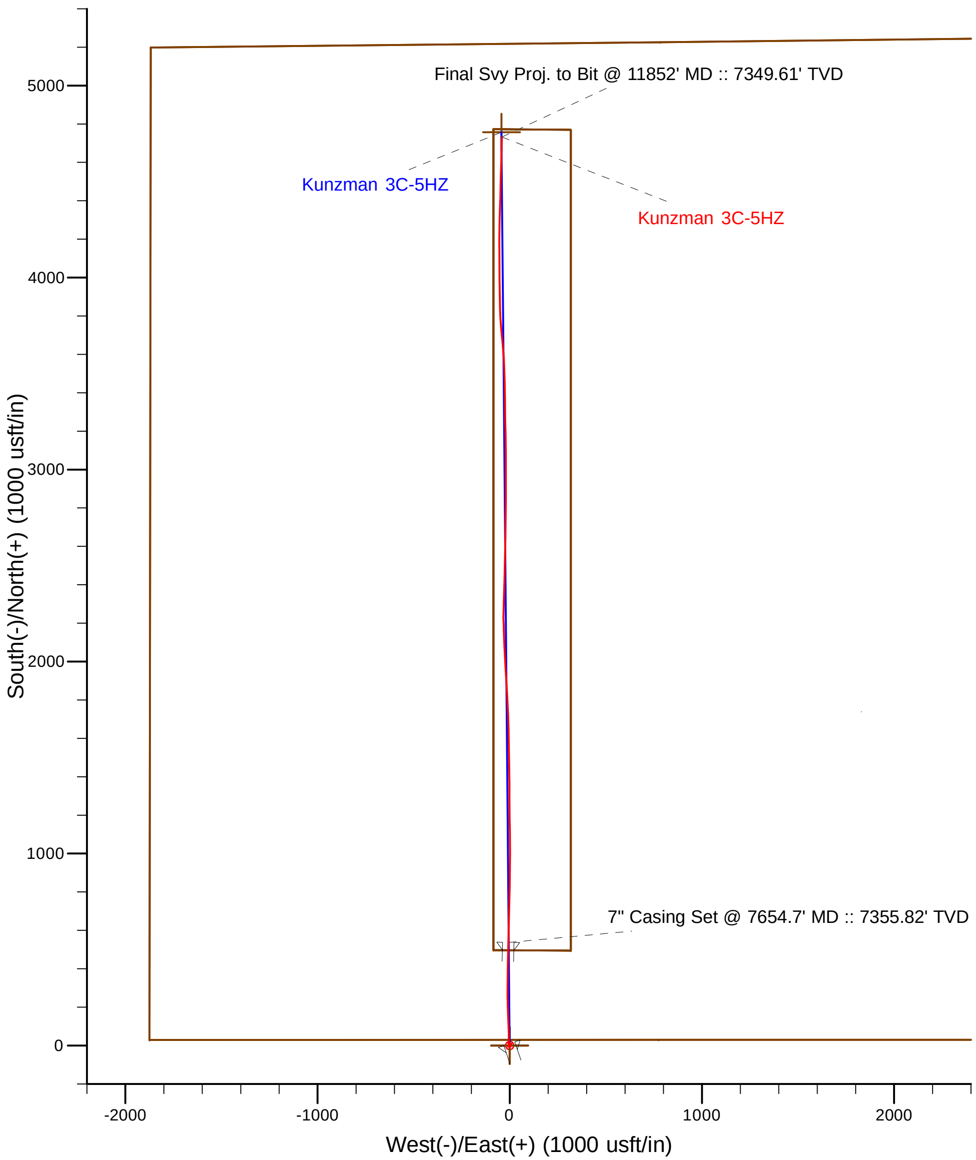
Project: Weld County, CO (NAD 83)
Site: Sec. 8-T2N-R66W
Well: Kunzman 3C-5HZ
Wellbore: Plan A
Design: Actual Field Surveys

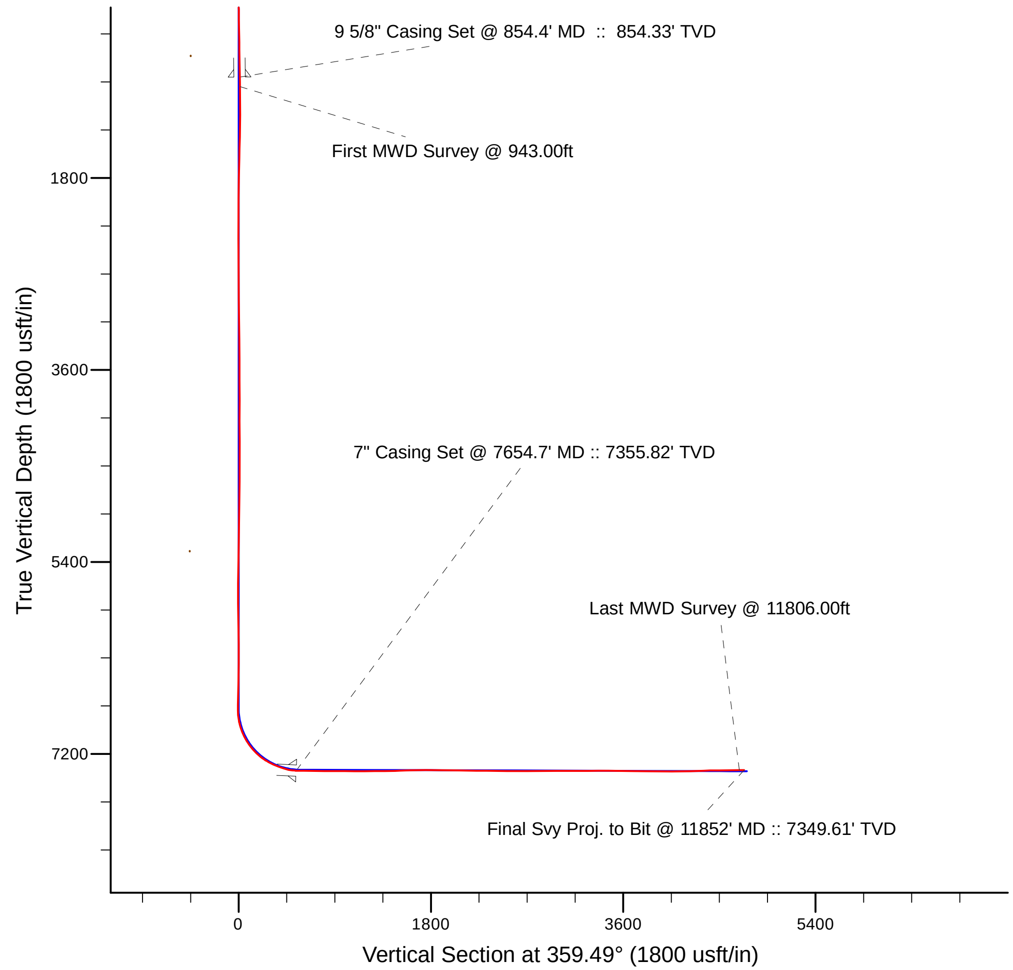
Anadarko Petroleum Corporation

HALLIBURTON
Sperry Drilling

LEGEND

Kunzman 3C-5HZ, Plan A, Rev A0 V0
Actual Field Surveys





7" Casing: ~507.57' FSL, ~1876.48' FWL
Lat/Long: 40.161237 N, -104.803941 E
State Planes - CO Northern: 1,302,345.31' N, 3,194,540.49' E
Location: Sec. 5-T2N-R66W

BHL: ~485.46' FNL, ~1835.62' FWL
Lat/Long: 40.172751 N, -104.804064 E
State Planes - CO Northern: 1,306,539.40' N, 3,194,473.06' E
Location: Sec. 5-T2N-R66W

WELL DETAILS: Kunzman 3C-5HZ

Ground Level: 4858.00
RKB = 13' @ 4871.00usft (Ensign 132)

Design: Actual Field Surveys (Kunzman 3C-5HZ/Plan A)

Created By: Clint Eshelman Date: 11/7/2013
Reviewed: ____________________ Date: __________

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)
Sec. 8-T2N-R66W
Kunzman 3C-5HZ

Plan A

Design: Actual Field Surveys

Sperry Drilling Services

Standard Report

07 November, 2013

Well Coordinates: 1,301,807.69 N, 3,194,551.04 E (40° 09' 35.14" N, 104° 48' 14.10" W)
Ground Level: 4,858.00 usft

Local Coordinate Origin:	Centered on Well Kunzman 3C-5HZ
Viewing Datum:	RKB = 13' @ 4871.00usft (Ensign 132)
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 Kunzman 3C-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
224.00	0.68	23.78	223.99	1.22	0.54	1.21	0.30
317.00	0.62	7.21	316.99	2.22	0.82	2.21	0.21
527.00	0.90	315.56	526.97	4.53	-0.19	4.53	0.34
596.00	0.94	342.31	595.96	5.45	-0.74	5.46	0.62
689.00	1.02	346.24	688.95	6.98	-1.17	6.99	0.11
810.00	0.86	340.84	809.93	8.89	-1.72	8.90	0.15
Tie-On to Gyro Surveys @ 810.00ft							
854.40	0.94	341.36	854.33	9.54	-1.95	9.56	0.17
9 5/8" Casing Set @ 854.4' MD :: 854.33' TVD							
943.00	1.09	342.17	942.91	11.03	-2.44	11.05	0.17
First MWD Survey @ 943.00ft							
1,065.00	1.17	348.37	1,064.89	13.36	-3.05	13.38	0.12
1,188.00	0.74	233.47	1,187.88	14.12	-3.94	14.15	1.32
1,280.00	1.40	184.49	1,279.87	12.64	-4.50	12.68	1.16
1,432.00	1.92	198.73	1,431.80	8.38	-5.47	8.43	0.43
1,524.00	1.02	177.25	1,523.77	6.10	-5.92	6.15	1.13
1,616.00	1.15	176.97	1,615.76	4.36	-5.83	4.41	0.14
1,799.00	1.44	214.00	1,798.71	0.62	-7.02	0.68	0.47
1,985.00	0.86	135.33	1,984.68	-2.31	-7.35	-2.24	0.82
2,176.00	0.43	217.97	2,175.67	-3.89	-6.78	-3.83	0.48
2,366.00	0.57	266.33	2,365.67	-4.52	-8.16	-4.44	0.23
2,556.00	1.23	39.27	2,555.65	-3.00	-7.82	-2.93	0.88
2,746.00	0.95	82.46	2,745.62	-1.21	-4.96	-1.17	0.44
2,937.00	0.92	47.79	2,936.60	0.03	-2.26	0.05	0.29
3,127.00	1.33	50.69	3,126.56	2.45	0.58	2.44	0.22
3,317.00	0.89	34.35	3,316.53	5.06	3.12	5.03	0.28
3,507.00	0.47	46.85	3,506.51	6.81	4.52	6.77	0.23
3,697.00	0.56	79.46	3,696.50	7.52	6.00	7.46	0.16
3,888.00	0.25	347.51	3,887.50	8.09	6.83	8.03	0.33
4,078.00	0.86	210.55	4,077.49	7.27	6.01	7.22	0.56
4,268.00	0.70	40.36	4,267.49	6.93	6.04	6.87	0.82
4,522.00	0.66	30.69	4,521.47	9.37	7.79	9.30	0.05
4,649.00	0.66	141.03	4,648.47	9.43	8.62	9.35	0.85
4,839.00	1.23	204.38	4,838.44	6.72	8.47	6.64	0.58
5,029.00	1.41	202.50	5,028.39	2.70	6.73	2.64	0.10
5,219.00	0.86	191.00	5,218.36	-0.86	5.57	-0.91	0.31
5,409.00	0.62	189.98	5,408.34	-3.27	5.12	-3.31	0.13
5,599.00	0.35	202.19	5,598.33	-4.82	4.72	-4.86	0.15
5,790.00	0.34	23.03	5,789.33	-4.84	4.72	-4.88	0.36
5,980.00	0.63	341.13	5,979.33	-3.33	4.60	-3.37	0.23
6,170.00	0.91	350.15	6,169.31	-0.86	4.01	-0.89	0.16
6,360.00	0.94	206.26	6,359.30	-0.77	3.06	-0.79	0.93
6,550.00	1.23	213.65	6,549.26	-3.86	1.24	-3.87	0.17
6,741.00	1.41	201.39	6,740.21	-7.76	-0.75	-7.75	0.17
6,789.00	1.37	335.87	6,788.21	-7.78	-1.20	-7.77	5.34
6,836.00	5.17	350.80	6,835.12	-5.18	-1.77	-5.16	8.22
6,884.00	9.87	355.30	6,882.70	1.06	-2.45	1.08	9.86
6,931.00	15.81	354.15	6,928.50	11.45	-3.44	11.48	12.65
6,979.00	18.76	358.50	6,974.33	25.68	-4.31	25.71	6.71

Design Report for Kunzman 3C-5HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
7,026.00	24.23	359.32	7,018.05	42.89	-4.62	42.93	11.66
7,074.00	29.74	358.82	7,060.80	64.66	-4.98	64.70	11.49
7,121.00	33.93	357.74	7,100.72	89.43	-5.74	89.48	9.00
7,169.00	38.32	358.16	7,139.49	117.70	-6.74	117.76	9.16
7,216.00	43.89	357.53	7,174.89	148.57	-7.92	148.63	11.88
7,265.00	48.64	358.12	7,208.75	183.94	-9.25	184.01	9.73
7,312.00	54.11	358.24	7,238.08	220.63	-10.42	220.71	11.64
7,360.00	58.60	359.31	7,264.67	260.56	-11.26	260.65	9.54
7,407.00	63.00	359.63	7,287.59	301.58	-11.64	301.67	9.38
7,455.00	68.15	0.07	7,307.43	345.27	-11.75	345.36	10.76
7,502.00	70.01	1.90	7,324.21	389.16	-10.99	389.24	5.37
7,553.00	73.37	2.21	7,340.23	437.54	-9.25	437.60	6.61
7,597.00	80.34	1.68	7,350.23	480.34	-7.80	480.39	15.88
7,622.00	84.41	1.51	7,353.55	505.10	-7.11	505.14	16.29
7,654.70	87.62	1.25	7,355.82	537.71	-6.33	537.74	9.84
7" Casing Set @ 7654.7' MD :: 7355.82' TVD							
7,674.00	89.51	1.09	7,356.31	557.00	-5.94	557.03	9.84
7,726.00	89.45	1.20	7,356.78	608.98	-4.90	609.00	0.24
7,821.00	89.35	0.85	7,357.78	703.96	-3.20	703.96	0.38
7,916.00	89.57	1.36	7,358.67	798.94	-1.36	798.92	0.58
8,012.00	89.69	1.57	7,359.29	894.91	1.09	894.86	0.25
8,107.00	89.75	359.56	7,359.75	989.90	2.03	989.84	2.12
8,202.00	89.32	359.35	7,360.53	1,084.89	1.12	1,084.84	0.50
8,297.00	90.43	359.21	7,360.73	1,179.88	-0.07	1,179.83	1.18
8,392.00	90.52	359.52	7,359.95	1,274.87	-1.12	1,274.83	0.34
8,487.00	90.22	359.54	7,359.33	1,369.86	-1.90	1,369.83	0.32
8,582.00	92.07	359.27	7,357.43	1,464.84	-2.89	1,464.80	1.97
8,677.00	92.09	359.23	7,353.99	1,559.77	-4.13	1,559.74	0.05
8,772.00	91.66	358.09	7,350.88	1,654.69	-6.35	1,654.68	1.28
8,867.00	89.63	357.71	7,349.81	1,749.61	-9.83	1,749.63	2.17
8,963.00	89.57	356.91	7,350.48	1,845.50	-14.34	1,845.56	0.84
9,058.00	89.14	356.32	7,351.55	1,940.33	-19.95	1,940.43	0.77
9,153.00	88.80	357.09	7,353.26	2,035.16	-25.41	2,035.30	0.89
9,248.00	89.51	357.46	7,354.66	2,130.04	-29.92	2,130.22	0.84
9,343.00	89.51	359.76	7,355.47	2,225.00	-32.23	2,225.20	2.42
9,438.00	89.41	2.18	7,356.36	2,319.98	-30.62	2,320.16	2.55
9,533.00	89.07	1.51	7,357.62	2,414.92	-27.56	2,415.07	0.79
9,628.00	89.32	1.40	7,358.96	2,509.88	-25.15	2,510.00	0.29
9,723.00	89.57	1.52	7,359.88	2,604.84	-22.73	2,604.94	0.29
9,819.00	90.71	0.41	7,359.64	2,700.83	-21.11	2,700.91	1.66
9,914.00	90.31	0.33	7,358.80	2,795.82	-20.50	2,795.89	0.43
10,009.00	90.56	0.33	7,358.08	2,890.82	-19.95	2,890.88	0.26
10,104.00	90.34	359.60	7,357.33	2,985.81	-20.01	2,985.87	0.80
10,199.00	89.78	359.43	7,357.23	3,080.81	-20.81	3,080.87	0.62
10,294.00	90.06	359.32	7,357.36	3,175.80	-21.85	3,175.87	0.32
10,389.00	90.34	359.20	7,357.03	3,270.79	-23.08	3,270.87	0.32
10,484.00	90.15	358.96	7,356.63	3,365.78	-24.60	3,365.87	0.32
10,579.00	90.28	358.47	7,356.27	3,460.76	-26.73	3,460.86	0.53
10,674.00	90.15	357.81	7,355.91	3,555.70	-29.82	3,555.83	0.71
10,769.00	86.61	354.60	7,358.60	3,650.43	-36.10	3,650.61	5.03
10,865.00	88.64	355.07	7,362.58	3,745.95	-44.73	3,746.20	2.17

Design Report for Kunzman 3C-5HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
10,960.00	90.43	358.39	7,363.35	3,840.78	-50.15	3,841.07	3.97
11,055.00	90.74	359.83	7,362.38	3,935.76	-51.62	3,936.06	1.55
11,150.00	88.98	358.81	7,362.61	4,030.75	-52.75	4,031.06	2.14
11,245.00	90.31	359.60	7,363.20	4,125.73	-54.07	4,126.05	1.63
11,340.00	91.69	1.26	7,361.54	4,220.71	-53.36	4,221.02	2.27
11,435.00	92.63	1.41	7,357.96	4,315.62	-51.14	4,315.90	1.00
11,530.00	91.20	1.54	7,354.79	4,410.53	-48.70	4,410.79	1.51
11,625.00	90.09	1.70	7,353.72	4,505.48	-46.02	4,505.72	1.18
11,721.00	90.80	1.17	7,352.97	4,601.45	-43.61	4,601.66	0.92
11,806.00	91.79	1.24	7,351.05	4,686.41	-41.82	4,686.60	1.17
Last MWD Survey @ 11806.00ft							
11,852.00	91.79	1.24	7,349.61	4,732.38	-40.83	4,732.55	0.00
Final Svy Proj. to Bit @ 11852' MD :: 7349.61' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	+E/-W (usft)	Comment
810.00	809.93	8.89	-1.72	Tie-On to Gyro Surveys @ 810.00ft
943.00	942.91	11.03	-2.44	First MWD Survey @ 943.00ft
11,806.00	7,351.05	4,686.41	-41.82	Last MWD Survey @ 11806.00ft
11,852.00	7,349.61	4,732.38	-40.83	Final Svy Proj. to Bit @ 11852' MD :: 7349.61' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	Origin +E/-W (usft)	Start TVD (usft)
User	No Target (Freehand)	359.49	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
224.00	810.00	MWD Surface Surveys	MWD+SC
943.00	7,674.00	MWD Vertical/Build Svys	MWD+SC
7,726.00	11,806.00	MWD Lateral Surveys	MWD+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
854.40	854.33	9 5/8" Casing Set @ 854.4' MD :: 854.33' TVD	9-5/8	13-1/2
7,654.70	7,355.82	7" Casing Set @ 7654.7' MD :: 7355.82' TVD	7	8-3/4

Design Report for Kunzman 3C-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 3C-5HZ_SE	0.00	0.00	0.00	0.00	0.00	1,301,807.69	3,194,551.04	40° 9' 35.139 N	104° 48' 14.105 W
- actual wellpath hits target center									
- Polygon									
Point 1			0.00	5,198.44	-1,867.30	1,306,991.10	3,192,643.07		
Point 2			0.00	29.35	-1,874.01	1,301,822.33	3,192,676.93		
Point 3			0.00	30.43	775.47	1,301,844.21	3,195,326.21		
Point 4			0.00	30.51	3,424.71	1,301,865.08	3,197,975.26		
Point 5			0.00	2,675.79	3,428.27	1,304,510.20	3,197,958.05		
Point 6			0.00	5,255.04	3,433.77	1,307,089.31	3,197,943.31		
Point 7			0.00	5,226.65	783.26	1,307,040.11	3,195,293.21		
Point 8			0.00	5,198.44	-1,867.30	1,306,991.10	3,192,643.07		
Kunzman 3C-5HZ_LD	0.00	0.00	0.00	0.00	0.00	1,301,807.69	3,194,551.04	40° 9' 35.139 N	104° 48' 14.105 W
- actual wellpath hits target center									
- Polygon									
Point 1			0.00	4,773.40	-84.50	1,306,580.08	3,194,429.07		
Point 2			0.00	497.19	-84.21	1,302,304.19	3,194,462.93		
Point 3			0.00	494.03	318.80	1,302,304.19	3,194,865.93		
Point 4			0.00	4,770.23	318.50	1,306,580.08	3,194,832.07		
Point 5			0.00	4,773.40	-84.50	1,306,580.08	3,194,429.07		
Kunzman 3C-5HZ_SH	0.00	0.00	0.00	0.00	0.00	1,301,807.69	3,194,551.04	40° 9' 35.139 N	104° 48' 14.105 W
- actual wellpath hits target center									
- Point									
Kunzman 3C-5HZ_BH	0.00	0.00	7,361.00	4,757.74	-42.76	1,306,564.75	3,194,470.94	40° 10' 22.156 N	104° 48' 14.656 W
- actual wellpath misses target center by 27.87usft at 11852.00usft MD (7349.61 TVD, 4732.38 N, -40.83 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	1.41 °/100usft	Maximum Dogleg over Survey:	16.29 °/100usft at 7,622.00 usft
Net Tortousity applicable to Plans:	0.65 °/100usft	Directional Difficulty Index:	6.115

Audit Info

North Reference Sheet for Sec. 8-T2N-R66W - Kunzman 3C-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 3C-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

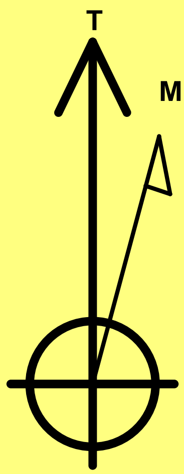
Grid Coordinates of Well: 1,301,807.69 usft N, 3,194,551.04 usft E

Geographical Coordinates of Well: 40° 09' 35.14" N, 104° 48' 14.10" W

Grid Convergence at Surface is: 0.45°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,852.00usft
the Bottom Hole Displacement is 4,732.55usft in the Direction of 359.51° (True).

Magnetic Convergence at surface is: -8.14° (29 September 2013, , BGGM2013)



Magnetic Model:	BGGM2013
Date:	29-Sep-13
Declination:	8.59°
Inclination/Dip:	66.76°
Field Strength:	52687

Grid North is 0.45° East of True North (Grid Convergence)
Magnetic North is 8.59° East of True North (Magnetic Declination)
Magnetic North is 8.14° East of Grid North (Magnetic Convergence)

To convert a True Direction to a Grid Direction, Subtract 0.45°
To convert a Magnetic Direction to a True Direction, Add 8.59° East
To convert a Magnetic Direction to a Grid Direction, Add 8.14°

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)
Sec. 8-T2N-R66W
Kunzman 3C-5HZ

Plan A

Design: Actual Field Surveys

Sperry Drilling Services

Geodetic Report

07 November, 2013

Well Coordinates: 1,301,807.69 N, 3,194,551.04 E (40° 09' 35.14" N, 104° 48' 14.10" W)
Ground Level: 4,858.00 usft

Local Coordinate Origin:	Centered on Well Kunzman 3C-5HZ
Viewing Datum:	RKB = 13' @ 4871.00usft (Ensign 132)
TVDs to System:	N
North Reference:	True
Unit System:	Dec-Deg - API - US Survey Feet - Custom

Geodetic Scale Factor Applied
Version: 5000.1 Build: 70

HALLIBURTON

Design Report for Kunzman 3C-5HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Geographic Coordinates Latitude (usft)	Geographic Coordinates Longitude (usft)	UTM Coordinates Northing (usft)	UTM Coordinates Easting (usft)
0.00	0.00	0.00	0.00	0.00	0.00	40.159761	-104.803918	1,301,807.69	3,194,551.04
224.00	0.68	23.78	223.99	1.22	0.54	40.159764	-104.803916	1,301,808.91	3,194,551.56
317.00	0.62	7.21	316.99	2.22	0.82	40.159767	-104.803915	1,301,809.92	3,194,551.84
527.00	0.90	315.56	526.97	4.53	-0.19	40.159773	-104.803919	1,301,812.21	3,194,550.81
596.00	0.94	342.31	595.96	5.45	-0.74	40.159776	-104.803921	1,301,813.14	3,194,550.25
689.00	1.02	346.24	688.95	6.98	-1.17	40.159780	-104.803922	1,301,814.66	3,194,549.81
810.00	0.86	340.84	809.93	8.89	-1.72	40.159785	-104.803924	1,301,816.56	3,194,549.24
854.40	0.94	341.36	854.33	9.54	-1.95	40.159787	-104.803925	1,301,817.22	3,194,549.01
943.00	1.09	342.17	942.91	11.03	-2.44	40.159791	-104.803927	1,301,818.70	3,194,548.51
1,065.00	1.17	348.37	1,064.89	13.36	-3.05	40.159798	-104.803929	1,301,821.02	3,194,547.89
1,188.00	0.74	233.47	1,187.88	14.12	-3.94	40.159800	-104.803932	1,301,821.77	3,194,546.99
1,280.00	1.40	184.49	1,279.87	12.64	-4.50	40.159796	-104.803934	1,301,820.30	3,194,546.43
1,432.00	1.92	198.73	1,431.80	8.38	-5.47	40.159784	-104.803938	1,301,816.03	3,194,545.50
1,524.00	1.02	177.25	1,523.77	6.10	-5.92	40.159778	-104.803939	1,301,813.74	3,194,545.07
1,616.00	1.15	176.97	1,615.76	4.36	-5.83	40.159773	-104.803939	1,301,812.01	3,194,545.17
1,799.00	1.44	214.00	1,798.71	0.62	-7.02	40.159763	-104.803943	1,301,808.26	3,194,544.01
1,985.00	0.86	135.33	1,984.68	-2.31	-7.35	40.159755	-104.803945	1,301,805.32	3,194,543.71
2,176.00	0.43	217.97	2,175.67	-3.89	-6.78	40.159750	-104.803943	1,301,803.74	3,194,544.29
2,366.00	0.57	266.33	2,365.67	-4.52	-8.16	40.159749	-104.803947	1,301,803.11	3,194,542.91
2,556.00	1.23	39.27	2,555.65	-3.00	-7.82	40.159753	-104.803946	1,301,804.63	3,194,543.24
2,746.00	0.95	82.46	2,745.62	-1.21	-4.96	40.159758	-104.803936	1,301,806.44	3,194,546.08
2,937.00	0.92	47.79	2,936.60	0.03	-2.26	40.159761	-104.803926	1,301,807.70	3,194,548.78
3,127.00	1.33	50.69	3,126.56	2.45	0.58	40.159768	-104.803916	1,301,810.14	3,194,551.60
3,317.00	0.89	34.35	3,316.53	5.06	3.12	40.159775	-104.803907	1,301,812.78	3,194,554.11
3,507.00	0.47	46.85	3,506.51	6.81	4.52	40.159780	-104.803902	1,301,814.54	3,194,555.50
3,697.00	0.56	79.46	3,696.50	7.52	6.00	40.159782	-104.803897	1,301,815.25	3,194,556.98
3,888.00	0.25	347.51	3,887.50	8.09	6.83	40.159783	-104.803894	1,301,815.84	3,194,557.80
4,078.00	0.86	210.55	4,077.49	7.27	6.01	40.159781	-104.803897	1,301,815.01	3,194,556.99
4,268.00	0.70	40.36	4,267.49	6.93	6.04	40.159780	-104.803897	1,301,814.66	3,194,557.02
4,522.00	0.66	30.69	4,521.47	9.37	7.79	40.159787	-104.803890	1,301,817.12	3,194,558.75
4,649.00	0.66	141.03	4,648.47	9.43	8.62	40.159787	-104.803887	1,301,817.19	3,194,559.59
4,839.00	1.23	204.38	4,838.44	6.72	8.47	40.159779	-104.803888	1,301,814.48	3,194,559.45
5,029.00	1.41	202.50	5,028.39	2.70	6.73	40.159768	-104.803894	1,301,810.45	3,194,557.75
5,219.00	0.86	191.00	5,218.36	-0.86	5.57	40.159759	-104.803898	1,301,806.88	3,194,556.61
5,409.00	0.62	189.98	5,408.34	-3.27	5.12	40.159752	-104.803900	1,301,804.46	3,194,556.18
5,599.00	0.35	202.19	5,598.33	-4.82	4.72	40.159748	-104.803901	1,301,802.91	3,194,555.79
5,790.00	0.34	23.03	5,789.33	-4.84	4.72	40.159748	-104.803901	1,301,802.89	3,194,555.80
5,980.00	0.63	341.13	5,979.33	-3.33	4.60	40.159752	-104.803902	1,301,804.40	3,194,555.67
6,170.00	0.91	350.15	6,169.31	-0.86	4.01	40.159759	-104.803904	1,301,806.87	3,194,555.05
6,360.00	0.94	206.26	6,359.30	-0.77	3.06	40.159759	-104.803907	1,301,806.95	3,194,554.10
6,550.00	1.23	213.65	6,549.26	-3.86	1.24	40.159750	-104.803914	1,301,803.84	3,194,552.31
6,741.00	1.41	201.39	6,740.21	-7.76	-0.75	40.159740	-104.803921	1,301,799.93	3,194,550.34

Design Report for Kunzman 3C-5HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Geographic Coordinates Latitude (usft)	Geographic Coordinates Longitude (usft)	UTM Coordinates Northing (usft)	UTM Coordinates Easting (usft)
6,789.00	1.37	335.87	6,788.21	-7.78	-1.20	40.159740	-104.803923	1,301,799.90	3,194,549.90
6,836.00	5.17	350.80	6,835.12	-5.18	-1.77	40.159747	-104.803925	1,301,802.50	3,194,549.31
6,884.00	9.87	355.30	6,882.70	1.06	-2.45	40.159764	-104.803927	1,301,808.73	3,194,548.57
6,931.00	15.81	354.15	6,928.50	11.45	-3.44	40.159792	-104.803931	1,301,819.12	3,194,547.51
6,979.00	18.76	358.50	6,974.33	25.68	-4.31	40.159832	-104.803934	1,301,833.33	3,194,546.53
7,026.00	24.23	359.32	7,018.05	42.89	-4.62	40.159879	-104.803935	1,301,850.54	3,194,546.08
7,074.00	29.74	358.82	7,060.80	64.66	-4.98	40.159939	-104.803936	1,301,872.30	3,194,545.55
7,121.00	33.93	357.74	7,100.72	89.43	-5.74	40.160007	-104.803939	1,301,897.07	3,194,544.60
7,169.00	38.32	358.16	7,139.49	117.70	-6.74	40.160084	-104.803942	1,301,925.33	3,194,543.37
7,216.00	43.89	357.53	7,174.89	148.57	-7.92	40.160169	-104.803947	1,301,956.19	3,194,541.95
7,265.00	48.64	358.12	7,208.75	183.94	-9.25	40.160266	-104.803951	1,301,991.54	3,194,540.34
7,312.00	54.11	358.24	7,238.08	220.63	-10.42	40.160367	-104.803956	1,302,028.22	3,194,538.89
7,360.00	58.60	359.31	7,264.67	260.56	-11.26	40.160476	-104.803959	1,302,068.15	3,194,537.73
7,407.00	63.00	359.63	7,287.59	301.58	-11.64	40.160589	-104.803960	1,302,109.16	3,194,537.03
7,455.00	68.15	0.07	7,307.43	345.27	-11.75	40.160709	-104.803960	1,302,152.84	3,194,536.58
7,502.00	70.01	1.90	7,324.21	389.16	-10.99	40.160829	-104.803958	1,302,196.74	3,194,536.99
7,553.00	73.37	2.21	7,340.23	437.54	-9.25	40.160962	-104.803951	1,302,245.13	3,194,538.35
7,597.00	80.34	1.68	7,350.23	480.34	-7.80	40.161080	-104.803946	1,302,287.93	3,194,539.46
7,622.00	84.41	1.51	7,353.55	505.10	-7.11	40.161148	-104.803944	1,302,312.70	3,194,539.96
7,654.70	87.62	1.25	7,355.82	537.71	-6.33	40.161237	-104.803941	1,302,345.31	3,194,540.49
7,674.00	89.51	1.09	7,356.31	557.00	-5.94	40.161290	-104.803939	1,302,364.60	3,194,540.73
7,726.00	89.45	1.20	7,356.78	608.98	-4.90	40.161433	-104.803936	1,302,416.59	3,194,541.36
7,821.00	89.35	0.85	7,357.78	703.96	-3.20	40.161693	-104.803930	1,302,511.58	3,194,542.31
7,916.00	89.57	1.36	7,358.67	798.94	-1.36	40.161954	-104.803923	1,302,606.56	3,194,543.40
8,012.00	89.69	1.57	7,359.29	894.91	1.09	40.162218	-104.803914	1,302,702.54	3,194,545.10
8,107.00	89.75	359.56	7,359.75	989.90	2.03	40.162478	-104.803911	1,302,797.53	3,194,545.29
8,202.00	89.32	359.35	7,360.53	1,084.89	1.12	40.162739	-104.803914	1,302,892.51	3,194,543.64
8,297.00	90.43	359.21	7,360.73	1,179.88	-0.07	40.163000	-104.803919	1,302,987.48	3,194,541.70
8,392.00	90.52	359.52	7,359.95	1,274.87	-1.12	40.163261	-104.803922	1,303,082.46	3,194,539.91
8,487.00	90.22	359.54	7,359.33	1,369.86	-1.90	40.163521	-104.803925	1,303,177.44	3,194,538.38
8,582.00	92.07	359.27	7,357.43	1,464.84	-2.89	40.163782	-104.803929	1,303,272.40	3,194,536.65
8,677.00	92.09	359.23	7,353.99	1,559.77	-4.13	40.164043	-104.803933	1,303,367.31	3,194,534.66
8,772.00	91.66	358.09	7,350.88	1,654.69	-6.35	40.164303	-104.803941	1,303,462.21	3,194,531.70
8,867.00	89.63	357.71	7,349.81	1,749.61	-9.83	40.164564	-104.803953	1,303,557.10	3,194,527.47
8,963.00	89.57	356.91	7,350.48	1,845.50	-14.34	40.164827	-104.803970	1,303,652.95	3,194,522.21
9,058.00	89.14	356.32	7,351.55	1,940.33	-19.95	40.165087	-104.803990	1,303,747.72	3,194,515.86
9,153.00	88.80	357.09	7,353.26	2,035.16	-25.41	40.165348	-104.804009	1,303,842.50	3,194,509.66
9,248.00	89.51	357.46	7,354.66	2,130.04	-29.92	40.165608	-104.804025	1,303,937.34	3,194,504.40
9,343.00	89.51	359.76	7,355.47	2,225.00	-32.23	40.165869	-104.804034	1,304,032.28	3,194,501.35
9,438.00	89.41	2.18	7,356.36	2,319.98	-30.62	40.166129	-104.804028	1,304,127.26	3,194,502.21
9,533.00	89.07	1.51	7,357.62	2,414.92	-27.56	40.166390	-104.804017	1,304,222.22	3,194,504.52
9,628.00	89.32	1.40	7,358.96	2,509.88	-25.15	40.166651	-104.804008	1,304,317.19	3,194,506.19

Design Report for Kunzman 3C-5HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Geographic Coordinates Latitude (usft)	Geographic Coordinates Longitude (usft)	UTM Coordinates Northing (usft)	UTM Coordinates Easting (usft)
9,723.00	89.57	1.52	7,359.88	2,604.84	-22.73	40.166911	-104.804000	1,304,412.17	3,194,507.86
9,819.00	90.71	0.41	7,359.64	2,700.83	-21.11	40.167175	-104.803994	1,304,508.15	3,194,508.73
9,914.00	90.31	0.33	7,358.80	2,795.82	-20.50	40.167436	-104.803992	1,304,603.15	3,194,508.59
10,009.00	90.56	0.33	7,358.08	2,890.82	-19.95	40.167696	-104.803990	1,304,698.14	3,194,508.40
10,104.00	90.34	359.60	7,357.33	2,985.81	-20.01	40.167957	-104.803990	1,304,793.13	3,194,507.59
10,199.00	89.78	359.43	7,357.23	3,080.81	-20.81	40.168218	-104.803993	1,304,888.11	3,194,506.04
10,294.00	90.06	359.32	7,357.36	3,175.80	-21.85	40.168479	-104.803996	1,304,983.09	3,194,504.26
10,389.00	90.34	359.20	7,357.03	3,270.79	-23.08	40.168739	-104.804001	1,305,078.07	3,194,502.29
10,484.00	90.15	358.96	7,356.63	3,365.78	-24.60	40.169000	-104.804006	1,305,173.03	3,194,500.02
10,579.00	90.28	358.47	7,356.27	3,460.76	-26.73	40.169261	-104.804014	1,305,267.98	3,194,497.14
10,674.00	90.15	357.81	7,355.91	3,555.70	-29.82	40.169521	-104.804025	1,305,362.90	3,194,493.31
10,769.00	86.61	354.60	7,358.60	3,650.43	-36.10	40.169782	-104.804047	1,305,457.57	3,194,486.29
10,865.00	88.64	355.07	7,362.58	3,745.95	-44.73	40.170044	-104.804078	1,305,553.02	3,194,476.90
10,960.00	90.43	358.39	7,363.35	3,840.78	-50.15	40.170304	-104.804098	1,305,647.80	3,194,470.74
11,055.00	90.74	359.83	7,362.38	3,935.76	-51.62	40.170565	-104.804103	1,305,742.76	3,194,468.52
11,150.00	88.98	358.81	7,362.61	4,030.75	-52.75	40.170825	-104.804107	1,305,837.73	3,194,466.65
11,245.00	90.31	359.60	7,363.20	4,125.73	-54.07	40.171086	-104.804112	1,305,932.70	3,194,464.59
11,340.00	91.69	1.26	7,361.54	4,220.71	-53.36	40.171347	-104.804109	1,306,027.68	3,194,464.55
11,435.00	92.63	1.41	7,357.96	4,315.62	-51.14	40.171607	-104.804101	1,306,122.59	3,194,466.02
11,530.00	91.20	1.54	7,354.79	4,410.53	-48.70	40.171868	-104.804093	1,306,217.52	3,194,467.72
11,625.00	90.09	1.70	7,353.72	4,505.48	-46.02	40.172129	-104.804083	1,306,312.49	3,194,469.66
11,721.00	90.80	1.17	7,352.97	4,601.45	-43.61	40.172392	-104.804074	1,306,408.46	3,194,471.31
11,806.00	91.79	1.24	7,351.05	4,686.41	-41.82	40.172625	-104.804068	1,306,493.43	3,194,472.43
11,852.00	91.79	1.24	7,349.61	4,732.38	-40.83	40.172751	-104.804064	1,306,539.40	3,194,473.06

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
810.00	809.93	8.89	-1.72	Tie-On to Gyro Surveys @ 810.00ft
943.00	942.91	11.03	-2.44	First MWD Survey @ 943.00ft
11,806.00	7,351.05	4,686.41	-41.82	Last MWD Survey @ 11806.00ft
11,852.00	7,349.61	4,732.38	-40.83	Final Svy Proj. to Bit @ 11852' MD :: 7349.61' TVD

Design Report for Kunzman 3C-5HZ - 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)	359.49	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
224.00	810.00	MWD Surface Surveys	MWD+SC
943.00	7,674.00	MWD Vertical/Build Svys	MWD+SC
7,726.00	11,806.00	MWD Lateral Surveys	MWD+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
854.40	854.33	9 5/8" Casing Set @ 854.4' MD :: 854.33' TVD	9-5/8	13-1/2
7,654.70	7,355.82	7" Casing Set @ 7654.7' MD :: 7355.82' TVD	7	8-3/4

Design Targets

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

Directional Difficulty Index

Average Dogleg over Survey:	1.41 °/100usft	Maximum Dogleg over Survey:	16.29 °/100usft at 7,622.00 usft
Net Tortousity applicable to Plans:	0.65 °/100usft	Directional Difficulty Index:	6.115

Design Report for Kunzman 3C-5HZ - Actual Field Surveys

Audit Info

HALLIBURTON

North Reference Sheet for Sec. 8-T2N-R66W - Kunzman 3C-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 3C-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 -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99995810

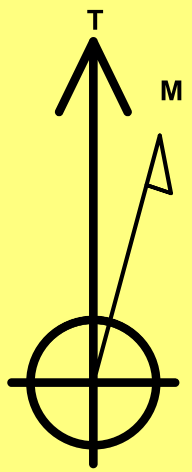
Grid Coordinates of Well: 1,301,807.69 usft N, 3,194,551.04 usft E

Geographical Coordinates of Well: 40° 09' 35.14" N, 104° 48' 14.10" W

Grid Convergence at Surface is: 0.45°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,852.00usft

the Bottom Hole Displacement is 4,732.55usft in the Direction of 359.51° (True).
Magnetic Convergence at surface is: -8.14° (29 September 2013, , BGGM2013)



Magnetic Model: BGGM2013
Date: 29-Sep-13
Declination: 8.59°
Inclination/Dip: 66.76°
Field Strength: 52687

Grid North is 0.45° East of True North (Grid Convergence)
Magnetic North is 8.59° East of True North (Magnetic Declination)
Magnetic North is 8.14° East of Grid North (Magnetic Convergence)

To convert a True Direction to a Grid Direction, Subtract 0.45°
To convert a Magnetic Direction to a True Direction, Add 8.59° East
To convert a Magnetic Direction to a Grid Direction, Add 8.14°