19.59	182.35	2,839.49	-285.89	-9.39	40.204583	-104.718275	1,318,334.48	3,218,343.35
2,964.00	21.10	181.47	2,923.87	-317.16	-10.43	40.204497	-104.718279	1,318,303.20	3,218,342.60
3,054.00	21.20	181.91	3,007.81	-349.62	-11.39	40.204408	-104.718282	1,318,270.73	3,218,341.92
3,144.00	21.47	182.45	3,091.64	-382.34	-12.63	40.204319	-104.718286	1,318,238.01	3,218,340.97
3,234.00	20.83	181.89	3,175.58	-414.78	-13.86	40.204229	-104.718291	1,318,205.55	3,218,340.02
3,324.00	18.07	181.06	3,260.43	-444.74	-14.65	40.204147	-104.718294	1,318,175.59	3,218,339.50
3,414.00	19.70	183.33	3,345.58	-473.84	-15.79	40.204067	-104.718298	1,318,146.48	3,218,338.62
3,504.00	17.45	181.56	3,430.89	-502.48	-17.04	40.203989	-104.718302	1,318,117.83	3,218,337.62
3,594.00	17.46	178.95	3,516.75	-529.47	-17.16	40.203915	-104.718303	1,318,090.85	3,218,337.74
3,684.00	16.92	177.68	3,602.73	-556.05	-16.38	40.203842	-104.718300	1,318,064.27	3,218,338.75

Design Report for Cruickshank 27N-24HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
3,774.00	17.50	183.63	3,688.71	-582.65	-16.71	40.203769	-104.718301	1,318,037.68	3,218,338.66
3,864.00	18.15	183.17	3,774.38	-610.15	-18.34	40.203693	-104.718307	1,318,010.16	3,218,337.27
3,953.00	19.23	181.95	3,858.69	-638.64	-19.60	40.203615	-104.718311	1,317,981.66	3,218,336.25
4,043.00	18.24	181.52	3,943.92	-667.53	-20.48	40.203536	-104.718315	1,317,952.77	3,218,335.63
4,133.00	19.44	181.89	4,029.10	-696.58	-21.35	40.203456	-104.718318	1,317,923.71	3,218,335.02
4,223.00	19.68	182.15	4,113.90	-726.69	-22.41	40.203373	-104.718322	1,317,893.59	3,218,334.22
4,313.00	19.91	182.19	4,198.59	-757.15	-23.57	40.203290	-104.718326	1,317,863.13	3,218,333.34
4,403.00	19.16	182.12	4,283.40	-787.22	-24.70	40.203207	-104.718330	1,317,833.05	3,218,332.47
4,493.00	16.92	181.76	4,368.97	-815.08	-25.65	40.203131	-104.718333	1,317,805.19	3,218,331.77
4,583.00	17.86	179.07	4,454.86	-841.97	-25.83	40.203057	-104.718334	1,317,778.30	3,218,331.83
4,673.00	20.06	179.00	4,539.97	-871.20	-25.33	40.202977	-104.718332	1,317,749.07	3,218,332.58
4,763.00	18.98	178.78	4,624.80	-901.27	-24.75	40.202894	-104.718330	1,317,719.01	3,218,333.42
4,853.00	20.36	177.36	4,709.55	-931.54	-23.72	40.202811	-104.718326	1,317,688.75	3,218,334.72
4,943.00	19.64	176.82	4,794.12	-962.28	-22.16	40.202727	-104.718321	1,317,658.02	3,218,336.55
5,034.00	20.06	178.80	4,879.71	-993.16	-20.98	40.202642	-104.718316	1,317,627.16	3,218,338.00
5,124.00	18.58	180.29	4,964.64	-1,022.93	-20.73	40.202560	-104.718315	1,317,597.39	3,218,338.51
5,214.00	19.32	180.54	5,049.76	-1,052.15	-20.94	40.202480	-104.718316	1,317,568.17	3,218,338.56
5,304.00	18.01	180.25	5,135.03	-1,080.96	-21.15	40.202401	-104.718317	1,317,539.37	3,218,338.61
5,394.00	19.66	181.33	5,220.21	-1,110.01	-21.56	40.202321	-104.718318	1,317,510.32	3,218,338.46
5,484.00	18.33	180.79	5,305.30	-1,139.29	-22.10	40.202241	-104.718320	1,317,481.02	3,218,338.17
5,574.00	17.66	180.62	5,390.90	-1,167.10	-22.45	40.202164	-104.718322	1,317,453.22	3,218,338.07
5,664.00	19.39	183.08	5,476.23	-1,195.67	-23.40	40.202086	-104.718325	1,317,424.64	3,218,337.37
5,754.00	17.84	181.17	5,561.52	-1,224.37	-24.48	40.202007	-104.718329	1,317,395.93	3,218,336.54
5,843.00	14.78	179.11	5,646.93	-1,249.36	-24.58	40.201939	-104.718329	1,317,370.95	3,218,336.66
5,934.00	15.76	178.81	5,734.72	-1,273.32	-24.15	40.201873	-104.718328	1,317,346.99	3,218,337.31
6,024.00	14.24	178.78	5,821.65	-1,296.61	-23.66	40.201809	-104.718326	1,317,323.71	3,218,338.00
6,204.00	12.03	172.39	5,996.94	-1,337.34	-20.70	40.201697	-104.718315	1,317,283.01	3,218,341.32
6,294.00	9.61	170.89	6,085.33	-1,354.06	-18.27	40.201651	-104.718307	1,317,266.31	3,218,343.90
6,384.00	7.52	169.18	6,174.32	-1,367.26	-15.97	40.201615	-104.718298	1,317,253.13	3,218,346.31
6,474.00	6.24	183.89	6,263.68	-1,377.93	-15.20	40.201586	-104.718296	1,317,242.47	3,218,347.17
6,564.00	5.71	179.46	6,353.19	-1,387.29	-15.49	40.201560	-104.718297	1,317,233.11	3,218,346.97
6,654.00	4.12	189.38	6,442.86	-1,394.95	-15.98	40.201539	-104.718298	1,317,225.44	3,218,346.55
6,744.00	1.25	223.25	6,532.76	-1,398.86	-17.18	40.201528	-104.718303	1,317,221.53	3,218,345.38
6,834.00	0.44	288.65	6,622.75	-1,399.46	-18.18	40.201527	-104.718306	1,317,220.91	3,218,344.39
6,924.00	3.37	352.22	6,712.69	-1,396.73	-18.86	40.201534	-104.718309	1,317,223.64	3,218,343.68
6,969.00	7.60	359.26	6,757.48	-1,392.44	-19.08	40.201546	-104.718310	1,317,227.92	3,218,343.43
7,014.00	11.52	1.00	6,801.84	-1,384.97	-19.04	40.201566	-104.718309	1,317,235.39	3,218,343.40
7,059.00	13.94	359.51	6,845.73	-1,375.06	-19.01	40.201594	-104.718309	1,317,245.31	3,218,343.34
7,104.00	17.23	359.04	6,889.07	-1,362.97	-19.16	40.201627	-104.718310	1,317,257.39	3,218,343.08
7,149.00	22.07	358.07	6,931.44	-1,347.85	-19.56	40.201668	-104.718311	1,317,272.51	3,218,342.55
7,194.00	25.90	356.62	6,972.55	-1,329.58	-20.43	40.201718	-104.718314	1,317,290.77	3,218,341.52
7,239.00	29.87	355.96	7,012.31	-1,308.58	-21.80	40.201776	-104.718319	1,317,311.75	3,218,339.97

Design Report for Cruickshank 27N-24HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
7,284.00	35.01	357.33	7,050.28	-1,284.49	-23.19	40.201842	-104.718324	1,317,335.83	3,218,338.37
7,329.00	39.82	358.56	7,086.01	-1,257.18	-24.15	40.201917	-104.718328	1,317,363.13	3,218,337.16
7,374.00	42.36	357.89	7,119.92	-1,227.62	-25.07	40.201998	-104.718331	1,317,392.68	3,218,335.98
7,419.00	46.69	356.57	7,152.00	-1,196.11	-26.61	40.202085	-104.718337	1,317,424.17	3,218,334.16
7,464.00	50.93	356.16	7,181.63	-1,162.32	-28.76	40.202177	-104.718344	1,317,457.94	3,218,331.72
7,509.00	55.41	356.38	7,208.60	-1,126.39	-31.10	40.202276	-104.718353	1,317,493.85	3,218,329.06
7,554.00	60.10	356.66	7,232.60	-1,088.41	-33.41	40.202380	-104.718361	1,317,531.80	3,218,326.42
7,599.00	65.56	357.13	7,253.14	-1,048.45	-35.57	40.202490	-104.718369	1,317,571.74	3,218,323.90
7,644.00	71.20	358.24	7,269.71	-1,006.67	-37.25	40.202605	-104.718375	1,317,613.51	3,218,321.85
7,689.00	74.91	359.54	7,282.83	-963.64	-38.08	40.202723	-104.718378	1,317,656.53	3,218,320.64
7,732.00	78.20	0.73	7,292.82	-921.82	-37.98	40.202838	-104.718377	1,317,698.34	3,218,320.38
7,779.00	83.34	2.14	7,300.36	-875.46	-36.81	40.202965	-104.718373	1,317,744.70	3,218,321.13
7,829.00	87.50	2.01	7,304.35	-825.67	-35.01	40.203102	-104.718367	1,317,794.51	3,218,322.50
7,865.50	88.25	1.63	7,305.70	-789.21	-33.85	40.203202	-104.718362	1,317,830.98	3,218,323.34
7,898.00	88.92	1.30	7,306.51	-756.73	-33.02	40.203291	-104.718359	1,317,863.46	3,218,323.88
7,988.00	90.65	0.15	7,306.84	-666.74	-31.88	40.203538	-104.718355	1,317,953.45	3,218,324.23
8,078.00	90.46	359.40	7,305.97	-576.75	-32.23	40.203785	-104.718357	1,318,043.43	3,218,323.08
8,168.00	90.09	359.39	7,305.54	-486.76	-33.18	40.204032	-104.718360	1,318,133.41	3,218,321.34
8,258.00	89.72	358.85	7,305.69	-396.77	-34.57	40.204279	-104.718365	1,318,223.38	3,218,319.16
8,348.00	91.42	359.44	7,304.80	-306.79	-35.91	40.204526	-104.718370	1,318,313.34	3,218,317.03
8,438.00	91.39	358.46	7,302.59	-216.83	-37.56	40.204773	-104.718376	1,318,403.28	3,218,314.58
8,618.00	89.88	357.19	7,300.59	-36.98	-44.39	40.205267	-104.718400	1,318,583.05	3,218,306.17
8,708.00	90.25	357.80	7,300.49	52.93	-48.32	40.205513	-104.718414	1,318,672.93	3,218,301.44
8,798.00	90.15	359.20	7,300.18	142.90	-50.68	40.205760	-104.718423	1,318,762.86	3,218,298.29
8,888.00	89.35	358.79	7,300.57	232.89	-52.26	40.206007	-104.718428	1,318,852.83	3,218,295.92
8,978.00	88.68	0.03	7,302.12	322.86	-53.18	40.206254	-104.718432	1,318,942.79	3,218,294.20
9,068.00	89.17	359.38	7,303.81	412.85	-53.65	40.206501	-104.718433	1,319,032.76	3,218,292.94
9,158.00	88.83	359.18	7,305.38	502.83	-54.78	40.206748	-104.718437	1,319,122.72	3,218,291.02
9,248.00	88.34	358.70	7,307.60	592.78	-56.44	40.206995	-104.718443	1,319,212.66	3,218,288.56
9,338.00	89.97	359.45	7,308.93	682.76	-57.89	40.207242	-104.718449	1,319,302.61	3,218,286.32
9,428.00	90.31	359.30	7,308.71	772.75	-58.88	40.207489	-104.718452	1,319,392.59	3,218,284.54
9,518.00	90.28	359.53	7,308.24	862.75	-59.80	40.207736	-104.718455	1,319,482.57	3,218,282.83
9,608.00	89.88	359.31	7,308.12	952.74	-60.71	40.207983	-104.718459	1,319,572.55	3,218,281.13
9,698.00	91.11	359.12	7,307.34	1,042.73	-61.94	40.208230	-104.718463	1,319,662.52	3,218,279.10
9,788.00	91.82	359.13	7,305.04	1,132.69	-63.31	40.208477	-104.718468	1,319,752.46	3,218,276.93
9,878.00	90.46	359.42	7,303.25	1,222.66	-64.45	40.208724	-104.718472	1,319,842.41	3,218,275.00
9,969.00	90.37	359.00	7,302.59	1,313.65	-65.71	40.208974	-104.718477	1,319,933.38	3,218,272.95
10,059.00	90.59	359.09	7,301.83	1,403.63	-67.21	40.209221	-104.718482	1,320,023.35	3,218,270.65
10,149.00	90.68	358.78	7,300.84	1,493.61	-68.88	40.209468	-104.718488	1,320,113.30	3,218,268.19
10,239.00	91.02	358.42	7,299.50	1,583.57	-71.08	40.209715	-104.718496	1,320,203.24	3,218,265.20
10,329.00	90.15	358.28	7,298.58	1,673.53	-73.67	40.209962	-104.718505	1,320,293.17	3,218,261.81
10,419.00	89.78	357.63	7,298.64	1,763.47	-76.88	40.210209	-104.718517	1,320,383.07	3,218,257.81

Design Report for Cruickshank 27N-24HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
10,509.00	90.68	358.62	7,298.28	1,853.42	-79.83	40.210456	-104.718527	1,320,472.99	3,218,254.07
10,599.00	91.20	359.47	7,296.80	1,943.40	-81.32	40.210703	-104.718532	1,320,562.94	3,218,251.78
10,689.00	91.35	358.63	7,294.80	2,033.36	-82.82	40.210950	-104.718538	1,320,652.89	3,218,249.49
10,778.00	92.03	358.33	7,292.17	2,122.29	-85.18	40.211194	-104.718546	1,320,741.79	3,218,246.35
10,869.00	90.46	359.79	7,290.20	2,213.25	-86.67	40.211443	-104.718552	1,320,832.73	3,218,244.05
10,959.00	89.17	358.92	7,290.49	2,303.24	-87.68	40.211690	-104.718555	1,320,922.70	3,218,242.25
11,139.00	88.95	0.85	7,293.44	2,483.21	-88.04	40.212184	-104.718556	1,321,102.65	3,218,240.30
11,229.00	88.77	0.95	7,295.23	2,573.18	-86.63	40.212431	-104.718551	1,321,192.63	3,218,240.92
11,319.00	88.52	359.28	7,297.36	2,663.15	-86.45	40.212678	-104.718551	1,321,282.59	3,218,240.31
11,409.00	89.88	358.55	7,298.62	2,753.12	-88.15	40.212925	-104.718557	1,321,372.54	3,218,237.81
11,499.00	90.09	358.64	7,298.64	2,843.10	-90.36	40.213172	-104.718565	1,321,462.49	3,218,234.81
11,589.00	89.97	358.79	7,298.59	2,933.07	-92.38	40.213419	-104.718572	1,321,552.44	3,218,232.00
11,679.00	90.09	359.24	7,298.54	3,023.06	-93.93	40.213666	-104.718578	1,321,642.41	3,218,229.66
11,769.00	90.28	359.00	7,298.25	3,113.05	-95.31	40.213913	-104.718583	1,321,732.38	3,218,227.48
11,859.00	90.99	359.11	7,297.26	3,203.03	-96.79	40.214160	-104.718588	1,321,822.34	3,218,225.21
11,949.00	91.02	359.60	7,295.68	3,293.01	-97.80	40.214407	-104.718591	1,321,912.30	3,218,223.40
12,039.00	90.77	358.64	7,294.27	3,382.99	-99.19	40.214654	-104.718596	1,322,002.26	3,218,221.23
12,129.00	90.40	357.56	7,293.35	3,472.93	-102.17	40.214901	-104.718607	1,322,092.17	3,218,217.45
12,219.00	90.12	356.78	7,292.94	3,562.82	-106.61	40.215148	-104.718623	1,322,182.01	3,218,212.21
12,309.00	91.02	359.09	7,292.05	3,652.75	-109.86	40.215395	-104.718635	1,322,271.91	3,218,208.18
12,399.00	91.32	358.73	7,290.21	3,742.72	-111.57	40.215642	-104.718641	1,322,361.85	3,218,205.67
12,489.00	90.92	0.41	7,288.45	3,832.69	-112.24	40.215889	-104.718643	1,322,451.81	3,218,204.21
12,579.00	89.32	0.33	7,288.26	3,922.69	-111.66	40.216136	-104.718641	1,322,541.80	3,218,203.99
12,669.00	89.63	0.35	7,289.09	4,012.68	-111.13	40.216383	-104.718639	1,322,631.80	3,218,203.73
12,759.00	88.98	359.41	7,290.18	4,102.67	-111.32	40.216630	-104.718640	1,322,721.78	3,218,202.75
12,849.00	88.49	358.47	7,292.17	4,192.64	-112.98	40.216877	-104.718646	1,322,811.72	3,218,200.29
12,939.00	88.67	358.38	7,294.40	4,282.57	-115.45	40.217124	-104.718655	1,322,901.63	3,218,197.03
13,029.00	88.89	357.76	7,296.31	4,372.50	-118.48	40.217371	-104.718666	1,322,991.52	3,218,193.21
13,119.00	88.71	357.28	7,298.20	4,462.40	-122.38	40.217617	-104.718679	1,323,081.38	3,218,188.52
13,249.00	89.01	357.03	7,300.79	4,592.21	-128.83	40.217974	-104.718703	1,323,211.12	3,218,180.93
13,296.00	89.01	357.03	7,301.60	4,639.14	-131.26	40.218102	-104.718711	1,323,258.03	3,218,178.08

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,176.00	1,175.97	-5.81	-4.90	Tie-On to Gyro Surveys @ 1176.00ft
1,284.00	1,283.97	-6.15	-4.72	First MWD Survey @ 1284.00ft
13,249.00	7,300.79	4,592.21	-128.83	Final MWD Survey @ 13249.00ft
13,296.00	7,301.60	4,639.14	-131.26	Str Line Proj to Bit @ 13296' MD :: 7301.60' TVD

Design Report for Cruickshank 27N-24HZ - Actual Field Surveys

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	Origin +E/-W (usft)	Start TVD (usft)
User	No Target (Freehand)	359.02	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
13.00	1,176.00	MS Energy Gyro Surveys	NS-GYRO-MS
1,284.00	7,988.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
8,078.00	13,249.00	MWD Lateral Surveys	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,225.40	1,225.37	9 5/8" Casing Set @ 1225.4' MD :: 1225.37' TVD	9-5/8	13-1/2
7,865.50	7,305.70	7" Casing Set @ 7865.5' MD :: 7305.70' TVD	7	8-3/4

Design Targets

Shape	Target Name	TVD (')	Northing (')	Easting (')	+N/-S	+E/-W	Created	Updated
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Directional Difficulty Index

Average Dogleg over Survey:	1.74 °/100usft	Maximum Dogleg over Survey:	12.74 °/100usft at 7,644.00 usft
Net Tortousity applicable to Plans:	0.37 °/100usft	Directional Difficulty Index:	6.496

Design Report for Cruickshank 27N-24HZ - Actual Field Surveys

Audit Info

North Reference Sheet for Sec. 24-T3N-R66W - Cruickshank 27N-24HZ - Plan C

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

Vertical Depths are relative to RKB = 13' @ 5028.00usft (Ensign 145). Northing and Easting are relative to Cruickshank 27N-24HZ

Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99995716

Grid Coordinates of Well: 1,318,620.42 usft N, 3,218,350.23 usft E

Geographical Coordinates of Well: 40° 12' 19.32" N, 104° 43' 05.67" W

Grid Convergence at Surface is: 0.51°

Based upon Minimum Curvature type calculations, at a Measured Depth of 13,296.00usft

the Bottom Hole Displacement is 4,641.00usft in the Direction of 358.38° (True).

Magnetic Convergence at surface is: -7.98° (25 August 2014, , BGGM2014)

