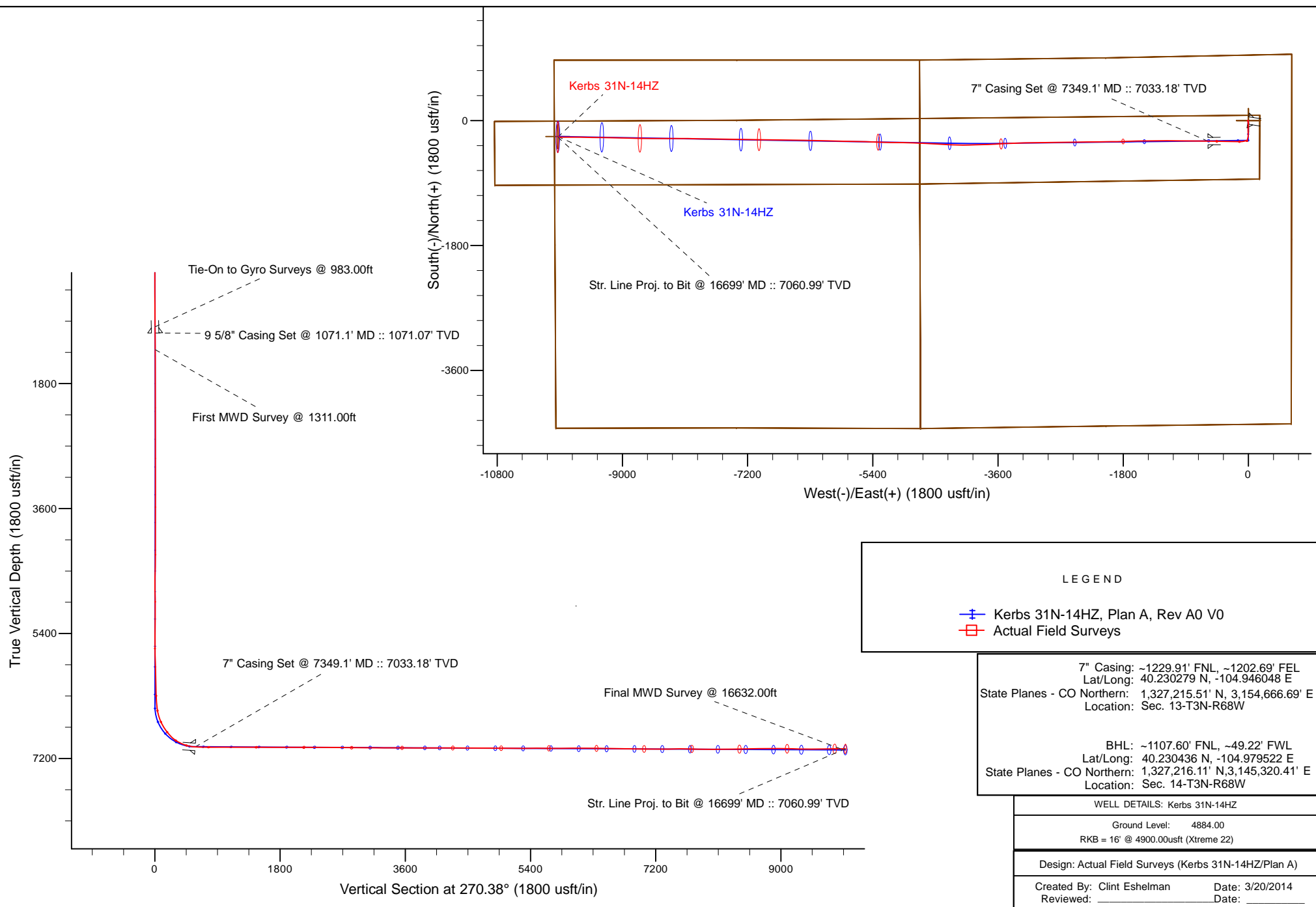


Project: Weld County, CO (NAD 83)
 Site: Sec. 13-T3N-R68W
 Well: Kerbs 31N-14HZ
 Wellbore: Plan A
 Design: Actual Field Surveys



HALLIBURTON
 Sperry Drilling



Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 13-T3N-R68W

Kerbs 31N-14HZ

Plan A

Design: Actual Field Surveys

Sperry Drilling Services

Standard Report

20 March, 2014

Well Coordinates: 1,327,516.97 N, 3,155,246.03 E (40° 13' 51.95" N, 104° 56' 38.28" W)

Ground Level: 4,884.00 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 Kerbs 31N-14HZ

RKB = 16' @ 4900.00usft (Xtreme 22)

N

True

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Design Report for Kerbs 31N-14HZ - 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
16.00	0.00	0.00	16.00	0.00	0.00	0.00	0.00
116.00	0.53	152.50	116.00	-0.41	0.21	-0.22	0.53
216.00	0.43	302.55	216.00	-0.62	0.11	-0.11	0.93
316.00	0.35	79.91	316.00	-0.36	0.10	-0.10	0.73
416.00	0.47	290.35	416.00	-0.17	0.01	-0.01	0.79
516.00	0.60	186.19	515.99	-0.54	-0.43	0.43	0.85
616.00	0.68	313.53	615.99	-0.66	-0.92	0.91	1.15
716.00	0.48	109.98	715.99	-0.39	-0.95	0.95	1.14
816.00	0.73	278.52	815.99	-0.44	-1.19	1.19	1.20
916.00	0.49	176.11	915.98	-0.77	-1.79	1.79	0.96
983.00	0.63	274.66	982.98	-1.03	-2.14	2.13	1.27
Tie-On to Gyro Surveys @ 983.00ft							
1,071.10	0.63	278.72	1,071.07	-0.92	-3.10	3.09	0.05
9 5/8" Casing Set @ 1071.1' MD :: 1071.07' TVD							
1,311.00	0.65	289.49	1,310.96	-0.26	-5.69	5.69	0.05
First MWD Survey @ 1311.00ft							
1,500.00	0.46	274.49	1,499.95	0.16	-7.46	7.46	0.13
1,690.00	0.28	129.75	1,689.95	-0.08	-7.86	7.86	0.37
1,964.00	0.44	143.26	1,963.94	-1.35	-6.72	6.71	0.07
2,146.00	0.43	152.46	2,145.94	-2.52	-5.98	5.96	0.04
2,329.00	0.17	225.60	2,328.94	-3.32	-5.86	5.84	0.23
2,512.00	0.31	241.97	2,511.93	-3.74	-6.49	6.46	0.08
2,695.00	0.40	268.58	2,694.93	-3.99	-7.56	7.54	0.10
2,878.00	0.14	118.73	2,877.93	-4.11	-8.01	7.98	0.29
3,059.00	0.26	36.80	3,058.93	-3.89	-7.57	7.54	0.15
3,236.00	0.70	53.42	3,235.92	-2.92	-6.46	6.44	0.26
3,407.00	0.27	269.43	3,406.92	-2.30	-6.02	6.01	0.55
3,579.00	0.97	270.82	3,578.91	-2.29	-7.88	7.87	0.41
3,750.00	0.65	280.24	3,749.89	-2.09	-10.29	10.27	0.20
3,922.00	0.68	89.85	3,921.89	-1.92	-10.22	10.21	0.77
4,093.00	0.39	115.82	4,092.88	-2.17	-8.69	8.67	0.22
4,264.00	1.85	168.63	4,263.84	-5.13	-7.62	7.58	0.96
4,436.00	5.04	167.62	4,435.51	-15.23	-5.45	5.35	1.85
4,607.00	8.80	172.45	4,605.24	-35.54	-2.12	1.88	2.22
4,779.00	11.63	183.97	4,774.51	-65.89	-1.59	1.15	2.02
4,950.00	9.24	185.38	4,942.67	-96.76	-4.07	3.43	1.41
5,122.00	10.41	178.76	5,112.15	-126.04	-5.03	4.19	0.94
5,292.00	10.29	177.35	5,279.38	-156.57	-4.00	2.96	0.16
5,464.00	9.62	175.78	5,448.79	-186.25	-2.23	0.99	0.42
5,635.00	9.86	184.48	5,617.34	-215.09	-2.32	0.89	0.87
5,806.00	9.77	190.09	5,785.84	-243.97	-6.01	4.39	0.56
5,977.00	7.24	196.84	5,954.95	-268.58	-11.67	9.89	1.59
6,149.00	3.81	181.12	6,126.13	-284.67	-14.92	13.04	2.16
6,320.00	3.76	241.75	6,296.82	-293.01	-19.98	18.03	2.23
6,406.00	4.19	273.57	6,382.63	-294.15	-25.60	23.64	2.58
6,449.00	3.98	284.04	6,425.52	-293.69	-28.61	26.66	1.80
6,492.00	6.89	277.37	6,468.32	-292.99	-32.62	30.67	6.91
6,535.00	9.90	268.22	6,510.86	-292.78	-38.87	36.93	7.64
6,577.00	14.09	260.65	6,551.93	-293.72	-47.53	45.58	10.64

Design Report for Kerbs 31N-14HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
6,620.00	16.49	256.98	6,593.41	-295.95	-58.64	56.68	6.02
6,663.00	21.57	258.57	6,634.05	-298.89	-72.34	70.36	11.87
6,706.00	24.50	261.04	6,673.61	-301.84	-88.90	86.90	7.17
6,749.00	27.75	266.51	6,712.22	-303.84	-107.71	105.69	9.40
6,792.00	32.06	270.34	6,749.49	-304.39	-129.13	127.11	10.96
6,835.00	35.55	273.08	6,785.22	-303.65	-153.03	151.01	8.86
6,878.00	37.61	272.07	6,819.75	-302.50	-178.63	176.62	4.99
6,920.00	40.22	271.64	6,852.42	-301.65	-204.99	202.99	6.25
6,963.00	44.31	271.58	6,884.24	-300.84	-233.90	231.90	9.51
7,006.00	50.03	271.79	6,913.46	-299.91	-265.41	263.41	13.31
7,049.00	56.82	270.67	6,939.07	-299.18	-299.91	297.92	15.93
7,092.00	61.32	269.89	6,961.16	-299.01	-336.78	334.79	10.58
7,135.00	64.68	270.03	6,980.68	-299.03	-375.09	373.10	7.82
7,177.00	68.37	270.29	6,997.41	-298.92	-413.61	411.62	8.80
7,220.00	73.66	270.30	7,011.39	-298.71	-454.25	452.26	12.30
7,263.00	78.52	270.31	7,021.73	-298.49	-495.98	493.99	11.30
7,290.00	80.94	270.90	7,026.54	-298.21	-522.54	520.56	9.22
7,349.10	86.16	269.85	7,033.18	-297.83	-581.25	579.26	9.00
7" Casing Set @ 7349.1' MD :: 7033.18' TVD							
7,372.00	88.18	269.45	7,034.31	-297.97	-604.12	602.13	9.00
7,543.00	90.12	272.43	7,036.85	-295.16	-775.05	773.07	2.08
7,714.00	90.09	271.55	7,036.53	-289.23	-945.94	944.00	0.51
7,885.00	89.85	269.17	7,036.62	-288.15	-1,116.93	1,114.99	1.40
8,056.00	89.82	269.16	7,037.12	-290.64	-1,287.91	1,285.95	0.02
8,227.00	89.63	269.02	7,037.94	-293.36	-1,458.89	1,456.91	0.14
8,398.00	89.88	268.69	7,038.67	-296.78	-1,629.85	1,627.85	0.24
8,570.00	89.91	268.19	7,038.98	-301.46	-1,801.78	1,799.75	0.29
8,741.00	89.88	269.60	7,039.30	-304.76	-1,972.75	1,970.68	0.82
8,912.00	90.09	269.32	7,039.34	-306.37	-2,143.74	2,141.66	0.20
9,084.00	90.28	268.97	7,038.79	-308.93	-2,315.72	2,313.62	0.23
9,255.00	89.41	269.52	7,039.25	-311.19	-2,486.70	2,484.58	0.60
9,427.00	88.80	269.28	7,041.93	-312.99	-2,658.67	2,656.54	0.38
9,598.00	89.88	268.76	7,043.90	-315.91	-2,829.63	2,827.47	0.70
9,775.00	90.09	269.48	7,043.95	-318.63	-3,006.61	3,004.43	0.42
9,958.00	90.06	268.98	7,043.71	-321.09	-3,189.59	3,187.39	0.27
10,141.00	89.54	267.36	7,044.35	-326.93	-3,372.49	3,370.25	0.93
10,324.00	89.01	266.86	7,046.67	-336.16	-3,555.24	3,552.93	0.40
10,506.00	89.88	268.29	7,048.43	-343.86	-3,737.06	3,734.70	0.92
10,689.00	90.22	268.32	7,048.27	-349.27	-3,919.98	3,917.58	0.19
10,872.00	89.63	269.44	7,048.51	-352.85	-4,102.95	4,100.51	0.69
11,054.00	90.40	273.17	7,048.46	-348.71	-4,284.86	4,282.46	2.09
11,236.00	89.85	272.92	7,048.06	-339.04	-4,466.61	4,464.26	0.33
11,407.00	89.26	272.87	7,049.39	-330.40	-4,637.38	4,635.09	0.35
11,578.00	89.69	273.01	7,050.96	-321.63	-4,808.15	4,805.91	0.26
11,750.00	90.06	270.23	7,051.33	-316.77	-4,980.06	4,977.85	1.63
11,921.00	89.01	270.78	7,052.72	-315.26	-5,151.05	5,148.84	0.69
12,093.00	90.46	272.08	7,053.52	-310.97	-5,322.98	5,320.80	1.13
12,264.00	90.22	271.85	7,052.50	-305.11	-5,493.88	5,491.74	0.19
12,436.00	89.48	270.89	7,052.95	-300.99	-5,665.83	5,663.71	0.70
12,607.00	90.25	271.33	7,053.36	-297.68	-5,836.79	5,834.69	0.52
12,779.00	90.49	271.16	7,052.25	-293.94	-6,008.75	6,006.67	0.17

Design Report for Kerbs 31N-14HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
12,950.00	89.57	271.03	7,052.16	-290.68	-6,179.72	6,177.65	0.54
13,121.00	89.32	271.22	7,053.81	-287.32	-6,350.67	6,348.63	0.18
13,293.00	89.85	271.59	7,055.06	-283.10	-6,522.62	6,520.60	0.38
13,464.00	89.20	271.23	7,056.48	-278.89	-6,693.56	6,691.56	0.43
13,635.00	88.24	270.02	7,060.30	-277.03	-6,864.50	6,862.51	0.90
13,806.00	90.06	270.82	7,062.83	-275.78	-7,035.47	7,033.48	1.16
13,977.00	89.32	270.07	7,063.76	-274.45	-7,206.46	7,204.48	0.62
14,148.00	90.74	271.28	7,063.67	-272.43	-7,377.44	7,375.47	1.09
14,320.00	90.65	271.43	7,061.58	-268.37	-7,549.38	7,547.43	0.10
14,491.00	89.26	270.83	7,061.72	-264.99	-7,720.34	7,718.41	0.89
14,662.00	88.89	270.82	7,064.48	-262.53	-7,891.30	7,889.38	0.22
14,833.00	89.11	270.70	7,067.46	-260.26	-8,062.26	8,060.35	0.15
15,005.00	90.09	269.97	7,068.66	-259.26	-8,234.25	8,232.35	0.71
15,176.00	92.31	269.70	7,065.08	-259.75	-8,405.20	8,403.29	1.31
15,347.00	92.07	270.34	7,058.55	-259.69	-8,576.07	8,574.16	0.40
15,519.00	89.97	271.43	7,055.48	-257.03	-8,748.01	8,746.12	1.38
15,690.00	89.20	271.50	7,056.72	-252.66	-8,918.95	8,917.08	0.45
15,862.00	88.86	271.25	7,059.63	-248.54	-9,090.88	9,089.03	0.25
16,033.00	88.73	270.80	7,063.23	-245.48	-9,261.81	9,259.98	0.27
16,204.00	90.65	270.94	7,064.16	-242.88	-9,432.78	9,430.96	1.13
16,375.00	90.62	270.67	7,062.26	-240.48	-9,603.75	9,601.95	0.16
16,546.00	89.94	270.14	7,061.42	-239.27	-9,774.75	9,772.94	0.50
16,632.00	90.25	270.28	7,061.28	-238.96	-9,860.74	9,858.94	0.40
Final MWD Survey @ 16632.00ft							
16,699.00	90.25	270.28	7,060.99	-238.63	-9,927.74	9,925.94	0.00
Str. Line Proj. to Bit @ 16699' MD :: 7060.99' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
983.00	982.98	-1.03	-2.14	Tie-On to Gyro Surveys @ 983.00ft
1,311.00	1,310.96	-0.26	-5.69	First MWD Survey @ 1311.00ft
16,632.00	7,061.28	-238.96	-9,860.74	Final MWD Survey @ 16632.00ft
16,699.00	7,060.99	-238.63	-9,927.74	Str. Line Proj. to Bit @ 16699' MD :: 7060.99' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	270.38	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
16.00	983.00	MS Energy Surveys	NS-GYRO-MS
1,311.00	7,290.00	MWD Vertical/Build Surveys	MWD+IFR1
7,372.00	16,632.00	MWD Lateral Surveys	MWD+IFR1

Design Report for Kerbs 31N-14HZ - Actual Field Surveys**Casing Details**

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,071.10	1,071.07	9 5/8" Casing Set @ 1071.1' MD :: 1071.07' TVD	9-5/8	13-1/2
7,349.10	7,033.18	7" Casing Set @ 7349.1' MD :: 7033.18' TVD	7	8-3/4

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
Kerbs 31N-14HZ_SHL - actual wellpath hits target center - Point	0.00	0.00	0.00	0.00	0.00	1,327,516.97	3,155,246.03	40.231096	-104.943966
Kerbs 31N-14HZ_SEC - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,327,516.97	3,155,246.03	40.231096	-104.943966
Point 1				0.00	868.99	-9,982.46	1,328,323.31	3,145,258.75	
Point 2				0.00	870.52	-7,354.63	1,328,341.32	3,147,886.41	
Point 3				0.00	871.78	-4,727.18	1,328,359.05	3,150,513.68	
Point 4				0.00	-1,782.31	-4,720.38	1,325,705.17	3,150,537.13	
Point 5				0.00	-4,436.59	-4,713.55	1,323,051.10	3,150,560.60	
Point 6				0.00	-1,782.31	-4,720.38	1,325,705.17	3,150,537.13	
Point 7				0.00	871.78	-4,727.18	1,328,359.05	3,150,513.68	
Point 8				0.00	903.12	-2,051.80	1,328,407.17	3,153,188.70	
Point 9				0.00	956.32	623.09	1,328,477.14	3,155,863.09	
Point 10				0.00	-1,706.22	619.70	1,325,814.74	3,155,876.39	
Point 11				0.00	-4,369.11	616.40	1,323,152.00	3,155,889.79	
Point 12				0.00	-4,402.09	-2,047.94	1,323,102.31	3,153,225.82	
Point 13				0.00	-4,436.59	-4,713.55	1,323,051.10	3,150,560.60	
Point 14				0.00	-4,428.18	-7,359.14	1,323,042.92	3,147,915.12	
Point 15				0.00	-4,432.10	-9,955.67	1,323,022.72	3,145,318.78	
Point 16				0.00	-1,787.10	-9,969.02	1,325,667.47	3,145,288.85	
Kerbs 31N-14HZ_LD - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,327,516.97	3,155,246.03	40.231096	-104.943966
Point 1				0.00	-932.34	-10,832.79	1,326,516.76	3,144,419.77	
Point 2				0.00	-12.29	-10,839.16	1,327,436.72	3,144,407.63	
Point 3				0.00	2.92	-7,355.37	1,327,473.77	3,147,891.11	
Point 4				0.00	77.29	161.95	1,327,595.27	3,155,407.49	
Point 5				0.00	-842.90	160.78	1,326,675.13	3,155,412.09	
Point 6				0.00	-915.29	-4,722.60	1,326,572.13	3,150,529.47	
Point 7				0.00	-932.34	-10,832.79	1,326,516.76	3,144,419.77	
Kerbs 31N-14HZ_BHL - actual wellpath misses target center by 17.74usft at 16698.53usft MD (7060.99 TVD, -238.63 N, -9927.28 E) - Point	0.00	0.00	7,077.00	-230.98	-9,927.31	1,327,223.76	3,145,320.80	40.230456	-104.979520

Directional Difficulty Index

Average Dogleg over Survey:	1.16 °/100usft	Maximum Dogleg over Survey:	15.93 °/100usft at 7,049.00 usft
Net Tortousity applicable to Plans:	0.33 °/100usft	Directional Difficulty Index:	6.670

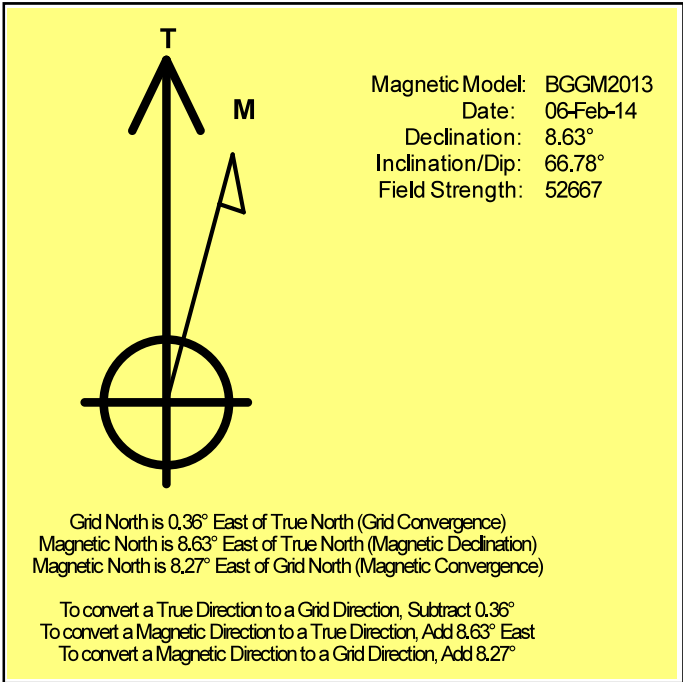
Audit Info

North Reference Sheet for Sec. 13-T3N-R68W - Kerbs 31N-14HZ - Plan A

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to True North Reference.
 Vertical Depths are relative to RKB = 16' @ 4900.00usft (Xtreme 22). Northing and Easting are relative to Kerbs 31N-14HZ
 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: 0.99995690

Grid Coordinates of Well: 1,327,516.97 usft N, 3,155,246.03 usft E
 Geographical Coordinates of Well: 40° 13' 51.95" N, 104° 56' 38.28" W
 Grid Convergence at Surface is: 0.36°

Based upon Minimum Curvature type calculations, at a Measured Depth of 16,699.00usft
 the Bottom Hole Displacement is 9,930.61usft in the Direction of 268.62° (True).
 Magnetic Convergence at surface is: -8.27° (6 February 2014, , BGGM2013)



Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 13-T3N-R68W

Kerbs 31N-14HZ

Plan A

Design: Actual Field Surveys

Sperry Drilling Services

Geodetic Report

20 March, 2014

Well Coordinates: 1,327,516.97 N, 3,155,246.03 E (40° 13' 51.95" N, 104° 56' 38.28" W)

Ground Level: 4,884.00 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 Kerbs 31N-14HZ

RKB = 16' @ 4900.00usft (Xtreme 22)

N

True

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Design Report for Kerbs 31N-14HZ - 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)
0.00	0.00	0.00	0.00	0.00	0.00	40.231096	-104.943966	1,327,516.97	3,155,246.03
16.00	0.00	0.00	16.00	0.00	0.00	40.231096	-104.943966	1,327,516.97	3,155,246.03
116.00	0.53	152.50	116.00	-0.41	0.21	40.231095	-104.943966	1,327,516.56	3,155,246.25
216.00	0.43	302.55	216.00	-0.62	0.11	40.231094	-104.943966	1,327,516.35	3,155,246.15
316.00	0.35	79.91	316.00	-0.36	0.10	40.231095	-104.943966	1,327,516.61	3,155,246.13
416.00	0.47	290.35	416.00	-0.17	0.01	40.231096	-104.943966	1,327,516.80	3,155,246.05
516.00	0.60	186.19	515.99	-0.54	-0.43	40.231095	-104.943968	1,327,516.42	3,155,245.61
616.00	0.68	313.53	615.99	-0.66	-0.92	40.231094	-104.943970	1,327,516.31	3,155,245.12
716.00	0.48	109.98	715.99	-0.39	-0.95	40.231095	-104.943970	1,327,516.57	3,155,245.08
816.00	0.73	278.52	815.99	-0.44	-1.19	40.231095	-104.943971	1,327,516.52	3,155,244.85
916.00	0.49	176.11	915.98	-0.77	-1.79	40.231094	-104.943973	1,327,516.19	3,155,244.25
983.00	0.63	274.66	982.98	-1.03	-2.14	40.231093	-104.943974	1,327,515.93	3,155,243.90
1,071.10	0.63	278.72	1,071.07	-0.92	-3.10	40.231094	-104.943977	1,327,516.03	3,155,242.94
1,311.00	0.65	289.49	1,310.96	-0.26	-5.69	40.231095	-104.943987	1,327,516.67	3,155,240.35
1,500.00	0.46	274.49	1,499.95	0.16	-7.46	40.231097	-104.943993	1,327,517.08	3,155,238.58
1,690.00	0.28	129.75	1,689.95	-0.08	-7.86	40.231096	-104.943994	1,327,516.84	3,155,238.18
1,964.00	0.44	143.26	1,963.94	-1.35	-6.72	40.231092	-104.943990	1,327,515.58	3,155,239.33
2,146.00	0.43	152.46	2,145.94	-2.52	-5.98	40.231089	-104.943988	1,327,514.41	3,155,240.07
2,329.00	0.17	225.60	2,328.94	-3.32	-5.86	40.231087	-104.943987	1,327,513.62	3,155,240.20
2,512.00	0.31	241.97	2,511.93	-3.74	-6.49	40.231086	-104.943990	1,327,513.19	3,155,239.57
2,695.00	0.40	268.58	2,694.93	-3.99	-7.56	40.231085	-104.943993	1,327,512.93	3,155,238.50
2,878.00	0.14	118.73	2,877.93	-4.11	-8.01	40.231085	-104.943995	1,327,512.81	3,155,238.05
3,059.00	0.26	36.80	3,058.93	-3.89	-7.57	40.231085	-104.943993	1,327,513.03	3,155,238.49
3,236.00	0.70	53.42	3,235.92	-2.92	-6.46	40.231088	-104.943989	1,327,514.01	3,155,239.59
3,407.00	0.27	269.43	3,406.92	-2.30	-6.02	40.231090	-104.943988	1,327,514.63	3,155,240.03
3,579.00	0.97	270.82	3,578.91	-2.29	-7.88	40.231090	-104.943994	1,327,514.63	3,155,238.17
3,750.00	0.65	280.24	3,749.89	-2.09	-10.29	40.231090	-104.944003	1,327,514.81	3,155,235.76
3,922.00	0.68	89.85	3,921.89	-1.92	-10.22	40.231091	-104.944003	1,327,514.99	3,155,235.82
4,093.00	0.39	115.82	4,092.88	-2.17	-8.69	40.231090	-104.943997	1,327,514.75	3,155,237.36
4,264.00	1.85	168.63	4,263.84	-5.13	-7.62	40.231082	-104.943994	1,327,511.79	3,155,238.45
4,436.00	5.04	167.62	4,435.51	-15.23	-5.45	40.231054	-104.943986	1,327,501.70	3,155,240.68
4,607.00	8.80	172.45	4,605.24	-35.54	-2.12	40.230999	-104.943974	1,327,481.42	3,155,244.14
4,779.00	11.63	183.97	4,774.51	-65.89	-1.59	40.230915	-104.943972	1,327,451.07	3,155,244.86
4,950.00	9.24	185.38	4,942.67	-96.76	-4.07	40.230830	-104.943981	1,327,420.19	3,155,242.57
5,122.00	10.41	178.76	5,112.15	-126.04	-5.03	40.230750	-104.943984	1,327,390.90	3,155,241.79
5,292.00	10.29	177.35	5,279.38	-156.57	-4.00	40.230666	-104.943981	1,327,360.39	3,155,243.02
5,464.00	9.62	175.78	5,448.79	-186.25	-2.23	40.230585	-104.943974	1,327,330.72	3,155,244.97
5,635.00	9.86	184.48	5,617.34	-215.09	-2.32	40.230506	-104.943975	1,327,301.88	3,155,245.06
5,806.00	9.77	190.09	5,785.84	-243.97	-6.01	40.230426	-104.943988	1,327,272.97	3,155,241.56
5,977.00	7.24	196.84	5,954.95	-268.58	-11.67	40.230359	-104.944008	1,327,248.34	3,155,236.05
6,149.00	3.81	181.12	6,126.13	-284.67	-14.92	40.230315	-104.944020	1,327,232.22	3,155,232.90
6,320.00	3.76	241.75	6,296.82	-293.01	-19.98	40.230292	-104.944038	1,327,223.86	3,155,227.90

Design Report for Kerbs 31N-14HZ - 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)
6,406.00	4.19	273.57	6,382.63	-294.15	-25.60	40.230289	-104.944058	1,327,222.68	3,155,222.28
6,449.00	3.98	284.04	6,425.52	-293.69	-28.61	40.230290	-104.944069	1,327,223.12	3,155,219.27
6,492.00	6.89	277.37	6,468.32	-292.99	-32.62	40.230292	-104.944083	1,327,223.79	3,155,215.26
6,535.00	9.90	268.22	6,510.86	-292.78	-38.87	40.230292	-104.944105	1,327,223.97	3,155,209.00
6,577.00	14.09	260.65	6,551.93	-293.72	-47.53	40.230290	-104.944136	1,327,222.97	3,155,200.35
6,620.00	16.49	256.98	6,593.41	-295.95	-58.64	40.230284	-104.944176	1,327,220.68	3,155,189.25
6,663.00	21.57	258.57	6,634.05	-298.89	-72.34	40.230276	-104.944225	1,327,217.65	3,155,175.57
6,706.00	24.50	261.04	6,673.61	-301.84	-88.90	40.230268	-104.944285	1,327,214.59	3,155,159.03
6,749.00	27.75	266.51	6,712.22	-303.84	-107.71	40.230262	-104.944352	1,327,212.47	3,155,140.24
6,792.00	32.06	270.34	6,749.49	-304.39	-129.13	40.230261	-104.944429	1,327,211.79	3,155,118.82
6,835.00	35.55	273.08	6,785.22	-303.65	-153.03	40.230263	-104.944514	1,327,212.38	3,155,094.92
6,878.00	37.61	272.07	6,819.75	-302.50	-178.63	40.230266	-104.944606	1,327,213.37	3,155,069.31
6,920.00	40.22	271.64	6,852.42	-301.65	-204.99	40.230268	-104.944700	1,327,214.05	3,155,042.94
6,963.00	44.31	271.58	6,884.24	-300.84	-233.90	40.230270	-104.944804	1,327,214.69	3,155,014.04
7,006.00	50.03	271.79	6,913.46	-299.91	-265.41	40.230273	-104.944917	1,327,215.42	3,154,982.53
7,049.00	56.82	270.67	6,939.07	-299.18	-299.91	40.230275	-104.945040	1,327,215.93	3,154,948.02
7,092.00	61.32	269.89	6,961.16	-299.01	-336.78	40.230275	-104.945172	1,327,215.87	3,154,911.15
7,135.00	64.68	270.03	6,980.68	-299.03	-375.09	40.230275	-104.945310	1,327,215.60	3,154,872.84
7,177.00	68.37	270.29	6,997.41	-298.92	-413.61	40.230276	-104.945448	1,327,215.47	3,154,834.33
7,220.00	73.66	270.30	7,011.39	-298.71	-454.25	40.230276	-104.945593	1,327,215.43	3,154,793.68
7,263.00	78.52	270.31	7,021.73	-298.49	-495.98	40.230277	-104.945743	1,327,215.39	3,154,751.96
7,290.00	80.94	270.90	7,026.54	-298.21	-522.54	40.230277	-104.945838	1,327,215.50	3,154,725.39
7,349.10	86.16	269.85	7,033.18	-297.83	-581.25	40.230279	-104.946048	1,327,215.51	3,154,666.69
7,372.00	88.18	269.45	7,034.31	-297.97	-604.12	40.230278	-104.946130	1,327,215.23	3,154,643.82
7,543.00	90.12	272.43	7,036.85	-295.16	-775.05	40.230286	-104.946742	1,327,216.97	3,154,472.88
7,714.00	90.09	271.55	7,036.53	-289.23	-945.94	40.230302	-104.947354	1,327,221.83	3,154,301.96
7,885.00	89.85	269.17	7,036.62	-288.15	-1,116.93	40.230305	-104.947966	1,327,221.83	3,154,130.98
8,056.00	89.82	269.16	7,037.12	-290.64	-1,287.91	40.230298	-104.948579	1,327,218.27	3,153,960.03
8,227.00	89.63	269.02	7,037.94	-293.36	-1,458.89	40.230291	-104.949191	1,327,214.48	3,153,789.08
8,398.00	89.88	268.69	7,038.67	-296.78	-1,629.85	40.230281	-104.949803	1,327,209.99	3,153,618.15
8,570.00	89.91	268.19	7,038.98	-301.46	-1,801.78	40.230268	-104.950419	1,327,204.23	3,153,446.25
8,741.00	89.88	269.60	7,039.30	-304.76	-1,972.75	40.230259	-104.951031	1,327,199.86	3,153,275.32
8,912.00	90.09	269.32	7,039.34	-306.37	-2,143.74	40.230255	-104.951644	1,327,197.18	3,153,104.35
9,084.00	90.28	268.97	7,038.79	-308.93	-2,315.72	40.230248	-104.952260	1,327,193.54	3,152,932.40
9,255.00	89.41	269.52	7,039.25	-311.19	-2,486.70	40.230242	-104.952872	1,327,190.21	3,152,761.44
9,427.00	88.80	269.28	7,041.93	-312.99	-2,658.67	40.230237	-104.953488	1,327,187.33	3,152,589.49
9,598.00	89.88	268.76	7,043.90	-315.91	-2,829.63	40.230228	-104.954100	1,327,183.33	3,152,418.56
9,775.00	90.09	269.48	7,043.95	-318.63	-3,006.61	40.230221	-104.954734	1,327,179.51	3,152,241.61
9,958.00	90.06	268.98	7,043.71	-321.09	-3,189.59	40.230214	-104.955389	1,327,175.90	3,152,058.66
10,141.00	89.54	267.36	7,044.35	-326.93	-3,372.49	40.230198	-104.956045	1,327,168.91	3,151,875.80
10,324.00	89.01	266.86	7,046.67	-336.16	-3,555.24	40.230173	-104.956699	1,327,158.54	3,151,693.12
10,506.00	89.88	268.29	7,048.43	-343.86	-3,737.06	40.230151	-104.957350	1,327,149.70	3,151,511.36

Design Report for Kerbs 31N-14HZ - 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)
10,689.00	90.22	268.32	7,048.27	-349.27	-3,919.98	40.230136	-104.958005	1,327,143.14	3,151,328.49
10,872.00	89.63	269.44	7,048.51	-352.85	-4,102.95	40.230127	-104.958661	1,327,138.42	3,151,145.56
11,054.00	90.40	273.17	7,048.46	-348.71	-4,284.86	40.230138	-104.959312	1,327,141.42	3,150,963.63
11,236.00	89.85	272.92	7,048.06	-339.04	-4,466.61	40.230164	-104.959963	1,327,149.95	3,150,781.83
11,407.00	89.26	272.87	7,049.39	-330.40	-4,637.38	40.230188	-104.960575	1,327,157.51	3,150,611.02
11,578.00	89.69	273.01	7,050.96	-321.63	-4,808.15	40.230212	-104.961186	1,327,165.21	3,150,440.20
11,750.00	90.06	270.23	7,051.33	-316.77	-4,980.06	40.230225	-104.961802	1,327,168.99	3,150,268.27
11,921.00	89.01	270.78	7,052.72	-315.26	-5,151.05	40.230229	-104.962414	1,327,169.43	3,150,097.29
12,093.00	90.46	272.08	7,053.52	-310.97	-5,322.98	40.230241	-104.963030	1,327,172.64	3,149,925.33
12,264.00	90.22	271.85	7,052.50	-305.11	-5,493.88	40.230257	-104.963642	1,327,177.43	3,149,754.41
12,436.00	89.48	270.89	7,052.95	-300.99	-5,665.83	40.230268	-104.964258	1,327,180.47	3,149,582.45
12,607.00	90.25	271.33	7,053.36	-297.68	-5,836.79	40.230277	-104.964870	1,327,182.71	3,149,411.47
12,779.00	90.49	271.16	7,052.25	-293.94	-6,008.75	40.230287	-104.965486	1,327,185.37	3,149,239.51
12,950.00	89.57	271.03	7,052.16	-290.68	-6,179.72	40.230296	-104.966098	1,327,187.56	3,149,068.53
13,121.00	89.32	271.22	7,053.81	-287.32	-6,350.67	40.230305	-104.966711	1,327,189.85	3,148,897.56
13,293.00	89.85	271.59	7,055.06	-283.10	-6,522.62	40.230317	-104.967326	1,327,192.99	3,148,725.60
13,464.00	89.20	271.23	7,056.48	-278.89	-6,693.56	40.230328	-104.967939	1,327,196.12	3,148,554.64
13,635.00	88.24	270.02	7,060.30	-277.03	-6,864.50	40.230333	-104.968551	1,327,196.92	3,148,383.70
13,806.00	90.06	270.82	7,062.83	-275.78	-7,035.47	40.230336	-104.969163	1,327,197.10	3,148,212.74
13,977.00	89.32	270.07	7,063.76	-274.45	-7,206.46	40.230340	-104.969776	1,327,197.35	3,148,041.75
14,148.00	90.74	271.28	7,063.67	-272.43	-7,377.44	40.230345	-104.970388	1,327,198.30	3,147,870.77
14,320.00	90.65	271.43	7,061.58	-268.37	-7,549.38	40.230356	-104.971004	1,327,201.28	3,147,698.81
14,491.00	89.26	270.83	7,061.72	-264.99	-7,720.34	40.230365	-104.971616	1,327,203.58	3,147,527.84
14,662.00	88.89	270.82	7,064.48	-262.53	-7,891.30	40.230372	-104.972228	1,327,204.97	3,147,356.88
14,833.00	89.11	270.70	7,067.46	-260.26	-8,062.26	40.230378	-104.972841	1,327,206.17	3,147,185.91
15,005.00	90.09	269.97	7,068.66	-259.26	-8,234.25	40.230381	-104.973457	1,327,206.10	3,147,013.93
15,176.00	92.31	269.70	7,065.08	-259.75	-8,405.20	40.230379	-104.974069	1,327,204.53	3,146,842.99
15,347.00	92.07	270.34	7,058.55	-259.69	-8,576.07	40.230379	-104.974681	1,327,203.52	3,146,672.13
15,519.00	89.97	271.43	7,055.48	-257.03	-8,748.01	40.230386	-104.975297	1,327,205.10	3,146,500.18
15,690.00	89.20	271.50	7,056.72	-252.66	-8,918.95	40.230398	-104.975909	1,327,208.40	3,146,329.23
15,862.00	88.86	271.25	7,059.63	-248.54	-9,090.88	40.230409	-104.976524	1,327,211.45	3,146,157.29
16,033.00	88.73	270.80	7,063.23	-245.48	-9,261.81	40.230417	-104.977137	1,327,213.43	3,145,986.34
16,204.00	90.65	270.94	7,064.16	-242.88	-9,432.78	40.230424	-104.977749	1,327,214.96	3,145,815.37
16,375.00	90.62	270.67	7,062.26	-240.48	-9,603.75	40.230431	-104.978361	1,327,216.29	3,145,644.39
16,546.00	89.94	270.14	7,061.42	-239.27	-9,774.75	40.230434	-104.978974	1,327,216.42	3,145,473.40
16,632.00	90.25	270.28	7,061.28	-238.96	-9,860.74	40.230435	-104.979282	1,327,216.20	3,145,387.41
16,699.00	90.25	270.28	7,060.99	-238.63	-9,927.74	40.230436	-104.979522	1,327,216.11	3,145,320.41

Design Report for Kerbs 31N-14HZ - Actual Field Surveys

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
983.00	982.98	-1.03	-2.14	Tie-On to Gyro Surveys @ 983.00ft
1,311.00	1,310.96	-0.26	-5.69	First MWD Survey @ 1311.00ft
16,632.00	7,061.28	-238.96	-9,860.74	Final MWD Survey @ 16632.00ft
16,699.00	7,060.99	-238.63	-9,927.74	Str. Line Proj. to Bit @ 16699' MD :: 7060.99' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	270.38	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
16.00	983.00	MS Energy Surveys	NS-GYRO-MS
1,311.00	7,290.00	MWD Vertical/Build Surveys	MWD+IFR1
7,372.00	16,632.00	MWD Lateral Surveys	MWD+IFR1

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,071.10	1,071.07	9 5/8" Casing Set @ 1071.1' MD :: 1071.07' TVD	9-5/8	13-1/2
7,349.10	7,033.18	7" Casing Set @ 7349.1' MD :: 7033.18' TVD	7	8-3/4

Design Report for Kerbs 31N-14HZ - Actual Field Surveys

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:	1.16 °/100usft	Maximum Dogleg over Survey:	15.93 °/100usft at 7,049.00 usft
Net Tortosity applicable to Plans:	0.33 °/100usft	Directional Difficulty Index:	6.670

Audit Info

North Reference Sheet for Sec. 13-T3N-R68W - Kerbs 31N-14HZ - Plan A

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

Vertical Depths are relative to RKB = 16' @ 4900.00usft (Xtreme 22). Northing and Easting are relative to Kerbs 31N-14HZ

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: 0.99995690

Grid Coordinates of Well: 1,327,516.97 usft N, 3,155,246.03 usft E

Geographical Coordinates of Well: 40° 13' 51.95" N, 104° 56' 38.28" W

Grid Convergence at Surface is: 0.36°

Based upon Minimum Curvature type calculations, at a Measured Depth of 16,699.00usft

the Bottom Hole Displacement is 9,930.61usft in the Direction of 268.62° (True).

Magnetic Convergence at surface is: -8.27° (6 February 2014, , BGGM2013)

