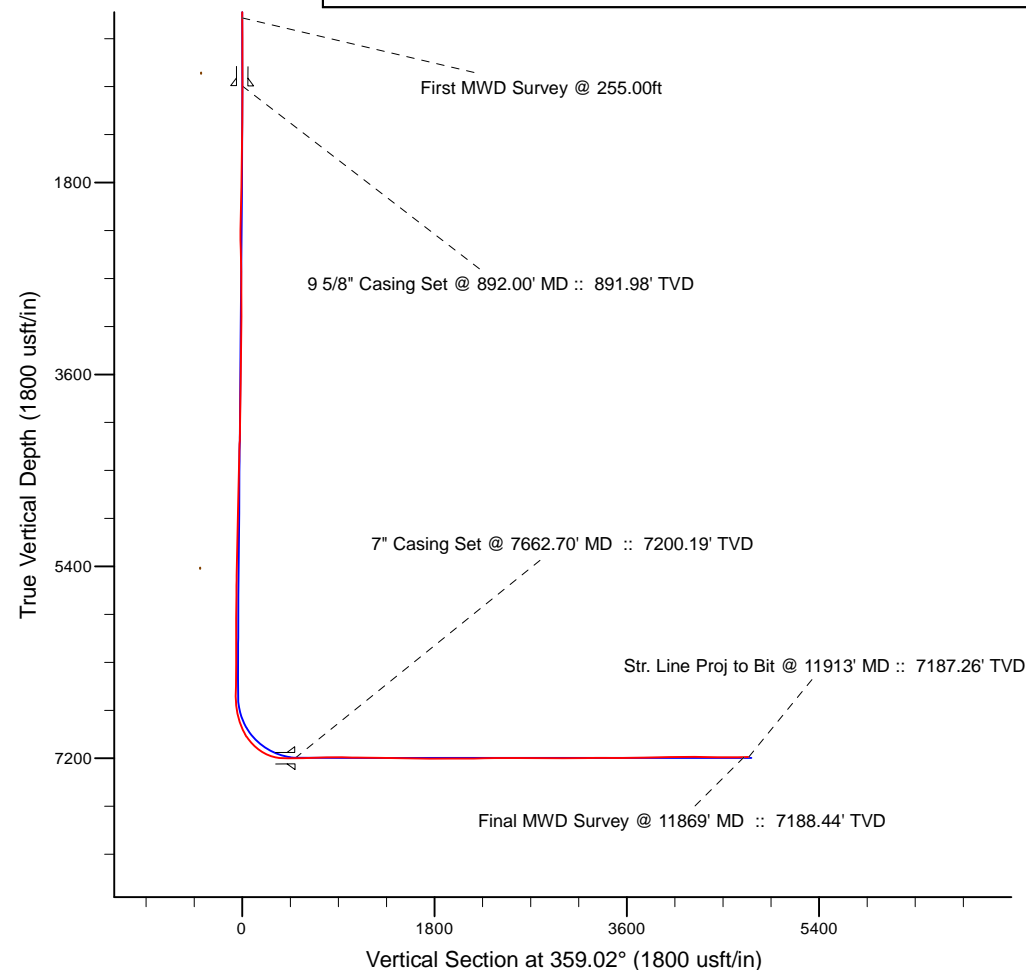
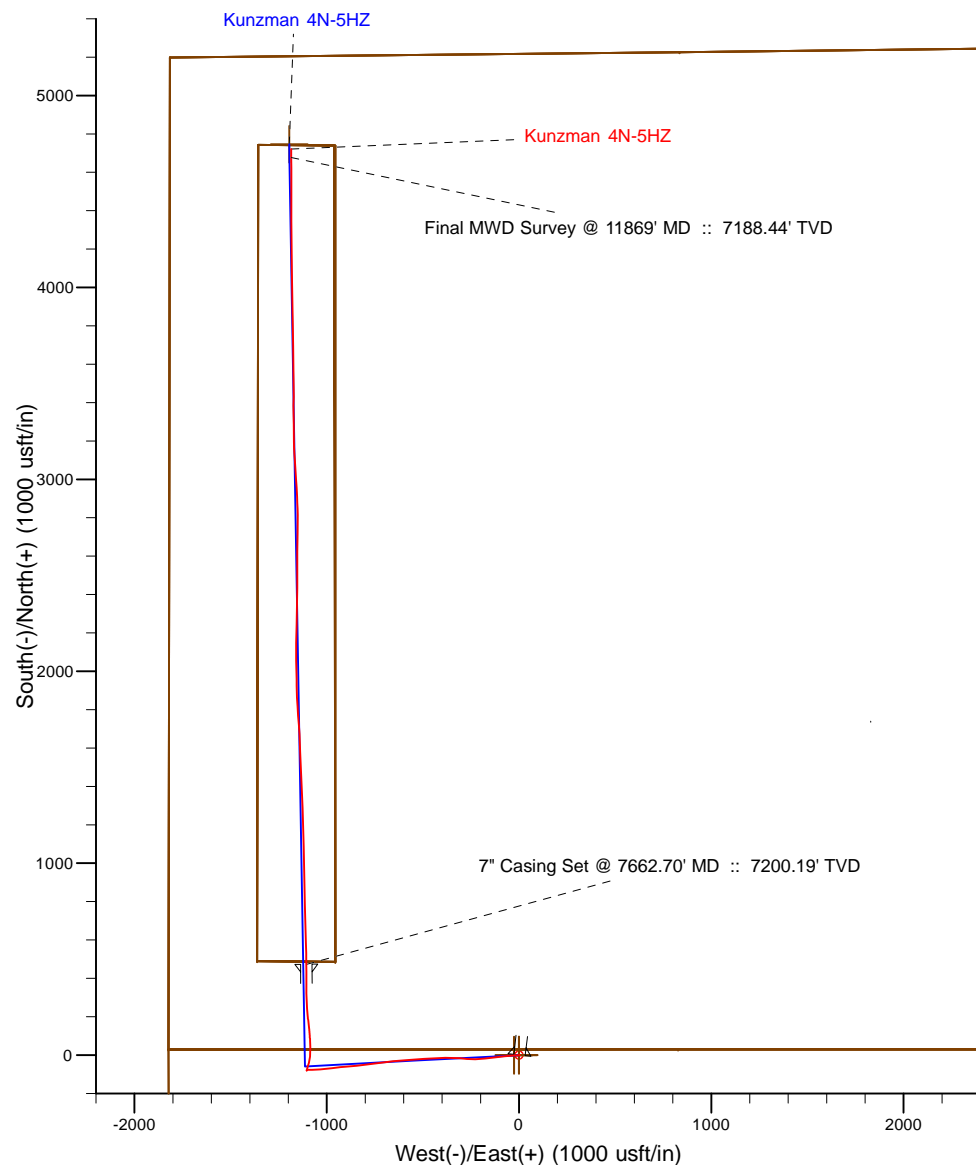


Project: Weld County, CO (NAD 83)
 Site: Sec. 8-T2N-R66W
 Well: Kunzman 4N-5HZ
 Wellbore: Plan A
 Design: Actual Field Surveys



7" Casing: ~443.51' FSL, ~715.43' FWL
 Lat/Long: 40.161060 N, -104.808061 E
 State Planes - CO Northern: 1,302,271.74' N, 3,193,389.43' E
 Location: Sec. 5-T2N-R66W

BHL: ~483.97' FNL, ~631.67' FWL
 Lat/Long: 40.172721 N, -104.808342 E
 State Planes - CO Northern: 1,306,518.78' N, 3,193,277.85' E
 Location: Sec. 5-T2N-R66W

WELL DETAILS: Kunzman 4N-5HZ	
Ground Level:	4858.00
RKB = 13' @ 4871.00usft (Ensign 132)	
Design: Actual Field Surveys (Kunzman 4N-5HZ/Plan A)	
Created By: Clint Eshelman	Date: 11/9/2013
Reviewed: _____	Date: _____

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 8-T2N-R66W

Kunzman 4N-5HZ

Plan A

Design: Actual Field Surveys

Sperry Drilling Services

Standard Report

09 November, 2013

Well Coordinates: 1,301,807.30 N, 3,194,499.05 E (40° 09' 35.14" N, 104° 48' 14.77" W)

Ground Level: 4,858.00 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 Kunzman 4N-5HZ

RKB = 13' @ 4871.00usft (Ensign 132)

N

True

API - US Survey Feet - Custom

HALLIBURTON

Design Report for Kunzman 4N-5HZ - 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
255.00	0.40	54.69	255.00	0.51	0.73	0.50	0.16
First MWD Survey @ 255.00ft							
440.00	0.44	55.71	439.99	1.29	1.84	1.26	0.02
534.00	0.41	100.78	533.99	1.43	2.47	1.39	0.35
627.00	0.38	106.78	626.99	1.28	3.09	1.22	0.05
721.00	0.24	146.13	720.99	1.02	3.50	0.96	0.26
840.00	0.33	178.70	839.99	0.47	3.65	0.41	0.15
892.00	0.33	186.43	891.98	0.18	3.63	0.11	0.09
9 5/8" Casing Set @ 892.00' MD :: 891.98' TVD							
1,065.00	0.36	210.63	1,064.98	-0.78	3.30	-0.84	0.09
1,249.00	5.36	270.53	1,248.70	-1.20	-5.59	-1.10	2.82
1,340.00	7.74	270.42	1,339.10	-1.12	-15.97	-0.84	2.62
1,432.00	9.53	266.82	1,430.06	-1.49	-29.77	-0.98	2.03
1,524.00	12.21	266.92	1,520.40	-2.44	-47.10	-1.63	2.91
1,616.00	13.97	262.99	1,610.01	-4.32	-67.83	-3.16	2.14
1,708.00	13.74	260.07	1,699.33	-7.56	-89.62	-6.02	0.80
1,799.00	14.92	260.95	1,787.50	-11.26	-111.83	-9.35	1.32
1,890.00	15.09	267.08	1,875.40	-13.71	-135.23	-11.39	1.75
1,985.00	14.93	266.71	1,967.16	-15.04	-159.80	-12.31	0.20
2,081.00	14.29	263.36	2,060.06	-17.12	-183.92	-13.97	1.10
2,176.00	12.83	261.80	2,152.41	-19.98	-206.00	-16.45	1.58
2,271.00	13.51	271.35	2,244.92	-21.22	-227.54	-17.33	2.40
2,366.00	12.87	271.87	2,337.41	-20.62	-249.21	-16.35	0.69
2,461.00	13.20	273.00	2,429.96	-19.70	-270.62	-15.07	0.44
2,556.00	14.23	276.76	2,522.25	-17.76	-293.04	-12.75	1.43
2,651.00	12.37	274.67	2,614.70	-15.56	-314.78	-10.17	2.02
2,746.00	13.51	271.48	2,707.29	-14.44	-336.02	-8.69	1.42
2,842.00	14.49	271.25	2,800.44	-13.89	-359.24	-7.75	1.02
2,937.00	13.65	270.09	2,892.59	-13.62	-382.33	-7.07	0.93
3,032.00	14.09	267.56	2,984.82	-14.09	-405.09	-7.16	0.79
3,127.00	12.92	266.13	3,077.19	-15.30	-427.24	-7.99	1.28
3,222.00	14.53	266.76	3,169.47	-16.69	-449.74	-9.00	1.70
3,317.00	12.75	268.10	3,261.79	-17.71	-472.11	-9.63	1.90
3,413.00	13.13	265.41	3,355.35	-18.93	-493.57	-10.49	0.74
3,508.00	13.84	263.94	3,447.73	-21.00	-515.63	-12.18	0.83
3,603.00	12.29	265.14	3,540.27	-23.05	-537.00	-13.87	1.66
3,698.00	12.55	268.38	3,633.05	-24.20	-557.39	-14.67	0.78
3,793.00	13.71	264.77	3,725.57	-25.52	-578.92	-15.62	1.49
3,888.00	12.43	264.12	3,818.10	-27.59	-600.30	-17.32	1.36
4,078.00	12.99	266.80	4,003.45	-30.88	-641.97	-19.90	0.43
4,174.00	14.74	264.01	4,096.65	-32.76	-664.89	-21.38	1.95
4,269.00	13.73	263.85	4,188.73	-35.23	-688.12	-23.45	1.06
4,364.00	11.61	263.31	4,281.41	-37.55	-708.82	-25.42	2.24
4,459.00	12.40	261.63	4,374.33	-40.15	-728.41	-27.68	0.91
4,554.00	13.34	261.07	4,466.95	-43.33	-749.33	-30.51	1.00
4,649.00	12.11	261.22	4,559.61	-46.56	-770.00	-33.38	1.30
4,745.00	14.07	264.01	4,653.11	-49.31	-791.56	-35.77	2.14
4,840.00	13.31	263.20	4,745.41	-51.81	-813.91	-37.88	0.83
4,935.00	14.31	265.08	4,837.67	-54.11	-836.46	-39.80	1.15

Design Report for Kunzman 4N-5HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,030.00	13.46	266.40	4,929.89	-55.81	-859.19	-41.11	0.95
5,125.00	15.47	264.04	5,021.88	-57.82	-882.83	-42.72	2.20
5,220.00	14.03	264.30	5,113.74	-60.28	-906.89	-44.76	1.52
5,315.00	12.16	262.93	5,206.27	-62.66	-928.28	-46.77	2.00
5,411.00	13.66	264.36	5,299.84	-65.02	-949.60	-48.77	1.60
5,506.00	12.72	263.80	5,392.33	-67.25	-971.16	-50.63	1.00
5,601.00	10.72	263.55	5,485.35	-69.37	-990.34	-52.42	2.11
5,696.00	9.10	263.09	5,578.93	-71.27	-1,006.58	-54.04	1.71
5,791.00	9.23	266.72	5,672.71	-72.61	-1,021.64	-55.12	0.62
5,886.00	8.28	258.81	5,766.61	-74.37	-1,035.96	-56.64	1.61
5,982.00	8.90	266.68	5,861.54	-76.14	-1,050.16	-58.17	1.38
6,077.00	8.47	274.30	5,955.45	-76.04	-1,064.47	-57.83	1.29
6,172.00	6.66	270.63	6,049.62	-75.46	-1,076.96	-57.03	1.97
6,267.00	4.40	267.28	6,144.17	-75.57	-1,086.11	-56.98	2.40
6,362.00	3.55	262.04	6,238.94	-76.15	-1,092.66	-57.45	0.97
6,457.00	2.80	262.54	6,333.79	-76.86	-1,097.87	-58.07	0.79
6,552.00	1.98	249.27	6,428.71	-77.74	-1,101.71	-58.89	1.04
6,647.00	0.57	185.79	6,523.69	-78.79	-1,103.29	-59.91	1.89
6,742.00	0.54	192.73	6,618.68	-79.70	-1,103.44	-60.82	0.08
6,790.00	2.57	14.41	6,666.67	-78.88	-1,103.22	-60.00	6.48
6,837.00	7.15	10.43	6,713.49	-74.98	-1,102.43	-56.11	9.77
6,885.00	10.87	15.15	6,760.89	-67.67	-1,100.70	-48.83	7.90
6,932.00	14.28	18.96	6,806.76	-57.91	-1,097.66	-39.12	7.46
6,980.00	19.09	14.04	6,852.72	-44.69	-1,093.83	-25.97	10.44
7,027.00	21.85	12.91	6,896.75	-28.70	-1,090.01	-10.05	5.93
7,075.00	25.29	6.66	6,940.75	-9.80	-1,086.83	8.79	8.85
7,122.00	31.22	359.99	6,982.14	12.38	-1,085.66	30.94	14.28
7,170.00	37.85	0.01	7,021.66	39.57	-1,085.66	58.13	13.81
7,217.00	42.12	358.53	7,057.66	69.76	-1,086.06	88.33	9.31
7,265.00	47.53	355.70	7,091.70	103.53	-1,087.81	122.12	12.01
7,312.00	54.23	354.00	7,121.34	139.83	-1,091.10	158.47	14.53
7,360.00	60.34	353.05	7,147.27	179.93	-1,095.67	198.65	12.84
7,407.00	67.04	354.85	7,168.09	221.81	-1,100.08	240.59	14.66
7,455.00	73.82	357.04	7,184.16	266.89	-1,103.26	285.72	14.76
7,503.00	81.36	358.49	7,194.47	313.70	-1,105.08	332.55	15.98
7,551.00	88.46	359.99	7,198.72	361.47	-1,105.71	380.33	15.12
7,598.00	88.92	359.96	7,199.80	408.46	-1,105.73	427.31	0.98
7,626.00	89.63	359.82	7,200.15	436.46	-1,105.79	455.31	2.58
7,662.70	90.25	359.54	7,200.19	473.16	-1,105.99	492.00	1.85
7" Casing Set @ 7662.70' MD :: 7200.19' TVD							
7,818.00	92.87	358.36	7,195.97	628.36	-1,108.83	647.23	1.85
7,913.00	91.54	357.96	7,192.31	723.24	-1,111.88	742.15	1.46
8,008.00	90.09	359.34	7,190.96	818.20	-1,114.12	837.13	2.11
8,103.00	89.66	359.07	7,191.17	913.19	-1,115.44	932.13	0.53
8,198.00	90.09	358.63	7,191.37	1,008.17	-1,117.34	1,027.13	0.65
8,294.00	88.52	358.55	7,192.54	1,104.13	-1,119.70	1,123.12	1.64
8,389.00	89.32	358.35	7,194.33	1,199.07	-1,122.27	1,218.09	0.87
8,484.00	89.29	357.93	7,195.48	1,294.02	-1,125.36	1,313.08	0.44
8,579.00	88.98	357.29	7,196.92	1,388.92	-1,129.32	1,408.04	0.75
8,674.00	88.70	357.47	7,198.84	1,483.80	-1,133.66	1,502.98	0.35
8,769.00	89.51	358.13	7,200.32	1,578.72	-1,137.31	1,597.94	1.10

Design Report for Kunzman 4N-5HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,864.00	89.41	356.71	7,201.22	1,673.62	-1,141.58	1,692.90	1.50
8,959.00	90.03	355.43	7,201.68	1,768.39	-1,148.09	1,787.77	1.50
9,054.00	90.31	357.26	7,201.40	1,863.19	-1,154.15	1,882.66	1.95
9,149.00	89.66	359.36	7,201.43	1,958.15	-1,156.95	1,977.65	2.31
9,244.00	90.56	358.95	7,201.24	2,053.13	-1,158.35	2,072.65	1.04
9,339.00	90.34	1.22	7,200.50	2,148.13	-1,158.21	2,167.62	2.40
9,435.00	91.54	0.87	7,198.92	2,244.09	-1,156.46	2,263.55	1.30
9,530.00	89.63	1.56	7,197.95	2,339.06	-1,154.45	2,358.47	2.14
9,625.00	89.88	0.48	7,198.36	2,434.05	-1,152.75	2,453.41	1.17
9,720.00	89.91	0.14	7,198.53	2,529.04	-1,152.24	2,548.38	0.36
9,815.00	90.93	359.86	7,197.84	2,624.04	-1,152.24	2,643.36	1.11
9,910.00	90.65	1.12	7,196.53	2,719.03	-1,151.43	2,738.32	1.36
10,005.00	89.26	359.48	7,196.60	2,814.02	-1,150.93	2,833.29	2.26
10,101.00	88.43	357.19	7,198.54	2,909.95	-1,153.72	2,929.26	2.54
10,196.00	89.69	355.75	7,200.09	3,004.75	-1,159.57	3,024.15	2.01
10,291.00	90.43	356.52	7,199.99	3,099.54	-1,165.97	3,119.03	1.12
10,386.00	91.73	358.54	7,198.20	3,194.42	-1,170.06	3,213.97	2.53
10,481.00	90.74	359.39	7,196.16	3,289.39	-1,171.78	3,308.95	1.37
10,576.00	89.29	0.28	7,196.13	3,384.38	-1,172.05	3,403.93	1.79
10,671.00	90.15	359.57	7,196.60	3,479.38	-1,172.18	3,498.92	1.17
10,766.00	90.31	359.86	7,196.21	3,574.38	-1,172.65	3,593.91	0.35
10,861.00	91.33	359.36	7,194.85	3,669.36	-1,173.30	3,688.89	1.20
10,956.00	92.25	358.48	7,191.89	3,764.30	-1,175.09	3,783.85	1.34
11,052.00	90.43	358.85	7,189.64	3,860.24	-1,177.32	3,879.81	1.93
11,147.00	91.23	359.16	7,188.27	3,955.22	-1,178.97	3,974.80	0.90
11,242.00	89.63	359.42	7,187.55	4,050.20	-1,180.15	4,069.80	1.71
11,337.00	90.68	359.14	7,187.30	4,145.19	-1,181.34	4,164.79	1.14
11,432.00	89.11	359.61	7,187.47	4,240.18	-1,182.38	4,259.79	1.73
11,527.00	89.04	359.57	7,189.00	4,335.17	-1,183.06	4,354.77	0.08
11,622.00	89.29	359.66	7,190.39	4,430.16	-1,183.70	4,449.75	0.28
11,717.00	90.25	0.05	7,190.77	4,525.16	-1,183.94	4,544.74	1.09
11,812.00	91.02	359.93	7,189.72	4,620.15	-1,183.95	4,639.72	0.82
11,869.00	91.54	359.80	7,188.44	4,677.13	-1,184.09	4,696.70	0.94
Final MWD Survey @ 11869' MD :: 7188.44' TVD							
11,913.00	91.54	359.80	7,187.26	4,721.12	-1,184.24	4,740.68	0.00
Str. Line Proj to Bit @ 11913' MD :: 7187.26' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
255.00	255.00	0.51	0.73	First MWD Survey @ 255.00ft
11,869.00	7,188.44	4,677.13	-1,184.09	Final MWD Survey @ 11869' MD :: 7188.44' TVD
11,913.00	7,187.26	4,721.12	-1,184.24	Str. Line Proj to Bit @ 11913' MD :: 7187.26' 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

Design Report for Kunzman 4N-5HZ - Actual Field Surveys

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
255.00	7,626.00	MWD Vertical/Build Svys	MWD+SC
7,818.00	11,869.00	MWD Lateral Surveys	MWD+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
892.00	891.98	9 5/8" Casing Set @ 892.00' MD :: 891.98' TVD	9-5/8	13-1/2
7,662.70	7,200.19	7" Casing Set @ 7662.70' MD :: 7200.19' TVD	7	8-3/4

Design Report for Kunzman 4N-5HZ - 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
Kunzman 4N-5HZ_LD	0.00	0.00	0.00	0.00	0.00	1,301,807.30	3,194,499.05	40° 9' 35.139 N	104° 48' 14.774 W
- actual wellpath hits target center									
- Polygon									
Point 1				0.00	4,743.27	-1,355.90	1,306,539.58	3,193,106.03	
Point 2				0.00	489.54	-1,361.41	1,302,286.12	3,193,133.90	
Point 3				0.00	486.35	-954.37	1,302,286.12	3,193,540.93	
Point 4				0.00	4,740.12	-954.85	1,306,539.58	3,193,507.07	
Point 5				0.00	4,743.27	-1,355.90	1,306,539.58	3,193,106.03	
Kunzman 4N-5HZ_SH	0.00	0.00	0.00	0.01	0.00	1,301,807.30	3,194,499.05	40° 9' 35.140 N	104° 48' 14.774 W
- actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									
Kunzman 4N-5HZ_SE	0.00	0.00	0.00	0.00	-25.99	1,301,807.09	3,194,473.06	40° 9' 35.139 N	104° 48' 15.109 W
- actual wellpath misses target center by 25.99usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	5,198.43	-1,789.32	1,306,991.10	3,192,643.07	
Point 2				0.00	5,226.64	861.23	1,307,040.11	3,195,293.21	
Point 3				0.00	5,255.04	3,511.74	1,307,089.31	3,197,943.31	
Point 4				0.00	2,675.79	3,506.24	1,304,510.20	3,197,958.05	
Point 5				0.00	30.50	3,502.70	1,301,865.08	3,197,975.26	
Point 6				0.00	30.42	853.45	1,301,844.21	3,195,326.21	
Point 7				0.00	29.34	-1,796.03	1,301,822.33	3,192,676.93	
Point 8				0.00	30.42	853.45	1,301,844.21	3,195,326.21	
Point 9				0.00	30.50	3,502.70	1,301,865.08	3,197,975.26	
Point 10				0.00	-5,246.73	3,489.00	1,296,588.12	3,198,002.98	
Point 11				0.00	-5,251.37	-1,778.40	1,296,542.15	3,192,736.00	
Point 12				0.00	-2,610.48	-1,787.24	1,299,182.78	3,192,706.43	
Point 13				0.00	29.34	-1,796.03	1,301,822.33	3,192,676.93	
Point 14				0.00	5,198.43	-1,789.32	1,306,991.10	3,192,643.07	
Kunzman 4N-5HZ_LD	0.00	0.00	0.00	0.01	-25.99	1,301,807.10	3,194,473.06	40° 9' 35.140 N	104° 48' 15.109 W
- actual wellpath misses target center by 25.99usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	4,743.26	-1,329.90	1,306,539.58	3,193,106.03	
Point 2				0.00	4,740.17	-935.90	1,306,539.58	3,193,500.03	
Point 3				0.00	486.34	-928.38	1,302,286.12	3,193,540.93	
Point 4				0.00	489.53	-1,335.41	1,302,286.12	3,193,133.90	
Point 5				0.00	4,743.26	-1,329.90	1,306,539.58	3,193,106.03	
Kunzman 4N-5HZ_SE	0.00	0.00	0.00	0.00	0.00	1,301,807.30	3,194,499.05	40° 9' 35.139 N	104° 48' 14.774 W
- actual wellpath hits target center									
- Polygon									
Point 1				0.00	5,198.43	-1,815.32	1,306,991.10	3,192,643.07	
Point 2				0.00	29.34	-1,822.02	1,301,822.33	3,192,676.93	
Point 3				0.00	30.42	827.46	1,301,844.21	3,195,326.21	
Point 4				0.00	30.50	3,476.70	1,301,865.08	3,197,975.26	
Point 5				0.00	2,675.79	3,480.25	1,304,510.20	3,197,958.05	
Point 6				0.00	5,255.04	3,485.75	1,307,089.31	3,197,943.31	
Point 7				0.00	5,226.64	835.23	1,307,040.11	3,195,293.21	
Point 8				0.00	5,198.43	-1,815.32	1,306,991.10	3,192,643.07	
BLUFFS RED W #5-5	0.00	0.00	7,196.00	3,366.12	-747.86	1,305,167.30	3,193,724.83	40° 10' 8.404 N	104° 48' 24.408 W
- actual wellpath misses target center by 424.25usft at 10556.52usft MD (7195.94 TVD, 3364.90 N, -1172.12 E)									
- Circle (radius 150.00)									
Bluffs Red W 5-4 - 150	0.00	0.00	7,196.00	4,652.10	-997.38	1,306,451.23	3,193,465.24	40° 10' 21.112 N	104° 48' 27.623 W
- actual wellpath misses target center by 186.76usft at 11843.36usft MD (7189.08 TVD, 4651.51 N, -1184.01 E)									
- Circle (radius 150.00)									
Kunzman 4N-5HZ_BH	0.00	0.00	7,196.00	4,746.46	-1,195.00	1,306,544.03	3,193,266.89	40° 10' 22.044 N	104° 48' 30.169 W
- actual wellpath misses target center by 28.88usft at 11913.00usft MD (7187.26 TVD, 4721.12 N, -1184.24 E)									
- Point									
Kunzman 4N-5HZ_BH	0.00	0.00	7,262.00	4,746.46	-1,065.84	1,306,545.04	3,193,396.04	40° 10' 22.044 N	104° 48' 28.505 W
- actual wellpath misses target center by 142.29usft at 11913.00usft MD (7187.26 TVD, 4721.12 N, -1184.24 E)									
- Point									

Design Report for Kunzman 4N-5HZ - Actual Field Surveys

Directional Difficulty Index

Average Dogleg over Survey:	1.95 °/100usft	Maximum Dogleg over Survey:	15.98 °/100usft at 7,503.00 usft
Net Tortousity applicable to Plans:	0.96 °/100usft	Directional Difficulty Index:	6.358

Audit Info

North Reference Sheet for Sec. 8-T2N-R66W - Kunzman 4N-5HZ - 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 = 13' @ 4871.00usft (Ensign 132). Northing and Easting are relative to Kunzman 4N-5HZ

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: 0.99995810

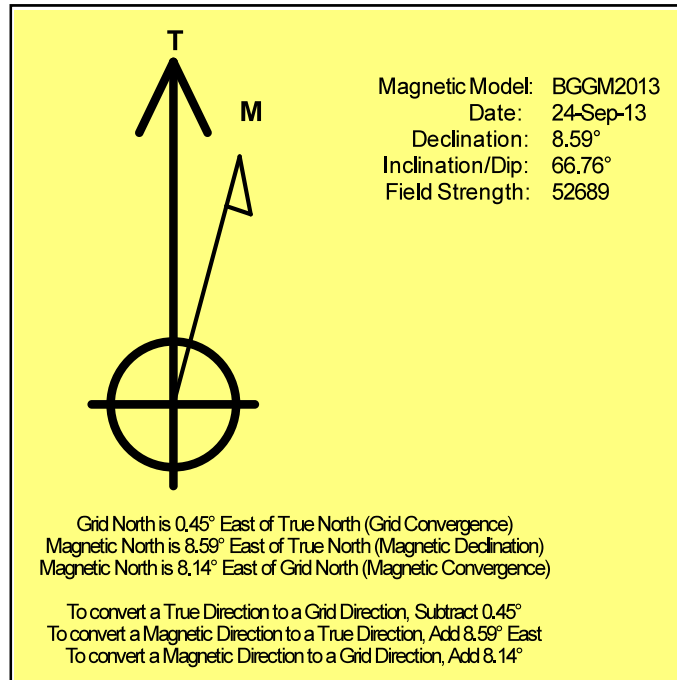
Grid Coordinates of Well: 1,301,807.30 usft N, 3,194,499.05 usft E

Geographical Coordinates of Well: 40° 09' 35.14" N, 104° 48' 14.77" W

Grid Convergence at Surface is: 0.45°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,913.00usft
the Bottom Hole Displacement is 4,867.38usft in the Direction of 345.92° (True).

Magnetic Convergence at surface is: -8.14° (24 September 2013, , BGGM2013)



Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 8-T2N-R66W

Kunzman 4N-5HZ

Plan A

Design: Actual Field Surveys

Sperry Drilling Services

Geodetic Report

09 November, 2013

Well Coordinates: 1,301,807.30 N, 3,194,499.05 E (40° 09' 35.14" N, 104° 48' 14.77" W)

Ground Level: 4,858.00 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 Kunzman 4N-5HZ

RKB = 13' @ 4871.00usft (Ensign 132)

N

True

API - US Survey Feet - Custom

HALLIBURTON

Design Report for Kunzman 4N-5HZ - 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° 9' 35.139 N	104° 48' 14.774 W	1,301,807.30	3,194,499.05
255.00	0.40	54.69	255.00	0.51	0.73	40° 9' 35.145 N	104° 48' 14.765 W	1,301,807.82	3,194,499.77
440.00	0.44	55.71	439.99	1.29	1.84	40° 9' 35.152 N	104° 48' 14.751 W	1,301,808.60	3,194,500.88
534.00	0.41	100.78	533.99	1.43	2.47	40° 9' 35.154 N	104° 48' 14.743 W	1,301,808.74	3,194,501.51
627.00	0.38	106.78	626.99	1.28	3.09	40° 9' 35.152 N	104° 48' 14.735 W	1,301,808.60	3,194,502.13
721.00	0.24	146.13	720.99	1.02	3.50	40° 9' 35.150 N	104° 48' 14.729 W	1,301,808.35	3,194,502.54
840.00	0.33	178.70	839.99	0.47	3.65	40° 9' 35.144 N	104° 48' 14.727 W	1,301,807.80	3,194,502.69
892.00	0.33	186.43	891.98	0.18	3.63	40° 9' 35.141 N	104° 48' 14.728 W	1,301,807.50	3,194,502.68
1,065.00	0.36	210.63	1,064.98	-0.78	3.30	40° 9' 35.132 N	104° 48' 14.732 W	1,301,806.54	3,194,502.36
1,249.00	5.36	270.53	1,248.70	-1.20	-5.59	40° 9' 35.128 N	104° 48' 14.846 W	1,301,806.05	3,194,493.47
1,340.00	7.74	270.42	1,339.10	-1.12	-15.97	40° 9' 35.128 N	104° 48' 14.980 W	1,301,806.05	3,194,483.09
1,432.00	9.53	266.82	1,430.06	-1.49	-29.77	40° 9' 35.125 N	104° 48' 15.158 W	1,301,805.57	3,194,469.29
1,524.00	12.21	266.92	1,520.40	-2.44	-47.10	40° 9' 35.115 N	104° 48' 15.381 W	1,301,804.49	3,194,451.98
1,616.00	13.97	262.99	1,610.01	-4.32	-67.83	40° 9' 35.097 N	104° 48' 15.648 W	1,301,802.45	3,194,431.26
1,708.00	13.74	260.07	1,699.33	-7.56	-89.62	40° 9' 35.065 N	104° 48' 15.929 W	1,301,799.04	3,194,409.50
1,799.00	14.92	260.95	1,787.50	-11.26	-111.83	40° 9' 35.028 N	104° 48' 16.215 W	1,301,795.16	3,194,387.31
1,890.00	15.09	267.08	1,875.40	-13.71	-135.23	40° 9' 35.004 N	104° 48' 16.516 W	1,301,792.53	3,194,363.93
1,985.00	14.93	266.71	1,967.16	-15.04	-159.80	40° 9' 34.991 N	104° 48' 16.833 W	1,301,791.00	3,194,339.38
2,081.00	14.29	263.36	2,060.06	-17.12	-183.92	40° 9' 34.970 N	104° 48' 17.143 W	1,301,788.73	3,194,315.28
2,176.00	12.83	261.80	2,152.41	-19.98	-206.00	40° 9' 34.942 N	104° 48' 17.428 W	1,301,785.70	3,194,293.22
2,271.00	13.51	271.35	2,244.92	-21.22	-227.54	40° 9' 34.930 N	104° 48' 17.705 W	1,301,784.29	3,194,271.69
2,366.00	12.87	271.87	2,337.41	-20.62	-249.21	40° 9' 34.936 N	104° 48' 17.984 W	1,301,784.72	3,194,250.02
2,461.00	13.20	273.00	2,429.96	-19.70	-270.62	40° 9' 34.945 N	104° 48' 18.260 W	1,301,785.47	3,194,228.61
2,556.00	14.23	276.76	2,522.25	-17.76	-293.04	40° 9' 34.964 N	104° 48' 18.549 W	1,301,787.23	3,194,206.17
2,651.00	12.37	274.67	2,614.70	-15.56	-314.78	40° 9' 34.986 N	104° 48' 18.829 W	1,301,789.27	3,194,184.41
2,746.00	13.51	271.48	2,707.29	-14.44	-336.02	40° 9' 34.997 N	104° 48' 19.102 W	1,301,790.22	3,194,163.17
2,842.00	14.49	271.25	2,800.44	-13.89	-359.24	40° 9' 35.002 N	104° 48' 19.401 W	1,301,790.58	3,194,139.95
2,937.00	13.65	270.09	2,892.59	-13.62	-382.33	40° 9' 35.005 N	104° 48' 19.699 W	1,301,790.68	3,194,116.86
3,032.00	14.09	267.56	2,984.82	-14.09	-405.09	40° 9' 35.000 N	104° 48' 19.992 W	1,301,790.03	3,194,094.10
3,127.00	12.92	266.13	3,077.19	-15.30	-427.24	40° 9' 34.988 N	104° 48' 20.277 W	1,301,788.64	3,194,071.96
3,222.00	14.53	266.76	3,169.47	-16.69	-449.74	40° 9' 34.974 N	104° 48' 20.567 W	1,301,787.08	3,194,049.48
3,317.00	12.75	268.10	3,261.79	-17.71	-472.11	40° 9' 34.964 N	104° 48' 20.855 W	1,301,785.88	3,194,027.11
3,413.00	13.13	265.41	3,355.35	-18.93	-493.57	40° 9' 34.952 N	104° 48' 21.131 W	1,301,784.49	3,194,005.66
3,508.00	13.84	263.94	3,447.73	-21.00	-515.63	40° 9' 34.932 N	104° 48' 21.416 W	1,301,782.25	3,193,983.63
3,603.00	12.29	265.14	3,540.27	-23.05	-537.00	40° 9' 34.912 N	104° 48' 21.691 W	1,301,780.03	3,193,962.27
3,698.00	12.55	268.38	3,633.05	-24.20	-557.39	40° 9' 34.900 N	104° 48' 21.953 W	1,301,778.72	3,193,941.89
3,793.00	13.71	264.77	3,725.57	-25.52	-578.92	40° 9' 34.887 N	104° 48' 22.231 W	1,301,777.23	3,193,920.37
3,888.00	12.43	264.12	3,818.10	-27.59	-600.30	40° 9' 34.867 N	104° 48' 22.506 W	1,301,774.99	3,193,899.01
4,078.00	12.99	266.80	4,003.45	-30.88	-641.97	40° 9' 34.834 N	104° 48' 23.043 W	1,301,771.38	3,193,857.37
4,174.00	14.74	264.01	4,096.65	-32.76	-664.89	40° 9' 34.816 N	104° 48' 23.338 W	1,301,769.32	3,193,834.47
4,269.00	13.73	263.85	4,188.73	-35.23	-688.12	40° 9' 34.791 N	104° 48' 23.637 W	1,301,766.67	3,193,811.26
4,364.00	11.61	263.31	4,281.41	-37.55	-708.82	40° 9' 34.768 N	104° 48' 23.904 W	1,301,764.19	3,193,790.57

Design Report for Kunzman 4N-5HZ - 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)
4,459.00	12.40	261.63	4,374.33	-40.15	-728.41	40° 9' 34.743 N	104° 48' 24.156 W	1,301,761.43	3,193,771.01
4,554.00	13.34	261.07	4,466.95	-43.33	-749.33	40° 9' 34.711 N	104° 48' 24.426 W	1,301,758.08	3,193,750.12
4,649.00	12.11	261.22	4,559.61	-46.56	-770.00	40° 9' 34.679 N	104° 48' 24.692 W	1,301,754.70	3,193,729.47
4,745.00	14.07	264.01	4,653.11	-49.31	-791.56	40° 9' 34.652 N	104° 48' 24.969 W	1,301,751.78	3,193,707.93
4,840.00	13.31	263.20	4,745.41	-51.81	-813.91	40° 9' 34.627 N	104° 48' 25.257 W	1,301,749.10	3,193,685.61
4,935.00	14.31	265.08	4,837.67	-54.11	-836.46	40° 9' 34.605 N	104° 48' 25.548 W	1,301,746.62	3,193,663.07
5,030.00	13.46	266.40	4,929.89	-55.81	-859.19	40° 9' 34.588 N	104° 48' 25.841 W	1,301,744.74	3,193,640.36
5,125.00	15.47	264.04	5,021.88	-57.82	-882.83	40° 9' 34.568 N	104° 48' 26.145 W	1,301,742.55	3,193,616.74
5,220.00	14.03	264.30	5,113.74	-60.28	-906.89	40° 9' 34.544 N	104° 48' 26.455 W	1,301,739.90	3,193,592.70
5,315.00	12.16	262.93	5,206.27	-62.66	-928.28	40° 9' 34.520 N	104° 48' 26.730 W	1,301,737.36	3,193,571.33
5,411.00	13.66	264.36	5,299.84	-65.02	-949.60	40° 9' 34.497 N	104° 48' 27.005 W	1,301,734.83	3,193,550.03
5,506.00	12.72	263.80	5,392.33	-67.25	-971.16	40° 9' 34.475 N	104° 48' 27.283 W	1,301,732.43	3,193,528.49
5,601.00	10.72	263.55	5,485.35	-69.37	-990.34	40° 9' 34.454 N	104° 48' 27.530 W	1,301,730.16	3,193,509.33
5,696.00	9.10	263.09	5,578.93	-71.27	-1,006.58	40° 9' 34.435 N	104° 48' 27.739 W	1,301,728.13	3,193,493.10
5,791.00	9.23	266.72	5,672.71	-72.61	-1,021.64	40° 9' 34.422 N	104° 48' 27.933 W	1,301,726.68	3,193,478.05
5,886.00	8.28	258.81	5,766.61	-74.37	-1,035.96	40° 9' 34.404 N	104° 48' 28.117 W	1,301,724.80	3,193,463.75
5,982.00	8.90	266.68	5,861.54	-76.14	-1,050.16	40° 9' 34.387 N	104° 48' 28.300 W	1,301,722.92	3,193,449.57
6,077.00	8.47	274.30	5,955.45	-76.04	-1,064.47	40° 9' 34.388 N	104° 48' 28.484 W	1,301,722.90	3,193,435.25
6,172.00	6.66	270.63	6,049.62	-75.46	-1,076.96	40° 9' 34.394 N	104° 48' 28.645 W	1,301,723.39	3,193,422.76
6,267.00	4.40	267.28	6,144.17	-75.57	-1,086.11	40° 9' 34.392 N	104° 48' 28.763 W	1,301,723.21	3,193,413.62
6,362.00	3.55	262.04	6,238.94	-76.15	-1,092.66	40° 9' 34.387 N	104° 48' 28.848 W	1,301,722.57	3,193,407.07
6,457.00	2.80	262.54	6,333.79	-76.86	-1,097.87	40° 9' 34.380 N	104° 48' 28.915 W	1,301,721.83	3,193,401.86
6,552.00	1.98	249.27	6,428.71	-77.74	-1,101.71	40° 9' 34.371 N	104° 48' 28.964 W	1,301,720.91	3,193,398.03
6,647.00	0.57	185.79	6,523.69	-78.79	-1,103.29	40° 9' 34.361 N	104° 48' 28.984 W	1,301,719.85	3,193,396.46
6,742.00	0.54	192.73	6,618.68	-79.70	-1,103.44	40° 9' 34.352 N	104° 48' 28.986 W	1,301,718.94	3,193,396.32
6,790.00	2.57	14.41	6,666.67	-78.88	-1,103.22	40° 9' 34.360 N	104° 48' 28.984 W	1,301,719.77	3,193,396.53
6,837.00	7.15	10.43	6,713.49	-74.98	-1,102.43	40° 9' 34.398 N	104° 48' 28.973 W	1,301,723.67	3,193,397.29
6,885.00	10.87	15.15	6,760.89	-67.67	-1,100.70	40° 9' 34.470 N	104° 48' 28.951 W	1,301,730.99	3,193,398.96
6,932.00	14.28	18.96	6,806.76	-57.91	-1,097.66	40° 9' 34.567 N	104° 48' 28.912 W	1,301,740.78	3,193,401.92
6,980.00	19.09	14.04	6,852.72	-44.69	-1,093.83	40° 9' 34.698 N	104° 48' 28.863 W	1,301,754.03	3,193,405.65
7,027.00	21.85	12.91	6,896.75	-28.70	-1,090.01	40° 9' 34.856 N	104° 48' 28.813 W	1,301,770.04	3,193,409.34
7,075.00	25.29	6.66	6,940.75	-9.80	-1,086.83	40° 9' 35.042 N	104° 48' 28.772 W	1,301,788.96	3,193,412.38
7,122.00	31.22	359.99	6,982.14	12.38	-1,085.66	40° 9' 35.261 N	104° 48' 28.757 W	1,301,811.15	3,193,413.37
7,170.00	37.85	0.01	7,021.66	39.57	-1,085.66	40° 9' 35.530 N	104° 48' 28.757 W	1,301,838.34	3,193,413.16
7,217.00	42.12	358.53	7,057.66	69.76	-1,086.06	40° 9' 35.829 N	104° 48' 28.763 W	1,301,868.53	3,193,412.52
7,265.00	47.53	355.70	7,091.70	103.53	-1,087.81	40° 9' 36.162 N	104° 48' 28.785 W	1,301,902.29	3,193,410.51
7,312.00	54.23	354.00	7,121.34	139.83	-1,091.10	40° 9' 36.521 N	104° 48' 28.828 W	1,301,938.55	3,193,406.93
7,360.00	60.34	353.05	7,147.27	179.93	-1,095.67	40° 9' 36.917 N	104° 48' 28.886 W	1,301,978.62	3,193,402.05
7,407.00	67.04	354.85	7,168.09	221.81	-1,100.08	40° 9' 37.331 N	104° 48' 28.943 W	1,302,020.45	3,193,397.31
7,455.00	73.82	357.04	7,184.16	266.89	-1,103.26	40° 9' 37.777 N	104° 48' 28.984 W	1,302,065.51	3,193,393.77
7,503.00	81.36	358.49	7,194.47	313.70	-1,105.08	40° 9' 38.239 N	104° 48' 29.008 W	1,302,112.30	3,193,391.59
7,551.00	88.46	359.99	7,198.72	361.47	-1,105.71	40° 9' 38.711 N	104° 48' 29.016 W	1,302,160.07	3,193,390.58

Design Report for Kunzman 4N-5HZ - 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)
7,598.00	88.92	359.96	7,199.80	408.46	-1,105.73	40° 9' 39.176 N	104° 48' 29.016 W	1,302,207.05	3,193,390.19
7,626.00	89.63	359.82	7,200.15	436.46	-1,105.79	40° 9' 39.452 N	104° 48' 29.017 W	1,302,235.04	3,193,389.92
7,662.70	90.25	359.54	7,200.19	473.16	-1,105.99	40° 9' 39.815 N	104° 48' 29.020 W	1,302,271.74	3,193,389.43
7,818.00	92.87	358.36	7,195.97	628.36	-1,108.83	40° 9' 41.349 N	104° 48' 29.056 W	1,302,426.91	3,193,385.37
7,913.00	91.54	357.96	7,192.31	723.24	-1,111.88	40° 9' 42.286 N	104° 48' 29.096 W	1,302,521.75	3,193,381.58
8,008.00	90.09	359.34	7,190.96	818.20	-1,114.12	40° 9' 43.225 N	104° 48' 29.124 W	1,302,616.69	3,193,378.59
8,103.00	89.66	359.07	7,191.17	913.19	-1,115.44	40° 9' 44.163 N	104° 48' 29.141 W	1,302,711.66	3,193,376.53
8,198.00	90.09	358.63	7,191.37	1,008.17	-1,117.34	40° 9' 45.102 N	104° 48' 29.166 W	1,302,806.62	3,193,373.88
8,294.00	88.52	358.55	7,192.54	1,104.13	-1,119.70	40° 9' 46.050 N	104° 48' 29.197 W	1,302,902.56	3,193,370.76
8,389.00	89.32	358.35	7,194.33	1,199.07	-1,122.27	40° 9' 46.989 N	104° 48' 29.230 W	1,302,997.48	3,193,367.45
8,484.00	89.29	357.93	7,195.48	1,294.02	-1,125.36	40° 9' 47.927 N	104° 48' 29.269 W	1,303,092.39	3,193,363.62
8,579.00	88.98	357.29	7,196.92	1,388.92	-1,129.32	40° 9' 48.865 N	104° 48' 29.321 W	1,303,187.26	3,193,358.92
8,674.00	88.70	357.47	7,198.84	1,483.80	-1,133.66	40° 9' 49.802 N	104° 48' 29.377 W	1,303,282.10	3,193,353.83
8,769.00	89.51	358.13	7,200.32	1,578.72	-1,137.31	40° 9' 50.740 N	104° 48' 29.424 W	1,303,376.98	3,193,349.44
8,864.00	89.41	356.71	7,201.22	1,673.62	-1,141.58	40° 9' 51.678 N	104° 48' 29.479 W	1,303,471.83	3,193,344.42
8,959.00	90.03	355.43	7,201.68	1,768.39	-1,148.09	40° 9' 52.615 N	104° 48' 29.563 W	1,303,566.55	3,193,337.16
9,054.00	90.31	357.26	7,201.40	1,863.19	-1,154.15	40° 9' 53.551 N	104° 48' 29.641 W	1,303,661.30	3,193,330.36
9,149.00	89.66	359.36	7,201.43	1,958.15	-1,156.95	40° 9' 54.490 N	104° 48' 29.677 W	1,303,756.22	3,193,326.82
9,244.00	90.56	358.95	7,201.24	2,053.13	-1,158.35	40° 9' 55.428 N	104° 48' 29.695 W	1,303,851.19	3,193,324.67
9,339.00	90.34	1.22	7,200.50	2,148.13	-1,158.21	40° 9' 56.367 N	104° 48' 29.693 W	1,303,946.18	3,193,324.07
9,435.00	91.54	0.87	7,198.92	2,244.09	-1,156.46	40° 9' 57.315 N	104° 48' 29.671 W	1,304,042.15	3,193,325.07
9,530.00	89.63	1.56	7,197.95	2,339.06	-1,154.45	40° 9' 58.254 N	104° 48' 29.645 W	1,304,137.13	3,193,326.33
9,625.00	89.88	0.48	7,198.36	2,434.05	-1,152.75	40° 9' 59.193 N	104° 48' 29.623 W	1,304,232.12	3,193,327.28
9,720.00	89.91	0.14	7,198.53	2,529.04	-1,152.24	40° 10' 0.131 N	104° 48' 29.616 W	1,304,327.11	3,193,327.05
9,815.00	90.93	359.86	7,197.84	2,624.04	-1,152.24	40° 10' 1.070 N	104° 48' 29.617 W	1,304,422.10	3,193,326.30
9,910.00	90.65	1.12	7,196.53	2,719.03	-1,151.43	40° 10' 2.009 N	104° 48' 29.606 W	1,304,517.09	3,193,326.37
10,005.00	89.26	359.48	7,196.60	2,814.02	-1,150.93	40° 10' 2.947 N	104° 48' 29.600 W	1,304,612.08	3,193,326.12
10,101.00	88.43	357.19	7,198.54	2,909.95	-1,153.72	40° 10' 3.895 N	104° 48' 29.636 W	1,304,707.98	3,193,322.58
10,196.00	89.69	355.75	7,200.09	3,004.75	-1,159.57	40° 10' 4.832 N	104° 48' 29.711 W	1,304,802.73	3,193,315.99
10,291.00	90.43	356.52	7,199.99	3,099.54	-1,165.97	40° 10' 5.769 N	104° 48' 29.794 W	1,304,897.46	3,193,308.84
10,386.00	91.73	358.54	7,198.20	3,194.42	-1,170.06	40° 10' 6.707 N	104° 48' 29.846 W	1,304,992.31	3,193,304.00
10,481.00	90.74	359.39	7,196.16	3,289.39	-1,171.78	40° 10' 7.645 N	104° 48' 29.869 W	1,305,087.25	3,193,301.54
10,576.00	89.29	0.28	7,196.13	3,384.38	-1,172.05	40° 10' 8.584 N	104° 48' 29.872 W	1,305,182.23	3,193,300.52
10,671.00	90.15	359.57	7,196.60	3,479.38	-1,172.18	40° 10' 9.523 N	104° 48' 29.874 W	1,305,277.22	3,193,299.65
10,766.00	90.31	359.86	7,196.21	3,574.38	-1,172.65	40° 10' 10.461 N	104° 48' 29.880 W	1,305,372.21	3,193,298.44
10,861.00	91.33	359.36	7,194.85	3,669.36	-1,173.30	40° 10' 11.400 N	104° 48' 29.888 W	1,305,467.18	3,193,297.04
10,956.00	92.25	358.48	7,191.89	3,764.30	-1,175.09	40° 10' 12.338 N	104° 48' 29.911 W	1,305,562.10	3,193,294.51
11,052.00	90.43	358.85	7,189.64	3,860.24	-1,177.32	40° 10' 13.286 N	104° 48' 29.940 W	1,305,658.02	3,193,291.52
11,147.00	91.23	359.16	7,188.27	3,955.22	-1,178.97	40° 10' 14.225 N	104° 48' 29.962 W	1,305,752.97	3,193,289.13
11,242.00	89.63	359.42	7,187.55	4,050.20	-1,180.15	40° 10' 15.164 N	104° 48' 29.977 W	1,305,847.94	3,193,287.20
11,337.00	90.68	359.14	7,187.30	4,145.19	-1,181.34	40° 10' 16.102 N	104° 48' 29.992 W	1,305,942.92	3,193,285.27
11,432.00	89.11	359.61	7,187.47	4,240.18	-1,182.38	40° 10' 17.041 N	104° 48' 30.006 W	1,306,037.89	3,193,283.48

Design Report for Kunzman 4N-5HZ - 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)
11,527.00	89.04	359.57	7,189.00	4,335.17	-1,183.06	40° 10' 17.980 N	104° 48' 30.015 W	1,306,132.87	3,193,282.06
11,622.00	89.29	359.66	7,190.39	4,430.16	-1,183.70	40° 10' 18.918 N	104° 48' 30.023 W	1,306,227.84	3,193,280.68
11,717.00	90.25	0.05	7,190.77	4,525.16	-1,183.94	40° 10' 19.857 N	104° 48' 30.026 W	1,306,322.83	3,193,279.69
11,812.00	91.02	359.93	7,189.72	4,620.15	-1,183.95	40° 10' 20.796 N	104° 48' 30.026 W	1,306,417.82	3,193,278.93
11,869.00	91.54	359.80	7,188.44	4,677.13	-1,184.09	40° 10' 21.359 N	104° 48' 30.028 W	1,306,474.80	3,193,278.35
11,913.00	91.54	359.80	7,187.26	4,721.12	-1,184.24	40° 10' 21.794 N	104° 48' 30.030 W	1,306,518.78	3,193,277.85

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
255.00	255.00	0.51	0.73	First MWD Survey @ 255.00ft
11,869.00	7,188.44	4,677.13	-1,184.09	Final MWD Survey @ 11869' MD :: 7188.44' TVD
11,913.00	7,187.26	4,721.12	-1,184.24	Str. Line Proj to Bit @ 11913' MD :: 7187.26' 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
255.00	7,626.00	MWD Vertical/Build Svys	MWD+SC
7,818.00	11,869.00	MWD Lateral Surveys	MWD+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
892.00	891.98	9 5/8" Casing Set @ 892.00' MD :: 891.98' TVD	9-5/8	13-1/2
7,662.70	7,200.19	7" Casing Set @ 7662.70' MD :: 7200.19' TVD	7	8-3/4

Design Report for Kunzman 4N-5HZ - 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:	1.95 °/100usft	Maximum Dogleg over Survey:	15.98 °/100usft at 7,503.00 usft
Net Tortousity applicable to Plans:	0.96 °/100usft	Directional Difficuly Index:	6.358

Audit Info

North Reference Sheet for Sec. 8-T2N-R66W - Kunzman 4N-5HZ - 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 = 13' @ 4871.00usft (Ensign 132). Northing and Easting are relative to Kunzman 4N-5HZ

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: 0.99995810

Grid Coordinates of Well: 1,301,807.30 usft N, 3,194,499.05 usft E

Geographical Coordinates of Well: 40° 09' 35.14" N, 104° 48' 14.77" W

Grid Convergence at Surface is: 0.45°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,913.00usft

the Bottom Hole Displacement is 4,867.38usft in the Direction of 345.92° (True).

Magnetic Convergence at surface is: -8.14° (24 September 2013, , BGGM2013)

